

Redisposition of some species excluded from *Didymosphaeria* (Ascomycotina)

by

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With 50 figures

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Abstract: While revising the species so far classified in *Didymosphaeria* (Melanommatales, Ascomycetes), many species were found to belong to other genera. Some species are repositioned here. Two genera are reinstated: *Phaeodothis* Sydow (Pleosporales, Phaeosphaeriaceae) and *Roussoëlla* Saccardo (Xylariales, Amphisphaeriaceae). Three new genera are described: *Aaosphaeria* Aptroot (Pleosporales, ?Dacampiaceae), *Flagellosphaeria* Aptroot (Xylariales, Amphisphaeriaceae) and *Munkovalsaria* Aptroot (Pleosporales, Dacampiaceae). Three new species are described: *Astrosphaeriella papuana* Aptroot, *Munkovalsaria rubra* Aptroot, Van der Aa & O. Petrini and *Parapyrenis maritima* Aptroot. The following new combinations are proposed: *Aaosphaeria arxii* (Van der Aa) Aptroot, *Flagellosphaeria polytrichospora* (Lucas & Sousa da Câmara) Aptroot, *Megalotremis megalospora* (Vainio) Aptroot, *Montagnula longipes* (Trabut) Aptroot, *Montagnula opulenta* (De Notaris) Aptroot, *Montagnula palmacea* (Cooke) Aptroot, *Montagnula spartii* (Castagne) Aptroot, *Munkovalsaria donacina* (Niessl) Aptroot, *Mycomicrothelia pachythea* (Saccardo & Sydow) Aptroot, *Parapyrenis macluriae* (Savulescu & Sandu) Aptroot, *Parapyrenis tecomatis* (Berkeley & M.A. Curtis ex Cooke) Aptroot, *Phaeodothis ribesiella* (Nylander ex Vainio) Aptroot, *Phaeodothis winteri* (Niessl) Aptroot, *Roussoëlla minutella* (Penzig & Saccardo) Aptroot, *Roussoëlla scabrispora* (Höhnelt) Aptroot and *Roussoëlla serrulata* (Ellis & G. Martin) K.D. Hyde & Aptroot. The new name *Astrosphaeriella minima* Aptroot is proposed for *Didymosphaeria fusispora* Penzig & Saccardo.

Introduction

The systematics of the fissitunicate pseudoparaphysate pyrenomycetes with brown 1-septate ascospores has received considerable attention over the last decades. This includes the monographs of Hawksworth (1981, 1985a, 198b) and Hawksworth and Boise (1985) on genera which were previously included in *Microthelia* Koerber, the treatment of Hawksworth & Diederich (1988) of *Polycoccum* Sauter ex Koerber and the species referable to the Pyrenulaceae, the Requienellaceae and the Trypetheliaceae by Aptroot (1991). The genus to which most species have been assigned of this group, *Didymosphaeria* Fuckel, is the subject of a monographic project by the author, of which this contribution provides the first results.

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More than 500 species have so far been assigned to the genus *Didymosphaeria* (Melanommatales, Didymosphaeriaceae), and new species are still being described in the genus. Of these species, over 100 have already been assigned to other genera, e.g. by Barr (1989a, 1989b, 1990a, 1990b, 1992a, 1992b, 1993a), Scheinpflug (1958) and Hawksworth (1985a). While working on a world monograph of this genus, many species were found to belong to various, only distantly related, groups, as already was anticipated. The present paper deals with several genera to which species of *Didymosphaeria* can be assigned and of which the classification is reasonably settled. In addition, some segregate genera are treated which exclusively contain former members of *Didymosphaeria* s.l. and which were still included in this genus by Scheinpflug (1958). The remaining species of *Didymosphaeria* s.l. will be discussed in a forthcoming monographic treatment.

The typification of *Didymosphaeria* has led to some confusion. The genus originally comprised of six species. Most authors selected *Didymosphaeria epidermidis* (Fries) Fuckel as type, but the first lectotype ever chosen seems to have been *Didymosphaeria peltigerae* Fuckel, which is a *Polycoccum*. This was done by Theissen & Sydow, using the first-species-rule. However, this species is in contradiction with the protologue, as it is not 'corticolae'. The type material of *Didymosphaeria epidermidis* consists only of coelomycetes. Therefore a proposal is made by Hawksworth & David (Taxon 38: 494) to conserve a type specimen (Fungi Rhenani 1770) for the genus. The type of the only original species which may be a *Didymosphaeria* in the present sense, *Didymosphaeria rubi* Fuckel, was not found in G or in any other herbarium. In this study it is assumed that the current circumscription of *Didymosphaeria* s.s. will be conserved soon.

During a closer study of the type species and the less than ten other species which belong to *Didymosphaeria* s.s., it turned out that the ascospore wall is actually distoseptate (Fig. 42), albeit not as thick as in, e.g., *Parapyrenis* Aptroot (Fig. 43). The endosporium has often been overlooked or mistaken for oil globules, which are very common in the Melanommatales. The sister group, and the only other genus accepted in the *Didymosphaeriaceae* by the author, is the cleistothecial, but otherwise very similar, *Neotestudina* Segretain & Destombes.

Among the species treated here, several belong to the families Trypetheliaceae and Requienellaceae which were recently monographed (Aptroot 1991). During that work it could not be anticipated that species of these two families, which show conspicuously thickened, distoseptate ascospores, could have been described in *Didymosphaeria*, invariably reported to be euseptate. They differ widely from *Didymosphaeria* s.s. in their thick endosporium with irregular lumina and the different structures of the hamathecium, which consists of heavily anastomosing paraphysoids in gel matrix in *Megalotremis* Aptroot (and in fact in all genera of the Trypetheliaceae), and of oily pseudoparaphyses in *Parapyrenis* (and in fact in all Requienellaceae).

Other groups treated here include some unitunicate species which have been described in *Didymosphaeria*, the species referable to *Dothidotthia* M. Barr, *Kirschsteiniotelia* D. Hawksworth and *Mycomicrothelia* Keissler.

For some smaller groups of closely related taxa no extant generic name could be found.

They are therefore assigned to newly described genera, none of which is closely related to *Didymosphaeria*.

The species treated here in *Montagnula* Berlese are characterized by, e.g., very thick gelatinous sheaths around the ascospores, which are pale to reddish brown and often minutely verrucose. The hamathecium consists of broad cellular pseudoparaphyses. The only difference with the so far known members of the genus *Montagnula* are the 1-septate rather than muriform ascospores. Eriksson (1967) has already pointed out the relationship of *Didymosphaeria arenaria* Mouton with *Pleospora spinosella* Rehm. Traditionally these *Montagnula* species were regarded as host-specific, although they are mere saprophytes. A number of taxa found on different substrata are synonymized here, because no internal morphological differences were found between them. Until the present every specimen of this group on a new substratum (e.g. *Ephedra*) has been described as a new species. The known hosts for *Montagnula spartii* (Castagne) Aptroot, grasses, brooms, palm leaves and *Ephedra*, do not differ much in structure. However, the substrata on which *Montagnula opulenta* (De Notaris) Aptroot is found, grasses and dead *Opuntia* cladodes, are so different that differences in the ascocarp wall occur, which is rounder in specimens growing on the soft *Opuntia*. Unless it can be proven experimentally that two different formae speciales are involved, the specimens from the different hosts are regarded as synonyms here. The resulting substratum/host ranges of the species treated here are remarkably wide, but the present approach is expected to facilitate reliable identification and contribute to a stable nomenclature.

Cultures have been studied from as many *Didymosphaeria* species as possible. It turned out, especially in the case of *Phaeodothis winteri* (Niessl) Aptroot, that specimens from very different substrata are indistinguishable in culture. Some recent collections, especially those collected by the author in Papua New Guinea in 1992, have been brought into culture.

All type specimens cited have been examined by the author, unless otherwise stated. Type specimens of taxa which are newly synonymized here are morphologically identical with the species with which they are synonymized, unless otherwise indicated. In contrast to common practice, some herbarium names are cited, because many of them have been widely used and it cannot be ruled out entirely that they have been published somewhere.

Morphology

In the following most of the diagnostic characters used to characterize the species and genera of *Didymosphaeria* s.l. are enumerated.

A (pseudo-)stroma is never more strongly developed than a one-layered clypeus around the ostiole, which can be black or rarely colourless and is often reduced. Ascomata are pseudothecioid, globose to pyriform or conoid, applanate above or not, black, smooth, simple or aggregated, immersed to erumpent, with an entire or dimidiate wall. The peridium is pale brown to black, consisting of one or two layers of variously shaped cells. The hamathecium may consist of 1) trabeculate (anastomosing)

paraphysoids (which can be simple or branched between the asci), 2) pseudoparaphyses (which can be large-celled or thinner), 3) unbranched paraphyses or 4) pseudoparenchymatic tissues, anastomosing or not, colourless, IKI-positive (blue) or negative. Asci are cylindrical or clavate, bitunicate or unitunicate, in most groups treated in this paper with an ocular chamber, IKI-positive (blue) or negative, with 8 ascospores (exceptionally with 4), arranged in one or two rows. Ascospores are ellipsoid to fusiform, of various shapes, with rounded to pointed ends, medium brown, red brown, dark brown, black or colourless, without (euseptate) or with (distoseptate) flexible internal wall thickenings surrounding the rounded, elongate, cordate or angular lumina, asymmetrically or symmetrically 1(-3)-septate, with or without a median constriction, with or without spinulose, striate or reticulate ornamentation or flagelliform appendages, lacking germ slits or pores, with or without a thin or thick gelatinous sheath.

Key to the genera treated here (and *Didymosphaeria*)

- 1a Asci with IKI-positive (blue) tips 2
 1b Asci without IKI reaction 3
- 2a Ascospores with several polar flagellar appendages (Fig. 4) *Flagellosphaeria*
 2b Ascospores without appendages (if with ornamentation, see *Roussoëlla*) *Amphisphaeria*
- 3a Hamathecium consisting of conspicuously transversely septate pseudoparaphyses or pseudoparenchymatous tissue (Figs 45-46) 4
 3b Hamathecium consisting of narrow, trabeculate paraphysoids (Figs 43-44) or paraphyses 10
- 4a Hamathecium nearly pseudoparenchymatous, with rounded cells *Dothidotthia*
 4b Hamathecium consisting of pseudoparaphyses 5
- 5a Ascospores distoseptate (Figs 22-24, 50) *Parapyrenis*
 5b Ascospores euseptate 6
- 6a Ascocarp wall dimidiate; ascospores with larger upper cell *Mycocomicrothelia*
 6b Ascocarp wall entire; ascospores usually with larger lower cell or equal cells 7
- 7a Ascocarp wall consisting of isodiametric cells *Kirschsteiniotelia*
 7b Ascocarp wall consisting of compressed cells 8
- 8a Ascospores usually blackish brown, pointed, more than 3 times as long as wide; hamathecium consisting of thin filaments, often sparse (Figs 25-30, 48) *Phaeodothis*
 8b Ascospores often reddish brown, shorter; hamathecium consisting of thick filaments, at least between the asci 9
- 9a Ascospores with thick (2-3 μm) gelatinous sheath or with rounded lumina, symmetrical or slightly asymmetrical (Figs 6-15) *Montagnula*
 9b Ascospores asymmetrical, with the upper cell more or less distorted, triangular and pointed and the lower cell elongated (Figs 16-20) *Munkovalsaria*
- 10a Ascospores colourless, thickly distoseptate (Figs 5, 44) *Megalotremis*
 10b Ascospores brown, euseptate or at most thinly distoseptate 11
- 11a Ascocarp wall dimidiate; ascospores relatively long, pointed *Astrosphaeriella*
 11b Ascocarp wall entire 12
- 12a Hamathecium filaments richly anastomosing above the asci (Fig. 43); ascospores thinly distoseptate (Fig. 49) *Didymosphaeria*
 12b Hamathecium filaments (nearly) unbranched; ascospores euseptate 13
- 13a Ascospores pointed, symmetrically septate, striate or reticulate (Figs 31-34) *Roussoëlla*
 13b Ascospores rounded, asymmetrically septate, not striate (Fig. 1) *Aaosphaeria*

1. **AAOSPHERIA** Aptroot, gen. nov.

Ascomycetes ad Dothideales pertinentes, hamathecio sparso ramuloso, ascosporis bicellularibus, fuscis, tenuitunicatis.

Type: *Aaosphaeria arxii* (Van der Aa) Aptroot (\equiv *Didymosphaeria arxii* Van der Aa).

Description: See Van der Aa (1989, sub *Didymosphaeria arxii*).

1.1 **Aaosphaeria arxii** (Van der Aa) Aptroot, comb. nov.

Fig. 1.

Basionym: *Didymosphaeria arxii* Van der Aa, Stud. Mycol. 31: 20. 1989.

Type — COLOMBIA: Meta, between Acacias and Villavicencio, from maize field soil (under *Zea mays*, Gramineae). Collected by O. Rangel, isolated by J. Veerkamp, s.n., 1978 (CBS 175.79, holotype, dried culture; also living culture; COL, isotype).

Didymosphaeria coffeae Saccas, Bull. Inst. Fr. Cult. Caffé 16: 139. 1981 [nom. inval., Art. 37].

Type — CENTRAL AFRICAN REPUBLIC: Boukoko, on *Coffea excelsa* (Rubiaceae). Saccas 139 (PC-Saccas, holotype). New synonymy.

See for a description the original publication of *Didymosphaeria arxii*. However, this species does not belong in *Didymosphaeria* s.s., because of the thin-walled spores and the not anastomosing interascal tissues. As no genus is known in which the genus can be satisfactorily accommodated, classification in a new genus, *Aaosphaeria*, is proposed here. It is referable to the Dothideales, but placement in any known family is still unclear. It could be close to *Polycoccum* in the Dacampiaceae, but differs, e.g., in the anamorph (see Van der Aa, l.c.).

The anamorph belongs to *Microsphaeropsis*, as has been reported by Van der Aa (1989).

Host plant recorded: *Mangifera indica* (Anacardiaceae), *Solidago virgaurea* (Compositae), *Zizyphus jujuba* (Rhamnaceae).

Additional material seen:

VIRGIN ISLANDS: St. Thomas, Bolongo Bay, on sclerophyllous leaf. Buck 3408a (NY, sub *Didymosphaeria* sp.).

GERMANY: Königstein, on *Solidago virgaurea* (Compositae). Krieger s.n., distributed in Fungi Saxonici 2377 (L, S, sub *Phyllosticta solidaginis*).

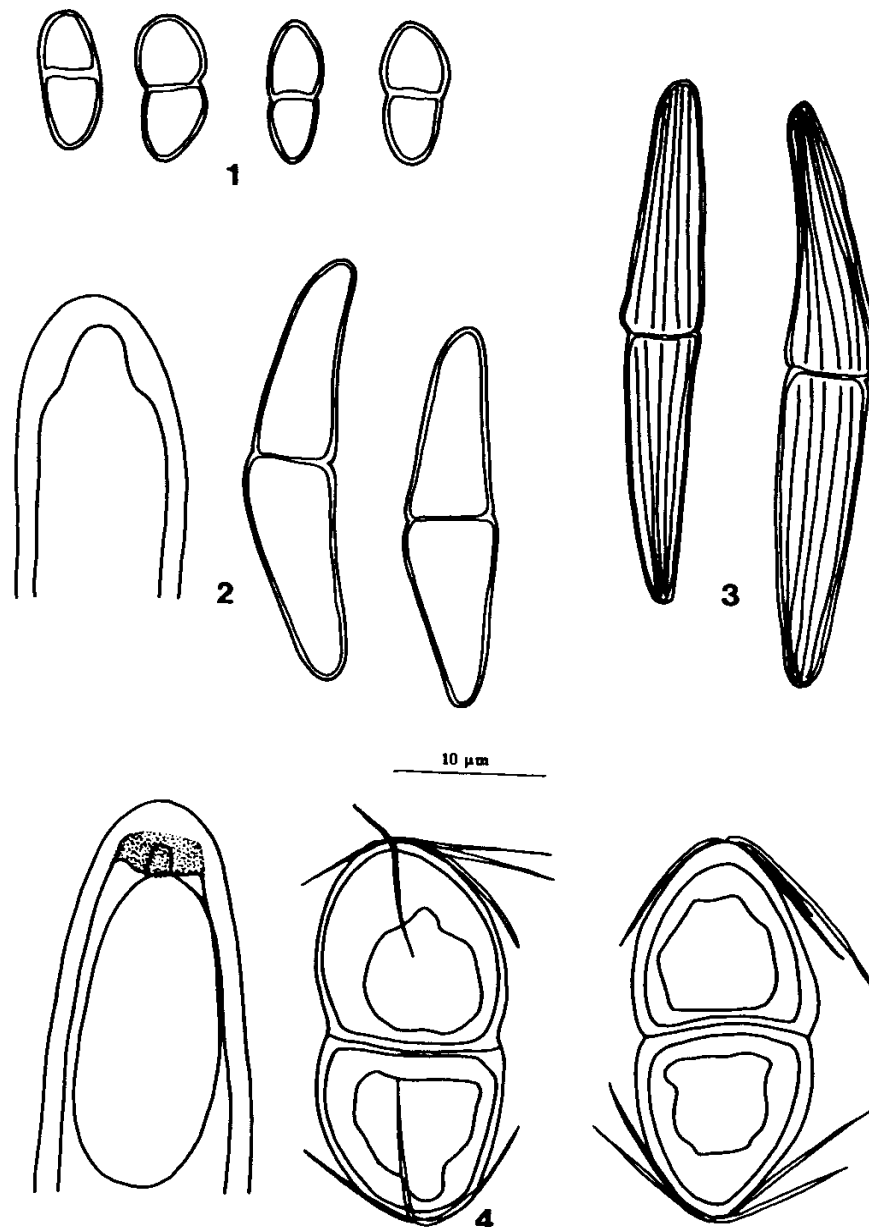
INDIA: Nasik, on unknown stem. Ujjainkar 82A (IMI 328930, sub *Didymosphaeria indica*); Bikann, on wood of *Zizyphus jujuba* (Rhamnaceae). Shanra 32 (IMI 262660, identification uncertain, sub *Didymosphaeria indica*).

INDONESIA: Java, Bogor, Botanical Garden, on dead stems. Boedijn s.n., VII 1953 (L, sub *Didymosphaeria* sp.).

SAMOA: W. Samoa, isolated from *Mangifera indica* (Anacardiaceae). Jackson s.n., X 1979 (IMI 242713, dried culture, sub *Didymosphaeria* sp.).

2. **AMPHISPHAERIA** Cesati & De Notaris, Comm. Soc. Critt. Ital. 1: 225. 1863.

Several species of *Didymosphaeria* have already been transferred to this genus in the Amphisphaeriaceae, e.g. by Barr (1989a). Below only those species are mentioned to which new synonyms have been assigned.



Figs 1-4. Ascospores and ascus tips: 1. *Aaosphaeria arxii*; 2. *Astrosphaeriella minima*; 3. *A. papuana*; 4. *Flagellosphaeria polytrichospora*. Illustrations are made from the type, unless otherwise mentioned. All drawings are at the same magnification (except Fig. 42), see bar.

2.1 *Amphisphaeria multipunctata* (Fuckel) Petrak, *Annls mycol.* 21: 329. 1923.

Didymosphaeria acerina Rehm ex Phillips & Plowright, *Grevillea* 6: 27. 1877 \equiv *Massariopsis acerina* (Rehm ex Phillips & Plowright) Rehm, *Annls mycol.* 4: 270. 1906.

Type — GERMANY: Windsheim, on *Acer campestre* (Aceraceae). Rehm s.n., IV 1874, distributed in Rehm, *Ascomyceten* 237 (S, holotype; FH, NY, isotypes). Synonymy already reported by Scheinpflug (1958).

Didymosphaeria fraxini Winter, *Hedwigia* 18: 168. 1879 \equiv *Didymosphaeria acerina* var. *fraxini* (Winter) Winter, nom. herb.

Type — GERMANY: Sachsen, Leipzig, on *Fraxinus excelsior* (Oleaceae). Winter s.n., V 1874 (S, isotype). New synonymy.

Didymosphaeria helvetica Rehm, nom. herb. \equiv *Massariopsis subsecta* f. *pruni-spinosae* Kunze, *Fungi Selecti Exsiccati* 327. 1878.

Type — SWITZERLAND: Zürich, Albisgütli, on *Prunus spinosa* (Rosaceae). Winter s.n., VIII 1878, distributed in Kunze, Fungi Selecti Exsiccati 327 (S, holotype). New synonymy.

Didymosphaeria acerina f. *viburni* Rousseau, nom. herb.

Type — BELGIUM: Yvoir, on *Viburnum opulus* (Caprifoliaceae). Rousseau s.n., IX 1888 (BR, holotype). New synonymy.

Didymosphaeria major Ellis & Everhart, Bull. Torrey bot. Club 24: 130. 1897.

Type — USA, KANSAS: Rooks Co., on wood of *Rhus glabra* (Anacardiaceae). Bartholomew 1934 (NY, holotype; FH, isotype). Synonymy already reported by Barr (1989a).

Didymosphaeria acerina f. *sorbi* Rehm, nom. herb.

Type — RUSSIA: St. Petersburg, on *Sorbus aucuparia* (Rosaceae). Kreutschel s.n., XI 1897 (S, holotype). New synonymy.

Didymosphaeria moravica Rehm, Annl. mycol. 11: 151. 1913.

Type — CZECHIA: Weißkirchen, Podhorn, on branches of *Quercus robur* (Fagaceae). Petrak s.n., VIII 1912 (S, holotype; FH (2 ×), W (2 ×), isotypes), also distributed in Flora Bohemiae et Moraviae Exsiccata 11 (BR, FH, S, Z, isotypes).

Didymosphaeria carpinicola Petrak, Fungi Polonici Exsiccati 578. 1921.

Type — POLAND: Podhorce, Stryj, on *Carpinus betulus* (Fagaceae). Petrak s.n., I 1917, distributed in Fungi Polonici Exsiccati 578 (W, holotype; M, S, W, isotypes).

Didymosphaeria sagaria Narendra & Rao, Sydowia 28: 355. 1976 ('1975').

Type — INDIA: Karnataka, Sagar, on dead branches. Narendra s.n., X 1972 (AMH 2311, holotype). New synonymy.

The last specimen mentioned is the first documentation of the species for Asia.

For a description see Müller & Von Arx (1962: 694, sub *A. millepuncta*).

Host plants recorded: *Acer campestre* (Aceraceae), *Carpinus betulus* (Fagaceae), *Fraxinus excelsior* (Oleaceae), *Prunus spinosa* (Rosaceae), *Quercus robur* (Fagaceae), *Rhus glabra* (Anacardiaceae), *Sorbus aucuparia* (Rosaceae), *Syringa vulgaris* (Oleaceae), *Viburnum opulus* (Caprifoliaceae).

Selected additional material seen:

AUSTRIA: Eisleben, on *Acer campestre* (Aceraceae). Kunze s.n., 1874, distributed in Thümen, Mycotheca Universalis 169 (FH, L, sub *Didymosphaeria acerina*).

BELGIUM: Tervueren, on *Syringa vulgaris* (Oleaceae). Rousseau s.n., IX 1888 (BR, sub *Didymosphaeria syringae*).

CZECHIA: Weißkirchen, on *Prunus spinosa* (Rosaceae). Petrak s.n., II 1913, distributed in Petrak, Flora Bohemiae et Moraviae Exsiccata 972 (BR, FH, Z, sub *Didymosphaeria acerina*); Weißkirchen, Podhorn, on branches of *Quercus robur* (Fagaceae). Petrak s.n., III 1914 (L (2 ×), topotypes of *Didymosphaeria moravica*); same locality and substratum, Petrak s.n., XI 1913, distributed in Flora Bohemiae et Moraviae Exsiccata 11b (BR, FH, W, Z, topotypes of *Didymosphaeria moravica*).

GERMANY: Windsheim, on *Acer campestre* (Aceraceae). Rehm s.n., IV 1873 (S, topotype of *Didymosphaeria acerina*); Augsburg, on *Acer campestre* (Aceraceae). Britzelmayer s.n., 1878, distributed in Thümen, Mycotheca Universalis 1545 (BR, FH, ZT, sub *Didymosphaeria acerina*); Königstein, on *Acer campestre* (Aceraceae). Krieger s.n., IV 1888, distributed in Krieger, Fungi Saxonici 530 (CUP, M, ZT (2 ×), sub *Didymosphaeria acerina*).

LUXEMBURG: Ronkerthal, on *Acer campestre* (Aceraceae). Feltgen s.n., I 1902 (FH-Höhnel, LUX, sub *Didymosphaeria acerina*).

SWITZERLAND: Zürich, Schlieren, on *Acer campestre* (Aceraceae). V. Tavel s.n., IV 1894 (ZT (2 ×)).

2.2 *Amphisphaeria umbrina* (Fries) De Notaris, Sferiacei Italiani: 69. 1863.

Didymosphaeria betulae (Niessl) Saccardo, Syll. Fung. 1: 707. 1882 \equiv *Phorcys betulae* Niessl, Verh. naturf. Ver. Brünn 14: 41. 1876 \equiv *Microthelia betulae* (Niessl) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — GERMANY: Baden, Rastatt, on bark of *Betula alba* (Betulaceae). Schroeter s.n., s.d. (M, not seen). The type of this species, which is the type of *Phorcys*, has already been reported to be lost by Müller & Von Arx (1962), who considered it a species of *Amphisphaeria*. Its identity with *Amphisphaeria umbrina* is assumed here because a specimen of another species of *Phorcys* could be studied, from the same author, locality, collector and herbarium:

Phorcys quercina Niessl nom. herb.

Type — GERMANY: Baden, Rastatt, on bark of *Quercus pedunculata* (Fagaceae). Schroeter s.n., XI 1875 (M, holotype). This is a new synonym of *Amphisphaeria umbrina* (Fries) De Notaris. It could be identical with *Didymosphaeria betulae*, for which also another host has been reported, viz. *Alnus glutinosa* (Betulaceae), by Lind (1913). It is even possible that this specimen, which grows on very smooth bark, is in fact the type of *Phorcys betulae*, but that Niessl had some doubt about the host, and that he changed the epithet in the publication, but not on the material.

Didymosphaeria nitidula Saccardo, Michelia 1: 32. 1877 \equiv *Microthelia nitidula* (Saccardo) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — ITALY: Veneto, Montello, on *Carpinus betulus* (Fagaceae). Saccardo s.n., VIII 1876 (PAD, holotype).

Synonymy is very probable, but the type specimen is in bad shape.

Didymosphaeria massarioides f. *hederae* Feltgen, Recl. Mém. Trav. Soc. bot. Luxemb. 16: 248. 1903. Type — LUXEMBURG: Eicherberg, on *Hedera helix* (Araliaceae). Feltgen s.n., VII 1903 (LUX, holotype; FH-Höhnel, isotype).

Synonymy is very probable, but the type specimens are not well developed.

For a description see Müller & Von Arx (1962: 693).

Host plants recorded: *Alnus glutinosa* (Betulaceae), *Betula alba* (Betulaceae), *Carpinus betulus* (Fagaceae), *Hedera helix* (Araliaceae), *Quercus pedunculata* (Fagaceae), *Salix* (Salicaceae), *Ulmus* (Ulmaceae).

3. ASTROSPHAERIELLA Sydow & H. Sydow, Anns mycol. 11: 260. 1913.

This genus comprises species growing in the tropics on hard vegetable substrata, mainly bamboo and palm leaves. During the present research one additional species was found. For a description of the genus and the remaining ten species see Hawksworth (1981) and Hawksworth & Boise (1985). The genus is probably best accommodated in the Platystomaceae.

3.1 *Astrosphaeriella minoensis* (Hara) D. Hawksworth, Anns mycol. 38: 118. 1985.

? *Didymosphaeria pustulata* Hino & Katumoto, Bull. Fac. Agric. Yamaguchi Univ. 2: 24. 1960. Type — JAPAN: Nagato, Hagi, on *Sasa kurilensis* (Gramineae). Hino s.n., XII 1957 (YAM, not seen).

No reply was received from YAM upon a request for the type. According to the description, it is probably a new synonym of *Astrosphaeriella minoensis* (Hara) D. Hawksworth.

For a description see Hawksworth & Boise (1985: 118).

Host plants recorded: *Phyllostachys bambusoides* (Gramineae), *Sasa kurilensis* (Gramineae).

3.2 *Astrosphaeriella minima* Aptroot, nom. nov.

Fig. 2.

≡ *Didymosphaeria fusispora* Penzig & Saccardo, Malpighia 11: 395. 1897 [non *Astrosphaeriella fusispora* Sydow & H. Sydow, 1913].

Type — INDONESIA: Java, Tjibodas, on *Bambusa* (Gramineae). Penzig 397 p.p., III 1897 (PAD, holotype, not seen; DAOM 114169 type slide; W (3 ×), isotypes).

The new name is necessary because the binomial *Astrosphaeriella fusispora* already exists (this is a synonym of *Astrosphaeriella stellata* (Patouillard) Saccardo).

Stroma reduced. Ascomata 0.4-0.7 mm diam., conoid, covered by the host epidermis. Ascospores fusiform, more than 3 times as long as wide, pointed, 24-29 × 7-8 μm, very pale brown, without ornamentation. Anamorph unknown.

Astrosphaeriella minima is mainly characterized by the ascospores, which are the smallest so far known in the genus, 24-29 × 7-8 μm. The ascocarp remains covered by the host plant substratum, except for the ostiole.

Host plant recorded: *Bambusa* (Gramineae).

Additional material seen:

CHINA: Yangso, Kwangsi, on *Bambusa* (Gramineae). Teng s.n., II 1938 (CUP-CH, M, sub *Didymosphaeria fusispora*).

INDONESIA: Java, Bogor, Botanical Garden, on *Bambusoideae* (Gramineae). Boedijn s.n., VII 1957 (L, sub *Didymosphaeria minutella*).

3.3 *Astrosphaeriella papuana* Aptroot, spec. nov.

Fig. 3.

Astrosphaeriella ascocarpiis conoideis epidermide obtectis, ascosporis striatis, 34-42 μm longis, 6-6.5 μm latis. Type: PAPUA NEW GUINEA: Madang, Tongu along road Bogia-Josephstaal, on *Bambusoideae* (Gramineae). Aptroot 30621, VI 1992 (CBS, holotype).

Stroma reduced. Ascomata 0.5-1.0 mm diam., conoid, covered by the host epidermis. Ascospores 34-42 × 6-6.5 μm, more than 5 times as long as wide, pointed, medium brown, with striate ornamentation. Anamorph unknown.

This species is related to the two other known species of *Astrosphaeriella* with striate ascospores, but has smaller ascospores of 34-42 × 6-6.5 μm and conoid ascocarps which remain hidden below the host epidermis.

3.4 *Astrosphaeriella stellata* (Patouillard) Saccardo, Syll. Fung. 24: 938. 1928.

For a description see Hawksworth (1981).

Material seen from additional countries:

INDIA: Marathwa, on *Dendrocalamus strictus* (Gramineae). Tilak s.n., X 1971 (CBS, sub *Microthelia* cf. *fusispora*).

PAPUA NEW GUINEA: Madang, Bogia, 3 km on road from Nubia to Bunapas, on *Bambusoideae* (Gramineae). Aptroot 30246, VII 1992 (CBS).

4. DOTHIDOTTHIA Höhnelt, Ber. dt. bot. Ges. 36: 312. 1918.

This genus of the Botryosphaeriaceae was monographed by Barr (1989b). It comprises seven species, which are so far known from North America only. In the course of the present study of *Didymosphaeria*, many species were found to be new synonyms of *Dothidotthia* species, which are not at all related to *Didymosphaeria*, but correctly placed in the vicinity of *Botryosphaeria*. These findings change the known distribution and host ranges considerably.

4.1 *Dothidotthia celtidis* (Ellis & Everhart) M. Barr

Didymosphaeria celtidis Ellis & Everhart, Proc. Acad. nat. Sci. Philad. 1895: 421. 1895 \equiv *Microthelia celtidis* (Ellis & Everhart) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898 \equiv *Dothidotthia celtidis* (Ellis & Everhart) M. Barr, Mycotaxon 34: 520. 1989.

Type — USA, KANSAS: Rooks Co., Rockport, on *Celtis occidentalis* (Ulmaceae). Bartholomew 1467, V 1894 (NY, holotype; CUP-A, FH, isotypes).

Didymosphaeria superapplanata Sivanesan, Trans. Br. mycol. Soc. 69: 122. 1977.

Type — GREAT BRITAIN: Kent, Hirstwood, Plaxtol, on *Castanea sativa* (Fagaceae). Coppins 1486, XII 1975 (IMI 202377, holotype; E, isotype). New synonymy.

For a description see Barr (1989b: 520).

Host plants recorded: *Castanea sativa* (Fagaceae), *Celtis occidentalis* (Ulmaceae).

Additional material seen:

USA, NEW YORK: Long Island, on *Celtis occidentalis* (Ulmaceae). Latham s.n., III 1923 (FH, NYS); OHIO: Hamilton Co, Anderson, on *Celtis occidentalis* (Ulmaceae). Cooke 34348 (DAOM 122177); S. CAROLINA: Santee Canal, on *Celtis occidentalis* (Ulmaceae). Ravenel 1422 (FH-Curtis).

4.2 *Dothidotthia ramulicola* (Peck) M. Barr, Mycotaxon 29: 503. 1987.

? *Didymosphaeria ceanothi* (Cooke & Harkness) Berlese & Voglino in Saccardo, Syll. Fung. Add. 1-4: 117. 1886 \equiv *Sphaeria (Didymosphaeria) ceanothi* Cooke & Harkness, Grevillea 13: 19. 1884 \equiv *Microthelia ceanothi* (Cooke & Harkness) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — USA, CALIFORNIA: On *Ceanothus* (Rhamnaceae). Harkness 2542 (not seen).

The type is not preserved in CAS. According to the description, it is most probably another synonym of *Dothidotthia ramulicola* (Peck) M. Barr.

Didymosphaeria accedens Saccardo in Fairman, Proc. Rochester Acad. Sci. 1: 48. 1890 \equiv *Microthelia accedens* (Saccardo in Fairman) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — USA, NEW YORK: Lyndonville, on branch of *Fraxinus americana* (Oleaceae). Fairman s.n., V 1889 (NY, holotype; CUP, PAD, isotypes). Synonymy already reported by Barr (1989b).

Didymosphaeria vagans Ellis & Everhart, Proc. Acad. nat. Sci. Philad. 1893: 446. 1894 \equiv *Microthelia vagans* (Ellis & Everhart) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — CANADA: Ontario, London, on *Ostrya* (Betulaceae). Dearness 2110 (NY, lectotype; FH (2 \times), '2166' & s.n.), NYS, isolectotypes). Synonymy already reported by Barr (1989b).

Didymosphaeria cerasorum subsp. *padina* Saccardo, Bull. Soc. mycol. Fr. 12: 65. 1896.

Type — FRANCE: Rigny, on *Prunus padus* (Rosaceae). Flageolet s.n., s.d. (PAD, holotype). New synonymy.

Didymosphaeria spegazzinii Saccardo & Sydow in Saccardo, Syll. Fung. 16: 499. 1902 \equiv *Didymosphaeria massarioides* Spegazzini, An. Mus. nac. B. Aires 6: 275. 1899 [nom. illeg. Art. 64, non Saccardo & Brunaud, 1882].

Type — ARGENTINA: La Plata, on *Ailanthus altissima* (Simaroubaceae). Spegazzini 5857, VI 1889 (LPS, holotype). New synonymy.

Didymosphaeria cryptosphaerioides Rehm, Anns mycol. 2: 176. 1904.

Type — USA, TEXAS. On bark of *Prosopis juliflora* (Leguminosae). Long 359, XII 1900 (S, holotype; CUP-A, isotype). New synonymy.

Didymosphaeria socialis var. *spiraeae* Rehm, nom. herb.

Type — CANADA, ONTARIO: London, on *Physocarpus opulifolia* (Rosaceae). Dearness 3093 (S, holotype).

The specimen is old, but synonymy is very probable.

Didymosphaeria yerbae Spegazzini, An. Mus. nac. B. Aires, ser. 3, 10: 122. 1908.

Type — ARGENTINA: Misiones, Campo das Cuías, on dead branches of *Ilex paraguayensis* (Aquifoliaceae). Spegazzini s.n., II 1907 (LPS, holotype). New synonymy.

Didymosphaeria eugeniicola Spegazzini, Revta Fac. Agron. Vet. La Plata, ep. 2, 6: 68. 1910.

Type — CHILE: Cerro Caracol de Concepción, on *Eugenia obtusa* (Myrtaceae). Spegazzini s.n., I 1909 (LPS, holotype). New synonymy.

Didymosphaeria boldoae Spegazzini, Revta Fac. Agron. Vet. La Plata, ep. 2, 6: 66. 1910.

Type — CHILE: Talcahuana, on branches of *Boldoa fragrans* (Nyctaginaceae). Spegazzini 5850, I 1909 (LPS, holotype). New synonymy.

Didymosphaeria linderiae Saccardo, Anns mycol. 12: 279. 1914.

Type — CANADA: Ontario, London, on *Lindera benzoin* (Lauraceae). Dearness 1647 ('3470'), XII 1913 (PAD, holotype; S, isotype). New synonymy.

? *Didymosphaeria verrucispora* S. Ahmad, Sydowia 2: 74. 1948.

Type — PAKISTAN: Ladhar, Sheikhpura, on *Gossypium* (Malvaceae). Ahmad 2011 (not seen).

It is unknown where this type is kept. It is not in IMI, L or ZT, where many specimens from Sultan Ahmad are kept. According to the description it is most probably a new synonym of *D. ramulicola*.

Didymosphaeria sarcococcae Scheinpflug, Ber. schweiz. bot. Ges. 68: 359. 1958.

Type — INDIA: Ranikhet, Chaubattia, on *Sarcococca saligna* (Buxaceae). Müller s.n., V 1957 (ETH, holotype). New synonymy; the structure of the hamathecium has apparently been wrongly observed by Scheinpflug.

Didymosphaeria tamaricis Koshkelova, Novitates Systematicae Plantarum Non-vascularium 7: 177. 1970.

Type — RUSSIA: Turkomania: Tachta-Basar, Murgabon on *Tamarix* (Tamaricaceae). Koshkelova s.n., IV 1960 (LE 34442, holotype). New synonymy.

Didymosphaeria aggregata Panwar & Kaur, nom. herb.

Type: INDIA: Jodhpur, on bark of *Ficus* (Moraceae). Singh & Panwar s.n., V 1976 (IMI 204351, holotype). New synonymy.

Didymosphaeria heteroasca Panwar & Kaur, nom. herb.

Type — INDIA: Jodhpur, on wood. Singh & Panwar s.n., V 1976 (IMI 204346, holotype). New synonymy.

For a description see Barr (1989b: 520). After the range extensions presented here it may be regarded as (warm-) temperate on both hemispheres and it is known to grow ubiquitously on bark.

Host plants recorded: *Ailanthus altissima* (Simaroubaceae), *Boldoa fragrans* (Nyctaginaceae), *Carya* (Juglandaceae), *Ceanothus* (Rhamnaceae), *Eugenia obtusa* (Myrtaceae), *Ficus* (Moraceae), *Fraxinus americana* (Oleaceae), *Gossypium* (Malvaceae), *Ilex paraguayensis* (Aquifoliaceae), *Lantana camara* (Verbenaceae), *Leucaena leucocephala* (Leguminosae), *Lindera benzoin* (Lauraceae), *Magnolia* (Magnoliaceae), *Menispermum* (Menispermaceae), *Morus alba* (Moraceae), *Ostrya* (Betulaceae), *Physocarpus opulifolia* (Rosaceae), *Prunus padus* (Rosaceae), *Prunus spinosa* (Rosaceae), *Prosopis juliflora* (Leguminosae), *Sarcococca saligna* (Buxaceae), *Smilax australis* (Smilacaceae), *Tamarix* (Tamaricaceae), *Ulmus* (Ulmaceae).

Selected additional material seen:

CANADA, ONTARIO: Brant Co., New Durham, on *Lindera benzoin* (Lauraceae). Cain 10977, V 1938 (DAOM 85437, FH, S, sub *Didymosphaeria linderiae*); Cain 1885 (DAOM 85438, sub *Didymosphaeria linderiae*); London, on *Carya* (Juglandaceae). Dearness 2113 (FH (s.n.), NY, paratypes of *Didymosphaeria vagans*); same locality, on *Ulmus* (Ulmaceae). Dearness 2113B (FH (s.n.), NY, paratypes of *Didymosphaeria vagans*); Long Point, Lake Timagami, on *Ulmus* (Ulmaceae). Jackson s.n., IX 1936 (DAOM 85439, sub *Didymosphaeria vagans*).

USA, NEW YORK: Ithaca, on *Fraxinus*. White 1778, 1919 (CUP, sub *Didymosphaeria accedens*).

ITALY: On *Prunus spinosa* (Rosaceae). Flageolet s.n., s.d. (PAD, sub *Didymosphaeria permutata*).

INDIA: Jabalpur, on *Leucaena leucocephala* (Leguminosae). Jamaluddin s.n. (IMI 291987, sub *Didymosphaeria* sp.); Jodhpur, on *Lantana camara* (Verbenaceae). Singh & Panwar s.n. (IMI 204357, sub *Didymosphaeria* sp.); On *Morus alba* (Moraceae). Panwar s.n., VIII 1971 (IMI 159627, sub *Didymosphaeria* sp.).

TAIWAN: Kukuan Taichung, on bark. Sivanesan 258 (IMI 323575, sub *Didymosphaeria* sp.).

AUSTRALIA, NEW SOUTH WALES: Cabbage Tree Creek, on *Smilax australis* (Smilacaceae). Petrak s.n., V 1955 (W, sub *Didymosphaeria* sp.).

5. FLAGELLOSPHAERIA Aptroot, gen. nov.

Ascomycetes ad Amphisphaeriaceas pertinentes, ascis amyloideis, ascosporis flagellatis, uniseptatis, fuscis, flagellis apicalibus, hyalinis, 3-5 sociatis, ad 10 μ m longis.

Type: *Flagellosphaeria polytrichospora* (Lucas & Sousa da Câmara) Aptroot (\equiv *Didymosphaeria polytrichospora* Lucas & Sousa da Câmara).

Didymosphaeria polytrichospora Lucas & Sousa da Câmara is regarded as representing a new genus in the Amphisphaeriaceae. The genus is mainly characterized by the many flagelliform appendages on the poles of the ascospores and the IKI-positive (blue) ascus tip. Most ascomycetes with flagellate ascospores are maritime, but the present species, which comes from a mountain region, is different from all known maritime ascomycetes with flagellate ascospores. Two other undescribed terrestrial species with flagella are known to the author, belonging to the (bitunicate) Dothideales s.l. Both occur on palms, close to the sea-shore. The genus *Flagellosphaeria* differs from both in, e.g., the IKI-positive ascus tip and the hamathecium, which consists of paraphyses.

Stroma forming a clypeus around the ostiole, black. Ascumata perithecioid, globose, black, smooth, simple, immersed to erumpent, c. 1 mm diam. Peridium black, consisting of two layers of flattened cells. Hamathecium consisting of paraphyses, simple, colourless, IKI-negative. Asci cylindrical, unitunicate, with ocular chamber, IKI-positive (blue), with 8 ascospores in one row. Ascospores 25-29 \times 10-12 μ m, ellipsoid, brown, symmetrically 1-septate, constricted at the septum, with ornamentation consisting of 3-5 hyaline polar flagella, each flagellum up to 10 μ m, without germ slit or pore, with a thin gelatinous sheath. Anamorph unknown.

Distribution and ecology: Only known from the type on stems of brooms.

5.1 *Flagellosphaeria polytrichospora* (Lucas & Sousa da Câmara) Aptroot, comb. nov.

Fig. 4

Basionym: *Didymosphaeria polytrichospora* Lucas & Sousa da Câmara, *Agronomia lusit.* 15: 156. 1953.

Type — PORTUGAL: Beira Alta, Serra da Estrêla, Serra do Desterro, on *Cytisus multiflorus* (Leguminosae). Branquinho de Oliveira 1129, IV 1952 (LISE, holotype).

Description: see the genus.

Host plant recorded: *Cytisus multiflorus* (Leguminosae).

6. KIRSCHSTEINIOTHELIA D. Hawksworth, Bot. J. Linn. Soc. 91: 182. 1985.

This genus, which is accommodated in the Pleomassariaceae by Barr (1993b), has been treated by Hawksworth (1985b). So far, six species are known.

6.1 *Kirschsteiniothelia aethiops* (Berkeley & M. A. Curtis) D. Hawksworth, Bot. J. Linn. Soc. 91: 185. 1985.

Didymosphaeria scabella (Quélet) Berlese & Voglino in Saccardo, Syll. Fung. Add. 1-4: 432. 1886 ≡ *Sphaeria scabella* Quélet, C. R. Ass. fr. Avanc. Sci. 13: 285. 1884 ≡ *Microthelia scabella* (Quélet) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — FRANCE: Jura, Roches, on *Hedera helix* (Araliaceae). S.c., IV 1883 (PC, holotype; UPS (2 ×), isotypes). New synonymy.

Didymosphaeria producta Saccardo & Paoletti in Saccardo, Bull. Soc. r. Bot. Belg. 28: 89. 1889 ≡ *Microthelia producta* (Saccardo & Paoletti) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — RUSSIA: Siberia, near Chabyk River, on *Lonicera coerulea* (Caprifoliaceae). Martianoff 1629 (PAD, holotype). New synonymy.

For a description see Hawksworth (1985b: 185).

Host plants recorded: *Agathis australis* (Araucariaceae), *Alnus rubra* (Betulaceae), *Carpinus betulus* (Fagaceae), *Fagus sylvatica* (Fagaceae), *Hedera helix* (Araliaceae), *Juglans* (Juglandaceae), *Lonicera coerulea* (Caprifoliaceae), *Pinus mugo* (Pinaceae), *Quercus* (Fagaceae), *Salix* (Salicaceae), *Thuja* (Cupressaceae), *Tilia* (Tiliaceae), *Tsuga canadensis* (Pinaceae).

Additional material seen:

GERMANY: Büren, on *Juglans* (Juglandaceae). Lahm s.n., IV 1863 (UPS, sub *Didymosphaeria* sp.).

6.2 *Kirschsteiniothelia recessa* (Cooke & Peck) D. Hawksworth, Bot. J. Linn. Soc. 91: 195. 1985.

Didymosphaeria oregonensis Goodding, Phytopathology 21: 913. 1931.

Type — USA, OREGON: Clackamas Co., Yokum Falls, causing canker on *Alnus rubra* (Betulaceae). Goodding & Darker 2783 ('4965'), VII 1929 (DAOM 121536, FH, isotypes; the DAOM isotype sub *Didymosphaeria nana* var. *brachyspora*). New synonymy. The type and all additional material seen belongs to *Kirschsteiniothelia recessa*.

For a description see Hawksworth (1985b: 185).

Host plants recorded: *Alnus rubra* (Betulaceae).

Selected additional material seen:

CANADA: Ontario, Lake Opinicon, on wood. Morgan-Jones s.n. (DAOM 110015, sub *Didymosphaeria* sp.).

USA, OREGON: Clackamas Co., Yokum Falls, on *Alnus rubra* (Betulaceae). Darker & Goodding s.n., VII 1929 (DAOM 121536, sub *Didymosphaeria nana* var. *brachyspora*); Clackamas Co., Still Creek, on *Alnus rubra* (Betulaceae). Goodding s.n., VII 1930 (M, paratype of *Didymosphaeria oregonensis*); NEW HAMPSHIRE: Concord, on *Alnus* (Betulaceae). Darker 3440 (DAOM 97768, sub *Didymosphaeria oregonensis*).

7. MEGALOTREMIS Aptroot, Bibliotheca Lichenologica 44: 124. 1991.

This genus of the Trypetheliaceae has been introduced and treated by Aptroot (1991). Two species were known, but during the present study an additional one was detected.

7.1 *Megalotremis megalospora* (Vainio) Aptroot, comb. nov. Figs 5, 44.

Basionym: *Didymosphaeria megalospora* Vainio, Proc. Am. Acad. Arts Sci. 58: 147. 1923.

Type — TRINIDAD: St. Ann's Valley, on bark. Thaxter 99 (TUR-Vainio 32490, lectotype, here designated; FH, isolectotype).

This is a clearly lichenized species of *Megalotremis* in the Trypetheliaceae. The hamathecium consists of richly anastomosing trabeculate paraphysoids and the spores are distoseptate. As the species differs from both other known species of the genus, a new combination is proposed. It is characterized by the skewed ascocarps and the consistently 1-septate spores which are arranged by 4 in the ascus and measure 62-67 × 22-25 μm. The type material was annotated by Dr R. C. Harris with an unpublished combination in *Ditremis* (= *Anisomeridium* nom. cons., Monoblastiaceae).

Additional material seen:

TRINIDAD: St. Ann's Valley, on bark. Thaxter 68 (FH, TUR-Vainio 32488, paratypes).

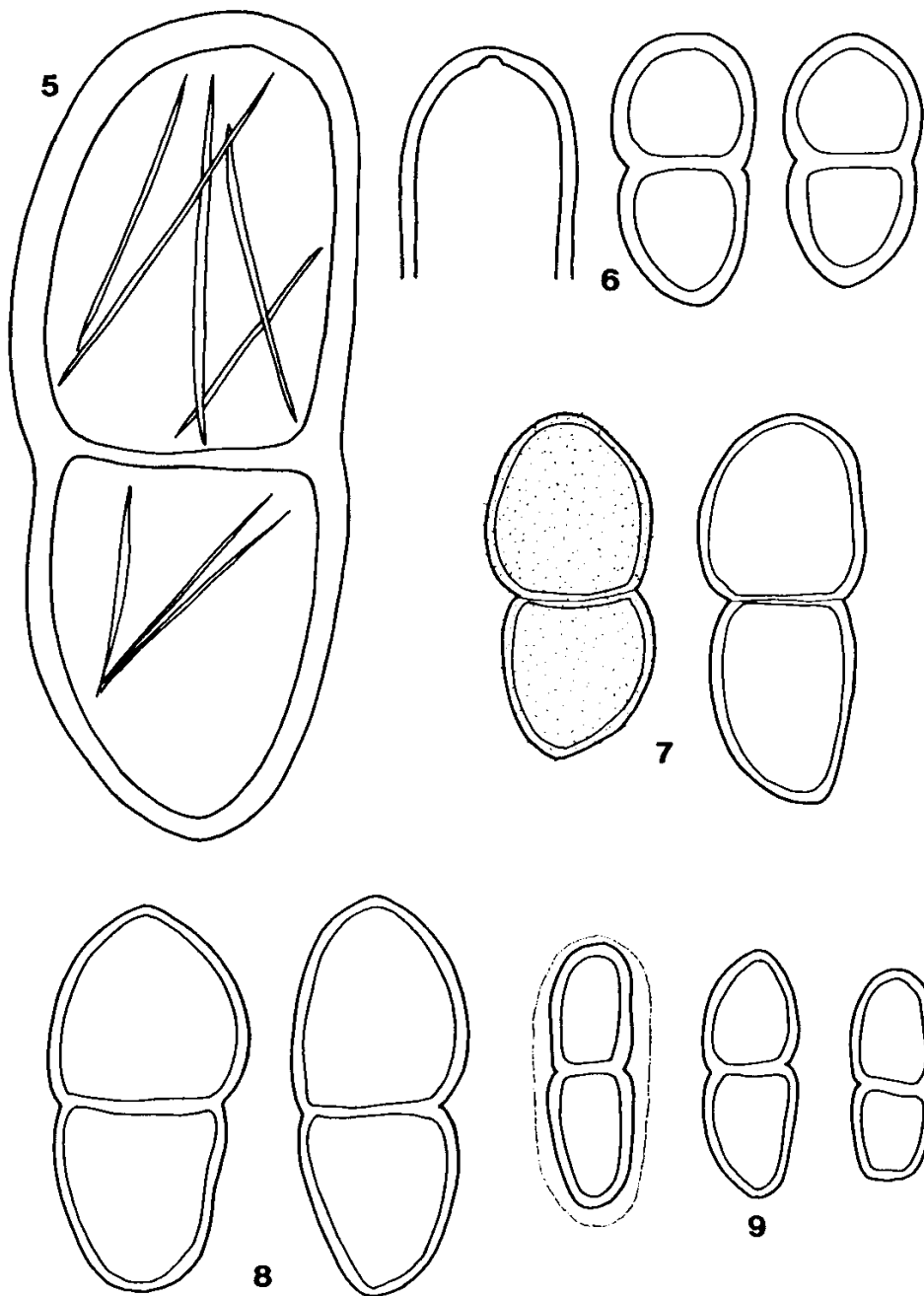
8. MONTAGNULA Berlese, Icon. Fung. 2: 68. 1896.

This genus has recently been reinstated and used (e.g. Barr, 1990b) to accommodate some dictyosporous species which had been placed before in *Pleospora*. It is characterized by pseudoparaphyses and clypeate ascocarps. The ascospores are characteristically thick-walled and often ornamented and/or covered with a thick gelatinous sheath. The following didymosporous species are regarded here as resembling the dictyosporous members of this genus in many respects and are therefore repositioned here. However, Barr (in Eriksson & Hawksworth, 1993) states that they 'must be assembled under another generic name in the Diademaceae'.

The genus is probably best accommodated in the Phaeosphaeriaceae.

Key to the didymosporous species of *Montagnula*

- | | | |
|----|---|--------------------|
| 1a | Ascospores conspicuously asymmetrical with larger upper cell..... | 2 |
| 1b | Ascospores nearly symmetrical..... | 3 |
| 2a | Ascospores pale brown, rather thin-walled, verrucose..... | <i>M. opulenta</i> |
| 2b | Ascospores red-brown, rather thick-walled, verruculose..... | <i>M. spartii</i> |
| 3a | Ascocarps superficial; ascospores strongly constricted at the septum..... | <i>M. longipes</i> |
| 3b | Ascocarps immersed; ascospores not or slightly constricted..... | <i>M. palmacea</i> |



Figs 5-9. Ascospores and ascus tips: 5. *Megalotremis megalospora*; 6. *Montagnula longipes*; 7. *M. opulenta*; 8. *M. opulenta*, type of *Didymosphaeria wulfii*; 9. *M. palmacea*.

8.1 *Montagnula longipes* (Trabut) Aptroot, comb. nov.

Fig. 6.

Basionym: *Didymosphaeria longipes* Traub in Saccardo, Syll. Fung. Add. 1-4: 411. 1886 \equiv *Didymosphaerella longipes* (Traub) Cooke, Grevillea 18: 29. 1889 \equiv *Microthelia longipes* (Traub) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — ALGERIA: Agha near Alger, on dead leaves of *Agave americana* (Agavaceae). Traub s.n., X 1884 (PAD, holotype), also distributed in Roumequère, Fungi Gallici Exsiccati 4050 (NY, isotype).

Stroma reduced. Ascomata 0.3-0.7 mm diam., superficial. Ascospores 16-18 \times 6-7.5 μ m, nearly symmetrical, strongly constricted at the septum. Anamorph unknown.

Distribution and ecology: Only known from *Agave* leaves in Algeria.

This species is closely related to *Montagnula palmacea* (Cooke) Aptroot, but mainly differs by superficial ascocarps and the strongly constricted ascospores. In addition it has another host preference.

Host plant recorded: *Agave americana* (Agavaceae).

Additional material seen:

ALGERIA: Alger, on dead leaves of *Agave americana* (Agavaceae). Maire s.n., I 1914, distributed in Mycotheca Boreali-Africana 195 (M, NY, W).

8.2 *Montagnula opulenta* (De Notaris) Aptroot, comb. nov. Figs 7, 8, 45.

Basionym: *Sphaeria opulenta* De Notaris, Atti Accad. Sci., Torino, Class. mat. fis, Ser. 2, 3: 64. 1839
≡ *Amphisphaeria opulenta* (De Notaris) Cesati & De Notaris, Comment. Soc. Crittog. ital. 1(4): 223. 1863
≡ *Didymosphaeria opulenta* (De Notaris) Saccardo, Syll. Fung. 1: 711. 1882 [non (Th. Fries & Almqvist) Saccardo & D. Saccardo in Saccardo (1905)]
≡ *Microthelia opulenta* (De Notaris) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — ITALY: Sardinia, on *Opuntia* (Cactaceae). De Notaris s.n., 1835 (RO, holotype).

Didymosphaeria arenaria Mouton, Bull. Soc. r. Bot. Belg. 27: 75. 1889 ≡ *Microthelia arenaria* (Mouton) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — GERMANY: Near Hamburg, on *Ammophila arenaria* (Gramineae). Krieger s.n., VIII 1877, distributed in Rehm, Ascomyceten 691 p.p. (S, lectotype, selected here; BR (2 ×), isotypes). New synonymy. The lectotype of *Didymosphaeria arenaria* is chosen from the material in S rather than in BR, because on the BR material only *Leptosphaeria ammophilae* (Lasch) Cesati & De Notaris could be found.

Didymosphaeria ammophilae Fautrey & Roumeguère, Revue mycol. 14: 4. 1892 ≡ *Microthelia ammophilae* (Fautrey & Roumeguère) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — FRANCE: Côte-d'Or, Jardin de Noidan, on leaves of *Ammophila arenaria* (Gramineae). Fautrey 792, V 1891, distributed in Roumeguère, Fungi Selecti Exsiccati 5934 (PC, holotype; PC, NY (2 ×), UPS, isotypes).

This is a new synonym of *Montagnula opulenta* (De Notaris) Aptroot, of which ascomata were seen in the holotype and the isotype in UPS. The isotype in PC contains a *Leptosphaeria* (also present in the isotype in UPS), the isotypes in NY contain a *Didymella*.

Didymosphaeria (Massariopsis) wulfii Lind, Meddr Grønland 64: 296. 1924 (as 'wulfii').

Type — GREENLAND: John Murray Island, on *Puccinellia angustata* (Gramineae). Wulff s.n., VII 1917 (C, holotype). New synonymy.

Stroma reduced. Ascomata 0.4-1.2 mm diam., immersed. Ascospores 19-25 × 9-13 μm, the upper cell larger and rounder than the lower one, strongly constricted at the septum, pale brown, rather thin-walled, verrucose. Anamorph unknown. Culture with creamy to white aerial mycelium, reverse medium brown, remaining sterile.

Distribution and ecology: On grasses and cacti in (warm-) temperate to arctic regions of the Northern hemisphere.

The species as accepted here shows a preference for two different kinds of substratum, viz. grasses and cacti. In the soft substratum of the cacti the excipular structures are well-developed, whereas they are less distinct on grasses. However, the internal structures are identical.

Host plants recorded: *Ammophila arenaria* (Gramineae), *Festuca brachyphylla* (Gramineae), *Opuntia ficus-indica*, *O. tuna* (Cactaceae), *Puccinellia angustata* (Gramineae), *Stipa himalaica* (Gramineae).

Additional material seen:

CANADA: Franklin, Buffin Island, on *Festuca brachyphylla* (Gramineae). Dansereau s.n., VII 1950 (DAOM 88147, sub *Didymosphaeria arenaria*); Somerset Island, Aston Bay, on *Poa abbreviata* (Gramineae). Savile 3756B (DAOM 70436, sub *Didymosphaeria arenaria*).

USA, CALIFORNIA: San Fernando, on *Opuntia tuna* (Cactaceae). Jensen s.n., VII 1910 (CUP (2 ×)).

CANARY ISLES: Tenerife, Puerto de la Cruz, on *Opuntia ficus-indica* (Cactaceae). Lunqvist 8173 (UPS).

FRANCE: Corsica, Ajaccio, on *Opuntia ficus-indica* (Cactaceae). Darker 3850 (DAOM 92136).

ITALY: Sardinia, Cagliari, on *Opuntia* (Cactaceae). Canepa s.n., 1867 (RO (2 ×)), also distributed in De Notaris, Erbario Crittogamico Italiano, Series II, 246 (FH-Höhnel, RO); Sicilia, Leosa, on *Opuntia ficus-indica* (Cactaceae). Beltrani s.n., III 1877 (FH, FH-Höhnel), also distributed in Thümen, Mycotheca Universalis 860 (BR, RO, W, sub *Amphisphaeria opulenta*).

MALTA: Marrascirocco, on *Opuntia ficus-indica* (Cactaceae). Caruano-Gatto s.n., IX 1907 (IMI 70334).

CYPRUS: Famagusta, on *Opuntia* (Cactaceae). Natrass s.n., s.d. (CBS, living culture 168.34, IMI 13542, also dried culture).

SWEDEN: Öland, Böda, on *Ammophila arenaria* (Gramineae). Eriksson 2035c (UPS, sub *Didymosphaeria arenaria*); Gotland, Klinte, on *Ammophila arenaria* (Gramineae). Johansson s.n., VIII 1920 (UPS, sub *Didymosphaeria arenaria*); Hellvi, Hideviken, on *Ammophila arenaria* (Gramineae). Petterson s.n., VI 1953 (UPS, sub *Didymosphaeria arenaria*).

TUNISIA: Kroussiah, on *Opuntia* (Cactaceae). Patouillard s.n., III 1891 (FH-Patouillard); Hammamaret, on *Opuntia ficus-indica* (Cactaceae). Jülich F1028 (B).

ISRAEL: Mt. Carmel, Beit Oren, on *Opuntia* (Cactaceae). Lowen 520 (NY, sub *Didymosphaeria yuccaegena*).

INDIA: Kashmir, Purig, Tangola, on *Stipa himalaica* (Gramineae). Koelz 6046 (DAOM 123981, sub *Didymosphaeria elbursensis*).

8.3 *Montagnula palmacea* (Cooke) Aptroot, comb. nov.

Fig. 9.

Basionym: *Sphaeria palmacea* Cooke, Grevillea 7: 12. 1878 ≡ *Didymosphaeria palmacea* (Cooke) Ellis & Everhart, N. Am. Pyrenom.: 329. 1892 ≡ *Anthostomella palmacea* (Cooke) Saccardo, Syll. Fung. 1: 291. 1882 ≡ *Didymosphaerella palmacea* (Cooke) Cooke, Grevillea 18: 29. 1889.

Type — USA, CALIFORNIA: On leaf of Palmae. Harkness 717 (K, holotype; NY, isotype).

Didymosphaeria smaragdina (Cesati) Saccardo, Syll. Fung. 1: 707. 1882 ≡ *Sphaeria smaragdina* Cesati in Rabenhorst, Fungi Europaei 2656. 1881 ≡ *Didymosphaerella smaragdina* (Cesati) Cooke, Grevillea 18: 29. 1889 ≡ *Microthelia smaragdina* (Cesati) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — ITALY: Napoli, Botanical Garden, on dead leaves of *Phoenix dactylifera* (Palmae). Cesati s.n., s.d. (RO, holotype), also distributed in Rabenhorst, Fungi Europaei 2656 (BR, H, L, NY, S, UPS, W, ZT, isotypes). New synonymy.

Didymosphaeria stowardii Saccardo, Anns mycol. 13: 138. 1915 (as 'stowardi').

Type — AUSTRALIA: On dead leaves of *Daviesia multiflora* (Liliaceae). Stoward 4, 1915 (PAD, holotype; PC, isotype). New synonymy. The isotype is a much richer collection than the holotype.

Didymosphaeria cocoes-capitatae Caballero, An. Jard. bot. Madr. 1: 180. 1940.

Type — SPAIN: Valencia, Botanical Garden, on living leaves of *Cocos capitata* (Palmae). Caballero 11805, IV 1938 (MA, lectotype, sub *Phaeosphaeria coccoina* Caballero; IMI 183757, type slide). New synonymy.

Stroma reduced. Ascomata 0.4-0.7 mm diam., immersed. Ascospores ellipsoid, symmetrical, not constricted at the septum, dark brown, with a very thick (2-3 μm) gelatinous outer layer, 14-18 × 4.5-6 μm. Anamorph unknown.

Distribution and ecology: On leaves of palms and other firm monocots in (warm) temperate regions of the Northern hemisphere.

The anamorph is *Coniothyrium palmarum* Corda. It is the type of the genus *Coniothyrium* s.s., characterized by an annellidic conidiogenesis and spinulose conidia (Sutton 1971).

Host plants recorded: *Chamaerops humilis* (Palmae), *Cocos capitata* (Palmae), *Daviesia multiflora* (Liliaceae), *Phoenix dactylifera*, *P. sylvestris* (Palmae), *Pitcairnia chrysantha* (Bromeliaceae), *Sabal palmetto* (Palmae).

Selected additional material seen:

USA, LOUISIANA: Pointe à la Hache, on petiole of *Sabal palmetto* (Palmae). Langlois 1477 (FH).
CHILE: On leaves of *Pitcairnia chrysantha* (Bromeliaceae). Reiche s.n., s.d. (S, sub *Didymosphaeria nubecula*).

GREECE: Crete, Sitia, Eremúpolis, on dead leaves of *Phoenix dactylifera* (Palmae). Rechinger s.n., V 1942 (S, W (6 ×), ZT, sub *Didymosphaeria smaragdina*).

FRANCE: Montpellier, on *Chamaerops humilis* (Palmae). Rechinger s.n., VI 1944 (BR, M, W), also distributed in Cryptogamae Exsiccatae Vindobonenses 4632 (B, H, M), also distributed in Reliquiae Petrakianae 2426 (B, GZU, H, M, all sub *Didymosphaeria nubecula*).

ITALY: Liguria, Porto Maurizio, on dead leaves of *Phoenix dactylifera* (Palmae). Gentile s.n., distributed in De Notaris, Erbario Crittogamo Italiano, Series II, 1072 (B, Z, sub *Didymosphaeria nubecula*).

TUNISIA: Oasis de Gabis, on dead leaves of *Phoenix dactylifera* (Palmae). Maire s.n., distributed in Rehm, Ascomyceten 1910 (CUP, FH-Höhnel, NY, PACA, S, W, sub *Didymosphaeria smaragdina*); Monastir, on dead leaves of *Phoenix dactylifera* (Palmae). Patouillard 31, III 1891 (FH-Patouillard, sub *Didymosphaeria smaragdina*).

EGYPT: Alexandria, Antoniades-Garden, on dead leaves of *Phoenix dactylifera* (Palmae). Höhnel s.n., IV 1902 (FH-Höhnel, sub *Didymosphaeria smaragdina*).

SAUDI ARABIA: Riyadh, Dir'iyah, on dead leaves of *Phoenix dactylifera* (Palmae). Hawksworth 4581 (IMI 227177, sub *Didymosphaeria smaragdina*).

IRAQ: Baghdad, Ba-quba, on dead leaves of *Phoenix dactylifera* (Palmae). Rechinger s.n., V 1957 (M, sub *Didymosphaeria smaragdina*), also distributed in Reliquiae Petrakianae 1430 (B, GZU, H, IMI 94650, L, M, sub *Didymosphaeria smaragdina*).

PAKISTAN: Kalar Kahar, on dead leaves of *Phoenix dactylifera* (Palmae). Ahmad 202126 (GZU, HMAS (2 ×), IMI 203126, sub *Didymosphaeria smaragdina*); Karachi, on dead leaves of *Phoenix sylvestris* (Palmae). Abbas s.n., IV 1970 (IMI 148315, sub *Didymosphaeria smaragdina*).

8.4 *Montagnula spartii* (Castagne) Aptroot, comb. nov.

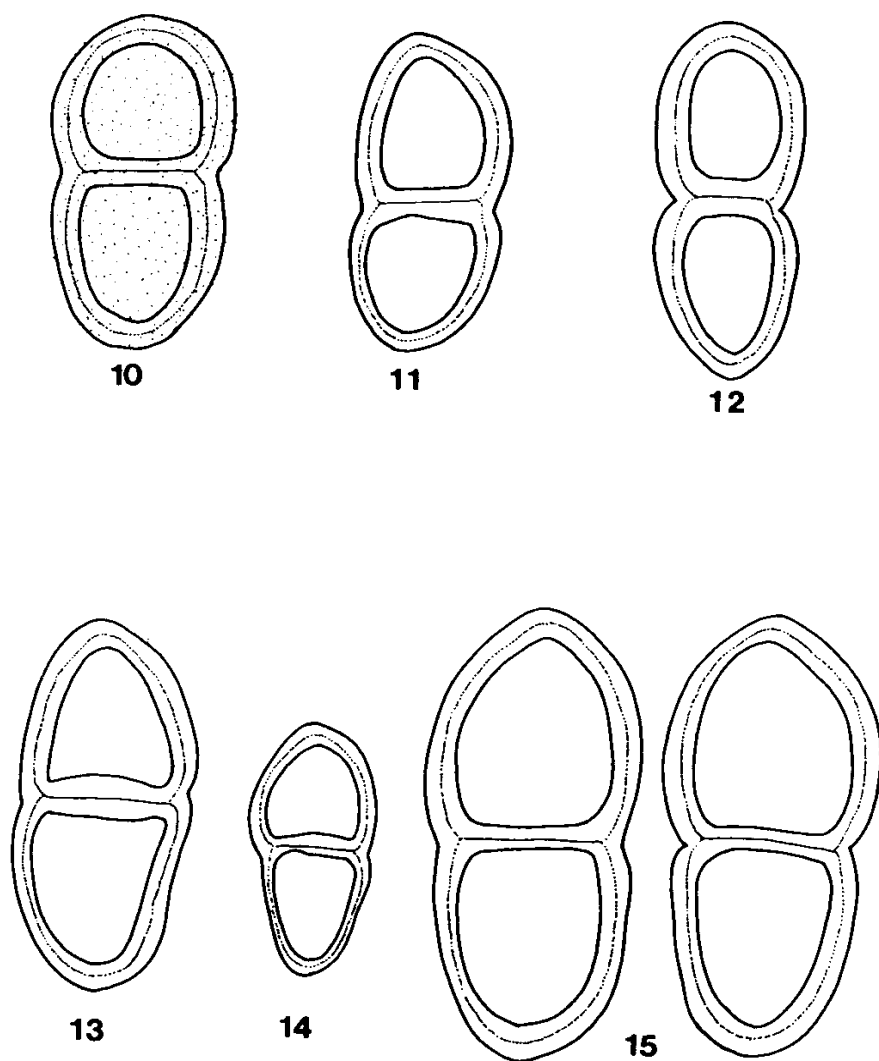
Figs 10-15.

Basionym: *Sphaeria spartii* Castagne, Catalogue des plantes qui croissent naturellement aux Environs de Marseille: 169. 1845 ≡ *Didymosphaeria spartii* (Castagne) Fabre, Ann. Sci. nat., Bot., sér. 6, 9: 83. 1878 ≡ *Microthelia spartii* (Castagne) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — FRANCE: Marseille, Montaud-les-Miramas, on *Spartium junceum* (Leguminosae). Castagne s.n., s.d. (G, isotype).

Didymosphaeria incarcerata (Desmazières) Saccardo, Syll. Fung. 1: 705. 1882 ≡ *Sphaeria (subsecta) incarcerata* Desmazières, Ann. Sci. nat., Bot., ser. 3, 6: 73. 1846 ≡ *Microthelia incarcerata* (Desmazières) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898 ≡ *Cainia incarcerata* (Desmazières) E. Müller & Von Arx, Phytopath. Z. 24: 361. 1955.

Type — FRANCE: On *Spartium junceum* (Leguminosae). Desmazières 1771 (PC, holotype; BR, G, H, PC, isotypes; FH-Höhnel, type slide). This is a new synonym of *M. spartii*, ascomata of which are present in all above-mentioned type specimens. There has been some confusion over this species: A species of *Cainia* was misidentified by Müller & Von Arx (1962) as *Cainia incarcerata* (Desmazières) E. Müller & Von Arx and accepted as such by Scheinpflug (1958). Later on it was recognized that the type of *Sphaeria incarcerata* was not a *Cainia* but identical with *Didymosphaeria smaragdina* (= *Montagnula palmaea*) and the new name *Cainia desmazieri* (E. Müller & Von Arx) F. Moreau & E. Müller, Rev. Mycol. 28: 24. 1963 [nom. inval., Arts 36, 37] was proposed for the *Cainia*. This was validated as *Cainia desmazierii* F. Moreau & E. Müller ex Krug, Sydowia 30: 124. 1978 ('1977'). This epithet is antedated by *Didymosphaeria costata* Duvernoy & Maire, Bull. Soc. Hist. nat. Afr. N. 13: 27. 1922, which probably is identical, based on the description. Therefore, a new combination for the *Cainia* may be necessary, when the type can be examined.



Figs 10-15. Ascospores of *Montagnula spartii*: 10. Type; 11. *Sphaeria incarcerata*; 12. *Didymosphaeria ephedricola*; 13. *D. larsenii*, authentic material, leg. Munk (C); 14. *D. aeluropodis*; 15. *D. elbursensis*.

Didymosphaeria sardoa Rehm, nom. herb.

Type — ITALY: Sardinia, Barbargia, Seui, on *Genista aspalatoides* (Leguminosae). Marcucci s.n., 1866 (S, holotype). New synonymy.

Schizostoma ammophilum Bommer, Rousseau & Saccardo in Saccardo, Syll. Fung. 9: 1074. 1891 [non *Didymosphaeria ammophilae* Fautrey & Roumeguère (1892)].

Type — BELGIUM: Knokke, on *Ammophila arenaria* (Gramineae) (not seen). Synonymy follows Eriksson 1967 (under *Didymosphaeria verdoni*).

?*Didymosphaeria epidermidis* var. *calycotomes-infestae* Scalia, Atti Accad. Gioenia Sci. Nat., Ser. 4, 13(20): 31. 1900 (as '*calycotomis-infestae*').

Type — ITALY: Sicilia, Cavòlo, on *Calycotome villosa* (Leguminosae). S.c., 1899 (CAT, not seen). No answer was received from Catania. According to the description, the species may be a synonym of *Montagnula spartii*.

Didymosphaeria minuta f. *major* Rehm, nom. herb.

Type — AUSTRIA: Tirol, Hollerstub, on Gramineae. Rehm s.n., IX 1904 (S, holotype). New synonymy.

Didymosphaeria epidermidis var. *calycotomes-spinosae* Fragoso, nom. herb. Reported to be published by Duvernoy & Maire in 1922.

Type — SPAIN: Barcelona, Tibidabo, on *Calycotome spinosa* (Leguminosae). Caballero s.n., XI 1916 (MA, holotype). New synonymy.

Didymosphaeria calamagrostidis Lobik, Materialy k floristicheskim i faunicheskim obsledovaniyam Terskogo Okruga: 22. 1928.

Type — RUSSIA. Ter, Georgievsk, on *Calamagrostis epigeios* (Gramineae). Wilkov 1120, VI 1925 (LE 34426, holotype). New synonymy.

Didymosphaeria aeluropodis Lobik, Materialy k floristicheskim i faunicheskim obsledovaniyam Terskogo Okruga: 21. 1928 (as '*aeluopi*').

Type — RUSSIA. Ter, Georgievsk. On *Aeluropus littoralis* (Gramineae). Wilkov 1119, VI 1925 (LE 122037, holotype). New synonymy.

Didymosphaeria heppii Petrak, Ber. bayer. Bot. Ges. 23: 169. 1938.

Type — GERMANY: Unterfranken: Geishöhe near Karlstadt am Main, on *Linum austriacum* (Linaceae). Ade s.n., VI 1936. (GZU, holotype; NY, isotype). This is a new synonym of *Montagnula spartii*. The isotype does not contain a *Didymosphaeria*, only *Pleospora* and *Paraphaeosphaeria*.

Didymosphaeria elbursensis Petrak in Rechinger, Annl. naturh. Mus. Wien 1: 429. 1940 ('1939').

Type — IRAN: Elburs, above Rehne on Mt. Demawend, on *Festuca sulcata* (Gramineae). Gilli s.n., VII 1936 (W, holotype). New synonymy.

Didymosphaeria verdonii Guyot, Bull. trimest. Soc. mycol. Fr. 65: 104. 1949 (as '*verdoni*').

Type — FRANCE: Var, Gorges du Verdon, on dead leaves of *Melica ciliata* (Gramineae). Guyot s.n., s.d. (PC-Guyot, not seen). New synonymy. The type could not be found in PC. According to the description, it agrees well with other material of *Didymosphaeria verdonii* sensu Scheinpflug (1958), which is a synonym of *Montagnula spartii* (Castagne) Aptroot.

Didymosphaeria larsenii Munk, Dansk bot. Ark. 17(1): 433. 1957.

Type — DENMARK: Jutland, Tversted, on *Koeleria glauca* (Gramineae). Larsen s.n., s.d. (CP, not seen). The type was not studied recently, but there is no evidence that it is destroyed, as has been indicated by Eriksson (1967). This idea was probably based on the original publication, which cites in the protologue an additional specimen that has not been kept. An authentic specimen studied (see below) shows that the species is a new synonym of *Montagnula spartii* (Castagne) Aptroot, as already supposed by Eriksson (1967, sub *Didymosphaeria verdoni*).

Didymosphaeria ephedricola Frolov, Novitates Systematicae Plantarum Non-vascularium 7: 184. 1970.

Type — TURKOMANIA: Badchys, on *Ephedra ciliata* (Ephedraceae). Koshkelova s.n., X 1963 (LE 34429, holotype). New synonymy.

The anamorph has been reported to be either a species of *Dendrophoma* with 4-7 × 1-2 μm large conidia (Scheinpflug 1958) or a species of *Diplodia* (C. & M. Moreau 1956). Neither of these reports could be verified by the present research.

Stroma reduced. Ascomata 0.4-1.0 mm diam., immersed. Ascospores 17-28 × 8-13 μm, asymmetrical, constricted at the septum, red brown, rather thick-walled, verruculose. Anamorph unknown. Culture felty, whitish with black margin, reverse pale brown, remaining sterile.

Distribution and ecology: On grasses, brooms and *Ephedra*, in temperate to arctic regions of the Northern hemisphere.

The species as accepted here shows a preference for two different kinds of substrata, viz. grasses and brooms. Both external and internal structures are identical.

Host plants recorded: *Aeluropus littoralis* (Gramineae), *Ammophila arenaria* (Gramineae), *Calamagrostis epigeios* (Gramineae), *Calycotome spinosa*, *C. villosa* (Leguminosae), *Carex rostrata* (Cyperaceae), *Chamaerops humilis* (Palmae), *Elymus arenarius* (Gramineae), *Ephedra ciliata* (Ephedraceae), *Festuca rubra*, *F. sulcata* (Gra-

mineae), *Genista aspalatoides* (Leguminosae), *Koeleria cristata* (Gramineae), *Koeleria glauca* (Gramineae), *Linum austriacum* (Linaceae), *Luzula spadicea* (Juncaceae), *Lygaeum spartum* (Gramineae), *Melica ciliata* (Gramineae), *Nardus stricta* (Gramineae), *Puccinellia peisonis* (Gramineae), *Sarothamnus scoparius* (Leguminosae), *Sesleria caerulea* (Gramineae), *Spartium junceum* (Leguminosae), *Ulex* (Leguminosae).

Additional material seen:

ALBANIA: Ragozina, on *Spartium junceum* (Leguminosae). Petrak s.n., IX 1918, distributed in Fungi Albanici et Bosniaci Exsiccati 180 (B, M, S, W).

AUSTRIA: Steiermark, Koralmpe, Seekar, on *Nardus stricta* (Gramineae). Kores 321, V 1981 (GZU, sub *Didymosphaeria verdoni*); Kärnten, Lavantthal, Saualpe, on *Nardus stricta* (Gramineae). Kores 335, IX 1982 (GZU, sub *Didymosphaeria verdoni*); Burgenland, Seewinkel, Illnitz, on *Puccinellia peisonis* (Gramineae). Kores s.n., VI 1984 (GZU, slide, sub *Didymosphaeria verdoni*).

DENMARK: Jutland, Vejrs Strand, on *Ammophila arenaria* (Gramineae). Munk s.n., IV 1964 (C, authentic specimen of *Didymosphaeria larsenii*).

FRANCE: Alpes Maritimes, Antibes, on *Calycotome spinosa* (Leguminosae). Müller s.n., IV 1959 (ZT); Normandie, Manèbe, St. Pair, on *Festuca arenaria* (Gramineae). Guyot s.n., VII 1948 (PC, only a coelomycete left); Vaucluse, Bédoin, on *Spartium junceum* (Leguminosae). Müller 2196 (B, CBS, also living culture 183.58, CUP, M, ZT); same locality and host. Shoemaker s.n. (DAOM 89957b); Alpes Maritimes, Fontan, on *Spartium junceum* (Leguminosae). Müller s.n., VI 1961 (CBS, M, ZT); On *Ammophila arenaria* (Gramineae). Desmazières s.n., distributed in Plantes Cryptogames de France 1288 (K, isotype; IMI 210458, type slide of *Sphaeria performans* Desmazières, Plantes Cryptogames de France 1288, but not in accordance with the protologue; the material in K contains material of a coelomycete, *Diplodia* sp., which is in accordance with it).

GERMANY: Berlin, Grünewald, on *Koeleria cristata* (Gramineae). Sydow s.n., IX 1895, distributed in Mycotheca Marchica (NY, sub *Didymosphaeria crastophila*).

GREAT BRITAIN: Orkney, Rockwick Bar, on *Ammophila arenaria* (Gramineae). Dennis 14049, V 1990 (K, sub *Didymosphaeria arenaria*).

GREECE: Samos, Manolates, on *Spartium junceum* (Leguminosae). Leuchtmann 3.86 (ZT).

ITALY: Sicily, Piano de Zucchi, on *Sesleria caerulea* (Gramineae). Von Arx s.n., V 1963 (CBS, sub *Didymosphaeria verdoni*); Acitrezza near Catania, on *Spartium junceum* (Leguminosae). Gremmen 2394, IV 1966 (CUP-Gremmen); Genua, on *Spartium junceum* (Leguminosae). Piccone s.n., distributed in Rabenhorst, Fungi Europaei 1435 (BR, FH-Höhnel, L, M, all sub *Didymosphaeria incarcerata*, all young).

SPAIN: Andalucia, on leaves of *Chamaerops humilis* (Palmae). Dennis s.n., VIII 1975 (IMI 199425, sub *Didymosphaeria larsenii*); Zaragoza, Alfajarin, on *Lygaeum spartum* (Gramineae). Kores 834, V 1983 (GZU, sub *Didymosphaeria verdoni*); Jaën, Sierra Magina, Huelna, on *Ulex* (Leguminosae). Ade s.n., V 1929 (W).

SWEDEN: Bohuslän, Tanum, Knotsberget, on *Ammophila arenaria* (Gramineae). Eriksson 2160k; 3469b (UPS, sub *Didymosphaeria verdoni*); Härjedalen, Tännäs, on *Carex rostrata* (Cyperaceae). Nannfeldt s.n., VIII 1933 (UPS, sub *Didymosphaeria verdoni*).

SWITZERLAND: Tessin, Bellinzona, on *Sarothamnus scoparius* (Leguminosae). Scheinpflug s.n., X 1957 (ZT (2 ×)); Bernina, Lago Bianca, on *Luzula spadicea* (Juncaceae). Braun s.n., XI 1905 (ZT, sub *Didymosphaeria verdoni*, mainly containing *Pleospora herbarum*).

TURKEY: Kuşadası, on *Spartium junceum* (Leguminosae). Bocquet s.n., VI 1974 (ZT).

RUSSIA: Irkoetsk, Selenogorsk-Repino, on *Elymus arenarius* (Gramineae). Eriksson 1880h (UPS, sub *Didymosphaeria verdoni*).

IRAN: Elburs, Keredj, on *Ephedra* (Ephedraceae). Rechinger 2464, V 1937 (W, sub *Didymosphaeria incarcerata*).

9. MUNKOVALSARIA Aptroot, gen. nov.

Ascomycetes ad Dothideales pertinentes, ascocarpiis simplicibus vel valsarioideis, hamathecio pseudoparaphysato subtus cellulari, supra ascis anastomosantibus, ascosporis didymosporis.

Type: *Munkovalsaria donacina* (Niessl) Aptroot (\equiv *Microthelia donacina* Niessl).

Two species are known so far in this genus, the type and a new species, *Munkovalsaria rubra*. It is named in honour of Dr A. Munk, who probably studied specimens of this genus when he reported *Valsaria* (which is now widely accepted to be a genus of unitunicate ascomycetes) to be closely related to *Didymosphaeria* (Munk, 1957). The present paper only treats those members of *Munkovalsaria* that were described in *Didymosphaeria*. It is likely that additional species and/or synonyms are to be found under *Valsaria*, a genus which has not been revised recently. The genus is probably best accommodated in the Dacampiaceae. It may be related to *Macrovalsaria* Petrak (1962), which mainly differs in the superficial stroma layer in which the ascocarps are immersed, the asymmetrical ostiole and the hamathecium filaments, which are not composed of two different types. Moreover, the ascospores are much larger.

Stroma extended, forming a clypeus around the ostiole, black. Ascomata pseudothecioid, globose to pyriform, black, smooth, simple to seemingly compound with one ostiole (valsarioid), immersed to erumpent. Peridium black, consisting of two layers of flattened cells. Hamathecium pseudoparaphyses, rather thick and sparingly branched between the asci, anastomosing and much thinner above, colourless, IKI negative. Asci cylindrical, bitunicate, with ocular chamber, IKI negative, with 8 ascospores in one row. Ascospores ellipsoid, reddish to deep brown, euseptate, asymmetrically 1-septate, with the upper cell pointed and the lower cell rounded and longer, with minute spinulose ornamentation, without germ pore or slit, with a thin gelatinous sheath. Conidiophores present in one species, hyphomycetous, irregularly branched, bearing mostly intercalary phialides. Conidia simple, elongate. Culture either orange red or black.

Distribution and ecology: Pantropical to nearly cosmopolitan, in and on stems of various plants, mainly branches of woody plants.

Key to the species of *Munkovalsaria*

- 1a Ascocarp simple, culture black, no cresol production..... *M. donacina*
1b Ascocarp compound, culture red, producing *m*-cresol..... *M. rubra*

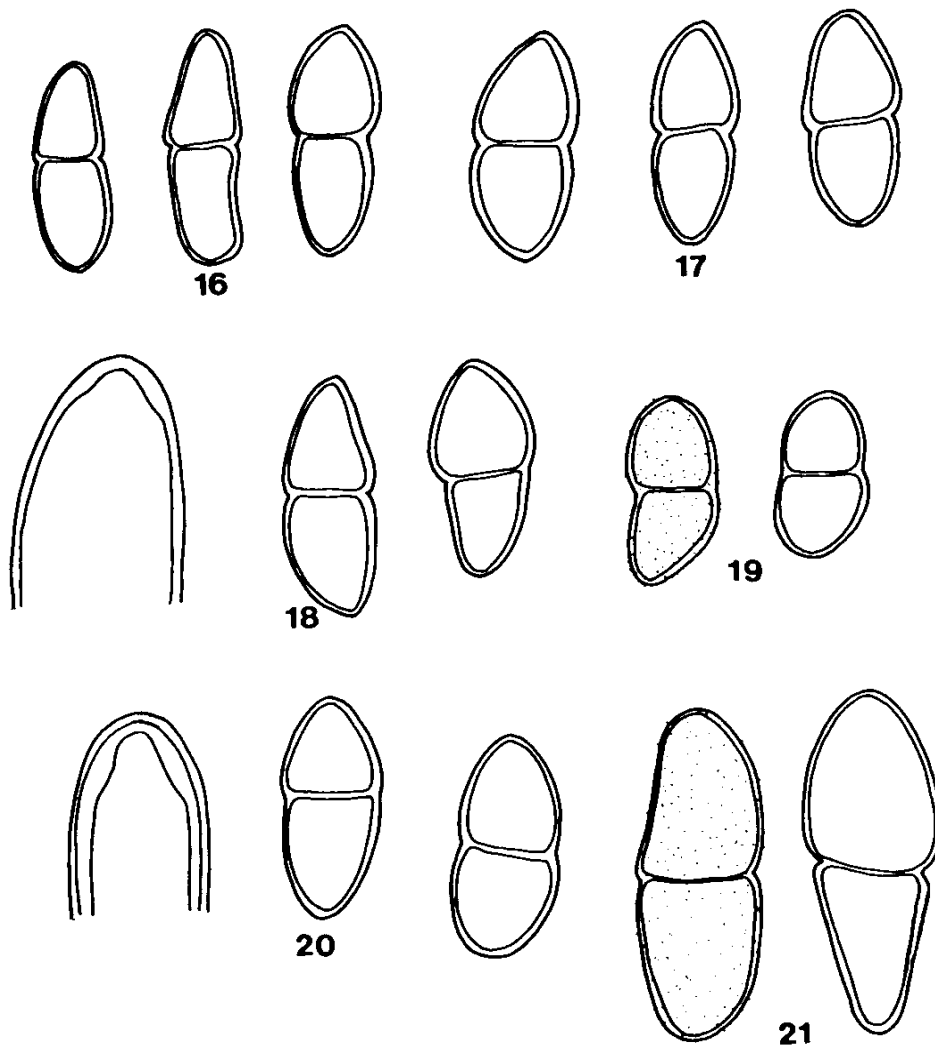
9.1 *Munkovalsaria donacina* (Niessl) Aptroot, comb. nov. Figs 16-18, 46.

Basionym: *Microthelia donacina* Niessl in Thümen, Instituto, Coimbra 28: 31 (reprint). 1881 \equiv *Didymosphaeria donacina* (Niessl) Saccardo, Syll. Fung. 1: 715. 1882 \equiv *Didymosphaerella donacina* (Niessl) Cooke, Grevillea 18: 29. 1889 \equiv *Phaeosphaerella donacina* (Niessl) Spegazzini in Saccardo, Syll. Fung. 22: 169. 1913.

Type — PORTUGAL: On *Arundo donax* (Gramineae). Moller 667 (M, holotype).

Didymosphaeria caespitulosus Saccardo, Anns mycol. 13: 127. 1915.

Type — PHILIPPINES: Luzon, Los Baños, on *Premna cumingiana* (Verbenaceae). Baker 2746, II 1914 (PAD, holotype; PC, isotype). New synonymy.



Figs 16-21. Ascospores and ascus tips: 16-18. *Munkovalsaria donacina*; 16. Type; 17. *Didymosphaeria caespitulosa*; 18. *D. muelleri* Mukerji & Kapoor; 19-20. *Munkovalsaria rubra*; 21. *Mycomicrothelia pachythea*.

Didymosphaeria coffeicola Spegazzini, An. Mus. nac. Hist. nat. B. Aires, ser. 3, 31: 411. 1923 (as 'coffaeicola'), [nom. illeg., Art. 64, non *D. coffeicola* Spegazzini, 1909] \equiv *Didymosphaeria coffaeicida* Spegazzini nom. herb.

Type — PARAGUAY: Asunción, Parque Caballero, on *Coffea arabica* (Rubiaceae). Spegazzini 5866, VII 1919 (LPS, holotype, sub *Didymosphaeria coffaeicida* Spegazzini). New synonymy.

Didymosphaeria althaeina Teng, Sinensia 4: 377. 1934.

Type — CHINA: Anhwei, Huang-shan, on *Althaea rosea* (Malvaceae). Deng 382 (BPI, isotype). New synonymy.

Didymosphaeria wikstroemiae Petrak, Sydowia 7: 385. 1953.

Type — HAWAII: Hawaii, Volcano, on *Wikstroemia* (Thymelaeaceae). Shear 1104a, I 1928 (W, holotype; M, W, isotypes). New synonymy.

?*Didymosphaeria acaciae* Tilak, Mycopath. Mycol. appl. 32: 264. 1967.

Type — INDIA: Kodaikanal, on trunk of *Acacia* (Leguminosae). Tilak s.n., XII 1964 (MUH 175, not seen).

Synonymy probable, according to the description. The type specimen could not be found in MUH.

Didymosphaeria muelleri Mukerji & Kapoor, Ceská Mykol. 23: 256. 1969 (as 'mulleri'; non Narendra & Rao, 1975).

Type — INDIA: Old Delhi, on *Adhatoda vasica* (Acanthaceae). Dhawan s.n., IX 1966 (IMI 130292, holotype). New synonymy.

?*Didymosphaeria durantae* Srinivasulu, Sydowia 24: 246. 1971 ('1970').

Type — INDIA: Aurangabad, on *Duranta repens* (Verbenaceae). Srinivasulu s.n., X 1967 (MUH 253, not seen). The type specimen is not preserved in MUH and from the IARI herbarium in New Delhi no answer was received. According to the description, the species could be a synonym of *M. donacina*.

?*Didymosphaeria ailanthi* Srinivasulu, Sydowia 24: 246. 1971 ('1970').

Type — INDIA: Aurangabad, on *Ailanthus altissima* (Simaroubaceae). Srinivasulu s.n., XI 1966 (MUH 252, not seen). Synonymy probable, according to the description. The type specimen is not preserved in MUH.

?*Didymosphaeria munkiana* Tilak & Jadhav, Sydowia 25: 63. 1972 ('1971').

Type — INDIA: Udgir, on *Ficus glomerata* (Moraceae). Jadhav s.n., III 1970 (not seen). The type could not be found in AMH. According to the description, it is most probably a synonym of *M. donacina*.

?*Didymosphaeria cajani* Gaikwad, Maharashtra Vidnyan Mandir Patrika 8: 16. 1973.

Type — INDIA: On *Cajanus cajan* (Leguminosae). Gaikwad s.n., X 1971 (IARI, not seen). The type specimen is not preserved in MUH and from the IARI herbarium in New Delhi no answer was received. According to the description, the species might be a synonym of *M. donacina*.

Didymosphaeria muelleri Narendra & V.G. Rao in V.G. Rao & Narendra, Indian J. Mycol. Pl. Path. 2: 174. 1975 ('1974') (as 'mulleri') [nom. illeg., Art. 64], non Mukerji & Kapoor, 1969.

Type — INDIA: Karnataka, Sagar, on stems. Narendra s.n., V 1972 (AMH 1979, holotype). The type is very poor and no identifiable fungus could be found on it. According to the description, it has most probably been *M. donacina*.

Didymosphaeria moricola Subhedar & V.G. Rao, J. Univ. Poona 50: 25. 1977 (as 'moriicola'; non Koshkelova & Frolov, 1973, nom. inval.).

Type — INDIA: Poona, on *Morus alba* (Moraceae). Subhedar s.n., II 1974 (AMH 2724, holotype). The type is very poor and no ascomycete could be found on it, only a coelomycete, probably belonging to *Diplodia*. The description most probably applies to *M. donacina*.

Didymosphaeria aurantiifolii Somani in Somani, Wangikar & Jadhar, Indian Phytopath. 32: 608. 1980 ('1979') (as 'aurantifolii').

Type — INDIA: Akola, on *Citrus aurantiifolium* (Rutaceae). Wangikar s.n., VII 1976. (IMI 205618, holotype). New synonymy. The type specimen was filed as *Didymosphaeria* sp. and the collection date was different from the date given in the publication (V 1976), but no doubt remains over the identity of the IMI collection with the type material.

Didymosphaeria canephora Saccas, Bulletin Inst. Fr. Cult. Caffé 16: 139. 1981 [nom. inval., Art. 37].

Type — CENTRAL AFRICAN REPUBLIC: Boukoko, on *Coffea robusta* (Rubiaceae). Saccas 219 (PC-Saccas, holotype). New synonymy.

?*Didymosphaeria malloti* C. Ramesh, Indian Phytopath. 43: 364. 1991 ('1990').

Type — INDIA: Maharashtra, Vaitarna, on bark of *Mallotus philippinensis* (Euphorbiaceae). Ramesh s.n., X 1983 (LFM 48, not seen).

?*Didymosphaeria shirkolaensis* C. Ramesh, Indian Phytopath. 43: 365. 1991 ('1990').

Type — INDIA: Maharashtra, Shirkolae, on bark of unknown tree. Ramesh s.n., IX 1983 (LFM 50, not seen).

?*Didymosphaeria vaitarnensis* C. Ramesh, Indian Phytopath. 43: 365. 1991 ('1990').

Type — INDIA: Maharashtra, Vaitarna, on bark of *Carya arborea* (Juglandaceae). Ramesh s.n., X 1983 (LFM 51, not seen).

No reply was received upon a request for type material of the last three taxa from Pune. According to the descriptions, these three species are most probably new synonyms of *M. donacina*.

Stroma reduced to rather extended. Ascomata simple, immersed to erumpent. Asco-

spores 12-17 × 4-6.5 μm, dark reddish brown. Anamorph unknown. Culture with black aerial mycelium, reverse black. Ascocarps are sometimes formed in culture.

Distribution and ecology: Pantropical to nearly cosmopolitan, in and on stems of various woody plants.

Hosts plants recorded: *Acacia reficiens* (Leguminosae), *Adhatoda vasica* (Acanthaceae), *Ailanthus altissima* (Simaroubaceae), *Althaea rosea* (Malvaceae), *Annona squamosa* (Annonaceae), *Arundo donax* (Gramineae), Bambusoideae (Gramineae), *Cajanus cajan* (Leguminosae), *Carya arborea* (Juglandaceae), *Citrus aurantiifolium* (Rutaceae), *Clerodendrum enarmi*, *C. infortunatum*, *C. multiflorum* (Verbenaceae), *Coffea arabica*, *C. robusta* (Rubiaceae), *Duranta repens* (Verbenaceae), *Ficus glomerata* (Moraceae), *Funtumia africana* (Apocynaceae), *Hibiscus* (Malvaceae), *Ipomoea carnea* (Convolvulaceae), *Mallotus philippinensis* (Euphorbiaceae), *Morus alba* (Moraceae), *Nerium odorum* (Apocynaceae), *Pistacia indica* (Anacardiaceae), *Premna cumingiana* (Verbenaceae), *Pseudosasa japonica* (Gramineae), *Saccharum officinarum* (Gramineae), *Tectona grandis* (Verbenaceae), *Terminalia tomentosa* (Combretaceae), *Wikstroemia* (Thymelaeaceae), *Zea mays* (Gramineae).

Selected additional specimens seen (unless otherwise mentioned, filed sub *Didymosphaeria* sp.):

USA, GEORGIA: Athens, Denmark Farm, on *Zea mays* (Gramineae). Grogan & Miller s.n., X 1941 (GA).

COLOMBIA: Magdalena, Sierra Nevada de Santa Marta, Hacienda Cincinnati, on unknown herbaceous plant. Martin 3577, VIII 1935 (GA).

BRAZIL: Minas Geraes, Viçosa-Escola, on *Saccharum officinarum* (Gramineae). Müller 640, VI 1933 (CUP); São Paulo, Mogi das Cruzas, on Bambusoideae (Gramineae). Zogg s.n., IV 1947 (ZT, 6 ×); Santos, São Vicente, on Bambusoideae (Gramineae). Zogg s.n., IV 1947 (ZT).

FRANCE: Landes, Lac de Léon, on *Pseudosasa japonica* (Gramineae). Candoussau 278, II 1994 (Herb. Candoussau, sub *Roussoëlopsis* sp.).

SIERRA LEONE: Musaia, on branches. Sellar M132, VIII 1963 (IMI 103445c); Peri, Kowana, on *Funtumia africana* (Apocynaceae). Deighton s.n., XI 1949 (IMI 40356c).

NAMIBIA: isolated from *Acacia reficiens* (Leguminosae). S.c., s.d. (IMI 334718, dried culture).

INDIA: W. Bengal, Hooghly, Adisaptagram, on *Clerodendrum infortunatum* (Verbenaceae). Maity s.n., VII 1977 (IMI 224592); Madhya Pradesh, Mandla, on *Hibiscus* (Malvaceae). Belapurkar s.n., s.d. (IMI 352187); Maharashtra, Dhule, Ranipur, on *Clerodendrum multiflorum* (Verbenaceae). Ujjainkar & Deoray s.n., XI 1988 (IMI 333858, sub *Didymosphaeria muelleri*); Chikhaldia, isolated from *Pistacia indica* (Anacardiaceae). Shreemali s.n., XI 1985 (IMI 303733, living and dried cultures); Jabalpur, Rani Durgawati, on *Tectona grandis* (Verbenaceae). Prasad s.n., XI 1987 (IMI 320800); Devziri, Chapda, Talgoon, on *Terminalia tomentosa* (Combretaceae). Ujjainkar s.n., X 1988 (IMI 330421); Jabalpur, on *Nerium odorum* (Apocynaceae). Rajak s.n., XII 1982 (IMI 274370, sub *Didymosphaeria muelleri*); Jabalpur, on *Ipomoea carnea* (Convolvulaceae). Rajah s.n., IX 1986 (IMI 310346, sub *Didymosphaeria muelleri*); Jabalpur, on *Annona squamosa* (Annonaceae). Gupta s.n., V 1985 (IMI 321926, sub *Didymosphaeria muelleri*).

PAPUA NEW GUINEA: Simbu, Bundi Gap on road Keglsugl-Bundi, on Bambusoideae (Gramineae). Aptroot 32532, VIII 1992 (CBS).

9.2 *Munkovalsaria rubra* Aptroot, Van der Aa & O. Petrini, spec. nov.

Figs 19-20, 42.

Munkovalsaria ascocarpiis valsarioideis, hyphis rubris, ascosporis 11-13 μm longis, 5.5-6.5 μm latis. Anamorphe phialidica, *Lecythophorae similis*.

Type — ITALY: Near Bari, on bark of *Ulmus campestris* (Ulmaceae). Frisullo s.n., 1986 (CBS 9786, holotype, living culture CBS 345.86).

Stroma conical, black. Ascomata c. 300 μm diam., pyriform, seemingly compound with common ostiole (valsarioid), erumpent. Peridium black, outer layers c. 30 μm , inner layer c. 10 μm thick. Hamathecium pseudoparaphyses, between the asci 3-5 μm wide, thinner above. Asci 70-120 \times 9-12 μm . Ascospores ellipsoid, symmetrical, constricted at the septum, black, with minute ornamentation, 11-13 \times 5.5-6.5 μm , with a 1 μm thick gelatinous sheath. Conidiophores present in young cultures, hyphomycetous, irregularly branched, 3-5 μm wide, bearing mostly intercalary phialides. Conidia simple, long ellipsoid, with a broad hilum and a rounded tip, 4-5 \times 1-2 μm . Culture with orange red aerial mycelium and red colour in the medium, with a strong odour of *m*-cresol.

Distribution and ecology: Probably at least pantemperate, but so far only known from Italy and South Africa, isolated from bark and lichens.

The anamorph of this species (Fig. 42) resembles *Lecythophora* Nannfeldt (Hyphomycetes) as redescribed by Gams & McGinnis (*Mycologia* 75: 985. 1983), but grows faster and has much wider hyphae.

The production of *m*-cresol has been chemically proven (Frisullo, Sparapano & Surico, 1989, sub *Didymosphaeria* sp.). The red colony with pronounced odour cannot be mistaken for anything else.

Host plants recorded: *Citrus* (Rutaceae) (Frisullo et al. 1989), *Ulmus campestris* (Ulmaceae).

Additional material seen:

SOUTH AFRICA: Isolated from lichens. Petrini s.n., 1988 (CBS 10.505, dried cultures).

10. MYCOMICROTHELIA Keissler, Rabenhorst, Krypt.-Fl. 9, 1(2): 23. 1936.

This genus was revised by Hawksworth (1985a). Some additional species and distribution data were published by Harris (1989) and Aptroot (1991). So far, 30 species are known, including the new combination below. Several of these species are only known from the type and may represent abnormal specimens of related species. Only the species for which new synonyms have been found in *Didymosphaeria* or material which extends the known range of distribution are mentioned here. The genus is probably best accommodated in the Arthopyreniaceae.

10.1 *Mycomicrothelia captiosa* (Krempelhuber) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 73. 1985.

So far known from Central and South America and Hawaii (Hawksworth 1985, Aptroot 1991). The present collection is the first from the Palaeotropics and indicates that this species is pantropical.

For a description see Hawksworth (1985a: 73).

Host plant recorded: on *Gouldia* (Rubiaceae). All previous records are on unidentified trees.

Material seen from additional country:

INDONESIA: Java, Bogor ('Buitenzorg'), Botanical Garden, on *Gouldia* (Rubiaceae). S.c., s.d. (W, sub *Didymosphaeria* sp.).

10.2 ***Mycomicrothelia confusa*** D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 76. 1985.

So far known from Norway, Spain and Great Britain. The present records fit into this Atlantic distribution pattern.

For a description see Hawksworth (1985a: 76).

Host plants recorded: *Alnus* (Betulaceae), *Betula* (Betulaceae), *Corylus avellana* (Betulaceae), *Fraxinus* (Oleaceae), *Ilex aquifolium* (Aquifoliaceae), *Quercus* (Fagaceae), *Sorbus aucuparia* (Rosaceae).

Material seen from additional countries:

FINLAND: Kuopio, Särkilahti, on *Alnus* (Betulaceae). Linkol s.n., VI 1909 (H (2 ×), sub *Didymosphaeria* sp.).

FRANCE: Gironde, Lac de Cazaux, on *Ilex aquifolium* (Aquifoliaceae). Barkman 5086, IX 1955 (L, sub *Didymosphaeria micula*).

10.3 ***Mycomicrothelia hemisphaerica*** (Müller Argoviensis) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 86. 1985. Fig. 35.

Didymosphaeria philippina Vainio, Ann. Acad. Sci. fenn, Ser. A, 15(6): 348. 1921.

Type — PHILIPPINES: Luzon, Nueva Vizcaya, Dupax, on bark. McGregor, Bureau of Science 14308, 1912 (TUR-Vainio 32528, holotype; W, isotype). New synonymy.

So far known from Central and South America and Hawaii (Hawksworth, 1985a; Aptroot, 1991). The collection cited above is the first from the Palaeotropics and suggests that this species is pantropical.

For a description see Hawksworth (1985a: 86).

10.4 ***Mycomicrothelia inaequalis*** (Fabre) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 90. 1985.

So far known from France and California. The records cited here prove that the species is northern temperate.

For a description see Hawksworth (1985a: 90).

Host plants recorded: *Olea cuspidata*, *O. europaea* (Oleaceae), *Ostrya virginica* (Betulaceae).

Material seen from additional countries:

USA, NEW YORK: Lyndonville, on *Ostrya virginica* (Betulaceae). Fairman s.n., 1906 (CUP, sub *Didymosphaeria* sp.).

PAKISTAN: Kala Chitta, Chak Jabbi, on *Olea cuspidata* (Oleaceae). Jamial s.n., VIII 1971 (IMI 178110, sub *Didymosphaeria* sp.).

10.5 Mycomicrothelia miculiformis (Nylander ex Müller Argoviensis) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 99. 1985. Fig. 36.

Didymosphaeria coccifera Vainio, Ann. Acad. Sci. fenn, Ser. A, 15(6): 349. 1921.

Type — PHILIPPINES: Luzon, Laguna, Banajao, on bark. Robinson, Bureau of Science 9828 (TUR-Vainio 32526, holotype; W, isotype). New synonymy. The specimens are faintly lichenized.

So far known from Cuba. The records cited here are the first for the Palaeotropics.

For a description see Hawksworth (1985a: 99).

Additional material seen:

AUSTRALIA: Queensland, Bunya Mts, 56 km NE of Dalby. Hafellner & Rogers 16752 (GZU, sub *Didymosphaeria* sp.).

10.6 Mycomicrothelia obovata (Stirton) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 106. 1985. Figs 37-38.

Didymosphaeria tetraspora Masee, Kew Bull. 1907: 124. 1907.

Type — MALAYSIA: Sarawak, on dead twigs. Ridley s.n., s.d. (K, holotype).

The asci of this species are not 4-spored but 8-spored and the specimen is clearly lichenized. New synonymy.

Didymosphaeria thelenoides Vainio, Ann. Acad. Sci. fenn, Ser. A, 6(7): 211. 1915.

Type — DOMINICA: Mt. Conliabon. Elliot 1533 (TUR-Vainio 32530, '1', lectotype, selected here; TUR-Vainio 32530, '2', paratype). New synonymy.

So far known from Asia and Australasia (Hawksworth 1985, Aptroot 1991). The record cited here shows that the species is probably pantropical.

For a description see Hawksworth (1985a: 106).

10.7 Mycomicrothelia pachytheca (Saccardo & Sydow) Aptroot, comb. nov. Fig. 21.

Basionym: *Didymosphaeria pachytheca* Saccardo & Sydow in H. & P. Sydow, Bull. Herb. Boissier 8: 79. 1900.

Type — BRAZIL: Isla S. Francisco, on leaves of *Fourcroya gigantea* (Amaryllidaceae). Ule 403 (S, holotype; PAD, isotype).

This is a species of *Mycomicrothelia*. It differs apparently from all other 29 known species of this genus (Hawksworth 1985a, Aptroot 1991) and therefore a new combination is made.

The substrate is unique in the genus, but it is not regarded as a decisive character here. The species is mainly characterized by the ascospores, which have a size and shape which differs from all other known species in the genus.

Stroma visible as 0.5-1 cm large thalli. Ascomata conical, 0.2-0.4 mm diam., scattered and immersed in the centre of the thalli. Ascospores minutely verrucose, 21-22 × 8 μm, with a shorter and somewhat pointed lower cell and a larger, rounded upper cell. Anamorph unknown.

Host plant recorded: *Fourcroya gigantea* (Amaryllidaceae).

10.8 Mycomicrothelia subfallens (Müller Argoviensis) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 111. 1985. Figs 39-40.

Didymosphaeria baccharidis Starbäck, Bih. K. svenska VetenskAkad. Handl. 25(3, 1): 59. 1879 (as 'bacharidis').

Type — BRAZIL: Rio Grande do Sul, Santo Angelo near Cachoeira, on *Baccharis* (Compositae). Regnell 257 ('251') (S, holotype). New synonymy. The specimen clearly shows lichenization.

Didymosphaeria coccifera var. *cinereorubricosa* Vainio, Ann. Acad. Sci. fenn, Ser. A, 15(6): 349. 1921.

Type — PHILIPPINES: Pollilo, on bark of *Thespesia populnea* (Malvaceae). Robinson, Bureau of Science 9090, VIII 1909 (TUR-Vainio 32527, holotype; FH, IMI 13536, isotypes). New synonymy. Only faintly lichenized.

For more than a century known only from the type from Cuba, but reported to be pantropical by Aptroot (1991). The present records include a recent collection from Cuba.

For a description see Hawksworth (1985a: 111).

Host plants recorded: *Acacia farnesiana* (Leguminosae), *Baccharis* (Compositae), *Lantana camara* (Verbenaceae), *Randia dumidorum* (Rubiaceae), *Rumex giganteus* (Polygonaceae), *Tabebuia* (Bignoniaceae), *Thespesia populnea* (Malvaceae).

Additional material seen:

CUBA: Bayamo, on *Acacia farnesiana* (Leguminosae). Urtiaga s.n., V 1967 (IMI 127707, sub *Didymosphaeria* sp.).

BRAZIL: São Paulo, on *Baccharis* (Compositae). Usteri 68b, IV 1907 (S, sub *Didymosphaeria baccharidis*).

PARAGUAY: Pilcomayo River, on *Tabebuia* (Bignoniaceae). Morong 740 (NY (2 ×), sub *Didymosphaeria* sp.).

INDIA: Coorg, on *Lantana camara* (Verbenaceae). Muthappa s.n., X 1965 (IMI 116167, sub *Didymosphaeria* sp.); Coorg, on *Randia dumidorum* (Rubiaceae). Anahosur s.n., X 1966 (IMI 126023, sub *Didymosphaeria* sp.).

HAWAII: Makaopuhi Crater, on *Rumex giganteus* (Polygonaceae). Degener s.n., II 1930 (W, sub *Didymosphaeria* sp.).

10.9 Mycomicrothelia thelena (Acharius) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 112. 1985. Fig. 41.

Didymosphaeria palaquii Vainio, Ann. Acad. Sci. fenn, Ser. A, 15(6): 348. 1921.

Type — PHILIPPINES: Mindanao, Zamboanga, on bark of *Palaquium obernianum* (Sapotaceae). Merrill 5006, 1905 (TUR-Vainio 32529, holotype; FH, IMI 13545, W, isotypes). New synonymy.

This is the first record from Asia of this species, which was previously only known from South America (Hawksworth 1985, Aptroot 1991). The isotype in IMI was mixed with *Ornatopyrenis queenslandica* (Müller Argoviensis) Aptroot, which was so far known only from Australia and Papua New Guinea.

For a description see Hawksworth (1985a: 112).

Host plants recorded: *Bonplandia trifoliata* (Rutaceae); *Cinchona* (Rubiaceae), *Palaquium obernianum* (Sapotaceae), *Sapium* (Euphorbiaceae).

11. **PARAPYRENIS** Aptroot, Bibliotheca Lichenologica 44: 96. 1991.

This genus of the Requiellaceae was treated by Aptroot (1991). During the present study, three additional species of this genus were found, in addition to the four species already known.

Key to the species of *Parapyrenis*

1a	Ascospores with rounded or angular lumina.....	2
1b	Ascospores with elongated lumina.....	5
2a	Hamathecium IKI positive (blue).....	3
2b	Hamathecium IKI negative.....	4
3a	Ascospores with angular lumina.....	<i>P. maritima</i>
3b	Ascospores with rounded lumina.....	<i>P. conica</i>
4a	Ascospores with angular lumina.....	<i>P. aurora</i>
4b	Ascospores with rounded lumina.....	<i>P. maclurae</i>
5a	Hamathecium IKI positive (blue).....	<i>P. elongata</i>
5b	Hamathecium IKI negative.....	6
6a	Ascospores with spinulose ornamentation, under 15 μm long.....	<i>P. tecomatis</i>
6b	Ascospores without ornamentation, over 15 μm long.....	<i>P. guayaci</i>

11.1 ***Parapyrenis maclurae*** (Savulescu & Sandu) Aptroot, comb. nov. Fig. 22.

Basionym: *Didymosphaeria maclurae* Savulescu & Sandu, Memle Sect. stiint. Acad. rom., ser. 3, 15: 421. 1940.

Type — ROMANIA: Ilfov, Muntenia near Bucarest, on *Maclura aurantiaca* (Moraceae). Savulescu s.n., XI 1938, distributed in Herbarium Mycologicum Romanicum 1316 (BUCM, holotype; CUP, IMI, L (2 \times), M, NY, W, isotypes).

The oily pseudoparaphyses and the dense ascocarp wall show that this is a species of *Parapyrenis*. As it differs from all other known species of this genus (see Aptroot 1991), a new combination is proposed here. The species is characterized by dark brown ascospores of $19\text{-}21 \times 9.5\text{-}10 \mu\text{m}$, with c. $1.5 \mu\text{m}$ thick outer wall and $2\text{-}3 \mu\text{m}$ thick distoseptate inner wall which leaves rounded lumina. The hamathecium is IKI negative.

The anamorph is reported on the labels of the exsiccate to be a *Diplodia*, which is richly present in the type collection, but the connection has not been established in culture.

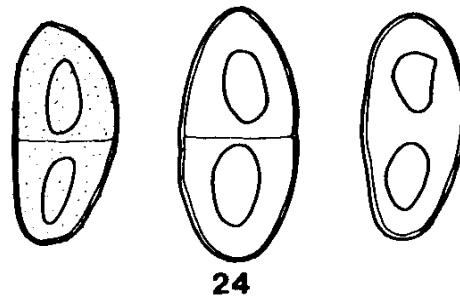
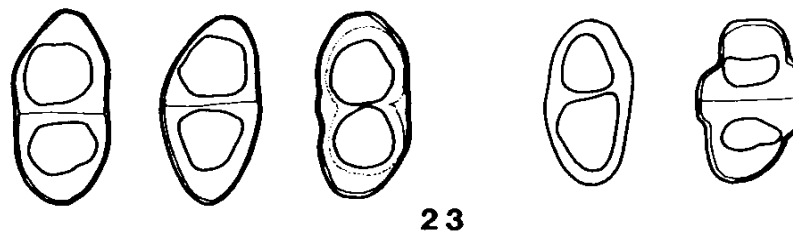
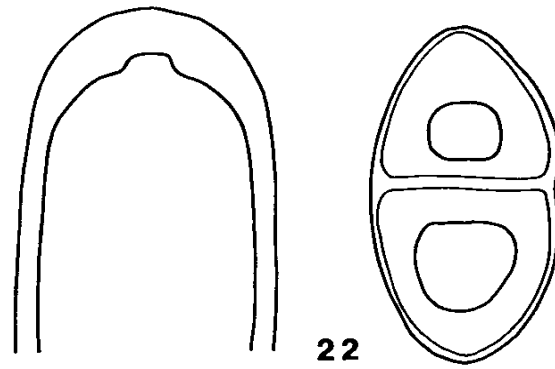
Host plants recorded: *Maclura aurantiaca* (Moraceae).

11.2 ***Parapyrenis maritima*** Aptroot, spec. nov.

Figs 23, 47.

Parapyrenis hamathecio amyloideo, ascosporis luminibus cordiformibus vel sexangularibus praeditis, ellipsoideis, $13\text{-}15 \times 5\text{-}6 \mu\text{m}$.

Type — PAPUA NEW GUINEA: Madang, Laing Island in Hansa Bay near Bogia, on driftwood. Aptroot 30166, VII 1992 (CBS, holotype; CBS 538.93, living culture, Herbarium Aptroot, isotypes).



Figs 22-24. Ascospores and ascus tips: 22. *Parapyrenis macluriae*; 23. *P. maritima*, with three mature, one young and one old ascospores; 24. *P. tecomatis*.

Stroma massive, black, up to 2 mm diam. Ascomata 0.3-0.5 mm diam., globose, immersed in the stroma. Hamathecium gel IKI positive (blue). Ascospores $13-15 \times 5-6 \mu\text{m}$, ellipsoid, medium brown, without spinulose ornamentation, with a $2-3 \mu\text{m}$ thick endosporium leaving a cordate to sexangular lumen. Anamorph unknown. Culture with creamy white aerial mycelium, remaining sterile.

The species is characterized by the amyloid reaction of the hymenial gel and the strong endosporium formation, which even remains visible in old, deformed ascospores.

Additional material seen:

PAPUA NEW GUINEA: Madang, Laing Island in Hansa Bay near Bogia, on driftwood. Aptroot 30173, VII 1992 (herb. Aptroot, topotype); same locality, on bark of *Cocos nucifera* (Palmae) drifted ashore.

Aptroot 30164, VII 1992 (Herb. Aptroot, topotype); Near Bogia, 1 km E of Boroï River mouth, on wood.
Aptroot 30590, VII 1992 (Herb. Aptroot).

11.3 *Parapyrenis tecomatis* (Berkeley & M.A. Curtis ex Cooke) Aptroot, comb. nov.
Figs 24, 50.

Basionym: *Didymosphaeria tecomatis* Berkeley & M.A. Curtis ex Cooke, Grevillea 20: 82. 1892 \equiv *Microthelia tecomatis* (Berkeley & M.A. Curtis ex Cooke) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — USA, SOUTH CAROLINA: On *Tecoma radicans* (Bignoniaceae). Berkeley 4947 (K, holotype; NY, isotype).

The oily pseudoparaphyses and the dense ascocarp wall show that this is a species of *Parapyrenis*. As it differs from all other known species (see Aptroot 1991), a new combination is made. The species is characterized by relatively small (250-300 μm diam.) ascocarps, which are immersed below a 0.5-0.7 wide clypeus. The ascospores are 13-14 \times 6-6.5 μm , with a 0.5 μm thick outer wall and a 2-3 μm thick distoseptate inner wall which leaves elongate lumina and have a spinulose ornamentation. The hamathecium is IKI negative.

Host plants recorded: *Smilax* (Smilacaceae), *Tecoma radicans* (Bignoniaceae).

Additional material seen:

USA, ALABAMA: On *Smilax* (Smilacaceae). Curtis s.n., s.d. (NYS, sub *Didymosphaeria futilis*).

12. PHAEODOTHIS Sydow, Annl. mycol. 2: 166. 1904.

Type: *Phaeodothis tricuspis* Sydow (= *Phaeodothis winteri* (Niessl) Aptroot).

This genus is reinstated here to accommodate two closely related species which so far have been mostly thought to belong to *Didymosphaeria*. Two species are known so far, the type and *Phaeodothis ribesiella* (Nylander ex Vainio) Aptroot. The genus is probably best accommodated in the Phaeosphaeriaceae. It is characterized by euseptate ascospores with a relatively broad, short and somewhat conical upper cell and a thinner, longer lower cell and by the sparse hamathecium consisting of thin pseudoparaphyses.

The two species mainly differ in the size of the ascospores and the immersion of the ascocarp. Several other species have been described in this genus. Some of them have been proved to be synonymous with *Phaeodothis winteri*, another one (*Phaeodothis gigantochloae*) with *Roussoëlla hysteroïdes* (see below). The remaining species have not been studied recently, except for *Phaeodothis yuccae* (Ellis & Everhart) Saccardo, which has been synonymized with *Dothidea conspicua* Griffiths by Barr (1972).

Stroma reduced, black. Ascomata pseudothecioid, globose to pyriform, black, smooth, simple, immersed to erumpent or superficial. Peridium black, consisting of one or two layers of flattened cells. Hamathecium pseudoparaphyses, simple to sparingly branched, thin and often sparse, colourless, IKI negative. Asci clavate, bitunicate, with ocular chamber, IKI negative, with 8, partly overlapping, ascospores. Ascospores fusiform, often bent, blackish brown, euseptate, asymmetrically 1-3-septate, with the upper cell pointed and conical and the lower cell also pointed but longer,

without ornamentation, without germ pore or slit, with a thin gelatinous sheath. Anamorph unknown.

Distribution and ecology: Cosmopolitan, in and on various plants, including fungi, hepatics and phanerogams, also as mycoparasite.

Key to the species of *Phaeodothis*

- 1a Ascospores grey to dark brown, up to 20 μm long, 1-septate; ascocarps erumpent to superficial. *P. winteri*
1b Ascospores pale brown, over 20 μm long, 1-3-septate; ascocarps immersed. *P. ribesiella*

12.1 *Phaeodothis ribesiella* (Nylander ex Vainio) Aptroot, comb. nov. Fig. 25.

Basionym: *Verrucaria ribesiella* Nylander ex Vainio, Medd. Soc. Fauna. Fl. fenn. 10: 195. 1883 \equiv *Didymosphaeria ribesiella* (Nylander ex Vainio) Vainio, Acta Soc. Fauna Fl. fenn. 49(2): 149. 1921 \equiv *Microthelia ribesiella* (Nylander ex Vainio) Zahlbruckner, Cat. Lich. Univ. 8: 79. 1931 \equiv *Microthelia macularis* f. *ribesiella* (Nylander ex Vainio) Keissler in Rabenhorst, Krypt.-Fl. 9, 1(2): 37. 1936 \equiv *Mycomicrothelia macularis* f. *ribesiella* (Nylander ex Vainio) Keissler in Rabenhorst, Krypt.-Fl. 9, 1(2): 36. 1936 \equiv *Massarina ribesiella* (Nylander ex Vainio) D. Hawksworth, Bull. Br. Mus. nat. Hist. (Bot.) 14: 163. 1985. Type — RUSSIA: Karelia, Viborg, on *Ribes grossularia* (Grossulariaceae). Vainio s.n., 1875 (H-NYL 858, lectotype, designated by Hawksworth (1985a), not seen; IMI 250042, type slide).

Didymosphaeria culmicola E. Müller & S. Ahmad, Biologia 5: 1. 1959.

Type — PAKISTAN: Lahore, Changa Manga, on *Panicum antidotale* (Gramineae). Ahmad 14279, X 1958 (ETH, holotype). New synonymy.

Stroma immersed in the substrate, reduced. Ascomata immersed in the stromata in the substrate. Ascospores pale brown, 1-3-septate, 20-25 \times 5-7 μm . Anamorph unknown. Cultures felty, greyish. Ascocarps are rarely produced in culture. See Hawksworth (1985a: 161) for a detailed description.

Distribution and ecology: Probably cosmopolitan, mostly on living branches and leaves.

Host plants recorded: *Arundo donax* (Gramineae), *Nauclea diderichii*, *N. latifolia* (Moraceae), *Panicum antidotale* (Gramineae), *Pinus radiata* (Pinaceae), *Piper* (Piperaceae), *Ribes grossularia* (Grossulariaceae).

Additional material seen:

VENEZUELA: On leaves of *Piper* (Piperaceae). Urtiaga 1124, VI 1970 (IMI 149381).

CANARY ISLES: Gomera, Hermigua, on *Arundo donax* (Gramineae). Korf et al. 1361 (CUP, identification uncertain).

FINLAND: Satakunta, Kaukaanpää, Venesjärvi, on *Ribes grossularia* (Grossulariaceae). Laurila s.n., VIII 1939 (H (4 \times)), also distributed in Räsänen, Lichenes Fennici Exsiccati 848 (H (2 \times), M); Paikkakunta, Kurkijoki, on *Ribes grossularia* (Grossulariaceae). Räsänen s.n., XI 1939 (H).

RUSSIA: Karelia, Nurmes, on *Ribes grossularia* (Grossulariaceae). Vainio s.n., 1875 (IMI 250044).

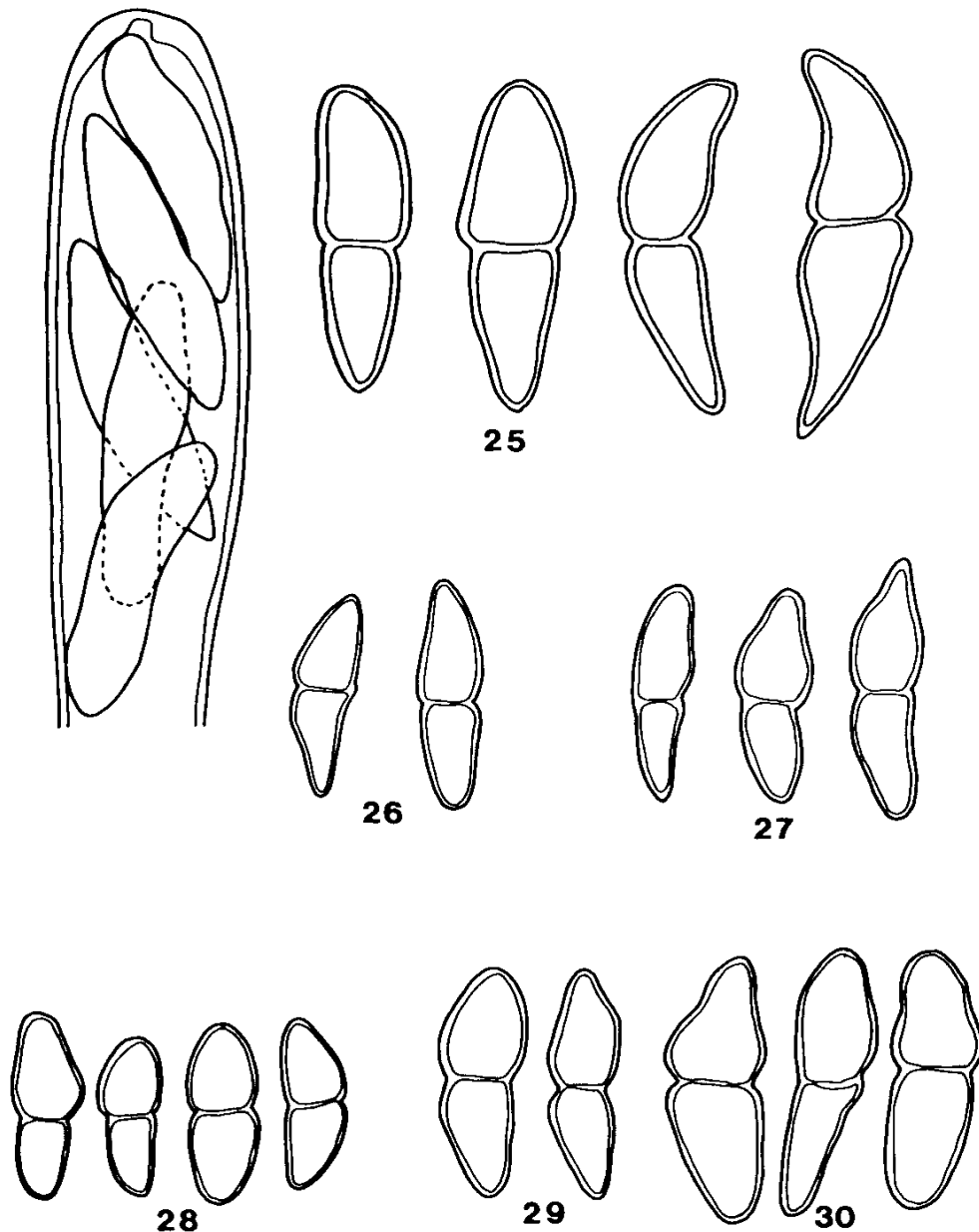
CONGO: Katanga, isolated from soil. Meyer 177 (IMI 115184, slides, identification uncertain).

NIGERIA: Obubra, on leaves of *Nauclea diderichii* (Moraceae). Omyegocho s.n., I 1963 (IMI 110619).

SIERRA LEONE: Kori, Njala, on leaves of *Nauclea latifolia* (Moraceae). Deighton s.n., IV 1948 (IMI 24415b).

TANZANIA: Dangaria, Arusha, isolated from needles of *Pinus radiata* (Pinaceae). Okioga s.n., VII 1969 (IMI 141064, slides only).

PAKISTAN: Lahore, Changa Manga, on *Panicum antidotale* (Gramineae). Ahmad, V 1964 (ETH, topotype).



Figs 25-30. Ascospores and ascus tips: 25. *Phaeodothis ribesiella*; 26-30. *P. winteri*; 26. *Didymosphaeria marchantiae*, Bavaria (M); 27. *Phaeosphaerella marchantiae*, neotype (B); 28. *Didymosphaeria schroeteri*; 29. *D. thalictri*; 30. *D. petrakiana*, topotype (M).

12.2 *Phaeodothis winteri* (Niessl) Aptroot, comb. nov.

Figs 26-30, 48.

Basionym: *Didymosphaeria winteri* Niessl, Öst. bot. Z. 25: 165. 1875 \equiv *Didymosphaerella winteri* (Niessl) Cooke, Grevillea 18: 29. 1889 \equiv *Microthelia winteri* (Niessl) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898. Type — AUSTRIA: Graz, Rosenberg, on *Solanum dulcamara* (Solanaceae). Niessl s.n., VIII 1874 (M, lectotype, selected here; FH-Höhnel, isolectotype).

Didymosphaeria schroeteri Niessl, Öst. bot. Z. 25: 199. 1875 \equiv *Didymosphaerella schroeteri* (Niessl) Cooke, Grevillea 18: 29. 1889 \equiv *Microthelia schroeteri* (Niessl) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898. Type — AUSTRIA: Rastatt, in ascomata of *Ophiobolus mathieui* (Ascomycetes) on *Oenothera biennis* (Onagraceae). Schroeter s.n., I 1874 (M, holotype). Synonymy already reported by Scheinpflug (1958).

Didymosphaeria phyllogena Winter, J. Mycol. 1: 121. 1885 \equiv *Microthelia phyllogena* (Winter) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898.

Type — USA, MISSOURI: On dead leaves of *Liriodendron tulipifera* (Magnoliaceae). S.c., X 1883 (B,

destroyed); USA, ALABAMA: Turtagu, on dead leaves of *Liriodendron tulipifera* (Magnoliaceae). Carter 393, VIII 1897 (NY, neotype, designated here).

The holotype was most probably destroyed in Berlin during World War II. Two other specimens were studied, the neotype and the type of *Didymosphaeria liriodendri* Winter, which is probably an obligate synonym (q.v.). The neotype agrees well with the description and shows that the species is a new synonym of *P. winteri*.

Didymosphaeria gallae Ellis & Everhart, nom. herb.

Type — USA, NEW JERSEY: Newfield, on gall on *Vaccinium corymbosum* (Ericaceae). Ellis s.n., I 1885 (NY, holotype).

Overmature, but most probably identical with *P. winteri*.

Didymosphaeria euryasca Ellis & Galloway, J. Mycol. 5: 67. 1889 ≡ *Microthelia euryasca* (Ellis & Galloway) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898 ≡ *Monascostroma euryascum* (Ellis & Galloway) M. Barr, Contrib. Univ. Mich. Herb. 9: 539. 1972 (as 'euryasca').

Type — USA, MONTANA: Mt. Helena, on needles of *Pinus murrayana* (Pinaceae). Anderson 403 (NY, holotype). New synonymy.

Didymosphaeria thapsi Vestergren, Bih. K. svenska VetenskAkad. Handl 22(3, 6): 13. 1896.

Type — SWEDEN: Gotland, Östergarn, on dead leaves of *Verbascum thapsus* (Scrophulariaceae). Vestergren s.n., VII 1895 (S, holotype). New synonymy.

Didymosphaeria thalictri Ellis & Dearness, Proc. Can. Inst., n. ser. 1(3): 89. 1897 ≡ *Didymella thalictri* (Ellis & Dearness) M. Barr, Mycotaxon 43: 376. 1992.

Type — CANADA: Ontario, London, on *Thalictrum polygamum* (Ranunculaceae). Dearness 2297, VIII 1895 (NY, holotype; NY, NYS, isotypes), also distributed in Ellis & Everhart, North American Fungi 3324 (CUP-A, FH, L, M, NY (3 ×), S, isotypes), also distributed in Fungi Columbiani 938 (CUP, W, isotypes). New synonymy. Scheinpflug synonymized *Didymosphaeria marchantiae* Starbäck with this species, but Döbbeler (1978) and Barr (1992a) disagreed. During the present study no differences could be found between these species, except in the overall size of the ascocarps, what could be influenced by the very different hosts. Both species are therefore regarded as synonyms of the omnivorous *P. winteri*.

Didymosphaeria marchantiae Starbäck, Bot. Notiser 1898: 218. 1898 [non *Phaeosphaerella marchantiae* P. Hennings, 1905].

Type — SWEDEN: Uppland, Ledinge, Knifsta, on *Marchantia polymorpha* (Hepaticae). Starbäck s.n., VII 1895 (not seen).

The type was not found in S, but all other material attributed to this species (see below, all on the liverwort *Marchantia polymorpha*) belongs to the same species. It is regarded here as a new synonym of *P. winteri*, like *Didymosphaeria thalictri* Ellis & Dearness, with which it was synonymized by Scheinpflug (1958), but not by Döbbeler (1978) and Barr (1992a).

Didymosphaeria destruens Rehm, Hedwigia 40: 116. 1901.

Type — BRAZIL: On monocotyledonous leaves. Ule 880 (S, holotype). New synonymy.

Didymosphaeria feltgenii Sydow, Anns mycol. 1: 177. 1903 (as 'feltgeni') ≡ *Didymosphaeria typhae* Feltgen, Recl Mém. Trav. Soc. bot. Luxemb. 15: 172. 1902 ('1901') [nom. illeg., Art. 64, non Peck, 1885].

Type — LUXEMBURG: Sandweiler-Contern, on *Typha latifolia* (Typhaceae). Feltgen s.n., IV 1900 (LUX, holotype). New synonymy.

Didymosphaeria minuta f. *pseudacori* Feltgen, Recl Mém. Trav. Soc. bot. Luxemb. 15: 175. 1902 ('1901').

Type — LUXEMBURG: Kockelscheuer, on *Iris pseudacorus* (Iridaceae). Feltgen s.n., IX 1900 (LUX, holotype). New synonymy.

Didymosphaeria minima Feltgen, Recl Mém. Trav. Soc. bot. Luxemb. 16: 246. 1903 [non Niessl, nom. herb.].

Type — LUXEMBURG: Pulvermühl-Höhe, on *Echium vulgare* (Boraginaceae). Feltgen s.n., IX 1903 (LUX, holotype). New synonymy.

Phaeodothis tricuspidis Sydow, Anns mycol. 2: 166. 1904.

Type — ARGENTINA: San José, on leaves of *Tricuspis latifolia* (Gramineae). Lorentz s.n., s.d. (S, not seen).

Synonymy follows Scheinpflug (1958).

Phaeosphaerella marchantiae P. Hennings, Verh. bot. Ver. Prov. Brandenb. 46: 120. 1905 [non *Didymosphaeria marchantiae* Starbäck, 1898].

Type — GERMANY: Berlin, Röntgental, on *Marchantia polymorpha* (Hepaticae). Osterwald s.n., X 1904 (B, holotype, destroyed); GERMANY: Brandenburg, Buch, on *Marchantia polymorpha* (Hepaticae). Osterwald s.n., 4 XII 1904 (B, neotype, designated here); same origin, but 11 XII 1904 (B, isoneotype).

The type has probably been destroyed in Berlin during World War II. Therefore, a neotype is selected here. It is identical with *Didymosphaeria marchantiae* Starbäck and, like this species, it is regarded as a new synonym of *P. winteri*.

Didymosphaeria coffeicola Spegazzini, An. Mus. nac. Hist. nat. B. Aires, ser. 3, 12: 370. 1909 [non Spegazzini, 1923, as '*coffaeicola*'].

Type — BRAZIL: São Paulo, on *Coffea arabica* (Rubiaceae). Girola s.n., XI 1908 (LPS, holotype). New synonymy.

Didymosphaeria petrakiana Saccardo, Annl. mycol. 12: 286. 1914.

Type — CZECHIA: Weißkirchen, Teplitz ('Czernotin'), on dead leaves of *Tilia platyphylla* (Tiliaceae). Petrak 3107, V 1914 (W, holotype), also distributed in Flora Bohemiae et Moraviae Esiccata 1033 (B (3 ×), BR, FH, S, W, Z, isotypes).

This is a new synonym of *P. winteri*. It is reported to be connected with *Asteroma tiliae* Rudolphi (Coelomycetes), but it is more likely that it actually parasitizes this fungus, because *P. winteri* often lives as a mycoparasite.

Didymosphaeria salviae-glutinosae Traverso, nom. herb.

Type — ITALY: On *Salvia glutinosa* (Labiatae). (PAD, holotype). New synonymy.

Didymosphaeria winteri f. *macrospora* Niessl, nom. herb.

Type — AUSTRIA: Wienerbruck, Josefsberg, on *Coronilla varia* (Leguminosae). Niessl s.n., VIII 1917 (M, holotype). New synonymy.

Phaeodothis isachnes Petch, Ann. R. Bot. Gard. Peradeniya 7: 308. 1922.

Type — SRI LANKA: Haputale, on *Isachne kuntheana* (Gramineae). Petch 5884, XI 1917 (K, holotype). New synonymy.

Didymosphaeria liriodendri Winter, nom. herb.

Type — USA, NORTH CAROLINA: Pisgah, on leaves of *Liriodendron tulipifera* (Magnoliaceae). Hedcock s.n., VIII 1924 (BPI, holotype).

In the large type specimen no identifiable fungus could be found. It is quite probable that Winter changed his opinion on the epithet and that this is an obligate synonym of *Didymosphaeria phyllogena* Winter, and with this species a synonym of *P. winteri*.

Didymosphaeria canariensis Petrak, Engler Bot. Jb. Beibl. 142: 103. 1928.

Type — CANARY ISLES: Tenerife, Guimar, Barranco Río, on *Brachypodium sylvaticum* (Gramineae). Ade s.n., V 1926 (W, holotype; FH, W, isotypes). New synonymy.

Didymosphaeria panici Marchal & Steyaert, Bull. Soc. r. Bot. Belg 61: 161. 1929.

Type — ZAIRE: Lusambo, on *Phyllachora congruens* (Ascomycetes) on living leaves of *Panicum maximum* (Gramineae). Ghesquière 8A, I 1925 (BR, holotype; BR, isotype). New synonymy.

Didymosphaeria ostiolata Kirschstein, Annl. mycol. 33: 211. 1935.

Type — LATVIA: Zemgale, Samca, on cf. *Mentha austriaca* (Labiatae). Kirulis A771, VIII 1933 (B, holotype; S, isotype). New synonymy.

Phaeodothis hyparrheniae Nattrass, Cyprus Fungi: 6. 1937.

Type — CYPRUS: Larnaca, Dekelia, on *Phyllachora* (Ascomycetes) on leaves of *Hyparrhenia hirta* (Gramineae). Nattrass 478, IV 1935 (IMI 18644, holotype). New synonymy.

Cryptodidymosphaeria clandestina Sydow, Annl. mycol. 37: 196. 1939.

Type — AUSTRIA: Pfaffenberg, Deutsch-Altenberg, in stromata of *Scirrhia fallax* ('*Phyllachora*', Ascomycetes) on *Andropogon gryllus* (Gramineae). Petrak s.n., IX 1940, distributed in Mycotheca Generalis 616 (DAOM 138146, type slide; M, Z, ZT, isotypes). Synonymy already reported by Scheinpflug (1958).

Didymosphaeria chionanthi Miller & Thompson, Mycologia 32: 10. 1940.

Type — USA, GEORGIA: Milledgeville, on dead leaves of *Chionanthus virginicus* (Oleaceae). Thompson & Miller s.n., V 1939 (GA, holotype; FH, NY, isotypes). New synonymy.

Anamorph: *Coniothyrium occultum* Sydow, *Annls mycol.* 35: 281. 1937, reported as anamorph of *Cryptodidymosphaeria clandestina* by Sydow in the original description of the latter. According to Urries (1957), this is a synonym of *Coniothyrium phyllachorae* Maublanc, *Bull. Soc. Mycol. Fr.* 20: 72. 1904. This anamorph was not obtained in cultures.

Stroma reduced. Ascomata erumpent to superficial. Ascospores grey to dark brown, consistently 1-septate, (11-)13-16(-19) × 4-6 μm. Anamorph unknown. Culture felty, continuous, black or grey with black margins, reverse black. Ascocarps are often produced in culture.

Distribution and ecology: Cosmopolitan, on a wide range of hosts (see below), including fungi, liverworts and fanerogams.

Although the host- and the substrata range is astonishingly wide, no clear correlations could be observed between the morphological variation. This variation mainly affects ascospore shape and measurements (Figs 26-30) and ascocarp shape. Some remarks are made under the synonyms above.

Host plants recorded: Fungi: *Asteroma tiliae* (Coelomycetes), *Diplodia* (Coelomycetes), *Hypoxylon fuscum* (Ascomycetes), *Leptosphaeria anthostomoides*, *L. doliolum* (Ascomycetes), *Lopadostroma turgidum* (Ascomycetes), *Melanomma pulvis-pyrius* (Ascomycetes), *Ophiobolus mathieui* (Ascomycetes), *Phyllachora afra*, *P. congruens*, *P. graminis* (Ascomycetes), *Phyllostachys* ('*Catacauma*') *venezuelensis* (Ascomycetes), *Pyrenopeziza rubi* (Ascomycetes), *Scirrhia fallax* (Ascomycetes).

Liverwort: *Marchantia polymorpha* (Hepaticae).

Phanerogams: *Acer negundo* (Aceraceae), *Amaranthus* (Amaranthaceae), *Andropogon cymbalarius*, *A. gryllus* (Gramineae), *Arrhenaterum elatius* var. *bulbosum* (Gramineae), *Aruncus dioicus* (Rosaceae), *Arundo donax* (Gramineae), *Aspilia helianthoides* (Melastomataceae), *Astragalus frigidus*, *A. oroboides* (Leguminosae), *Bambusoideae* (Gramineae), *Beckeropsis procera*, *B. uniseta* (Gramineae), *Berberis* (Berberidaceae), *Beta vulgaris* (Chenopodiaceae), *Bixa orellana* (Bixaceae), *Bougainvillea spectabilis* (Nyctaginaceae), *Brachypodium silvaticum* (Gramineae), *Butea monosperma* (Leguminosae), *Camellia sinensis* (Theaceae), *Cassia alata* (Leguminosae), *Chamaenerion angustifolium* (Onagraceae), *Chionanthus virginicus* (Oleaceae), *Chloris gayana* (Gramineae), *Chrysopogon echinulatus*, *C. serrulatus* (Gramineae), *Coffea arabica*, *C. robusta* (Rubiaceae), *Coronilla varia* (Leguminosae), *Corylus avellana* (Betulaceae), *Croton roxburghii* (Euphorbiaceae), *Cymbopogon* (Gramineae), *Dalhousiea bracteata* (Leguminosae), *Dioscorea dumetorum* (Dioscoreaceae), *Echium vulgare* (Boraginaceae), *Epilobium hirsutum* (Onagraceae), *Erythrina* (Leguminosae), *Fagus sylvatica* (Fagaceae), *Fraxinus excelsior* (Oleaceae), *Grewia pachycalyx* (Tiliaceae), *Hevea brasiliensis* (Euphorbiaceae), *Hibiscus esculentus* (Malvaceae), *Hyparrhenia hirta* (Gramineae), *Hyssopus officinalis* (Labiatae), *Iris pseudacorus* (Iridaceae), *Isachne albens*, *I. kuntheana* (Gramineae), *Ixora* (Rubiaceae), *Juncus effusus* (Juncaceae), *Kobresia* (Gramineae), *Liquidamber styraciflora* (Magnoliaceae), *Lisiodendron tulipifera* (Magnoliaceae), *Loudetia arundinacea* (Gramineae), *Lysimachia vulgaris* (Primulaceae), *Machaerium* (Leguminosae), *Malus* (Rosaceae), *Melinis minutiflora* (Gramineae), cf. *Mentha austriaca* (Labiatae), *Musa sapientum* (Mu-

saceae), *Nicotiana tabacum* (Solanaceae), *Oenothera biennis* (Onagraceae), *Ophiuros corymbosus* (Gramineae), *Panicum maximum* (Gramineae), *Pennisetum purpureum* (Gramineae), *Pinus murrayana* (Pinaceae), *Pueraria phaseoloides* (Leguminosae), *Pyrus pyrifolia* (Rosaceae), *Roupellia grata* (Apocynaceae), *Rubus idaeus* (Rosaceae), *Rumex crispus* (Polygonaceae), *Saccharum officinarum* (Gramineae), *Salvia glutinosa* (Labiatae), *Sambucus canadensis* (Caprifoliaceae), *Sarothamnus scoparius* (Leguminosae), *Scrophularia* (Scrophulariaceae), *Senecio sylvaticus* (Compositae), *Solanum dulcamara* (Solanaceae), *Sporobolus pyramidalis* (Gramineae), *Stachys sylvatica* (Labiatae), *Thalictrum macrostylum*, *T. polygamum* (Ranunculaceae), *Theobroma cacao* (Sterculiaceae), *Tilia platyphylla* (Tiliaceae), *Tricuspis latifolia* (Gramineae), *Typha angustata*, *T. latifolia* (Typhaceae), *Vaccinium corymbosum* (Ericaceae), *Veratrum album* (Liliaceae), *Verbascum phlomoides*, *V. thapsus* (Scrophulariaceae), *Vitex agnus-castus* (Verbenaceae).

Selected additional material seen:

CANADA: Ontario, York, Kleinburg, on *Thalictrum polygamum* (Ranunculaceae). Cain 24598 (GZU, IMI, UPS, ZT, sub *Didymosphaeria thalictri*).

USA, NEW YORK: Old Forge, on *Thalictrum* (Ranunculaceae). Shear s.n., VIII 1934 (M, sub *Didymosphaeria thalictri*); GEORGIA: Tallasse Shoals, on *Thalictrum macrostylum* (Ranunculaceae). Thompson & Miller s.n., VII 1940 (GA, sub *Didymosphaeria thalictri*); LOUISIANA: St. Tammany, Covington, on fruits of *Liquidamber styraciflora* (Magnoliaceae). Rogerson s.n., VI 1976 (NY); FLORIDA: Winter Park, on *Vitex agnus-castus* (Verbenaceae). Petrak s.n., X 1944 (W (2 ×), sub *Didymosphaeria* sp.). COSTA RICA: Guapiles, isolated from leaves of *Musa sapientum* (Musaceae). Baker s.n., (IMI 187053, living and dried culture, sub *Didymosphaeria donacina*).

CUBA: Bayamo, on leaves of *Panicum maximum* (Gramineae). Urtiaga s.n., VII 1966 (IMI 120847, sub *Didymosphaeria* sp.); On *Saccharum* (Gramineae). Shear s.n., IV 1916 (B, M, W, sub *Didymosphaeria donacina*).

TRINIDAD: Gasparee Island, on *Phyllachora* ('*Catacauma*') *venezuelensis* (Ascomycetes) on *Machaerium* (Leguminosae). Dale s.n., I 1946 (IMI 6248c, slides, sub *Didymosphaeria* sp.).

ARGENTINA: La Plata, on *Arundo donax* (Gramineae). Lindquist s.n., V 1937 (DAOM 121559).

CANARY ISLES: Tenerife, Anaga, 2 km NE of Las Mercedes, on *Juncus effusus* (Juncaceae). Nannfeldt 23320a (UPS, sub *Didymosphaeria futilis*).

AUSTRIA: Sonntagsberg, on female gametophores of *Marchantia polymorpha* (Hepaticae). Strasser s.n., s.d. (S, ZT, sub *Didymosphaeria marchantiae*); Wiener Wald, on *Stachys sylvatica* (Labiatae). Höhnel s.n., VII 1905 (FH-Höhnel); Wiener Wald, Langendellschlag, on *Rumex crispus* (Polygonaceae). Stepan 645, IX 1961 (B); Steiermark, Stubalpe, on female gametophores of *Marchantia polymorpha* (Hepaticae). Hafellner s.n., VI 1985, distributed in Plantae Graecenses, Fungi 501 (GZU, L, M, UPS, sub *Didymosphaeria marchantiae*).

BELGIUM: Groenendaal, on *Senecio sylvaticus* (Compositae). Rousseau s.n., VIII 1888 (BR, sub *Didymosphaeria conoidea*); Beaufays, on ascocarps of *Leptosphaeria doliolum* (Ascomycetes) on *Scrophularia* (Scrophulariaceae). Mouton s.n., s.d. (BR).

CZECHIA: Brno ('Brünn'), Schreibwald, on *Amaranthus* (Amaranthaceae). Niessl s.n., IX 1876 (M); Brno, in ascomata of *Ophiobolus mathieui* (Ascomycetes) on *Verbascum phlomoides* (Scrophulariaceae). Niessl s.n., IX 1876 (PAD, sub *Didymosphaeria schroeteri*); Bohemia, Harta, on *Epilobium hirsutum* (Onagraceae). Cypers s.n., IV 1914 (CBS, sub *Didymosphaeria brunneola*); Weißkirchen, Teplitz ('Czernotin'), on dead leaves of *Tilia platyphylla* (Tiliaceae). Petrak IV 1916 (W (2 ×), topotypes of *Didymosphaeria petrakiana*); IV 1936, distributed in Mycotheca Generalis 234 (B, M, S, UPS, W, Z, ZT (2 ×), topotypes of *Didymosphaeria petrakiana*); V 1936 (GZU, IMI, NY, W, ZT, topotypes of *Didymosphaeria petrakiana*), also distributed in Flora Bohemiae et Moraviae Esiccata 2472 (M, S, W, Z, topotypes of *Didymosphaeria petrakiana*); also distributed in Weese, Eumycetes Selecti Exsiccati 781 (M, topotype of *Didymosphaeria petrakiana*).

FRANCE: Pyrenées-Atlantiques, Orthez, on *Hypoxylon* (Ascomycetes) on *Fraxinus excelsior* (Oleaceae). Vivant s.n., VIII 1983 (Herb. Vivant); Sauveterre-de-Bearn, on *Hypoxylon* (Ascomycetes) on *Acer ne-*

gundo (Aceraceae). Vivant s.n., III 1983 (Herb. Vivant); Oloron, Forêt de Bugangue, on *Melanomma pulvis-pyrius* (Ascomycetes) on wood. Candoussau & Petrini s.n., X 1981 (CUP, ZT).

GERMANY: Windheim, on *Berberis* (Berberidaceae). Rehm s.n., VI 1872 (S); Ravensburg, Bavendorf, on wood of *Malus* (Rosaceae). Weiler s.n., II 1982 (CBS, sub *Didymosphaeria bisphaerica*); Oberbayern, Rottmanshöhe, in ascocarps of *Leptosphaeria doliolum* (Ascomycetes) on stems. Schnabl 1222, IV 1885 (H, sub *Didymosphaeria conoidea*); Sachsen, Königstein, on thallus and female gametophores of *Marchantia polymorpha* (Hepaticae). Krieger s.n., X 1904, distributed in Fungi Saxonici 1924 (CUP, GZU, L, M, S (2 ×), sub *Didymosphaeria marchantiae*); Harz, Braunlage, on thallus of *Marchantia polymorpha* (Hepaticae). Sydow s.n., VIII 1904, distributed in Mycotheca Germanica 320 (BR, CUP, L (2 ×), M, S (2 ×), Z, sub *Didymosphaeria marchantiae*); Westfalen, Siegen, Littfeld, on female gametophores of *Marchantia polymorpha* (Hepaticae). Ludwig s.n., IX 1936, distributed in Sydow, Mycotheca Germanica 3305 (BR, L, M, S, TUR, Z, sub *Didymosphaeria marchantiae*).

GREAT BRITAIN: Channel Islands, Sark, on root bulbs of *Arrhenaterum elatius* var. *bulbosum* (Gramineae). M. & J. Ellis s.n., IX 1948 (IMI 57749, sub *Didymosphaeria* sp.); Surrey, Rossmore Common, on *Chamaenerion angustifolium* (Onagraceae). S.c., XI 1957 (IMI 71075, sub *Didymosphaeria* sp.); Wennalt, *Rhusbina Glaubwales*, on wood of *Sarothamnus scoparius* (Leguminosae). Ellis s.n., IV 1947 (IMI 13475c, sub *Didymosphaeria* sp.); Yorkshire, Swinton Park, on *Lopadostroma turgidum* (Ascomycetes) on *Fagus sylvatica* (Fagaceae). Hughes s.n., X 1947 (IMI 19255b, sub *Didymosphaeria* sp.); North Wales, Llydir Forest near Llanrwst, on *Chamaenerion angustifolium* (Onagraceae). Spooner s.n., IX 1988 (K, sub *Didymosphaeria* sp.).

HUNGARY: Gödöllő, on *Hyssopus officinalis* (Labiatae). Tóth s.n., IX 1957 (BP, sub *Didymosphaeria futilis*); Répáshuta, Bükk-Hegység Mts, in *Hypoxylon fuscum* (Ascomycetes) on *Corylus avellana* (Betulaceae). Tóth & Budai s.n., II 1981 (BP, sub *Didymosphaeria futilis*); Veszprém, Nyirád, in *Phyllachora graminis* (Ascomycetes) on *Andropogon gryllus* (Gramineae). Tóth s.n., X 1970 (BP, UPS).

POLAND: On *Marchantia polymorpha* (Hepaticae). Eichler s.n., III 1905 (S, sub *Didymosphaeria marchantiae*).

SWEDEN: Uppland, Harbo, Harbonäs, on *Marchantia polymorpha* (Hepaticae). Santesson 13560 (UPS, sub *Didymosphaeria marchantiae*); Härjedalen, Tännäs, Hamrofjället, on *Astragalus oroboides* (Leguminosae). Holm s.n., VII 1948 (UPS, sub *Didymosphaeria astragalii*); same locality, on *Astragalus frigidus* (Leguminosae). Holm s.n., VII 1948 (UPS, sub *Didymosphaeria astragalii*).

SWITZERLAND: Unterengadin, S-Carl, on *Pyrenopeziza rubi* (Ascomycetes) on *Rubus idaeus* (Rosaceae). Müller s.n., IX 1970 (ZT, sub *Didymosphaeria conoidea*); Wallis, Brig, Aletschreservat, partly on *Leptosphaeria anthostomoides* (Ascomycetes) on *Veratrum album* (Liliaceae). Müller s.n., IX 1970 (ZT, sub *Didymosphaeria conoidea*).

SUDAN: Katiae, on leaves of *Erythrina* (Leguminosae). Jarr 1357, X 1951 (IMI 48742, sub *Didymosphaeria* sp.); Yambio-Sabbae-road, on *Phyllachora* (Ascomycetes) on *Loudetia arundinacea* (Gramineae). Tarr s.n. (IMI 59685).

GUINEA: Kuidia, on leaves of *Aspilia helianthoides* (Melastomataceae). Kranz s.n., XI 1963 (IMI 104991, sub *Didymosphaeria* sp.).

LIBERIA: Firestone Plantations Company, isolated from leaf of *Hevea brasiliensis* (Euphorbiaceae). S.c. 1963 (CBS 551.63, living culture).

SIERRA LEONE: Tombo, on *Phyllachora* (Ascomycetes) on *Loudetia arundinacea* (Gramineae). S.c. (IMI 34132); Njala, on *Phyllachora afra* (Ascomycetes) on leaves of *Sporobolus pyramidalis* (Gramineae). Deighton M708 (IMI 8032).

NIGERIA: Ibadan, Noor Plantation, on leaves of *Ixora* (Rubiaceae). Bailey s.n., V 1962 (IMI 99199, sub *Didymosphaeria* sp.); Ibadan, isolated from *Dioscorea dumetorum* (Dioscoreaceae). Emua s.n., (IMI 231943, sub *Didymosphaeria donacina*).

ETHIOPIA: Shogolle, on *Phyllachora* (Ascomycetes) on leaves of *Beckeropsis procera* (Gramineae). Getahun s.n., I 1961 (IMI 88374).

KENYA: Lower Kubete, on *Phyllachora* (Ascomycetes) on leaves of *Pennisetum purpureum* (Gramineae). Natrass 2206 (IMI 73689, sub *Didymosphaeria panicii*).

TANZANIA: Dar es Salaam, Morogoro, on *Phyllachora* (Ascomycetes) on leaves of *Pennisetum purpureum* (Gramineae). Hennesy s.n., IX 1973 (IMI 181198, sub *Didymosphaeria panicii*); Zyamungu, isolated from *Camellia sinensis* (Theaceae). Kibani 3790 (IMI 212613, dried culture, sub *Didymosphaeria* sp.); Nyasa-Hoshland, Kymbila, on *Phyllachora* (Ascomycetes) on leaves of *Andropogon cymbalarius* (Gramineae). Stolz s.n., VI 1912 (M, ZT, sub *Cryptodidymosphaeria clandestina*).

UGANDA: Bunyoro, on leaves of *Cymbopogon* (Gramineae). S.c. s.n., X 1962 (IMI 102799, sub *Didymosphaeria* sp.); Kawanda, on *Phyllachora* (Ascomycetes) on leaves of *Beckeropsis unisetata* (Gramineae). Hansford s.n., XI 1942 (IMI 18712b); Kampala, on *Phyllachora* (Ascomycetes) on culms of *Pennisetum purpureum* (Gramineae). Hansford 1118 (IMI 13547, slides, sub *Didymosphaeria panici*); Kampala, on *Phyllachora* (Ascomycetes) on culms of *Hyparrhenia* (Gramineae). Hansford 1109 (IMI 13546, slides, sub *Didymosphaeria panici*).

ZIMBABWE: Chilanga, on *Diplodia* (Coelomycetes) on *Grewia pachycalyx* (Tiliaceae). Angus s.n., VI 1962 (IMI 95132, sub *Didymosphaeria futilis*); Mt. Makulu, on *Chloris gayana* (Gramineae). Angus s.n., VI 1962 (IMI 93882d, sub *Didymosphaeria* sp.).

PAKISTAN: Balakot, on *Phyllachora* (Ascomycetes) on leaves of *Chrysopogon echinulatus* (Gramineae). Ahmad s.n., X 1966 (IMI 126112; 126115).

INDIA: Jodhpur, isolated from *Butea monosperma* (Leguminosae). Bilgrani s.n., 1968 (IMI 129307, culture); Lahul, Kukti Pass, on *Kobresia* (Gramineae). Koelz 1210 (DAOM 124023, sub *Didymosphaeria sadasivani*); Gopeshwar, on *Phyllachora* (Ascomycetes) on leaves of *Chrysopogon serrulatus* (Gramineae). Kala 15 (IMI 264130); Bangalore, on *Typha angustata* (Typhaceae). Ponnappa s.n., VIII 1967 (IMI 129838, sub *Didymosphaeria futilis*); Assam, Burnihat, on leaves of *Croton roxburghii* (Euphorbiaceae). Chowdhury s.n., VIII 1981 (IMI 261507, sub *Didymosphaeria* sp.); Burnihat, on leaves of *Dalhausia bracteata* (Gramineae). Mehrotra s.n., (IMI 257885b; 268482, sub *Didymosphaeria donacina*); Poona, on Lythraceae. Patwardhan s.n., IX 1971 (CBS, sub *Didymosphaeria futilis*); Jabalpur, on fungi on leaves and stems of *Ophiuros corymbosus* (Gramineae). Sharna s.n., VII 1979 (IMI 240304, sub *Didymosphaeria* sp.); Isolated from leaves of *Coffea arabica* (Rubiaceae). Muthappa s.n., VII 1976 (IMI 205171; 205176, dried cultures, sub *Didymosphaeria* sp.).

SRI LANKA: Isolated from seeds of *Beta vulgaris* (Chenopodiaceae). Habarakada s.n. (IMI 316169, dried culture, sub *Didymosphaeria donacina*).

TAIWAN: Hualien, Tiensiang, on *Bougainvillea spectabilis* (Nyctaginaceae). Sivanesan 137 (IMI 323571, sub *Didymosphaeria* sp.); Taichung, Tongshiki, on *Pyrus pyrifolia* (Rosaceae). Sivanesan 50, XII 1987 (IMI 323573, sub *Didymosphaeria* sp.).

MALAYSIA: Cameron Highlands, on *Phyllochora* (Ascomycetes) on *Isachne albens* (Gramineae). Johnston 587 (IMI 49575a); Kuala Lumpur, isolated from *Saccharum officinarum* (Gramineae). Geh Swee Lan 594 (IMI 156195, dried culture, sub *Didymosphaeria* sp.); Lumpur, isolated from leaves of Orchidaceae. Chee s.n., XI 1968 (IMI 136129, dried culture, sub *Didymosphaeria* sp.); Tuar, on *Melinis minutiflora* (Gramineae). Williams s.n., I 1964 (IMI 104506, sub *Didymosphaeria* sp.); Isolated from *Hibiscus esculentus* (Malvaceae). Pillai s.n., 1979 (IMI 238733, dried culture, sub *Didymosphaeria* sp.); Isolated from seedlings of *Pueraria phaseoloides* (Leguminosae). Newsam 744 V 1962 (IMI 93098, dried culture, sub *Didymosphaeria* sp.).

BRUNEI: On leaves of *Cassia alata* (Leguminosae). Peregrine s.n., II 1976 (IMI 202635, sub *Didymosphaeria* sp.); On leaves of *Roupellia grata* (Apocynaceae). Peregrine s.n., IV 1971 (IMI 156277a, sub *Didymosphaeria* sp.).

BORNEO: Sarawak, Semongok Agricultural Station, on leaves of *Hevea brasiliensis* (Euphorbiaceae). S.c. (IMI 93316, sub *Didymosphaeria* sp.); Sibuluan, Oya road, on leaves of *Bixa orellana* (Bixaceae). S.c. (IMI 182547, sub *Didymosphaeria thalictri*); Song, on leaves of *Coffea robusta* (Rubiaceae). Johnston s.n., IX 1959 (IMI 79427, sub *Didymosphaeria* sp.); Sapung Estate, on leaves of *Hevea brasiliensis* (Euphorbiaceae). Johnston s.n., (IMI 79358, sub *Didymosphaeria* sp.); North Borneo, on leaves of *Theobroma cacao* (Sterculiaceae). Williams s.n., V 1961 (IMI 86965, sub *Didymosphaeria* sp.).

INDONESIA: Isolated from leaf of *Nicotiana tabacum* (Solanaceae). Meurs s.n., 1931 (CBS 162.31, living culture).

AUSTRALIA: Queensland, isolated from air. Rees s.n., III 1964 (IMI 108512, dried culture, sub *Didymosphaeria* sp.).

HAWAII: Hawaii, Mauna Loa, on *Rubus* (Rosaceae). Shear & Stevens s.n., I 1928 (W, sub *Didymosphaeria* sp.); Oahu, Honolulu, on Bambusoideae (Gramineae). Shear & Stevens s.n., XI 1927 (W, sub *Didymosphaeria* sp.).

13. **ROUSSOËLLA** Saccardo in Saccardo & Paoletti, Atti Ist. veneto Sci. ser. 6, 6: 410. 1888.

Type — *Rousoëlla nitidula* Saccardo & Paoletti (\equiv *Rousoëlla hysterioides* (Cesati) Höhnel).

This genus is accepted here for four mainly bambusicolous species with unitunicate, IKI-negative or positive (blue) asci and elongated ascospores with striate or reticulate ornamentation, following, e.g., Müller & Von Arx (1962). It is probably best accommodated in the Amphisphaeriaceae. The ornamentation of the ascospores is considered to be not homologous with the striate ornamentation found in some species of *Didymosphaeria* s.s. The striae of the latter are much thinner and undulating and probably homologous with the spinulose ornamentation of other species of the genus. Several other species have been described in the genus, the identity of which is mostly known, e.g. *R. nitidula* Saccardo & Paoletti = *R. hysterioides* (Cesati) Höhnel, *R. subcoccodes* Spegazzini = *Pseudothis coccodes* (Léveillé) Theissen & Sydow and *R. verruculosa* Candoussau & Katumoto = *R. minutella* (Penzig & Saccardo) Aptroot.

It is anticipated that several other species which were not studied by the author may belong to this genus.

Stroma extended, with one or usually several immersed ascomata, black. Ascomata flattened, black, smooth, simple but often aggregated in a stroma, with separate ostioles, immersed to erumpent. Peridium black, consisting of two layers of flattened cells. Hamathecium probably true paraphyses, simple or somewhat branched above the asci, colourless, IKI negative. Asci cylindrical, without ocular chamber, IKI negative or positive (blue), with 8, partly overlapping, ascospores. Ascospores fusiform, medium brown, euseptate, symmetrically 1-septate, with pointed ends, with a striate or reticulate ornamentation, without germ pore or slit, with a thin gelatinous sheath. Anamorph unknown.

Distribution and ecology: Pantropical to nearly cosmopolitan, mostly on firm and smooth plant materials, such as bamboo and palm stipes.

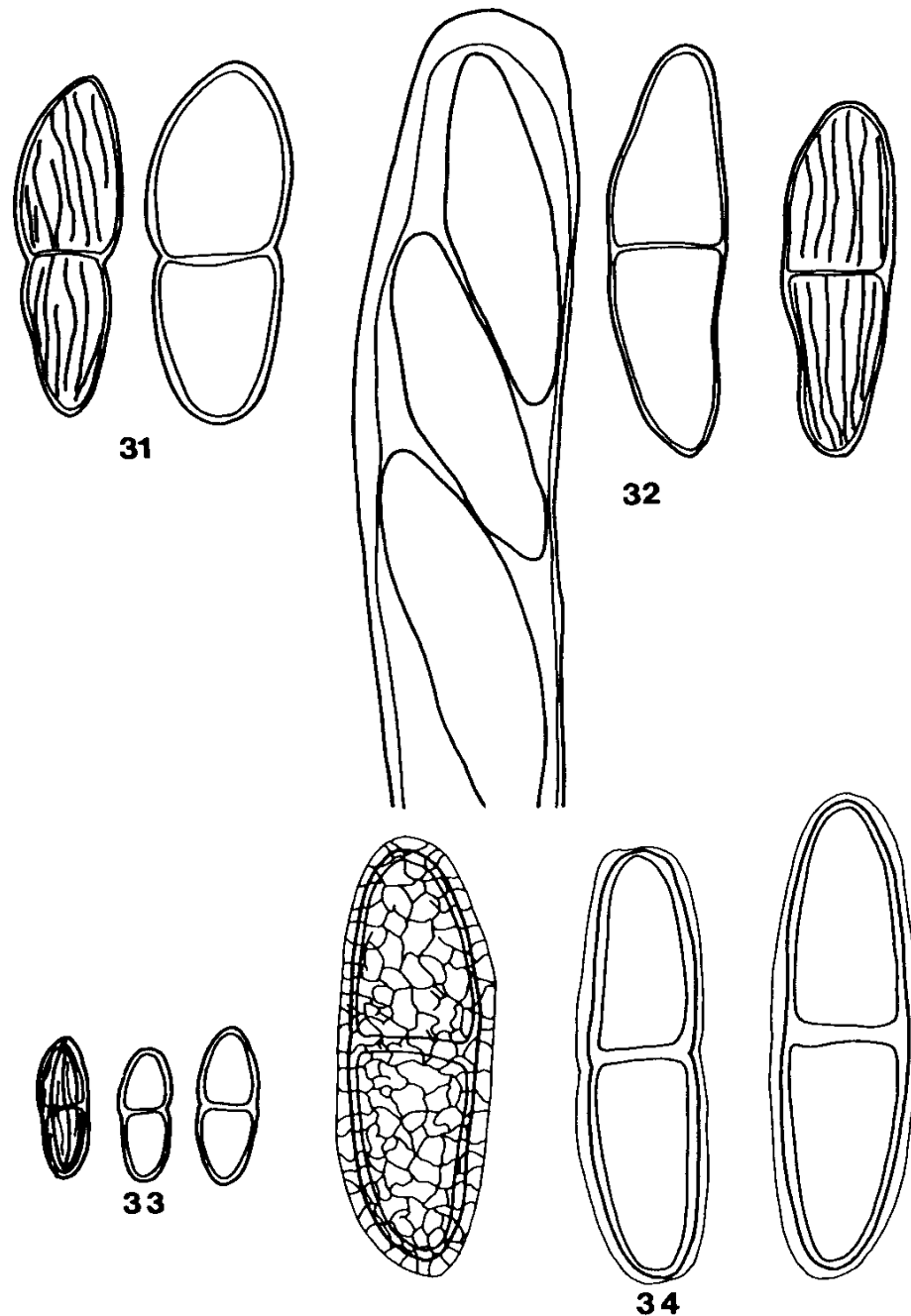
Key to the species of *Rousoëlla*

- | | | | |
|----|---|------------------------|---|
| 1a | Ascospores with reticulate ornamentation..... | <i>R. scabrispora</i> | 2 |
| 1b | Ascospores with striate ornamentation..... | | |
| 2a | Ascospores less than 15 μ m long..... | <i>R. minutella</i> | 3 |
| 2b | Ascospores more than 20 μ m long..... | | |
| 3a | Ascocarps superficial; ascospores pointed; ascus tips often IKI —..... | <i>R. hysterioides</i> | |
| 3b | Ascocarps immersed in the substratum; ascospores rounded; ascus tips always IKI + blue..... | <i>R. serrulata</i> | |

Fig. 31.

13.1 ***Rousoëlla hysterioides*** (Cesati) Höhnel

Dothidea hysterioides Cesati, Atti Accad. Sci. Fis. Mat. Napoli 8: 24. 1880 \equiv *Rhopographus hysterioides* (Cesati) Saccardo, Syll. Fung. 2: 648. 1883 \equiv *Didymosphaeria hysterioides* (Cesati) Theissen & Sydow in sched. \equiv *Rousoëlla hysterioides* (Cesati) Höhnel, Sber. K. Akad. Wiss. Wien, math.-nat. Kl. 128 (1): 563. 1919 [non *Microthelia hysterioides* Rehm].
Type — On Bambusoideae (Gramineae) (not seen).



Figs 31-34. Ascospores and ascus tips: 31. *Roussoëlla hysterioides*, type of *Didymosphaeria rhytidosperma*; 32. *Roussoëlla serrulata*; 33. *R. minutella*; 34. *R. scabrispora*.

Roussoëlla nitidula Saccardo & Paoletti, Atti Ist. veneto Sci. ser. 6, 6: 410. 1888.

Type — INDONESIA: Malacca, on *Bambusoideae* (Gramineae) (PAD, not seen).

Didymosphaeria rhytidosperma Spegazzini, An. Soc. cient. argent. 18: 283. 1884 \equiv *Didymosphaerella rhytidosperma* (Spegazzini) Cooke, Grevillea 18: 29. 1889 \equiv *Microthelia rhytidosperma* (Spegazzini) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898 \equiv *Clypeosphaeria rhytidosperma* (Spegazzini) Rick, Brotéria, Cienc. nat. 29: 197. 1933.

Type — PARAGUAY: Carapeguá, on *Bambusoideae* (Gramineae). Balansa 3822, VII 1883 (LPS, holotype; PC, W, isotypes). New synonymy.

Didymosphaeria striatula Penzig & Saccardo, Malpighia 15: 227. 1901.

Type — INDONESIA: Java, Tjibodas, on *Bambusa* (Gramineae). Penzig 258, 1897 (W, isotype). Synonymy already reported by Müller & Von Arx (1962).

Phaeodothis gigantochloae Rehm, Leafl. Philipp. Bot. 6: 2223. 1914.

Type — PHILIPPINES: Luzon, Los Baños, Mt. Maquiling, on *Gigantochloa scribneriana* (Gramineae). Baker 66, VII 1913 (S, holotype). New synonymy.

This species is characterized by ascocarps, which are compound, immersed in the superficial stroma, and by the striate ornamentation of the pointed ascospores. For a description see Müller & Von Arx (1962: 699).

Distribution and ecology: Pantropical, extending into the subtropics, mostly on bamboos, but also on petioles of palms.

Host plants recorded: *Bambusa vulgaris*, *Calamus* (Gramineae), *Elaeis guineensis* (Palmae), *Gigantochloa scribneriana* and *Phyllostachys bambusoides* (Gramineae).

Selected additional material seen:

ECUADOR: Pichincha, Mindo, on Bambusoideae (Gramineae). Sydow s.n., XI 1937 (M, W (2 ×), sub *Didymosphaeria infossa*); San Jorge, on Bambusoideae (Gramineae). Lagerheim s.n., VII 1892 (FH-Patouillard, sub *Didymosphaeria rhytidosperra*).

BRAZIL: Rio Grande do Sul, São Leopoldo, on *Bambusa* (Gramineae). Rick s.n., 1907 (PACA (2 ×), sub *Didymosphaeria striatula*).

FRANCE: Pyrenées, Uhart-mixe, on *Phyllostachys*. Candoussau 5395, II 1994 (Herb. Candoussau).

GABON: Libreville, on *Elaeis guineensis* (Palmae). Sulmont s.n., II 1968 (ZT).

CHINA: Changsha, Hunan, on Bambusoideae (Gramineae). Shen 376, IX 1933 (CUP-CH, sub *Didymosphaeria rhytidosperra*); Yongso, Kwangsi, on *Bambusa* (Gramineae). Teng 3215, III 1938 (CUP-CH, M, sub *Didymosphaeria infossa*); Changsha, Hunan, on Bambusoideae (Gramineae). Shen 376, IX 1933 (CUP-CH, sub *Didymosphaeria hysterioides*); Yangso, Kwangsi, on Bambusoideae (Gramineae). Teng 3028, III 1938 (CUP-CH, M, sub *Didymosphaeria hysterioides*).

INDIA: West Bengal, Darjeeling, Mochaki, on *Bambusa* (Gramineae). Gupta s.n., VIII 1974 (DAOM 167889, sub *Didymosphaeria striatula*).

PHILIPPINES: Luzon, Los Baños, Mt. Maquiling, on *Gigantochloa scribneriana* (Gramineae). Baker 1237 (S, topotype of *Phaeodothis gigantochloae*); Los Baños, Mt. Maquiling, on *Calamus* (Gramineae). Baker 133, V 1914 (M (2 ×), NY, S, W (2 ×), sub *Didymosphaeria striatula*); Antipolo, on *Bambusa* (Gramineae). Ramos, Bureau of Science 871, X 1912 (S, sub *Didymosphaeria striatula*), also distributed in Rehm, Ascomyceten 2107 (CUP, FH, FH-Höhnel, M, S, W, sub *Didymosphaeria striatula*); Bataan, Mt. Mariveles, on *Bambusa* (Gramineae). Graff s.n., XI 1912, distributed in Sydow, Fungi Exotici Exsiccati 176 (BR, CUP, L (2 ×), M, PACA, W (3 ×), Z, sub *Didymosphaeria striatula*), also distributed in Reliquiae Petrakianae 2647 (B, GZU, H, M, sub *Didymosphaeria striatula*).

INDONESIA: Java, Tjibodas, on *Bambusa* (Gramineae). Höhnel s.n., 1907-1908 (FH-Höhnel, topotype of *Didymosphaeria striatula*); Bogor, on Bambusoideae (Gramineae). Sri Salani s.n., II 1956 (L, sub *Didymosphaeria* sp.); Bogor, on petiole of Palmae. Boedijn s.n., V 1955 (L, sub *Didymosphaeria* sp.); Bogor ('Buitenzorg'), on *Bambusa* (Gramineae). Höhnel s.n., 1907-1908 (FH-Höhnel, sub *Didymosphaeria striatula*); Malacca, on Bambusoideae (Gramineae). Sartellini s.n., s.d. (S, sub *Didymosphaeria striatula*).

PAPUA NEW GUINEA: Madang, Tongu, along road Bogia-Josephstaal, on Bambusoideae (Gramineae). Aptroot 30622, VII 1992 (CBS).

COOK ISLANDS: Raratonga, on Bambusoideae (Gramineae). Parks & Parks 22473, 1929 (FH, GA, H, S, W, ZT, sub *Didymosphaeria striatula*).

13.2 Roussoëlla minutella (Penzig & Saccardo) Aptroot, comb. nov. Fig. 33.

Basionym: *Didymosphaeria minutella* Penzig & Saccardo, Malpighia 11: 396. 1897.

Type — INDONESIA: Java, Tjibodas, on *Bambusa* (Gramineae). Penzig s.n., s.d. (PAD, holotype; W (4 ×), isotypes (2 of which are filed sub *Didymosphaeria fusispora*)).

? *Didymosphaeria phyllostachydis* Hino & Katumoto, Bull. Fac. Agric. Yamaguchi Univ. 7: 272. 1956.

Type — JAPAN: On *Phyllostachys reticulata* (Gramineae). (YAM, not seen).
No reply was received upon a request for type material from YAM. According to the description, this species is almost certainly a synonym of *Roussoëlla minutella*.

Roussoëlla verruculosa Candoussau & Katumoto in Candoussau, Katumoto & Sherwood-Pike, Sydowia 38: 31. 1986 ['1985'].

Type — FRANCE: Hotel Theas, 33 Bernos Beaulac, on *Phyllostachys* (Gramineae). Candoussau 5396, II 1984 (CBS, ZT, isotypes). The species was originally described from *Phyllostachys mitis*, but this identification has been changed in *Phyllostachys* sp. by the author.

The species is characterized by small ascospores (8-12 × 3-5 μm) with a striate ornamentation which is often only visible with interference contrast in light microscopy and simple to aggregated, superficial to immersed ascocarps.

Distribution and ecology: Pantropical, extending into warm temperate areas, mostly on bamboo, but also on palms.

Host plants recorded: *Arundinaria tecta* (Gramineae), *Bambusa vulgaris* (Gramineae), *Dinochloa scandens* (Gramineae), *Hyparrhenia* cf. *filipendula* (Gramineae), *Phyllostachys bambusoides* (Gramineae).

Selected additional material seen:

USA, ALABAMA: Lee Co., Auburn, on *Arundinaria tecta* (Gramineae). Duggar s.n., IX 1891 (CUP-A (3 ×), sub *Didymosphaeria eumorpha* (Berkeley & M. A. Curtis) Atkinson).

CUBA: Bayamo, on *Bambusa vulgaris* (Gramineae). Urtiaga 1137 (IMI 131852, identification uncertain, sub *Didymosphaeria* sp.).

ECUADOR: Pichincha, Mindo, on *Bambusa* (Gramineae). Sydow 388, XI 1937 (M, ZT), also distributed in Reliquiae Petrakianae 1429 (B, GZU, H, L, M, S).

FRANCE: Pyrenées-Atlantiques, Sauveterre de Bearn, on *Phyllostachys bambusoides* (Gramineae). Vivant s.n., XII 1982 (Herb. Vivant, sub *Didymosphaeria* sp.).

ZAMBIA: Chilanga, Mt. Mahulu, on *Hyparrhenia* cf. *filipendula* (Gramineae). Angus s.n., (IMI 95141c, sub *Didymosphaeria* sp.).

CHINA: Hainan, Ting-an, on Bambusoideae (Gramineae). Deng 4536, IX 1934 (CUP-CH, sub *Didymosphaeria bambusicola*).

INDIA: Coonor, Simis Park, on *Bambusa* (Gramineae). Sivanesan s.n., XII 1964 (IMI 299729, sub *Didymosphaeria* sp.).

TAIWAN: Taichung, Kukuan, on Bambusoideae (Gramineae). Sivanesan 264 (IMI 323570, sub *Didymosphaeria* sp.).

PHILIPPINES: Palawan, Silanga, on Bambusoideae (Gramineae). Merrill 8933; 8941 (both FH, NY); Taytay, on *Dinochloa scandens* (Gramineae). Merrill 8755 (FH, NY).

13.3 Roussoëlla scabrispora (Höhnelt) Aptroot, comb. nov. Fig. 34.

Basionym: *Didymosphaeria scabrispora* Höhnelt, Sber. Akad. Wiss. Wien, Abt. 1, 118: 1501. 1909.

Type — INDONESIA: Java, Bogor ('Buitenzorg'), Botanical Garden, on Bambusoideae (Gramineae). S.c. s.n., 1907-1908 (FH-Höhnelt, holotype).

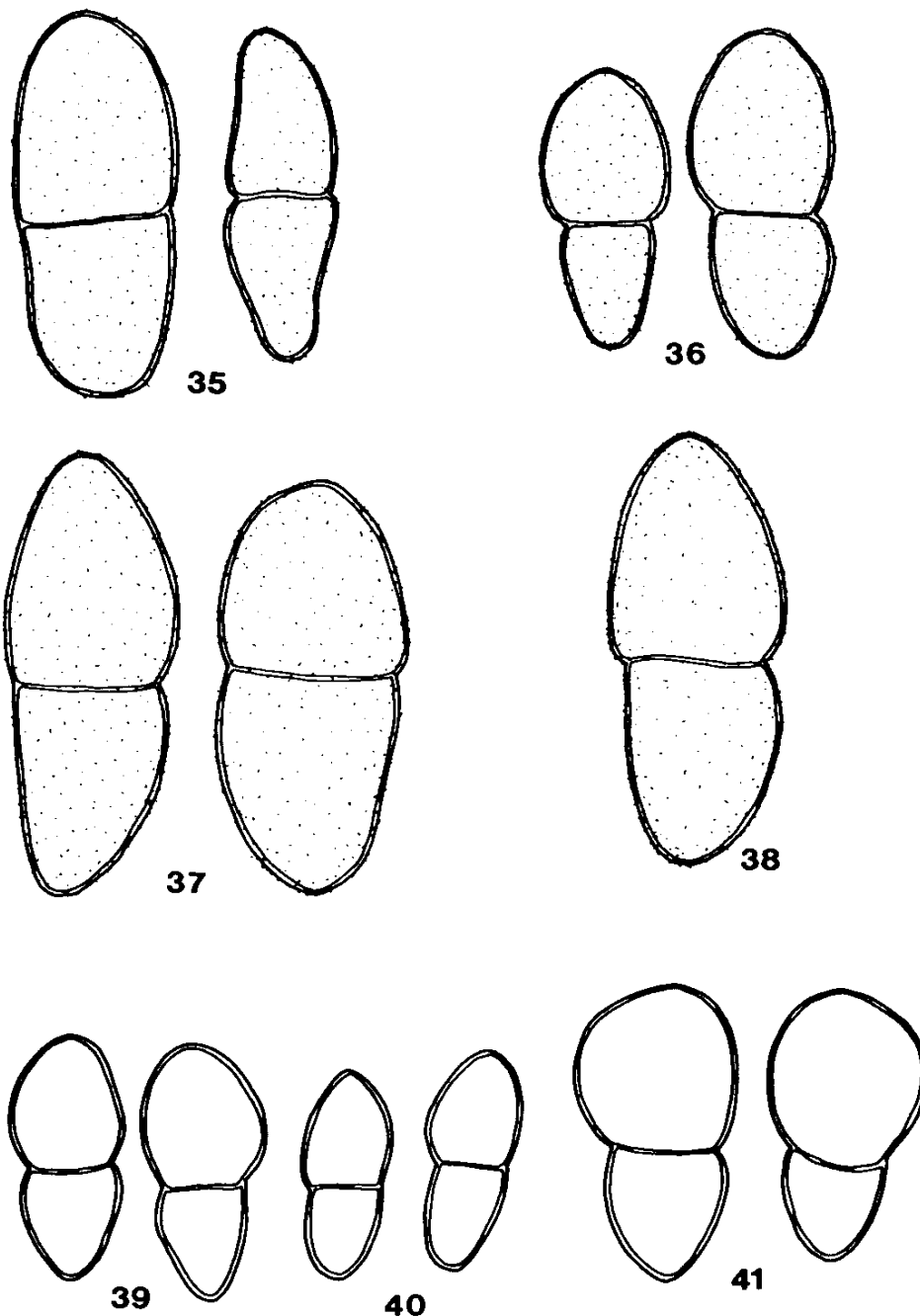
This species is characterized by the reticulate ornamentation on the ascospores.

Distribution and ecology: Tropical Asia, on bamboo.

Host plant recorded: Bambusoideae (Gramineae).

Additional material seen:

INDIA: Assam, Burnihat, on Bambusoideae (Gramineae). Baisya 46, IV 1979 (IMI 238160, sub *Didymosphaeria* sp.).



Figs 35-41. Ascospores and ascus tips: 35. *Mycomicrothelia hemisphaerica*, type of *Didymosphaeria philippina*; 36. *M. miculiformis*, type of *D. coccifera*; 37. *M. obovata*, type of *D. thelenoides*; 38. idem, type of *D. tetraspora*; 39. *M. subfallens*, type of *D. baccharidis*; 40. idem, type of *D. coccifera* var. *cine-reorubricosa*; 41. *M. thelena*, type of *D. palaquii*.

13.4 *Roussoëlla serrulata* (Ellis & G. Martin) K.D. Hyde & Aptroot, comb. nov. Fig. 32.

Basionym: *Didymosphaeria serrulata* Ellis & G. Martin, J. Mycol. 1: 99. 1885 \equiv *Didymosphaerella serrulata* (Ellis & G. Martin) Cooke, Grevillea 18: 29. 1889 \equiv *Microthelia serrulata* (Ellis & G. Martin) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898 \equiv *Seynesia serrulata* (Ellis & Martin) Petrak, Sydowia 7: 109. 1953 \equiv *Amphisphaeria serrulata* (Ellis & G. Martin) M. Barr, Stud. Mycol. 31: 24. 1989.
 Type — USA, FLORIDA: Green Cove Springs. On *Serenoa serrulata* (Palmae). Martin s.n., s.d. (NY, holotype).

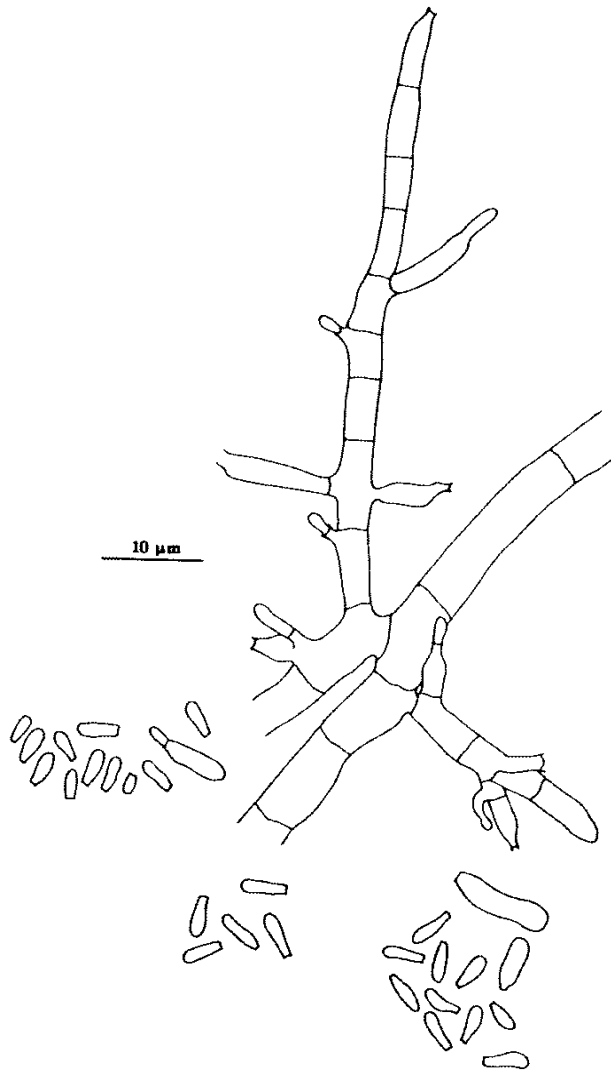


Fig. 42. Conidiophore and conidia of the *Lecythophora*-like anamorph of *Munkovalsaria rubra*. Scale: see bar.

Didymosphaeria andropogonis Ellis & Langlois in Ellis & Everhart, Proc. Acad. nat. Sci. Philad. 1890: 235. 1890 ≡ *Microthelia andropogonis* (Ellis & Langlois) O. Kuntze, Rev. Gen. Pl. 3(2): 498. 1898. Type — USA, LOUISIANA: St. Martinsville, on *Andropogon muricatus* (Gramineae). Langlois 1814 (NY, holotype, FH (2 ×), isotypes).

Didymosphaeria striatispora Sydow in Sydow & P. Sydow, Annls mycol. 2: 260. 1913 (as '*striatospora*'; non Nograsek, 1990).

Type — JAPAN: Mino, Kawauye-mura, on *Miscanthus sinensis* (Gramineae). Hara 73, IV 1912 (S, holotype; W, isotype). New synonymy.

Didymosphaeria infossa Saccardo, Philipp. J. Sci. 18: 597. 1921.

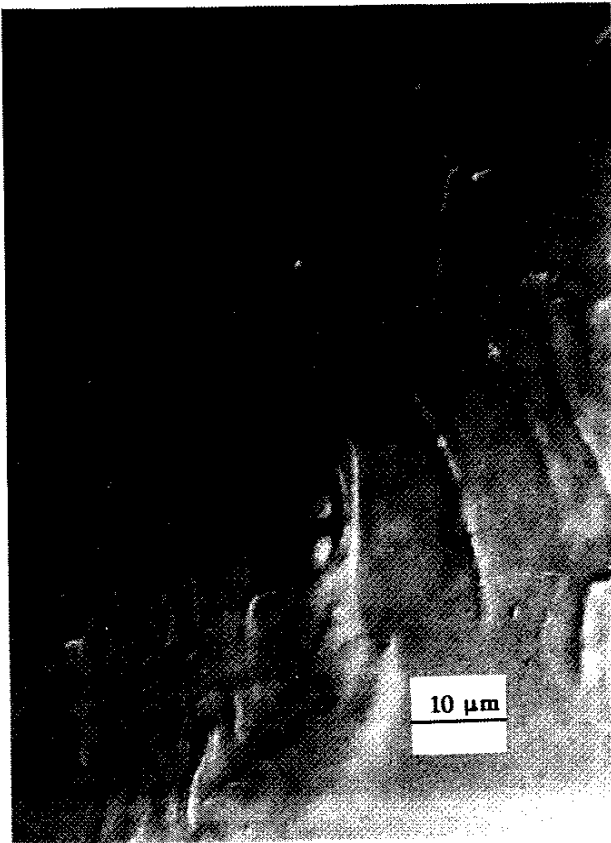
Type — CHINA: Kanton, Kwang Tung, on *Bambusa vulgaris* (Gramineae). Reinking 4732, V 1919 (PAD, holotype; BPI, isotype).

The isotype does not contain an identifiable fungus. All additional material filed under *R. infossa* belongs to *R. hysteroioides* (q.v.).

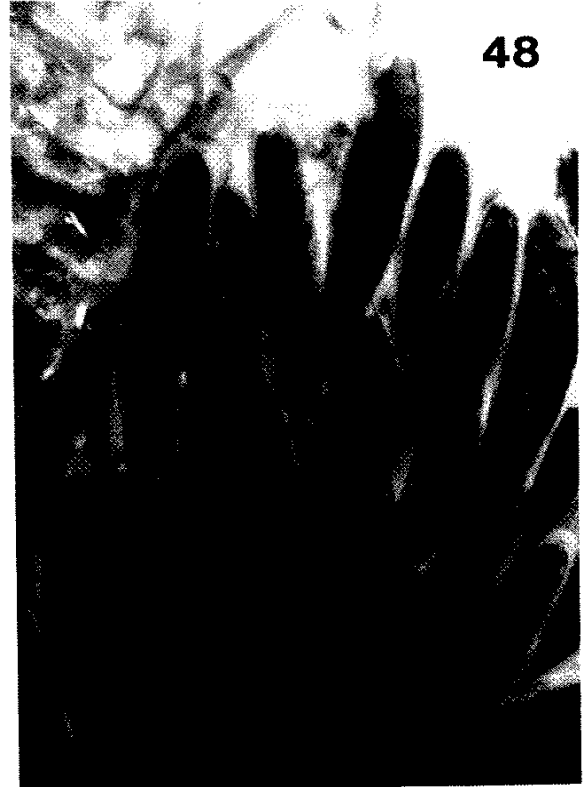
?*Didymosphaeria striatula* var. *minuta* Hino & Katumoto, Bull. Fac. Agric. Yamaguchi Univ. 7: 272. 1956.

Type — JAPAN: On *Phyllostachys bambusoides* (Gramineae) (YAM, not seen).

No reply was received upon a request for type material from YAM. According to the description, this species is almost certainly a synonym of *Roussoëlla serrulata*. The only specimen studied under this name also belongs here (see below).



Figs 43-46. Ascocarp sections with hamathecium: 43. *Didymosphaeria dimastospora*; 44. *Megalotremis megalospora*; 45. *Montagnula opulenta*; 46. *Munkovalsaria donacina*, IMI 352187. All micrographs are printed at the same magnification, see bar.



Figs 47-50. Ascocarp sections with hamathecium and ascospores: 47. *Parapyrenis maritima*; 48. *Phaeodothis winterei*, IMI 13316; 49. *Didymosphaeria bisphaerica*; 50. *Parapyrenis tecomatis*.

Amphisphaeria saccharicola Sivanesan, Trans. Br. mycol. Soc. 65: 397. 1975.

Type — JAMAICA: Botanical Gardens, on *Saccharum officinarum* (Gramineae). Hudson s.n., II 1960 (IMI 84471, not seen). Synonymy follows Barr (1989a).

See for a description Barr (1989a: 24).

The species is characterized by the often deeply (up to 1 mm) immersed ascocarps, the blunt ascospores and the ascus tips, which are consistently IKI positive (blue).

Distribution and ecology: Pantropical, extending into the subtropics, mostly on bamboo, but also on palm leaves.

Host plants recorded: *Andropogon muricatus*, *Bambusa vulgaris*, *Miscanthus sinensis*, *Phyllostachys bambusoides*, *Saccharum officinarum*, *Sasa borealis*, *S. japonica* (all Gramineae), *Serenoa serrulata* (Palmae).

Additional specimen seen:

FRANCE: Pyrénées Atlantiques, Capbreton, on *Sasa japonica* (Gramineae). Candoussau s.n., VI 1984 (ZT, sub *Didymosphaeria striatula* var. *minuta*).

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From the following herbaria all available material of the genus *Didymosphaeria* has been revised: B, BP, BR, CBS, CUP, DAOM, E, FH, GA, GZU, H, HMAS, IMI, L, M, NY, NYS, PACA, S, TUR, UPS, W, Z, ZT, Herb. Aptroot (Soest) and Herb. Vivant (Orthez). From the following herbaria selected material (mainly types) was investigated: AMH, BPI, BUCM, C, G, IMUR, K, LE, LEP, LISU, LPS, MA, PAD, PC, PO, RO, SIENA, Herb. Candoussau (Pau) and Herb. Concarneau (Concarneau). All curators of these herbaria are warmly thanked for their cooperation, especially Mr. G. Mascarell, who was of great help during my visit to the Paris herbarium and Dr. E. Horak, who arranged everything for a successful stay in Zürich.

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