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A NEW SPECIES OF MELAMPSORIDIUM ON CARPINUS AND OSTRYA[1]

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Since the genus *Melampsoridium* was established by Klebahn in 1899, five species have been described throughout the world. Their telial hosts are betulaceous woody plants except that of *Melampsoridium inerme* Singh & Pandey. Kaneko and Hiratsuka (1981) classified four species on Betulaceae based primarily on the germ pore arrangement in the urediniospores. Furthermore, the authors (1982) suggested that the rusts that had been treated as *M. carpini* (Fuck.) Dietel could be separated into two morphological groups according to the position of germ pores and the presence or absence of a smooth area in the urediniospore apex. This paper describes one of these fungal groups on *Carpinus* spp. and *Ostrya japonica* found in Japan and China as a new, sixth *Melampsoridium* species.

Melampsoridium asiaticum Kaneko et Hiratsuka,f., sp. nov. (Figs. 1-5)

Spermogoniis et aeciis ignotis. Urediniis hypophyllis, subepidermalis, sparsis, 0.1-0.2 mm diam., flavis; peridio hemisphaerico, firmo, ex cellulis polygonalibus, 8-17 µm latis, membrana 1-2 µm crassa, levi, cellulis ostiolaribus acutato-productis, 18-35 µm longis; urediniosporis obovato-ellipsoideis vel subclavatis 17-30 × 10-15 µm, membrana 1.5-2 µm crassa, echinulatis, hyalina, cytoplasma flavida, poris germinationis 2-4, plerumque aequatorialibus. Teliis plerumque hypophyllis, subepidermalis, sparsis, minutus, 0.2-0.3 mm diam., brunneis; teliosporis oblongis vel oblongo-clavatis, utrimque rotundatis, 17-40 × 7-14 µm, membrana ca. 1 µm crassa, dilute flavida.

Spermogonia and aecia unknown. Uredinia hypophyllous, subepidermal, scattered on small yellow spots, 0.1-0.2 mm diam., yellow, dehiscent by central pore; peridia hemispherical, firm, peridial cells polygonal, 8-17 µm across, wall 1-2 µm thick, smooth, ostiolar cells long-pointed, 18-35 µm long; urediniospores obovate ellipsoid or subclavate, 17-30 × 10-15 µm, wall 1.5-2 µm thick, echinulate, colorless, cytoplasm yellow, germ pores 2-4, mostly equatorial. Telia mostly hypophyllous, subepidermal, scattered, minute, 0.2-0.3 mm diam., brown; teliospores arranged in a single layer,

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[1] Contribution from the Tottori Mycological Institute, No. 186.

oblong or oblong-clavate, rounded at both ends, 17-40 × 7-14 µm, wall uniformly thin, ca. 1 µm thick, smooth, pale yellow.

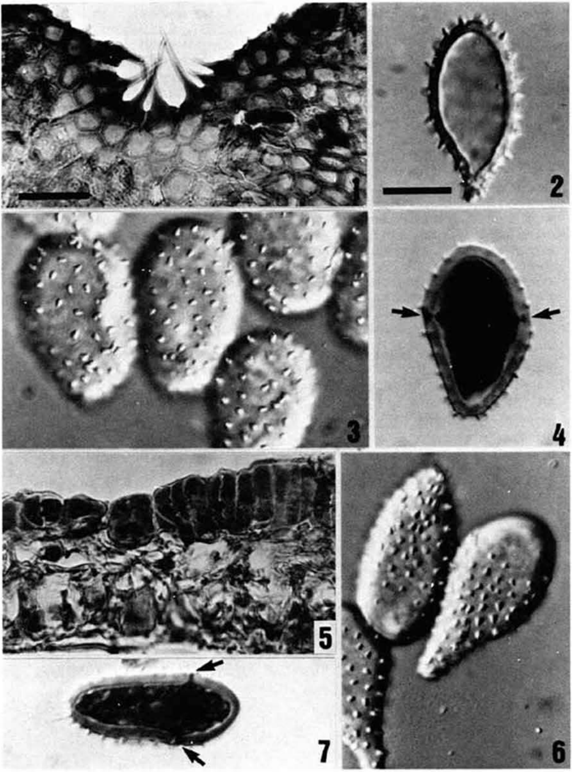
Types: on *Carpinus tshonoskii* Maxim. (*Inushide*). Mt. Senjyo-san, Saihaku-gun, Tottori, Japan, Nov. 6, 1941, N. Hiratsuka, holotype in the Hiratsuka Herbarium, Tokyo (HH 78184), isotype in the Tottori Mycol. Inst. (TMI 7277).
Distribution: China and Japan.

Other specimens examined: on *Carpinus tschonoskii* Maxim.: Japan: Sado Is., Niigata (K. Yoshino, HH 78104); Chofu-shi, Tokyo (N.Hiratsuka, HH 67048); Kintoki-yama, Kanagawa (H. Ishida, HH 78216); Ametaki, Tottori (S. Kaneko, HH 77799); Mt. Daisen, Tottori (N. Hiratsuka & S. Okubo, HH 60581 & 62836); Mt. Jyubo, Tottori (S. Kaneko, HH 78270); Mt. Osuzu, Miyazaki (S. Hirata, HH 78108); Kirishima, Kagoshima (N. Hiratsuka, HH 78109). on *Carpinus laxiflora* (Sieb. et Zucc.) Blume (*Akashide*): Japan: Mt. Hayachine, Iwate (G. Yamada, HH 78099); Mt. Daisen, Tottori (N. & T. Hiratsuka, HH 77970). on *Carpinus* sp.: China: Kweichow (S.Y. Cheo, No. 606, HH 55405). on *Ostrya japonica* Sarg. (*Asada*): Japan: Kiyokawa-mura, Oita (N. Hiratsuka, HH 78094); Mt. Katamuki, Oita (N. Hiratsuka, HH 78211).

Specimens examined of *Melampsoridium carpini* (Fuck.) Dietel on *Carpinus betulus* L. from Europe: U.S.S.R.: Caucasia (Nagorny, HH 55406). Austria: Salisburjia (Dorflen, IMI 12302); Kärnten (K. Rechinger, IMI 30168 & UPS); Baden (P. Magnus, UPS); Sterrkeaberg (P. Magnus, UPS); Steiermark (J. Baumgartner, UPS); (J. Baumpartaer, IMI 32939). Italy: Pedemontio (Cesati (Herb. E. Fries), UPS); (A. Guarinoni, IMI 3967 & 3968); (Rudolphi (Herb. E. Fries), UPS).

Dietel (1900) transferred *Melampsora carpini* Fuck. that was based upon a rust on *Carpinus betulus* found in Europe to the genus *Melampsoridium*. Since that time, *Melampsoridium carpini* on *Carpinus* spp. and on a few species of the closely related genus *Ostrya* has been recorded from Europe, North America, and Asia (Sydow and Sydow, 1915; Arthur, 1934; Hiratsuka, 1936, 1958; Gäumann, 1959; Azbukina, 1974; and others). The rust on *Ostrya virginiana* from the United States, however, was identified as *Melampsoridium betulinum* Kleb. by Kaneko and Hiratsuka (1981) based upon the arrangement of the urediniospore germ pores and urediniospore size.

Melampsoridium asiaticum resembles *M. carpini* in host relation, peridial characteristics of uredinia, and size of urediniospores, but it clearly differs from the latter in the following two respects in urediniospores. (1) The urediniospore surface of *M. asiaticum* is uniformly echinulate without a smooth area (Figs. 2, 3). However, the urediniospores of *M. carpini* on its type host, *Carpinus betulus* from Europe definitely have a smooth area at their apex (Fig. 6). Sydow and Sydow (1915) and Gäumann (1959) also have described the apical wall of *M. carpini* urediniospores as smooth. Being similar to the above case, some *Melampsora* species on poplars and willows are classified based on the presence or absence of a smooth area in urediniospore apex (Ito, 1938; Gäumann, 1959). (2) The urediniospore



Figs. 1-5. *Melampsoridium asiaticum* on *Carpinus tshonoskii* (holotype). 1. Peridium with long-pointed ostiolar cells. 2, 3. Uniformly echinulate urediniospores. 4. Urediniospore with equatorial germ pores (arrows). 5. Vertical section of telia. Figs. 6, 7. *Melampsoridium carpini* on *Carpinus betulus* from Europe. 6. Urediniospores with an apical smooth area (UPS). 7. Urediniospore with superequatorial germ pores (arrows)(UPS). (Scales in 1, 5 = 30 µm; in 2-4, 6, 7 = 10 µm).

germ pores of *M. asiaticum* are 2-4 in number, and mostly equatorial (Fig. 4) in contrast to 2-5 numbered, mostly superequatorial germ pores of *M. carpini* on *Carpinus betulus* (Fig. 7). Morphological comparisons of teliospores between *M. asiaticum* and *M. carpini* on *Carpinus betulus* have not been made because no telia were found in the latter specimens examined here. In the teliospores of the genus *Melampsoridium*, however, no specific characteristics have been recognized.

Our comparative study of the uredinial state on *Carpinus betulus* and three other *Carpinus* species, i.e., *C. cordata* from Japan, *C. kawakamii* from Formosa (Taiwan), and *C. orientalis* from Caucasus, U.S.S.R. shows that the rust on the three latter hosts is conspecific with *Melampsoridium carpini*. This confirms the work of previous investigators. Furthermore, the morphological comparisons suggest that *M. asiaticum* and *M. carpini* have a completely different host range from each other. Both rust species probably overwinter as the uredinial state.

ACKNOWLEDGEMENTS

We wish to thank Professor L. Holm of the Herbarium, Uppsala University, and Dr. B.C. Sutton of the Commonwealth Mycological Institute, for the loan of many herbarium specimens of *M. carpini* examined in this study; and Professor J.F. Hennen of the Purdue University for his review of the manuscript.

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STUDIES IN THE GENUS *PHOMA*. II. CONCERNING *PHOMA SORGHINA*.

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ABSTRACT

Phoma sorghina (Saccardo) Boerema, Dorenbosch and van Kesteren is described and illustrated from isolates obtained from dead and dying needles of newly-emerged seedlings of *Pinus elliotii* Engelm., seedlings in Texas, and as air contaminants of chicken hatcheries in Mississippi.

INTRODUCTION

A group of *Phoma* species, comprising seven taxa, including the recently described *Phoma americana* Morgan-Jones and White, is characterized by possession of phaeodictyochlamydospores. These structures vary considerably in morphology, ranging from a distinctly alternarioid form in *P. glomerata* (Corda) Wollenw. and Hochapf., and *P. jolyana* Pirozynski and Morgan-Jones, to a more irregularly-shaped, somewhat botryoid condition in *P. sorghina* (Sacc.) Boerema, Dorenbosch and van Kesteren. Those of *P. epicoccina* Punithalingam, Tulloch and Leach represent an *Epicoccum* state [identical with *Epicoccum purpurascens* Ehrenb.] while those of *P. chrysanthemicola* Hollós are usually aggregated to form pseudosclerotia. In five of the species, single-celled chlamydospores, similar to those of *P. eupyrena* Sacc., and *P. medicaginis* Malbr. and Roum., are frequently present also, as well as phaeodictyosporic entities.

Species of *Phoma* producing chlamydospores are sometimes difficult to differentiate, particularly because of variation in the morphology and origination [whether borne terminally, laterally or intercalarily on the hyphae] of these structures. A combination of cultural and morphological characteristics, to compensate for overlapping features, is required to make assured correct determination *in vitro*. The characteristics of a particular culture *in toto* have, ideally, to be linked to one or more key distinguishing features such as the presence of chlamydospores or peculiarities of pycnidial wall structure and organisation.

Phoma sorghina, a striking, ubiquitous, chlamydosporic species of cosmopolitan distribution, is an example of *Phoma* species possessing a number of easily recognizable and stable diagnostic characteristics, some of which are either not mentioned, or are inadequately documented in the literature. Acquisition of fresh isolates of this fungus in the southern

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United States, and opportunity to examine an isolate obtained from seed of rice at the Danish Government Institute of Seed Pathology for Developing Countries, has allowed us to conduct a definitive study of it.

A description of *P. sorghina*, under the name *Phoma indianensis* (Deshpande and Mantri) Boerema, Dorenbosch and van Kesteren [*Peyronellaea indianensis* Deshpande and Mantri], was published by Boerema et al. (1968) and the same authors (Boerema et al., 1971, 1973, 1977) subsequently added notes on its geographical distribution, host/substrate relationships, and extensive nomenclatural synonymies. The name *Phoma glumarum* Ellis and Tracy was adopted as the valid name for the fungus (Boerema et al., 1971), but the specific epithet *sorghina* was later adopted following determination of date priority (Boerema et al., 1973). In the latter publication the name *P. glumarum* was noted to have been misapplied, an examination of its type having showed it to belong to *Coniothyrium* Corda rather than *Phoma*. A brief description was provided by Punithalingam and Holliday (1972) [as *Phoma isidiosa* Tassi], but no mention was made by them of the presence of dictyochlamydospores.

MATERIALS AND METHODS

Axenically grown cultures were prepared from single-spore isolates as described previously (Morgan-Jones and White, 1983). Pycnidia for scanning electron micrography and for sectioning were prepared following the procedures outlined by Morgan-Jones and White (1983). Cultures have been deposited at the American Type Culture Collection.

TAXONOMIC PART

Phoma sorghina (Sacc.) Boerema, Dorenbosch and van Kesteren, Persoonia 7: 134, 1973 [Plates 1 and 2, figures 1 and 2].

≡ *Phyllosticta sorghina* Saccardo, Michelia 1: 140, 1878.

[For full synonymy see Boerema et al., 1971, 1973, 1977]

Colonies on potato dextrose agar (Plate 1, A) at first lanose, pale, whitish, becoming dense, floccose, gray-green to olivaceous, but with distinctly tufted areas maintaining a whitish or pale salmon-pink coloration and sometimes producing clear, reddish exudate droplets superficially (arrow, Plate 1, A), attaining a diameter of 40mm at 20C after 4 days, 62mm at 25C, 67mm at 30C, reverse becoming progressively reddish with production of diffusible pigment [most abundantly at 20C], and with brown patches underlying tufted portions; on malt extract agar (Plate 1, B) highly variable in appearance, at first lanose, whitish, rapidly becoming patchy with gray-green, dark olivaceous, and white or salmon-pink areas irregularly intermixed, some portions somewhat floccose, others distinctly felted, attaining a diameter of 33mm at 20C after 4 days, 48mm at 25C and 55mm at 30C, reverse brownish-black; on Czapek-Dox agar thinly felted, gray-green with white or salmon-pink areas, attaining a diameter of 27mm at 20C after 4 days, 39mm at 25C and 38mm at 30C, reverse brick red to orange brown. On PDA, MEA and CD mature pycnidia produced sparsely after 10 days, partly immersed in the agar. Colonies on cellulose agar extremely

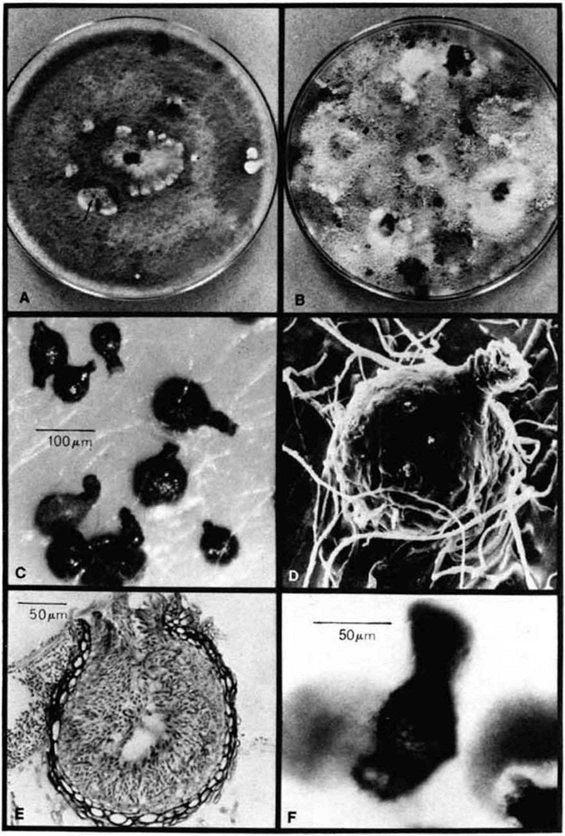

PLATE 1. *Phoma sorghina.* A, 2 week old colony on PDA; B, 2 week old colony on CD; C, pycnidia on cellulose agar; D, SEM of pycnidium; E, V.S. pycnidium; F, pycnidium showing large wall cells.

sparse but producing abundant pycnidia superficially after 4 days (Plate 1, C). Mycelium composed of septate, branched, subhyaline to pale-brown, smooth, 2.5 - 3.5µm wide hyphae, and tenuous, 0.5 - 1µm wide, subhyaline hyphae; broader hyphae sometimes aggregated into closely appressed strands, narrower hyphae occasionally convoluted. Pycnidia solitary, scattered or gregarious, occasionally touching but not confluent, subglobose to flask-shaped, usually with a distinct, straight or somewhat curved, up to 80µm long, 30 - 40µm wide neck (Plates 1, C,D; 2, A), with one or, rarely, two ostioles, mid brown to blackish-brown, on MEA and PDA completely covered by mycelium, on cellulose agar superficial and largely glabrous, 80 - 160 X 55 - 120µm. Occasionally aberrant, arrested, small, non-ostiolate, pycnidial elements, 10 - 23µm in diameter, are present, even in older cultures. Pycnidial wall pseudoparenchymatous, 8 - 16µm thick, composed of an outer layer of thick-walled, brown cells, some of which are characteristically inflated (Plate 2, B), more or less isodiametric or, more predominantly, somewhat elongate, and an inner layer of thinner-walled, subhyaline cells from which the conidiogenous cells arise; larger cells of outer layer 5 - 15 X 3 - 8µm in size. Short, periphyses-like elements present in the neck region. Conidiogenous cells monophialidic, hyaline, simple, smooth-walled, subglobose to ampulliform, 2.5 - 5µm in diameter. Conidia enteroblastic, hyaline or sometimes very pale brown, simple, nonguttulate or frequently biguttulate, ellipsoid, continuous, 4.5 - 6 X 2.5µm. Exuded conidial mass salmon in color. Chlamydospores highly variable (Plate 2, E-H, Figure 2), borne predominantly intercalarily, sometimes terminally as short lateral extensions, solitary or in short or longish chains, subglobose, ellipsoidal or irregular, uni-, bi-, or multicellular, when septate phragmosporous or dictyosporous, constricted at the septa and with individual peripheral cells frequently becoming strongly inflated, when terminal often assuming a highly characteristic botryoid configuration, with walls of varying thickness, individual cells sometimes appearing to have discrete walls laid down within the outer delimiting wall layer, smooth, verrucose or, rarely, tuberculate, subhyaline to brown, 8 - 35µm in diameter, when non-septate 5 - 15µm in diameter, produced abundantly on PDA, sparsely on MEA, CD and cellulose agar.

Ubiquitous; cosmopolitan.

Collections examined: isolated from seed of *Oryza sativa* L., Danish Government Institute of Seed Pathology for Developing Countries, Hellerup, Copenhagen, Denmark, 1969, A. Chantarasnit, AUA; isolated from diseased young needles of *Pinus elliotii* Englm., seedlings, Temple-Eastex Nursery. near Jasper, Texas, U.S.A., May 1981, W.D. Kelley, AUA; isolated as air contaminants of chicken hatcheries, Jackson, Mississippi, May 1982, Y. Vizzier, AUA.

ADDITIONAL NOTES

Phoma sorghina appears to ubiquitous particularly in the tropics and subtropics where it is most frequently associated with members of the Gramineae family, and is soil borne. When cultured *in vitro* higher temperatures [up to 30C] support the best growth on most agar media.

A possibility exists that it is implicated as at least a weak pathogen of pine seedlings in Texas since it is consistently associated with

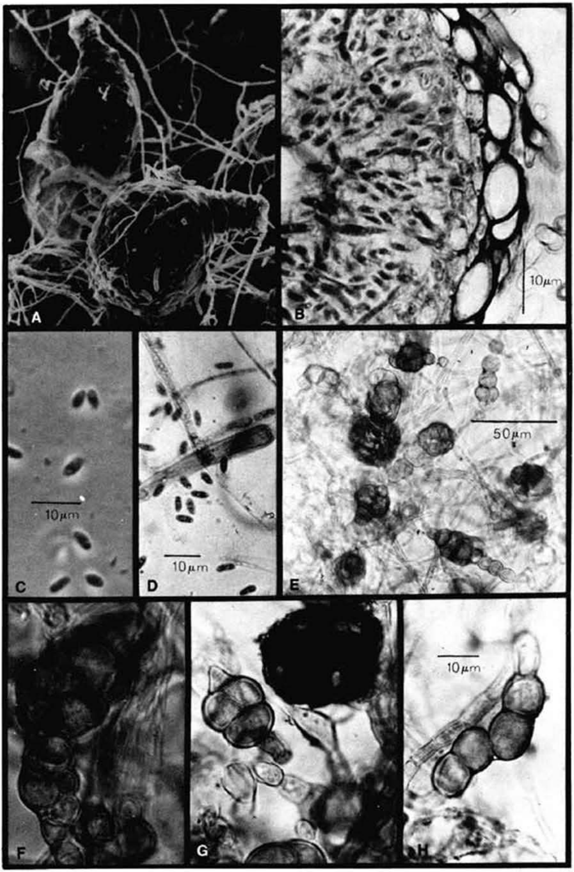

PLATE 2. *Phoma sorghina*. A, SEM of pycnidia; B, pycnidial wall; C, D, conidia; E-H, chlamydospores.

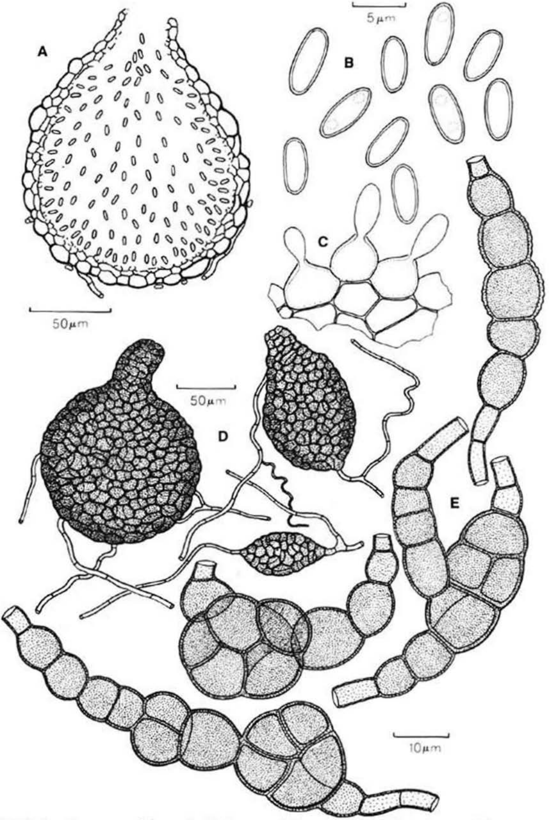

FIGURE 1. *Phoma sorghina.* A, V.S. pycnidium; B, conidia; C, conidiogenous cells; D, pycnidia (including aberrant forms); E, chlamydospores.

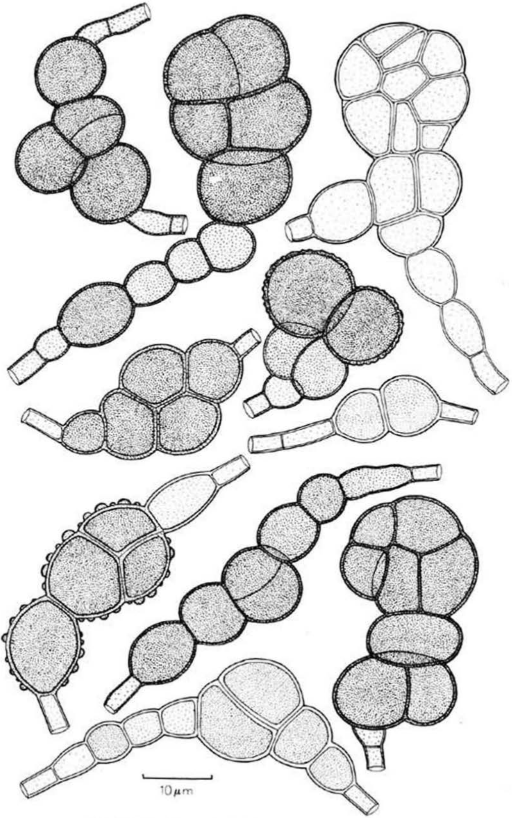

FIGURE 2. *Phoma sorghina*. Chlamydospores.

dead and dying needles of newly emerged seedlings of *Pinus elliotii* (W.D. Kelley, personal communication). In this connection it is interesting to note that it has previously been isolated from a *Pinus* stem and from roots of a conifer in Madagascar (Boerema et al., 1968).

A number of stable characteristics are diagnostic for this species. The mottled colony appearance, especially on MEA, where white to pale salmon-pink patches are evident, together with reddish diffusible pigment as superficial droplets, and as coloration of the medium, are highly distinguishing. The presence of a number of distinctly inflated cells in the outer layer of the pycnidial wall [these are frequently discernible without sectioning (Plate 1, F), and of botryoid chlamydospores, whose individual cellular elements often appear endogenously discrete (Plate 2, F), are additional unique features.

Pycnidia of *P. sorghina* generally have longish necks but there is some variation in this regard, papillate pycnidia predominating in some isolates.

An assumption has been made that *P. sorghina* represents the anamorph of *Mycosphaerella holci* Tehon (Tarr, 1962; Anahosur and Sivanesan, 1978) probably because Tehon (1937) noted in his description of *M. holci* that *Phyllosticta* pycnidia were frequently present intermixed with perithecia in the material examined. No cultural studies *in vitro*, have, however, been conducted to confirm this supposed teleomorph/anamorph connection.

ACKNOWLEDGMENTS

We thank Dr. Gerhard H. Boerema, Plantenziektenkundige Dienst, Wageningen, The Netherlands, for the culture originating in Denmark and Dr. W.D. Kelley and Ms. Y. Vizzier for the isolates from *Pinus elliotii* and chicken hatcheries respectively. The manuscript was reviewed by Dr. Carol A. Shearer, Department of Botany, University of Illinois at Urbana-Champaign.

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NOTES ON HYPHOMYCETES. XLV.
NEOPERICONIA, A NEW PHAEODICTYOSPOROUS GENUS FROM INDIA

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ABSTRACT

Neopericonia indica Kamal, Rai and Morgan-Jones, a new genus and species, is described and illustrated from a collection made on living leaves of *Pterocarpus marsupium* Roxb., in Uttar Pradesh, India.

INTRODUCTION

A number of foliicolous hyphomycetes, collected on living leaves of a variety of host plants, in Uttar Pradesh, India, have, upon examination, been determined to be undescribed. In the present paper a phaeodictyosporous entity, possessing conidiophores similar to those of some species of *Periconia* Tode, and *Periconiella* Saccardo, is described as a new genus.

TAXONOMIC PART

Neopericonia gen. nov.

Deuteromycotina, Hyphomycetes, Dematiaceae.

[Etym. Gr. *neos*, new, et *Periconia*]

Coloniae effusae, fuscae vel atrae, breviter pilosae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis vel brunneis, laevibus compositum. Conidiophora macronemata, ex mycelio singulatim vel in caespitulos pusillos oriunda, erecta, recta vel interdum leviter curvata, laevia, parietibus crassis, septata, brunnea, apicem versus ramosa. Cellae conidiogenae mono vel polyblasticae, terminales vel laterales, discretae, cylindricae. Conidia solitaria vel breviter catenata, sicca, ellipsoidea vel sub-

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sphaerica vel late oblonga, brunnea vel atrobrunnea, cruciatim septata, parietibus crassis, verrucosa, ex apice successive maturitates.

Species typica: *Neopericonia indica* Kamal, Rai and Morgan-Jones.

Colonies effuse, brown to black, shortly hairy. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth-walled hyphae. Conidiophores macronematous, arising singly or in small groups from the mycelium, erect, straight or sometimes slightly curved, smooth, thick-walled, septate, brown, branched towards the apex. Conidiogenous cells mono or polyphialidic, terminal or lateral, discrete, cylindrical. Conidia solitary or in short chains, dry, ellipsoid or subspherical or broadly oblong, brown or dark brown, cruciately septate, thick-walled, verrucose, maturing in bastipetal succession.

Neopericonia indica sp. nov. (Plate 1; Figure 1).

Maculae hypogenae. Coloniae hypophyllae, effusae, fuscae vel atrae, breviter pilosae, interdum sparsae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis vel brunneis, laevibus, 2 - 3.5μm crassis compositum. Hyphae ex cellulis inflatis saepe compositae. Stromata rudimentale, ex cellulis pallide brunneis vel brunneis, usque ad 13μm crassa composita. Conidiophora macronemata, ex mycelio singulatim vel in caespitulos pusillos oriunda, erecta, recta vel interdum leviter curvata, laevia, parietibus crassis, septata, brunnea, apicem versus ramosa, sursum pallidiora, usque ad 290μm longa, 7 - 8μm crassa, basim versus 10μm crassa. Cellae conidiogenae mono vel polyblasticae, terminales vel laterales, discretae, cylindricae, aliquantum clavatae, 9 - 13 X 4 - 6μm. Conidia solitaria vel breviter catenata, sicca, ellipsoidea vel subsphaerica vel late oblonga, brunnea vel atrobrunnea, cruciatim septata, parietibus crassis, verrucosa, ex apice successive maturitates, 12 - 14 X 10 - 11μm.

In foliis vivis Pterocarpi marsupii, Sohelwa, East Bahraich Forest Division, Uttar Pradesh, India, January 1981, A.N. Rai, AUA, holotypus.

Spots hypogenous. Colonies hypophyllous, effuse, brown to black, short hairy, sometimes sparse. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth or very rarely minutely verruculose, 2 - 3.5μm wide hyphae. Some hyphal cells, both terminal and intercalary, very occasionally inflated and sometimes having a somewhat saccate appearance. Rudimentary stromata composed of a few pale brown to brown, up to 13μm wide cells, frequently present adjacent to conidiophores. Conidiophores macronematous, arising singly or in small groups from the mycelium, erect, straight or sometimes slightly curved, smooth, thick-walled, septate, brown, usually branched towards the apex, paler distally, up to 290μm long, 7 - 8μm wide, up to 10μm wide at the base, which can be somewhat bulbous in shape. Conidiogenous cells mono or polyblastic, terminal or lateral on the main stipe or on a lateral branch, discrete, cylindrical or somewhat clavate, 9 - 13 X 4 - 6μm. Conidia solitary or in short chains, dry, ellipsoidal or subsphaerical or broadly oblong, brown to dark brown, mostly cruciately septate, occasionally with one or more additional oblique septa, frequently very slightly constricted at the septa, thick-walled, verrucose, maturing in basipetal succession, 12 - 14 X 10 - 11μ.

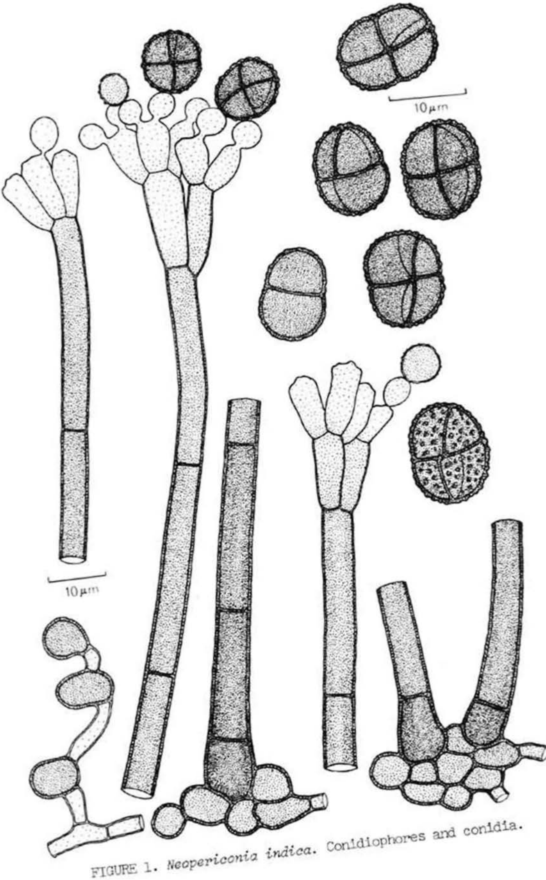

FIGURE 1. *Neopericonia indica*. Conidiophores and conidia.

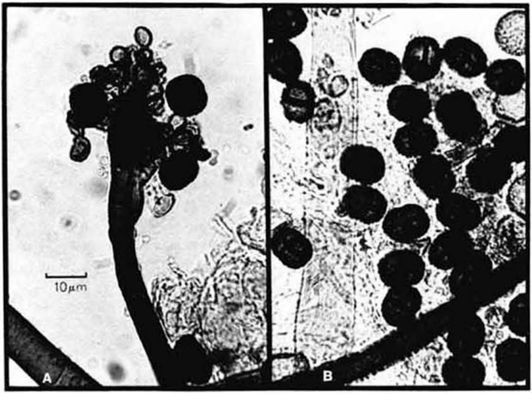

PLATE 1. *Neopericonia indica.* A, Conidiophores; B, conidia.

On leaves of *Pterocarpus marsupium* Roxb.; India.

Collection examined: on *P. marsupium*, Sohlewa, East Bahraich Forest Division, Uttar Pradesh, India, January 1981, A.N. Rai, AUA, IMI 259291, GPU (KR 522), type.

The genus *Neopericonia* bears similarity to *Mystrosporiella* Munjal and Kulshrestha, *Periconia* and *Periconiella.* Its conidiophores resemble those of some species of *Periconia*, such as *P. digitata* (Cooke) Sacc., and *P. venezuelana* M.B. Ellis, as does the basipetal maturation sequence. Conidium septation precludes its inclusion in that genus, however. Its conidiophores are also broadly similar to those of *Periconiella.* In that genus, however, the conidiogenous cells are long cylindrical, heavily and prominently cicatrized with the scars easily discernible and, where catenate conidia are present, their maturation is acropetal. *Mystrosporiella* shares a phaeodictyosporic conidium condition with *Neopericonia* and, again, a resemblance in conidiophore morphology. In that genus the conidia are invariably solitary and the conidiogenous cells are cicatrized and extendedly sympodial.

Colonies of *Periconia byssoides* Pers., are associated and intermixed with those of *N. indica* in the collection described above.

ACKNOWLEDGMENTS

We thank Mr. James F. White for assistance with the photography. The manuscript was reviewed by Dr. J. Leland Crane.

MYCOTAXON

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APORPIUM - AN EXAMPLE OF HORIZONTAL GENE TRANSFER?

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In a recent study of the genus *Aporpium* and additional polyporoid fungi (Setliff and Ryvarden, 1982), an interesting collection (Dumont PA-84, N.Y.) was described as being a *Poria* inhabited by the tremellaceous mycoparasite *Basidiodendron eyrei* (Wakef.) Luck-Allen. When first examined in 1977, this collection was believed to be an undescribed species of *Aporpium* with a trimitic hyphal system and gloeocystidia. It was not until the discovery in 1979 of a basidiocarp of *Tyromyces lacteus* (Fr.) Murr. infested with *Tremella polyporina* Reid (Setliff, 1982), that PA-84 was re-evaluated from the standpoint that the basidiocarp actually represented two intimately associated fungi. Likewise, Reid (1970) observed the replacement of the hymenium of *Tyromyces lacteus* by *Tremella polyporina*. In these instances, there seemed to be little doubt that these tremellaceous fungi were using polypores as substrates for fruiting and spore dispersal. These discoveries have raised doubts, many of which have not yet been resolved, about other *Aporpium* species that have been described (Setliff and Ryvarden, 1982), as well as other tremellaceous polypores (Bandoni *et al.*, 1982; Setliff and Ryvarden, 1982). For this reason, basidiocarps (DAOM 17774, 31251, and 31252) that were grown from presumably pure cultures of *Aporpium caryae* (Schw.) Teix. et Rog. (Macrae, 1955) were re-examined. Macrae's observations were confirmed in that the basidia were cruciately septate but the basidiocarps otherwise resembled in many respects a typical resupinate polypore or *Poria*. The taxonomic solution up to now was to place *A. caryae* into the Heterobasidiomycetidae (Teixiera and Rogers, 1955) or more recently, the Phragmobasidiomycetidae (McNabb, 1973; Pegler, 1973), a subclass that includes the Tremellales, Auriculariales, and Septobasidiales. However, Pilát (1971) believed that the cruciately septate basidia in *A. caryae* represented an example of parallel evolution and so he maintained the fungus in the Polyporaceae.

Quite clearly then, if the earlier observations (Macrae, 1955; Teixiera and Rogers, 1955) concerning *A. caryae* were correct, this fungus possesses the characteristics of two subclasses. Rather than place the fungus in either subclass, a third alternative is to recognize *A. caryae* for what it is, i.e., an unusual organism that expresses the characteristics of two divergent subclasses. This suggestion is made because of the intriguing possibility that mycoparasitism, such as reported for *Tremella polyporina,* or bacterial vectors (plasmids) between intimately associated fungi, and/or other pathogen-suscept interactions may provide mechanisms for some degree of genetic exchange between different taxonomic groups. Interestingly, the concept of so-called "horizontal transfer" of genes, i.e., the transfer of genes in all directions among organisms is becoming newsworthy (Lewin, 1982). The theoretical concept that exchanges of genetic factors at this macromolecular level (molecular ecology) have occurred in the course of fungal evolution should be more seriously considered. Such events, even if they occurred rarely, would obfuscate to some extent a natural phylogenetic scheme. Thus a "natural" classification of the Aphyllophorales would simply be based on the characters being used at any given time and the weight (subjective) given to them. These characters often reflect the methods and level of technology being used in gathering information and the bias of the worker. Thus, as more knowledge is gained, and more characters assessed, the confusion about what constitutes a given taxonomic group increases. Demarcations as clear cut as those found in higher plants and animals may not really exist. Certainly there is enough apparent relationship to allow many fungal species to be successfully grouped into natural genera. However, the possibilities of genetic exchange between unlike organisms (as one mechanism in fungal evolution) should temper the present tendency for the erection of new taxa and evolutionary concepts with little understanding of the overall biology of the fungi in question and the dynamics of nature. In fact, the natural phylogeny of the polypores in particular have confounded mycologists even to the present day. In the future, a fungal classification based on a broader biological understanding will be of great interest.

I should like to thank my colleagues and friends near and afar for their helpful suggestions during the course of this exercise.

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NANNIZZIA COOKIELLA, A NEW SPECIES OF DERMATOPHYTE

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SUMMARY

Description and mating behaviour of *Nannizzia cookiella* sp. nov. with a *Microsporum* anamorphic state, isolated from soil in the Ivory Coast.

Using our modified hair-baiting technique (1,2) we isolated a new Dermatophyte from soil samples collected in Ivory Coast.

The colony on Sabouraud agar is very similar to that of *Microsporum cookei* Ajello 1959. However the macroconidia are much smaller, hence the name *cookiella*. Sexual reproduction was readily obtained and the fungus proved to be a new heterothallic *Nannizzia* sp.

MATERIAL and METHODS

Strains : RV.47031 isolated from a soil sample collected under a fallen *Rhigiocarya racemifera* (Menispermaceae), and strain RV.47032 from a soil sample collected in a hollow of *Coula edulis* (Olaceae), both in the Banco forest near Abidjan (Ivory Coast) in January 1981.

Culture media: -Sabouraud 2% glucose agar was used for the morphological studies of the conidial state.
- 'Sabouraud 1/10 + salts' agar was used for the maintenance of the strains (3).

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- 'Niger (*Guizotia abyssinica*) + salts' agar was used to induce cleistothecial production by inoculating two strains 1 cm. apart one from another, in the center of the Petri dishes (4).

DESCRIPTION : *Nannizzia cookiella* sp. nov.

Fungus heterothallicus.

Cleistothecia globosa, pallido-bubalina ad lutea, 400-800 um diam. Hyphae peridii pallido-bubalinae, verruculosae, septatae, semel vel aliquoties ramosae. Rami distales recti vel geniculati. Cellulae peridii 10-20 x 2-5 um, asperulatae, appendiculis praeditae. Appendiculi aut graciles, laeves, 64-400 x 2 um, aut in spiram 10-14 um diam., 8-22 orbitus convoluti.

Asci subglobosi, 4-6 x 4 um, tenuitunicati, octospori, evanidi. Ascosporae luteae, laevitunicatae, lenticulares, 2 x 3 um.

Macroconidia numerosa, oviformia, brevia, 18-34 x 17 um, plerumque quadricellularia, crasso-(2-4 um) tunicata, dense verrucosa, verruculis aliquando digitiformibus. Microc

Microconidia numerosa, piriformia, aliquando elongata , 2-8 x 1-2 um.

Cultura in agaro Sabouraud ad 20°C praecox. Colonia pulverea,ochracea; in parte exteriore lanuginosa et alba. Pars lanuginosa violacea post 7 dies. In parte aversa rubro-fusca, in margine luce transmissa violacea. Pigmentum diffusum non adest. Ad 37°C non crescit.

Heterothallic.

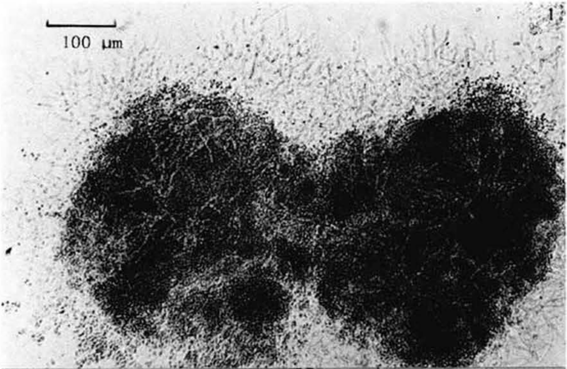
Cleistothecia globose, pale-buff to yellow, 0.4-0.8 mm in diam. Peridial hyphae pale-buff, verrucose, septate, dividing in two or more branches. Distal branches straight or curved in "running legs". Peridial cells 10-20 x 2-5 um, asperulate, with appendages. Appendages either slender, smooth-walled, 64-400 x 2 um, or as 10-14 um wide spirals with 8-22 turns.

Asci subglobose, 4-6 x 4 um, 8-spored, evanescent. Ascospores golden-yellow in mass, smooth-walled, 2-3 um.

Macroconidia numerous, oval-shaped, dumpy, 18-34 x 17 um, predominantly 4-celled, thick-walled, 2-4 um, very densely verruculose, the 'warts' resembling sometimes 'pseudopodes'.

Microconidia numerous, piriform, sometimes very elongate, 1-2 x 2-8 um.

On Sabouraud 2% glucose agar, colonies rapidly growing. Aerial mycelium, ochraceous powdery, at the margin white



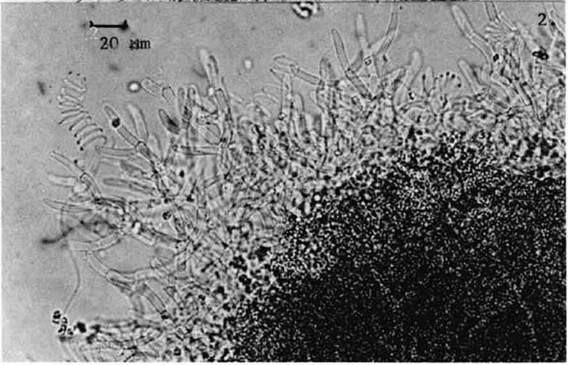


Fig.1. Cleistotheica.
Fig.2. Peridium.

and fluffy; the down becomes violet after 7 days. Reverse brownish-purple with a non diffusing pigment and a violet border by transparency. There is no growth at 37°C. Inoculation on the scarified skin of guinea-pigs is negative.
Habitat in soil of Ivory Coast. Keratinophilic.

Type: dessicated culture on 'Niger + salts' agar of the confrontation between SA8 *mt-* and SA9 *mt+* deposited at the Centraalbureau voor Schimmelcultures, Baarn. Living mating strains of the type, SA8 *mt-*(RV.48782) and SA9 *mt+*(RV.48783) deposited in the Laboratory of Mycology,Institute of Tropical Medicine, Antwerp and at the Centraalbureau voor Schimmelcultures, Baarn (SA8=CBS.101.83 and SA9=CBS.102.83).

MATING BEHAVIOR

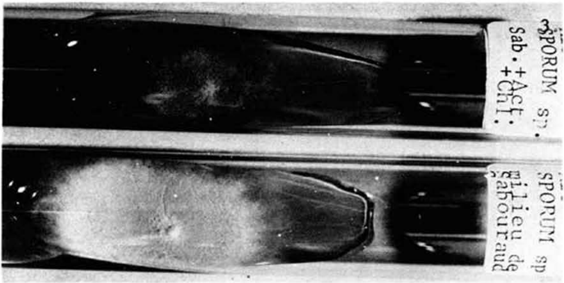
One isolate, strain RV.47301, was self-fertile(heterokaryon) and six single ascospore strains (SA1,2,...,6) were isolated from a cleistothecium produced in its subculture on 'Sabouraud 1/10 + salts' agar. Their mating type was determined using *Arthroderma simii mt+* and *mt-* as tester strains.

Three strains were of the "-" mating type (SA1,SA2 and SA6) and the others of the "+" mating type. When cultured singly they produced no cleistothecium. Confrontations between strains of the opposite mating type produced numerous cleistothecia. This indicates the heterothallism of this species.

From a fertile mating SA2 *mt-* x SA5 *mt+*, five single ascospore F2 strains were obtained : SA7 and SA8 of *mt-*, and SA9, SA10 and SA11 of *mt+*. The crossings between those F2 strains and their parent strains gave the following results: only two strains (SA8 and SA9) produced an abundant number of cleistothecia; the three others being weak reactors. As can be seen from table I, the same results were obtained in F2 x F2 crosses. We therefore chose SA8 *mt-*(RV.48782) and SA9 *mt+*(RV.48783) as the mating strains of the type.

ACKNOWLEDGEMENTS

We thank Pr.R.Vanbreuseghem for providing the soil samples. We would also like to thank sincerely Dr.M. Takashio who taught us the techniques of micromanipulation and Pr.Ch.De Vroey, for their advice.



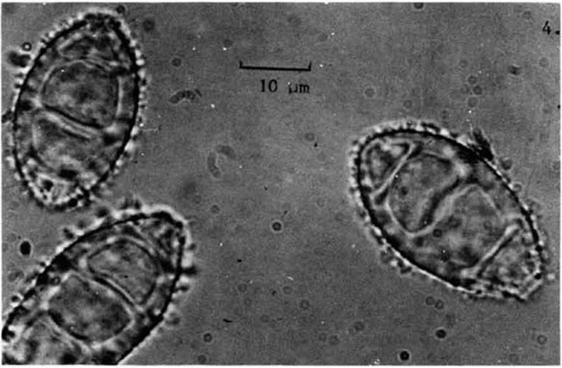


Fig.3. Cultures on 'Sabouraud + actidione + chloramphenicol' and Sabouraud.

Fig.4. Macroconidia.

	SA9 *mt+*	SA10 *mt+*	SA11 *mt+*
SA7 *mt-*	+/+++	+/+	+/+
SA8 *mt-*	+++/+++	+++/+	+++/+

Left side of / indicates the production of cleistothecia on the side of the strains SA7 and SA8; right side of / indicates that on the side of strains SA9,SA10 and SA11.
+ : production of cleistothecia.
+++: production of a large number of cleistothecia.

TABLE I. RESULTS OF CROSSINGS BETWEEN TWO F2 *mt-* AND THREE F2 *mt+* STRAINS.

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STUDIES IN THE LICHEN GENUS PSOROMA*
2. PSOROMA FRUTICULOSUM AND PSOROMA RUBROMARGINATUM

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SUMMARY

Psoroma fruticulosum P.James et A.Henssen, and P.rubromarginatum P.James et J.Murray, are described for the first time. Both new species are pioneer lichens occurring on subalpine to alpine soils, glacial moraines or among mosses in the Southern Hemisphere. P.fruticulosum is characterized by upright lobes with digitate margins, and a well-developed, strongly gelatinized upper cortex; P.rubromarginatum by adnate lobes or squamules, a poorly developed upper cortex and a reddish-ochre flushing of the surface of the lobes and margins of the apothecia. P.rubromarginatum contains pannaric acid and tenuin (porphyrilic acid methyl ester) while P.fruticulosum contains no lichen substances of taxonomic importance. Habitat notes and distribution maps are appended.

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* Part 1. Mycotaxon 13: 433-449 (1981).

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INTRODUCTION

This paper records two new Southern Hemisphere species of Psoroma. Both were found simultaneously during 1959 by the late J.Murray in New Zealand, and by P.W.James during the Shipton Expedition to Patagonia. When the two collectors met in London in 1960 they decided to describe the two species jointly. The range of P.fruticulosum was extended by its discovery in Tierra del Fuego by A.Henssen and G.Vobis in 1973 and additional collections of both species in New Zealand were made by D.J.Galloway.

The name fruticulosum was chosen to describe the characteristic subfruticose growth form of P.fruticulosum, while the epithet rubromarginatum draws attention to the diagnostic reddish-ochre flushing of the apothecial and lobe margin. A description, habitat notes and distribution is given for both species.

MATERIAL AND METHODS

MATERIAL. Specimens were examined from the following herbaria: BA, BM, CHR, MB, MEL, OTA.

MORPHOLOGY. Samples were sectioned with a freezing microtome and the sections mounted in lactophenol cotton-blue (LPCB). Measurements of spores and anatomical structures were made from permanent preparations; measurements of gross morphology from air-dried specimens. For details of ascus structure, KI_3 solution was added directly to squash preparations. Micrographs were taken with a dissecting microscope M 7 of the Fa. Wild, or with the Wild M 20 compound microscope.

CHEMISTRY. Crude aceton extracts were chromatographed in solvent system A, B. C of Culberson (1972) and D, E of Renner (1980). Mass spectrometry and UV/VIS spectroscopy were used for the identification of the lichen substances; details are given in Renner et al. (1981).

TAXONOMIC PART

Psoroma fruticulosum P.James et Henssen, sp. nov. *Figs. 1-5.*

DIAGNOSIS. Thallus squamulosus, usque ad 7(-10)cm latus, pallidus, olivaceus vel ligno-brunneus. Lobi plus minusve erecti, 1.4-1.8(-3.5)mm longi et 0.4-1.2(-1.6)mm lati margine digitato. Thallus (100-)250-480μm altus, corticatus; cortex superior fortiter gelatinosus, 50-120(-150)μm altus, cortex inferior (10-)35-50μm altus deinde nigricans. Alga unicellularis, ad Chlorococcales pertinens. Cephalodia maximam partem laminalia, squamulosa, pallida, corticata, alga ad *Nostoc* pertinens.

Apothecia usque ad 3-8(-15)mm lata, disco urceolato vel deinde plano, atrofusco, margo thallinus crenulatus, 0.2-0.4mm crassus. Hymenium (90-)120-150μm altum, asci cylindrici vel obclavati, 85-120 x 17-23μm, 8-(6-)spori, apice incrassato et amyloideo. Sporae simplices, incolores, polymorphae, ellipsoideae vel ovoideae, 15.5-20(-25) x (6-)8-10(-12)μm, superficie verruculosa. Pycnidia usque ad 0.4mm lata, conidiophora brevicellularia, conidia terminalia et lateralia formantia. Conidia bacilliformia, circiter (2.5-)3-4 x 1μm.

Chemistry: no lichen substances of taxonomic value detectable.

Holotype: Argentina, Patagonia, Lago Argentino, Cerro Mayo, foot of Ventisquero Mayo, on sandy soil, 1959, *James 81* (BM). Paratype: Argentina, Tierro del Fuego, Ushuaia, foot of Monte Olivia, 1973, *Henssen & Vobis 24373a* (MB).

FURTHER SPECIMENS EXAMINED. ARGENTINA: Patagonia, Prov.Santa Cruz, Lago Argentino, Cerro Mayo, 1959, *James 1470* and *5060* (BM). Tierra del Fuego, Monte Olivia, 1973, *Henssen & Vobis 24472d* (MB).- AUSTRALIA: Victoria, Baw Baws, 1973, *Ashton*, and 1979 *Fuhrer* (MEL); Great Dividing Range, Lake Mountain, 1973, *Filson 14579* (MEL). - NEW ZEALAND: Wellington, Tararua Range, Harris Creek, 1969, *King* (CHR). Nelson, St Arnaud Range, 1977, *Galloway* (CHR); Lake Rotoroa, 1977, *Galloway* (CHR). Canterbury, Nina Valley, near Lewis Pass, 1979, *Galloway* (CHR); Arthurs Pass, 1964, *Wetmore* (BM), Upper Godley Valley, 1958, *Scott* (OTA); Glen Lyon Station, 1958, *Mason 140* (OTA); Mt Peel, 1972, *Galloway* (CHR); Four Peaks Range, 1978, *Galloway* (CHR). Otago, Mt Maungatua, 1961, *Murray 3790* (OTA); Swampy Hill, 1958, *Murray 3568* (BM, OTA); Flagstaff Hill, 1958, *Murray 1613* (OTA); Silver Peaks, Pulpit Rock, 1959, *Murray 4235* (CHR); Matukituki Valley, 1957, *Smith* (OTA),

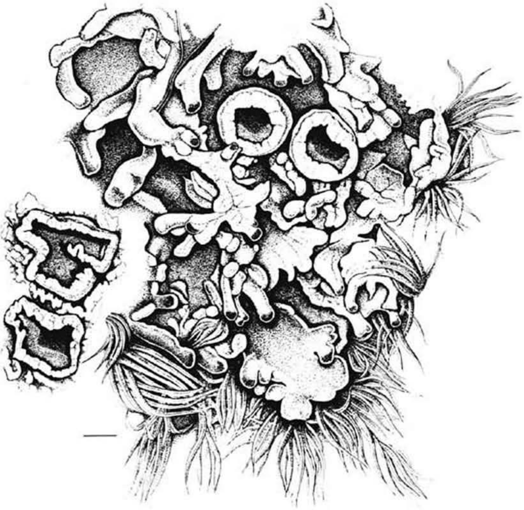

Fig. 1. *Psoroma fruticulosum* (paratype), two large apothecia with part of thallus. Scale = 1mm; drawn by H.Becker.

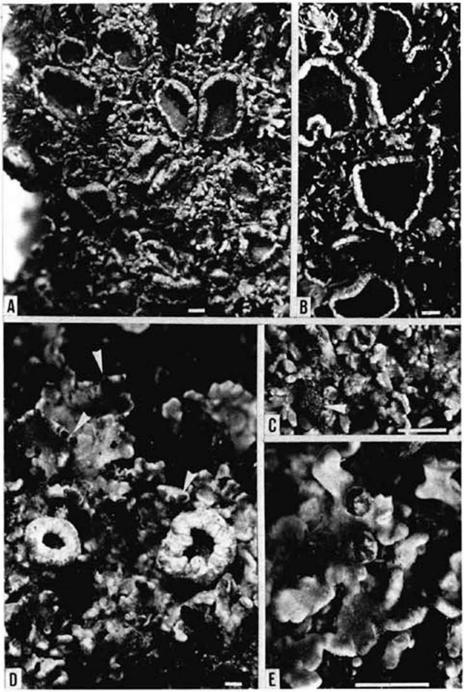

Fig. 2. Habit photographs of Psoroma fruticulosum (A, holotype, B-E, paratype). A, densely aggregated lobes and apothecia. B, large apothecium between ascending lobes. C, large cephalodium (arrow) between lobes. D, two young apothecia and marginal, black pycnidia (indicated by arrow). E, two pycnidia at higher magnification, the upper one opening by a slit. A-E, scale = 1mm.

1958, Bishop (OTA),and 1967, 1969 Galloway (CHR); French Ridge, 1967, Galloway (CHR), Rockborn Gorge, 1968, Galloway (CHR), Dredgeburn Valley, 1971, Galloway (CHR), Forgotton River, 1971, Galloway (CHR), Remarkables near Lake Alta, 1968, Galloway (CHR), Southland, Homer, 1967, Galloway (CHR); Lake Thomson near Lake Te Anau, 1962, James (BM); Resolution Island, Dusky Sound, Mt Hodges, 1962, Galloway (CHR), Mt Clerke, 1969, Galloway (CHR); Stewart Island, Mt Anglem, 1966 Galloway (CHR), Mt Allen, 1969, Galloway (CHR); Campbell Island, Ray 5500 (BM, OTA).

Thallus terricolous or muscicolous, 2-5(-10)cm diam., pale olivaceous-fawn to pale brown, or tawny to red-brown, composed of small squamules often dispersed or in clusters or rosettes and sometimes coalescing to form swards and cushions, prothallus not apparent. Squamules ascending or totally erect, subelongate, 4-6mm long,0.5-3mm wide and 0.25-0.45mm thick, markedly small-lobulate, lobules to 3mm long and 0.1-1.3mm wide, flattened-palmate to terete-nodular (Figs. 1, 2). Upper surface becoming coarsely scabrid-areolate in older basal parts of squamlules. Lower surface directly attached to substrate, pale or straw-coloured, becoming blackish at the point of attachment.

Squamules varying in thickness, thallus in sections 210-480µm thick. Upper cortex 50-120(-150) µm thick, upper edge uneven (Fig. 3B) corresponding to scabrid surface of squamules, composed of conglutinated, thick-walled cells with mainly roundish lumina 9-12(-18)µm wide (Fig. 3A),structure resembling a collenchyma. Medulla 150-300µm thick including an algal zone of 90-120(-150)µm thickness; medullary hyphae horizontally aligned and closely interwoven, 5-7µm wide, in part aggregated at the lower surface to form a cortex 35-60µm thick and finally dark-brown, especially near substrate. Phycobiont green,non-filamentous, cells (7-)10-16(-18)µm diam.

Cephalodia to 4mm diam., variable in shape and colour, from small,irregular, dark-brown laminal or marginal nodular excrescences to flattened, pale, more or less white pruinose squamules with dark-blue margins. Hyphae forming a uniform network throughout cephalodium around clusters of Nostoc-cells and forming a thin cortex at the surface in a periclinal arrangement of cells. In the upper cortex the hyphal walls become gelati-

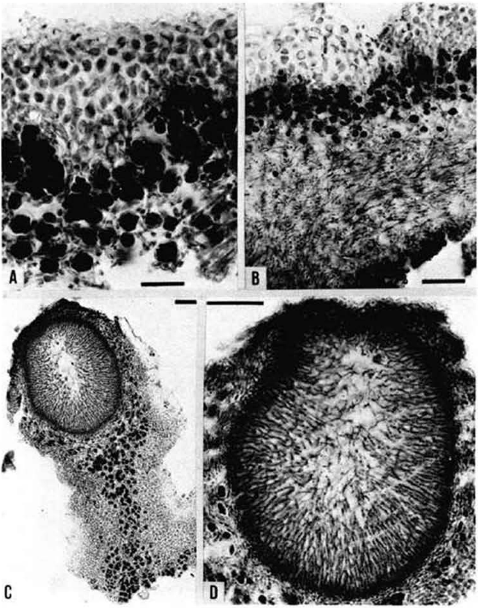

Fig. 3. Anatomy of Psoroma fruticulosum (microtome sections), A, C, D, holotype, B, paratype). A, t.s. of young lobe. B, t.s. of old thallus, upper cortex with fissures. C, stalked pycnidium. D, pycnidium at higher magnification. A, scale = 20µm, B-D, scale = 50µm.

nised while remaining thin-walled in the lower cortex (Fig. 4A). Cells of Nostoc, 8-9µm in diam., round or slightly ovoid.

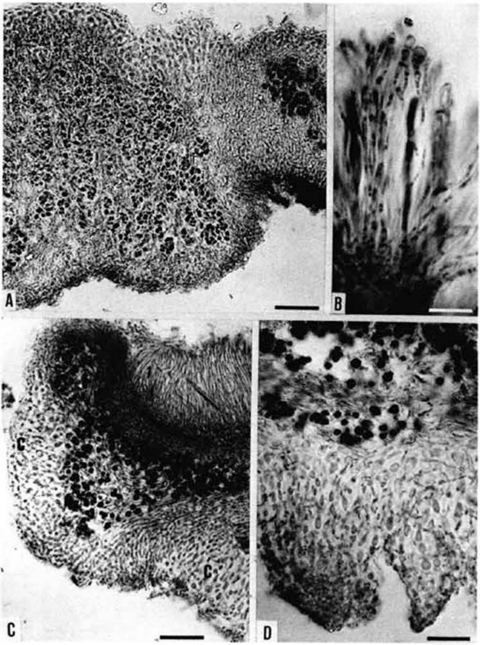

Fig. 4. Anatomy of Psoroma fruticulosum (microtome sections, A, C, paratype, B, D, holotype). A, t.s. of cephalodium and adjacent thallus. B, ascus and paraphyses. C, marginal part of apothecium, margo thallinus with well-developed cortex. D, part of basal cortex of margo thallinus. A, C, D, scale = 50µm, B, scale = 20µm.

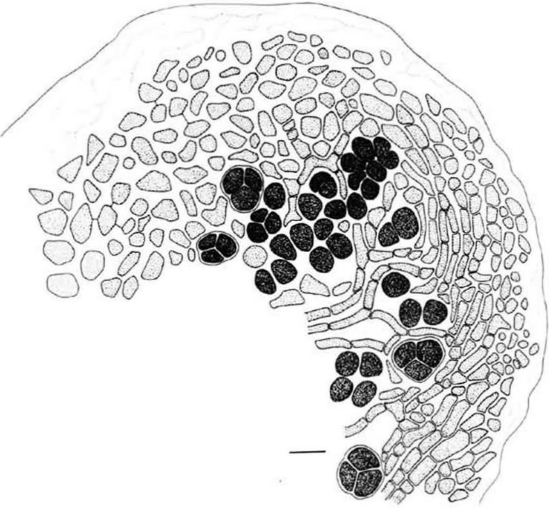

Fig. 5. Psoroma fruticulosum (Filson no.4579), t.s. of lobe tip. Scale = 10µm.

Apothecia laminal, scattered or contiguous, conspicuous, to 8mm diam., finally irregular in shape (Figs. 1, 2A,B). Disc urceolate to concave, dark red-brown to brown-black. Thalline margin well-developed, persistent, crenulate, concolorous with thallus, outer surface ridged or uneven or with lobules.

Hymenium ((90-)100-125(-150)µm tall, upper part of hymenial gelatine brown-pigmented; hypothecium 23-45µm thick; subhymenial layers of varying thickness, frequently extending into a stipe. Asci 85-115 x 17-23µm, cylindrical or obclavate, with amyloid ring structure in tholus. Spores

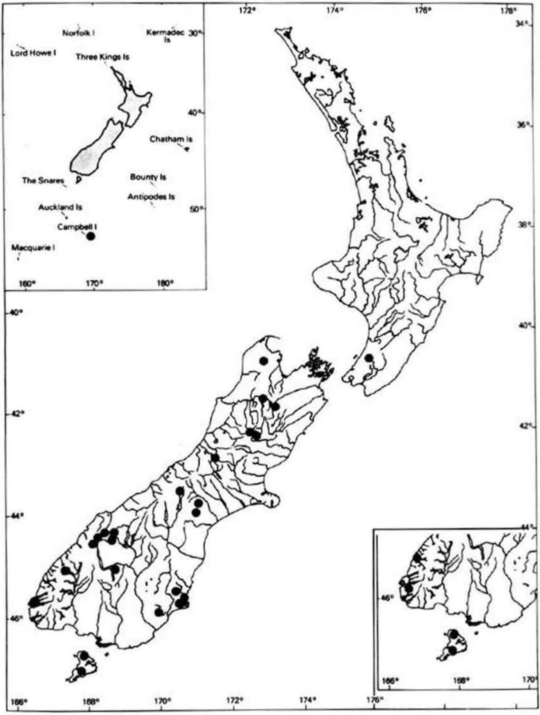

Fig. 6. Distribution of Psoroma fruticulosum (main map and left hand inset) and P. rubromarginatum (right hand inset of southern New Zealand) in New Zealand.

(6-) 8 per ascus, (16-)18-23 x (6-)9-10µm, ellipsoid or lachrymiform, surrounded by a thick epispore 1-2µm thick. Paraphyses c. 2µm thick, apical cells frequently broadened to 4.5µm (Fig. 4B). Margo thallinus with a well-developed cortex similar in structure to that of the squamules, 100-150µm thick in the marginal, and to 250µm thick in the basal part, in the latter, with deep fissures corresponding to the scabrid surface (Fig. 4C,D).

Pycnidia mainly submarginal but also laminal or marginal, to 0.4mm broad, blackish in upper part, frequently on thalline stalks and opening by a pore or slit (Fig. 2D,E). Development of cavity of the Lobaria-type (Vobis 1980); conidiophores short-celled, conidia rod-shaped, (2.5-)3-4 x 1µm.

Distribution and ecology. P.fruticulosum is a widespread austral species and is known in southern Argentina, south-east Australia and in New Zealand where it occurs abundantly in South Island (Fig. 6). It is an alpine-subalpine species of characteristic cushion-forming habit, often amongst mosses (especially Andreaea) on soil, in drainage cracks in rocks, stream beds and lake shores, in damp crevices in fellfields and glacial till; sometimes a pioneer species of recently deposited morainic soil near glaciers.

REMARKS. P.fruticulosum is possibly related to P.buchananii Nyl. The two species have conspicuous blackish pycnidia, large apothecia of irregular shape, and a strongly gelatinised cortex in the upper thallus surface and apothecial margin. In both species the colour of the thallus is olivaceous-fawn more or less flushed reddish brown. P.fruticulosum differs mainly in the well defined, erect, deeply-divided squamules forming extensive swards or cushions which become loosely detached when predominantly muscicolous. In P.buchananii the squamules are smaller, less well defined and in close contact with the substrate. The cell lumina in the upper cortex are more rounded in P.fruticulosum; at the lobe tips the hyphae are strongly orientated in a parallel direction, and thin-walled (Fig. 5); in P.buchananii angular, reticulately connected cell lumina are embedded within a gelatinous matrix in the lobe apices.

Psoroma rubromarginatum P.James et J.Murray sp. nov.

Figs. 7-10.

DIAGNOSIS. Thallus squamulosus vel subfoliosus, usque ad 2-4(-8)cm latus, hinnuleus vel olivaceus plus minusve rubescens, arcte appressus. Lobi 5-12mm longi et 2-7mm lati, margine crenulato. Thallus 200-400(-600)µm altus, vix corticatus. Hyphae in zonam algarum reticulum formantes, alga symbiotica laete viridis, verosimiliter ad familiam Chlorococcaceae pertinens. Cephalodia maximam partem laminalia, globosa vel squamulosa, pallida, vix corticata, alga ad Nostoc pertinens.

Apothecia usque ad 4.5(-6)mm lata, contigua, disco urceolato vel plano, brunneo vel atrofusco, margo thallinus crenulatus, 0.2-0.4mm crassus, saepe rubescens. Hymenium 150-190µm altum, asci cylindrici vel obclavati, 115-145(-160) x 20-40 µm, 8-spori, apice incrassato et amyloideo. Sporae simplices, incolores, polymorphae, ellipsoideae vel ovoideae, 20-25(-31) x (9.5-)11-13(-17) µm, superficie vix verruculosa. Pycnidia non visa.

Chemistry: thallus and apothecia contain porphyrilic acid methyl ester (teuin) and pannaric acid.

Holotype: Argentina, Patagonia, Lago Argentino, Estancia La Christina, lateral arm of Uppsala glacier at 600m, 1959, James 717 (BM).

FURTHER SPECIMENS EXAMINED. ARGENTINA: Patagonia, Prov. Santa Cruz, lateral arm of Uppsala glacier, at 1100m, 1959, James 5061 (BM), Cerro Mayo, on morainic detritus at edge of small lateral glacier at 1100m, 1959, James 5097 (BM). - CHILE: Prov. Llanquihue, Cerro Derrumbe, on earth in rock crevices at 1400m, 1974, Redon 03468 (BM). - NEW ZEALAND: South Island, Secretary Island, Doubtful Sound, 1959, Murray 4047 (BM, OTA); Dusky Sound, Cascade Cove, 1969, Galloway (CHR); Stewart Island, Mt Anglem, 1966, Galloway (BM, CHR), Mt Allen, 1969, Galloway (BM, CHR).

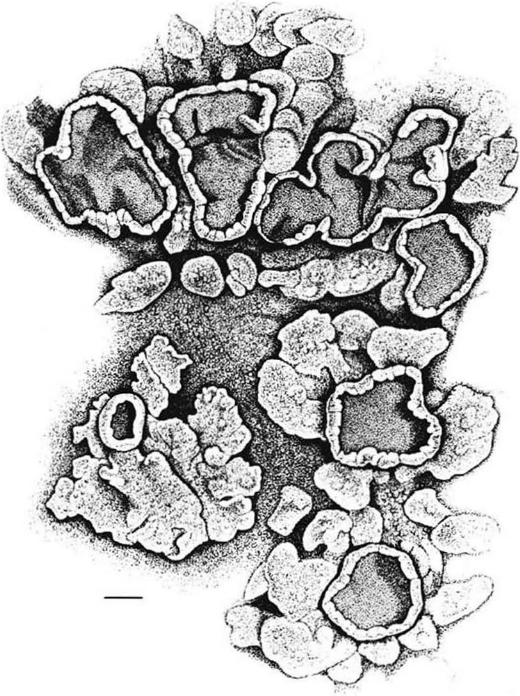

Fig. 7. Habit of Psoroma rubromarginatum (parts of the holotype), young thallus with small apothecium, and large, confluent apothecia between lobes. Scale = 1mm; drawn by H. Becker.

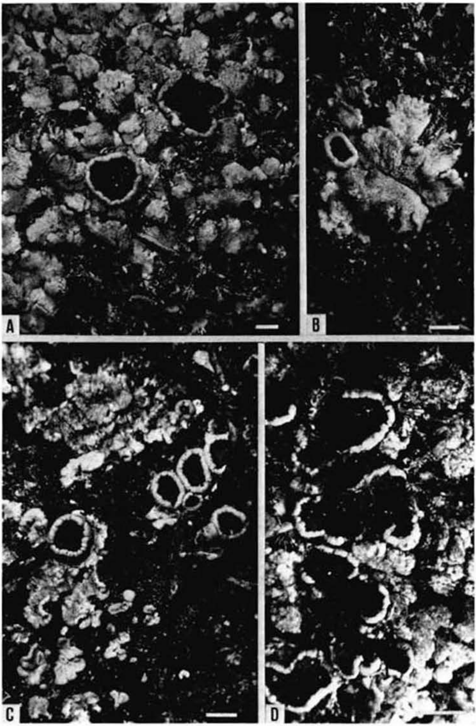

Fig. 8. Habit photographs of Psoroma rubromarginatum (A, B, holotype, C, James 5097). Scale = 1mm.

Thallus terricolous, rosette-forming to irregularly dispersed and spreading, 2-4(-8)cm diam., olive-brown to olive-green when wet, in part blackish, tinged ochre-red at lobe margins and apothecia, becoming fawn or pale ochre to entirely suffused reddish in the herbarium. Thallus closely appressed, a black prothallus sometimes apparent. Lobes either contiguous and fused, forming a thick, tartareous crust with occasional deep fissures, or dicrete-squamulose. Squamules rounded or irregular, rarely subelongate, variable in size, 5-12mm long and 2-7mm wide. Upper surface undulate or sometimes lumpy, smooth, scabrid or minutely verrucose, margins plicate-radiate or minutely lobate. Lower surface pale at margins becoming dark centrally, attached to substrate by black tomentum.

Thallus sections 200-400(-600)µm thick, in young specimens with a rudimentary cortex c.25µm thick (Fig. 9A) which later disintegrates to form a necrotic layer (Fig. 9B). Hyphae in the upper part of the thallus ascending and richly branched, becoming more horizontally arranged towards lower surface where a layer of 6 to 8 strongly aggregated, thick-walled hyphae form a primitive cortex c.50-70µm thick. Crystals of lichen substances deposited in clusters (Fig. 10B). Phycobiont green, non-filamentous, probably a member of the Chlorococcaceae. Algal cells distributed throughout the thallus, some cells within the lower cortex, (7-)10-16(-20)µm diam. including largevacuole which does not stain in LPCB (Fig. 9B).

Cephalodia globular or squamulose, red-brown to bluish brown, 1-2(-3)mm diam., originating from lower surface and margins of squamules, delimited by primitive cortex or necrotic layer; hyphae more or less richly branched, radiating from the center towards surface (Fig. 10C).

Apothecia to 6mm diam., laminal, irregular, with a persistent, entire or crenulate thalline margin (Figs. 7, 8), often flushed reddish, disc red-brown to black.

Hymenium 140-190µm tall, upper part of hymenial gelatine brown-pigmented; hypothecium 40-45µm thick; subhymenial layers 40-160µm thick, of in-

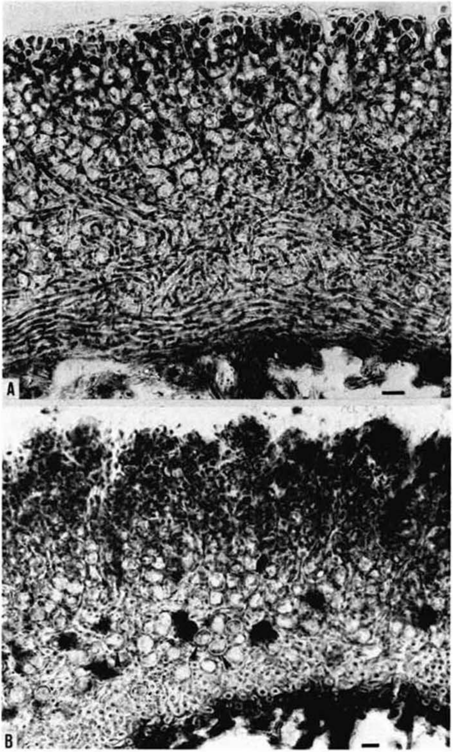

Fig. 9. Thallus anatomy in Psoroma rubromarginatum (microtome sections, A, Redon no.03468, B, holotype). A, l.s. of thallus with rudimentary

terwoven hyphae. Asci 115-145(-160) x 20-24µm, cylindrical, with amyloid ring structure in tholus. Spores 8 per ascus, usually uniseriate, (15.5-)20-25(-31) x (7-)9-13(-17)µm, ellipsoid, rarely apiculate at one end. Paraphyses 1.5-2µm wide, only slightly enlarged towards apices with 1-5 submoniliform cells. Margo thallinus well developed, in part corticate (Fig. 10B) or not (Fig. 10A), crystals of lichen substances deposited in medulla. Pycnidia not seen.

Chemistry: pannaric acid and tenuin (porphyrilic acid methyl ester) present.

Distribution and ecology. *P.rubromarginatum* is known only in southern Patagonia, Chile and southern New Zealand (Fig. 6). The lichen grows among mosses in wet poorly drained, exposed alpine or subalpine grasslands or on stable, glacial morainic soils.

REMARKS. From thallus anatomy, *P.rubromarginatum* corresponds to some extent to *P.internectens* M. Lamb (1955, holotype: BA). In this latter species also the algal cells are distributed rather uniformly throughout the thallus and contain vacuoles causing an unequal staining of their cell contents. This species is, however, much smaller, the apothecia lack a conspicuous thalline margin, and no lichen substances were found (unpublished results).

The lichen substances tenuin and pannaric acid were reported, previously, in another species of *Psoroma*, *P.tenue* Henssen var. *tenue* and its variety var. *boreale* (Renner et al. 1981, Henssen et Renner 1981).

cortex at upper surface; B, t.s. of thallus, surface uneven, covered by necrotic layer not staining in LPCB. In both sections the algal cells are mostly filled with vacuoles (arrows) or dead, and are not staining in LPCB. Scale = 20µm.

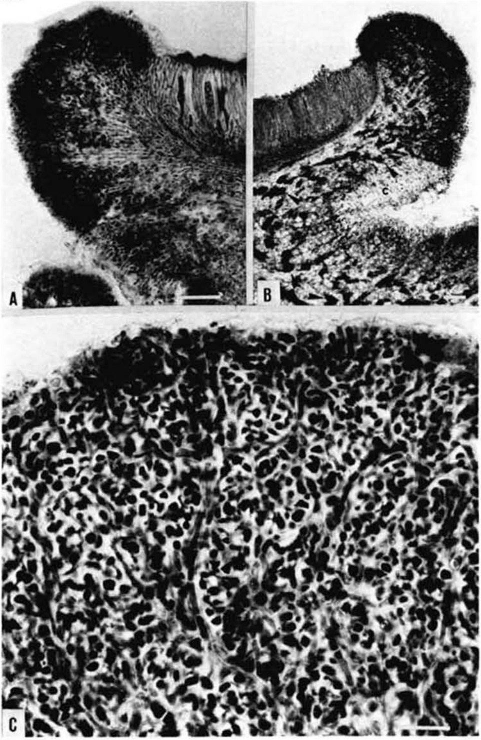

Fig. 10. Anatomy of *Psoroma rubromarginatum* (microtome sections, A, *James* no.5097, B, holotype, C, *Redon* no.03468). A, marginal part of young apothecium lacking a distinct cortex in margo thallinus. B, part of apothecium with cortex (c) in margo thallinus; crystals of lichen substances deposited in medulla (arrows). C, upper part of cephalodium. A, B, scale = 50µm, C, scale = 20µm.

ACKNOWLEDGEMENTS

These studies were supported by grants of the Deutsche Forschungsgemeinschaft. P.W.J. acknowledges grants from the Royal Geographical Society and the Royal Society, New Zealand. We express our sincere thanks to the curators of the herbaria for the loan of the material in their care. Miss A.Schenk is thanked for preparing the drawing in Fig. 5 and Mrs. G.Traute for skillfull technical assistance.

ZUSAMMENFASSUNG

Die beiden neuen Arten *Psoroma fruticulosum* P. James et Henssen und *P.rubromarginatum* P.James et J.Murray sind südhemisphärische Flechten. Beide Arten wachsen auf Moosen und Erde an mehr oder weniger feuchten Standorten, am Ufer von Bächen und Seen und auf Gletscherböden in der subalpinen und alpinen Stufe. *P.frutoiculosum* ist mit *P.buchananii* verwandt, hat wie diese Art schwarze, aufsitzende Pycnidien, im Alter große Apothecien von unregelmäßigem Umriß und eine fahlbraune bis braunrote Farbe. *P.fruticulosum* unterscheidet sich vor allem durch die aufrechten, am Rande in fingerförmige Lobuli auslaufenden Loben und durch die mehr rundlichen Lumina der gut entwickelten oberen Rinde des Lagers und des Cortex im Margo thallinus. In *P.fruticulosum* konnten keine Flechtenstoffe von taxonomischem Wert nachgewiesen werden.

P.rubromarginatum ist durch eine rötliche Verfärbung das Lagers und Apothecienrandes ausgezeichnet. Die dicken Lagerschuppen liegen dem Substrat angepreßt. Eine obere Rinde ist nur rudimentär in jungen Lagern entwickelt; sie desintegriert zu einer nekrotisch-gallertigen Auflagerung. Parallel harizontal verlaufende Hyphen bilden die untere Begrenzung des Lagers. Die Algenzellen sind nicht auf eine Zone begrenzt, sondern liegen im Mark verstreut und vereinzelt zwischen den Hyphen der unteren Berindung. Die Flechtenstoffe Pannarsäure und Porphyrylsäure-

methylester wurden in P.rubromarginatum nachgewiesen, für letztere Substanz wird der Trivialname "Tenuin" erstmals verwandt.

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THE SPORES OF HEXAGONIA APIARIA AND H. TENUIS (APHYLLOPHORALES)

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Basidiospores are very seldom found in herbarium collections of *Hexagonia* species (Kauffmann Fidalgo, 1968: 37). C.G. Lloyd noticed in his Synopsis (1910: 1), that he has never seen a single spore in any species he included in *Hexagonia*. The lack of spores in herbarium specimens is obviously connected with the large pores of the hymenophore, but may also be a result of speedy decomposition of spores by bacteria in tropical conditions when a basidiocarp is not dried quickly enough. In consequence of this, the species have been characterized on the basis of measuring only a few spores, found for example on the surface of the pileus, or the measurements given by one author are repeated by others, or are omitted from descriptions of the species.

The spores described below were collected as spore prints obtained in room conditions at night after collecting the basidiocarps. From every sample 30 spores were measured in 2 per cent KOH solution using an eyepiece micrometer at a magnification of x 700. For every sample the mean values ± standard error and co-efficient of variability V of spore length, spore width and Q were calculated. All the herbarium specimens were collected by the author.

HEXAGONIA APIARIA (Pers.) Fr.

Collection TAA 103 416: on a fallen angiosperm trunk in a *Tectona*-forest. India, Tamil Nadu, Tirunelveli Distr., Mundanthurai Sanctuary, Kodimudi plantation area, 17 Febr. 1979.
Spores: (12.8)-13-15.5-(15.8) x (5.8)-6-7.5-(8) μm.
Mean length: 14.12 ± 0.13 μm; V = 5.1
mean width: 6.81 ± 0.09 μm; V = 7.4
Q: 2.08 ± 0.03; V = 7.8

Spores have not been found in this species by Bakshi (1971: 62), Cunningham (1965: 255), Ito (1955: 247) or Teng (1964: 526). Kauffmann Fidalgo (1968: 43) gives these 11-15-(16) x 4.5-6 μm; the same figures have been indicated by Domański (1974: 254: 11-16 x 4.5-6 μm) and Ryvarden & Johansen (1980: 11-15 x 4.5-6 μm). Kauffmann Fidalgo noted (1968: 46): "Of all the collections examined only one from

Ceylon... was found with basidiospores attached to the basidia; in a few other collections spores... were seen scattered among the hairs of the pilear surface". Accordingly some of the spores measured by her might be immature.

HEXAGONIA TENUIS (Hook.) Fr.

COLLECTIONS:

TAA 103 527: on a fallen twig of *Lantana* sp. India, Uttar Pradesh, Dehra Dun Distr., Timli, 26 March 1979.
Spores: 13.5-15.5-(16) x (3.8)-4.2-4.8 µm.

TAA 103 064: on a dead branch of *Zizyphus* sp. India, Punjab, Patiala, 26 Jan. 1979.
Spores: (14.8)-15.5-18-(18.3) x 4.2-5-(5.5) µm.

TAA 102 043: on a fallen angiosperm twig. India, Himachal Pradesh, Deli near Kalka, alt. 500 m, 3 Jan. 1979.
Spores: (15.5)-15.8-18.5-(19) x 4.2-4.8-(5) µm.

TAA 103 020: on a fallen angiosperm twig. India, Haryana, Morni Hills, 28 Dec. 1978.
Spores: (15)-16-19.5 x 4.5-5-(5.5) µm.

Specimen no.	Mean length	s.e.	*V*	Mean width	s.e.	*V*	*Q*	s.e.	*V*
103 527	14.45	0.14	5.3	4.29	0.04	5.4	3.38	0.04	5.8
103 064	16.22	0.18	6.2	4.59	0.06	7.6	3.56	0.06	9.5
102 043	17.35	0.16	5.1	4.47	0.05	5.8	3.89	0.04	6.2
103 020	17.64	0.25	7.6	4.74	0.05	5.7	3.72	0.06	8.6

Spores of this species are not described in the papers of Ito (1955: 250), Murrill (1908: 83) or Teng (1964: 527). Cunningham (1965: 185) indicates 6-8 x 2-2.5 µm which must be an error. Bakshi (1971: 64) gives 8.8-14.7 x 2.9-4.4 µm for Indian specimens and Westhuizen (1971: 291) 10-15 x 4-6 µm for South African ones. Ryvarden & Johansen (1980: 376) indicate 14-20 x 4.7-6.3 µm for East Africa; these data obtained from a spore print are the only available ones comparable with our results.

The data given above demonstrate once more how important it is for taxonomy to obtain spore prints when collecting Polyporoid fungi in the tropics.

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GLOEOPHYLLUM IMPONENS (APHYLLOPHORALES)

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Gloeophyllum imponens (Ces.) Teng is one of the most striking polypores, as mentioned already by Lloyd (1923). Its type is a rich, well preserved and fertile collection. The photographs published by Lloyd demonstrate the lenzitoid structure of its hymenophore; however, smaller pilei of the same collection (RO) have large angular pores.

G. imponens has a thickening catahymenium with numerous hyphidioid cystidia, subfusoid or almost cylindrical spores 10-13 µm long and trimitic hyphal system with coloured skeletals and clamped generative hyphae. The colour of the pileus and context is dark and similar to that of other *Gloeophyllum* species.

GLOEOPHYLLUM IMPONENS (Ces.) Teng Fungi from China 760-761, 1964. - *Daedalea imponens* Ces., Atti Accad. Sci. Fis. (Napoli) 8 (3): 7, 1879; Sacc. Syll. Fung. 6: 376, 1888; Bres., Hedwigia 51: 320, 1912. - *Lenzites imponens* (Ces.) Lloyd, Mycol. Notes 70: 1225, f. 2521-2522, 1923. - *Funalia philippinensis* Murr., Bull. Torrey Bot. Club 34: 469, 1907.

Basidiocarp single or a few basidiocarps laterally fused, dimidiate or flabellate, 3.5-12 x 4-13 cm, 5-8 mm thick at the base, corky-tough, of very light weight. Whole basidiocarp black with KOH. Pileus flat or slightly conchate, with concentric zones, radially adpressedly strigose-fibrillose or almost glabrous, especially at the base with adpressed rough and stiff, sometimes forked or almost antler-like hairs 0.5-1.5, sometimes up to 4 mm long and (when fused together) up to 2 mm in diam. at base; surface cinnamon-umber (5 YR 4/5; 6 D 6),* at base darker (blackish). Margin thin, entire or rough-fibrillose. Context continuous with hymenophoral trama, not duplex (but somewhat more dense above the hymenium), thin (1-2 mm thick), soft-suberose, cinnamon (5 YR 5/6; 6 D 7). Hymenophore lamellate with forked lamellae 0.5-1.2 mm thick and 3-6 mm deep, in older specimens irregularly dentate, 5-6 per cm along the margin; in smaller pilei some part of the hymenophore with

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* The colour names are given after Rayner, 1970; and noted according to Munsell, 1976, and Kornerup & Wanscher, 1967.

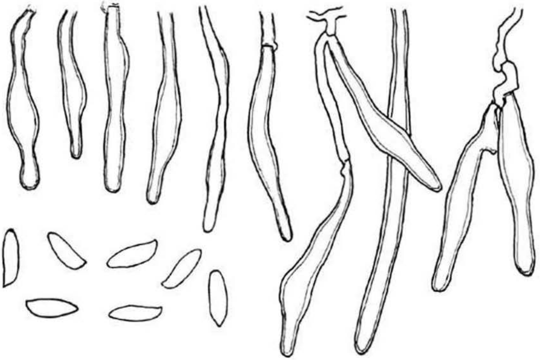

Fig. 1. *Gloeophyllum imponens:* cystidia and spores (x 1000)

elongated rounded-angular or almost hexagonal pores 1.5-2.5 mm broad and 2-5 mm long; hymenophore vinaceous buff (7.5 YR 6.5-7/4; 6 C-D 4).

Hyphal system trimitic. Skeletal hyphae abundant, brownish yellow, mostly loosely intervowen, thick-walled or almost solid, straight, 2.7-4.5 µm in diam. in context, 2.5-3.5 µm in trama. Binding hyphae rare but always present, yellowish, moderately branched, thick-walled or solid, 2-3 µm in diam. Generative hyphae subhyaline, thin-walled, branched, with clamps, 2.5-3.5 µm in diam. Catahymenium thickening, 100-170 µm thick, composed of almost hyphidioid cystidia and few basidia; in the lower part of the catahymenium few erect skeletal hyphae with rounded tips. Cystidia fusoid with almost cylindrical upper part and blunt tip, with thin or thickened, hyaline or slightly yellowish walls, clamped at base, 50-75-(80) µm long, 4.5-7.5 µm in diam. in broadest part and 2.5-5 µm in upper part, slightly incrusted with resinous matter. Basidia clavate, 40-50 x 5-6 µm, with 4 sterigmata, soon collapsing. Spores subfusoid or almost cylindrical, 10-13 x 3.2-4 µm (mean of 30 spores: 11.67 x 3.59 µm).

Type studied: Malaysia, Sarawak, leg. O. Beccari no. 186 (RO, holotype). Reported also from the Philippines (Bresadola, 1912: 320) and from Hainan Island in Southeast China (Teng, 1964: 532).

G. imponens seems to be closely related to *G. abietinum* (Bull.: Fr.) P. Karst., which differs in having lamellae

Fig. 2. *Gloeophyllum imponens:* upper surface and hymenophore of some specimens from type collection (x 1.1)

8-12 per cm, tomentose or scrupose pileal surface without prominent flattened anterlike protuberances or hairs, darker cystidia of another form and up to 40 µm long, smaller basidia up to 35 µm long and duplex context.

G. imponens has also some similarity with *Hexagonia apiaria* (Pers.) Fr. and *Coriolopsis telfarii* (Kl.) Ryv.: all three species have large forked anterlike hairs on the pileal surface and large angular pores; the colour of *G. imponens* and *H. apiaria* is also similar. The similarity (described above) may be interpreted as a result of homologous variability in these three related genera and as similar adaptation to some common environmental factors of the tropical forests.

Acknowledgements

I would like to thank the director and the curator of the herbarium of the Botanical Institute of Rome University (RO) for making the type available, to Dr. D.A. Reid and Dr. L. Ryvarden for critically reviewing the manuscript.

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STUDIES IN THE GENUS *PHOMA*. III.
PARAPHOMA, A NEW GENUS TO ACCOMMODATE *PHOMA RADICINA*.

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ABSTRACT

Paraphoma Morgan-Jones and White, a new genus, is established to accommodate *Phoma radicina* (McAlp.) Boerema, which is described and illustrated from isolates obtained from cysts of *Heterodera glycines* in North Carolina soybean field soils. The genus is characterized by thick-walled, setose pycnidia; lageniform, phialidic conidiogenous cells, and is hyaloamerosporous.

INTRODUCTION

Well in excess of one hundred species of pycnidial fungi possessing small, hyaline, thin-walled, unicellular conidia and distinctly setose conidiomata have, over the years, been classified in the genus *Pyrenochaeta* de Not. Increasing attention during the last decade to the morphology of conidiogenous cells as an important criterion in classification has, however, led to the recognition of heterogeneous elements within the genus (Sutton, 1980). In *Pyrenochaeta* sensu stricto, as typified by *P. nobilis* de Not., branched, septate conidiophores bearing integrated, acropleurogenous phialides, which arise as short lateral branches immediately below septa, occur. In some species, or possibly in many, conidia are produced from small, simple, undifferentiated, ampulliform to lageniform phialidic conidiogenous cells borne directly on the innermost cells of the pycnidial wall and lining the venter. These latter taxa are not fully satisfactorily classified in *Pyrenochaeta* on account of this difference in morphology and several have been transferred to *Phoma* Sacc., although they differ from that genus in possessing setose pycnidia.

The generic characteristics of *Pyrenochaeta* were clarified by Schneider (1976) who designated a neotype for *P. nobilis*, but accepted only eleven species as being valid. In a subsequent paper the same author (Schneider, 1979) provided a descriptive account of the genus. Further taxonomic revision, following examination of conidiophore structure of different species, will undoubtedly lead to the removal of a large number of taxa from *Pyrenochaeta*. This has, in fact, already begun to occur, as alluded to above.

Pyrenochaeta acicola (Lév.) Sacc., [≡ *Vermicularia acicola* Léveillé],

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a brief description of which was provided by Dorenbosch (1970) and for which a neotype was selected, was placed in the genus *Phoma* by Boerema and Bollen (1975), as *Phoma leveillei* Boerema and Bollen [a new name was necessitated to avoid creating a later homonym for *Phoma acicola* (Lév.) Sacc., (≡ *Sphaeropsis acicola* Léveillé), a different fungus]. This transfer was made because *Pyrenochaeta acicola* produces conidia from undifferentiated cells lining the pycnidial venter.

Pyrenochaeta terrestris (Hansen) Gorenz, Walker and Larson, a fungus similar in morphology to *P. leveillei*, but differing from it by the presence of red diffusible pigment in agar underlying its colonies and slower growth *in vitro*, is also, presumably, better placed in *Phoma* where it was originally classified.

Boerema (in Boerema and Dorenbosch, 1979) has removed *Pyrenochaeta radicina* McAlpine [as *Phoma radicina* (McAlp.) Boerema] and *Pyrenochaeta telephii* [as *Phoma septicidalis* Boerema (to avoid creation of a homonym of *Phoma telephii* (Vestergr.) van Kesteren)] to *Phoma*.

Isolation of *Phoma radicina* from surface sterilized cysts of the destructive phytonematode *Heterodera glycines* Ichinohe from soybean field soils in North Carolina [Gintis, Morgan-Jones and Rodriguez-Kabana, 1982 (as *Phoma leveillei*)], has afforded us an opportunity to study the fungus in detail.

The presence of distinctly setose conidiomata has traditionally been considered a significant taxonomic criterion in coelomycete taxonomy, witness its importance in characterizing such genera of the Phialopycnidineae as *Chaetasbolisia* Spegazzini, *Chaetodiplodia* Karsten, *Chaetosphaeronema* Moesz, *Chaetosticta* Petrak and Sydow, as well as *Pyrenochaeta*. Examination of the pycnidial wall structure of *P. radicina*, and bearing in mind that it consistently has heavily setose pycnidia, has convinced us that it is appropriate to segregate it from *Phoma* in a separate genus. Since no described genus having the combination of morphological features exhibited by *P. radicina* appears to be available a new name is established for it herein.

TAXONOMIC PART

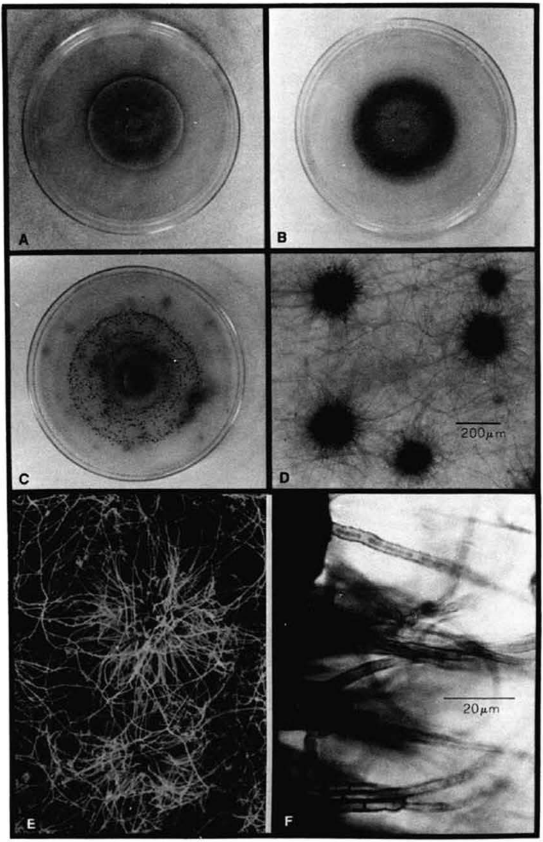
Paraphoma gen. nov.

Deuteromycotina, Coelomycetes, Sphaeropsidales.

[Etym. Gr. *para*, near, et *Phoma*]

Mycelium abundans, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, laevibus compositum. Pycnidia solitaria vel aggregata, in agaro superficialia vel semi-immersa, brunnea vel atro-brunnea, globosa vel subglobosa, brevirostrata, unilocularia, setosa; ostiolum singulare, circulare. Parietes pycnidiorum crassi, ex strato exteriore, 2 cellulis crasso, ex cellulis atrobrunneis, sclerotioideis compositi,

PLATE 1. *Paraphoma radicina*. A, 10-day old colony on MEA; B, 10-day old colony on PDA; C, 10-day old colony on cellulose agar; D, pycnidia on cellulose agar; E, SEM view of pycnidia; F, setae.


A
B
C
D
200µm
E
F
20µm

et strato interiore, 4-5 cellulis crasso, ex cellulis subhyalinis vel pallide brunneis, pseudoparenchymaticis compositi. Setae pycnidii copiosae, rectae vel leniter flexuosae, acuminatae, laeves vel verrucosae, parietibus crassis, septatae; apices acuminati, subacuti vel acuti, pallide brunnei vel subhyalini. Cellae conidiogenae monophialidicae, ex cellulis interioribus parietis pycnidii formatae, hyalinae vel subhyalinae,discretae, determinatae, lageniformes. Conidia enteroblastica, ellipsoidea, aseptata, hyalina, laevia, guttulata.

Species typica: *Paraphoma radicina* (McAlp.) Morgan-Jones and White.

Mycelium abundant, composed of branched, septate, subhyaline to pale brown, smooth hyphae. Pycnidia solitary or aggregated, superficial or semi-immersed in agar, brown to dark brown, globose to subglobose, with a short neck, uniloculate, setose; ostiole singular, circular. Wall of pycnidium thick, made up of an outer layer, 2 cells thick, of dark brown cells and an inner layer, 4-5 cells thick, of subhyaline to pale brown pseudoparenchymatous cells. Pycnidial setae copious, straight or slightly flexuous, acuminate, smooth or verrucose, thick-walled, septate; apices acuminate, subacute to acute, pale brown to subhyaline. Conidiogenous cells monophialidic, formed from the inner cells of the pycnidial wall, hyaline to subhyaline, discrete, determinate, lageniform. Conidia enteroblastic, ellipsoid, aseptate, hyaline, smooth, guttulate.

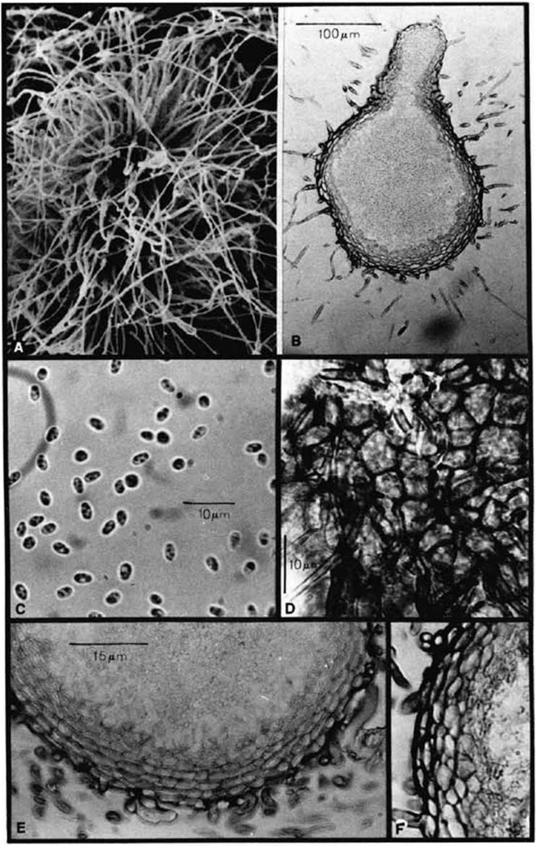
Paraphoma radicina (McAlp.) comb. nov. (Plates 1 and 2, figure 1).

≡ *Pyrenochaeta radicina* McAlpine, Fung. Dis. Stone-fruit-trees Melb. 127, 1902.

≡ *Phoma radicina* (McAlp.) Boerema, Versl. Meded. plziektenk. Dienst Wageningen 153: 20, 1979.

Colonies on potato dextrose agar (Plate 1, B) at first somewhat wooly, pale gray, but soon becoming olivaceous or brownish in a wide submarginal zone and felty, remaining lighter centrally older colonies having a marginal zone of largely submerged hyphae, growing rather slowly, attaining a diameter of 22mm at 20C after 7 days, 26mm at 25C, and 15mm at 30C, reverse brownish to dark brown, with dense yellowish to brownish diffusible pigment discoloring the agar below and immediately surrounding the expanding colony; on malt extract agar (Plate 1, A) gray to olivaceous green, velvety, more or less the same texture and color over the entire colony except for the extreme periphery which is usually somewhat lighter, attaining a diameter of 21mm at 20C after 7 days, 25mm at 25C, and 14mm at 30C, producing yellowish to brownish diffusible pigment but to a lesser extent than on PDA, reverse pale brown. On both PDA and MEA pycnidia are not produced abundantly. Colonies on cellulose agar (Plate 1, C) produce little aerial hyphae but abundant pycnidia superficially after 7 days (Plate 1, D). Mycelium composed of septate, branched, subhyaline to brown, smooth, 1 - 2.5µm wide hyphae; hyphae sometimes aggregated into closely appressed strands, which occasionally form small loops. Pycnidia solitary or somewhat aggregated, never confluent, formed superficially on the agar surface or very slightly

PLATE 2. *Paraphoma radicina*. A, SEM view of single pycnidium; B, V.S. pycnidium; C, conidia; D, superficial view of pycnidial wall; E-F, sections of pycnidial wall.


A
100 μm
B
10 μm
C
10 μm
D
15 μm
E
F

immersed, brown to blackish brown, globose to subglobose, 180 - 450μm in diameter, with a short neck, 40 - 60μm wide, sometimes becoming flask-shaped with up to three short necks which become more or less conspicuous as a pycnidium swells, uniloculate, completely and usually densely covered with unbranched, thick-walled, straight or slightly flexuous, septate, smooth or slightly roughened, pale brown, acuminate setae (Plate 1, F), 75 - 200μm long, 3 - 4μm wide towards their base, 2 - 2.5μm wide distally, arising from the outer pycnidial wall cells, with apices subacute to acute, pale brown to subhyaline; ostiole single, circular, 10 - 15μm in diameter. Pycnidial wall 9 - 15μm thick (Plate 2, E & F), composed of an outer layer, one or two cells wide, of brown, thick-walled cells, and an inner layer, four to five cells wide, of thin-walled, subhyaline to very pale brown, more or less isodiametric or sometimes slightly elongate, pseudoparenchymatous cells, 2 - 3 X 4.5 - 6μm. Conidiogenous cells monophialidic, formed from the innermost cells of the pycnidial wall, hyaline or subhyaline, discrete, determinate, flask-shaped, 4 - 6 X 3μm. Conidia enteroblastic, ellipsoid to obovate, aseptate, hyaline, smooth, usually multiguttulate, 3 - 5 X 1 - 3μm. Conidial mass creamy in color, visible only by crushing pycnidia. Chlamydospores absent.

Plurivorous; Australia, Europe and North America.

Collections examined: isolated from young cysts of *Heterodera glycines* Ichinohe from root surfaces of soybean [*Glycine max* (L.) Merr.], Clayton, Johnson County; Hertford, Perquimans County; Clinton, Sampson County and Goldsboro, Wayne County, North Carolina, U.S.A., May 1982, B. Ownley Gintis and G. Morgan-Jones, AUA.

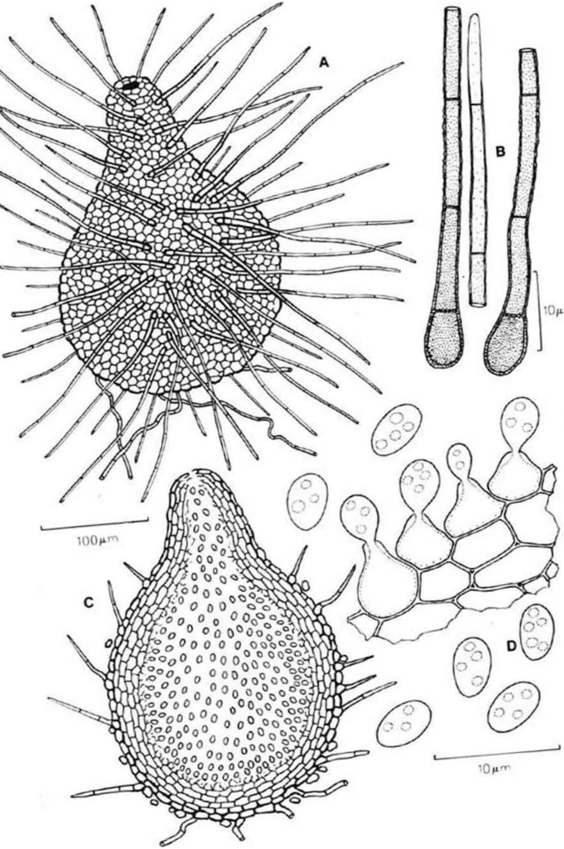
Paraphoma radicina has, to date, been recorded on a variety of hosts (Boerema and Dorenbosch, 1979). In the United States it has been isolated from soil in Wisconsin and from roots of strawberry in Illinois (G.H. Boerema, unpublished data).

ADDITIONAL NOTES

The pycnidial wall organization of *P. radicina* is much better developed than it is in the case of *Phoma herbarum* Westd., the type species of *Phoma*, and twenty eight other species of *Phoma* examined by us during the course of our recent studies in the genus (White and Morgan-Jones, unpublished data). *Phoma medicaginis* Malbr. and Roum., var. *pinodella* (L.K. Jones) Boerema has, among *Phoma* species, the best developed wall but its organization is very different from that of *P. radicina*. In *Phoma*, generally, the pycnidial wall is tenuous and composed of but few layers of irregular and variously shaped and sized cells. The composition of the pycnidial wall of *P. radicina* differs very appreciably, being made up of more or less uniformly shaped, compact cells (Plate 2, E). In *Phoma* where there is any degree of wall thickening this occurs distally, proximal to the ostiole or in the neck or papillar area, where such is present. In such cases the wall below is invariably noticeably thinner. Wall thickness in *P. radicina* is consistent over the entire pycnidium except for the extreme apex where the wall is somewhat narrower.

With regard to wall thickness and construction, a parallel difference

FIGURE 1. *Phoma radicina*. A, pycnidium; B, setae; C, V.S. pycnidium; D, conidiogenous cells and conidia.


A
B
10µm
100µm
C
D
10µm

occurs between *Ascochyta* Libert, whose pycnidial wall is thin and tenuous, and such other comparable and morphologically similar didymosporous members of the Phialopycnidiineae as *Ascochytula* (Potebnia) Diedicke [as typified by *Ascochytula obiones* (Jaap) Diedicke (see Dickinson and Morgan-Jones, 1966)], *Ascochytulina* Petrak and *Didymochaeta* Sacc. and Ellis. Petrak (1953) and Sutton (1977, 1980), consider *Ascochytula* to be a synonym of *Pseudodiplodia* (Karst.) Sacc., but the pycnidial wall of the type species of that genus, *P. ligniaria* (Karst.) Sacc., is thin and rather different from the well developed wall of *A. obiones*.

Pycnidia of *Paraphoma radicina* do not readily open to release conidial masses when grown *in vitro* as is invariably the case in species of *Phoma*.

The setae, densely spread over the surface of the pycnidium, are an important distinguishing characteristic of *Paraphoma*. In their distribution they resemble those of *Chaetasbolisia* which are scattered over the pycnidium, and in being thick-walled and sometimes minutely verruculose (Plate 1, F). In *Pyrenochaeta* the setae are most abundant around the ostiole. Boerema and Bollen (1975) have argued that the presence of setae can only be used as a "species-character" citing a strain of *Phoma herbarum*, [described by Smith (1963) under the name *Pyrenochaeta mali* Smith], isolated from spots of apples as capable of producing setose pycnidia. We consider, however, the invariable presence of well-differentiated, thick-walled setae in abundance over the entire surface, coupled with the peculiarities of pycnidial wall construction decribed above, to be significant characteristics reflecting sufficient discontinuity to warrant the segregation of *P. radicina* in its own genus. Following re-examination it seems possible that other taxa originally described in *Pyrenochaeta*, but which have *Phoma/Paraphoma*-type conidiogenous cells, will eventually need to be reclassified.

ACKNOWLEDGMENTS

We have again had the benefit of consultation with Dr. Gerhard H. Boerema, Wageningen, The Netherlands and are most grateful to him for kindly examining a representative culture of our isolates of *P. radicina*. The manuscript was reviewed by Dr. Carol A. Shearer, University of Illinois.

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NOTES ON HYPHOMYCETES. XLVI.
PARAFULVIA, A NEW FOLIICOLOUS, PHAEOPHRAGMOSPOROUS GENUS WITH CATENATE CONIDIA

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ABSTRACT

Parafulvia indica Kamal, Rai and Morgan-Jones, a new genus and species, is described and illustrated from a collection made on living leaves of *Wrightia tinctoria* R. Br., in Uttar Pradesh, India.

INTRODUCTION

Among foliicolous hyphomycetes collected on living leaves of *Wrightia tinctoria* R. Br., in the Katarniaghat Range of the West Baharaich Forest Division, Uttar Pradesh, India, an area where humid subtropical climatic conditions prevail, is a catenate, phaeophragmosporous fungus, hitherto undescribed. Its mycelium is mostly superficial, forming a somewhat sparse, wooly colony intermixed on the abaxial leaf surface with abundant leaf hairs over which and along which hyphal and conidiophore elements grow. It somewhat resembles *Fulvia* Ciferri, as characterized by *F. fulva* (Cooke) Ciferri, its type species, and *Parapithomyces* Thaung.

TAXONOMIC PART

Parafulvia gen. nov.

Deuteromycotina, Hyphomycetes, Dematiaceae.

[Etym. Gr. *para*, near, et *Fulvia*]

Maculae hypogenae. Coloniae effusae, lanatae, olivaceo-virides ad fuscae, sparsae. Mycelium plerumque superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, flexuosis, tenuitunicatis, laevibus compositum. Conidiophora semi-

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macronemata, flexuosa, laevia, septata, pallide brunnea vel brunnea, interdum ramosa. Cellae conidiogenae mono vel polyblasticae, terminales vel intercalares, integratae, sympodiales, cylindricae vel inflatae, cicatricatae. Conidia catenata, in catenas ramosis formata, sicca, ellipsoidea vel clavata, 0-4 septata, recta vel leviter curvata, leavia, brunnea, parietibus crassis, ad bases cicatrice protrudenti et ad apices 1-3 cicatricibus protrudentibus.

Species typica: *Parafulvia indica* Kamal, Rai and Morgan-Jones

Spots hypogenous. Colonies effuse, wooly, lax, dark olive-green to brown, usually somewhat sparse. Mycelium mostly superficial, partly immersed in the substratum, composed of branched, septate, subhyaline to pale brown, flexuous, thin-walled, smooth hyphae. Conidiophores semi-macronematous, flexuous, smooth, septate, pale brown to brown, occasionally branched. Conidiogenous cells mono or polyblastic, terminal or intercalary, integrated, sympodial, cylindrical or inflated, bearing flat, thickened scars. Conidia catenate, in branched chains, dry, ellipsoid or somewhat clavate, 0-4 septate, straight or slightly curved, smooth, brown, relatively thick-walled, with one basal and one to three apical, thickened, protruding scars, or, if terminal, obtuse at the apex.

Parafulvia indica sp. nov. (Figure 1).

Maculae hypogenae. Coloniae hypophyllae, effusae, sparse vel interdum leviter densae, lanatae, olivaceo-virides ad fuscae. Mycelium plerumque superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, flexuosis, tenuitunicatis, 2 - 3µm crassis compositum. Stromata nulla. Conidiophora semi-macronemata, ex mycelio vegetativo singulatim oriunda, flexuosa, laevia, septata, pallide brunnea vel brunnea, simplicia vel interdum ramosa, usque ad 78µm longa X 2 - 2.5µ crassa. Cellae conidiogenae mono vel polyblasticae, terminales vel intercalares, integratae, indeterminatae, sympodiales, cylindricae vel inflatae, cum 1-4 cicatricibus, incrassatis, prominentibus, sessilibus vel protrudentibus, 4 - 9 X 3 - 5.5µm. Conidia catenata, in catenas ramosis formata, sicca, ellipsoidea vel clavata, 0-4 septata, recta vel leviter curvata, laevia, brunnea, parietibus crassis, ad bases cicatrice protrudenti et ad apices 1-3 cicatricibus protrudentibus, 6 - 23 X 4.5 - 7µm.

In foliis vivis Wrightiae tinctoriae, Kataraniaghat, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.N. Rai, AUA, holotypus.

Spots hypogenous, varying considerably in size from small to extensive and sometimes coalescing to cover most or all of a leaf surface, giving a gray-green to dark gray-green appearance. Colonies hypophyllous, effuse, usually extensive, wooly, lax, sparse or sometimes becoming somewhat dense in part, dark olivaceous-green, with conidia appearing as dark brown to black masses when dry. Mycelium mostly superficial, partly immersed in the substratum, composed of branched, septate, subhyaline to pale brown, flexuous, thin-walled, smooth, 2 - 3µm wide hyphae. Stromata absent. Conidiophores semi-macronematous, arising singly from the vegetative mycelium, mostly flexuous, frequently overgrowing leaf hairs and sometimes straight when growing

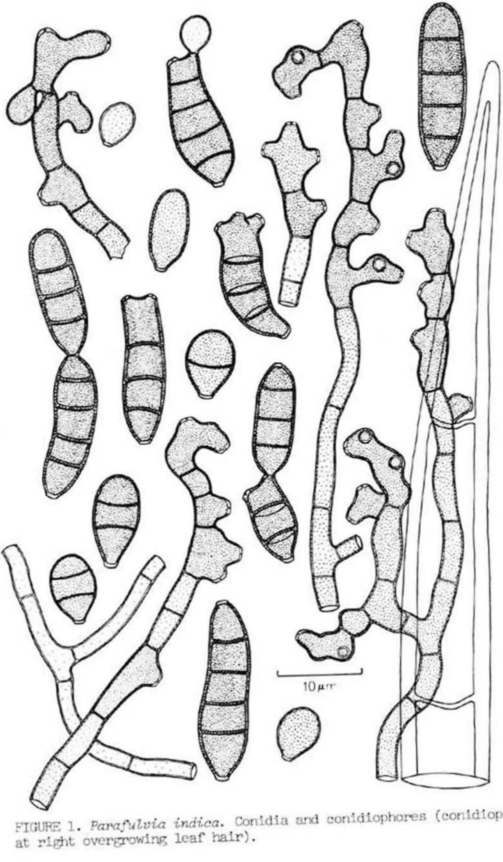

FIGURE 1. *Parafulvia indica*. Conidia and conidiophores (conidiophore at right overgrowing leaf hair).

upwards along a leaf hair, smooth, septate, usually heavily septate in the fertile part, very pale brown to brown, simple or sometimes branched, up to 78µm long, 2 - 5.5µm wide. Conidiogenous cells mono or polyblastic, holoblastic, terminal or intercalary, integrated, cylindrical or in part inflated and frequently assuming an irregular, geniculate configuration, usually pigmented appreciably darker than the hypha-like remainder of the conidiophore and very slightly thicker-walled, where intercalary with one or more short, lateral protuberances or with a longer, somewhat undulate lateral extension bearing conidiogenous loci, occasionally occurring some distance below the conidiophore tip and separated from the fertile distal region by sterile cells, 4 - 9 X 3 - 5.5µm; with 1-4 thickened scars, 1 - 2µm in diameter, flat, prominent, sessile or at the end of short protuberances and produced in a sequential sympodial or unsynchronised manner. Conidia catenate, in branched chains, dry, ellipsoid to clavate, 0-4 septate, ramo-conidia usually 4-septate or, very rarely, 5-septate, straight or slightly curved, smooth, brown, relatively thick-walled, with one basal and one to three apical, thickened, protruding, pale scars, each scar having a minute central channel, scars sometimes located on a protruding, short, papilla-like extension, where terminal on a chain apex obtuse, 6 - 23 X 4.5 - 7µm.

On living leaves of *Wrightia tinctoria* R. Br., (Apocyanaceae); India.

Collection examined: on *W. tinctoria*, Kataraniaghat, West Baharaich Forest Division, Uttar Pradesh, India, December 1979, A.N. Rai, AUA, IMI 247382, GPU (KR 414), type.

The generic affinities of *Parafulvia* would seem to lie with *Cladosporium* Link, *Fulvia* Ciferri and *Phaeoramularia* Muntanola, since these genera possess similar dry, acropleurogenous conidia produced in branched chains and where conidiogenous cells and conidia are distinctly cicatrized, with scars being thickened and usually prominent, *Cladosporium* differs in having mostly well differentiated, relatively thick-walled, macronematous conidiophores, bearing in some cases discrete conidiogenous cells, although occasionally semi-macronematous conidiophores are present. Some species, such as *C. acaciicola* M.B. Ellis and *C. macrocarpum* Preuss, have conidia which are similar to those of *Parafulvia* in wall thickness and pigmentation, but most species have conidia with more tenuous walls and are lighter in color. *Fulvia* and *Phaeoramularia* also possess macronematous conidiophores and pale conidia. In these two genera moreover the conidiophores are arranged in caespitose clusters emerging through leaf stomata and arising from small, substomatal stroma. The conidiogenous cells of *Fulvia*, where integrated and intercalary in position, bear similarity to those of *Parafulvia* in having fertile loci on short, protuberant, lateral extensions. A similar condition is seen in *Gonatophragmium* Deighton, but in that genus each lateral bulge is heavily denticulate rather than bearing a few flat scars. Such lateral extensions also occur on the conidiophores of *Parapithomyces* Thaung. In this, a monotypic genus, [type species, *P. brideliae* Thaung], the conidiophores are also semi-macronematous and quite similar in appearance to those of *Parafulvia*. In *Parapithomyces*, however, the conidia arise from attenuated tips of conidiophores or laterally on denticles from determinate conidiogenous cells. The conidia secede rhexolytically, as they do in *Pithomyces* Berk. and Br., another genus with broadly similar semi-macronematous conidiophores, where denticle remnants remain attached at the base of released conidia. The schizolytic conidium secession method in *Parafulvia* is quite different involving a split through the septum or scar that delimits the conidium prior to its release. The peculiar morphology of the conidiophores of *Parafulvia* immediately separates it from other known genera that appear superficially similar.

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DIATRYPE WHITMANENSIS SP. NOV. AND THE ANAMORPHS OF DIATRYPE BULLATA AND EUTYPELLA SORBI

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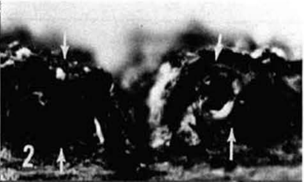
ABSTRACT

Diatrype whitmanensis sp. nov. is described from southeastern Washington; teleomorphic, anamorphic, and cultural features are discussed. Anamorphic and cultural features of Diatrype bullata and Eutypella sorbi are described. Conidiogenesis in all three species is holoblastic, conidiogenous cell proliferation is sympodial, conidia are scolecosporous and conidiomata are morphologically rudimentary.

A species of Diatrype is a common inhabitant of decorticated angiospermous wood in southeastern Washington and, probably, contiguous areas. In spite of the many descriptions of Diatrype taxa in the literature we have not found a description that embraces our collections. We therefore describe it as new, naming it in honor of Whitman County, Washington, the type locality.

Diatrype whitmanensis J. D. Rogers and D. A. Glawe, sp. nov. Figs. 1-6, 11, 18, 19.

Stromata discreta vel late effusa, in formams pulvinatam tendentia, extus hebeter nigra, peritheciis in textura alba pseudoparenchymata immersis; in ligno decorticato crescentia. Peritheciorum ostiola papilli-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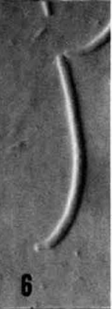
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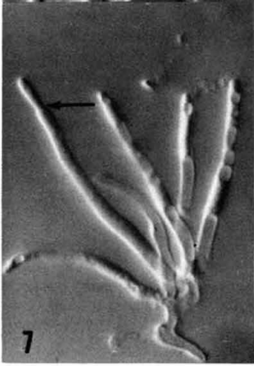
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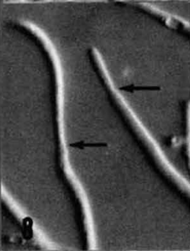
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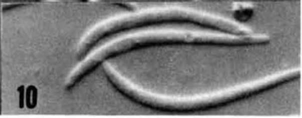
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formia vel subdigitata, nonnumquam sulcis male definitis notata. Asci clavati vel fusiformes, longe stipitati, parte sporifera 50-60 x 7 µm. Ascosporae allantoideae vel inaequilaterales, brunneae, (9.5-) 11-14 (-17.6) x 3-4 µm.

Stromata discrete to widespreading, tending to be pulvinate (Fig. 1). Exterior dull black, the perithecia 0.5-0.7 mm diam, embeddeu in white pseudoparenchymatous tissue (Fig. 2); on decorticated wood. Perithecial ostioles papillate to nearly digitate, some with 3-4 ill-defined sulcations. Asci 8-spored, clavate to spindle-shaped, long-stipitate, 130-150 µm total length, p. sp. 50-60 µm long x 7 µm broad. Ascospores allantoid to inequilateral, brown (Figs. 18, 19), (9.5-) 11-14 (-17.6) x 3-4 µm.

Collection cited herein: WASHINGTON: Rogers, J. D., 21.III.1982, lower entrance to Steptoe Canyon, Whitman Co., on unidentified decayed, decorticated wood, probably Celtis or Alnus. Holotype deposited in WSP as 67330.

Colonies on Bonar's modification of Leonian's agar (see Booth, 1971 for formulation) after 4 wk whitish, thin, appressed, with reverse uncolored to yellowish. Colonies after 8 wk underlaid with black hyphal aggregations, never entirely covering plate. Sporulation from small (less than 1 mm diam) conidiomata which resemble

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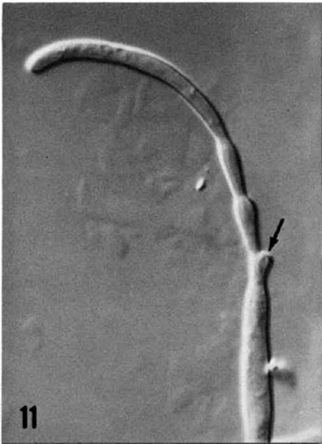
Figs. 1-10. Diatrype whitmanensis and Eutypella sorbi. Figs. 1-6. Diatrype whitmanensis. Fig. 1. Stromata (arrows) on decorticated wood. Fig. 2. Section of perithecial stromata, with four perithecia exposed. White arrows point to well-developed entostromata. Fig. 3. Conidium attached to conidiogenous cell, the secession region at arrow. Fig. 4. Sympodial production of conidia (arrow). Fig. 5. Conidia and conidiogenous cells, an arrow marking the secession region on one conidiogenous cell. Fig. 6. Conidium. Figs. 7-10. Eutypella sorbi. Fig. 7. Conidiogenous cells attached to the basal cell from which they originated. One cell has initiated a conidium (arrow). Figs. 8 and 9. Conidiogenous cells with conidial fundaments. Secession areas are marked with arrows in Fig. 8. Fig. 10. Conidia.

Figs. 1 and 2 by macrophotography. Other figures via differential interference contrast microscopy of unstained material. Fig. 1, ca. X 1; Fig. 2, ca. X 10. Other figures ca. x 1600.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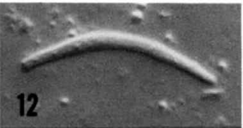
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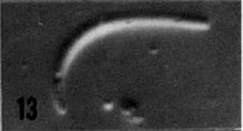
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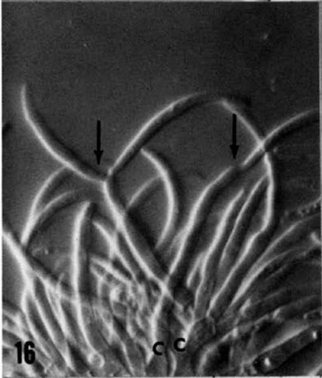

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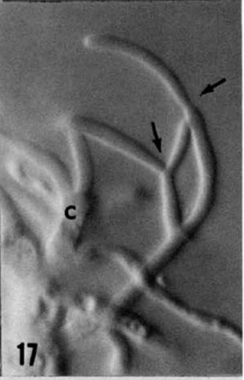

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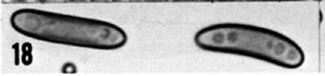
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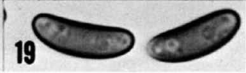
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rudimentary pycnidia after 4 wk and much more abundantly from larger (1-2 mm diam) conidiomata after 8 wk.

Conidiophores sparingly branched, developing from underlying pseudoparenchymatous cells. Conidiogenous cells in dense palisades lining conidiomatal walls, cylindrical, straight to curved, sometimes scarred in sympodial manner (Figs. 3, 4, 5), often bearing swellings beneath conidiogenous regions (Fig. 11). Conidia produced holoblastically in sympodial sequence (Figs. 4, 11). Conidia one-celled, hyaline, nearly straight to J-shaped or C-shaped to irregular, with flattened bases (Figs. 3, 5, 6), highly variable in length, (16-) 20-42 (-44) x 1-2 µm. Conidia formed in 4-wk-old cultures averaging shorter, (16-) 22-30 x 1.2 µm, than those formed in 8-wk-old cultures, 28-42 (-44) x 1-2 µm.

Diatrype whitmanensis has the aspect of a Eutypa on decorticated wood, but features a well-developed pseudoparenchymatous entostroma unlike most members of the latter genus. We acknowledge, however, that generic concepts in the Diatrypaceae are somewhat artificial and that genera -- including Diatrype and Eutypa -- intergrade. In addition to its somewhat eutypoid habit D. whitmanensis differs from most described Diatrype species in its highly pigmented ascospores.

We unfortunately have no information on the D. whitmanensis anamorph from nature. The anamorph in culture is much like those described previously for some other diatrypaceous fungi (Glawe and Rogers, 1982a, b),

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Figs. 11-19. Diatrype whitmanensis and Diatrype bullata. Fig. 11. Diatrype whitmanensis. Conidiophore has produced two swellings prior to producing the apical conidium. Conidium secession scar evident below the swellings (arrow). Figs. 12-17. Diatrype bullata. Figs. 12-15. Conidia. Note the more or less median bulges in conidia of Figs. 14 and 15. Figs. 16 and 17. Portion of conidiogenous hymenium. Arrows mark secession regions between conidia and conidiogenous cells. Cells from which conidiogenous cells have originated are marked with "c". Figs. 18 and 19. Diatrype whitmanensis. Ascospores.

Figs. 18, 19 by brightfield microscopy of unstained material. All other figures via differential interference contrast microscopy of unstained material. Fig. 16, ca. X 1600. Other figures ca. X 2000.

i.e., in producing scolecosporous conidia holoblastically in conidiomata suggestive of pycnidia. No annellated conidiogenous cells were observed, but, based upon our experience with other diatrypaceous anamorphs (Glawe and Rogers, 1982a, b), it would not be surprising if they eventually were encountered. The only remarkable feature of the D. whitmanensis anamorph appears to be the rather high frequency of "beaded" or swollen areas on conidiogenous cells, such as those depicted in Fig. 11. We suspect that these represent abortive attempts to produce conidia and might be visualized as remnants of conidial fundaments.

Diatrype bullata (Hoffm. : Fr.) Fr. Anamorph. Figs. 12-17.

Colonies on Bonar's modification of Leonian's agar (see Booth, 1971 for formulation) covering plates in 3 wk, pale whitish, thin, appressed; culture medium stained pale yellowish. Sporulation from small (less than 1 mm diam) blackish conidiomata resembling rudimentary pycnidia formed in centers of colonies after 6 wk.

Conidiophores sparingly branched to highly branched, developing from underlying pseudoparenchymatous cells. Conidiogenous cells in dense palisades along conidiomatal walls, cylindrical, straight to curved or irregular, producing conidia holoblastically in sympodial sequence (Figs. 16, 17). Conidia one-celled, hyaline, nearly straight to J-shaped or C-shaped to irregular, frequently swollen and distorted near the middle, with flattened bases (Figs. 12-17), 11-17 (-20) x 1-2 µm.

Collection from which culture was initiated: WASHINGTON: Rogers, J. D., IX.1982, Whitman Co., on corticated Salix sp. branches. Teleomorphic and dried cultural material bearing anamorph deposited in WSP as 67331.

Diatrype bullata is widespread in the Pacific Northwest, being encountered most commonly on Salix sp. We have not observed the anamorph under natural conditions. Cultural and anamorphic characters of D. bullata resemble those of other diatrypaceous fungi (Glawe and Rogers, 1982a, b). The most noteworthy feature of the anamorph is the high percentage of distorted conidia as depicted in Figs. 14 and 15. It is possible that the bulging is a prelude to germination, but germ tubes have not been observed. Conidiogenesis was holoblastic with sympodial conidiogenous cell proliferation. Annellated conidiogenous cells were not observed, but, based upon our experience with other diatrypaceous anamorphs (Glawe and Rogers, 1982a, b), it would not be surprising if these were eventually found.

Eutypella sorbi (Schmidt : Fr.) Sacc. Anamorph. Figs. 7-10.

Colonies on SME agar (see Kenerley and Rogers, 1976 for formulation) covering plates in 4 wk, white with tan sectors, thin and appressed with areas of lanose mycelium, with pale yellowish reverse. Sporulation abundant from small (less than 1 mm diam) yellowish hyphal wefts at margins of colonies after 6 wk.

Conidiophores sparingly branched, developing from underlying pseudoparenchymatous cells. Conidiogenous cells in dense palisades, cylindrical, straight to curved or irregular, producing conidia holoblastically in sympodial sequence (Figs. 7, 8, 9). Conidia one-celled, hyaline, nearly straight to J-shaped, with flattened bases (Figs. 8, 10), 15-22 (-25) x 1-2 µm.

Collection from which culture was initiated: SWITZERLAND: Petrini, L. and O., 28.VI.1981, Splügen, Graubünden, on *Sorbus aucuparia* L. Teleomorphic and dried anamorphic material deposited in WSP as 67332.

Teleomorphic material and a culture of *E. sorbi* were kindly sent us by Orlando Petrini, Zürich, Switzerland. Conidial production was unreliable, abundant in some culture plates and absent in others. Cultural and anamorphic characters were generally like those reported herein and elsewhere (Glawe and Rogers, 1982a, b) for other diatrypaceous fungi. Conidiogenesis was holoblastic with sympodial conidiogenous cell proliferation. No evidence of annellated conidiogenous structures was seen. Conidiogenous regions in cultures were interpreted as rudimentary conidiomata.

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MYCOTAXON

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CONTRIBUTION TO THE LICHEN FLORA OF URUGUAY XVIII. TAXONOMIC NOTES.

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SUMMARY: The author presents the results obtained from floristical studies carried out in Uruguay and the revision of some old collections.
Thirteen lichen species are added to the known flora of the country.
Nine taxa must be deleted from the Uruguayan lichen flora due to misidentifications.

In the present paper the author is primarily publishing the results obtained from recent floristic studies carried out in different localities in Uruguay. The species here listed were selected because they are either new records to the known flora of Uruguay or because the finding represent significant range extensions in the country.
Redeterminations of some old collections already published are also included in this paper as an introductory work prior to the issue of the Supplementary Catalogue of the lichen flora of Uruguay.

Acarospora schleicheri (Ach.) Mass.
COLONIA: Cerros de San Juan, on rocks, hill'top, not common, Osorio 6289.
MONTEVIDEO: Cerro de Montevideo, on rocks, E-slope, alt. 100-120 m., Osorio 5189.
New to Uruguay. Magnusson in his Mcnograph (1929) did not quote any record of this species from the Southern Hemisphere. One year later Cengia Sambo (1930) reported this species from the Argentine Province of Chubut and in 1965 O. Almborn distributed in his exsiccata "Lichenes Africani" some collections from South Africa.

Anaptychia hypoleuca (Mühlenb.) Vain.
The revision of the Uruguayan collections preserved in different herbaria under this name proved that in fact the name was frequently missapplied.
Räsänen (1942) published a collection under this name (Herter 93.416 in H) from the locality of Porongos, Flores Dept.. This one is composed of several small fragments of a maculate *Physcia* that matches well with *Physcia aipolia*(Ehrh. ex Humb.) Fürnr.
Another collection also identified by Räsänen as *Anaptychia hypoleuca* (MONTEVIDEO: Paso de la Arena, Estate Tomkinson, I.M.Lamb 22.III.1946, H) was redetermined by the author as *Heterodermia diademata* (Tayl.) Awasthi. Magnusson (1950) identified as *Anaptychia hypoleuca* the collec-

tion Osorio 1085 from the locality Subida de Mendez, Rivera Dept. After the revision of the collections preserved at UPS and in the private herbarium of the author both specimens were redetermined as *Heterodermia diademata* (Tayl.) Awasthi.

Anaptychia isidiophora (Nyl.) Vain.
Reported by Räsänen (1942) from Valle Edén, Tacuarembó Dept. The specimen preserved with this name in H (Herter 83.952) according with the label is a mixture of A. *isidiophora* and A. *sorediifera*. The author could not find any isidiate material and the whole preserved collection belongs to *Heterodermia obscurata* (Nyl.) Trevis.

Anaptychia speciosa (Wulf.) Mass.
The problem of the misidentifications of old collections of this species is very similar to that observed in *Anaptychia hypoleuca*.
Räsänen (1939) reported a collection from Aiguá, Minas Dept. (at present Lavalleja Dept.) gathered by Herter nr. 94.597 (H) which is a mixture of *Heterodermia tremulans* (Müll. Arg.) Culb. and *Hypotrachyna osorioi* (Hale) Hale.
Three other collections identified by Räsänen as *Anaptychia speciosa* were revised by the author as follows:
ROCHA: Arroyo de la India Muerta, Paso Tranqueras, Hosseus 2 (H)(Räsänen 1939); Estancia Siete Cerros near Rocha, Hosseus 1 (H) (Räsänen 1939).
LAVALLEJA: Cerro Arequita, I.M.Lamb 5.IV.1946 (H).
All the above mentioned collections were redetermined as *Heterodermia obscurata* (Nyl.) Trevis.
Müller Argau (1888) published *Physcia speciosa* var. *hypoleuca* Nyl. from Montevideo collected by Arechavaleta. The specimen seen at MVM with the determination handwritten by Müller Arg. is *Heterodermia obscurata* Nyl.) Trevis.
Navás (1908) also published *Anaptychia speciosa* from Montevideo collected by Arechavaleta but all the species quoted in this list are merely duplicates of the species already published by Müller Arg. (op.cit.)

Buellia modesta (Kremplh.) Müll. Arg.
CANELONES: Bañado del Negro, trunk of *Populus*, Osorio 5163 & 5164.
LAVALLEJA: Cerro Arequita, on shrubs, Osorio 2076.
ROCHA: Laguna Negra, on *Ficus*, Osorio 5690.
New to Uruguay.

Calicium cinereorufescens (Vain.) R. Sant.
FLORES: Arroyo Sarandí, Paso de los Ahogados (3 km W from Trinidad City), on wooden post, Osorio 6419, conf. L. Tibell.
ROCHA: Hwy. 9 and Arroyo Sarandí del Consejo, on trunk of *Eucalyptus*, Osorio 5583.
New to Uruguay.

Cladonia ceratophylla (Sw.) Spreng.
TREINTA Y TRES: Quebrada de los Cuervos, on mossy rocks, Osorio 5919, conf. T. Ahti 1982.
New to Uruguay.

Cladonia macilenta Hoffm.
CANELONES: Parque Nacional "F. D. Roosevelt", on bark of *Eucalyptus robusta*, Osorio 6843.
New to Uruguay.

Cladonia miniata Mey. f. *sorediella* (Vain.) Vain.
This taxon seems to be common in the Department of Rocha growing on boles of palms and forming large patches (Lic. E. Marchesi,pers. comm.). The collection from the Department of Canelones is the southernmost record of this species in South America.
ROCHA: Castillos, Estancia El Palmar, on *Syagrus capitata*, Marchesi 19.III.1977 (MVM); on *Arecastrum romanzoffianum*, Rubio 12.X.978 (MVM); on trunk of palm, Achaval 16.X.1982 (MVM).
CANELONES: Parque Nacional "F. D. Roosevelt", on trunk of *Eucalyptus*, Osorio 8126.

Cladonia ochracea Scriba
CANELONES: Independencia (at present La Paz City), on rocks, Berro 5.V.1900 (MVM), det. T. Ahti.
New to Uruguay. In a former paper (Osorio 1981.a.) this collection was published as *Cladonia* sp. nova.

Cladonia subdelicatula Vain. ex Asah.
ROCHA: Castillos, on trunk of palm, San Martín 4.V.1962 (MVM, Herb. Osorio), det. T. Ahti 1979.
New to Uruguay. So far as I know this species is known only from the type locality in the Brazilian State of Rio Grande do Sul (Asahina 1963, Sandstede 1938).

Graphis striatula (Ach.) Spreng.
ROCHA: Fuerte de San Miguel, on shrubs, Legrand 25.X.1948 (Herb. Osorio).
New to Uruguay.

Lecidea coarctata (Sm.) Nyl. var. *elachista* (Ach.) Th. Fr.
Reported by Räsänen (1942) from the locality La Palma, Florida Dept. In H are two collections from this locality : Herter 99.558 and 99.561 and both were redetermined by the author as *Lecanora fusca* Müll. Arg. According to the author's field observations this species is the most common saxicolous *Lecanora* which occurs in Uruguay.

Leptogium puiggarii Müll. Arg.
Known in Uruguay only from the locality of Vergara, Treinta y Tres Dept. (Räsänen 1942). The collection existing in H (Herter 88.811) is an isidiate specimen that I have redetermined as *Leptogium cyanescens* (Ach.) Körb.

Parmelia perforata Ach.
Recorded from Montevideo by Müller Arg. (1888). The collection existing at MVM under this name (Arechavaleta s.n.) belongs to *Parmotrema cetratum* (Ach.) Hale.

Parmelia perforata var. *ulophylla* Mey. & Flot.
The collection preserved at MVM (Montevideo, Arechavaleta s.n) and published by Müller Arg. (1888) was redetermined by the author as *Parmotrema reticulatum* (Tayl.) Choisy.

Parmelia urceolata Eschw.
The collection under this name at MVM (Montevideo, Arechavaleta s.n.) and published by Müller Arg. (1888) is a *Parmotrema* species which contains stictic acid and matches well with *Parmotrema eciliatum* (Nyl.) Hale.

Parmotrema leucosemothetum (Hue) Hale
CANELONES: Parque Nacional" F. D. Roosevelt", on trunk of *Eucalyptus*,

Osorio 6243, det. M. Hale 1973.
New to Uruguay. The southernmost record previously known is located in the Argentine Province of Misiones (Osorio 1981.b.).

Parmotrema subisidiosum (Müll.Arg.) Hale
CANELONES: Parque Nacional "F. D. Roosevelt", on trunk of *Eucalyptus*, Osorio 6249, det. M. Hale 1973.
New to Uruguay.

Phaeographis lobata (Eschw.) Müll. Arg.
ROCHA: Hwy. 16, Cerro Aspero, on *Blepharocalyx*, Osorio 5732.b.
New to Uruguay. The present finding represents a nearly 500 km southward extension of the range of this species in South America. The southernmost record previously known is the locality of Guaiba in the Brazilian State of Rio Grande do Sul (Osorio, Homrich & Fleig 1982).

Pyrenula bonariensis Malme
DURAZNO: Rio Negro, Paso de las Piedras, on branches of shrubs, Osorio 6957.
New to Uruguay. Formerly known from two other localities in Argentina and Paraguay respectively (Malme 1929).

Ramalina gracilis (Pers.) Nyl.
Räsänen (1938) reported this species from Vergara, Treinta y Tres Dept. The collection preserved in H (Herter 90.810) was redetermined as *Ramalina usnea* (L.) Howe (Race III, Rundel 1978).

Usnea rubicunda Stirt.
ROCHA: Hwy. 16, Cerro Aspero, on *Blepharocalyx*, Osorio 5732.a.
TREINTA Y TRES: Cuchilla de Dionisio, Estancia La Teja, on *Ilex paraguariensis*, Osorio 6091, 6092.
New to Uruguay. The delimitation of this species was made according the criteria given by James (1979).

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MYCOTAXON

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PLAGIOSTOMA SOLIDAGINIS, A NEW SPECIES ON SOLIDAGO

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In July 1979, a specimen of *Plagiostoma* was collected on dried, overwintered stems of *Solidago sempervirens* L. The host was in the high central part of a marsh area adjacent (east) of the Patchaug River and north of Route 1 in Westbrook, Connecticut. The specimen differs from described species in several critical features and is described as new.

The genus *Plagiostoma* Fckl. (Diaporthales, Valsaceae) contains nonstromatic species of the Diaporthales with oblique or horizontal perithecia and eccentric or lateral beaks. The ascospores are ellipsoidal, fusoid or cylindrical with a single median or near median septum. Barr (1978) grouped species of this genus into five sections based on the shape of the ascospores and appendages, position of the septum, arrangement of spores within the ascus and the general appearance of the perithecial beak.

The main features of the new species indicate that it belongs in Section I, Plagiostoma. The features of this section include fusoid ascospores with tapering to pointed ends, a medium septum and biseriate arrangement of the spores in the ascus. Appendages are usually not formed but setose appendages have been described in *P. devexa* (Desm.) Fckl. (Barr, 1978). *Plagiostoma solidaginis* has larger perithecia, beaks, asci and ascospores than other species described in this section. Also distinct setose appendages can be seen on numerous free ascospores using phase contrast microscopy.

Plagiostoma solidaginis J. C. Cooke et Barr, sp. nov. Figs. 1-2. Perithecia singulara vel aggregata, immersa, obliqua vel horizontalia, globosa depressa, 447-700 μm diametro, 225-385 μm alta. Rostra brevia vel elongata, usque ad 750 μm longa, 150-225 μm lata et 110-180 μm apicem versus, periphyses numerosae; erumpentia, lateralia, recta vel leviter curvata. Asci oblongi-cylindrici, 70-98(-110) X 12-16 μm, 8-spori, annulo apicali 3-6 μm diametro. Ascosporae hyalinae, ellipsoidae fusoideae, in extrema rotunda gradatim decrescentiae, leves, (19-)24-28(-32) X 6-8 μm, septum medium, non vel vex constrictum, globuli duo intracellules, exappendiculae vel appendiculae setaceae, 6-13 μm longae.

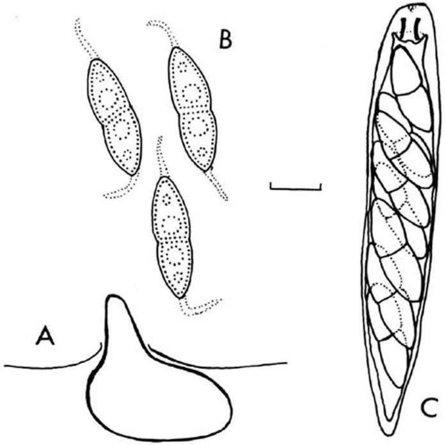

Figure 1. *Plagiostoma solidaginis*. (A) Outline of perithecium in host tissue. (B) Ascospores. (C) Ascus. Scale = 200 µm for perithecium and 10 µm for asci and ascospores.

Holotypus in stipibus anni praeteriti *Solidago sempervirens* L., Westbrook, Connecticut, 18 July 1979, J. C. Cooke (M-46), N. Capozzi, M. R. Cooke, in herbario University of Massachusetts (MASS).

Perithecia single or aggregated, immersed, oblique or horizontal, depressed globose, 445-700 µm diam, 225-385 µm high exclusive of beak. Beaks short or elongate, up to 750 µm long, 150-225 µm wide near the base, tapering to 110-180 µm wide near the apex, lined with periphyses, erumpent, eccentric or lateral, straight or slightly curved. Asci

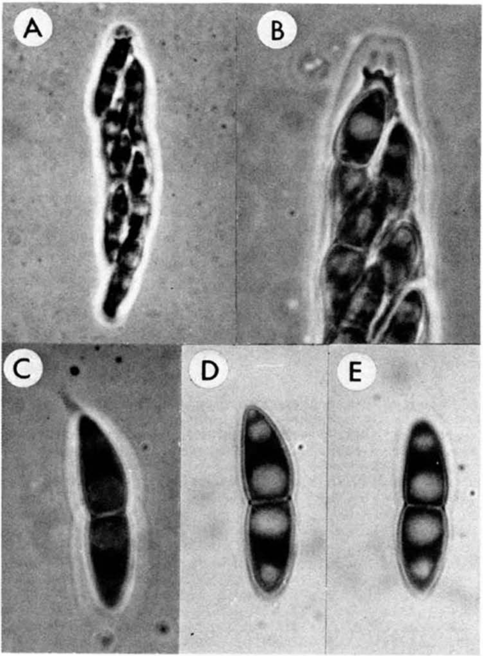

Figure 2. *Plagiostoma solidaginis*, phase contrast. (A) Asci with ascospores X750. (B) Ascus tip showing apical annulus. (C) Ascospores with refractive globules. B,C,D,E X1500.

oblong cylindrical, 70-98(-110) X 12-16 µm, 8 spored, apical annulus 3-6 µm diam and 5-6 µm from ascus tip. Ascospores hyaline, ellipsoid fusoid with ends rounded, smooth, (19-)24-28(-32) X 6-8 µm, septum medium, slightly constricted at septum, 2 refractive globules per cell, elongate appendages, 6-13 µm long, usually present at ends of spores. Spores overlapping or biseriate in the ascus.

On overwintered stems of *Solidago sempervirens* L. Holotype collected in a marsh, east of Patchaug River, Westbrook, Connecticut, J. C. Cooke (M-46), N. Capozzi and M. R. Cooke, 18 July 1979 (MASS). A second collection was made at the same site 26 Aug. 1982, J. C. Cooke (M-451) and R. P. Collins (CONN).

When the literature was searched for a possible name, the description and figures of *Diaporthopsis appendiculata* Wehmeyer on *Aster* sp. seemed close to the species on *Solidago*. The holotype of *D. appendiculata* (MICH) proved to differ from *Plagiostoma solidaginis* and to agree in all respects with the original description, except that the perithecia are oblique with lateral ostioles, indicated in Wehmeyer's sketch (Wehmeyer, 1933, Pl. XVIII, fig. 7) but not stated in the description. This fungus is indeed a species of *Clypeoporthella* as suggested earlier (Barr, 1978) and the new combination is proposed *Clypeoporthella appendiculata* (Wehm.) J. C. Cooke et Barr. Basionym: *Diaporthopsis appendiculata* Wehm., The genus *Diaporthe* Nitschke and its segregates., Univ. Michigan Stud. Sci. Ser. 9: 233, 1933.

ACKNOWLEDGEMENTS

The authors thank the curator of the University of Michigan Herbarium (MICH) for the loan of the type specimen, Dr. Clark T. Rogerson for his review, and Mrs. Dorothy Norton for typing the manuscript.

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MYCOTAXON

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HADROTRICHUM PYRENAICUM nov. sp., A NEW DEUTEROMYCETE FROM THE PYRENEES (FRANCE)

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ABSTRACT

Hadrotrichum pyrenaicum Petrini et Candoussau is described and illustrated.

During a collecting trip in the Pyrénées Atlantiques (France) one of us collected what appeared to be a coelomycetous fungus that we could not place satisfactorily in any known genus. Some months later three more collections were made, two were from the Pyrénées and the third from Ticino in Switzerland; all three were on ***Fraxinus***.
The conidiomata of this fungus could be described as acervular; however, acervuli are often hardly distinguishable from sporodochial fructifications, and we attempted the identification both as a coelomycete and as a hyphomycete. ***Hadrotrichum*** Fuck., in the hyphomycetes, appeared to be the nearest suitable genus. In all four collections examined the conidia are sequentially formed although the individual conidiogenous loci are difficult to see and not as thickened as they should be for ***Hadrotrichum*** (Dr. B.C.Sutton, C. M. I., Kew, pers. comm.). Moreover, of the species described in ***Hadrotrichum*** only two are not foliicolous (***H. atromaculans*** Sacc. on palm stems and ***H. lunzinense*** van Szilvinyi, isolated from soil), whereas our specimens are clearly lignicolous.
Our fungus probably represents a new form genus in the Deuteromycetes but we prefer not to describe it as such while generic concepts within this group are still confused (Kendrick, 1980). Instead we propose a new species in ***Hadrotrichum***, a genus which is not yet clearly delimited.

Hadrotrichum pyrenaicum Petrini et Candoussau, nov. sp. (Fig. 1)

> *Conidiomata ad 10 mm diametro, singula vel gregaria ac confluentia, disciformia, erumpentia, fusca, textura angulari composita.*
> *Conidiophora paene hyalina ad pallide brunnea, rare septata, subulata, ad 25 µm longa. Cellulae conidiogenae holoblasticae, cylindraceae, cicatricibus indistinctis. In cultura pura autem conidiophora ramosa, Nodulisporio affinia.*
> *Conidia solitaria, continua, globosa vel ellipsoidea, pallide brunnea vel fusca aetate provecta, laevia, 5 - 7 x 3 - 5 µm. In cultura pura conidia distincte sympodialiter orientia, 6 - 8 x 3 - 5 µm.*
> *Habitat in ligno Fraxini excelsioris.*
> *Holotypus: in ligno Fraxini excelsioris, Bois de Bourdettes, 64 PAU (Gallia pyrenaica), 21.1. 1982, leg. F. Candoussau (ZT, IMI).*

Conidiomata acervular or sporodochial, separate or confluent, discoidal, erumpent, brown, up to 10 mm across, formed of pale brown to brick red textura angularis. Conidiophores subhyaline to pale brown, rarely septate, unbranched, straight, tapered toward the apices, formed from the upper cells of the conidioma, up to 25 µm long. Conidiogenous cells holoblastic, cylindrical, smooth. Conidia aseptate, pale brown, becoming dark when old, obovate to nearly spherical, smooth, 5 - 7 x 3 - 5 µm. Habitat on old, decaying wood of *Fraxinus excelsior* L. Holotype on *Fraxinus excelsior* L. , Bois de Bourdettes, 64 PAU (France), leg. F. Candoussau, 21.1. 1982 (ZT, isotype in IMI).

Cultural characters: (single conidial isolates, Fig. 2) Colony attaining 50 mm diameter on 2% Malt agar in four weeks at 15°C; aerial mycelium white to pale brown with yellow tinges. Colony reverse brown, exudate and odour absent. Conidiophores and conidia are formed within 6 weeks; no acervuli or sporodochia are produced. The conidiophores are scattered over the whole surface of the mycelium, septate, branched, *Nodulisporium*-like; the conidia are aseptate, obovate to almost spherical, brown, becoming darker when old, 6 - 8 x 3 - 5 µm.

Material examined:

FRANCE. On *Fraxinus excelsior* L., Bois de Bourdettes, 64 Pau, leg. F. Candoussau, 21.1. 1982 (TYPE, ZT, IMI 270516).- On *Fraxinus excelsior* L., Bois de Bager Nord, 64 Arudy, leg. F. Candoussau.- On *Fraxinus excelsior* L., Bugangue, 64 Oloron, leg. F. Candoussau,

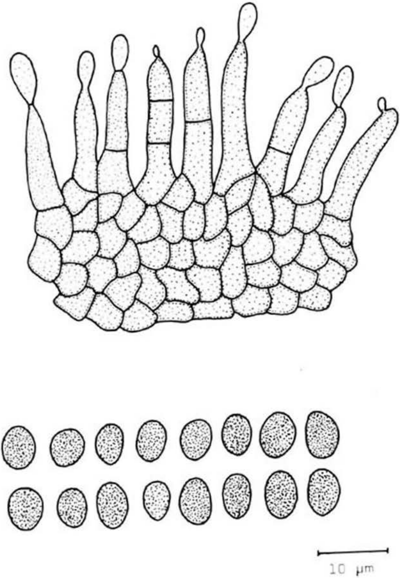

Fig. 1 . ***Hadrotrichum pyrenaicum***. Holotype, ZT and IMI 270516. Conidiophores and conidia formed on the host.

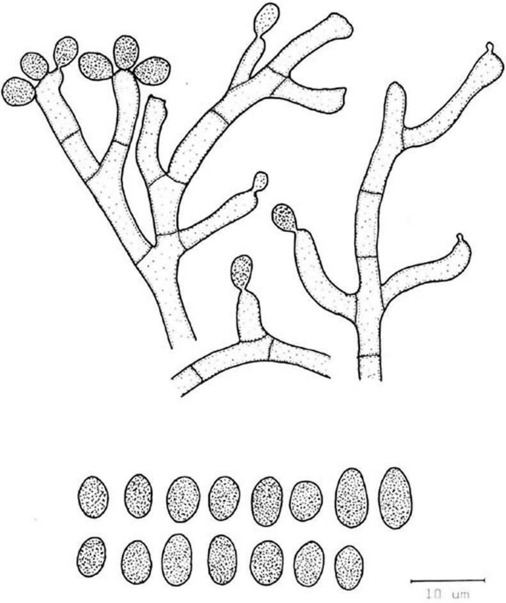

Fig. 2. *Hadrotrichum pyrenaicum*. Conidiophores and conidia formed in single conidial isolates from the type material.

G. Gilles et J. Vivant, 3.10. 1982 (ZT).
SWITZERLAND. On *Fraxinus excelsior* L. , Meride,Spinirolo TI, leg. L. Petrini and A.J.S. Whalley, 26.8. 1982 (ZT, IMI 270431).

Hadrotrichum pyrenaicum has probably been overlooked, or confused, for a long time with immature forms of *Hypoxylon spp.*, although a microscopical examination leaves no doubt as to its identity. No connection with any known species of *Hypoxylon* could be established even though the presence of *Nodulisporium* - like conidiophores and conidia in pure culture indicates a possible link.
The absence of conidiomata in culture is striking, but by no means uncommon for coelomycetous or sporodochial fungi. *Sclerophoma pythiophila* (Corda) von Höhnel (= *Dothichiza pythiophila* (Corda) Petrak) is reported to frequently produce only its hyphomycetous synanamorph *Hormonema dematioides* Lagerberg et Melin in culture (Hermanides-Nijhof, 1977); some species of *Sirodothis* form only their *Phialophora* hyphomycetous synanamorph when isolated in pure culture (Petrini, unpublished). Hence the need to establish any connections between hyphomycete and coelomycete genera by means of cultural work in order to get a comprehensive interpretation of the pleomorphism within anamorphs.

We wish to thank Dr. S.M. Francis, C. M. I., Kew and Dr. E. Müller, Zürich for the critical reading of the manuscript. Mrs. L. Petrini did the single conidia isolates. We are grateful to Dr. B. C. Sutton for examining and expressing opinions on the taxonomical position of this fungus.

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STUDIES IN THE GENUS PSOROMA*
3. PSOROMA PANNARIOIDES AND PSOROMA INTERNECTENS

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SUMMARY

Psoroma pannarioides Henssen is described for the first time. The new species was collected on soil in Tierra del Fuego, and is characterised by an almost homoiomerous thallus and zeorine apothecia with a well-developed cortex in the margo thallinus. The cephalodia are remarkable for their production of pycnidia and soredia. The internal structure of the thallus and apothecia of P.pannarioides corresponds to those of P.internectens, a terricolous species from Patagonia. The two species are thought to be closely related members of the P.hypnorum-group. Both lichens have no substances of taxonomic value detectable by TLC.

INTRODUCTION

This paper like the first of the series (Henssen and Rennner 1981) reports on species of Psoroma related to P.hypnorum(Vahl) S.F.Gray. The new species, P.pannarioides, is the most inconspicuous of the group with apothecia of about one millimeter in diam. The lichen superficially re-

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* Part 1. Mycotaxon 13:433-449 (1981).
Part 2. Mycotaxon 18:29-48 (1983).

ies of *Pannaria*. In the anatomy of the thallus and apothecia, *P.pannarioides* corresponds to *P.internectens* M.Lamb, a terricolous lichen with imbricate lobes and the habit of a species of *Psoromidium* Stirton (Lamb 1955). In *Psoroma pannarioides* and in *P.internectens* the thallus is homoiomerous, at least in young lobes. As in certain other members of the *P.hypnorum*-group the cephalodia are small and arise in groups underneath the apothecia or they are conspicuous and of similar shape to the lobes. In *P.pannarioides* large cephalodia were found to include pycnidia (Fig. 3C). These observations are of general interest in regard to studies of morphotypes in other lichen genera (James and Henssen 1976, Renner and Galloway 1982) since they reveal a certain equivalence of the blue-green morphotype. In *P.pannarioides* the cephalodia may also form soredia (Fig. 3E). The production of well developed soredia from cephalodia is known for *P.durietzii* P.James et Henssen (James and Henssen 1975).

The name *pannarioides* stresses the similarity of the lichen to species of the genus *Pannaria*.

MATERIAL AND METHODS

MATERIAL. *Psoroma internectens*: Argentina, Patagonia, Prov.Chubut, Lago Menéndez, 1940 Kühnemann 4747 (holotype:BA).

METHODS. The methods described in Henssen and Renner (1981) are followed. The measurements given refer to microtome sections embedded in lactophenol cotton-blue (LPCB), or to air dry material, respectively.

TAXONOMIC PART

Psoroma pannarioides Henssen, sp.nov.

Figs 1 A-E, 2 A-C, 3 A-E, 4, 5 A-D, F.

DIAGNOSIS. Thallus minute squamulosus, fuscescens vel nigricans, substrato arcte affixus, squamulis c. 0.5-1 (-1.5)mm latis. Thallus corticatus, homoiomerus, hyphae medullosae reticulum formantes, alga symbiotica laete viridis, verosimiliter ad familiam *Chlorococcaceae* pertinens.

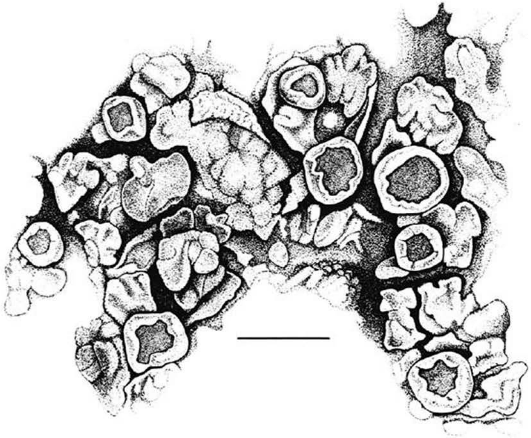

Fig. 1. Psoroma pannarioides (part of holotype). Scale = 1mm; drawn by H.Becker.

Cephalodia squamulosa, vix 0.5mm lata, indistincte corticata, alga ad Nostoc pertinens.

Apothecia 0.5(-1)mm lata, disco plano, rufofusco, margine thallode circumdata. Asci cylindrici vel clavati, 80-100 x 12-18µm, 8-spori, annullo amyloideo in apice incrassato. Sporae simplices, incolores. polymorphae. ovoideae. subfusiformes vel lacrimiformes, (15.5-)20-28 x (4.5-)7-10µm, superficie verruculosa. Pycnidia 120-190µm lata. Conidia bacilliformia, c. 2.5-3.5 x 1µm.

Chemistry: chemical compounds of taxonomic value not detectable by TLC.

Holotype: Argentina, Tierra del Fuego, Parque Nacional de la Tierra del Fuego, Laguna Escondida, on loamy soil near lakeshore, at c.270ms.m., 1973, Henssen & Vobis 24439f (MB); (isotype:LPS).

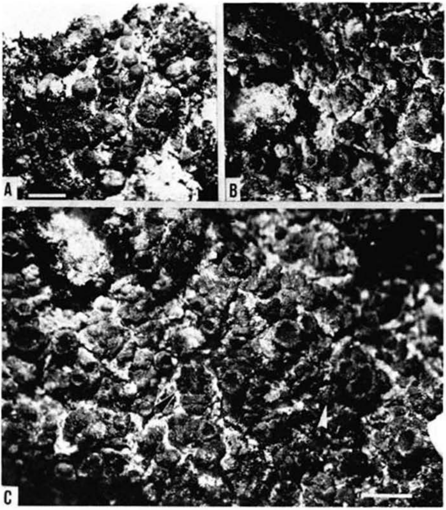

Fig. 2. Habit photographs of Psoroma pannarioides (parts of holotype); A, scattered squamules. B, and C, aggregated squamules bearing apothecia of different size; cephalodia indicated by arrows. Scale = 1mm.

Thallus terricolous, of minute squamules, forming a blackish-brown crust on substrate, at least 3cm in diam. (Figs. 1, 2). Squamules 0.5-1 (-1.5) mm large, closely appressed, attached by 4.5-5µm thick colourless or slightly dark hyphae with vacuolated cells.

Squamules nodulose, varying in thickness. Thallus sections 150-280µm, surrounded by a thin cortex. Upper cortex composed of isodiametric cells, 1 or 2 rows thick, lower cortex formed by 2 or 3

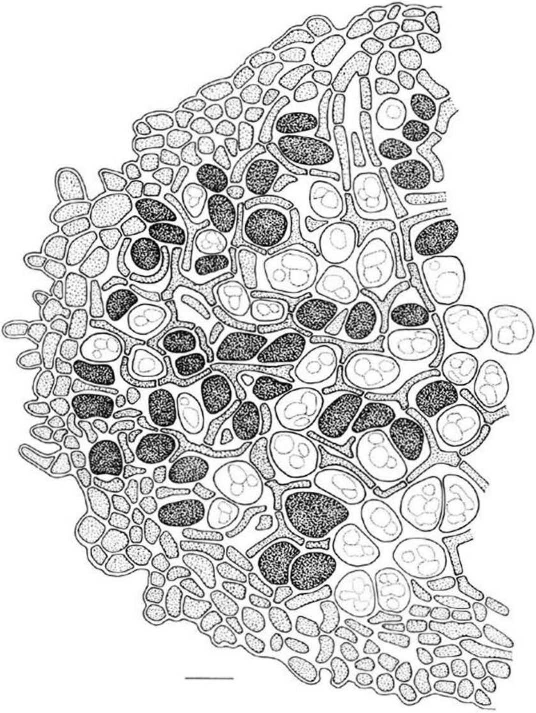

Fig. 3. Psoroma pannarioides (holotype); l.s. of lobe tip, algal cells in part disintegrating, or containing large vacuoles, not staining in LPCB. Scale = 10μm; camera lucida drawing.

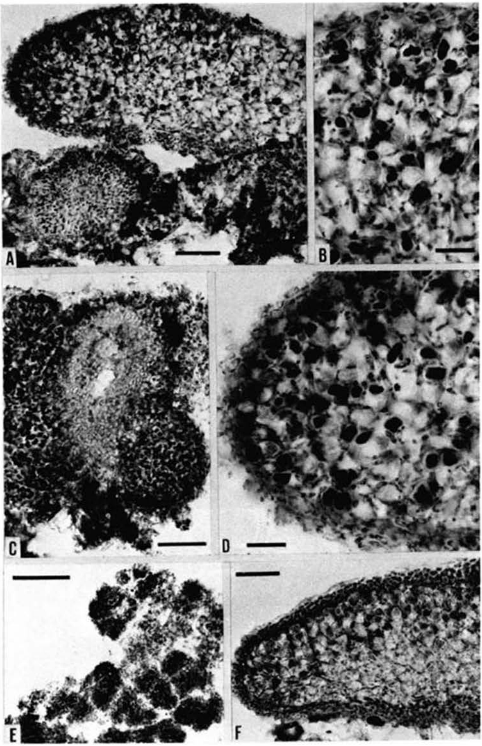

Fig. 4. Thallus anatomy of Psoroma species (microtome sections). A-E, P.pannarioides (holotype). A, l.s. of young thallus overgrowing older thallus, and cephalodium including developing

layers of horizontally extended hyphae (Fig. 3A). Medullary hyphae richly branched, forming a densely meshed network around the algal cells.(Figs. 3B,D, 4). Phycobiont green, non-filamentous, distributed throughout the thallus. Algal cells 7-12µm diam. Algal cells which have large vacuoles or are morbid do not stain in lactophenol cotton-blue: a high proportion of the algal cells in thallus are in such condition (Fig. 3D, arrows, Fig. 4).

Cephalodia either small and nodulose arising in groups below the apothecia bearing squamules or larger and squamulose developing seperately between the squamules of the green-algal morphotype, to 0.5mm diam., dark purple-brown or blackish, surface roughened through development of soredia, phycobiont Nostoc.

Apothecia 0.5-1mm diam., arising singly or in pairs in the upper surface of a squamule, finally adnate or slightly constricted at base (Figs. 1, 2), disc dark red-brown, thalline margin entire or slightly crenulate. Hymenium 95-115µm tall, hypothecium 35-50µm thick, excipulum cupular, of strongly parallelly aligned hyphae, c. 20-30 µm thick at the upper edge. Paraphyses only slightly branched and anastomosing, c. 1µm thick, apical cells enlarged to 2µm. Asci cylindrical or clavate, 82-100 x 12-18µm, tholus with amyloid ring structure. Spores 8 per ascus, polymorphic, ovoid to fusiform or lachrymiform (Fig. 5B), immature in ascus (4.7-)7-9.5 x (15.5-) 20-24µm, with epispore, outer surface roughened.

Pycnidia so far observed included in cephalodia, in sections 120-190µm, conidiophores articulate bearing conidia terminally and laterally, conidia rod-shaped, 2.5-3.5 x c. 1µm.

nidium (arrow). B, l.s. of thallus upper part, C, l.s. of cephalodium including disintegrating pycnidium. D, l.s. of lobe tip, algal cells in part including large vacuoles and not staining in LPCB (arrows). E, upper part of cephalodium developing soredia. F, P.internectens (holotype), l.s. of thallus with well developed cortex. A-F, scale = 20µm.

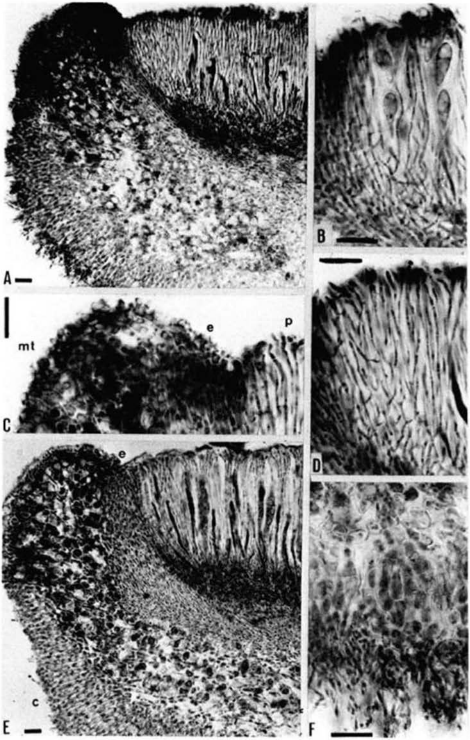

Fig. 5. Structure of apothecia in Psoroma species (microtome sections). A-D, P.pannarioides (holotype). A, marginal part of old apothecium with well developed cortex in margo thallinus. B, part

Distribution and ecology. *P.pannarioides* is a pioneer lichen on soils covered by snow for longer periods of time. It is so far known only from the type locality.

Remarks. *P.pannarioides* is one of the smallest known species of *Psoroma*. The similarity to *Pannaria* is striking (Fig. 2). When the lichen was collected it was taken for a species of that genus but microscopic examination revealed the presence of green-algal cells in the thalline margin of the apothecia and lobes as well as the presence of cephalodia between the squamules.

P.pannarioides is, obviously, closely related to *P.internectens*. Both species correspond in the internal structure of the thallus and apothecia. The thallus is almost homoiomerous, in its inner part composed of branched hyphe forming a dense network around the algal cells, and delimited by a narrow cortex above and below. The cortex is better developed in lobes of *P.internectens* (Fig. 4A, F). In both species, the predation of the mycobiont, on the phycobiont is rather severe, leading to the vacuolisation and disintegration of many algal cells (Figs. 3, 4, 8). In the apothecia of both species the initially annular excipulum develops into a closed, cup-shaped layer formed by parallelly arranged hyphae, and the cortex in the margo thallinus is well developed in the basal part (Fig. 5A, E).

P.pannarioides is distinguished from *P.internectens* by the closely adnate, more rounded and smaller squamules, and by the tiny apothecia with thick thalline margins. In *P.internectens* the ascending lobes are distinctly imbricate, and the

of hymenium with lacryform spores. C, upper apothecium edge with margo thallinus (mt), excipulum (e) and tips of paraphyses (p). D, development of basally branched paraphyses in marginal zone of hymenium. E, *P.internectens* (holotype), marginal part of apothecium with well developed excipulum and thalline cortex. F, *P.pannarioides* (holotype), marginal part of cortex in margo thallinus covered by hairs. Scale = 20µm.

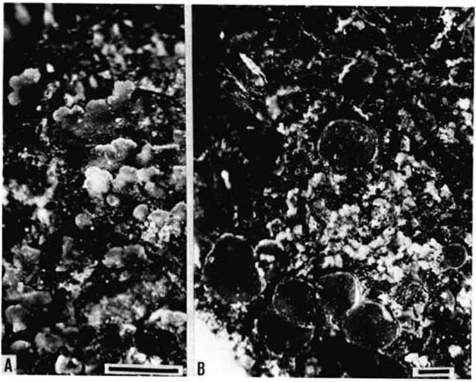

Fig. 6. Habit photographs of Psoroma internectens (holotype). A, aggregated imbricate lobes. B, nodulose lobes and large apothecia with depressed thalline margin. Scale = 1mm.

apothecial thalline margin is soon depressed (Figs. 6, 7). P.rubromarginatum has a somewhat similar thallus anatomy and also closely adnate lobes but differs in having a much larger thallus with a reddish coloration and by the presence of the lichen substances tenuin and pannaric acid (Henssen et al. 1983). P.tenue Henssen, a species with comparably small squamules like P.pannarioides, is distinguished by larger apothecia with a distinct crenulate thalline margin, a brown colour of the lobes, and the presence of tenuin and pannaric acid (Henssen and Renner 1981).

The production of coarse soredia in P.pannariodes coresponds mostly to that in Homothecium somediosum, a cyanophilic lichen with Nostoc as phycobiont (Henssen 1979). Also in this lichen the soredia are coarse and blackish. The soredia

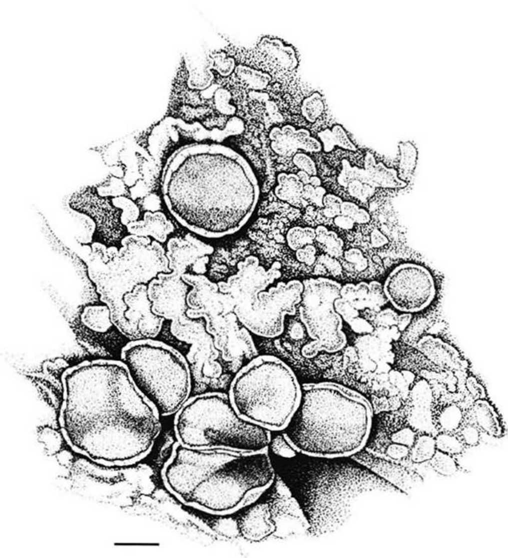

Fig. 7. Psoroma internectens, part of holotype (BA). Scale = 1mm; drawn by H.Becker.

in Psoroma durietzii, which are also formed by cephalodia, are farinose ,and blue-grey in colour (James and Henssen 1975).

Psoroma internectens M.Lamb
Figs. 4 F, 5 E, 6 A-B, 7, 8.

Psoroma internectens is known only from the western part of Patagonia where it was collected on earth by a lake shore. The species is charact-

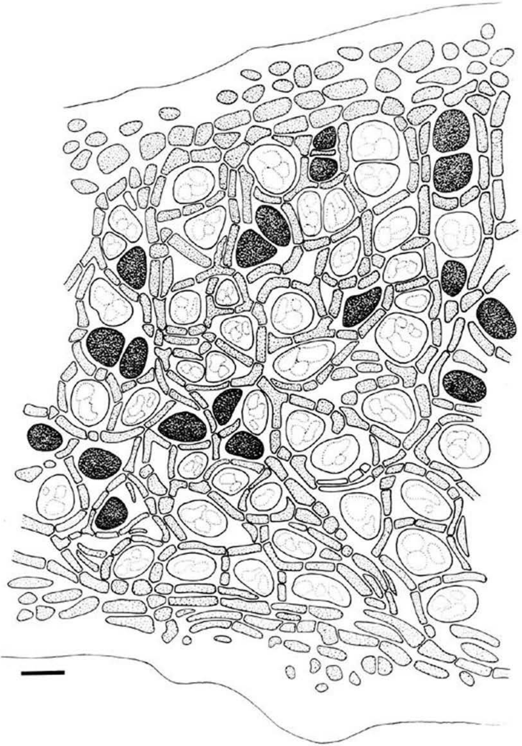

Fig. 8. Psoroma internectens (holotype), l.s. of lobe tip. Scale = 10µm; camera lucida drawing.

erised by small, nodulose or imbricate squamules and relatively large apothecia with a depressed thalline margin (Figs. 6, 7). The morphology of the lichen was described by Lamb (1955 p. 427-429). Some additional results obtained by investigation of freezing microtome sections are given here.

The *lobes* are delimited on both surfaces by a 10- 25µm thick cortex composed of isodiametric cells at the upper and a strand of periclinally arranged hyphae at the lowwer surface (Fig. 4F). In the median part of the thallus, the hyphae are anticlinally arranged forming a network of small meshes around the algal cells. As in *P.pannarioides*, the algal cells are uniformly distributed throughout the thallus. Frequently, they contain vacuoles or are completely destroyed, and do not stain in lactophenol cotton-blue (Fig. 8).

The dark red-brown *cephalodia* have either the form of imbricte squamules or they are nodulose and grouped underneath apothecia and lobes. Large cephalodia a cortex of a similar structure to that in the green-algal lobes.

The *apothecia* have a 55-60µm thick cupular excipulum composed of a strand of parallel hyphae. The margo thallinus has a cortex in the basal part to 120µm thick. The internal structure corresponds closely to that observed in *P.pannarioides* (Fig. 5E).

P.internectens contains no lichen substances of taxonomic value detectable by TLC.

ACKNOWLEDGEMENT

The study was supported by a grant of the Deutsche Forschungsgemeinschaft.I am greatly indebted to Dr. B.Renner for performing the TLC-studies of the specimens, and to the curator of the herbarium in Buenos Aires for the loan of the type specimen of *P.internectens*. Mrs.G.Traute is thanked for technical help and Miss A.Schenk for making the drawings in Figs. 3 and 8. Dr. D.J.Galloway and Mr.P.W.James kindly read the manuscript.

ZUSAMMENFASSUNG

Die neue Art Psoroma pannarioides Henssen ist nur von der Typuslokalität in Tierro del Fuego bekannt. Die kleinschuppige Flechte mit den winzigen, bis 1mm breiten Apothecien gleicht habituell einer Pannaria-Art. Das Lager ist ringsum berindet, im Innern fast homöomer aufgebaut: netzig verzweigte antikline Hyphen bilden ein enges Maschenwerk um die Zellen der symbiotischen Grünalge. Die Algenzellen sind teils vakuolisiert oder abgestorben. Solche Algenzellen färben sich nicht mit Lactophenol-Baumwollblau. Die Cephalodien sind schuppig oder granulär, liegen zwischen oder unter den Loben und Apothecien. Sie enthalten Nostoc als symbiotische Alge. Die Cephalodien sind durch die Bildung von Pycnidien und Soredien ausgezeichnet. Die Apothecien haben einen glatten oder wenig gekerbten Lagerrand mit gut entwickelter Rinde und ein cupulares Excipulum.

P.pannarioides stimmt in der Struktur des Lagers und der Apothecien weitgehend mit der südamerikanischen Psoroma internectens M.Lamb überein. Beide Arten sind nahe miteinander verwandt. P.internectens unterscheidet sich durch eine besser entwickelte Lagerrinde, durch aufrechte, gekerbte Loben und durch Apothecien mit bald herabgedrücktem Lagerrand.

In keiner der beiden Psoroma-Arten konnten Flechtenstoffe von taxonomischem Wert nachgewiesen werden.

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DESCRIPTIONS OF NEW SPECIES AND COMBINATIONS IN MICROSPHAERA AND ERYSIPHE (IV)

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The present paper contains combinations and descriptions of the following new species and varieties: *Microsphaera berberidis* var. *asiatica* var. nov., *M. dimorpha* (Yu & Zhao) stat. nov., *Erysiphe hydrophyllacearum* spec. nov., *E. cichoracearum* var. *latispora* var. nov., *E. diervillae* spec. nov., *E. chloranthi* (Golovin & Bunkina) stat. nov., *E. werneri* stat. et nom. nov., *E. thuemenii* stat. et nom. nov., *E. galii* var. *riedliana* (Speer) stat. nov., *E. actinostemmae* spec. nov., *E. laporteae* spec. nov., *E. americana* spec. nov., *E. cumminsiana* spec. nov. Furthermore, taxonomic notes on some additional species are included.

1. *Microsphaera* on *Berberis*

Yu and Zhao (1981) published a very important paper on the Chinese *Microsphaera* species on *Berberis*. I reexamined the European *M. berberidis* on *B. vulgaris*, the type host, and Japanese material on *B. amurensis*. A careful comparison between the two races revealed obvious, constant differences. The appendages of the typical *M. berberidis* are 1-3 times as long as the cleistothecial diameter and the apex is always very loosely and irregularly branched (1-2, mostly 1-1.5 x in *B. amurensis*, apex rather closely and more regularly branched).

Key to the species of *Microsphaera* on *Berberis*

1. Appendages very long and flexuous, up to 950 µm, with a tendency to turn towards one direction, apex simple or sometimes 1-3 x branched, loose, on Berberis spec. in Central Asia (Kirgiz S.S.R.) ... 6. *M. golovinii*

1′ Appendages shorter, length < 400 µm, ca. 1-3.5 x diam. cleist., apex richly branched, 3-6 x 2

2. Apex of the appendages dichotomously branched, tips of the ultimate branchlets always straight 3

2′ Tips partly recurved in mature samples 4

3\. Appendages 1-3 x as long as the cleist. diam., apex very loosely and irregularly branched, European species .... 1a. M. berberidis var. berberidis

3′ Appendages 1-2, mostly 1-1.5 x as long as the cleist. diam., apex rather closely and more regularly branched, distributed in Asia (Japan, Far East of the USSR, China) .... 1b. M. berberidis var. asiatica

4\. Appendages ca. 1-2 x as long as the cleist. diam., apex very closely and regularly branched, compact, primary branches short, on Berberis heteropoda, China .... 2. M. dimorpha

4′ Appendages longer, 1.5-3.5 x diam. cleist., branchings rather loose, primary branches frequently elongated 5

5\. Cleist. small, 70-100 µm in diam., 4-15 appendages, apex 3-4 (-6) x branched, primary branches elongated, often somewhat recurved, branches of the higher order short, on B. dasystachya (China) and B. thunbergii (Japan) .... 3. M. berberidicola

5′ Cleist. 70-115 µm diam., 5-35 appendages, apex 4-6 x branched, a different mode of branching, on other hosts 6

6\. Appendages (1-) 1.5-2.5 (-3) x as long as the cleist. diam., rather stiff, basal part usually coloured, brown, rough, thick-walled throughout or thick below and thin above, ascospores 16-30 x 8-15 µm, on B. amurensis, China, Japan .... 4. M. multappendicis

6′ Appendages 1.5-3.5, mostly 2-3 x as long as the cleist. diam., flexuous, hyaline or only coloured at the very base, smooth, thin-walled, ascospores 16-20 x 9-13 µm, on B. diaphana, China .... 5. M. sichuanica

1a. Microsphaera berberidis (DC.) Lév. var. berberidis, Ann. Sci. Nat., bot., 3 sér., 15, p.159, 381 (1851)

B. vulgaris is the main host of the fungus. In Europe it can easily infect other species of the genera Berberis and Mahonia, especially in parks and botanical gardens. Fig. 2.

1b. M. berberidis var. asiatica U. Braun var. nov.

Syn.: M. berberidis var. berberidis ss. Yu and Zhao (1981).

A typo differt appendicibus 1-2, saepe 1-1.5plo longioribus et regulariter dichotome ramosis. Fig. 1.

Holotypus: hospes - Berberis amurensis Rupr. var. japonica (Regel) Rehd., Japan, Sapporo, 3-10-1925, Homma (TNS-F-214333).

Cleistothecia (70-) 80-110 (-125) µm in diam., cells ca. 10-15 µm diam., (5-) 8-15 (-20) equatorial appendages, rather stiff, length 1-2, mostly 1-1.5 x diam. cleist., stalk hyaline or coloured at the very base, smooth or rough below, 0-1-septate, moderately thick-walled throughout or thin above and thicker towards the base, 8-11 µm wide near the base, apex 3-7 x branched, primary and secondary branches often long, appearance often somewhat digitate, tips always straight, 3-8 asci, 40-60 x 25-40 µm, 3-5 (-6) spores, 16-25 x 9-15 µm.

Japanese material on *B. tschonoskyana* Regel could not be studied. But it *seems also to belong* to the present variety.

2. *M. dimorpha* (Yu & Zhao) U. Braun stat. nov.

Bas.: *M. berberidis* var. *dimorpha* Yu & Zhao, Acta Microbiol. *Sinica 21(2)*, p.*145 (1981)*.

The species has been described from China on *B. heteropoda*. It appears also to be distributed in *Kazakhstan on the same host* (Vasjagina & al. 1961, p.294, fig. 96). The apical branchings of the appendages are very close and regular and the ultimate tips are partly recurved in mature samples. This mode of branching is quite distinct from the *M. berberidis* complex. The fungus should not be lumped *with the latter* species. Fig. 4.

3. *M. berberidicola* Tai, Bull. Torrey bot. Club 73, p. *115 (1946)*

The species is known on *B. dasystachya* from China. I reexamined some Japanese *collections on B. thunbergii* (e.g. TNS-F-229943). The fungus on this *host belongs* clearly to *M. berberidicola*. Fig. 3.

4. *M. multappendicis* Zhao & Yu, Acta Microbiol. Sinica *21(2), p.146 (1981)*

The species seems to be rather rare in Japan. I studied numerous collections of *M. berberidis* var. *asiatica* on *B. amurensis*, but only *a single sample* on *this host* was *infected by* this species (*B. amurensis* var. *japonica*, Japan, Mt. Akagi, Seta-*gun*, *Gumma Pref*., *16-9-1979*, ex herb. Nomura, now in HAL).

5. *M. sichuanica* Yu, Acta Microbiol. Sinica 21(2), p. *149 (1981)*

The species is only known on *B. diaphana* from the type collection in China.

6. *M. golovinii* (Domasch.) U. Braun, Nova Hedwigia 34, *p.709 (1981)*

Syn.: *Trichocladia golovinii* Domasch., Bot. mat. otd. spor. *rast. bot. inst. akad.* nauk SSSR 12, p.161 (1959).

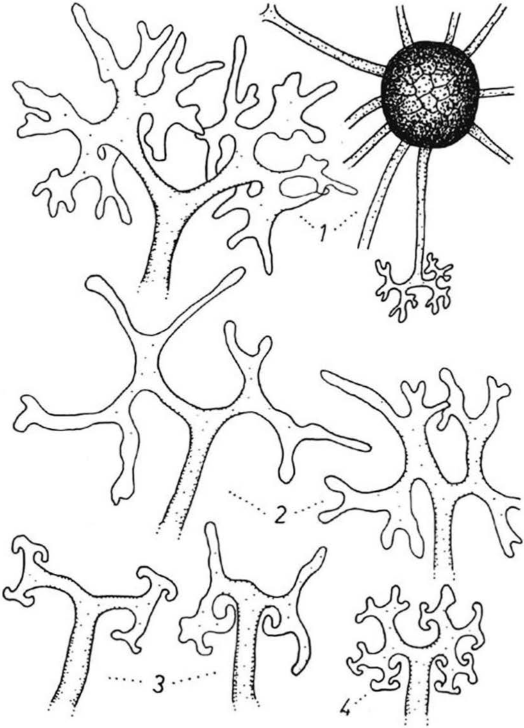

Fig. 1-4. Microsphaera berberidis var. asiatica, cleistothecium, appendage, branched apex (1). Apical branchings of appendages, M. berberidis var. berberidis (2), M. berberidicola (3), M. dimorpha (4). U. Braun del.

2. *Erysiphe hydrophyllacearum* U. Braun spec. nov.
Syn.: *E. cichoracearum* em. Salmon (1900) p.p.

Conidia catenulata, 28-38 x 13.5-20 µm. Cleistothecia 85-140 µm diam., cellulae peridii 8-25 (-35) µm diam., appendices numerosae, diametro cleistothecii 1-3.5plo longiores, tenuitunicatae, septatae, fuscae, 5-12 (-15) µm latae, asci 6-20, (50-) 60-80 x 25-40 (-55) µm, ascosporae 2(-3), (16-) 20-25 (-28) x 11-16 µm. Fig. 5.

Holotypus: hospes - *Hydrophyllum virginianum* L., Canada, Ont., N. Toronto, Hogg's Hollow, 24-7-1930, Cain (DAOM 86303).

Amphigenous, mycelium subpersistent, effused or irregular patches, conidia in chains, ellipsoid-ovoid to barrel-shaped, 28-38 x 13.5-20 µm. Cleistothecia mostly scattered, 85-140 µm in diam., cells of the upper half very conspicuous, polygonal, thick-walled, easily to be seen in fully coloured, closed ascocarps, 8-25 (-35) µm diam., appendages numerous, well developed and long in mature samples, 1-3.5 x as long as the cleist. diam., inserted around the equatorial zone and in the upper half of the fruit body, completely brown or paler upwards, thin-walled, septate, smooth, simple, rather coarse and mostly stiff and straight at the base, 5-12 (-15) µm wide, 6-20 asci, stalked, (50-) 60-80 x 25-40 (-55) µm, 2(-3) spores, (16-) 20-25 (-28) x 11-16 µm.

The outer cells of the peridium in the upper half of the fruit body are very conspicuous, large and easily to be seen, also in fully coloured, closed ascocarps. The appendages are equatorially inserted and in the upper half, they are rather coarse and stiff in the basal part. These features distinguish the new species from the whole *E. cichoracearum* complex.

3. *Erysiphe cichoracearum* DC. var. *latispora* U. Braun var. nov.

Syn.: *E. cichoracearum* auct. p.p. *Oidium latisporum* U. Braun, Zbl. Microbiol. 137, p.315 (1982). (?) *Erysiphe ambrosiae* Schw., Syn. Fung. Am. Bor., p.270 (1834).

Cleistothecia similia eis typi. A typo differt conidiis latioribus, conidia 28-45 x 18-27 µm. Fig. 6.

Holotypus: hospes - *Helianthus grosseserratus* Mart., U.S.A., Wisc., Faville Prairie Preserve, near Lake Mills, Jefferson Co., 31-8-1963, Greene (DAOM 96982).

Amphigenous, mycelium subpersistent, patches or effused, often covering the whole surface of the leaves, conidiophores straight, foot-cells cylindric, about 20-65 x 9-13 µm, followed by 1-3 short cells, appressoria nipple-shaped, conidia in chains, broadly ellipsoid-ovoid to barrel-shaped, fresh about 28-45 x 18-27 µm,

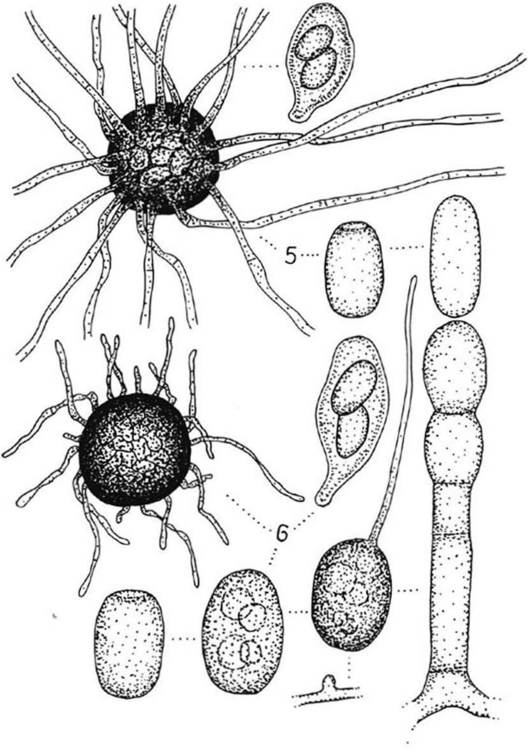

Fig. 5-6. *Erysiphe hydrophyllacearum*, cleistothecium, ascus, conidia (5), *E. cichoracearum* var. *latispora*, cleistothecium, ascus, conidia, conidiophore, appressorium. U. Braun del.

l/w < 2 (ca. 1.3-2.0, mostly 1.4-1.6), cleistothecia (65-) 85-130 µm in diam, cells irregularly shaped, appendages numerous, inserted in the lower half, ca. 0.5-2 x diam. of the cleistothecium long, mycelioid, simple, brown when mature, thin-walled, smooth, septate, ca, 4-8 µm wide, interlaced with each other and with the mycelium, 5-15 asci, stalked, ca. 45-80 x 25-40 µm, 2-spored, rarely 3, 19-29 x 12-20 µm.

I reinvestigated a large number of *E. cichoracearum* collections on *Helianthus* (*laetiflorus, grosseserratus, petiolaris, rigidus, strumosus, annuus, tuberosus*) and *Rudbeckia* (*laciniata, hirta*) from N. America, deposited in DAOM. The cleistothecia on these hosts agree fully with typical *E. cichoracearum*, but the conidia are well distinguished. They are rather broad and have a relative length (l/w) between 1.3 and 2.0, mostly 1.4-1.6 (ca. 15-22 µm wide and l/w around 2 in var. *cichoracearum*). The Oidium is very characteristic and it appeared recently in Central Europe (on *Helianthus laetiflorus*, described as *Oidium latisporum* Braun). In 1982, the author collected numerous additional samples on *H. laetiflorus* and *Rudbeckia laciniata* (G.D.R., Halle, Halle-Neustadt, Köthen, leg. U. Braun, deposited in HAL). Nomura (1981) published a photograph of a conidial state on *Ambrosia elatior* (N. American plant). This material, collected in Japan, coincides well with var. *latispora*. *Erysiphe ambrosiae* Schw. seems to be a synonym of var. *latispora*, an American fungus, introduced in Europe and Asia on some cultivated plants (*Helianthus*, *Rudbeckia*, *Ambrosia*).

4. *Erysiphe diervillae* Miyabe ex U. Braun spec. nov.

Syn.: *E. diervillae* Miyabe in herb. (Salmon 1900, p. 185, sub *E. polygoni*). *E. communis* f. *diervillae* Jacz. (1927, p.233). *E. pisi* ss. Homma (1937) p.p.

Cleistothecia 95-190 µm diam., cellulae peridii ca. 8-20 µm diam., appendices numerosae vel sparsae, diametro cleistothecii 0.5-1.5plo longiores, hyalinae, septatae, tenuitunicatae, ca. 5-8 µm latae, asci 6-15, 40-85 x 25-55 µm, sporae (5-) 6-7 (-8), 16-28 x 9-15 µm. Fig. 7.

Holotypus: hospes - *Weigelia hortensis* Koch (= *Diervilla japonica*), Japan, Akita Pref., Ani, Kita-Akita Gun, Oct. 1902, Tokubuchi (TNS-F-214504).

Mycelium on leaves, stems, and fruits, dense, white, persistent patches, cleistothecia more or less immersed, large, 95-190 µm in diam., mostly 110-160, cells indistinct, about 8-20 µm diam., appendages inserted in the lower half, number variable, sometimes numerous, well developed, 0.5-1.5 x diam. cleist. in length, interlaced with the mycelium and with each other, sometimes few, poorly developed, short, hyaline, thin-walled, smooth to faintly rough below, with few inconspicuous septa, ca. 5-8 µm wide, simple, 6-15 asci, stalked or sessile, 40-

85 x 25-55 µm, (5-) 6-7 (-8)-spored, 16-28 x 9-15 µm.

There is no comparable species. The position of E. diervillae is very isolated. The species is well characterized by very large ascocarps and the number of the ascospores. The fruit bodies are usually not fully mature in specimens of the current year (full development of asci and spores seemingly in the spring of the following year).

5. Erysiphe chloranthi (Golovin & Bunkina) U. Braun stat. nov.

Bas.: E. communis f. chloranthi Golovin & Bunkina, Nov. sist. nizš. rast. 1968, p.140 (1968).

Braun (1980 b) discussed the position of the Chloranthus-Erysiphe and published a description (type ex herb. LE studied). The cleistothecia are close to E. knautiae (distribution: N. America, Europe, Asia) and E. aquilegiae var. ranunculi (nearly cosmopolitic). E. chloranthi should not be lumped with these species. The distribution is very restricted (Japan and Far East of the USSR) and it seems to be distinguished by the conidial state (relatively small ellipsoid conidia). It is urgently necessary to study fresh conidial samples on Chloranthus in order to be able to carry out a careful comparison between the related taxa. Fig. 8.

6. Erysiphe werneri U. Braun stat. et nom. nov.

Bas.: E. communis f. corydalis Golovin & Bunkina, Bot. mat. otd. spor. rast. bot. inst. akad. nauk SSSR 14, p.117 (1961).

Etym.: Dr. K. Werner, botanist, curator of the herbarium HAL (Martin-Luther-Universität Halle, Sekt. Biowissenschaften, G.D.R.). The monographic studies in the Erysiphaceae would be impossible without his continuous help and the facilities of the herbarium.

Amphigenous, cleistothecia mostly epiphyllous, ca. 80-105 µm in diam., cells polygonal, appendages few, about 7-10, short and long appendages mixed, 4-6 asci, ca. 35-65 x 30-45 µm, shortly stalked, 4-8-spored, 16-23 x 10-11 µm.

Nomura (1981) collected conidial material on Corydalis pallida in Japan and published a description and a photograph. The conidia are oblong, cylindric, 48-63 x 15-23 µm, the germ tubes are very short and irregular. The fungus on Corydalis (Fumariaceae) is clearly different from E. macleayae Zheng & Chen (1982, p.290) and E. cruciferarum Junell (on Brassicaceae, in Europe also on allied host families - Rhoeadales s.l., Capparidaceae, Resedaceae, Papaveraceae, Fumariaceae).

Key to the species of Erysiphe sect. Erysiphe on Papaveraceae s.l. (incl. Fumariaceae)

1. Cleistothecia small, 72-93 (-101) µm in diam., appen-

dages (0.5-) 1-7 x diam. cleist. in length, 2-4 asci, (2-) 3-4 (-5) spores, (23-) 29-38 x 13-16.5 µm, on Macleaya and Papaver, China, Japan .... E. macleayae

1′ Cleist. larger, ca. 80-150 µm diam., about 4-10 asci, spores ca. (16-) 18-23 (-30) µm 2

2. Cleist. large, 85-150 µm in diam., appendages numerous, densely crowded around the fruit body, asci usually 3-6-spored .... E. cruciferarum

2′ Cleist. ca. 80-105 µm in diam., few appendages, ca. 7-10, asci 4-8-spored, on Corydalis, Japan and the Far East of the U.S.S.R. .... E. werneri

7. Erysiphe thuemenii U. Braun stat. et nom. nov.

Bas.: E. communis f. potentillae Jacz., Karm. opr. grib., mučn.-rosj. grib., p.285 (1927).

Etym.: F. de Thuemen, mycologist.

Mycelium persistent, white patches, conidia ellipsoid to barrel-shaped, ca. 26-31 x 15.5-17 µm. Cleistothecia usually immersed in the mycelium, ca. 80-110 µm in diam., appendages numerous, mycelioid, hyaline, short, usually shorter than the cleistothecial diam., about 6 asci, shortly stalked, ca. 60-75 x 25-50 µm, 2-4-spored, 24-30 x 10-16 µm.

The species is still insufficiently known. It has been recorded from Siberia (Bunkina 1979) and Kazakhstan (Vasjagina & al. 1961). The fungus is related to E. krumbholzii U. Braun (on Chrysosplenium) but differs by large asci and ascospores. Jaczewski (l.c.) cited under f. potentillae "de Thuemen, Myc. univ. 2056" (sub Erysiphe lamprocarpa f. potentillae-bifurcae nom. nud.). It should be noted that some duplicates of no. 2056 contain Sphaerotheca aphanis (Wallr.) Braun.

8. Erysiphe galii Blumer var. riedliana (Speer) U. Braun stat. nov.

Bas.: E. riedliana Speer, Anz. öster. Akad. Wiss., math.-nat. Kl., 106(1-4), p.244, "1969" (1970).

Experiments have shown that the specialization within the complex of Erysiphe on Galium is not very strong (Vanev 1975). Galium aparine is the main host of E. galii. The cleistothecia are usually immature in specimens of the current year, ascospores are not developed. A closely related fungus on G. verum possesses larger ascocarps (ca. 100-185, mostly 120-160 µm in diam) and the fruit bodies and asci are always mature in samples of the current year; two spores are developed. I consider this fungus as a variety. It is very rare in Europe (Speer, l.c.), but it seems to be more common in Asia (Benua & Karpova-Benua, 1973, p.110 and fig. 53; Zheng & Chen, 1982, p.306, fig. 48).

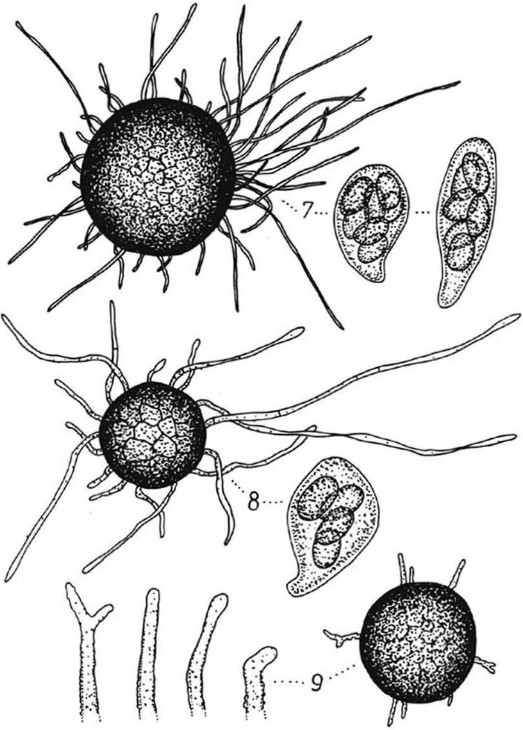

Fig. 7-9. Cleistothecia and asci, *Erysiphe diervillae* (7), *E. chloranthi* (8), cleistothecium and appendages, *E. sikkimensis* (9). U. Braun del.

9. *Erysiphe actinostemmae* U. Braun spec. nov.

Syn.: *E. polygoni* auct. p.p. (Homma 1937). *E. communis* auct. p.p. *E. communis* f. *cucumidis* Marczenko, Ukr. bot. Zh. 33(3), p.273 (1976) ?

Mycelium amphigenum, evanescens vel subpersistens, conidia ± ellipsoidea, ca. 30-38 x 13-17.5 µm. Cleistothecia (75-) 95-135 (-155) µm diam., cellulae peridii angulatae, ca. 8-20 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii (0.25-) 0.5-2 (-2.5)plo longiores, 4.5-8 (-10) µm latae, tenuitunicatae, septatae, brunneae, contextae vel cum mycelio intertextae, asci 4-8, (40-) 50-60 (-70) x (25-) 30-50 µm, ascosporae (3-) 4-5 (-7), 17-24 x 9.5-15.5 µm. Fig. 10.

Holotypus: hospes - *Actinostemma lobata* Maxim., Japan, Kadzurashima, Takasu-mura, Tosa, Kochi Pref., 23-10-1910, Yoshinaga (TNS-F-229705).

The mycelium is amphigenous, thin, effused or patches of irregular shape, conidia ± ellipsoid (ellipsoid-doliform), cleistothecia scattered to gregarious, appendages inserted in the lower half, smooth or somewhat rough, simple, brown, paler or sometimes hyaline in the upper half, asci mostly sessile.

The species is near to *E. cruciferarum* Junell; it differs, however, by the appearance of the mycelium and the shape of the conidia. *Actinostemma lobata* seems to be the principal host of this fungus. Studied collections on *Schizopepon* and *Trichosanthes* have been very scarce. It is not quite certain whether they belong to the present fungus. The position of *E. communis* f. *cucumidis* is also unclear. It seems to be close to our new fungus, but the type was not available.

10. *Erysiphe laporteae* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p. (Homma 1937).

Mycelium amphigenum, persistens, conidia catenulata, 25-40 x 13.5-20 µm. Cleistothecia ca. 120-155 µm diam., cellulae peridii angulatae, ca. 6-20 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii ca. 0.25-1.5plo longiores, ca. 4-9 µm latae, septatae, hyalinae, brunneae, tenuitunicatae, contextae vel mycelio intertextae, asci numerosae, ascosporae 2. Fig. 11.

Holotypus: hospes - *Laportea bulbifera* Wedd., Japan, Yoichi, Prov. Shiribeshi, 12-7-1898, Yamada (TNS-F-214579).

Mycelium amphigenous, effused or patches, persistent to subpersistent, cleistothecia densely gregarious to subgregarious, often immersed in the dense mycelium, appendages inserted in the lower half, usually short, not longer than the cleistothecial diam., smooth to faintly rough, at first hyaline, later yellowish to brown, the mycelium of older infections turns to brown, especially around the ascocarps. The appendages and the hyphae are usually strongly interwoven; they form often a dense felt. A distinction between appendages and mycelium is rather difficult. The studied collections (type + TNS-F-214585, 215114) are rather scarce and the asci are immature. The *Laportea Erysiphe* (Urticaceae) is, however, a very characteristic species, well discriminated from *E. cichoracearum* and allied taxa by large, immersed ascocarps and the features of the mycelium and appendages. Therefore, I do not hesitate to describe it as a new species.

11. *Erysiphe americana* U. Braun spec. nov.

Syn.: *E. cichoracearum* auct. p.p.

Mycelium amphigenum, subpersistent. Cleistothecia 75-135 µm diam., cellulae peridii irregulariter angulatae, ca. 6-30 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii 0.25-2plo longiores, (4.5-) 5-8 (-10.5) µm latae, brunneae, tenuitunicatae, septatae, contextae et cum mycelio intertextae, asci ca. 10-15, (45-) 50-65 (-75) x 25-35 (-40) µm, ascosporae 2, 18-26 x 11-15 µm. Fig. 12.

Holotypus: hospes - *Napaea dioica* L., U.S.A., Wisc., Green Co., near Juda, 12-8-1961, Greene (AZ).

The mycelium is effused or forms irregular patches, cleistothecia scattered to loosely gregarious, the appendages are attached from the basal half up to the upper part of the fruit body, they are simple, very rarely branched. *E. americana* is very near to *E. cichoracearum*. It causes severe infections on species of the family Malvaceae and is fairly common in North America. Accidental infections can be excluded. The appearance of the appendages, inserted between the basal and upper half, distinguishes the new species from *E. cichoracearum*.

12. *Erysiphe cumminsiana* U. Braun spec. nov.

Mycelium amphigenum, evanescens vel subpersistens, conidia catenulata, ca. 29-38 x 13-19.5 µm, appressoria lobata. Cleistothecia aequabiliter sparsa, (95-) 130-160 (-180) µm diam., cellulae peridii irregulariter angulatae, 8-20 µm diam., appendices numerosae, mycelioideae, diametro cleistothecii 0.5-2.5plo longiores, 4-9 µm latae, septatae, tenuitunicatae, hyalinae, asci ca. 5-15, 50-60 x 30-35 µm, ascosporae 0 (immaturae). Fig. 13.

Holotypus: hospes - *Senecio seemannii* Sch.-Bip., U.S.A., Arizona, Madera Canyon, Santa Rita Mts., Coronado Nat. Forest, Santa Cruz Co., Nov. 1978, Goldstein, Cummins, Koenig, Gilbertson (AZ). Isotypus HAL.

Etym.: Prof. Dr. G. B. Cummins, mycologist, Arizona, U.S.A.

The appendages are attached to the lower half of the fruit body, they are very crisp, hyaline or only faintly coloured (yellowish), smooth or faintly rough, the asci are very thin-walled, mostly sessile and show no trace of spores. The occurrence of catenate conidia, lobed appressoria and asci without development of spores in specimens of the current year indicates a species of *Erysiphe* sect. *Galeopsidis*, close to *E. galeopsidis*. The new species is well characterized by uniformly scattered, large ascocarps and hyaline or only faintly yellowish appendages.

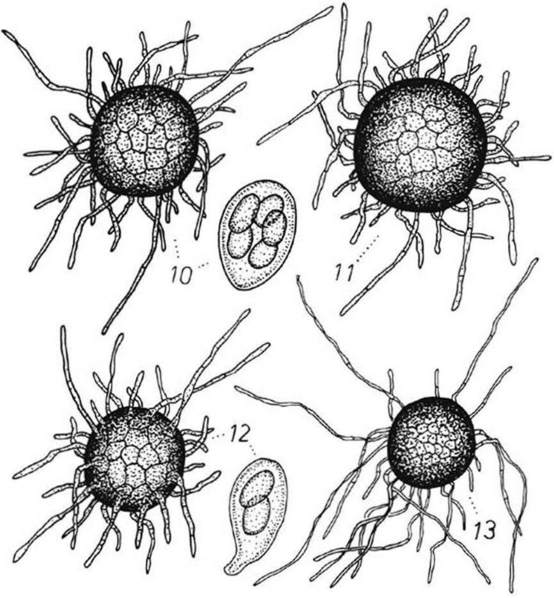

Fig. 10-13. *Erysiphe actinostemmae*, cleistothecium, ascus (10), *E. laporteae*, cleistothecium (11), *E. americana*, cleistothecium, ascus (12), *E. cumminsiana*, cleistothecium (13). U. Braun del.

Taxonomic notes on some species of *Erysiphe*

(1) *Erysiphe amphicarpaeae* Zheng & Chen (1982, p.283) = *E. pisi* DC. var. *desmodii* P. Henn.

The species differs from *E. pisi* by very narrow (ca. 3-6.5 µm wide), hyaline or only yellowish appendages, the cleistothecia are always scattered. American specimens on *Amphicarpaea* coincide entirely with this Chinese species. Furthermore, it is very common on *Amphicarpaea* and *Desmodium* in Japan. I reexamined the type of *E. pisi* var. *desmodii* (ex TNS, type host = *Amphicarpaea edgeworthii* var. *japonica*) and more than 20 additional Japanese collections. *E. amphicarpaeae* and *E. pisi* var. *desmodii* are identical. The fungus is very close to *E. pisi* s.str., transitional forms are known, especially in N. America. Therefore, I prefer to reintroduce the variety name.

Erysiphe pisi DC. var. *desmodii* P. Henn., in Engl. bot. Jahrb. 29, p.148 (1901)

Syn.: *E. amphicarpaeae* Zheng & Chen (1982, p.283). *Ischnochaeta desmodii* (P. Henn.) Sawada (1951, p.113), not validly published. *E. communis* f. *amphicarpaeae* Jacz. (1927, p.251). *E. pisi* auct. p.p. *E. polygoni* auct. p.p.

(2) *Erysiphe fagacearum* Zheng & Chen = *E. sikkimensis* Chona & al.

The original description and illustration of *E. sikkimensis* is rather poor and misleading. The reinvestigation of a part of the original material (HCIO 26084) showed that this species is fully agreeing with *E. fagacearum* (fig. 9). Both species should be merged:
E. sikkimensis Chona & al., Indian Phytopath. 13, p.72 (1960). Syn. *E. fagacearum* Zheng & Chen, Acta Microbiol. Sinica 21, p.27 (1981).

(3) *Erysiphe lycopsidis* Zheng & Chen = *E. cynoglossi* var. *anchusae* (Braun) Braun

The *Anchsa-Erysiphe* differs from *E. cynoglossi* (Wallr.) Braun (= *E. asperifoliorum*) by 3-4-spored asci. Recently I have collected rich conidial samples on *Anchusa officinalis* (G.D.R., Köthen, Oct. 1982). This conidial state is a real "Pseudoidium" (conidia singly formed, ellipsoid to barrel-shaped, 30-40 x (12.5-) 16-22.5 (-25) µm, conidiophores cylindric, foot-cells 25-45 x 7-10 µm, followed by 1-3 short cells, appressoria lobed). Hence, the *Anchusa-Erysiphe* belongs to *Erysiphe* sect. *Erysiphe* and is not related to *E. cynoglossi* (= sect. *Golovinomyces*). It must be regarded as a distinct species:
E. lycopsidis Zheng & Chen (1982, p.234). Syn.: *E. asperifoliorum* Grev. var. *anchusae* U. Braun, Nova Hedw. 34, p.694 (1981); *E. cynoglossi* (Wallr.) Braun var. *anchusae* (U. Braun) U. Braun, Mycotaxon 15, p.136 (1982).

(4) *Erysiphe paeoniae* Zheng & Chen (1982, p.300)

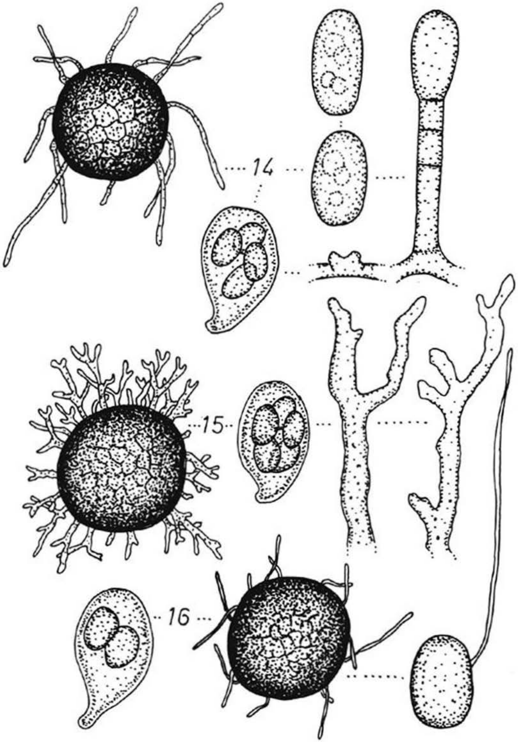

Fig. 14-16. *Erysiphe lycopsidis*, cleistothecium, ascus, conidia, conidiophore, appressorium (14), *E. paeoniae*, cleistothecium, ascus, appendages (15), *E. artemisiae* on *Achillea millefolium*, ascus, cleistothecium, conidium with germ tube (16). U. Braun del.

The species has been described on Paeonia from China. It is well characterized by short, strongly branched appendages. They are branched in a coral-like manner, verrucose, hyaline to faintly coloured, outline extremely irregular, aseptate or with few inconspicuous septa (fig. 15). I studied numerous European specimens on Paeonia officinalis (ex herb. HAL and JE). They must be referred to this species.

(5) Erysiphe echinopis U. Braun (1981, p.504)

The description of the ascocarps based on immature material. In 1982 it has been possible to collect rich fully mature samples (on Echinops sphaerocephalus L., G.D.R., Köthen, Oct. 1982, leg. Braun, HAL). Mature cleistothecia are characterized as follows: fruit bodies large, 120-180 µm in diam., cells 8-20 µm diam., obscure, numerous basal appendages, 0.25-2 x diam. of the cleistothecium in length, mycelioid, septate, hyaline to faintly coloured, ca. 3.5-9 µm wide, interwoven, 6-18 asci, large, 65-110 x 30-60 µm, stalked, 2(-3) spores, 24-43 x 16-25 µm.

(6) Erysiphe on Achillea millefolium

This host is usually infected by E. cichoracearum DC. I investigated numerous specimens from Europe and N. America. The conidia are about 15-21 µm wide, l/w around 2. Braun (1980 a, 1982) recorded a second Oidium on this host from Central Europe (G.D.R.) and supposed that it belongs to E. artemisiae Grev. (conidia 18-26 µm wide, l/w 1.1-1.7). In 1982 I have found a sample with developed ascocarps (G.D.R., Köthen, Sept. 1982). They correspond exactly with the fruit bodies of E. artemisiae (appendages very short, hyaline, simple, narrow, only 3.5-7 µm wide, fig. 16). These results confirm that E. cichoracearum and E. artemisiae can occur on A. millefolium simultaneously.

(7) Additional notes about the identity of some recently described species

The first name is always the valid one for the species concerned.

Erysiphe gracilis Zheng & Chen (1981, p.89) = E. hiratae U. Braun (1981, p.500).

E. hommae U. Braun (1981, p.501) = E. elsholtziae (Sawada) Zheng & Chen (1982, p.273), Ischnochaeta elsholtziae Sawada (1951, p.112) not validly published.

E. pileae (Jacz.) Bunkina ex U. Braun (1981, p.503) = E. pileae (Sawada) Zheng & Chen (1982, p.319), Ischnochaeta pileae Sawada (1951, p.114) not validly published. Sawada's Ischnochaeta species have been published under an illegitimate generic name. The valid description of Ischnochaeta dates back to 1959.

E. sedi U. Braun (1981, p.502) = *E. sedi* Zheng & Chen (1982, p.253).

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A NEW SPECIES OF CONIOSCYPHA

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SUMMARY

Conioscypha japonica Udagawa & Toyazaki, a new species, is described and illustrated from an isolate from scrapings and hair of male dog collected in Kobe, Japan.

An isolate of a dematiaceous hyphomycete obtained from scrapings and hair of male dog has been determined as an undescribed species of *Conioscypha* Höhnel. This genus was established by von Höhnel (1904) for a single species, *C. lignicola*, isolated from fallen wood of *Carpinus* on Mt. Gelber Berg, Weinerwald, Lower Austria. The genus is characterized by enteroblastic conidiogenous cells with a beaker-like thick collarette and one-celled, dark brown, globose to subpyriform conidia with a truncate base.

In 1973, the generic concept of *Conioscypha* was emended by Shearer on the basis of type and pure culture studies of her additional isolates which were saprobic on balsa wood submerged in the Patuxent River at the Patuxent Wildlife Refuge, Laurel, Maryland, U. S. A. At the same time, a second species was also described by Shearer on balsa wood submerged in the same locality. In the latter fungus, *C. varia*, conidia are smaller, more elongate, thinner walled and more variable in shape than those of *C. lignicola*.

A third species, *C. bambusicola* isolated from rotting stems of *Phyllostachys edulis* and *Bambusa multiplex* from Japan was added subsequently by Matsushima (1975) as having conidia which are smaller and apically pointed.

Our fungus appeared to be intermediate in conidial characters between *C. lignicola* and *C. varia*. It is therefore named and described herein. The description is based upon cultures grown on cornmeal agar, potato-carrot agar, and potato-dextrose agar three weeks at 21 and 37 C.

Conioscypha japonica Udagawa & Toyazaki, sp. nov. (Figs. 1-8)

Coloniae in agaro "cornmeal" vel "potato-carrot" lente crescentes, post 21 dies sub 21 C 8-12 mm diametro, planae, tenues, ex mycelio vegetativo submerso compositae; conidia abundantia, aggregata, viridi-nigra; reversum olivaceo-griseum vel ferreo-griseum.

Mycelium in substrato immersum vel partim superficiale, ex hyphis ramosis, hyalinis vel subhyalinis, septatis, saepe cum vacuolis, 1-5 µm diam, laevibus compositum. Conidiophora micronemata vel semimacronemata, mononemata, ex apice vel latere hypharum oriunda, simplicia, erecta, hyalina, laevia, 6-30 × 2-4.5 µm, saepe deminuta vel subnulla. Cellulae conidiogenae monoblasticae, discretae vel in conidiophoris incorporatae, sessiles vel in stipitibus brevibus suffultae, interdum intercalares, laeves, hyalinae, cyathiformes vel doliiformes, ad apicem collis cupulatis multiplicibus 4-14 × 3-10 µm praeditae. Conidia singula et successive a proliferatione percurrente cellulae conidiogenae efformata, tunica exteriore ad apicem rupta ab hac cellula separata, saepe in massa mucida aggregata, primum hyalina vel dilute brunnea, deinde fusco-brunnea, continua, diversiformia: (1) obpyriformia vel subglobosa, (7-)9-13(-14) × 5-10 µm, et (2) late ellipsoidea, interdum elongata, 10-14 × 4.5-7 µm, ad basim truncata et poro praedita, ad apicem late rotundata, crassiuscula, laevia sed cum pigmentis irregularibus intrinsecus instructa, tunicata. Chlamydospora saepe producentia.

Holotypus: cultura NHL 2915 ex fragmentis cuticularibus et pilo canis, urbis Kobe in Japonia, in 10.viii.1982, a N. Toyazaki, isolata. In collectione fungorum "National Institute of Hygienic Sciences (NHL), Tokyo, Japan".

Etymology: lat. *japonicus* = Japan, referring to the locality.

Colonies on cornmeal agar or potato-carrot agar very slow-growing, attaining a diameter of 8-12 mm in 21 days at 21 C, plane, thin, consisting of a submerged vegetative mycelium, with a slimy mass of abundant conidia, greenish black (Rayner, 1970); reverse olivaceous gray (M. 1F2 from Kornerup and Wanscher, 1978) or iron gray (Rayner).

Mycelium usually immersed in the substratum, partly superficial, composed of branched, hyaline to subhyaline, septate, often vacuolate, smooth-walled hyphae measuring 1-5 µm in diam. Hyphae sometimes swollen and constricted

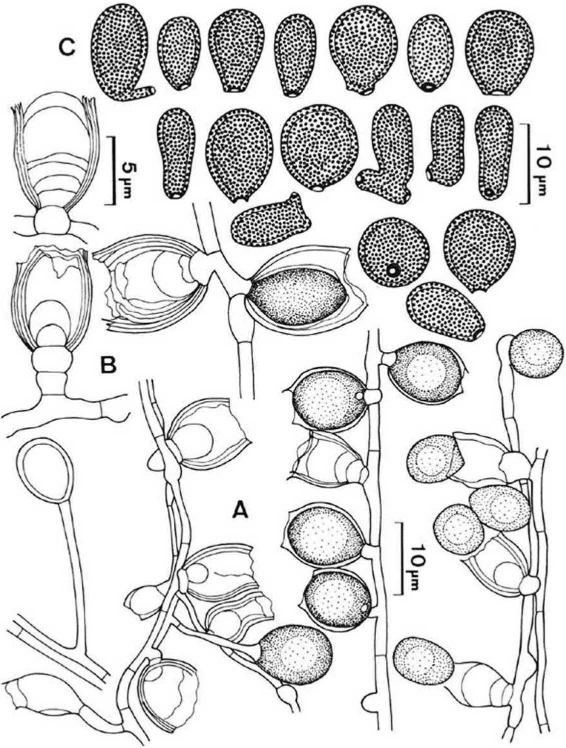


Figure 1. *Conioscypha japonica*.
A, B. Conidiogenous cells. C. Conidia.

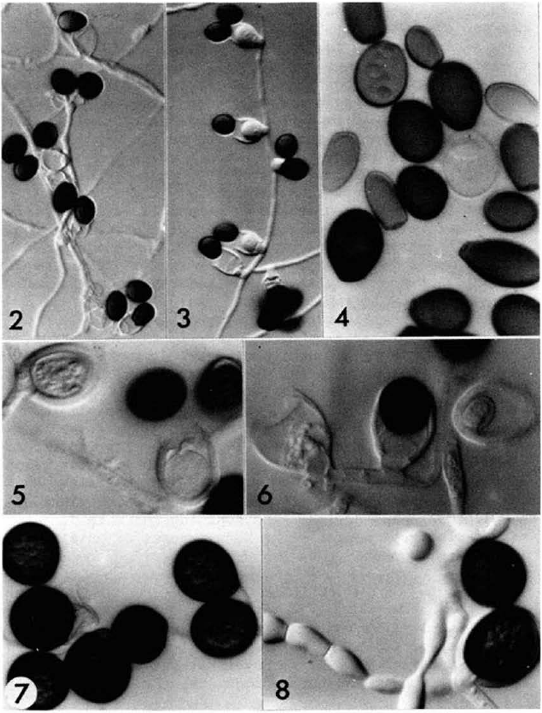
at the septa. Conidiophores micronematous or semimacronematous, mononematous, arising terminally or laterally from the hyphae, simple, erect, hyaline, smooth-walled, 6-30 × 2-4.5 µm, often reduced to a minute protuberance on the hyphae. Conidiogenous cells monoblastic, discrete or integrated, sessile or on short conidiophores, sometimes intercalary, smooth-walled, hyaline, cyathiform or doliiform, with multilayered cup-like collarette measuring 4-14 × 3-10 µm. Conidia formed singly and successively by minute percurrent proliferation of the apex of the conidiogenous cell, separating by apical rupture of outer wall of the conidiogenous cell, often accumulate in a slimy mass, at first hyaline to pale brown, then becoming dark brown (nearly black under reflective light), 1-celled, variable in shape: (1) obpyriform or subglobose, (7-)9-13(-14) × 5-10 µm, with a truncate base and a broadly rounded apex, rather thick-walled (ca. 1-2 µm thick), smooth but with irregular pigments deposited at the periphery of the wall to give the appearance of roughness, with a pore at the point of attachment to the conidiogenous cell, entirely covered by a thin gelatinous sheath; (2) mostly broadly ellipsoid, sometimes elongate, 10-14 × 4.5-7 µm, otherwise similar to the above. Chlamydospores often produced terminally on the hyphae.

Colonies on potato-dextrose agar similar in rate of growth, but developing a floccose, compact overgrowth, wrinkled, raised up to 3 mm in colony centers, olivaceous gray (Rayner), or brownish gray (M. 8F2); reverse smoke gray (Rayner) to mouse gray (Rayner) or yellowish gray (M. 4B2).

At 10 C, growth is nil. At 37 C, growth rate is about half that at 21 C. Cellulolytic. Not keratinolytic.

Specimen examined: an isolate from scrapings and hair of male dog, Kobe-city, Japan, August 10th, 1982, coll. N. Toyazaki, NHL 2915, holotype.

Conioscypha japonica is more reminiscent of *C. lignicola* than of two other described species in producing obpyriform or subglobose conidia marked by a rich blackish pigmentation at the periphery of the wall. It differs from the latter species in the more variable shape and particularly the smaller dimensions of its conidia. Shearer (1973), Yokoyama and Tubaki (1973), and Matsushima (1975) give conidium dimensions of 12-22.6 × 11-22 µm, 12-20 × 10-15 µm, and 16-22 × 12-18 µm respectively for *C. lignicola*. It is also separated from *C. lignicola* by the wall thickness of its conidia. The shape of the conidia in this species is very variable: usually the conidia are obpyri-



Figures 2-8. *Conioscypha japonica*: Conidiogenous cells and conidia, photographed with Nomarski interference contrast microscopy. (Figs. 2-3, × 500; Fig. 4, × 1200; and Figs. 5-8, × 1500).

form or subglobose, but even in the same culture the conidia are often broadly ellipsoid, cylindric, navicular, etc.

An interesting feature of *Conioscypha* is that the conidial and conidiogenous cell formation appears to have characteristics of both the phialidic and annellidic concepts of conidiogenesis and may be an intermediate form. The process is described in detail by Shearer and Motta (1973), who discussed the origin and development of conidia in *C. lignicola* and *C. varia*. The first-formed conidium is enteroblastic and later ruptures the outer conidiogenous cell wall and secedes schizolytically. The subsequent basipetal production of succeeding conidia is associated with short percurrent proliferations of the conidiogenous cell within the previous ruptured wall. This mode of conidiogenesis of *Conioscypha* is similar to that described for several genera of annellated Deuteromycetes (ex. Sutton and Sandhu, 1969). In annellides the conidiogenous locus is not fixed as in phialides and moves distally due to the percurrent proliferation of the fertile cell. However, annellations in *Conioscypha* are obscured by the collarette which is composed of layers of previously ruptured walls. This type of conidiogenesis is also given by Cole and Samson (1979), who discussed convergence of phialidic and annellidic concepts and stated: "For example, we would elect to place *Conioscypha varia*, *C. lignicola* and *Cryptosporiopsis* in a separate subdivision of phialidic development based on the absence of exogenous annellations, but the occurrence of distinct, endogenous proliferations of the conidiogenous cells". The conidiogenesis in *C. japonica* was also representative of "convergence of phialidic and annellidic concepts".

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REVISION OF *ERYSIPHE GLYCINES* TAI

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摘 要

戴芳澜（TAI, 1939）发表新种大豆白粉菌*Erysiphe glycines* TAI时指出，此种特征为子囊近圆柱形、内含6-8个子囊孢子。实际上，根据模式子囊却是卵形至近球形、内含3-7个孢子。这个种的模式（WEI 2168）现在保存于中国科学院微生物研究所真菌标本室内，标本号HMAS 13846，但标識上既未用*Erysiphe glycines* TAI的原名，也沒有标明係其模式，而是以蓼白粉菌*Erysiphe polygoni* DC. 的名称入藏的。因此，在郑、陈（ZHENG & CHEN, 1981）研究中国的白粉菌属时，没有发觉到这份定名为*Erysiphe polygoni* 的HMAS 13846标本就是*Erysiphe glycines* 的模式，而把它作为许多被错误地鉴定为*Erysiphe polygoni* 的标本之一重新鉴定为她们的新种两型豆白粉菌*Erysiphe ampnicarpaeae* ZHENG & CHEN。另一方面，郑、陈根据*Erysiphe glycines* 的描述，将胡枝子属*Lespedeza* 上的子囊含6-8个孢子的另一种白粉菌鉴定为这个种。在重新发现了*Erysiphe glycines* 的模式，并且知道了*Erysiphe amphicarpaeae* 与它为相同的种，*Lespedeza* 上的菌则为与它完全不同的种后，在本文中作者将*Erysiphe glycines* TAI作一修改描述，将*Erysiphe amphicarpaeae* ZHENG & CHEN作为其异名，而将*Lespedeza*上的菌作为新种胡枝子白粉菌*Erysiphe lespedezae* ZHENG & BRAUN sp. nov. 另行描述。

Erysiphe glycines TAI was first described in 1939 by TAI, his account being based on a specimen of powdery mildew parasitizing Glycine soja (L.) SIEB. & ZUCC. (= Glycine ussuriensis REGEL & Maack., published as Glycine sp.) collected by WEI (2168) in Guan Xian, Sichuan Prov., China. Characteristic of this species, as indicated by TAI, was the subcylindrical asci which were 6-8-spored. However, when WEI studied his own specimen, he (WEI, 1942) discovered that the number of the ascospores per ascus was not 6-8 but 4-7, mostly 5-6. He reidentified this specimen as 'Erysiphe polygoni DC.' and made a statement in the discussions pertaining to the species. Later on, TAI (1946, 1979) himself also incorporated his species into Erysiphe polygoni. It is not clear whether TAI had never labelled his specimen (WEI 2168) as the type of Erysiphe glycines and sent it to the herbarium immediately at the time of his first publication, but had procrastinated till his ideas had been revised so that when the specimen was sent to the herbarium, it was labelled directly as Erysiphe polygoni, or whether he did label it as Erysiphe glycines at the beginning, but had eliminated it by changing the name to Erysiphe polygoni afterwards. In short, this specimen (HMAS 13846) was neither labelled as Erysiphe glycines nor indicated as the type of it.

ZHENG & CHEN (1981) mistakenly believed that the type of Erysiphe glycines had been lost when they engaged in the studies of the genus Erysiphe in China, and did not realize that the specimen HMAS 13846 labelled as Erysiphe polygoni was in fact the type of Erysiphe glycines. Thus, proceeding from the diagnosis of Erysiphe glycines which said that the asci were 6-8-spored, ZHENG & CHEN identified a 6-8-spored Erysiphe on Lespedeza as this species. On the other hand, when they restudied the entire collection of Erysiphe preserved in the Mycological Herbarium of the Institute of Microbiology, Academia Sinica (HMAS), they reidentified the specimen HMAS 13846 (type of Erysiphe glycines) as one of the many misidentified Erysiphe polygoni and transferred it to their new species Erysiphe amphicarpaeae ZHENG & CHEN.

Now that the above errors have been discovered and the type specimen of Erysiphe glycines found, Erysiphe amphicarpaeae should then be regarded as its synonym, since Erysiphe glycines TAI was an earlier legitimate name. As regards the fungus on Lespedeza, we shall redescribe it as a new species Erysiphe lespedezae ZHENG & BRAUN sp. nov.

In the diagnosis of Erysiphe pisi DC. var. desmodii P. HENN. (1900), another powdery mildew parasitizing Leguminosae, it was said to have perithecia not exceeding 100 µm in diameter, appendages not exceeding 100 µm in length and 5-8 µm in width, and was thus quite different from Erysiphe glycines. But, according to Dr. Uwe BRAUN (personal communication), who has recently studied the type specimen of *Erysiphe pisi* var. *desmodii*, they are perfectly identical with each other. As the present author holds that the fungus should be retained at a species level, the name *Erysiphe pisi* var. *desmodii* is treated as a synonym of *Erysiphe glycines* here.

ERYSIPHE GLYCINES TAI, Lingnan Sci. J. 18:457. 1939. em. ZHENG

Erysiphe pisi DC. var. *desmodii* P. HENN. in ENGLER, Bot. Jahrb. 29:148. 1900.
Ischnochaeta desmodii (P. HENN.) SAW., Bull. Govt. Forest Exp. Stat. Tokyo 50:113. 1951. nom. illegit.
Erysiphe amphicarpaeae ZHENG & CHEN, Sydowia 34:283. 1981.
Erysiphe polygoni sensu auct. non DC.: TAI, Bull. Chinese Bot. Soc. 1:12. 1935. p.p.; WEI, Nanking J. 11:106. 1942. p.p.; TAI, Bull. Torrey Bot. Club 73:113. 1946. p.p.; TAI, Sylloge Fungorum Sinicorum. p. 137. 1979. p.p.

Amphigenous; mycelium subpersistent to subevanescent, forming thin and irregular white patches; conidia doliform-cylindrical, subcylindrical, 25.4-38.1 X 12.7-17.8 µm; perithecia scattered, dark brown, depressed globose, (88-)98-120(-144) µm diam., wall cells irregularly polygonal, (6.3-)7.6-17.8(-25.4) µm diam.; appendages (8-)16-48(-71), generally simple, rarely branched once, flexuous to tortuous, (½-)1-5(-7) times the diameter of the perithecium, (40-)125-580(-763) µm long, subuniform in width throughout, but may nonuniform in parts, slender, (2.5-)3.0-5.1(-7.1) µm wide, thin walled, smooth or verruculose, 0-3(-6)-septate, hyaline or pale yellow; asci 4-10(-12), ovate, subglobose or other irregular forms, shortly stalked, subsessile or sessile, (40.6-)48.3-66.0(-78.7) X (27.5-)30.5-43.2(-48.3) µm; ascospores (3-)4-6(-7), ovoid or oblong-ovoid, yellowish, (16.3-)17.8-22.9(-25.4) X (11.3-)12.7-15.2(-17.8) µm.

HOSTS: *Amphicarpaea trisperma* (MIQ.) BAKER, *Desmodium racemosum* (THUNB.) DC., *Desmodium repandum* (VAHL) DC., *Desmodium* sp., *Glycine soja* (L.) SIEB. & ZUCC., *Glycine* sp., *Phaseolus* sp., *Vicia unijuga* A. BR., *Vicia* sp.

LOCALITIES*: Beijing, Guangxi Zhuangzu Autonomous Region, Hebei Prov., Hunan Prov., Jiangxi Prov., Shaanxi Prov., Sichuan Prov., Xinjiang Uygur Autonomous Region, Yunnan Prov., Zhejiang Prov. (CHINA).

SPECIMENS EXAMINED: HMAS 68, 3606, 3904, 11503, 11577, 11593, 11961, 13846 (holotype), 19332, 19333, 19334, 19352, 19359, 24952, 24953, 40101, 40102, 40103, 40107,

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*According to Dr. BRAUN, this fungus is widely distributed on *Amphicarpaea* and *Desmodium* in Japan and the Far East of USSR. It is also known on *Amphicarpaea* from North America.

40108, 40109, 40110, 40111, 40112, 40113, 40114, 40115, 40116, 40117, 40118.

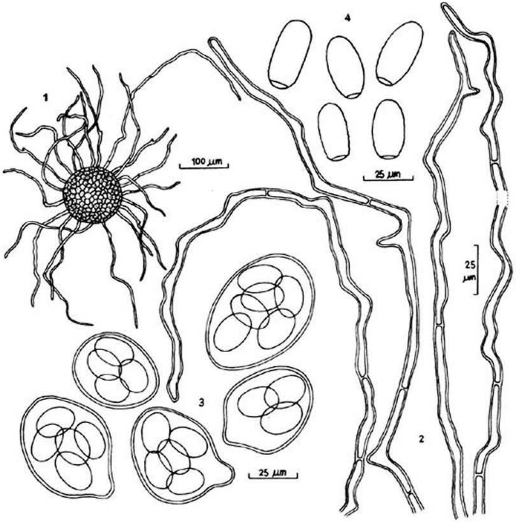

Fig. 1. *Erysiphe glycines* TAI em. ZHENG: 1. perithecium. 2. appendages. 3. asci and ascospores. 4. conidia. (on *Amphicarpaea trisperma* (MIQ.) BAKER, HMAS 3606)

ERYSIPHE LESPEDEZAE ZHENG & BRAUN sp. nov.

Erysiphe glycines sensu auct. non TAI: ZHENG & CHEN, Sydowia 34:278. 1981.

Mycelium amphigenum, evanescens ad subpersistens; conidia doliiformo-cylindracea, subcylindracea, 22.9-35.6(-43.2) X 12.7-17.8(-18.8) µm; perithecia sparsa ad subgregaria, fusce brunnea, globoso-depressa, 89-120(-130) µm in diam., cellulae parietis exterioris irregulariter angulatae, 5.1-19.1 µm diam.; appendices (8-)14-42(-52), generaliter simplices, raro irregulariter ramosae semel, subrectae, flexuosae ad tortuosas, diam. perithecii (½-)1½-3½(-4½) [(35-)140-425(-500) µm] longae, in latitudine subaequales vel qua parte tumidae qua parte minutae, 3.8-6.3(-7.6) µm latae, tenuitunicatae, leves vel verruculosae, 0-3(-5)-septatae, generaliter hyalinae, raro brunneolae ad subflavas parte basilare; asci (5-)6-11(-14), subovales, late ovales vel alterae irregulares formae, breviter pedicellati, subsessiles ad sessiles, (48.3-)55.9-68.6(-79.0) X (30.5-)33.0-43.5(-45.7) µm; ascosporae 6-7(-8), ovoideae, oblongo-ovoideae, subflavae, 15.7-20.3(-22.9) X (10.6-)11.4-13.9(-15.7) µm.

In foliis vivis *Lespedezae tomentosae* (THUNB.) SIEB., Baihuashan, Provincia Hebei, Sinica, leg. J. D. ZHAO et al. (ML 492), 24 IX 1950, HMAS 19344 (holotypus).

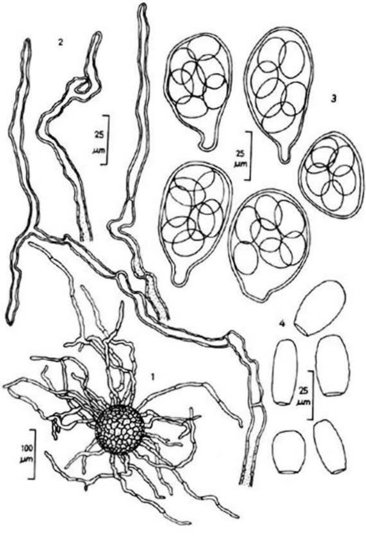

Fig. 2. *Erysiphe lespedezae* ZHENG & BRAUN sp. nov.: 1. perithecium. 2. appendages. 3. asci and ascospores. 4. conidia. (on *Lespedeza tomentosa* (THUNB.) SIEB., HMAS 19344, holotype)

Amphigenous; mycelium evanescent to subpersistent; conidia doliform-cylindrical, subcylindrical, 22.9-35.6(-43.2) X 12.7-17.8(-18.8) µm; perithecia scattered to subgregarious, dark brown, depressed globose, 89-120(-130) µm diam., wall cells irregularly polygonal, 5.1-19.1 µm diam.; appendages (8-)14-42(-52), generally simple, rarely irregularly branched once, substraight, flexuous to tortuous, (½-)1½-3½(-4½) times the diameter of the perithecium, (35-)140-425(-500) µm long, subuniform in width, or nonuniform in parts, 3.8-6.3(-7.6) µm wide, thin walled, smooth or verruculose, 0-3(-5)-septate, generally hyaline, rarely pale brown to pale yellow coloured at the base; asci (5-)6-11(-14), subovate, broadly ovate to other irregular forms, shortly stalked, subsessile to sessile, (48.3-)55.9-68.6(-79.0) X (30.5-)33.0-43.5(-45.7) µm; ascospores 6-7(-8), ovoid, oblong-ovoid, yellowish, (15.7-)16.4-20.3(-22.9) X (10.6-)11.4-13.9(-15.7) µm.

HOSTS: *Lespedeza cuneata* (DUM.-COURS.) G. DON, *Lespedeza dahurica* (LAXM.) SCHINDL., *Lespedeza floribunda* BUNGE, *Lespedeza hedysaroides* (PALL.) KITAG., *Lespedeza inschanica* (MAXIM.) SCHINDL., *Lespedeza tomentosa* (THUNB.) SIEB., *Lespedeza* sp.

LOCALITIES*: Beijing, Gansu Prov., Hebei Prov., Hubei Prov. (CHINA).

SPECIMENS EXAMINED: HMAS 11944, 11945, 11947, 19341, 19342, 19343, 19344 (holotype), 19345, 40121, 40122, 40123, 40124, 40125, 40126, 40127, 40128, 40129, 40130, 40131.

ACKNOWLEDGEMENT

I am grateful to Dr. Uwe BRAUN of Martin-Luther-Universität Halle-Wittenberg, GDR, for helpful discussions and for calling attention to the problem. Thanks are due to Miss JIAN Li and Miss TANG Wen of this institute for inking the line drawings.

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*According to Dr. BRAUN, the *Lespedeza*-*Erysiphe* is also known from Japan and the Far East of USSR.

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NOTES ON HYPOGEOUS FUNGI FROM COLORADO

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Hypogeous fungi produce sporocarps below the surface of the soil, only rarely becoming exposed at maturity, and are presumed to form obligate, ectomycorrhizal associations with hardwoods and conifers (Trappe 1962). These fungi have become dependant on animals for spore dispersal due to their subterranean habit and loss of active spore discharge mechanisms. In turn, these fungi constitute a major source of food for many small mammals (Fogel and Trappe 1978). Large stands of suitable hosts, especially conifers, occur in the western Cordilleras, and hypogeous fungi are reputedly common from the Rocky Mountains to the Pacific Coast (Thiers 1979) although published distribution data are meager.

The hypogeous fungi discussed below were part of a collection from a study on the importance of hypogeous fungi and mushrooms in the diet of tassel-eared squirrels (Sciurus aberti Gemlin). The hypogeous fungi discussed below represent new additions to the mycoflora of Colorado with the exception of Sclerogaster xerophilum Fogel (Fogel and Trappe 1976, Fogel 1977).

The study was conducted on Enchanted Mesa, near Boulder, Boulder County, Colorado, 40 00′ N Lat., 105 17′30′′ W Long., at an elevation of 1940 m during the summers of 1978 and 1979. The forest is a medium-stocked, uneven-aged stand dominated by Pinus ponderosa Laws. (ponderosa pine) with a few, scattered individuals of Pseudotsuga menziesii (Mirb.) Franco (Douglas fir) and Juniperus scopulorum Sarg.

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present in the understory. A 0.5-10 cm thick layer of conifer litter carpeted the soil surface under the trees.

Anatomical features were described from sections mounted in 5% KOH or in Melzer's reagent. Colors of sporocarps were determined by use of the ISCC-NBS Centroid Color Charts (Kelly 1965). Voucher specimens are deposited in the herbaria of Oregon State University (OSC) and the University of Michigan (MICH).

1. Genabea cerebriformis (Harkn.) Trappe, Mycotaxon 2:118. 1975.

Material examined: Kotter 36 (OSC, MICH).

Buried in 7.5 cm of mineral soil under ponderosa pine and a few scattered Douglas fir, 28 June 1978. The ascocarps are typical of the species as described by Gilkey (1954), having a yellowish white, convoluted, verrucose surface with several openings; a white interior with complex infolding; and echinulate, globose spores 28-44 um broad. Previously unknown from the Rocky Mountains (Fogel and Trappe 1976, Hawker 1968) although common in western Oregon and northern California under Douglas fir.

2. Rhizopogon alkalivirens Smith in Smith & Zeller, Mem. N. Y. Bot. Gard. 14:48. 1966.

Material examined: Kotter 155 (OSC, MICH).

Buried in 9 cm of mineral soil under ponderosa pine, 3 July 1979. The distinctive large spores of this species were also present in the fecal pellets of tassel-eared squirrels trapped on the site (Kotter 1981). The basidiocarps are typical of the species as described by Smith and Zeller (1966), having a pallid surface which becomes grayish red, overlaid by appressed "brownish" rhizomorphs; gleba white to grayish yellow; spores versiform 12-18 x 3.5-6 um, weakly amyloid with a truncate base. Previously reported from Idaho.

3. Scleroderma hypogaeum Zeller, Mycologia 14:193. 1922.

Material examined: Trappe 5168 (OSC).

One dried sporocarp was found lodged 5 m above the ground on a ponderosa pine branch in October 1977. This specimen was presumably placed on the branch by a squirrel; squirrels commonly ascend trees to consume mushrooms and other food items. The basidiocarp is typical of the species, having a thick, smooth, moderate yellow peridium; a black, powdery gleba; and subglobose, alveolate spores 11-25(30) um in diameter. Previously reported from lawn sod in Oregon.

4. Sclerogaster xerophilum Fogel, Mycologia 69:981. 1977.

Material examined: COLORADO, Boulder County, Enchanted Mesa: Kotter 5, Kotter 19, Kotter 24, Kotter 25, Kotter 26. ARIZONA, Coconino County, Pine Flat Campground S of Flagstaff, Fogel F2016. UTAH, Washington County, Oak Grove Campground, NW of Leeds, Fogel F2621 (all in MICH).

Sclerogaster xerophilum has been collected previously from a number of localities in the Front Range of Colorado during May and June, including Enchanted Mesa (Fogel 1977). Two additional distributional records have come to our attention. A collection of this very distinctive species was made in southern Utah on 27 July 1981 at an elevation of 2075 m (Fogel F2621) and another collection in northern Arizona on 20 May 1975 at an elevation of 1555 m (Fogel F2016); both collection were hypogeous under ponderosa pine. No special significance is attached to the July data for the Utah collection as the sporocarps were dried in situ. Spores of this species were frequent in the stomachs and feces of tassel-eared squirrels trapped on the Enchanted Mesa (Kotter 1981).

5. Sedecula pulvinata Zeller, Mycologia 33:213. 1941.

Material examined: Kotter 61 (OSC, MICH), Kotter 64 (OSC, MICH), Kotter 67 (MICH), and Kotter 185 (MICH).

Hypogeous under ponderosa pine during July and August. The distinctive spores of this species were prevalent in the stomachs and feces of tassel-eared squirrels trapped on the site (Kotter 1981). The basidiocarps are typical of the species as described by Zeller (1941) and Theirs (1979), having a thick, yellow peridium, surface often appearing pitted; a black gleba becoming powdery at maturity, traversed by cord-like cartilaginous veins; and smooth, brown, ovoid to elliptical to dacyroid spores (11)13.3-14.3(16) x (17)22-28.5 um. Previously known only from the Northern Sierra Nevada Mountains of California.

ACKNOWLEDGEMENTS

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MURIFORM ASCOSPORES IN CLASS ASCOMYCETES

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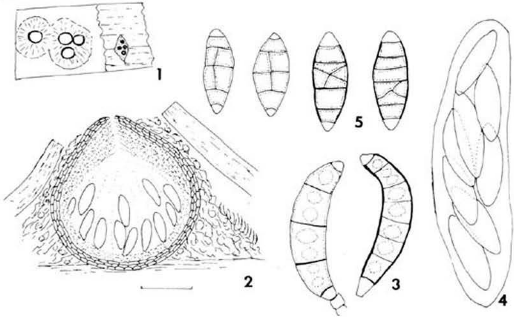
In Class Loculoascomycetes phaeodictyosporous taxa are numerous and varied in characteristics of ascomata and centra, whereas they comprise only a small part of Class Ascomycetes. Following the study of a number of species named as *Fenestella* or *Teichospora*, several entities are removed from Class Loculoascomycetes. One is a species belonging to *Dictyoporthe* in the Diaporthales, Melanconidaceae, and quite different from other species in that genus (Barr, 1978).

Dictyoporthe canadensis (Ell. & Ev.) Barr, comb. nov.
Figs. 1-5
Basionym: *Fenestella canadensis* Ell. & Ev. North Amer. Pyrenomycetes, 545. 1892.

Ascomata perithecioid, immersed beneath periderm, in small valsoid groups or separate at times; stroma reduced, around ascomata as filmy mixture of light brown hyphae binding periderm cells, forming a ± circular brown area, barely margined, on wood; ascomata globose, 440-490 µm diam; apex short papillate, opening by rounded pore, canal periphysate; peridium 26-40 µm wide, of compressed layers of cells, brown externally, hyaline internally. Asci 70-100 (-115) x (15-)20-24 µm, unitunicate, oblong or broadly cylindric, thin walled, no apical annulus seen, 2-8-spored. Paraphyses sparse, delicate, in matrix. Ascospores (22-)25-30 x 9-10(-12) µm, hyaline becoming reddish brown except for hyaline or pallid end cells, ellipsoid fusoid, 3-5-(6-7-) septate, with one longitudinal septum in mid cells, not constricted at septa; contents granular young, then homogeneous; wall thick, smooth; overlapping biseriate in the ascus.



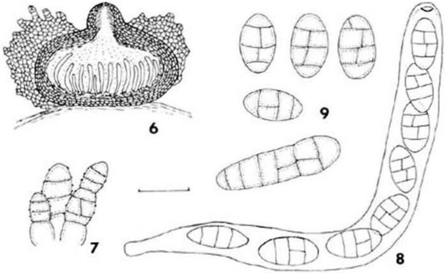
Figs. 1-5. *Dictyoporthe canadensis*. 1. Habit sketch of ascomata, at left periderm removed showing slight stroma and bases of ascomata, at right apices of ascomata emergent at surface of break in periderm. 2. Vertical section of ascoma in stroma, conidial locule on right flank. 3. Two conidia. 4. Ascus. 5. Ascospores. Standard line = 150 µm for Fig. 2, 15 µm for Figs. 3-5.

Anamorph (by association): *Coryneum carpinicola* Sutton, Mycol. Pap. 138: 20. 1975: Conidiogenous cells forming layer on flanks of stroma, short; conidia 40-50(-60) x 7.5-9(-10) µm, reddish brown, ends pallid, elongate fusoid, typically curved, 3-5-7-9-distoseptate, not constricted at septa.

On *Carpinus caroliniana* Walt., Ontario.

Material examined: Ontario: London, Mar 1890, J. Dearness (holotype, NY).

Two other taxa, described from *Carpinus* in Europe, are probably related to *D. canadensis*. *Fenestella bipapillata* (Tul. & Tul.) Sacc. Syll. Fung. 2: 327. 1883, is remarkably similar in ascospore shape and septation, according to Berlese's illustration (Pl. CVIII, fig. 2, 1895-1899), as Berlese himself observed. The ascospores are considerably larger than those of the North American taxon, 40-43 x 12-16 µm. *Pseudovalsa macrosperma* Tul. & Tul. var. *fenestrata* Flag. & Chen. in Chenantais, Bull. Soc. Mycol. France 35: 124. 1919, was described briefly, with ascospores 30-32 x 16-18 µm, with three transverse and one longitudinal septa.



Figs. 6-9. *Discostroma muricata*. 6. Vertical section of ascoma surrounded by massed conidiophores and conidia. 7. Tips of conidial chains. 8. Ascus. 9. Ascospores, the lowermost one of only three in one ascus. Standard line = 150 µm for Fig. 6, 15 µm for Figs. 7-9.

A second species, originally described in *Teichospora*, is a member of the genus *Discostroma* in the Xylariales, Amphisphaeriaceae. Species in this genus vary in ascospore pigmentation, from hyaline to brown, and in septation, from one-septate to several-septate to muriform (Brockmann, 1976). The species are usually associated with anamorphs referred to the genera *Sporocadus* or *Seimatosporium*. The present species has closely associated with the ascomata dark brown chains of conidia, 10-12 x 6 µm, 2-3-septate with occasional longitudinal septum, whose conidiogenous cells could not be observed with clarity, but whose other features suggest *Taeniolella muricata* (Ell. & Ev.) Hughes. Additional collections of the fungus are needed to clarify the status of the presumed anamorph. The teleomorph seems to be most closely related to *Discostroma polymorpha* Brockmann, Sydowia 28: 306. 1976, but is considerably larger, with ascospores in the size range of the hyaline-spored *D. massarina* (Sacc.) Brockmann, Sydowia 28: 299. 1976.

Discostroma muricata (Ell. & Ev.) Barr, comb. nov.

Figs. 6-9

Basionym: *Teichospora muricata* Ell. & Ev. Bull. Washburn Coll. Lab. Nat. Hist. 1: 5. 1884.

Strickeria muricata (Ell. & Ev.) Kuntze, Rev. Gen. Pl. 3: 534. 1898.

Ascomata perithecioid, superficial with bases ingrown in periderm, separate or grouped; globose depressed, up to 550 µm diam, 385 µm high; apex abruptly papillate, opening by rounded pore, canal periphysate; surface dull black, roughened by massed chains of conidia that form a sort of stromatic layer over much of ascoma; peridium relatively soft, 20-30 µm wide, light reddish brown, of pseudoparenchymatous cells, inner layers compressed and hyaline. Asci (80-)100-110 x 12-17 µm, unitunicate, basal, clavate or cylindric; apical annulus shallow, nonamyloid. Paraphyses narrow, delicate. Ascospores 18-20(-34) x 8-10(-12.5) µm, light to dark brown, broadly ellipsoid, ends obtuse, straight, 3-(4-6-)septate, not constricted at septa, one longitudinal septum in one or several cells; contents granular; wall smooth, thin, septa darkened; uniseriate or partially biseriate in the ascus.

On periderm of unknown tree, California.

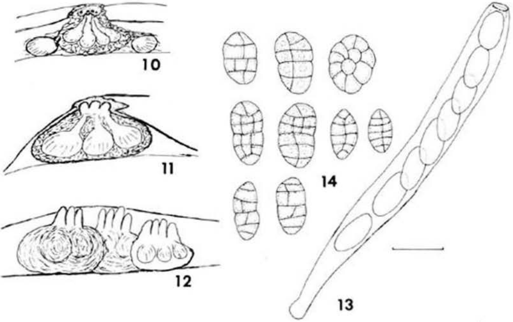
Material examined: California: San Diego, Dec 1883, C. R. Orcutt 96 (holotype, NY).

Thyridium vestitum (Fries) Fuckel is the lectotype species of *Thyridium* Nitschke 1867 (Holm, 1975). The genus was drastically revised by Saccardo (1877) when he arranged *T. vestitum* among species of *Fenestella* because of similarities in stroma and configuration of ascomata. He utilized *Thyridium* ss. Saccardo 1877 for a group of species that have quite different ascomata, centra, and asci than *T. vestitum*. Such misuse of the generic name cannot be maintained, and more discussion is to be provided under *Mycothyridium* Petrak in the Loculoascomycetes (Barr, in preparation). *Thyridium vestitum* is rather frequent on woody plants in temperate regions, and it has been described under a number of names. The taxon seems best arranged in the Xylariales, Amphisphaeriaceae, related to *Valsaria*. *Mycothyridium* Müller (in Müller and von Arx, 1973) was an unnecessary name for *Thyridium* Nitschke, as well as a later homonym of *Mycothyridium* Petrak 1962.

Thyridium vestitum (Fries) Fuckel, Jahrb. Nass. Ver. Naturk. 23/24: 195. 1870. Figs. 10-14
  Sphaeria vestita Fries, Syst. Mycol. 2: 410. 1823.
  Valsa vestita (Fries) Fries, Summa Veget. Scand. 412. 1849.
  Pseudovalsa vestita (Fries) Ces. & de Not. Comment. Soc. Critt. Ital. 1: 206. 1863.

Fenestella vestita (Fries) Sacc. Michelia 1: 50. 1877.
Mycothyridium vestitum (Fries) Müller in Müller & von Arx, The Fungi, IVA: 121. 1973.
Sphaeria tumida Pers.: Fries, Syst. Mycol. 2: 389. 1823.
Thyridium tumidum (Pers.:Fries) Nits. in Fuckel, Jahrb. Nass. Ver. Naturk. 25/26: 314. 1871.
Sphaeria ehrenbergii Tul. Act. Acad. Sci. Paris t. XXXII, 471. 1851; Ann. Sci. Nat. ser. III: 376, t.XV. 1851.
Valsa ehrenbergii (Tul.) Tul. Ann. Sci. Nat. ser. IV: 117, t. V. 1856.
Cucurbitaria vagans Sacc. Mycol. Venet. 122. 1873.
Sphaeria valsaeformis Fuckel, F. rhen. 954, in sched. 1864.
Valsa condensata Berk. & Curt. Grevillea 4: 102. 1876.
Fenestella condensata (Berk. & Curt.) Sacc. Syll. Fung. 2: 331. 1883.
Thyridium rostratum Fuckel, Jahrb. Nass. Ver. Naturk. 25/26: 314. 1871.
Fenestella rostrata (Fuckel) Sacc. Syll. Fung. 2: 330. 1883.
Fenestella tumida var. *rostrata* (Fuckel) Berlese (as Saccardo) Icon. Fung. 2: 75. 1897.
Fenestella amorpha Ell. & Ev. J. Mycol. 4: 58. 1888.
Fenestella ulmicola Ell. & Ev. Proc. Acad. Nat. Sci. Philadelphia 1893: 143. 1893.
Fenestella canadica Rehm, Ann. Mycol. 12: 172. 1914.

Stroma variable in size and development, 2-2.5(-6) mm diam, composed of yellow, yellow brown, grayish brown, orange yellow, or reddish brown, loosely interwoven hyphae and cells of periderm, over upper parts of ascomata or entirely surrounding ascomata, at times darkened and compact at margin, rarely sparse or nearly lacking, forming erumpent small, rounded or elongate, yellowish, brown or blackened discs; ascomata perithecioid, immersed beneath periderm and raising it, circinate, few (1-6) or numerous in stroma; globose or ovoid or difformed by mutual pressure, 300-715 (-1000) µm diam; ostioles relatively short and papillate or elongate and beaked, up to 550-600(-1000) µm long, 135-165 µm wide near base, expanded to 220 µm wide near apex, opening by rounded pore, canal periphysate, converging and barely penetrating stromatic disc, or emergent beyond disc; peridium of compressed layers of cells, reddish brown or dark brown externally, hyaline internally, 20-35 µm wide. Asci 90-160(-190) x 10-16(-18) µm, unitunicate, peripheral, cylindric, short stipitate or at times long stipitate; apical annulus shallow, refractive, nonchitinoid, nonamyloid,



Figs. 10-14. *Thyridium vestitum.* 10-12. Habit sketches showing variation in stromata: 10, conidiomata in stroma, ascomata beyond, from type of *F. canadica*; 11, from type of *F. ulmicola*; 12, from hickory, Iowa. 13. Ascus. 14. Ascospores. Standard line = 15 µm for Figs. 13, 14.

ascus cytoplasm dextrinoid; (4-6-)8-spored. Paraphyses numerous, filiform, narrow, ca. 1-1.5 µm wide. Ascospores (12-)15-24(-26) x (6-)7-11(-14) µm, light reddish brown to dark dull brown, ellipsoid or broadly ovoid, ends obtuse, straight, rarely inequilateral, 3-5-(6-7-8-)septate, not or slightly constricted at septa, one longitudinal septum in mid or all cells, often oblique in end cells, at times one additional septum in mid cells; contents with single globule in each cell or homogeneous; wall smooth; uniseriate in the ascus.

Anamorph: *Pleurocytospora vestita* Petrak, Ann. Mycol. 21: 257. 1923: conidiomata eustromatic, multiloculate, borne in upper part of stroma prior to or at times concurrently with ascomata, irregular in size and shape; conidiophores lining centrum, narrow, branched, 25-40 x 1.5-2.5 µm; conidiogenous cells enteroblastic-phialidic; conidia hyaline, 2.5-4.5 x 1-2 µm, oblong, cylindric, straight or slightly curved (nearly allantoid), with minute guttule at each end.

Saprobic or weakly parasitic on numerous angiospermous trees and shrubs, Europe, North America, New Zealand. Known from *Actinidia* (N.Z.), *Berberis, Betula, Caragana, Carya, Colutea, Cytisus, Eleagnus, Forsythia, Platanus, Quercus, Ribes, Robinia, Sambucus, Ulmus.*

Material examined (selected): NORTH AMERICA: Ontario: Dearness 1201, 1572, 1592, 2242; London, Aug 1892 (holotype of *F. ulmicola*, NY); Rehm Ascom. 2112 (isotype of *F. canadica*, NY); Massachusetts: Barr 2872, 4126A, 6652 (MASS); New York: Lyodonville, Apr 1888, C. E. Fairman (holotype of *F. amorpha*, NY); Kansas: Bartholomew, no data (NY); Iowa: Decorah, Mar 1885, E. W. Holway (NY); Missouri: Davis Creek, near Emma, 27 Oct 1897, C. N. Demetrio (NY). EUROPE: Herb. Barbey-Boissier 96(NY); Fuckel, F. rhen. 954 (isotype of *Sphaeria valsaeformis*, BPI); Krieger F. Sax. 838; Petrak, Myc. Carp. 232; Roumeguere, F. sel. exs. 4775; Saccardo, Myc. venet. 1272; Sydow, Myc. Marchica 1570, 3760, 3941, 4645 (all NY). NEW ZEALAND: Bay of Plenty, DSIR Research Orchard, 15 Jul 1981, G. J. Samuels (MASS).

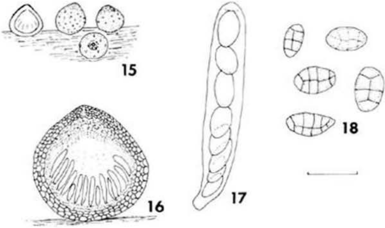
Thyridium vestitum shows variability among collections: in substrates, in compaction, pigmentation and size of stroma, i.e., "pseudostroma" of fungus hyphae plus cells of substrate, and in size, shape, and septation of ascospores. Tabulation of data from over 20 collections from Europe, New Zealand and various localities in North America indicated that the overlap in these characters is such that only a single species can be recognized. None of the variations observed, and responsible for the long synonymy, can be correlated with enough surety to separate more than variants of the one taxon.

The final species to be considered here belongs in the Hypocreales. It appears to fit precisely in *Calyptronectria* Speg. (Rogerson, 1970). Two species were described in the genus, both with larger sizes than the North American taxon. The possibility that this species is a nonstromatic form of *Thyronectria* was also considered. In part this seemed feasible because numerous minute hyaline (?) conidia were observed in centrum sections, suggesting the possibility of ascospores budding; none of the asci was found to contain such ascospores. There is no indication of stroma tissues on the substrate, and the species seems best disposed in *Calyptronectria*, where it is certainly more visible than misplaced in *Teichospora*.

Calyptronectria ohiensis (Ell. & Ev.) Barr, comb. nov.
Figs. 15-18

Basionym: *Teichospora (Teichosporella) ohiensis* Ell. & Ev. Proc. Acad. Nat. Sci. Philadelphia 1894: 329. 1894.

Teichosporella ohiensis (Ell. & Ev.) Berlese, Icon. Pyren. 2: 62. 1896.



Figs. 15-18. *Calyptronectria ohiensis*. 15. Habit sketch of superficial ascomata. 16. Vertical section of ascoma. 17. Ascus. 18. Ascospores. Standard line = 150 µm for Fig. 16, 15 µm for Figs. 17, 18.

Strickeria ohiensis (Ell. & Ev.) Kuntze, Rev. Gen. Pl.
3: 534. 1898.

Ascomata perithecioid, erumpent superficial, gregarious in multitudes; globose, rarely pinched in at sides, 275-385 µm diam; apex bluntly papillate, blackened, pore rounded, canal periphysate; surface light brown dotted with darker areas; peridium soft and fleshy, of two regions: externally reddish to light yellow, ca. 30 µm wide, composed of pseudoparenchymatous sclerotial cells, internally bright yellow with reddish tinges, 10-15 µm wide, composed of compressed layers of cells. Asci unitunicate, 50-70 x 8-10 µm, basal and lateral, oblong, 8-spored or less than eight maturing. Paraphysoids short, apical, delicate, a few between asci to base; centrum pale pinkish yellow. Ascospores 8-13 x 6-7 µm, hyaline, broadly ellipsoid, ends obtuse or acute at times, straight or inequilateral; 3-(5-)septate, not constricted at septa, one longitudinal septum in mid cells, oblique into end cells; contents minutely guttulate; wall thin, smooth; overlapping uniseriate in the ascus.

On hard wood, Ohio.

Material examined: Ohio: Preston, A. P. Morgan 1012, two packets (holotype, NY).

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I acknowledge with appreciation help from curators of the herbaria cited; without their cooperation this study and all of my research would be severely handicapped. Dr. C. T. Rogerson generously read the manuscript. Again I thank him for support and encouragement.

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VERMICULARIOPSIELLA BENDER, AN EARLIER NAME FOR ORAMASIA URRIES.

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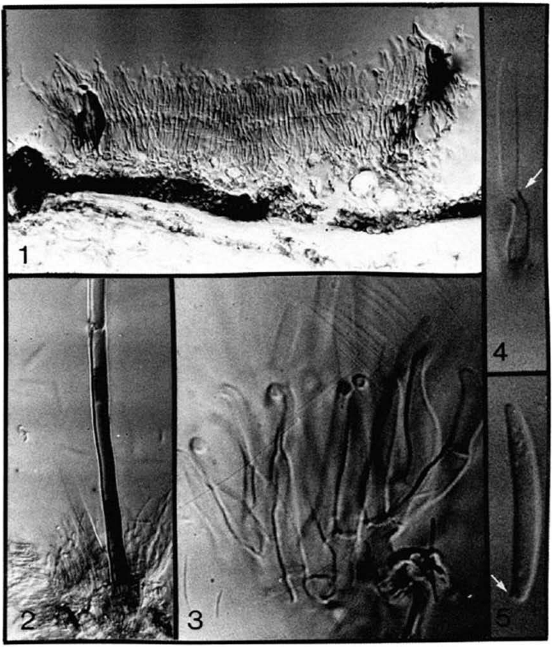
In a short account of Excipula immersa Desm., Höhnel (1918) transferred the fungus to a new anamorph-genus, Vermiculariopsis Höhnel, in the hyphomycetes, and gave a short generic description. Later (1929), in a detailed account of the single species: Vermiculariopsis immersa (Desm.) Höhnel, he noted that conidiomata of the fungus were not excipulate but sporodochial, and that he disagreed with Saccardo's (1892) redisposition of the fungus as a species of Dinemasporium Lev. Bender (1932) pointed out that Vermiculariopsis Höhnel was a later homonym of Vermiculariopsis Torrend, and proposed a new name, Vermiculariopsiella Bender, for it. Carmichael et al. (1980) treated Vermiculariopsiella as an acceptable, valid anamorph-genus but indicated that, despite the accounts published earlier by Desmazieres (1857), Saccardo (1892), Höhnel (1918, 1929) and Bender (1932), no illustration depicting the morphological features of the fungus has ever been published, nor has the genus been reassessed using up-to-date taxonomic criteria. Sutton (1977) commented on the nomenclatural status of Vermiculariopsis Torrend, Vermiculariopsis Höhnel and Vermiculariopsiella Bender.

Desmazières distributed exsiccati of Excipula immersa Desm., in Pl. Crypt. Fr. No. 268 in 1855. The following description, with illustrations in Figs.1-6, is based on a study of an isotype specimen in FH.

Foliicolous. Conidiomata sporodochial, hypophyllous, scattered to gregarious, superficial to semi-immersed, discrete, setose, black with an overlying, agglutinated, white mass of conidia; stroma immersed, of a basal 'textura globulosa' to 'textura angularis' with brown, thick-walled cells merging gradually with thicker-walled, dark brown cells in linear series and then a loosely aggregated tissue of pale brown, thin-walled



Figs. 1-5. *Vermiculariopsiella immersa*. 1. Vertical section of conidioma. 480X. 2. Part of a seta and basal stroma with conidiophores. 480X. 3 & 4. Conidiogenous cells with recurved apices and flared collarettes (arrow). 2000X. 5. A mature conidium with papillate protuberance at the base (arrow). 2000X.

cells. Setae and conidiophores arising from this layer. Setae simple, erect, cylindrical, gradually tapering toward a blunt apex, dark brown for the most part, lighter toward the apex, 5-8-septate, wall thick and smooth but occasionally minutely

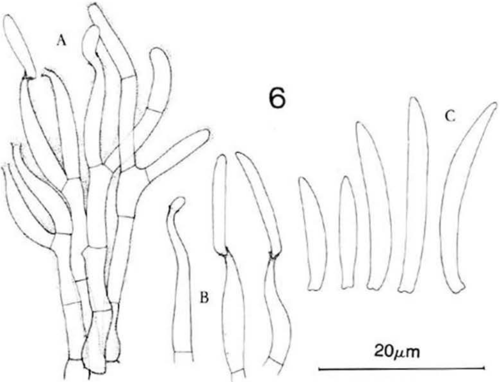


Fig. 6. Vermiculariopsiella immersa. A. Conidiophores. B. Stages in development of a conidium. C. Mature conidia.

asperate; up to 700 µm long, 10-12 µm wide at the base, 5-7 µm wide at the apex. Conidiophores erect, sparsely branched, 3-4-septate, densely packed in a palisade, pale brown or hyaline, up to 40 µm long. Conidiogenous cells phialides, subcylindrical to lageniform with recurved apices and flaring collarettes, hyaline, smooth-walled, 13-19 µm long, 2-3.5 µm wide at the base, and up to 1.5 µm wide at the apex, without percurrent proliferations. Conidia blastic-phialidic, amerosporous, cylindrical, apex obtuse, base truncate with a short, papillate protuberance on one side marking the point of attachment, curved or straight, hyaline, smooth-walled, 14-25 X 2-2.5 µm.

Specimens examined: 1. FH (isotype), Desmazières- Pl. Crypt. Fr. # 268, on leaves of Quercus ilex and Q. coccifera (no other data); 2. UW, on leaves of Loranthus sp. in litter, Coonoor, Tamilnadu, India, 28.IX.1980, T.R.Nag Raj.

The description of Oramasia hirsuta Urries (Urries 1956, Sutton & Pirozynski 1963, Sutton 1978) establishes the fungus as conspecific with **V. immersa** (Desm.) Bender as redescribed and illustrated here. Hence, the following nomenclator appears appropriate.

VERMICULARIOPSIELLA Bender, Mycologia 24: 412, 1932.
≡ Vermiculariopsis Höhnel, Ber. dtsch. Bot. Ges. 36: 317, 1918; Mitt. Bot. Inst. Techn. Hochs. Wien 6: 32, 1929 (non Vermiculariopsis Torrend, Broteria Bot. Ser. 10: 41, 1912).
= Oramasia Urries, An. Inst. bot. A. J. Cavanilles 14 (1955): 168, 1956.
= Singera Batista & Bezerra, Publ. Inst. Mic. Univ. Recife 298: 5, 1960, fide Sutton, Mycol. Pap. 141: 191, 1977.

Type anamorph-species: **Vermiculariopsiella immersa** (Desm.) Bender. var. **immersa.**

Vermiculariopsiella immersa (Desm.) Bender var. **immersa.** Mycologia 24: 412, 1932.
≡ Excipula immersa Desm., Bull. Soc. Bot. Fr. 4: 911, 1857.
≡ Dinemasporium immersum (Desm.) Sacc., Syll. Fung. 10: 439, 1892.
≡ Vermiculariopsis immersa (Desm.) Höhn., Ber. dtsch. Bot. Ges. 36: 317, 1918; Mitt. Bot. Inst. Techn. Hochsch. Wien 6: 32, 1929.
= Oramasia hirsuta Urries, An. Inst. bot. A. J. Cavanilles 14 (1955): 168, 1956.
≡ Oramasia hirsuta Urries var. hirsuta Urries apud Sutton, Mycologia 70: 796, 1978.

Vermiculariopsiella immersa (Desm.) Bender var. **ramosa** (Sutton) **comb. nov.**
≡ Oramasia hirsuta Urries var. ramosa Sutton, Mycologia 70: 796, 1978.

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Höhnel, F. von. 1918. Dritte vörlaufige Mitteilung mycologischer Ergebnisse Nr. 201-304). Ber. dtsch. Bot. Ges. 36: 309-317.

Höhnel, F. von. 1929. Uber Excipula immersa Desmazieres. Mitt. Bot. Inst. Techn. Hochsch. Wien 6: 30-32.

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Urries, M. J. 1956. Novedades micológicas de la Flora Canaria. An. Inst. bot. A. J. Cavanilles 14: 153-170.

MYCOTAXON

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CHALARA ELEGANS (: THIELAVIOPSIS BASICOLA) AND ALLIED SPECIES. II - VALIDATION OF TWO TAXA

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SUMMARY

Chalara neocaledoniae and Chalara populi (Thielaviopsis neocaledoniae Dadant and Chalaropsis populi Veldeman, nomina invalida) are redescribed, illustrated, and validated by designation of type specimens. Thielaviopsis wallemiaeformis Dominik & Ihnatowicz is considered as a nomen invalidum.

RESUME

Chalara neocaledoniae et Chalara populi (Thielaviopsis neocaledoniae Dadant et Chalaropsis populi Veldeman, nomina invalida) sont redécrits, illustrés et validés par désignation d'échantillons-types. Thielaviopsis wallemiaeformis Dominik et Ihnatowicz est considéré comme nomen invalidum.

In a previous paper (Delon & Kiffer,1978) we gave a systematic and phytopathological review of some Chalara and conidial Ceratocystis spp, characterized either by the production of an accessory anamorph - "chlamydospores", aleuriospores - previously classified as Thielaviopsis and Chalaropsis, or by their phytopathogenic nature, or by both these features. Chalara elegans and some other species were described and illustrated, and a table summarized the features of 13 species of this group. We shall discuss here the case of three species which were not validly published, nor examined by Nag Raj and Kendrick (1975).

Chalara neocaledoniae Dadant ex Kiffer & Delon, sp. nov. (Thielaviopsis neocaledoniae Dadant, nom.inval., Art.36, 37). Dadant, 1950; Rev.gén.Bot., 57 : 176).
Fig. 1, a-c, Fig. 2, a-c.

Coloniae in malto agarato mycelium sparsum,griseoviride radiatim confertum formantes, ad 32 mm diam.in 3 d., 90 mm in 6 d., 22°C,velutinae,primum albae dein griseobrunneae,verso griseae.

Hyphae hyalinae vel brunneae, septatae, ramosae, (1.5) - 4.5 - (12) µm latae.

Phialophora erecta, simplicia, 3-6 cellularia,dilute brunnea, cum phialidibus (64) - 85 - (123) µm longa.Phialides elongatae, concolores, haud inflatae ad basim, collo cylindraceo vel conico,interne 2 ad 4 conidiis munitae, (40) - 54 - (72) x (3.7) - 4.3 - (5.3) (ad ampullam), 2.2 µm (ad apicem). Conidia cylindracea hyalina,utrinque truncata, (3.7) - 6.8 - (10.5) x (1.5) - 2.0 - (2.3) µm.

Odore ethyli acetici.

Habitat in Coffea robusta et Psidio guayava in Nova Caledonia (R.Dadant). In Cryptogamiae Laboratorio, MNHN, (Lutetiae Parisiorum) culta sub n° M 1055 (PC) et in CBS sub n° 149.83.

Holotypus IMI 270649.

Colonies on malt agar composed of a thin, radiate, appressed, greyish-green mycelium. Surface velvety, at first whitish then brownish-grey due to sporing structures. Reverse grey. Diameter : 32 mm after 3 days, 90 mm or more after 6 days at 22°C in the dark.

Hyphae hyaline to brown, septate, branched, (1.5) - 4.5 - (12) µm wide.

Phialophores erect, simple, medium brown,bearing long phialides. Total length of phialophores with phialides (64) - 85 - (123) µm with (2) - 2.8 - (5) septa. Phialides with a medium brown, slightly or not inflated venter and a long, cylindrical or obconical, light brown collar, containing 2-4 conidia, (40) - 54 - (72) x (3.7) - 4.3. - (5.3) (venter) and 2.2 µm (collar). Conidia cylindrical, hyaline, with truncate ends, united in fragile chains, (3.7) - 6.8 - (10.5) x (1.5) - 2.0 - (2.3) µm. Aleurioconidia or chlamydospores absent.

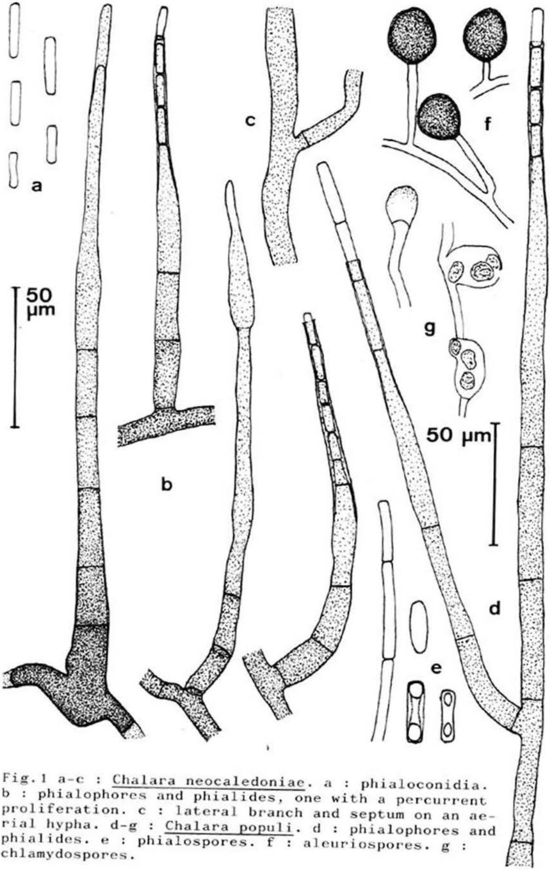
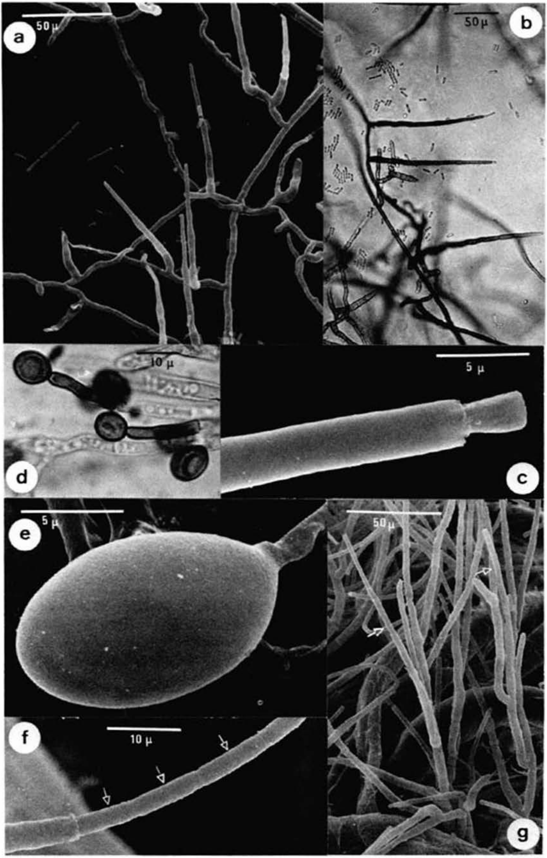


Fig.1 a-c : Chalara neocaledoniae. a : phialoconidia. b : phialophores and phialides, one with a percurrent proliferation. c : lateral branch and septum on an aerial hypha. d-g : Chalara populi. d : phialophores and phialides. e : phialospores. f : aleuriospores. g : chlamydospores.

Fig. 2 a-c : Chalara neocaledoniae; a,b:hyphae, phialides and phialoconidia. a : Scanning Electron Microscope, b : Light Microscope. c : phialide extruding a conidium, SEM., d-g : Chalara populi ; d,e : aleuriospores, d : LM, e : SEM., f : Phialide tip extruding a chain of phialoconidia, SEM., g : hyphae, phialophores, phialides and phialoconidia, SEM.


50 μ
a
50 μ
b
10 μ
d
5 μ
c
5 μ
e
50 μ
f
10 μ
g

Odor reminiscent of ethyl acetate (on malt agar).

Origin : Observed and isolated by R.Dadant in New Caledonia, about 1948-1950, on Coffea robusta and Psidium guayava. Strain maintained in the Mycothèque du Laboratoire de Cryptogamie, Museum National d'Histoire Naturelle, Paris - réf. M 1055 and in CBS, Baarn, as CBS 149.83.

Holotype IMI 270649 (CMI, Kew).

Dadant (1950) described "a new disease of Coffea robusta in New Caledonia". Similar symptoms were also observed on guava (Psidium guayava). The agent was a Hyphomycete with long, tubular phialides, endogenously producing phialospores, and no other known anamorph or teleomorph. Dadant gave a rather detailed macro - and microscopic description in French, from natural and cultured material, a few photographs, and he studied the fungus from the phytopathological angle.

The dimensions given by Dadant for the various elements of this species are close to what we observed, if the differences in cultural conditions and the subculturing of the strain for 30 years are taken into account. The author described in cultures of Th. neocaledoniae "a very distinct acetone odor", but we subjectively identified it as an odor of ethyl acetate (on malt agar). Such a production of odoriferous volatiles is well known in this group of fungi (Collins & Morgan,1962) and methyl acetate has been supposed to be an active agent in pathogenesis (Tabachnik & Devay 1980) in the related Chalara elegans.

Another noticeable character is the appearance of branches and septa in the aerial mycelium (Fig. 1,c) :the daughter-hypha is slightly narrowed at its base, wherefrom it originates on the mother-hypha, and the dividing septum is situated a few µm above ; this branching is somewhat reminiscent of Rhizoctonia solani.

Dadant proposed to name this fungus Thielaviopsis neocaledoniae "if it should prove to be a new species". He placed it in the genus Thielaviopsis because of its long, tubular phialides and endogenous phialoconidia, and probably also because of its phytopathogenic nature, although he was aware that the absence of "the second type of spores : large pigmented arthrospores" was atypical for the genus. This species should, by all means, have been classified with Chalara.

As far as we know, a formal description, with a Latin diagnosis and the deposition of a type specimen, never was effected, and therefore, Dadant's Thielaviopsis neocaledoniae is invalidly published. We could obtain a strain kept in the Culture Collection of the Laboratoire de Cryptogamie, Museum National d'Histoire Naturelle in Paris,we studied it and prepared a type specimen (dried culture) which was deposited at the Herbarium of CMI, Kew. This allows us to validate Dadant's species, while transferring it to Chalara. Comparison with other described species (Nag Raj & Kendrick, 1975) confirmed that it was different. The closest species, Ch. crassipes, has smaller phialides and phialoconidia.

Chalara populi Veldeman ex Kiffer & Delon, sp. nov.
(Chalaropsis populi Veldeman, nom.inval., Art. 36, 37)
(Veldeman, 1971, Meded. Fak. Landb. - Wet. Gent, 36 : 1001)
Fig. 1, d-g, Fig. 2, d-g.

Coloniae in malto agarato mycelium sparsum formantes ad 50 mm diam. in 15 d., 22°C, pallide griseae dein griseobrunneae, superficie flocculis fertilibus, 2 mm latis sparsae.

Hyphae hyalinae,raro pallide brunneae, septatae, ramosae, 1.5-5 µm latae.

Phialophora erecta, ex hyphis aeriis latis (4-8 µm) oriunda, nonnunquam ramosa, dilute brunnea, phialidibus longis munita. Phialophora cum phialidibus (105)-170-(210) µm longa, (2)-3.5 (5) septis praedita. Phialides cylindricoconicae,interdum subinflatae, dilute brunneae,collo cylindraceo pallidiore praeditae (60)-70- (83) x(3.7)-4.4-(5.3) (ad ventrum), ad collum (2.2)-2.9-(3.0) µm latae. Phialoconidia hyalina,elongata, primum cylindracea utrinque truncata, dein doliiformia vel medio constricta,utrinque plus minusve rotundata, 2-guttulata, (6.0)-15.0-(18.8) x (2.2)-3.0-(3.8) µm.

Aleuria (conidia solitaria holoblastica, "chlamydosporae") subsphaerica vel ovoidea, rarius apiculata seu piriformia, pariete laevi, brunneo crassoque, (6.7)-9.1-(12.0) x (6.0)-7.6-(9.0) µm,hilo basilari 1 µm lato praedita. A.R.Veldeman scripta et e Populi robustae cortice isolata, in quo maculas nigras evocat. In CBS Mycotheca praeservata sub n° 484.71.

Holotypus : IMI 270650.

Colonies on malt agar composed of a sparse, hyaline mycelium, reaching a diameter of 50 mm in 15 days at 22°C in the dark, bearing fertile tufts about 2 mm in diameter, at first light grey, becoming brownish grey.

Hyphae hyaline, rarely light brown, septate,branched, 1.5-5 µm in diameter.

Phialophores erect on wide (4-8 µm) brown aerial hyphae, often branched, medium brown. Total length of phialophores + phialides (105)-170-(210) µm, with (2)-3.5-(5) septa. Phialides long, light to medium brown,with a cylindrical or slightly inflated venter and a subconical or cylindrical collar,(60)-70-(83) x (3.7)-4.4-(5.3) (venter) and (2.2)-2.9-(3.0) µm (collar).Phialoconidia hyaline, long, at first cylindrical with truncate ends, then barrel- or dumbbell-shaped with rounded ends, containing two oil droplets, forming fragile chains, (6.0)-15.0-(18.8) x (2.2)-3.0-(3.8) µm.

Aleuriospores (solitary holoblastic conidia,"chlamydospores") usually subspherical or ovoid, rarely apiculate or pyriform, with a brown, smooth and thick wall,(6.7)-9.1-(12.0) x (6.0)-7.6-(9.0) µm. Basal hilum 1 µm wide.Aleuriophores micronematous, simple or more or less branched.

Origin : isolated and described by R. Veldeman from bark of Populus and Salix spp., where it produces brown spots (trunk scab disease). Culture preserved as CBS 484.71 Baarn, isolated from Populus robusta, Gent, Belgium,1970, by R. Veldeman.

Holotype : IMI 270650 (CMI, Kew).

Veldeman published twice (1970,1971) about this fungus, mainly concerning its phytopathological effects,with an English description and photographs but no biometry. A formal description was announced but never appeared.

The fungus is a cambium killer, parasite on the bark of Populus and Salix spp. Two strains,484.71 and 486.71, are maintained in the culture collection of CBS, Baarn.From 484.71 we prepared the above description and a type specimen (dried culture) deposited at CMI, Kew.CBS 486.71,ex Populus gelrica, Gent, 1970, was not examined.

With its long tubular phialides and unicellular aleuriospores, this fungus agrees perfectly with the definition of the genus Chalaropsis. Profusely branched aleuriophores were described and photographed by Veldeman, but in our cultures they were only simple (Fig.1, f) or slightly branched. Veldeman (1971) also reported on the presence of terminal or intercalary, hyaline or light brown chlamydospores (sensu stricto). We observed a few of them, about 7 µm in diameter, spherical or elongate and then reaching 15 µm in length (Fig. 1,g).

The status of Fungi which possess two or more different anamorphs (synanamorphs, Hughes, 1979) has been widely discussed in the past years (Hennebert, 1971 ; Hennebert & Weresub, 1977 ; Kendrick, 1980; Gams, 1982). We shall follow here the anatomical system of Nag Raj and Kendrick (1975), who place all fungi with a Chalara anamorph in the genus Chalara.Genera like Chalaropsis and Thielaviopsis, which were characterized by the presence of two synanamorphs are thus suppressed. Among the Chalara species with unicellular aleuriospores (: Chalaropsis), Ch. populi is close to Ch.ovoidea but has longer phialides on branched conidiophores ; the other species are quite different.

Thielaviopsis wallemiaeformis Dominik & Ihnat.

(Dominik and Ihnatowicz, 1975, Zesz. Nauk. Akad.Rolniczej Szczecin., 50 : 24).

This fungus was described from a soil isolate obtained in Ivory Coast. It was characterized by a Chalara state associated with another anamorph producing retrogressive, brown echinulate conidia, looking like Wallemia sebi, whence the name.

This species was provided with a Latin diagnosis, but no type specimen was designated. We could obtain neither dried nor living material and we consider Th.wallemiaeformis as a nomen invalidum (Art.37).

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LICHENS COLLECTED BY L. HANSSON IN NORTHWESTERN GREENLAND

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SUMMARY

A list is given of 63 species of macro- and microlichens collected by Miss Lisbet Hansson in four localities in northwestern Greenland. Twelve species are additions to the known lichen flora of this part of Greenland, viz. Acarospora chlorophana (Wahlenb.)Massal., Allantoparmelia alpicola (Th. Fr.)Essl., Buellia geophila (Flörke ex Sommerf.)Lynge, Cladonia carneola (Fr.)Fr., Cladonia cyanipes (Sommerf.)Nyl., Lecanora behringii Nyl., Lecidea auriculata Th. Fr., Xanthoparmelia incurva (Pers.)Hale, Physcia dubia (Hoffm.)Lettau, Rhizocarpon copelandii (Körber)Th. Fr., Rhizocarpon superficiale (Schaerer)Vainio and Stereocaulon rivulorum Magnusson. Together with other recent investigations, these collections demonstrate that the group of species, which are widely distributed in Greenland, are larger than previously supposed, compared to the group of species with a restricted occurrence in more southern parts of Greenland.

A few new Greenland specimens of Squamarina lentigera (Weber)Poelt collected in Nyeboes Land by Dr. Eigil Knuth are shortly mentioned.

INTRODUCTION

Although a few recent contributions to the lichen flora of northwestern Greenland are available (E.S. Hansen, 1980, 1981; Thomson, 1978), the region between Svartenhuk Peninsula in Central West Greenland and the north coast of Greenland can still be considered partly uninvestigated (cf. also E.S. Hansen, 1978a). Therefore it was welcome that Lisbet Hansson in the summer of 1981 got an opportunity to collect lichens in the following four areas situated between Qõrqut and Thule (Fig. 1; the location of the investigation areas in Greenland is also shown on the distribution map, Fig. 2):

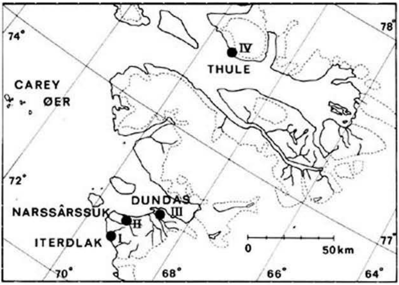

Fig. 1. Location of the four collecting sites.

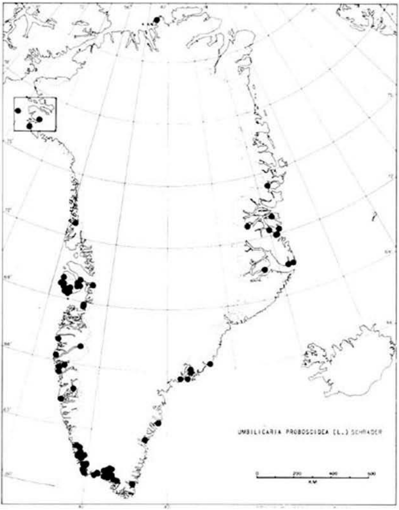

Fig. 2. Distribution map of Umbilicaria proboscidea (L.) Schrader in Greenland.

Locality I. Valley and ridge near Iterdlak (Qaersorssuaq). 76°19'N, 69°15'W (4. and 5. July 1981).

Locality II. Valley, c. 5 km east of Narssârssuk. 76°26'N, 69°12'W. (28. June 1981).

Locality III. South-facing slope and top of Point 300, Dundas. 76°33'N, 68°38'W. (1. July 1981).

Locality IV. Area near the airstrip at Thule (Qânâq). 77°29'N, 69°12'W. (19. July 1981).

Information about the climatic and geological conditions of Dundas and Thule is provided in E.S. Hansen (1980); cf. also Escher & Stuart Watt (1976). No meteorological data are available to illustrate the climate of Loc. I and II, which, however, is supposed to be similar to that of Dundas.

LIST OF SPECIES AND LOCALITIES

The following list shows, in which localitites each of the 63 species was collected (c. ap. = apothecia present; st. = sterile specimen).

Acarospora chlorophana (Wahlenb.) Massal. I (c.ap.)
Agyrophora lyngei (Schol.) Llano I (st.); III (st.)
Alectoria nigricans (Ach.) Nyl. I (st.); II (st.)
Alectoria ochroleuca (Hoffm.) Massal. I (st.)
Allantoparmelia alpicola (Th.Fr.) Essl. I (c.ap.)
Bryoria chalybeiformis (L.) Brodo & Hawksw. III (st.)
Buellia disciformis (Fr.) Mudd I (c.ap.)
Buellia geophila (Flörke ex Sommerf.) Lynge IV (c.ap.)
Caloplaca stillicidiorum (Vahl) Lynge IV (c.ap.)
Caloplaca tiroliensis Zahlbr. II (c.ap.)
Candelariella aurella (Hoffm.) Zahlbr. IV (c.ap.)
Candelariella vitellina (Hoffm.) Müll. Arg. I (c.ap.); III (c.ap.)
Cetraria cucullata (Bell.) Ach. I (st.)
Cetraria delisei (Bory ex Schaerer) Nyl. I (st.)
Cetraria nivalis (L.) Ach. I (st.); II (st.)
Cladonia amaurocraea (Flörke) Schaerer I (st.)
Cladonia carneola (Fr.) Fr. I (st.)
Cladonia coccifera (L.) Willd. I (c.ap.)
Cladonia cyanipes (Sommerf.) Nyl. I (st.)
Cladonia pocillum (Ach.) O.-J. Rich. II (st.)
Cladonia pyxidata (L.) Hoffm. I (st.)
Cornicularia divergens Ach. I (st.)
Dactylina arctica (Hook.) Nyl. I (st.)
Dactylina ramulosa (Hook.) Tuck. II (st.)
Hypogymnia oroarctica Krog III (st.)
Lecanora behringii Nyl. IV (c.ap.)
Lecanora epibryon (Ach.) Ach. II (c.ap.)
Lecanora polytropa (Ehrh.) Rabenh. I (c.ap.); III (c.ap.)
Lecidea auriculata Th. Fr. I (st.)
Lepraria neglecta (Nyl.) Lettau I
Ochrolechia frigida (Swartz) Lynge I (st.)

Omphalodiscus decussatus (Vill.) Schol. I (c.ap.)
Omphalodiscus virginis (Schaerer) Schol. I (c.ap.)
Orphniospora atrata (Sm.) Körber I (c.ap.); III (c.ap.)
Parmelia saxatilis (L.) Ach. I (st.)
Parmelia sulcata Taylor I (st.)
Peltigera leucophlebia (Nyl.) Gyelnik II (st.)
Peltigera rufescens (Weis.) Humb. II (st.)
Peltigera scabrosa Th. Fr. I (st.)
Physcia dubia (Hoffm.) Lettau I (c.ap.)
Physconia muscigena (Ach.) Poelt II (st.)
Pseudephebe minuscula (Nyl. ex Arnold) Brodo & Hawksw. III (st.)
Pseudephebe pubescens (L.) Choisy I (st.)
Rhizocarpon copelandii (Körber) Th. Fr. III (c.ap.)
Rhizocarpon disporum (Naeg. ex Hepp) Müll. Arg. I (c. ap.); III (c.ap.)
Rhizocarpon geographicum (L.) DC. I (c.ap.); III (c.ap.)
Rhizocarpon superficiale (Schaerer) Vainio III (c.ap.)
Rhizoplaca melanophthalma (Ram.) Leuck. & Poelt
Rinodina turfacea (Wahlenb.) Körber II (c.ap.)
Solorina bispora Nyl. II (c.ap.)
Sphaerophorus fragilis (L.) Pers. I (st.)
Sphaerophorus globosus (Huds.) Vainio I (st.)
Sporastatia testudinea (Ach.) Massal. III (c.ap.)
Steroeocaulon rivulorum Magnusson I (st.); II (st.)
Thamnolia subuliformis (Ehr.) W. Culb. I; II; III
Umbilicaria arctica (Ach.) Nyl. I (c.ap.)
Umbilicaria cylindrica (L.) Delise ex Duby I (st.)
Umbilicaria hyperborea (Ach.) Ach. I (c.ap.); III (c.ap.)
Umbilicaria proboscidea (L.) Schrader I (c.ap.)
Umbilicaria torrefacta (Lightf.) Schrader I (st.)
Xanthoparmelia incurva (Pers.) Hale I (st.)
Xanthoria candelaria (L.) Th.Fr. I (st.)
Xanthoria elegans (Link) Th.Fr. I (c.ap.); III (c.ap.); IV (c.ap.)

DISCUSSION

About half of the 63 species listed in the collections of Lisbet Hansson were found growing on different siliceous rocks and stones. Among them are some interesting microlichens, for example, Acarospora chlorophana, Rhizocarpon copelandii and R. superficiale, that are more or less common in the Diskó-Nûgssuaq region in Central West Greenland, but previously not reported from localities farther to the north on the west coast of Greenland. The same applies to the macrolichens, Allantoparmelia alpicola and Xanthoparmelia incurva. These two species have various common ecological characteristics (Creveld, 1981) and occur together in a community dominated by Orphniospora atrata and Pseudephebe pubescens on extremely quartziferous rocks on a ridge near Iterdlak. This community is also well characterized by the species, Umbilicaria proboscidea, which is often dominant on exposed, siliceous rocks farther south on the west coast (cf. Fig. 2).

The group of ornithocoprophilous lichens is represented by eight species, which are almost identical with those collected by Laurence de Bonneval and Bent Fredskild in Siorapaluk and Dundas, respectively. Physcia dubia was, however, not found by these collectors. There is a large gap between the previous localities on Nûgssuaq peninsula and the new locality near Iterdlak, where it occurs on the top of bird stones together with, e.g., Xanthoria candelaria and Rhizoplaca melanophthalma. It is common in similar situations in southwestern Greenland (Dahl, 1950; E.S. Hansen, 1978a; K. Hansen, 1971), and there are also many reports of its occurrence in eastern Greenland (cf., e.g., E.S. Hansen, 1978b; Lynge & Scholander, 1932). Lichens restricted to rocks rich in Ca or Mg are not represented, although such rocks do occur in some of the areas visited (E.S. Hansen, 1980).

Four species, including Candelariella aurella, Caloplaca stillicidiorum, Lecanora behringii and Xanthoria elegans, were, however, found growing on old bones near the airstrip at Thule. Together with, e.g., Xanthoria candelaria and Physcia dubia, these species constitute a very characteristic association on bones of reindeer, whale and other arctic mammels.

All the remaining species are epigaeic and either occur on humus soils (inclusive of dead plant fragments) or on mineral soils with high or low contents of Ca. The first group is far greater than the group of "calciphilous" species, which comprises of six species, only, viz. Cladonia pocillum, Dactylina ramulosa, Peltigera leucophlebia, P. rufescens, Physconia muscigena and Solorina bispora. Generally this group is weakly represented in northwestern Greenland, although it has to be supposed that it will be extended during further collecting. Thus Dr. Eigil Knuth collected some sterile specimens of Squamarina lentigera on a river plain (marine foreland), c. 2 km south of the head of Frankfield Bay (c. 82°07'N, 55°00'W) in Nyeboes Land in the summer of 1981. This interesting addition to the lichen flora of Greenland occurs on soils rich in Ca and is also known from steppe-like areas characterized by high summer temperatures and low precipitation in, for example, the Baltic Islands, Central Europe, the Mediterranean area and southeastern Russia (Poelt, 1969).

Most of the species occurring on soils rich in humus in the present localities are more or less common in open dwarf shrub heaths in many parts of Greenland (cf. K. Hansen, 1971; E.S. Hansen, 1978b). This applies to all species of Alectoria, Cetraria, Ochrolechia, Sphaerophorus, Thamnolia and to some species of Cladonia, viz. C. amaurocraea, C. coccifera and C. pyxidata. Cladonia carneola, C. cyanipes and Stereocaulon rivulorum have not previously been reported from more northern areas on the west coast of Greenland. The two first mentioned species are also lacking in northeastern Greenland contrary to Stereocaulon rivulorum, which is common in this region (Lynge & Scholander, 1932).

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HERICIUM CORALLOIDES AND H. ALPESTRE (BASIDIOMYCETES) IN EUROPE

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ABSTRACT: The nomenclature of *Hericium coralloides* (Scop.:Fr.) Pers. is discussed and a neotype is selected from Sweden (Femsjö). Matings proved *H. coralloides* to be incompatible with *H. alpestre* Pers. Amphithallism is indicated in both species and haploid fruiting occurred in culture. Culture characters are given.

INTRODUCTION. Three species of *Hericium* have been found in Europe, *viz. H. coralloides* (Scop.:Fr.) Pers., *H. alpestre* Pers., and *H. erinaceus* (Bull.:Fr.) Pers.

H. coralloides (=*H. clathroides* (Pallas:Fr.)Pers.) is usually found on fallen, decayed trunks of Fagus silvatica, other deciduous trees, and exceptionally on Abies. It is probably widely distributed all over Europe.

H. alpestre has almost exclusively been found on newly fallen trunks and on stumps of Abies in the mountains of C and S Europe (Jahn 1979, as *H. coralloides*). It has not been found in Scandinavia.

H. erinaceus is mostly found on living oak and beech trees and is distributed in C and S Europe, in the N reaching S Sweden. Morphologically it differs from the former ones by having a compact fruitbody with much longer spines, up to 4 cm long. A short description of the fruitbodies of *H. coralloides* and *H. alpestre* is given below.

THE NOMENCLATURAL PROBLEM.

There has been confusion over the species concept to be associated with *H. coralloides*. Traditionally the species growing on Fagus has been given that name. However, Maas Geesteranus (1959) labelled the species growing on Abies in C Europe as *H. coralloides* and others (e.g. Domanski 1975, Marchand 1976, Jahn 1979) have followed him. According to Maas Geesteranus the species growing on Fagus is called *H. clathroides* (Pallas:Fr.) Pers. No original material of Scopoli or Fries has been found, thus the protolog was studied and a neotype selected.

The two species are closely related and it is most probable that early authors, like Scopoli and Fries, did not realise there were two species in Europe.

Hydnum coralloides sensu Fries: In the sanctioned work of Fries (1821) both *Hydnum coralloides* and *H. clathroides* were treated. It is quite certain that Fries's concept of *H. coralloides* was the species growing on Fagus in S Sweden. In "Systema mycologicum" he wrote:"Ad truncos Fagus, Abies, passim. Vidi vivum". However, in S. Sweden just one of the two species occurs - the one growing on Fagus.
In the dissertations written by Fries (1827, 1857) as well as in Fries (1862) his species concept is quite clear.
In a biography on Elias Fries, Rydeman (1915) tells about an episode, 1806, when Fries saw *Hydnum coralloides* for the first time. The fungus made a great impression on the 12 year-old boy and stimulated him to start his studies on fungi.

About *H. clathroides*, Fries (1821) wrote "vidi iconem", i.e. he had not seen the species in nature himself, because it was known only from Siberia.

Maas Geesteranus (1959) dismissed the concept of Fries (1821) as a "misapplication".

Hydnum coralloides sensu Scopoli: Fries used the name *H. coralloides*, established by Scopoli (1772). In Scopoli's description there is nothing to indicate that he was referring specifically either to the species growing on Abies or to the one growing on Fagus. No substrate is given, but Scopoli referred to Scopoli (1760) and to illustrations by Micheli (1729) and Schaeffer (1762).

The illustrations by Micheli and Schaeffer do not support Maas Geesteranus' conclusions. They are performed in a conventionalized manner and tell very little about the finer details necessary for a determination. Scopoli's (1760) text does not help much in attempts to decide which of the two species he had described. However, there is a notation that the species grows on rotten wood and - as mentioned above - this speaks in favour of Fries's concept.

Scopoli collected in N Yugoslavia. Tortić and Jelić (1977) and Plank (1978) reported both species in this area.

It is clear which species Fries (1821) had but equally valid arguments can not be made over which species Scopoli had.
To resolve the discussion a neotype for *Hericium coralloides* (Scop.:Fr.) Pers. is designated:

Hydnum coralloides / on a fallen decayed trunk of Fagus/ Sweden, Femsjö, Skubbhult / 1948-09-27 / S. Lundell & G. Hagström, n 5702 (UPS).

Persoon (1825) described *Hericium alpestre* and wrote: "Ad truncos abietinos, in vallesiacis subalpinis detectum a L. Thomas".
In the herbarium of Persoon (L) there are two specimens under the name *Hericium alpestre* (L 910 256 - 1300 and L 910 256 - 1313). Both are in a bad condition and none of them is suitable as type material. The spines are, however, rather thick and branched, and also the spore size is in accordance with the species growing on Abies (see also Maas

Geesteranus, 1959). A neotype for *H. alpestre* should be based on better material, not available by the time of this publication.
Bresadola (1932) and Nikolajeva (1961) used the name *H. alpestre* in the sense of Persoon.

BASIDIOCARP MORPHOLOGY IN *H. coralloides* AND *H. alpestre*.

Both species are fleshy, branched; individual branches covered with spines. In *H. coralloides*, the spines are rather evenly distributed on the lower surface af the branches, like the teeth on a comb. In *H. alpestre* the spines are branched, tufted and pendant (fig. 1).

In other respects the macromorphology is very variable. In both species there are specimens with thin and delicate branches as well as thick and short ones. Even resupinate forms are known. The spines are usually thicker and longer (up to 2 cm) in *H. alpestre* while thin and not more than 1 cm long in *H. coralloides*.

Hyphal system monomitic; hyphae with clamps, hyaline, in some specimens amyloid; gloeoplerous hyphae present, sparsely branched, simple septate, with a yellowish, oily content, more or less sulfo-positive.

Basidiospores broadly ellipsoid to subglobose, minutely tuberculate, amyloid, 3,5-5x3-4 µm in *H. coralloides*, 5-6,5x 4,5-5,5 µm in *H. alpestre*.

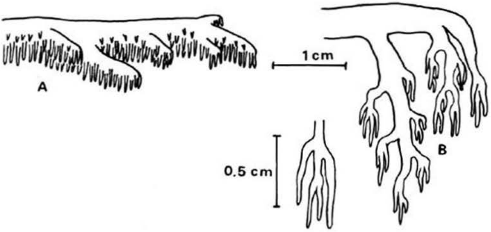

Fig. 1. Schematic illustrations of the arrangement of the spines in basidiocarps. A) *Hericium coralloides* . B) *H. alpestre*.

CULTURE STUDIES.

Single spore cultures from the following specimens were used in compatibility tests:
Hericium coralloides/ GB 145/ Denmark, Mön/ 1980-09-18--21/ N. Hallenberg.

GB 168/ Sweden, Västergötland/ 1980-10-19/ P.O. Martinsson. All isolated single spore cultures were clamped.
GB 331/ Sweden, Närke/ On Fagus/ 1981-09-23--24/ N. Hallenberg.
GB 364/ France, Fontainebleau forest/ On Fagus/ 1981-10-15/ M. Duverger.
LY 9916/ Yugoslavia, Plitvice/ On Abies/ 1981-10-06/ A. David.
LY 9923/ France, Fontainebleau forest/ 1981-11-03/ J. Boidin.
LY 9910/ France, Fontainebleau forest/ 1981-10-03/ J. Boidin.
GB 820/ Fructification in culture of LY 9910/6.

Hericium alpestre/ GB 392/ Austria, Steiermark/ On Abies/ 1981-11-03/ L. & N. Hallenberg, S. Michelitsch.
GB 407/ Austria, Steiermark/ 1981-11-03/ L. & N. Hallenberg, S. Michelitsch.

METHODS. Common malt agar was used as medium; drop-tests for extra-cellular oxidases followed Marr's directions (1979); nuclear staining was done according to Boidin (1958); culture codes are from Nobles (1965) with emendations by Boidin (1966).

INTERCOMPATIBILITY TESTS.

	GB 331/1	GB 364/2	GB 364/5	LY 9916/1	LY 9916/2	LY 9923/1	LY 9923/2	GB 820/2	GB 820/3	GB 820/5	GB 392/1	GB 392/2	GB 392/4	GB 407/1
GB 145/1	+	+		+	+	+	+	+	-	+	-		-	-
GB 145/2	+										-		-	-
GB 145/3	+	+		+	+	+	+	+	-	+				
GB 331/1		+		+	+	+	+	+	+	+	-		-	-
GB 364/2				+	+	+	+	+	+	+				
GB 364/5						+	+	+	+	+				
LY 9916/1					+	+	+	+	+	+	-	-		-
LY 9916/2						+	+	+	+	+	-	-		-
LY 9923/1							+	+	+	+	-		-	-
LY 9923/2								+	+	+	-		-	-
GB 820/2									-	-	-		-	-
GB 820/3										+	-		-	-
GB 820/5											-		-	-
GB 392/1												-	-	+
GB 392/2													+	+
GB 392/4														+

Di-mon matings gave the following results (dicaryotic x monocaryotic mycelia):

LY 9910 x GB 392/1,4 = -
LY 9910 x GB 407/1 = -
LY 9910 x GB 331/1 = -
LY 9910 x GB 145/1 = -
LY 9910 x GB 145/3 = +
LY 9910 x LY 9923/1,2 = +
GB 168 x GB 145/1 = +

From above it is obvious that *H. coralloides* is not compatible with *H. alpestre*. Further, within *H. coralloides* partial compatibility is observed between GB 145 (Denmark) and LY 9910 (France) and it's progeny (GB 820). Even in the combination between GB 145/3 and LY 9910 which resulted in the formation of clamps, the dicaryotization was very slow and incomplete.

INDICATIONS OF AMPHITHALLISM. It has been a striking feature in both species, that many of the isolated single spore cultures were clamped. In one case, LY 9910, P. Lanquetin (in litt.) isolated 20 single spore cultures but all were clamped. This would indicate homothallism but in di-mon matings LY 9910 dicaryotized haploid cultures of *H. coralloides* (GB 145/3, LY 9923/1,2).
LY 9910/6 fructified in culture and a new spore dispersal was made from that fruitbody. Examination of the germlings showed that most of the small ones were clamp-less, while some (more rapidly growing ones) were clamped. In several cases clamped hyphae grew directly from a spore without contact with any other hyphae.
In spite of the tetra-sterigmate basidia it must be concluded that amphithallism occurs in *H. coralloides* and most probably also in *H. alpestre*. Amphithallism in species with tetra-sterigmate basidia has earlier been found only in a few cases (Prillinger, 1982). Spores from amphithallic species are supposed to be both uninucleate and binucleate (or trinucleate). In this case, however, nuclear staining of the spores is difficult to interpret because of the small size of the spores and the somewhat thickened spore walls. The spores seem to be uninucleate, but the occurence of binucleate spores can not be excluded.

HAPLOID FRUITING IN CULTURES. In two simple-septate, single spore cultures, GB 407/1 (*H. alpestre*) and LY 9916/1 (*H. coralloides*), haploid fruiting was observed. No specialized fruitbody was formed. The bi-sterigmate basidia were found directly on the mycelium. Single spore isolates were obtained - GB 432 (8 isolates) from GB 407/1 and GB 433 (6 isolates) from LY 9916/1. All mycelia obtained were haploid and in polarity tests no clamps were formed. Crossing tests between GB 432 and GB 407/1 gave negative results, while GB 432 x GB 392/2 resulted in clamp formations.
A polarity test in LY 9916 showed that nr 1 and nr 2 were compatible poles, while nr 4 and nr 8 belonged to the other two compatible poles (tetrapolarity). Crossings between GB 433 and LY 9916 resulted in clamp formation when combinated with LY 9916/2 but no clamps were found when paired with nr 1, 4, or 8.

From this is concluded that basidiospores from the haploid fruitbodies all belong to the same pole as the originating haploid mycelium (cfr. Biggs, 1938, observations on *Peniophora ludoviciana*).

CULTURE CHARACTERISTICS.

H. coralloides (GB 145, LY 9910, LY 9916):
Mat plumose, downy, old mycelium velvety; hyphae with clamps, ordinarily branched, 1,5-7 µm wide, with thin- to slightly thickened walls, some hyphae in strands; gloeoplerous hyphae 3-7 µm wide, mostly simple-septate, with an oily yellowish content, reacting negatively to sulfo-vanilline, sometimes apically enlargend to gloeocystidium-like structures (Fig. 2 A, 3 A, B, and C).

Code: 2a. 3c. 16. 26. 32. 37. 38. 47. 54. 55. 60. 61.

Oxidase reactions:

Syringaldazine	+	1-Naphtol	+
Gum Guaiac	+	Guaiacol	+
p-Cresol	-	L-Tyrosine	-

Polarity. LY 9916 - A_1B_1: 1, 7; A_2B_2: 2, 3, 5, 9, 10; A_1B_2: 8; A_2B_1: 4, 6.
GB 820 (from LY 9910/6) - A_1B_1: 3, 6, 10, 16, 18, 20; A_2B_2: 5, 7, 9, 12, 14, 17; A_1B_2: 2, 11; A_2B_1: 15.

Cytology. Monosporous mycelia with uninucleate cells, clamped mycelia dicaryotic.

H. alpestre (GB 392, GB 407):
Mat cottony, floccose - granular, with drop-like exudates; hyphae with clamps, ordinarily branched, straight, 1,5-8 µm wide, thin-walled; gloeoplerous hyphae present, with clamps in the connection with generative hyphae, otherwise simple-septate, sometimes appearing as gloeocystidium-like structures, with an oily, yellowish, sulfo-negative content; lemon-shaped chlamydospores present, 6-8x9-11 µm, intercalary formed. After 3 weeks growth fructification was observed (GB 407). Fig. 2 B, C, 3 D.

Code: 2a. (2b). 3c. 26. 34. 36. (37). 38. 43. 48. 55. 60. 61.

Oxidase reactions:

Syringaldazine	+	1-Naphtol	+
Gum Guaiac	+	Guaiacol	+
p-Cresol	+	L-Tyrosine	-

Polarity. GB 392 - A_1B_1: 1; A_2B_2: 4; A_2B_1: 2,3.

Cytology: Monosporous mycelia with uninucleate cells, clamped mycelia dicaryotic. Chlamydospores uninucleate when formed on haploid mycelium, binucleate when formed on clamped mycelium.

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The culture studies reveal additional separating characters between the two species. In *H. coralloides* there is a slow growth, mat is plumose and reaction with p-cresol is negative.

In *H. alpestre* there is a rapid growth, mat is cottony, floccose, presence of chlamydospores and a positive reaction with p-cresol.

Both Boidin (1958) and Stalpers (1978) described the culture characters of *H. coralloides* (cultures from CBS). From their descriptions, however, it is obvious that they referred to what here is called *H. alpestre*.

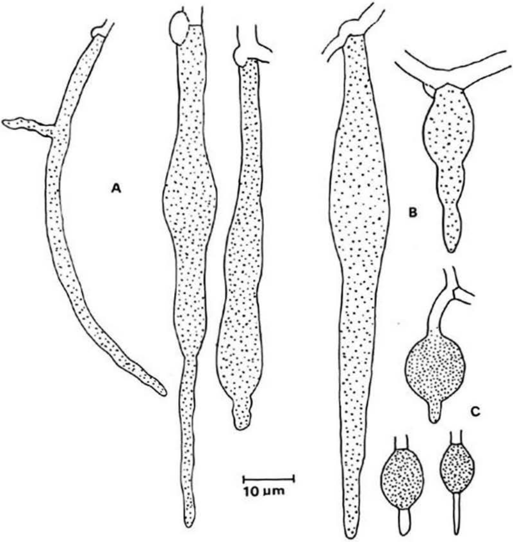

Fig. 2. Gloeoplerous hyphae and gloeocystidium-like structures in culture, of A) *H. coralloides*, GB 145. B) *H. alpestre*, GB 407. C) Chlamydospores in *H. alpestre*, GB 392.

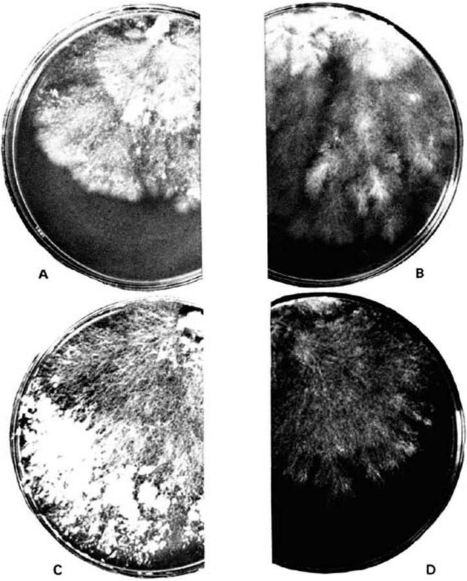

Fig. 3. Mycelial growth on agar plates after 6 weeks.
A) *H. coralloides*, GB 145. B) *H. coralloides*, LY 9910.
C) *H. alpestre*, GB 407. D) *H. coralloides*, LY 9916.

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THE SYDNEY RULES AND THE NOMENCLATURE OF RUSSULA SPECIES

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At Sydney, Article 13 of the International Code of Botanical Nomenclature was modified, specifically with respect to the starting point date of some fungi. This change of the rules had, of course, been discussed for many years, but remained highly controversial at the time of its passage. It has been claimed by the proponents of the change, that it will have very little effect on the nomenclature of the fungi and in particular, that the names of exceedingly few fungi will be changed as a result. However, our experiences with the Agaricales and some other groups of Higher Basidiomycetes suggest that the changes in these groups will indeed be extensive, since these groups are most frequently treated and most readily identifiable in the pre-1821 literature.

We have chosen in this preliminary report to examine a particular genus: Russula. We consider this genus typical for the impact the new rules are likely to have upon the larger genera of Agaricales. The senior author has ample experience with the infrageneric taxonomy of the genus and the literature referring to it. Our methods have been ad hoc, and therefore the following discussion of commonly used epithets of the genus Russula is possibly incomplete. We have simply examined all of those books in the library of the junior author published between 1753 and 1821, for identifiable descriptions and/or illustrations of Russula species, and examined the possibility that the epithet might have to be changed as a result of the new rules. Our results are in part conditional, because we find the wording in the new rules lacking in clarity. We do find their consequences more far-reaching than expected at first.

Our technical discussion is divided into six parts, based on well known Russula epithets.

1. Russula aurata

This binomial, not sanctioned by inclusion in Fries (1), Systema-Elenchus (1821-1832), as are most of the species of European Russulae, goes back to the basionym Agaricus auratus Withering (17), which, according to the data available to us, was published in 1796, the same year in which Persoon published R. aurea Persoon. It is impossible to decide whether A. aurata was published before or after R. aurea nor is it clear to us whether the former is a superfluous name, since A. quinquepartitus L. (p. 198 l.c.) is not clearly indicated as a synonym.

2. Russula chamaeleontina

This name, likewise not sanctioned by Fries, but introduced by him in Epicrisis (1838) (3), has been used by monographers in the sense of Romagnesi (1967), Maire and Singer (12), and J. Schäffer (10, p. 174-177). If the latter is excluded as not applying to the diagnosis by Fries, we have still two interpretations which can be attributed to Russula crocea Persoon (5) - (Russula crocea Persoon 1796 = R. chamaeleontina) Fries, 1838). Both these species can only be understood as being either R. chamaeleontina ss. Romagnesi, or *R. chamaeleontina* ss. Maire, Singer. Either *R. chamaeleontina* or *R. crocea* could be easily neotypified so that they become clearly defined. Romagnesi thinks that *R. chamaeleontina*, in his sense, is conspecific with *R. lutea*. We do not wish to enter the question as to which interpretation is correct or what status is adequate for *R. chamaeleontina* Fries, but the latter, as species, is undoubtedly antedated by *R. crocea* Persoon (5). The non-specialist may easily be confused by the fact that Fries, *Systema III, Index*, lists an *Agaricus chamaeleontinus* Lasch, Linnaea III, 389 [1832], which, according to the Sydney rules, is a sanctioned name. But this *Agaricus chamaeleontinus* Lasch, is neither based on the same type as *Russula chamaeleontina* Fries, nor is it in the least similar or referable to the same genus *(Russula)* but apparently belongs to *Mycena*.

3. *Russula delica*

Another species, first published in *Epicrisis* 1838 (3), and therefore not sanctioned, was previously described, as all authors agree, as *Agaricus exsuccus*, (Pers.) Otto 1816 at least in the wider concept of the species, and should, according to the Sydney rules, be known as *Russula exsucca* (Persoon) X, - the epithet *exsuccus* being sanctioned, by the way, on the varietal level, by Fries, *Systema* 1:77, 1821, as *A. vellereus* β *exsuccus* Persoon.

4. *Russula nitida*

This epithet , sanctioned by the Sydney rules, appears in all modern monographs as one or another of the most common North-temperate species of the genus. It has been interpreted, as we believe, correctly, as *R. nitida* sensu Singer (12) or, as we believe, incorrectly as *R. nitida* sensu J. Schäffer (10), the latter, in our opinion, correctly, called *R. sphagnophila* Kauffman. It is not our purpose to enter the question of interpretation, since we are interested in the nomenclatorial status of the binomial *Agaricus nitidus*.

A. nitidus Fries, 1821 (2), is obviously a superfluous name, since it should have been named *Agaricus risigallinus* Batsch (1). If, as it appears to us, sanctioned names are not automatically protected against Art. 63, this epithet is illegitimate. If Art. 63.3 is here applicable, i.e. if "it derives from a basionym... whose final epithet is legitimate", it would be incorrect when published "but it may become correct later". However, *A. nitidus* Persoon, 1801 (6), the basionym, is likewise a superfluous name, since Persoon considered *A. purpureus* Schaeffer, which has priority over *A. purpureus* Bulliard, as conspecific, and wondered only whether it is his *A. nitidus* ssp. *purpureofuligineus* or the type form so that "at the time" (Art. 63) *A nitidus* Persoon was superfluous, and what should have been renamed was *A. purpureus* Bulliard. Fries (2) "sanctioned" *A. purpureus* Bull., but this does not make *A. nitidus* non-superfluous according to Art. 63, nor is it illegitimate or in any way incorrect for Schröter 1889 (11) to transfer *A. purpureus* Schaeff. to *Russulina*, or for Quélet 1896 (7) to *Russula* (as [var.?] *R. purpurea*) according to Art. 72, note 1).

According to the old rules (1978 Code), (15), *Agaricus nitidus* is not a superfluous name, since valid publication of names began in 1821, and a lectotype could have been and has been chosen from the protolog. Applying, however, the Sydney rules, it is unclear whether Art. 13, new wording, or Art. 63 prevail, since the latter lacks a reference as to inapplicability in the case of the sanctioned names. If Art. 63 is applicable in this case, *R. nitida* ss. Singer becomes *R. purpurea* (Schaeffer) and *R. nitida* ss. Schäffer - *R. sphagnophila* Kauffman.

5. *Russula rosacea* and *R. rosea*

These binomials are not sanctioned, but they cannot be discussed without discussing at the same time *Agaricus ruber* (Lam. ex Fries 1821), *R. rosacea* (Persoon) ex S.F. Gray (1821), *R. rosacea* Fries, *R. sanguinea* (Bulliard) ex Fries (1838), and *R. lepida* Fries (1838). The earliest and only sanctioned binomial is *A. ruber* based on *Amanita rubra* Lam. The protolog seems to make it a mixture of *R. rosacea* (Persoon) ex S.F. Gray, *R. rosacea* Fries, and *A. sanguineus* (Bulliard) ex Fries, with the additional difficulty that a species with "lamellis furcatis, candidis", "amarissimus" and "omnino felleus" at the same time simply does not exist among European Russulae. With the impossibility of selecting a lectotype, it is a suitable candidate for the list of nomina rejicienda, inasmuch as Fries's quotation of 1838, "Krombh. t 64" has encouraged many authors, including Bresadola and Romagnesi, to use the binomial in *Russula* for a species quite different from that described in Fries's *Systema*. An earlier use of the binomial *Agaricus ruber* is that by Schaeffer (1774), quoted by Fries (3) only in 1838, and hardly applicable to his description of *R. rubra* (it is *R. melliolens* Quélet, according to Maire). Fries's own illustration (original conserved at Upsala) is *Russula badia* Quélet (Singer (3), p. 459).

We had to discuss the standing of *A. ruber* at some length in order to show that it is not in competition with the remaining names - all unprotected by sanctioning. *A. rosaceus* Pers. 1801 = *R. rosea* Pers. 1796 has been studied in the Persoon Herbarium (L) by Singer (14), and is unquestionably the same as the species called *R. lepida* Fries (3) by generations of European mycologists. Since *R. rosea* has the priority, this eliminates not only *R. lepida*, but *R. rosacea* (Persoon) ex S.F. Gray (both as later synomyms) as soon as the 1821 starting point is abandoned, and likewise, *R. rosea* Quélet, as a later homonym. *R. rosea* Quélet non Persoon, a common

European fungus, can hardly be replaced by *R. aurora* Krombh. ("...la description princeps [of *R. aurora*] convient mal", Romagnesi (8), p. 932), but would have to be known by the otherwise forgotten name of *R. velutipes* Velen., České. Houby p. 133, 1920 (16).

There is a further complication, fortunately without nomenclatorial consequences. *A. sanguineus* Bulliard, transferred to *Russula* by Fries 1838, is not affected by the fact that *R. rosacea* Fries, 1838 (3), a species different from *R. rosacea* (Persoon) ex S.F. Gray, is a synonym of *R. sanguinea* (Bulliard ex St-Amans) Fr. (or *R. sanguinea* (Bulliard) Fr.), since the latter has priority.

6. *Russula vitellina*

Provided this species is conspecific with *R. lutea* (sanctioned), the Sydney rules have no effect. However, Singer (12) and Romagnesi (8) treat *R. vitellina* as a separate species. In the latter case, *A. vitellinus* Persoon, 1801 (6), is a superfluous name because it was first published as being identical with *A. risigallinus* Batsch as Fries implicitly recognizes by quoting for his *R. nauseosa* var. *vitellina* "Persoon syn p. 442: Batsch f. 72". The correct name of this fungus, if recognized as an independent species, would then be *R. risigallina* (Batsch) or else a new name would have to be proposed in case Batsch's (1) fungus is considered not conspecific with the *R. vitellina* ss. Singer, Romagnesi. This name change would not have been necessary, according to the 1978 Code (15), for the same reason as given under *R. nitida* (No. 2).

Conclusions

If sanctioned names are subject to application of Art. 63, and if R. aurea has priority over A. auratus, seven of the names applied by recent monographers to species of Russula have to be changed if the new Sydney rules are applied. If it could be made clear that sanctioned names are not subject to the application of Art. 63, and A. auratus should turn out to have priority over R. aurea, five names of Russulas must be changed if the Sydney rules are applied. This means one seventh, respectively 9.7% of the species described in Fries's Epicrisis (3). While this amounts to only 1.8%, respectively 3.1% of the world flora, it must be taken into consideration that all but one of the species treated here are among the most important, most frequently cited, and most generally accepted species in the genus Russula. It should, furthermore, be remembered that our study does not include pre-1821 species of doubtful standing (which may, however, be cleared up by further topotype and herbarium studies), and that a complete set of the pre-1821 literature was not at our disposal. Some rare and forgotten book or article may yield another "priority".

In addition to the name changes resulting from the Sydney rules, there is an even more serious objection. The new code would require those who want to comply with the rules to spend a disproportionate amount of time on scientifically barren library work that will not even produce any result if the "researcher" is not thoroughly familiar with the respective group of fungi in Europe. It is totally impossible to come to any result if an exceptionally good library is not locally available - a condition met hardly anywhere in Asia, Africa, Latin America, and Australia, and even in most North American and European centers, where active mycological work is going on. The tracing of pre-Friesian literature, and the attempt to identify pre-Friesian taxa, the necessity of checking whether these taxa were from works practicing binomial Linnaean nomenclature, and whether the newly acceptable names will cause later names to become homonyms, will be, even in a taxonomically restricted group, so time-absorbing that a conscientious taxonomist in Basidiomycetes will be set back many years. Our examples (1, 2, 3, 5, 6) show that it has been overlooked at Sydney that a larger number of the now accepted Friesian species of Europe were published after than in the Systema-Elenchus complex. Example 1 shows clearly that the presumed simplification supposedly inherent in the revision of Art. 13 is merely obtained by new complications and uncertainties about the publication data, not to speak of the difficulties of obtaining the necessary - more expensive, less easily interpretable and less quoted - ancient literature. The mycological literature between 1821 and 1836, supposedly unimportant for nomenclatorial purposes after Sydney, must not be neglected even if the so-called revalidation is not the only issue. If consultation of this literature was too burdensome for some nomenclaturists - and it has indeed often been overlooked - it might have been restricted by a simple nomenclatorial adjustment, for example an additional note in Art. 13 under (f), - a solution which would have been more in the spirit of the voting at Tampa (IMC2) where Linnaeus as overall starting point was rejected by the few agaricoloists present and the majority of those voting. But even without such an additional note restricting the number of "revalidating" works, by excluding simple mentions, listings, translations, etc., or by enumerating the works where validation is accepted (St-Amans, S.F. Gray, and a few more), the defenders of the Sydney rules would obviously be hard up to prove that the strict application of the pre-Sydney rules would cause an upheaval in now current names of Russula or any other representative genus of Higher Basidiomycetes even remotely comparable to the one demonstrated in our study. If we add to this situation the uncertainties derived from the application of Art. 63 (for example in our No. 1 and No. 4) in the pre-Friesian as well as in the "sanctioned" literature, we shall begin to understand the uneasiness expressed by many taxonomists with regard to the new rulings.

We readily admit the possibility that for certain other groups of fungi, such as Ascomycetes and Deuteromycetes, the new starting point (Linnaeus, 1753) may well be advantageous. Yet, it becomes quite obvious, that for Agaricales and other Higher Basidiomycetes the introduction of "sanctioned" works and names is no sufficient safeguard against deviations from the principles of the Preamble of the Code, which now, as before Sydney, calls not only for a "precise and simple system of nomenclature", but "a stable method of naming taxonomic groups".

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REVUE DES LIVRES

par

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THE DOWNY MILDEWS, par D.M. SPENCER éd., xxii + 636 p., ill., 16x24 cm, toilé, 1981, Academic Press, 24/28 Oval Road, London NW1 7DX. Prix £ 49.00, $ 102.00.

Les 28 chapitres de cet important ouvrage sur les mildious sont l'oeuvre de trente spécialistes de 13 pays différents. Les champignons traités sont ceux de la famille des Péronosporacées à l'exception expresse du genre *Phytophthora* qui ne sera invoqué que dans le besoinde comparaison En effet les travaux sur *Phytophthora infestans* et *P. cinnamomi* à eux seuls couvriraient tout un livre. Parmi les Péronosporacées traitées, ce sont le *Plasmopara viticola* et le *Peronospora tabacina* qui occupent le centre d'intérêt de la partie générale de l'ouvrage (chap. 1-14, 320 pp.). Cette première partie retrace l'histoire et l'importance des mildious (par G. Viennot-Bourgin), la taxonomie de la famille, la distribution géographique, la répartition taxonomique des hôtes, l'épidémiologie (par C. Populer), le rôle des hôtes sauvages, la cytologie, la génétique, la biochimie de la relation hôte-parasite, la sporulation sexuée et asexuée, la structure fine (par J.A. Sargent), la spécificité d'hôte(par I.R.Crute) la sélection d'hôtes résistants (par P. Matthews) et la lutte (par J. Patl J. Rotem ry F.J. Schwinn). La seconde partie de l'ouvrage (chap. 15-28) expose les particularités de chaque mildiou, ceux des Brassicas, des Cucurbitacées, de la laiture, des Graminées, du houblon, de l'onion, des légumineuses fourragères, des pois, haricots et soja, de la betterave et de l'épinard, du tournesol, du tabac, de la vigne et des plantes ornementales L'endémie originelle de certains mildious évoluant d'épidémies dévastatrice à des pandémies spectaculaires couvrant plusieurs continents par suite de facteurs humains a donné aux études épidémiologiques, aux études de la spécificité d'hôte et de la répartition géographique l'importance qu'exigeaient la perte économique et la recherche de moyens efficaces de lutte. Celle-ci d'ailleurs a pris un grand développement depuis l'invention de la bouillie bordelaise par Prousten 1800 et s'est orientée à la fois dans une lutte chimique de plus en plus affinée, dans l'aménagement des pratiques culturales et dans la sélection de cultivars résistants sur la base de connaissances acquises sur la variation génétique de pathogénécité et d'aggressivité du pathogène. Autant pour servir les études épidémiologique que le perfectionnement de la lutte, des travaux plus fondamentaux sur les cycles de sporulation, la structure et la biologie cellulaires et la biochimie de la relation hôte-parasite ont été réalisées ou sont en plein développement. Ce livre couvre bien tous ces domaines, étayé d'abondantes références. Il constitue un regard d'ensemble et d'actualité que les spécialistes des mildious comme tous les chercheurs et praticiens phytopathologues apprécieront.

THE RUST FUNGI, par K.J. SCOTT & A.K. CHAKRAVORTY éd., xi + 288 p. 16X24 cm, toilé, 1982. Academic Press, 24/28 Oval Road, London NW1 7DX, UK. Prix £ 26.80, $ 50.00.

Ce livre n'est pas une monographie systématique des Uredinales mais une synthèse des connaissances actuelles sur la biologie des rouilles et en particulier leur relation hautement spécialisée avec la plante hôte. Le concept de parasite obligé n'a plus sa connotation d'organisme inaccessible à l'expérimentation in vitro depuis que les principales rouilles ont été obtenues en culture axénique et sont étudiées dans leurs exigences nutritives, leur métabolisme, leurs cycles vitaux et leur génétique. Ainsi leur métabolisme, particulier du point de vue de l'azote, du soufre et de l'utilisation du glucose, détermine sous l'action du génome une modification spécifique du métabolisme primaire de l'hôte par un changement dans la transcription du mRNA et une synthèse de nouvel RNA et de nouvelles protéines. Cela entraine, dans le cas de la non-résistance de l'hôte, des modifications du métabolisme intermédiaire de celui-ci (enzymes, photosynthèse, respiration) qui permettent la croissance et la reproduction du parasite. La culture de la rouille in vitro sur gélose ou sur tissu d'hôte représente un outil de mieux en mieux maîtrisé et utilisé dans les études biochimiques et génétiques. Le livre comprend 7 chapitres: sur la pléomorphie des rouilles et ses implications taxonomiques, la culture axénique et leur physiologie, la génétique en relation à l'hôte, la biochimie de la germination des spores, la biochimie du parasistisme, les mécanismes de défense de l'hôte et enfin la lutte chimique et biologique contre les rouilles des céréales. Ce livre fait bien le point des approches explicatives du parasitisme des rouilles, mais montre aussi combien reste encore à découvrir et à expliquer.

HISTORY OF BOTANICAL SCIENCE, an account of the development of botany from ancien times to the present age, par A.G. MORTON, xii + 474 p., 27 figs., 16x24 cm, toilé, 1981. Academic Press, 24/28 Oval Road, London NW1 7DX, UK. Prix £ 18.00, $ 45.00.

Une histoire passionnante que celle de la science des plantes, depuis les activités de cueillette des origines de l'humanité jusqu'aux mystères encore non élucidés de la physiologie cellulaire comme celui de la cyclose cytoplasmique. Ecrite d'un style allègre et vivant, laissant à des notes additionnelles les détails et références aux sources originales étudiées, cette histoire doit susciter l'intérêt de tout botaniste, taxonomiste ou physiologiste, sans en exclure les mycologues ni même les agronomes. Il n'est plus permis d'ignorer le chemin parcouru afin de mieux tracer le chemin à parcourir. De la cueillette à la culture, l'homme a fait des choix taxonomiques basés sur des critères d'effets, d'usage et de domestication des plantes. L'homme a choisi ses aliments, le guérisseur ses plantes médicinales, l'agriculteur ses plantes de culture. En Asie mineure, en Egypte, en Chine, des jardins de plantes étaient nés, des listes descriptives des plantes manuscrites. Le medecin grec Théophraste (300 AC)consigne une botanique d'observation et d'usage en 15 volumes illustrés. Dioscoride (60 PC) publia sa *Materia medica* qui fut abondamment recopiée durant douze siècles mais progressivement entachée d'erreurs conduisant ainsi la connaissance botanique du moyen-âge à la confusion. Mais les efforts de la pharmacologie médicale de la Renaissance suscita un renouveau d'intérêt pour la botanique et Cesalpino, dans le *De plantis* (1583) définit les premiers principes de distinction et de classification des plantes. Dans les années 1600, l'anatomie et la cytologie des plantes, parallèlement à l'anatomie humaine, étaient nées des mains de Malpighi et de Hooke, tandis que Jung, puis Ray appliquaient la méthode de Descartes à la description systématique des plantes. Ray fut amené à supposer l'existence de la sexualité chez les plantes (1686) que démontra bientôt Camerer de Tübingen en 1694. Etaient alors jetées les bases de la botanique moderne. Après l'effort nomenclatural de Tournefort, ce fut à Carl Linné le privilège de construire un système des plantes (*Systema Naturae*, 1735, *Genera plantarum*, 1735) et les fondements définitifs et critiques de la classification des plantes (*Fundamenta Botanica*, 1736, *Critica Botanica*, 1737) qu'il repris dans sa *Philosophia Botanica* (1751) et appliqua dans son *Species plantarum* (1753) point de départ de la nomenclature botanique. Se succédèrent alors les grands noms de la botanique du 18-19e S., de Jussieu, Adamson, Buffin, Hedwig, Gaertner, Priestley, de Saussure, Goethe, Lamarck, Darwin, jusqu' à l'établissement de la reproduction cellulaire comme base unitaire du règne végétal. L'âge de la botanique moderne et expérimentale avait alors commencé.

BIOLOGY AND CONTROL OF TAKE ALL, par M.J.C. ASHER & P.J. SHIPTON éd. 538 p., ill., 15x23 cm, toilé, 1981. Academic Press, 24/28 Oval Road, London NW1 7DX, UK. Prix £ 41.00, $ 85.00.

Le piétin des céréales et des herbes est une des maladies classiques des champs et pâturages causant des pertes considérables et pour laquelle depuis les 125 ans de sa découverte, aucune méthode effective de lutte a été mise au point. Ce livre fait le point des connaissances sur la maladie, ses agents et sa lutte. Dans une première partie, sur la taxonomie et la biologie des agents pathogènes, J. Walker revoit la taxonomie des *Gaeumannomyces, Linocarpon, Plagiosphaera, Ophiobolus, Phaeosphaeria, Ophiosphaerella* et *Leptosphaeria* des graminées, ainsi que celle des anamorphes, vérifiés ou supposés, de type *Wojnovicia, Phialophora* et *Acremonium (Cephalosporium)*.J.W. Deacon expose l'écologie de ces agents pathogènes, leur spécificité, leur colonisation de la racine du froment et d'autres hôtes et leur inhibition par la rhizosphère. D'autres étudient la culture et la physiologie de ces champignons ainsi que leur parasitisme par des virus. Dans une deuxième partie c'est de l'interaction agent pathogène-hôte qu'il s'agit. L'envahissement du système radiculaire, les variations de la pathogénécité du champignon et de la sensibilité de l'hôte ainsi que les effets pathologiques sur celui-ci sont considérés. La troisième partie traite de l'évaluation de la maladie, de son épidémiologie, des réserves d'inoculum et de la réponse aux facteurs du sol et aux fertilisants. A.D. Rovira et G.B. Wildermuth y précisent le phénomène naturel de la régression du "take all", voire de sa suppression, par les facteurs du milieu et en analysent les mécanismes, ce qui conduit à une stratégie de lutte. Un dernier chapitre fait une revue du piétin des herbes cultivées et sauvages. Le livre couvre le piétin à travers le monde. Il se base non seulement sur la compétence de ses 26 auteurs mais aussi sur plus de mille références bibliographiques. Il ne peut que stimuler et aider la recherche dans ce domaine.

LICHENS, an illustrated guide, par Frank DOBSON, 2e edit. xl + 320 p. ill., 14 x 22 cm, 1981. Richnmond Publishing Co, Orchard Road, Richmond, Surrey, UK. Prix US 18.70.

Des 1400 espèces de lichens connues des Iles Britanniques, l'auteur présente les quelques 500 espèces qu'il est aisé de trouver. Il est décrit groupées par genre, les genres dans un ordre alphabétique. On arrive aux genres par une clé synthétique illustrée qui les différencie par leur morphologie végétative et sporale, par leur habitat et la réaction à 4 substances chimiques. Dans les genres importants, une clé dichotomique conduit aux espèces. Celles-ci sont illustrées et leur répartition figurée sur carte. 48 photos couleurs complètent l'illustration donnée par l'auteur dans son

Common British Lichens (1979). Les corrections de nomenclature devenues nécessaires en cours d'impression sont ajoutées en annexe. Ce livre est un bon guide de terrain, demandant cependant l'usage du microscope pour l'identification. Il ne donne ni un classement taxonomique des genres, ni les auteurs des taxa. Ces informations sont à trouver ailleurs.

BIOLOGICAL CONTROL OF PLANT PATHOGENS, par K.F. BAKER et R.J. COOK, xviii + 433 p., ill., 15x23 cm, toilé, 1982, American Phytopathological Society, 3340 Pilot Knob Road, St Paul, MN 55121, USA. Prix $ 32.- (a reprint of the original 1974 W.H. Freeman & Co edition).

Depuis peu seulement, l'homme prend conscience qu'il est mieux de travailler en accord avec les forces biologiques naturelles que de les ignorer et les contrevenir. C'estce changement d'optique que connaît la protection des végétaux et même l'agriculture en général. Les équilibres biologiques assurent une protection naturelle des plantes. S'ils sont rompus comme dans la monoculture, les maladies se répandent de manière catastrophique. Dans ces équilibres, la microflore, et en particulier les champignons, joue un grand rôle. Un vrai contrôle biologique des maladies des plantes se base sur la connaissance de ces équilibres faits d'interactions multiples entre les microorganismes, les pathogènes et les autres, les plantes, la plante-hôte et ses associées, et les facteurs abiotiques et sur l'utilisation des antagonismes naturels ou introduits en vue de réduire le pouvoir des agents pathogènes. C'est à ce qu'est le contrôle biologique naturel qu'est consacrée la première partie du livre. Les chapitres suivants examinent en détail le rôle respectif des microorganismes antagonistes, de l'agent pathogène, de l'hôte et des facteurs du sol et du milieu dans la suppression ou la non-apparition de la pathogenèse et dès lors leur utilisation dans la lutte biologique. Les auteurs concluent: "Man must learn to visualize the pathogen on his crops as a "partner at the feast, there before himself. Each organism is as much "the center of its own universe as man believes himself to be. There is "no one system by which biological control works. Each relationship is "absolutely unique. Analysis of the microorganisms involved, and the "biochemistry of their relationships, then becomes a means of perfecting "the result obtained, not a necessary precursor to attempting biological "control." L'"imaginative ingenuity" nécessaire à celui qui veut user du contrôle biologique sera grandement stimulée par les multiples exemples analysés tout au long de ce livre passionnant.

RECOGNITION AND CONTROL OF PESTS AND DISEASES OF FARM CROPS, par E. GRAM, P. BOVIEN et C. STAPEL, texte par F. HOPE, 2e edit., 166 p., 120 pl. col., 16x24 cm, toilé, 1980, Blandford Press, Link House, West Street, Poole, Dorset BH15 1LL, UK. Prix £ 15.00.

Ce livre est essentiellement un atlas de 120 planches en couleurs illustrant 700 exemples de maladies et d'infestations des plantes des plantes cultivées, accompagné d'un texte de commentaires sur l'importance des dégâts des maladies illustrées et les moyens de les combattre. Les planches sont composées d'aquarelles de bonne qualité représentant les symptômes des maladies, les divers stades de développement des insectes prédateurs. Les plantes considérées sont les céréales, les herbes, les légumineuses, la betterave, les crucifères, la pomme de terre, la carotte et le lin. Ce livre sera toujours d'utilité à l'étudiant et au praticien tant pour la lutte que pour l'identification des maladies des plantes cultivées.

COMPENDIUM OF BARLEY DISEASES, par D.E. MATHRE ed., The Disease Compendia Series n. 8, 78 p., 55 figs., 116 pls. col., 4°, 1982, The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minn. 55121, USA.

Ce compendium est le huitième de la série, après celui du froment, de la luzerne, du maïs, du coton, de la pomme de terre, de l'orme et du soja. Tous sont d'une égale tenue scientifique. Ils détaillent dans un texte dense et illustré la biologie, la symptomatologie et les principes de lutte pour chacune des maladies de la plante concernée, qu'elles soient d'origine bactérienne, fongique, virale, animale ou écologique. Dans ce compendium des maladies de l'orge, 32 maladies fongiques sont étudiées et l'agent causal illustré (noter que la légende de la fig. 45 est erronée). Les caractères d'identification sont donnés. Un bibliographie propre à chaque maladie permet une étude plus approfondie.

DIE GATTUNG PLEUROTUS (FR.)KUMMER, unter besondere Berücksichtigung des Pleurotus eryngii-Formenkomplexes, par O. HILBER (dessins par R. HILBER). Bibliotheca Mycologica vol. 87, 448 p., 172 figs., 25 pls. bn. et col., 15x23 cm., toilé, 1982. J. Cramer, Garntner Verlag, FL 9490 Vaduz, Lichtenstein. Prix DM 200.-.

L'auteur nous présente une monographie du genre *Pleurotus* dans lequel il reconnaît 12 espèces et variétés qi'il groupe en trois sous-genres, sbg. *Pleurotus* (e.a. *P. eryngii, P. cornucopiae, P. pulmonarius, P. ostreatus*), sbg. nov. *Coremiopleurotus* (*P. cystidiosus, P. abalonus*) et sbg. *Lentodiopsis* (e.a. *P. dryinus*). Le complexe *P. eryngii* est constitué des trois entités *P. "eryngii", "ferulae"* et *"nebrodensis"* différant par l'hôte mais démontrées comme une seule et même espèce sur la base d'une morphologie variable, de leur intercompatibilité et des tests d'inoculation croisée. *P. ostreatus* var. *ostreatus* et *P. ostreatus* var. *columbinus* se distinguent par la couleur du chapeau et leur interincompatibilité. *Pleurotus "florida"* est un *nomen nudum* donné à une espèce nord-américaine cultivée industriellement, incompatible à *P. ostreatus* et identifiable à *P. pulmonarius*. Le nouveau sous-genre *Coremiopleurotus* se caractérise par la formation de corémies à aleurioconidies au pied des carpophores. Le sous-genre *Lentodiopsis*, Pleurotes à voile caduque, se divise en deux sections, les *Lepiotarii* avec *P. dryinus* possédant des aleurioconidies et les *Calyptrati* qui n'en possèdent pas. Enfin il est mentionné que les Pleurotes à chapeau de couleur foncée tels que *P. ostreatus* possèdent une penicillinacylase active sur la penicilline V. L'ouvrage est particulièrement bien illustré de dessins de carpophores et de leurs parties essentielles et d'excellentes photographies blanc-noir et couleurs de carpophores en nature et en culture.

AN INTRODUCTION TO PLANT TAXONOMY, par C. JEFFREY, 2e ed., 154 p., 14x21 cm, 1982. Cambridge University Press. Trumpington Street, Cambridge CB2 1RP, UK. Prix £ 12.50 (cartonné), 5.95.

Ce livre explique en termes simples comment se font la classification et la dénomination des plantes supérieures. Le concept d'espèce et celui de classification sont d'abord amenés. Sont ensuite analysés la signification de la hiérarchie des rangs taxonomiques, le processus de la dénomination et de la typification, les principes de priorité, de légitimité, de conservation et les voies de l'identification, descriptions, flores et clés. Pourquoi la taxonomie et comment la pratiquer, voilà ce que ce livre apprendra à l'étudiant.

PLANT PATHOLOGY AND PLANT PATHOGENS, par C.H. DICKINSON et J.A. LUCAS, Basic Microbiology Series, J.F. Wilkinson ed., vol. 6, 2e ed. 240 p., ill., 15x24 cm, 1982. Blackwell Scientific Publications, Osney Mead, Oxford OX2 OEL, UK. Prix £ 7.80.

Ce livre, comme partie d'une collection de microbiologie générale, traite spécificquement du phénomène de la pathogénie des plantes causée par les agents microbiens. La relation plante-hôte et agents microbiens pathogènes est le coeur du sujet. Après une définition de la maladie, les auteurs traitent en 3 chapitres des agents pathogènes (pathogenèse/symbiose, bio-/nécrotrophie, parasite facultatif/obligé, résistance/sensibilité), de leur biologie (croissance, reproduction, dispersion, survie, dormance, longévité) et de leur développement dans l'hôte. En 3 autres chapitres, les interactions entre hôtes et pathogènes sont revues à trois niveaux, celui de la population végétale (évaluation de la maladie, modèles épidémiologiques, lutte), celui de la cellule (interface hôte-pathogène, modification physiologique de l'hôte, syndrôme pathologique) et celui de l'interaction biochimique (modification de la synthèse des protéines et des enzymes, production de toxines, de phytoalexines et de régulateurs de croissance) pour enfin analyser la spécificité hôte-pathogène. L'ouvrage se termine par un aperçu des méthodes de lutte. Ce livre destiné aux étudiants en microbiologie, botanique et phytopathologie est intéressant par son optique très peu descriptive mais dynamique.

A NOMENCLATURAL REVISION OF F.J. SEAVER'S NORTH AMERICAN CUP FUNGI (OPERCULATES), par Donald H. PFISTER, Occasional Papers of the Farlow Herbarium of Cryptogamic Botany n.17, 32 p., 1982. Harvard University, Cambridge, Mass. 02138. Prix US $ 3.-.

Ce fascicule donne une mise à jour de la nomenclature des 357 espèces de Discomycètes operculés décrits par J.F. Seaver. Certaines espèces considérées comme douteuses par Seaver ont néanmoins été revues. D'autres sont indiquées comme n'ayant jamais plus été retrouvées en Amérique du Nord. Certaines espèces revues sont accompagnées de commentaires taxonomiques. Une liste reclasse les espèces par genres et familles dans une taxonomie moderne. Une liste bibliographique guidera le lecteur. Cette revision sera très utile au mycologue. On ne peut que souhaiter voir paraître d'autres revisions semblables d'ouvrages classiques.

A REVISION OF THE GENUS SCUTELLINIA (PEZIZALES) IN SOVIET UNION. par B.B. KULLMAN, 158 p., 22 figs., 40 pls., 14x20 cm, 1982 (en russe), Institute of Zoology and Botany, Academy of Sciences of the Estonian SSR, Tallinn.

La monographie couvre 28 espèces et variétés reconnues de *Scutellinia* réparties en 4 sections : *Laevisporae* Svrcek, *Globisporae* Svrcek (divisés en *Diaboliae* Kullm. et *Trechisporae* Kullm.), *Hirtulae* Svrcek (divisiés en *Umbrarum* Kullm., *Ampullaceae* Kullm., *Pseudomargaritaceae* Kullm.) et *Scutellinia typica*. Les sections et séries sont justifiées en particulier par la disctribution des dimensions ascosporales. L'ornementation sporale est particulièrement bien analysée en microcopie optique et électronique. Une clé d'identification est donnée.

CALIFORNIA MUSHROOMS 1970-1980. FUNGUS FAIR AND FORAY COLLECTIONS, par H. SAYLOR, P. VERGEER, D. DESJARDIN et T. DUFFY, 38 p. (pas de date, probablement 1981). The Mycological Society of San Francisco, P.O.Box 11321, San Francisco, Calif.94101, USA. Prix US$ 3.00.

Cette liste des 700 espèces de champignons appartenant à 180 genres récoltés par la S. M. S. F. durant la dernière décade est le résulat de 4900 récoltes, pour la plupart trouvées dans la région de la Baie de San Francisco.

LA CULTURE DES CHAMPIGNONS, par Philippe JOLY, Collection Rustica, 96 p., ill., 16x22cm, 1980; Ed. Dargaud, 12, rue Blaise Pascal, F-92201 Neuilly-sur-Seine, France.

Ce petit livre de vulgarisation est une introduction pratique de l'amateur à la culture du champignon de Paris *Agaricus bisporus*, de la pleurote *Pleurotus ostreatus*, de la morille *Morchella esculenta* et de la pholiote du peuplier *Pholiota aegerita*.

IL FUNGO PLEUROTO, par Floriano FERRI, Biblioteca di Micologia, vi + 85 p., 44 figs., 11 phs. col., 13x20 cm, 1981, Ed. Universale Edagricole, Via Emilia 31, Bologna, Italia.

Ce petit guide, en italien, expose la biologie et les diverses méthodes de culture de la pleurote, en particulier de *Pleurotus ostreatus*. Un premier groupe de méthodes produit la pleurote sur substrats naturels comme des buches de peuplier. Celles-ci sont d'abord inoculées et incubées dans des fosses obscures, puis disposées verticales à demi enfouies en terre ou horizontales empilées dans des fosses. Dans d'autres méthodes, le substrat artificiel fait de paille de froment et de maïs doit être partiellement stérilisé, mis en sac de plastique et inoculé. La production a lieu en plein air ou en serre, la lumière étant indispensable. Des champignons hyperparasites sont à craindre, ainsi que les collemboles. Ce livre illustre surtout la grande production de la pleurote en Italie.

GUIDE TO THE PRICES OF ANTIQUARIAN AND SECONDHAND BOTANICAL BOOKS 1970-1979. CRYPTOGAMIC LITERATURE (BOOKS, MONOGRAPHS, REPRINTS, PERIODICALS), par L. VOGELENZANG, 518 p., 17x24 cm., 1982, Boerhaave Press, P.O.Box 1051, NL-2302BB Leiden, Nederland. Prix DFl 95.-.

Si le but de cette publication est directement de servir de référence dans l'évaluation des livres et périodiques anciens à des fins de bibliophilie, de bibliothèque ou de commerce, ce guide sera aussi utile aux mycologues. Il donne une revue assez complète de la littérature cryptogamique qui a été disponible en antiquariat, la fréquence avec laquelle chaque ouvrage est apparu et l'augmentation de sa valeur. Ainsi est-il possible d'observer que le prix des originaux rares tels que le *Systema mycologicum* de E.M. Fries a triplé tandis que celui des "reprints" édités par J. Cramer a doublé en dix ans.

NOUVEAUX PERIODIQUES:

BULLETIN OF MYCOLOGY, édité par Sultan AHMAD et S.H. IQBAL, Departement of Botany, University of the Punjab, New Campus, Lahore, Pakistan. Vol. 1, n° 1, 90 p., Autumn 1980.

La parution de ce nouveau périodique est le témoignage de l'activité des mycologues du Pakistan parmi lesquels les éditeurs sont bien connus pour leurs travaux. Ce Bulletin publiera des travaux de taxonomie, d'écologie, de physiologie et de pathologie des champignons et lichens. Ce premier fascicule comprend quatre articles traitant des hyphomycètes d'eau douce, d'ascomycètes, des ascomycètes coprophiles et des agaricales du Pakistan.

INTERNATIONAL JOURNAL OF MYCOLOGY AND LICHENOLOGY, édité par W. JULICH, Leiden, Rijksherbarium, Schelpenkade 6, Nederland. Publ. J. Cramer. Prix DM 80.- par volume. Vol. 1, part 1, 142 p., 1982.

Ce nouveau journal publiera des contributions en anglais, français, allemand, espagnol, portugais et italien, présentées à l'éditeur sous la forme de manuscrits prêts à la réduction et à la reproduction, dactylographiés à la justification de 25 x 16 cm. Les auteurs recevront 50 tirés-à-part gratuits. Le journal publie aussi le sommaire d'une dizaine de Périodiques mycologiques. Dans ce premier fascicule on lira un aperçu sur les ascomycètes d'Espagne, une contribution sur les basidiomycètes résupinés, une étude d'*Entoloma,* une autre sur *Lactarius pubescens* et *L. favrei,* une étude de la structure sporale des Gastéromycètes et la description de trois nouvelles laboulbéniales.

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