A world revision of *Massarina* (Ascomycota)

by

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With 46 figures


**Abstract:** A world revision of the pyrenocarpous ascomycete genus *Massarina* (Lophiostomataceae, Pleosporales) accepting 43 species is presented. The genera *Epiphegia* and *Oraniella* are reinstated. Several species formerly classified in *Massarina* were found to belong to *Exarmidium*, of which *Xylopezia* is found to be a synonym. Several other species are excluded from the genus; most of them were found to be synonymous with other taxa, including many lichens. The following new combinations are proposed: *Anisomeridium grumatum* (Cooke) Aptroot, *Epiphegia microcarpa* (Fuckel) Aptroot, *Exarmidium biseptatum* (Sherwood) Aptroot, *E. excellens* (Rehm ex Saccardo) Aptroot, *E. hemisphaericum* (Fries:Fries) Aptroot, *E. inclusum* (Persoon) Aptroot, *Massarina igniaria* (C. Booth) Aptroot, *Pseudopyrenula staphyleae* (Petrak) Aptroot, *Splanchnonema quinqueseptatum* (M. Barr) Aptroot, *Wettsteinina corni* (Fuckel) Aptroot, and *W. xerophylli* (Ellis) Aptroot.

**Key words:** Ascomycetes, *Massarina*, Lophiostomataceae, Pleosporales, *Epiphegia*, *Oraniella*, *Xylopezia*, *Anisomeridium*, *Exarmidium*, *Pseudopyrenula*, *Splanchnonema*, *Wettsteinina*, lichens, revision.

**Introduction and History**

The genus *Massarina* Saccardo (1883) was erected for species of pyrenocarpous ascomycetes segregated from *Massaria* De Notaris by having hyaline ascospores. Among the original species, the most common species of the genus as presently circumscribed, *M. eburnea* (Tulasne & C. Tulasne) Saccardo, was selected as lectotype of the genus by Clements and Shear (1931).

The genus was ranked in a separate family, the Massarinaceae Munk, by Munk (1956), but it is now regarded as belonging to the Lophiostomataceae Saccardo in the Pleosporales, according to Barr (1992).

Most species of *Massarina* are saprotrophs occurring on wood, with many representatives in aquatic or marine habitats. Little is known about host preferences, but most of the common species are known from a wide variety of hosts. However, some species appear to be restricted to, e.g., palms or *Dryas*.
At present, 160 taxa are described in or combined into the genus, most of which were enumerated by Hyde (1995a), who also redescribed and illustrated the type species. Some species formerly classified in *Massarina* have already been transferred to various other genera, including the unrelated genera *Acrocordia* Massalongo and *Phragmoporthe* Petrak.

Several genera were treated as synonyms of *Massarina* by Petrak (1959), Bose (1961), Müller & Von Arx (1962), Von Arx & Müller (1975) and Kohlmeyer & E. Kohlmeyer (1979). Hyde (1995a) enumerates nine generic synonyms from the literature, but most of them differ considerably from *Massarina*. Among them, only the synonymy of *Bertiella* (Saccardo) Saccardo & Sydow and *Pseudodiaporthe* Spegazzini with *Massarina* could be confirmed.

Three regional revisions of the genus have been published. The revision of Bose (1961) covered most European species, and was supplemented with some extra-European species; the revision of Srinivasulu and Sathe (1974) only covered species known from India, while Barr (1992) treated the North American members of the genus. None of these revisions was exhaustive and many taxa remain for which only the original description, often dating back to the previous century, exists.

More recently, several *Massarina* species have been collected during explorations in the tropics, mainly in freshwater habitats (Hyde & Aptroot 1997b, Shearer & Hyde 1997) or on palms (Hyde & Aptroot 1997a). In order to confidently name these taxa, it became necessary to revise all species described in *Massarina* and similar genera.

**Material and methods**

Nearly 1000 specimens labelled as species of *Massarina* were studied, including the types of most described taxa. Material was examined from as many taxa as possible, including those already redisposed or synonymized before the start of this study. All available material of the genus from the following herbaria was examined: ABL, BR, BRIP, C, CBS, CUP, FH, GZU, HKU (M), L, M, NY, UPS, herb. Berger (Kopfing, Austria) and herb. Jaklitsch (Wien, Austria); while selected material (mainly types) was investigated from: AMH, ASU, B, BERN, BP, BPI, CO, DAOM, DAR, G, H, HIO, IMI, IMUR, K, LPS, NYS, PAD, PC, S, W and ZT. Because of the large number of specimens available, only selected material is listed for common species, including material from all countries from which specimens have been studied, as well as all identifiable exsiccata from published series.

Because most species are known only from herbarium material, most of the work was carried out with dried specimens. In addition, cultures available in the CBS collection were studied and fresh material was collected in the Netherlands, Germany, Belgium, France, Sweden, Switzerland, Canada and Papua New Guinea, but this led to a limited number of isolates. Some dried cultures were also studied, mainly preserved in the herbarium of IMI. Attempts to culture species using ascospores from dried specimens were unsuccessful. Cultures were studied on various standard media, including beerwort agar (2%) (MEA) and oatmeal agar (OA), often with sterilized *Lupinus* stems or *Fagus* twigs.

The available indices of published *Massarina* names were found to be incomplete. The list of names of *Massarina* species presented here was obtained by combining the published lists with an exhaustive study of the literature and annotations in the herbaria listed. The status of all names encountered was checked against the International Code of Botanical Nomenclature (ICBN, Greuter et al. 1994), and some were found to be either invalid or illegitimate. In this paper not only the illegitimate and invalidly published names are treated, but also herbarium names for which no publication could be traced. Some of these names have been incorrectly regarded by other authors as published, and therefore the recommendation not to mention hitherto unpublished names is not followed.
All material cited, including types, was examined unless otherwise indicated. All specimens were examined using an Olympus BH microscope, with Nomarski differential interference contrast. Hand sections and occasionally microtome sections were mounted in water, in which all measurements were made. Iodine reactions were observed in undiluted Lugol's solution (Merck 9261). A variety of other mounting media was used for comparison to evaluate the effect on morphology and dimensions, including 10% KOH, KOH followed by IKI, NaClO, Melzer's reagent, NaOH, lactophenol, cotton blue in lactic acid, Congo red, and Shear's reagent. Illustrations are from the types unless otherwise mentioned. All drawings were made with a camera lucida equipment at constant magnification, as indicated by the bars, which represent 10 μm in all figures.

Results and discussion

Pyrenocarpous ascomycetes have comparatively few morphological characters and therefore all available characters must be taken into account. At the start of this study, no deliberate selection was made as to which characters were to be regarded as relevant at which level, because the same character can be a valuable generic criterion in certain groups or the product of infraspecific variation in another group. As expected, however, the structure of the hamathecium proved to be valuable in characterizing the genera belonging to the family Lophiostomataceae, as was found in related groups (Hawksworth 1985, Aguirre 1991, Aptroot 1991, 1995b).

Of the 160 Massarina names, only 43 are accepted here for species which occur on various plant substrata worldwide. The lectotype species, M. eburnea (Tulasne & C. Tulasne) Saccardo, is very common in Europe and North America, mostly on twigs of Fagus sylvatica. Some other species are fairly common and widespread. Most species, however, are only known from one or a few collections. Some of these may be rare, but they may also have been overlooked, due to their inconspicuous habit. Therefore, little can be said of the ecology and the distribution of the rarely collected species. However, relatively many species are known from freshwater habitats (Hyde & Aptroot 1997b) or from palms (Hyde & Aptroot 1997a).

All species of Massarina are characterized by septate pseudoparaphyses, hyaline, septate, fusiform to long-ellipsoid ascospores and bitunicate asci. The type species, M. eburnea, has an immersed, little developed ascoma wall and broadly fusiform, 3-septate ascospores with a thick gelatinous sheath. The majority of the species differs from the type species in various characters, especially the ascospore shape, which is often narrowly fusiform, and the shape and extension of the gelatinous sheath around the ascospores.

The descriptions given here contain only what are considered to be important diagnostic characters. These include ascospore shape, septation and dimensions and the presence/absence, shape and dimensions of the surrounding gelatinous sheath, hamathecium structures and dimensions and shape and dimensions of the ascomata and ostioles. Little variation was observed in the asci, except for the dimensions, which correlate with the ascospore dimensions, as all asci contain eight, irregularly biseriate ascospores. Peridium thickness and the degree of carbonization of the clypeus proved to be very variable (even within one specimen) and they are correlated with the degree of immersion of the ascomata, which is in itself often rather variable with-
in a species. In general, immersed ascomata are relatively thin-walled and little carbonized, whereas superficial ascomata are thick-walled and heavily carbonized. Erumpent ascomata are intermediate. For illustrations of peridium and clypeus structures of representative species see Hyde (1989, 1995a, 1995b) and Hyde & Aptroot (1997a, 1997b).

Some species of *Massarina* appear similar to species of other genera, especially *Astrosphaeriella* Sydow & P. Sydow, differing from their counterparts in *Massarina* only in a few characters, particularly the septate pseudoparaphyses (versus anastomosing trabeculae). Also, the reported anamorphs do belong to very different groups. Therefore, the species accepted here in *Massarina* may not form a monophyletic group. However, on the basis of morphological characters, no clear subdivision could be made. Future studies using ultrastructure or DNA analysis may be required.

No attempt has been made to survey other genera for species that may be better assigned to *Massarina*. Especially in the (currently not accepted) genus *Metasphaeria* Saccardo, numerous species have been described which might belong to *Massarina*, but additional species of *Massarina* may also be currently hidden in *Massariosphaeria* (E. Müller) Crivelli, *Mycosphaerella* Johanson, *Wettsteinina* Höhnel, or even the genera mentioned in Table I. Also the delimitation between the genera of the Lophiostomataceae (Barr 1992, Holm & Holm 1988), especially between *Lophiostoma* Cesati & De Notaris and *Massarina*, seems schematic rather than natural. However, before a more natural classification can be obtained, the other genera of the family should be revised and the distinguishing characters evaluated.

The species so far placed in *Massarina* are found to belong to very different groups (Tab. I). Among them are ten more or less lichenized species, belonging to unrelated genera like *Anisomeridium* (Müller Argoviensis) M. Choisy, *Pyrenula* Acharius, *Stigula* Fries and *Trypethelium* Sprengel. In addition, some species could not be satisfactorily assigned to any known genus.

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Table I. Genera to which former *Massarina* species are disposed

<table>
<thead>
<tr>
<th>Acrocordia</th>
<th>Mycosphaerella</th>
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<tr>
<td>Anisomeridium</td>
<td>Oraniella</td>
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<tr>
<td>Arthopyrena</td>
<td>Paraphaeosphaeria</td>
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<tr>
<td>Cainia</td>
<td>Peridiothelia</td>
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<td>Chaetomium</td>
<td>Phaeodothis</td>
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<td>Diaporthe</td>
<td>Polymeridium</td>
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<td>Didymella</td>
<td>Pseudopyrenula</td>
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<tr>
<td>Didymosphaeria</td>
<td>Pyrenula</td>
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<tr>
<td>Epiphegia</td>
<td>Requienella</td>
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<tr>
<td>Exarmidium</td>
<td>Splanchnonema</td>
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<tr>
<td>Heterosphaeria</td>
<td>Strickeria</td>
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<td>Keissleriella</td>
<td>Strigula</td>
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<td>Lophiostoma</td>
<td>Trypethelium</td>
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<tr>
<td>Massaria</td>
<td>Wettsteinina</td>
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<td>Melomastia</td>
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Two unispecific genera, *Epiphegia* Nitschke ex G.H. Otth and *Oraniella* Spegazzini, are reinstated and briefly treated. Several species were found to belong to *Exarmidium* P. Karsten, of which *Xylopezia* Höhnel is found to be a synonym. This genus was recently treated as pyrenomycetous (Barr & Boise 1985), whereas its synonym had been treated as (excluded) discomycetous, partly by the same author (Sherwood-Pike & Boise 1986). Both revisions roughly cover the same set of species. Unfortunately, the little-known name *Exarmidium* has priority, whereas the epithets used in *Xylopezia* are older. Several other species are excluded from *Massarina*, and are most often found to be synonymous with other taxa.

**Key to some hyalophragmosporous pyrenomycete genera likely to be confused with Massarina**

1a. Asci unitunicate; hamathecium filaments paraphyses with free tips ........................................ 2  
1b. Asci bitunicate; hamathecium filaments indistinct, pseudoparaphyses or trabeculae, without free tips 3

2a. Asci always IKI-positive (blue), with pulvillus; ascospores uniseriate ......................... *Discostroma*  
2b. Asci usually IKI-negative, or only IKI-positive (blue) after pretreatment with KOH; ascospores irregularly biseriate .................................................. 3. *Exarmidium*

3a. Hamathecium filaments indistinct, hamathecium composed of dispersed remnants of the initial interascal tissue; ascospores often with pseudosepta (incomplete septa) in addition to eusepta....

3b. Hamathecium filaments distinct, pseudoparaphyses or trabeculae; ascospores usually with eusepta only ................................................................. 5. *Wettsteinina*

4a. Hamathecium filaments trabeculae, anastomosing and with few septa, usually less than 1 µm wide 5

4b. Hamathecium filaments pseudoparaphyses, not anastomosing or only anastomosing above the asci, with many septa, usually more than 1.5 µm wide .................................. 6

5a. Ascomata conical, often erumpent or superficial; ascospores with pointed ends, usually more than 30 µm long ......................................................... *Astrosphaeriella*  
5b. Ascomata pyriform, immersed; ascospores with rounded ends, less than 30 µm long 4. *Oraniella*

6a. Ascomata aggregated in dense clusters; ostioles with fused walls .................................. 2. *Epiphegia*  
6b. Ascomata single or in loose clusters; ostioles not fused ................................................ 1. *Massarina*


Type — *Massarina eburnea* (Tulasne & C. Tulasne) Saccardo, lectotype, fide Clements & Shear (1931) (≡ *Sphaeria pupula* var. *minor* Desmazières).


Type — *Bertiella macrospora* (Saccardo) Saccardo & Traverso, holotype (≡ *Massarina macrospora* (Saccardo) O. Eriksson & J.Z. Yue).


Type — *Pseudodiaporthe coffeae* Spegazzini, holotype (≡ *Massarina coffeae* (Spegazzini) Bose = *Massarina corticola* (Fuckel) L. Holm).

Stroma not well differentiated, sometimes forming an external clypeus around the ostiole, black, but often reduced. Ascomata single or aggregated, sometimes below a clypeus, pseudothecioid, sphaeroid, hemispherical, conical, globose or pyriform, black, smooth or irregularly roughened, immersed, erumpent or superficial. Subicu-
lum none. Peridium thin at base and sides, pale brown to black, consisting of a mul-
ticellular layer of brown, flattened hyphae (textura intricata), IKI-negative, KOH-
negative. Hamathecium consisting of relatively wide (over 1 μm), septate pseudopa-
raphyses (not trabeculae), unbranched between the asci, but often branched and ana-
stomosing above the asci, colourless, embedded in a gelatinous matrix, not in-
spersed with oil droplets, IKI-negative. Asci narrowly to broadly clavate (largely depending
on the size of the ascospores), bitunicate, usually with a shallow, c. 2 μm wide, ocu-
lar chamber, dextrinoid (IKI-positive, brownish), with 8 ascospores which are irregu-
larly biseriate. Ascospores fusiform to long ellipsoid, hyaline, asymmetrically or sym-
metrically 1-3(-7)-septate, constricted near the septum or not, without germ locus,
often covered with a thin to thick gelatinous sheath and/or with polar gelatinous
appendages; senescent ascospores remaining hyaline or more often becoming pale
to dark brown, with or without minutely verrucose ornamentation. Anamorphs some-
times formed in culture or found in nature in close association, belonging to Acroca-
lymma Alcorn & J.A.G. Irwin, Chaetophoma Cooke, Diplodia Fries, Periconia To-
de, Phoma Saccardo, Stagonospora (Saccardo) Saccardo, Tetraploa Berkeley & Broome,
Tumularia Marvanová & Descals, or not identifiable.

Distribution and ecology: The 43 recognized species of the genus occur worldwide.
Most species are saprophytes on plant material, especially wood and branches. Rela-
tively common in marine or fresh-water habitats.

Notes: The remaining genera treated as synonyms of Massarina by Petrak (1959),
Bose (1961), Müller & Von Arx (1962), Von Arx & Müller (1975), Kohlmeyer & E.
Kohlmeyer (1979) or Hyde (1995a) and their type species are discussed below. The
type species of all these genera, except Phragmosperma marattiae (Hennings) Theis-
ßen & Sydow, are also discussed in the main body of the text, under the respective
genera, or in the annotated list of species. None of them was found to be congeneric
with Massarina.

Type — Abaphospora rhopalosperma Kirschstein, holotype (≡ Massarina rhopalosperma (Kirschstein)
E. Müller). This genus is a new synonym of Strickeria Koerber rather than of Massarina,
with which it was synonymized by Müller & Von Arx (1962).

Type — Amphididymella adeana Petrak, holotype (≡ Massarina adeana (Petrak) E. Müller). The type
species was correctly synonymized by Yue & Eriksson (1985) with Acrocordia gemmata (Ach.) Massal.
Amphididymella Petrak is therefore a synonym of Acrocordia Massalongo rather than of Massarina,
with which it was synonymized by Petrak (1959).

Type — Clypeothecium weirii Petrak, holotype. The type species was synonymized by Barr & Boise (1985)
with Exarmidium morthieri (Fuckel) M. Barr & Boise, which is synonymized below with Exarmidium
hemisphaericum (Fries: Fries) Aptroot; the genus therefore becomes a synonym of Exarmidium P. Karsten,
as shown by Barr & Boise (1985); the synonymy with Massarina proposed by Von Arx & Müller (1975)
is not tenable.

Type — Epiphegia alni Nitschke ex G.H. Otth, holotype (≡ Massarina alni (Nitschke ex G.H. Otth) Sacc-
cardo = Epiphegia microcarpa (Fuckel) Aptroot). The genus Epiphegia is reinstated below.
**Holstiella** Hennings, in Engler, Die Pflanzenwelt Ostafrikas, C: 33. 1895.

Type — *Holstiella usambarensis* Hennings, holotype ("Massarina usambarensis" (Hennings) Höhnel, nom. herb.). The type species represents the common pantropical lichen *Trypethelium eluteriae* Sprengel. Thus, *Holstiella* becomes a synonym of *Trypethelium* Sprengel rather than of *Massarina*, with which it was synonymized by Von Arx & Müller (1975).


Type — *Massarinula quercina* Généau de Lamarlière, holotype (≡ *Massarina quercina* (Généau de Lamarlière) E. Müller). No material of the type species was found in PC. It was probably also not examined by Müller or Von Arx. Therefore, the application of this generic name, which was synonymized by Müller & Von Arx (1962) with *Massarina*, remains obscure. According to the description given by Müller & Von Arx (1962), this species could be a synonym of *Arthopyrenia punctiformis* Massalongo, and the genus would become a synonym of *Arthopyrenia* Massalongo.


Type — *Oraniella coffeicola* Spegazzini, holotype (≡ *Massarina coffeicola* (Spegazzini) Bose). The genus was synonymized with *Massarina* by Bose (1961). However, the type and only species belongs to the Melanommatales. It does not seem to be closely related to any other genus currently accepted in the order. It is reinstated with a single accepted species, *Oraniella coffeicola* Spegazzini.


Type — *Paraspbaeria contraria* Sydow, holotype (≡ *Massarina contraria* (Sydow) v. Arx & E. Müller). No material of the type species was found in either B, FH or S. Therefore, the type should be regarded as lost, possibly destroyed in Berlin during World War II. It was probably also not examined by Von Arx & Müller (1975). The application of the generic name remains obscure.


Type — *Phragmosperma marattiae* (Hennings) Theissen & Sydow, holotype (≡ *Micropeltis marattiae* Hennings). According to the description of the type, this fungus is a true foliicolous Dothidealean fungus, not even remotely related to *Massarina*, though it was cited as a synonym by, e.g., Kohlmeyer & E. Kohlmeyer (1979).

**Trematostoma** (Saccardo) Shear, Mycologia 34: 273. 1942 ≡ Zignoëlla subgenus Trematostoma Saccardo, Syll. Fung. 2: 222. 1883.

Type — *Trematostoma morthieri* (Fuckel) Shear, holotype (≡ *Trematosphaeria morthieri* Fuckel ≡ *Massarina morthieri* (Fuckel) von Arx & E. Müller). The type species was found to be identical with *Exarmidium hemisphaericum*, and the genus becomes a synonym of *Exarmidium* P. Karsten, with which it was already synonymized by Barr & Boise (1985), but not with *Massarina*, as proposed by Von Arx & Müller (1975).

**Key to the species of Massarina**

Mature, but hyaline ascospores should be examined for measurements, septation and gelatinous sheath, as these characters are often different in young and senescent ascospores.

1a. Ascospores (1-3)-7-septate ................................................................. 2
1b. Ascospores 1-septate, at most with additional incomplete septa (pseudosepta) .................................................. 18
2a. Ascospores (3)-4-7-septate ................................................................. 3
2b. Ascospores at most 3-septate ............................................................. 7
3a. Ascospores 3-4-septate, (16)-21-24(-26) μm long ................................ 1.31 *M. papulosa*
3b. Ascospores (3)-5-7-septate ................................................................. 4
4a. Gelatinous sheath with up to 50 μm long appendages; ascospores (38)-45-60(-70) μm long .................................................. 1.25 *M. ingoldiana*
4b. Gelatinous sheath without appendages ................................................. 5
5a. Ascospores less than 35 (27-33) μm long ............................................. 1.44 *M. sp. (undescribed)
5b. Ascospores more than 35 μm long .................................................. 6
6a. Ascospores 3-5 septate, 37-53 μm long ............................................ 1.30 M. palmicola
6b. Ascospores 5-7-septate, 43-50 μm long .......................................... 1.37 M. talae
7(2)a. Ascospores long ellipsoid to broadly fusiform .............................. 8
7b. Ascospores (narrowly) fusiform ...................................................... 14
8a. Ascomata aggregated below a clypeus, ascospores (16-)21-24(-26) μm long... 1.29 M. palmetta
8b. Ascomata single ................................................................. 9
9a. Ascospores long ellipsoid; gelatinous sheath expanding when membrane is broken ............. 10
9b. Ascospores broadly fusiform; gelatinous sheath missing or not normally expanding when broken 11
10a. Hamathecium filaments unbranched, more than 2 μm wide; ascospores 19-25 μm long .................. 1.35 M. ricifera
10b. Hamathecium filaments branched, less than 2 μm wide; ascospores 16-21 μm long .......... 1.14 M. carolinensis
11a. Ascospores with gelatinous sheath ............................................. 12
11b. Ascospores without gelatinous sheath, (25-)27-32(-35) μm long; ascospore wall 1-2 μm thick ....... 1.16 M. cisti
12a. Ascospores not or only slightly constricted at the septa, (25-)32-42(-50) μm long .................... 1.20 M. eburnea
12b. Ascospores strongly constricted, at least at the median septum ........................................... 13
13a. Ascospores constricted at all septa, 42-50(-56) μm long; sheath not constricted 1.41 M. velatispora
13b. Ascospores constricted only at the median septum, (28-)33-45(-47) μm long; sheath also constricted at the median septum ................................................................. 1.39 M. thalassiae
14(7)a. Ascospores without gelatinous sheath, 26-30 μm long; senescent (brownish) ascospores 1-septate
14b. Ascospores with gelatinous sheath; senescent (brownish) ascospores 3-septate ................... 1.23 M. igniaria
15a. Gelatinous sheath with appendages; ascospores strongly curved, 32-35 μm long 1.4 M. appendiculata
15b. Gelatinous sheath without appendages; ascospores mostly straight ................................... 16
16a. Ascospores mostly more than 25 [(17-)24-28(-33)] μm long ....................... 1.1. M. acrostichi
16b. Ascospores mostly less than 25 μm long .................................. 17
17a. Ascospores strongly constricted at the median septum, (15-)17-25(-28) μm long .................. 1.36 M. rubi (3-septate material)
17b. Ascospores not or weakly constricted at the median septum, 20-24(-27) μm long 1.42 M. waikanaënsis
18(1)a. Ascospores long ellipsoid to ovoid or broadly fusiform ....................... 19
18b. Ascospores fusiform .......................................................... 28
19a. Ascospores ovoid, (22-)24-30 μm long; upper cell much larger than lower cell 1.10 M. balnei-ursi
19b. Ascospores long ellipsoid to broadly fusiform .................................. 20
20a. Ascospores long ellipsoid, 50-65(-73) μm long; hamathecium filaments unbranched, more than 3 μm wide ................................................................. 1.18 M. cystophorae
20b. Ascospores broadly fusiform; hamathecium filaments branched, less than 3 μm ............... 21
21a. Ascospores without gelatinous sheath ........................................ 22
21b. Ascospores with gelatinous sheath ............................................ 24
22a. Ascospores more than 35 (38-46) μm long .................................. 1.32 M. peerallyi
22b. Ascospores less than 30 μm long ............................................. 23
23a. Ascospores straight, without pseudo-septa, (20-)25-30 μm long ....................... 1.11 M. biconica
23b. Ascospores curved, with pseudo-septa, 25-31 μm long .......................... 1.40 M. thalassioidea
24a. Ascospores very strongly constricted, often breaking into halves, (17-)19-22(-24) μm long .... 1.24 M. immersa
24b. Ascospores not or less strongly constricted, not breaking into halves .................. 25

96
25a. Ascospores not constricted, without pseudosepta, 32-42 μm long 1.20 M. eburnea (1-septate material)
25b. Ascospores constricted, often with additional incomplete septa (pseudosepta)............. 26

26a. Upper ascospore cell bulging out above the septum; gelatinous sheath with appendages, expanding when the membrane is broken; ascospores 32-42 μm long. 1.34 M. ramunculicola
26b. Upper ascospore cell not bulging out; gelatinous sheath without appendages, not expanding. 27

27a. Ascospores less than 40 [32-36] μm long. 1.28 M. moeszii
27b. Ascospores mostly more than 40 [(34-45-55(-59))] μm long. 1.9 M. australiensis

28(18)a. Ostiole laterally flattened (slot-like) ....................................................... 29
28b. Ostiole rounded (flush, papillate or beak-like) ............................................. 31

29a. Upper ascospore cell bulging out above the septum; ascospores without gelatinous sheath, 35-44 μm long 1.26 M. lignorum
29b. Upper ascospore cell not bulging out; ascospores with gelatinous sheath ................................................................. 30

30a. Gelatinous sheath with conical appendages with an internal spine; ascospores 23-28 μm long... 1.21 M. fronsisubmersa
30b. Gelatinous sheath without appendages; ascospores 52-56 μm long 1.19 M. desmonci

31a. Ostiole forming an up to 170 μm long beak; ascospores not or only slightly constricted at the septum, 19-22 μm long. 1.43 M. walkeri
31b. Ostiole flush or papillate; ascospores constricted at the septum. .......................... 32

32a. Ascospores without gelatinous sheath, upper cell never bulging out (when bulging out, go to 36) 33
32b. Ascospores with gelatinous sheath, upper cell bulging out or not ............................................. 36

33a. Ascospores less than 25 μm long ................................................................. 34
33b. Ascospores mostly more than 25 μm long ..................................................... 35

34a. Ascospores strongly constricted, more than 4.5 μm wide, 16-23(-25) μm long 1.22 M. hepaticarum
34b. Ascospores slightly constricted, less than 4.5 μm wide, (18-)23-25 μm long 1.15 M. chamaecyparissi

35a. Ascospores more than 35 (36-43) μm long........... 1.27 M. macrospora
35b. Ascospores less than 35 (24-32) μm long............................. 1.8 M. arundinariae
36(32)a. Gelatinous sheath with more than 10 μm long, often curved, appendages .......... 37
36b. Gelatinous sheath without appendages, at most with short, up to 10 μm long, extensions... 38

37a. Gelatinous appendages about twice as long as wide, continuous with a gelatinous sheath surrounding the ascospores; ascospores 27-35(-39) μm long............. 1.6 M. armatispora
37b. Gelatinous appendages about 4 times as long as wide, not or little extending around the ascospores; ascospores 24-32 μm long. 1.12 M. bipolaris

38a. Upper ascospore cell not bulging out above the septum........................................ 39
38b. Upper ascospore cell bulging out above the septum........................................... 41

39a. Ostiole pale, wide; ascospores less than 23 [(14-)16-19(-22)] μm long. 1.2 M. albocarnis
39b. Ostiole dark, narrow; ascospores more than 23 μm long................................... 40

40a. Ascospores less than 35 [(23-26-29(-32))] μm long .............. 1.3 M. amphibia
40b. Ascospores more than 35 [40-50] μm long............................................... 1.33 M. purpurascens

41a. Gelatinous sheath constricted at the septum; ascospores 22-29(-34) μm long... 1.5 M. aquatica
41b. Gelatinous sheath not constricted at the septum............................................. 42

42a. Ascospores mostly less than 25, [(15-)17-25(-28)] μm long..................................... 1.36 M. rubi
42b. Ascospores mostly more than 25 μm long................................................... 43

43a. Gelatinous sheath usually extending beyond the ascospore ends; ascospores (22-25-34 μm long. 1.7 M. arundinacea
43b. Gelatinous sheath not conspicuously extending................................. 44

44a. Ascospores often curved, 29-35(-42) μm long; senescent (brown) ascospores 5-6-septate...... 1.38 M. tetraploa
44b. Ascospores usually straight; senescent (brown) ascospores 3-4-septate......... 45
45a. Ostiole pale, wide, not papillate; ascospores (28-)32-35 μm long.  
45b. Ostiole black, narrow, papillate; ascospores (22-)25-35(-40) μm long.


Type — **BRUNEI**: Kampong Kapok Mangrove, on rhachis of *Acrostichum speciosum* (Pteridophyta). Hyde s.n., V 1987 (IMI 327274, holotype).

For additional illustrations see Hyde (1989).

Ascomata 300-600 μm diam., conical, immersed, with an erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores fusiform, (1-)3-septate, (17-)24-28(-33) × 6-10 μm, with a median constriction, not constricted at the additional septa, middle cells equal, broader but shorter than end cells, ends pointed, surrounded by a 3-5 μm thick gelatinous sheath. Senescent ascospores pale brownish and ornamented with small warts. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** So far only known from Brunei, on decaying fern.

**Host plant recorded:** *Acrostichum speciosum* (Pteridophyta).

1.2 **Massarina albocarnis** (Ellis & Everhart) M. Barr, Mycotaxon 45: 210. 1992. 


Type — **CANADA**: Ontario, London, on *Cornus* (Cornaceae). Dearness s.n., V 1891, distributed in Ellis & Everhart, North American Fungi 2820 (NY, lectotype, designated here; NY (2x), isotypes).

Ascomata 300-450 μm diam., rounded, immersed, with a wide, pale, erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores fusiform, 1-septate, (14-)16-19(-22) × 4-6 mm, with a median constriction, cells equal, ends pointed, surrounded by a 1 μm thick gelatinous sheath, which may be protracted at the ends. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** So far only known from Canada, on branches of Betulaceae.

**Host plants recorded:** *Cornus* (Cornaceae) and *Ostrya virginiana* (Betulaceae).

**Additional material seen:** Canada: Ontario, London, on *Cornus* (Cornaceae). Dearness s.n., IV 1890 (NY, topotype); same locality, host and collector, V 1892 (NY, topotype); same locality, host and collector, s.d. (NY, topotype); same locality, on *Ostrya virginiana* (Betulaceae). Dearness s.n., V 1892 (NY, paratype); same locality and collector, 1877 (NY, paratype).

1.3 **Massarina amphibia** Magnes & Hafellner, Biblioth. Mycol. 139: 89. 1991.

Type — **AUSTRIA**: Steiermark, Totes Gebirge, Tauplitzalm, Großsee, on *Carex rostrata* (Cyperaceae). Magnes & Nograsek 58, VIII 1988 (GZU, holotype).

Ascomata 100-250 μm diam., rounded, immersed, with an erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide, some seemingly periphysoid or protruding.
from the ostiole. Ascospores fusiform, 1-septate, (23-)26-29(-32) μm (4-)5-6(-7) μm, with a median constriction, cells equal, ends rounded, surrounded by a 2-3 μm thick gelatinous sheath, which may be protracted at the ends. Senescent ascospores 3-septate, pale brownish. Conidiomata unknown. In vitro slow growing, forming a whitish to grey, sterile aerial mycelium.

**Distribution and ecology:** As far as known, a boreo-alpine element in Europe, occurring on monocots and *Equisetum* near ponds.
Host plants recorded: Carex nigra and C. rostrata (Cyperaceae), Equisetum fluviatile (Equisetaceae), Scirpus lacustris (Cyperaceae), and Typha latifolia (Typhaceae).

Additional material seen: Austria: Steiermark, Graz, on Typha latifolia (Typhaceae). Scheuer 814, VI 1986 (GZU, sub Massarina lacustris); Wolzer Tauern, Goldbachsee, on Carex rostrata (Cyperaceae). Hafellner & Magnes 196, VII 1989 (GZU); Schladming, on Carex rostrata (Cyperaceae). Köckinger & Scheuer 018, IX 1987 (GZU); Totes Gebirge, Schwarzensee, on Carex nigra (Cyperaceae). Magnes 072, VIII 1988 (GZU); Hochschwab, Sackwiesensee, on Equisetum fluviatile (Equisetaceae). Magnes & Schreiner 053, VIII 1988 (GZU).


Switzerland: Obwalden, Sarnen, on Scirpus lacustris (Cyperaceae). Leuchtmann s.n., VI 1982 (CBS 618.86, living culture, sub Massarina lacustris).

Additional specimens agreeing in all characters, except that the ascospores are already 3-septate in early stages: Austria: Steiermark, Krakau-Hintermühlen, Ettrachsee, on Carex rostrata (Cyperaceae). Hafellner & Magnes 234, VIII 1989 (GZU, sub Massarina sp. 1).


1.4 Massarina appendiculata Panwar, Purohit & Gehlot ex Aptroot, spec. nov. Fig. 4.


Type — India: Pachmarhi, on Zizyphus rugosa (Rhamnaceae). Panwar s.n., X 1971 (IMI 162206 (slides only), lectotype, here designated; also mentioned as syntype: JAC 103 [‘JUML’]).

Ascomata 250-550 μm diam., rounded, immersed, with an erumpent ostiole. Hamathecium consisting of unbranched or only sparsely branched, septate pseudoparaphyses, filaments c. 1 μm wide. Ascospores fusiform, 1-3-septate, slightly curved, 32-35 × 9-12 μm, with a median constriction, middle cells equal, end cells, when present, much smaller, ends pointed, surrounded by a 1-2 μm thick gelatinous sheath, which is much protracted and curved at the ends and c. 3-6 μm long. Conidiomata unknown. In vitro unknown.

Notes: This species shows similarities to the marine M. armatispora.

Distribution and ecology: So far only known from the type locality.

Host plant recorded: Zizyphus rugosa (Rhamnaceae).

1.5 Massarina aquatica J. Webster, Trans. Brit. Mycol. Soc. 48: 451. 1965. Fig. 5.

Type — British Isles: Yorkshire, Hebden Bridge, Blake Dean, on submersed wood of Alnus glutinosa (Betulaceae). Webster 2747, IX 1964 (K, holotype, also dried culture; UPS, isotype [‘2946’]).


Type — British Isles: Leicestershire, on submerged leaves of Quercus (Fagaceae). Ingold s.n., 1942 (CBS 212.46, living culture, ex type).

Ascomata 300-500 μm diam., rounded, erumpent or superficial, with a flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anasto-
mosing above the asci, filaments c. 1.5 µm wide. Ascospores fusiform, 1-septate, 22-29(-34) × (3.5-)4-5 µm, with a median constriction, upper cell often shorter but wider than lower cell, bulging out above the median septum, ends pointed, surrounded by a 1-3 µm thick gelatinous sheath which is constricted at the median septum and can be protracted at the ends and c. 2-3 µm long. Senescent ascospores 3-septate, pale brownish. Conidiomata hyphomycetous, belonging to *Tumularia aquatica* (In-gold) Descals & Marvanová. In vitro initially producing the anamorph, type culture now sterile.

**Notes:** Most ascocarps contain only 1-septate ascospores, but some ascocarps contain many 3-septate, but still colourless, ascospores.

**Distribution and ecology:** An aquatic species known from England, Mauritius and South Africa (Hyde & Aptroot 1997b). The anamorph is widely distributed in Europe, and strains in CBS are present from Austria and England.

**Host plants recorded:** *Alnus glutinosa* (Betulaceae) and Phragmites (Gramineae).

**Additional material seen:** MAURITIUS: Black River, on submerged wood. Hyde & Poonyth MAUR 25, VII 1995 (HKU (M)).

SOUTH AFRICA: Durban, Palmiet River, on submerged *Phragmites* (Gramineae). Steinke & Hyde 2154, XI 1994 (HKU (M)).

### 1.6 Massarina armatispora K.D. Hyde, Vrijmoed, Chinnaraj & E.B.G. Jones, Bot. Mar. 35: 325. 1992. Fig. 6.

Type — INDIA: Andaman Islands, Maya Bunder, on intertidal wood in mangrove. Chinnaraj, K.D.H. 494, III 1990. (BRIP 19711, holotype [sub *M. appendiculata*]).

For additional illustrations see Hyde et al. (1992).

Ascomata 350-450 µm diam., conical, immersed, with a long, papillate, erumpent ostiole. Hamathecium consisting of unbranched or only sparsely branched, septate pseudoparaphyses, filaments up to c. 3 µm wide. Ascospores fusiform, 1-septate, 27-35(-39) × (7-)8-10 µm, with a median constriction, upper cell larger and wider than lower cell, ends rounded, surrounded by a 1-2 µm thick gelatinous sheath, which is strongly protracted and often curved at the ends and c. 6-8 µm long. Conidiomata unknown. In vitro unknown.

**Notes:** This species shows similarities to the terrestrial *M. appendiculata*, but differs, e.g., by the relatively much larger end cells of the ascospores.

**Distribution and ecology:** So far only known from China and India, in mangrove.

**Additional material seen:** CHINA: Macau, Taipa Mangrove, on intertidal wood in mangrove. Vrijmoed, Hyde & Jones, KDH 820, X 1990 (BRIP 19712).

### 1.7 Massarina arundinacea (Sowerby : Fries) Leuchtmann, Sydowia 37: 179. 1985 ['1984']. Fig. 7.


≡ *Sphaeria striaeformis* subsp. *arundinis* Albertini & Schweinitz, Consp. Fung. Agro Niskiensi: 15. 1805

≡ *Sphaeria striaeformis* subsp. *arundinis* Albertini & Schweinitz, Consp. Fung. Agro Niskiensi: 15. 1805

Melogramma arundinaceum (Sowerby : Fries) Niessl, Hedwigia 13: 185. 1874


Type — POLAND: On Phragmites australis (Gramineae). Albertini & Schweinitz s.n. (PH, holotype, not seen). No type material of this species was found in BPI.


Leptosphaeria arundinacea f. godinii (Desmazières) Auerswald, Verz. Leipziger Tausch-Ver. 1866: 4. 1866

Leptosphaeria arundinacea var. godinii (Desmazières) Saccardo, Syll. Fung. 2: 63. 1884 [often as ‘godini’].

Type — FRANCE: on Phragmites australis (Gramineae). Desmazières s.n. (BR, holotype; no material found in PC). This synonymy was already indicated by Leuchtmann (1985).

Leptosphaeria nigricans f. arundinis Roumeguère, Fungi Selecti Exsiccati 4265. 1887.

Type — FRANCE: Rhône, Lyon, Parc de la Tête d’Or, on Phragmites australis (Gramineae). Therry s.n., 1887, distributed in Roumeguère, Fungi Selecti Exsiccati 4265 (PC (2 x), isotypes). This synonymy was already indicated by Shoemaker & Babcock (1989).


Type — CZECH REPUBLIC: Weiβkirchen, Sternberg, on Phragmites australis (Gramineae). Piskor s.n., V 1926 (W 10859, holotype), also distributed in Petrak, Flora Bohemiae et Moraviae Exsiccata 2298 (M, W, isotypes). New synonymy.

Ascomata 150-300 µm diam., globose, immersed below a clypeus or erumpent, often gregarious in rows, with an erumpent ostiole. Hamathecium consisting of sparsely branched, septate pseudoparaphyses, filaments c. 2 µm wide. Ascospores fusiform, 1-septate, (22-)25-34 × 3-6 µm, with a median constriction, upper cell equal in length but wider than lower cell, bulging out above the median septum, ends pointed, surrounded by a 1-2 µm thick gelatinous sheath, which can be protracted at the ends and c. 2-3 µm long. Senescent ascospores 3-septate, pale brownish. Conidiomata unknown, but the fungus is often found together with Stagonospora elegans (Berkeley) Saccardo & Traverso. In vitro rather fast growing, forming copious blackish grey aerial mycelium, not producing conidiomata, but ascocarps are sometimes formed after two months on stems.

Distribution and ecology: Throughout Europe, on Phragmites culms. Often abundantly present.

Host plant recorded: Phragmites australis (Gramineae).

Additional material seen (all on Phragmites australis (Gramineae): AUSTRIA: Steyr. Vasilyeva & Scheuer s.n., VII 1994 (GZU).

BELGIUM: Oudenaarde. Bosquent s.n., XI 1855 (BR, sub Sphaeria godinii); Kortrijk. Collector unknown 270 (BR, sub Sphaeria godinii); locality unknown. Westendorp s.n. (BR, sub Sphaeria godinii).

BRITISH ISLES: Norfolk, Kings-Lynn. Plowright s.n., VI 1876, distributed in Thümen, Mycotheca Universalis 1256 (GZU).

CZECH REPUBLIC: Hranice. Petrak s.n., V 1942, distributed in Cryptogamiae Exsiccatae Vindobonenses 4002 (GZU); Sternberg. Piskor s.n., V 1926 (GZU), also distributed in Petrak, Mycotheca Generalis 572 (GZU); Leipnik. Petrak s.n., VI 1942, distributed in Reliquiae Petrakianae 50 (GZU).

FRANCE: Locality unknown. Roumeguère s.n., distributed in Fungi Selecti Exsiccati 356 (BR, sub Sphaeria godinii).

SWEDEN: Bohuslän, Högsås. Santesson 13964, VIII 1960 (UPS); Uppland, Dalby. K. & L. Holm 3374c, X 1984 (UPS); Bygdéa. Eriksson 2439c, VIII 1964 (UPS); Bondkyrka. Eriksson 2490a, IX 1964 (UPS); Hagn. Vestergren s.n., IV 1876 (UPS).

SWITZERLAND: Zürich, Andelfingen. Leuchtmann s.n., IX 1981 (CBS 619.86, living culture).

1.8 Massarina arundinariae (Ellis & Everhart) M. Barr, Mycotaxon 45: 211. 1992. Fig. 8.


Type — USA, LOUISIANA: Lobbe's Wood near St. Martinsville, on Arundinaria (Gramineae). Langlois 2338 (NY, holotype).

Ascomata 250-400 μm diam., sphaeroid, immersed, with a papillate, erumpent ostiole. Hamathecium consisting of sparsely branched, septate pseudoparaphyses, filaments up to c. 2 μm wide. Ascospores fusiform, 1-septate, 24-32 × 6-7 μm, with a median constriction, cells equal, ends pointed, without a gelatinous sheath. Senescent ascospores 3-septate, pale brownish. Conidiomata unknown. In vitro unknown.

Distribution and ecology: So far only known from bamboo in N. America.

Host plant recorded: Arundinaria (Gramineae).


Ascomata 250-450 μm diam., conical, erumpent to superficial, with a flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores broadly fusiform, 1-septate, (34-)45-55(-59) × (13-)15-20(-23) μm, with a median constriction, cells equal, ends rounded, without or with an inconspicuous gelatinous sheath. Conidiomata unknown. In vitro unknown.

Notes: This species is close to M. thalassiae.

Distribution and ecology: So far only known from Australia.

Additional material seen: AUSTRALIA: Queensland, Cow Bay, on submerged wood in freshwater. T.M. & K.D. Hyde 2287, 1996 (HKU (M)).

1.10 Massarina balnei-ursi (Rehm) K. Holm & L. Holm, Sydowia 38: 142. 1985. Fig. 10.


Type — AUSTRIA: Tirol, Kaiser, Hinterbärenbad, on stems and wood of Dryas octopetala (Rosaceae). Rehm s.n., VIII 1902 (S, holotype).

Ascomata 300-600 μm diam., sphaeroid, erumpent to superficial, with a large, papillate (and in one case laterally flattened) ostiole. Hamathecium consisting of
branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores long ovate to broadly fusiform, 1-septate, (22-24-30 × 9-10(-12) μm, with a median constriction, upper cell longer and broader than lower cell, ends rounded, with a 1-4 μm thick gelatinous sheath. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** As far as known a boreo-alpine element in Europe, occurring on *Dryas*.

**Host plant recorded:** *Dryas octopetala* (Rosaceae).

**Additional material seen** (all on *Dryas octopetala* (Rosaceae)): **AUSTRIA:** Steiermark, Grazer Bergland, Hochlantsch. Matzer & Nograsek 1327, IX 1990 (GZU); Dachstein-Massiv, Stoderzinken. Hafellner s.n., VII 1985 (GZU); same locality and host. Nograsek s.n., VII 1987 (GZU); Totes Gebirge, Tauplitzalm. Nograsek s.n., VIII 1988 (GZU).

**SLOVENIA:** Steiner Alpen, Kranska. Nograsek & Wetschnig s.n., VIII 1992 (GZU).


**SWEDEN:** Torne Lappmark, Mt. Nuolja, Ridonjira. Holm & Nograsek s.n., VII 1986 (GZU); same locality, host and date, K. & L. Holm 4089b (UPS [as ‘Njulla’]); Mt. Nuolja, near summit. Holm & Nograsek s.n., VII 1986 (GZU); same locality, host and date, K. & L. Holm 4061g (UPS [as ‘Njulla’]); Kopparåsen. Nograsek s.n., VII 1986 (GZU); Abisko. Nograsek s.n., VII 1986 (GZU).

**SWITZERLAND:** Graubiinden, S-charl. K. & L. Holm 3257a, 3256b, 3251b, 3316f, VIII 1984 (UPS); Albulapass. K. & L. Holm 3261d, 3295f, VIII 1984 (UPS); Samnaun. K. & L. Holm 3243a, VIII 1984 (UPS).


Fig. 11.

**Type** — **SRI LANKA:** Peradeniya, Gangaruwa, on *Hevea brasiliensis* (Euphorbiaceae). Petch 5006, II 1917 (K, isotype).

Ascomata 500-800 μm diam., sphaeroid, immersed, with an erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 2 μm wide. Ascospores broadly fusiform, 1-septate, 20-25(-30) × (7-)8-10(-12) μm, with a median constriction, upper cell slightly longer and broader than lower cell, ends rounded, without gelatinous sheath. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** So far only known from the type locality.

**Host plant recorded:** *Hevea brasiliensis* (Euphorbiaceae).


Fig. 12.

**Type** — **HONG KONG:** Tai Po Country Park, on submerged wood. Hyde 1845, VIII 1993 (BRIP 21489, holotype).

For additional illustrations see Hyde (1995b).

Ascomata 350-500 μm diam., sphaeroid, immersed to erumpent, with a papillate, erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments up to c. 2 μm wide. Ascospores fusiform,
1-septate, 24-32 × 6-8 μm, with a median constriction, cells equal or upper cell slightly larger and wider than lower cell, ends pointed, surrounded by a 1 μm thick gelatinous sheath, which is strongly protracted and often curved at the ends and c. 4-7 μm long. Conidiomata unknown. In vitro unknown.
**Distribution and ecology:** An aquatic species known from Australia, Hong Kong, Malaysia and South Africa (Hyde & Aptroot 1997b).

**Additional material seen:** South Africa: Durban, Palmiet River, on submerged wood. Steinke & Hyde 2166 (BRIP).

1.13 *Massarina canadensis* (Ellis & Everhart) M. Barr, Mycotaxon 45: 211. 1992. [Fig. 13.]


*Type* — Canada: Ontario, London, on *Salix* (Salicaceae). Dearness 1378, I 1890 (NY, holotype).

Ascomata 200-300 μm diam., rounded, immersed, with a wide, pale, erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 1.5 μm wide. Ascospores fusiform, 1-septate, (28-)32-35 × (6-)8-10 μm, with a median constriction, upper cell bulging out above the septum and slightly larger, ends pointed, surrounded by a 1-2 μm thick gelatinous sheath. Senescent ascospores 3-5-septate, pale brown, with a verruculose ornamentation. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** So far only known from Canada, on *Salix*, although it has been reported from other areas and hosts by Barr (1992).

**Host plant recorded:** *Salix* (Salicaceae).

**Notes:** Additional material cited by Barr (1992) belongs to various different species.

1.14 *Massarina carolinensis* Kohlmeyer, Volkmann-Kohlmeier & O. Eriksson, Mycol. Res. 100: 400. 1995. [Fig. 14.]

*Type* — USA, North Carolina: Carteret Co., Broad Creek, on *Juncus roemerianus* (Juncaceae). Kohlmeyer 5540, VIII 1994 (IMS, holotype, not seen; UME, isotype, not seen).

For additional illustrations see Kohlmeyer, Volkmann-Kohlmeier & Eriksson (1995b).

Ascomata 150-200 μm diam., rounded, immersed, becoming erumpent when the host cortex desintegrates, with a wide, pale, erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 1.5 μm wide. Ascospores long ellipsoid, 3-septate, 16.5-21 × 4.5-6.5 μm, constricted at the septa, all cells equal in length, ends rounded, surrounded by a 2-4 μm thick gelatinous sheath, which expands to form an even larger sticky mass when the enveloping membrane is broken. Conidiomata unknown. In vitro unknown.

**Notes:** The species was reported to be close to *M. ricifera*, but the hamathecium of *M. carolinensis* is described as consisting of dense, anastomosing, septate pseudoparaphyses, whereas the hamathecium of *M. ricifera* is said to consist of a few thick unbranched pseudoparaphyses. No authentic material has been seen from this recently described species. However, material matching the original description was found on bamboo in the mountains of Papua New Guinea.
Distribution and ecology: Described from standing culms in a salt marsh in N. Carolina. Recently also found on bamboo in the mountains at 2400 m alt. in Papua New Guinea.

Host plants recorded: Bambusoideae (Gramineae) and Juncus roemerianus (Juncaceae).


Type — SLOVENIA: Ljubljana ['Laibach'], on Lycopodium tristachyum (Lycopodiaceae). Voss s.n., VIII 1883 (S, holotype; UPS, isotype slides) [host as 'Lycopodium complanatum subsp. chamaecyparissus'].


Ascomata 150-200 μm diam., conical, erumpent to superficial, with an inconspicuous flush ostiole. Hamathecium consisting of unbranched or sparsely branched, septate pseudoparaphyses, filaments c. 2 μm wide. Ascospores fusiform, 1-septate, (18-)23-25 × 3-4 μm, with a median constriction, upper cell somewhat broader than lower cell, ends pointed, without a gelatinous sheath. Senescent ascospores 1-3-septate, pale brown, with a verruculose ornamentation. Conidiomata unknown. In vitro unknown.

Distribution and ecology: As far as known a boreo-alpine element in Europe, occurring on Lycopodium.

Host plants recorded: Lycopodium annotinum, L. complanatum and L. tristachyum (Lycopodiaceae).


Type — FRANCE: Var, Plan d'Aups, on wood of Cistus albidus (Cistaceae). Hütter & Loeffler 2937, VI 1959 (ZT, holotype; CBS 266.62, living culture, ex type).

Ascomata 350-650 μm diam., hemispherical, superficial, with an inconspicuous flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores broadly fusiform, (1-)3-septate, (25-)27-32(-35) × 9-11 μm, constricted at the septa, middle cells larger
and broader than end cells, ends rounded, without or with an inconspicuous gelatinous sheath, but with a 1-2 μm thick wall. Conidiomata coelomycetous, classified in Chaetophoma Cooke. In vitro forming copious white to grey aerial mycelium. Culture now sterile, but reported to form conidiomata by Bose (1961).

**Distribution and ecology:** So far only known from France, on branches of *Cistus.*

**Host plant recorded:** *Cistus albidus* (Cistaceae).


Type — GERMANY: Hattenheim, Münchau, on bark of *Ulmus campestris* (Ulmaceae). Fuckel s.n., s.d. (UPS, isotype).


Type — FRANCE: Vaucluse, Sérignan, on wood of *Morus alba* (Moraceae). Fabre s.n., I 1882 (l'Harmas, holotype, not seen). New synonymy. The type was examined by Boise (l.c.). The species is synonymized here, based on her redescription.


Type — NORWAY: Larvik, Andvik, on bark of *Ulmus* (Ulmaceae). Norman s.n., III 1882 (UPS, isotype). This synonymy was already mentioned by Santesson (1993).


Type — USA, NEW YORK: Caroga, Fulton Co., on submersed branches of *Myrica gale* (Myricaceae). Peck s.n., VII 1884 (NYS, holotype; NYS, isotype). New synonymy.


Type — ITALY: Trento, Val di Sole, on *Sambucus ebulus* (Caprifoliaceae). Berlese s.n. (PAD, holotype, not found). No type material of this species was found in PAD, and the type is presumably lost. The material cited below belongs to Massarina corticola and agrees well with the protologue.

Material seen: ITALY: Roma, Cessati Spiriti, on *Sambucus* (Caprifoliaceae). Saccardo s.n., XI 1903, distributed in Mycotheca Italiana 1488 (L, sub Metasphaeria ambigua).

Massarina salicicola Rehm, Ann. Mycol. 4: 397. 1906 [as 'salicincola'].

Type — GERMANY: Regensburg, Dechbetten, on *Salix* (Salicaceae). Rehm s.n., V 1879 (S, holotype). New synonymy.


Type — ARGENTINA: Jujuy, Orán, on *Coffea arabica* (Rubiacceae). Spegazzini 2459, III 1905 (LPS, holotype). New synonymy. This is the type species of Pseudodiaporthe Spegazzini.


Type — PAKISTAN: Punjab, Rawalpindi, on *Aster mollisculus* (Compositae). Dickason 1, IV-V 1927-1928 (DAOM 120207, holotype). New synonymy.


Type — PAKISTAN: Changa Manga, on *Tamarix articulata* (Tamaricaceae). Ahmad 15385, II 1962 (DAOM, isotype, only slides). New synonymy.


Type — INDIA: Kerala, Devikulam, on *Barleria* (Acanthaceae). Mani Varghese s.n., I 1976 (AMH 3873, holotype). This synonymy was already recognized by Aptroot (1995a).


For additional illustrations see Hyde & Aptroot (1997b).

Ascomata 250-500 μm diam., conical to hemispherical, immersed to erumpent or superficial, with an erumpent ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sometimes sparsely anastomosing above the asci, filaments c. 1-2 μm wide. Ascospores fusiform, 1-septate, (22)-25-35(-40) × (4-)5-7(-11) μm, with a median constriction, upper cell usually shorter but broader than lower cell, bulging out above the septum, ends pointed, without or with an inconspicuous gelatinous sheath. Senescent ascospores 1-3-septate, pale brown. Conidiomata unknown. In vitro forming sparsely white to pale brownish aerial mycelium. Cultures (CBS 154.93) now sterile, but reported to form immature conidiomata by Bose (1961).

Distribution and ecology: Widespread in Europe, North America and temperate Asia, also known from South America; recently found in tropical Asia and therefore possibly cosmopolitan, most often on wood and bark, but also on branches, culms, needles, palm stems and petioles and ascomycetes.


Selected additional material seen: CANADA: Quebec, Gaspé Provincial Park, Mt. Albert, on *Ledum groenlandicum* (Ericaceae). Bigelow & Barr 2262a, VIII 1957 (NY).


BRITISH ISLES: Kent, Toy’s Hill, on wood. Lowen 110, X 1984 (NY).

DENMARK: Kolding, on *Populus candicans* (Salicaceae). Larsen s.n., III 1934 (C, sub *Massarina salicicola*); Uggeløse Skov, on *Salix* (Salicaceae). Munk s.n., III 1965 (C, sub *Massarina salicicola*); Lyngby, on *Salix cf. viminalis* (Salicaceae). Munk s.n., II 1963 (C, sub *Massarina salicicola*).

GERMANY: Oestrich, along the Rhine, on bark and wood of *Salix fragilis* (Salicaceae). Fuckel s.n., distributed in *Fungi Rhenani* 2528 (G (2 x), NY, UPS, authentic material, but not types, as often indicated); Hamburg, on *Tilia platyphylloides* (Tiliaceae). Schröer 330, IX 1992 (CBS 154.93, living culture).


SWEDEN: Uppland, Stockholm, on wood and bark of *Salix* (Salicaceae). Romell s.n., VIII 1893 (UPS); Jumkil, on dead twigs with bark of *Myrica gale* (Myricaceae). K. & L. Holm 5571g (UPS); Gotland, Hejedrab, on wood of *Salix repens* (Salicaceae). Vester gren s.n., VIII 1895 (UPS).


PAPUA NEW GUINEA: Madang Province, S side of Ramu valley, 11 km W of Brahman Mission, logging site in tropical lowland rain forest, inside bark. Aptroot 36582, X 1995 (CBS).


Type — **AUSTRALIA**: Tasmania, on *Cystophora retroflexa* (Phaeophyta). Cribb s.n. (not seen).

For illustrations see Kohlmeyer & Kohlmeyer (1979).

Ascomata 650-1000 μm diam., globose to turbinate, immersed to erumpent from galls, with a flush ostiole. Hamathecium consisting of unbranched, septate filaments, filaments c. 3-8 μm wide. Ascospores long ellipsoid, 1-septate, 50-65(-73) × (15-)16-23(-25) μm, with a median constriction, cells equal, ends rounded, with conspicuous, cap-like, c. 10 μm long gelatinous appendices at the ends, wall c. 2-3 μm thick. Conidiomata found associated in the same galls. Conidia hyaline, ellipsoidal, 3-4 × 2 μm. In vitro unknown.

**Notes:** No material of this species was found in BRIP, where Cribb apparently never deposited any material (Hyde, pers. comm.). The above description is based on the description and illustrations of type slides in Kohlmeyer & E. Kohlmeyer (1979). It is accepted here with some hesitation in *Massarina*, because it is reported to have very wide, unbranched hamathecium filaments.

**Distribution and ecology:** So far only known from Australia, where it grows on seaweeds.

**Host plants recorded:** *Cystophora retroflexa* and *C. subfarcinata* (Phaeophyta).


Type — **BRAZIL**: Pará, on dead petiole of *Desmoncus* (Palmae). Baker 217, I 1908 (S, holotype, not seen).

For illustrations see Hyde & Aptroot (1997a).

Ascomata 350-500 μm diam., hemispherical, immersed to erumpent, with a papillate, laterally flattened (slot-like) erumpent to superficial ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments up to c. 2 μm wide. Ascospores fusiform, 1-septate, 52-56 × 12-15 μm, with a median constriction, cells nearly equal, ends pointed, with a 1-2 μm thick gelatinous sheath. Conidiomata unknown. In vitro unknown.

**Distribution and ecology:** So far only known from the type, which has been examined recently by K.D. Hyde.

**Host plant recorded:** *Desmoncus* (Palmae).

Fig. 18.


**Type** — **FRANCE**: Locality unknown, on *Fagus sylvatica* (Fagaceae). Desmazières 1764, 1851 (PC, lectotype, selected by Hyde 1995).


**Type** — **BELGIUM**: Malmédy, on *Betula alba* (Betulaceae). Libert s.n., distributed in Roumeguère, Fungi Gallici Exsiccati 1578; Reliquiae Mycologicae Libertianae 114 (L, NY, isotypes). New synonymy. The indicated host association of this forma is regarded as a description, as was probably the intention of the author.


**Type** — **SWITZERLAND**: Neuchâtel, Rochefort, on *Corylus avellana* (Betulaceae). Morthier, s.n. (not seen). Synonymy follows Jaczewski (1894). No material of this forma was found in **G**.


**Type** — **SWITZERLAND**: Bern, Steffisberg, on *Platanus* (Platanaceae). Otth, s.n. (not seen). Synonymy follows Jaczewski (1894). No material of this forma was found in **BERN**.


**Type** — **FINLAND**: Mustiala, on inner side of bark of *Salix cinerea* (Salicaceae). Karsten s.n., IX 1884 (not seen). Synonymy probable. No material of this subspecies was found in **H**.


**Type** — **FRANCE**: Dauphine, on *Fagus sylvatica* (Fagaceae) Tulasne s.n., IX 1857 (PC, lectotype, designated here) [as "lunula" on the label]. New synonymy. This is a form of **Massarina eburnea** with 1-septate ascospores. Other syntypes from the same locality, but on *Acer pseudoplatanus* (Aceraceae), could not be found in **PC**.


**Type** — **GERMANY**: Münster, on *Corylus avellana* (Betulaceae). Füisting s.n. (M, holotype, not found). Synonymy already recognized by Jaczewski (1894).

**Massaria eburnoides** Saccardo, Michelia 1: 41. 1879 ≡ **Massarina eburnoides** (Saccardo) Saccardo, Syll. Fung. 2: 153. 1883.

**Type** — **ITALY**: Conegliano, on *Corylus avellana* (Betulaceae). Spegazzini s.n., VI 1876 (PAD, holotype). Already synonymized with *M. eburnea* by Bose (1961).


**Type** — **GERMANY**: Sachsen, Königstein, on *Quercus* (Fagaceae). Krieger s.n., III 1890, distributed in Fungi Saxonici 536 (M, NY, isotypes). New synonymy. The publication of this forma has been overlooked by the various indices.


Type — CANADA: Ontario, London, on *Carpinus caroliniana* (Betulaceae). Dearness 1696, V 1890 (NY, holotype), also distributed in Ellis & Everhart, North American Fungi 2743 (NY (4×), isotypes). New synonymy. This is a form of *Massarina eburnea* with 1-septate ascospores. Further additional material seen under this name (mostly reported by Barr, 1992) proved to belong to several different species.

Type — USA, IOWA: Decorah, on *Corylus* (Betulaceae). Holway s.n., V 1892 (NY, holotype). New synonym, although Höhnel (1917) already suggested a relationship with *Massarina eburnoides*. 
Type — FRANCE: Saône et Loire, Rigny-sur-Arroux, on Carpinus betulus (Betulaceae). Flageolet 34 (PAD, holotype). New synonymy.


Type — USA, LOUISIANA: Monroe, on Berchemia scandens (Rhamnaceae). Shear P142, III 1940 (BPI, holotype; M, isotype), also distributed in Reliquiae Petrakianae 1050 (FH, GZU, L, M, isotypes). New synonymy.

For additional illustrations see Hyde (1995a).

Ascomata 450-800 μm diam., lens-shaped or conical to hemispherical, immersed, rarely erumpent, with a flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments c. 2 mm wide. Ascospores broadly fusiform, usually 3-septate (sometimes partly or only 1-septate; see below), (25-)32-42(-50) × (6-)9-11(-15) μm, not or slightly constricted at the septa, middle cells larger and broader than end cells, ends rounded, with a 2-4 μm thick gelatinous sheath, wall 1-2 μm thick. Conidiomata coelomycetous, classified in Chaetophoma Cooke, see Bose (1961) for a description. In vitro rather fast growing, up to 5 cm diam. in two weeks on OA, forming copious white to yellowish aerial mycelium. Cultures form conidiomata after two months, especially on Fagus twigs.

Notes: There exists a form of Massarina eburnea with 1-septate ascospores. However, some specimens (e.g. Barr 5848 and Bigelow & Barr 3369) show 1- and 3-septate ascospores in equal or unequal proportions. Therefore, no taxonomic status is attributed to this form. It is known throughout the range of distribution and hosts of M. eburnea. Material with 1-septate ascospores is enumerated separately below.

Distribution and ecology: Widespread and common in Europe and North America, predominantly on Fagus, but also on other trees and shrubs.

Host plants recorded: Acer saccharum (Aceraceae), Alnus (Betulaceae), Berchemia scandens (Rhamnaceae), Betula alba (Betulaceae), Carpinus betulus and C. caroliniana (Betulaceae), Cornus sp. (Cornaceae), Corylus avellana (Betulaceae), Crataegus monogyna (Rosaceae), Fagus sylvatica (Fagaceae), Fraxinus (Oleaceae), Ostrya virginiana (Betulaceae), Platanus (Platanaceae), Quercus (Fagaceae), Salix cinerea (Salicaceae) and Ulmus campestris (Ulmaceae).

Selected additional material seen: CANADA: Ontario, London, on Ostrya (Betulaceae). Dearness s.n., VI 1892 (NY, sub Massarina leucosarca).

USA, MAINE: Franklin Co., Carrabassett Valley, on cf. Acer (Aceraceae). Barr 5848, VIII 1971 (NY); Penobsbot Co., Ambibejus Lake, on Fagus sylvatica (Fagaceae). Bigelow & Barr 3369, VII 1962 (NY); MASSACHUSETTS: Leverett, Mt. Toby, on Cornus sp. (Cornaceae). Bigelow & Barr 2959, VII 1961 (NY, sub Massarina corni); Conway, on Ostrya virginiana (Betulaceae). Barr 5304, VI 1969 (NY, sub Massarina corni); Northampton, on Carpinus caroliniana (Betulaceae). Ahles s.n., II 1980 (NY); NEW YORK: Alcove, on Carpinus caroliniana (Betulaceae). Shear s.n., 1893 (M); VERMONT: Lamoille Co., Stowe, on Alnus (Betulaceae). Bigelow & Barr 4680b, IX 1964 (NY).

BRITISH ISLES: Surrey, Shere, on Fagus sylvatica (Fagaceae). Capron s.n., I 1866, distributed in Cooke, Fungi Britannici Exsiccati 371 (NY (2 x)); Bath, Bathford, on Fagus sylvatica (Fagaceae). Broome s.n., X 1880 (NY).
AUSTRIA: Steiermark, Graz, on *Fagus sylvatica* (Fagaceae). Scheuer s.n., V 1988, distributed in Plantae Graecenses 522 (GZU, L, M); Niederösterreich, Klosterneuburg, on *Fagus sylvatica* (Fagaceae). Petrak s.n., IV 1941, distributed in Mycotheca Generalis 451 (GZU, M, UPS); Hüttdorf, on *Fagus sylvatica* (Fagaceae). Niessl s.n., V 1913 (M); Wienerwald, Sparbach, on *Fagus sylvatica* (Fagaceae). Höhnol 3815, 1904 (M); Niederösterreich, Lunz, on *Corylus avellana* (Betulaceae). Petrak s.n., VII 1939, distributed in Mycotheca Generalis 1838 (GZU, M, UPS, sub *Massarina eburnoides*); Kärnten, Rosental, St. Margareten, on *Salix* (Salicaceae). Jaklitsch s.n., X 1995 (herb. Jaklitsch).

CZECH REPUBLIC: Žeřákov, on *Corylus avellana* (Betulaceae). Petrak s.n., IV 1923, distributed in Flora Bohemiae et Moraviae Exsiccata 1620 (BR, C, M, sub *Massarina eburnoides*); Bern, on *Corylus avellana* (Betulaceae). Piskor s.n., V 1925 (M, sub *Massarina eburnoides*); Moravia, Brno ['Brünn'], Adamsthal, on *Fagus sylvatica* (Fagaceae). Niessl s.n., VIII 1883 (CUP-F 3050, M); Žeřákov, on *Fagus sylvatica* (Fagaceae). Petrak s.n., V 1913 (C, L, M), also distributed in Flora Bohemiae et Moraviae Exsiccatae 737 (BR); Erzebirge, Görkau, on *Fagus sylvatica* (Fagaceae). Kupka s.n., 1912 (M); 1913 (M); Böhmerwald, Eisenstein, on *Fagus sylvatica* (Fagaceae). Kupka s.n., 1916 (M).

DENMARK: S. Ruderhegn, on *Fagus sylvatica* (Fagaceae). Rostrup s.n., V 1890 (C).

FRANCE: Troyes, on *Corylus avellana* (Betulaceae). Briand 18 (PAD, sub *Massarina eburnoides*).

GERMANY: Brandenburg, Triglitz, on *Fagus sylvatica* (Fagaceae). Jaap s.n., III 1910, distributed in Fungi Selecti Exsiccati 427 (C, L, M); Silesia, Karlsbrunn, on *Fagus sylvatica* (Fagaceae). Niessl s.n., VIII 1880 (M), also distributed in Thümen, Mycotheca Universalis 1951 (BR, FH, GZU, L, M, NY); Sachsen, Königstein, on *Quercus* (Fagaceae). Krieger s.n., III 1890, distributed in Fungi Saxonici 536 (M, NY, in M sub *Massarina eburnoides f. quercus*); same locality, on *Corylus avellana* (Betulaceae). Krieger s.n., IV 1888, distributed in Fungi Saxonicici 376 (M, NY, in M sub *Massarina eburnoides*); same locality, on *Fagus sylvatica* (Fagaceae). Krieger s.n., IV 1882 (M), also distributed in Fungi Saxonicici 376 (M, NY), also distributed in Sydow, Mycotheca Marchica 452 (NY), also distributed in Rehm, Ascomyceten 697 (M, NY); Sachsen, Königsbrunn, on *Fagus sylvatica* (Fagaceae). Krieger s.n., IV 1882, distributed in Rabenhorst, Fungi Europaei 2767 (BR, L, M, NY); Oestrich, on *Betula* (Betulaceae). Buckel, distributed in Fungi Rhenani 2445 (L, M); Winterberg, on *Fagus sylvatica* (Fagaceae). Magnus s.n., V 1889 (BR); Wiesbaden, on *Fagus sylvatica* (Fagaceae). Steppan 21228, V 1962 (M); same locality, host and collector 21229, VIII 1964 (M); same locality, host and collector 24238, VI 1964 (M); Münster, on *Fagus sylvatica* (Fagaceae). Nitschke s.n. (M).

ITALY: Locality unknown, on *Fagus sylvatica* (Fagaceae). Saccardo 201 (PAD).

NETHERLANDS: Gelderland, Gorssel, Almen, on *Fagus sylvatica* (Fagaceae). Aptroot 36063, VII 1995 (Herb. CBS); Utrecht, Soest, De Stompert, on *Fagus sylvatica* (Fagaceae). Aptroot & Hyde s.n., VIII 1996 (ABL, CBS, HKU); Soest, Pijnenburg, on *Fagus sylvatica* (Fagaceae). Aptroot 36057, VI 1995 (CBS); Amersfoort, Pinetum, on *Fagus sylvatica* (Fagaceae). Aptroot 36059, VII 1995 (CBS); Leusden, Den Tweek, on *Fagus sylvatica* (Fagaceae). Aptroot 36025, VI 1995 (CBS); Baarn, on *Fagus sylvatica* (Fagaceae). Aptroot 36002, VI 1995 (CBS, dried culture); same locality and host. Dorman & Van Luyk s.n., V 1924 (L); same locality and host. Van Luyk 4469, IV 1921 (L); same locality and host. Van Luyk 4347, V 1921 (L (2 X)); Maartensdijk, on *Betula* (Betulaceae). Waakker s.n., 1882 (L).

POLAND: Gdynia, Orłowo, on *Fagus sylvatica* (Fagaceae). Kochman s.n., VII 1963, distributed in Mycotheca Polonica 430 (NY); Stanislav, on *Fagus sylvatica* (Fagaceae). Petrak s.n., II 1918, distributed in Fungi Polonicici Exsiccato 440 (M), also distributed in Mycotheca Carpatica 120 (M).

SWEDEN: Småland, Femsjö, on *Fagus sylvatica* (Fagaceae). Romell 15783, IX 1890, distributed in Lundell & Nannfeldt, Fungi Exsiccati Suecici, Præsertim Upsalienses 775 (C, CBS).

SWITZERLAND: Zürich, Rehalp, on *Fagus sylvatica* (Fagaceae). Bose s.n. (CBS 473.64, living culture); Bern, Bremgartenwald, on *Fagus sylvatica* (Fagaceae). Otth s.n., distributed in Wartmann & Winter, Schweizerische Kryptogamen 827 (M); Bern, Weissenburgbad, on *Fagus sylvatica* (Fagaceae). Otth s.n. (BERN, sub *Cladosphaeria fuscida*); Zürich, Rumensee, on *Corylus avellana* (Betulaceae). Bose s.n., 1960 (CBS 201.66, living culture, sub *Massarina eburnoides*); Jura, Neuchâtel ['Necolum'], on *Fagus sylvatica* (Fagaceae). Morthier s.n., distributed in Buckel, Fungi Rhenani 2158 (BR, L, M, NY).

Additional material seen with only 1-septate ascospores: CANADA: Ontario, London, on *Carpinus caroliniana* (Betulaceae). Dearness 2112, V 1893 (NY, toptype of *Massarina leucosarca*); same locality, on *Acer saccharum* (Aceraceae). Dearness 967, VII 1891 (NY, sub *Massarina leucosarca*).

USA, VERMONT: Lamoille Co., Lake Mansfield, on *Fagus sylvatica* (Fagaceae). Bigelow & Barr 4353, VII 1964 (NY).

AUSTRIA: Lunz am See, on *Fagus sylvatica* (Fagaceae). Petrak s.n., VII 1939 (M); Hüttdorf, on *Ulmus campestris* (Ulmaceae). Niessl s.n., VIII 1917 (M, sub "Massaria eburnea f. ulmi" Niessl, nom. herb).


Type — PAPUA NEW GUINEA: Western Province, Bensbach, on submerged leaf of *Livistona* (Palmae). Hyde 1392, V 1992 (BRIP 21393, holotype).

For additional illustrations see Hyde & Aptroot (1997a).

Ascomata 200-400 μm diam., conical, erumpent but often still covered by a thin layer of host tissue, with a papillate, laterally flattened (slot-like) superficial ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments c. 2 μm wide. Ascospores fusiform, 1-septate, 23-28 × 4-7 μm, with a median constriction, cells nearly equal, often with 2 large oil globules each, ends pointed, with a 1 μm thick gelatinous sheath which is drawn out at the ends in curved, 5-18 × 2-4 μm large appendices, each with an inner canal-like region appearing as an apical spine. Conidiomata unknown. In vitro unknown.

Notes: This species, with its conspicuously compressed ostioles, is reminescent of *Lohiostoma*.

Distribution and ecology: An aquatic species which is so far only known from Papua New Guinea.

Host plants recorded: *Livistona, Metroxylon sago* (Palmae).

Additional material seen: PAPUA NEW GUINEA: Western Province, Wando, on submerged rachis of *Metroxylon sago* (Palmae). Hyde 1366, V 1992 (HKU (M)).


Type — FRANCE: Finistère, on *Reboulia hemisphaerica* ['*Lunularia cruciata*'] (Hepaticae). Crouan s.n., III 1860 (CO, holotype).

For additional illustrations see Döbbeler (1978).


Distribution and ecology: So far only known from the type, on a liverwort in France.

Host plant recorded: *Reboulia hemisphaerica* (Hepaticae).
1.23 **Massarina igniaria** (C. Booth) Aptroot, comb. nov.  
Fig. 21.


**Type** — **INDIA**: From culture of *Periconia igniaria* with unknown origin. Rai s.n., (IMI 128479, holotype).


**Type** — **BRITISH ISLES**: Brundall, on *Phalaris arundinacea* (Gramineae). Ellis s.n., XII 1945 (IMI 9758, holotype).

Ascomata 250-400 μm diam., sphaeroid, superficial, with a papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments c. 2 μm wide. Ascospores fusiform, 3-septate, 26-30 × 8-9 μm, with a median constriction, middle cells nearly equal or upper middle cell largest, middle cells larger than end cells, ends pointed, without gelatinous sheath. Senescent ascospores 1(-3)-septate, pale brown, with verruculose ornamentation. Conidiomata hyphomycetous, belonging to *Periconia igniaria* E.W. Mason & M.B. Ellis. In vitro forming the anamorph, which is more common than the teleomorph.

**Notes**: It was already realized by Aptroot (1995a), that this species is better classified in *Massarina* than in *Didymosphaeria*. It has colourless, 3-septate ascospores, which is also visible in the micrograph in the original publication. This in contrast to the drawings in the original publication, which show brown, 1-septate ascospores.

**Distribution and ecology**: So far only known from the type collection. All other specimens under this name studied (including living culture CBS 845.96 from Papua New Guinea and numerous dried cultures in IMI) only contain the anamorph, *Periconia igniaria*, which is cosmopolitan, known from all continents from a variety of substrata including soil, leaf litter and grasses.

Fig. 22.

**Type** — **SWITZERLAND**: Wallis, Mörel near Brig, on *Polytrichum juniperinum* (Musci). Dömbeler 1225, IX 1973 (GZU, holotype; ZT, isotype).

For additional illustrations see Dömbeler (1978).

Ascomata 100-150 μm diam., globose, immersed, with an erumpent, often papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1.5 μm wide. Ascospores broadly fusiform, 1-septate, (17-)19-22(-24) × 6-8 μm, with a strong median constriction along which the cells are sometimes broken, upper cells larger and broader than lower cell and bulging out above the septum, ends rounded, with a 1 μm thick gelatinous sheath. Senescent (brown) ascospores 3-septate. Conidiomata unknown. In vitro unknown.

**Notes**: In contrast to the original description, the ascomata were found to open on both sides of the moss leaves, with more ascomata opening on the dorsal than on the ventral side.

**Distribution and ecology**: So far only known from the type, from moss leaves in the Alps.

**Host plant recorded**: *Polytrichum juniperinum* (Musci).


For illustrations see Shearer & Hyde (1997).

Ascomata 200-500 μm diam., subglobose, immersed or becoming exposed when the covering host tissue desintegrates, with an erumpent, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1.5-3 μm wide. Ascospores fusiform, initially 1-septate, later becoming 3-5-septate, (38-)45-60(-70) × 7-12(-16) μm, with a slight median constriction, cells equal when 1-septate, end cells progressively smaller than median cells when 3-5-septate, ends rounded, with a large, 2-4 μm thick gelatinous sheath, which is drawn out at the ends in curved or coiled, up to 50 × 20 μm large appendices, which expands to form an even larger sticky mass when the enveloping membrane is broken. Conidiomata unknown. In vitro reported to produce identical ascomata (Shearer & Hyde 1997). A culture will be preserved in ATCC, but was not yet available for study.

**Distribution and ecology:** Known from submerged wood in Australia, Brunei, Malaysia and the USA (Florida, Illinois, Maine, Virginia and Wisconsin).

**Specimen seen:** BRUNEI: Temburong, on submerged wood. Hyde 1931, II 1994 (HKU).

1.26 **Massarina lignorum** (Wehmeyer) M. Barr, Mycotaxon 45: 215. 1992. Fig. 23.

≡ **Massarinula lignorum** Wehmeyer, in W.B. Cooke, Mycologia 41: 611. 1949.


Ascomata 600-1000 μm diam., hemispherical, superficial, with a papillate, laterally compressed (slot-like) ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments c. 1.5 μm wide. Ascospores fusiform, 1-septate, 35-44 × 10-12 μm, with a strong median constriction, upper cell slightly larger and broader than lower cell, bulging out above the septum, ends pointed, without gelatinous sheath. Conidiomata unknown. In vitro unknown.

**Notes:** This species resembles a *Lophiotrema*, with a conspicuous slot-like, compressed ostiole. The additional material from Utah (Bigelow & Barr 6091), which has been cited by Barr (1992), shows a rounded ostiole, albeit in irregular depressions, and it is *Massarina corticola*.

**Distribution and ecology:** So far only known from the type on *Acer* wood in California, although it has been erroneously reported from elsewhere in the USA.

**Host plant recorded:** *Acer glabrum* (Aceraceae).

1.27 **Massarina macrospora** (Saccardo) O.E. Eriksson & J.Z. Yue, Mycotaxon 27: 248. 1986. Fig. 24.

≡ **Bertia macrospora** Saccardo, Michelia 1: 452. 1878 ≡ **Bertiella macrospora** (Saccardo) Saccardo & Traverso, Syll. Fung. 19: 147. 1910 [non *Massaria macrospora* Saccardo].
Type — ITALY: Treviso, Cansiglio, on wood of *Fagus sylvatica* (Fagaceae). Saccardo s.n., X 1874, distributed in Mycotheca Veneta 651 (PAD, holotype).

For additional illustrations see Eriksson & Yue (1986).

Ascomata 600-1000 μm diam., somewhat irregularly hemispherical, superficial, with an inconspicuous, flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2 μm wide. Ascospores fusiform, 1-septate, 36-43 × 8-9 μm, with a median constriction, upper cell slightly larger and broader than lower cell, ends pointed, without gelatinous sheath. Senescent ascospores 3-septate, pale brown. Conidiomata unknown. In vitro unknown.

Notes: This is the type species of *Bertiella*, which has already been synonymized with *Massarina* by Eriksson & Yue (1986). The additional material found under this name (cited below) contains only a coelomycete.

Distribution and ecology: So far only known from the type locality.

Host plant recorded: *Fagus sylvatica* (Fagaceae).

Additional material seen: FRANCE: Saône et Loire, Rigny-sur-Arroux, on *Fagus sylvatica* (Fagaceae). Flageolet s.n. (PAD).


Type — HUNGARY: Budapest, Szentendrei Ságet Island in the Danube, on bark and wood of *Fumana procumbens* (Cistaceae). Tóth 2844, VI ['IV'] 1959 (BP, holotype).

Ascomata 500-900 μm diam., sphaeroid, somewhat irregularly verrucose, superficial (possibly initially erumpent), with a large, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 2-3 μm wide. Ascospores broadly fusiform, 1-septate, 32-36 × 11-14 μm, with a median constriction, upper cell slightly larger and broader than lower cell, both cells partly with pseudosepta, ends rounded, without gelatinous sheath, wall c. 1.5 μm thick. Conidiomata unknown. In vitro unknown.

Distribution and ecology: So far only known from *Fumana* in Hungary.

Host plant recorded: *Fumana procumbens* (Cistaceae).


Type — USA, GEORGIA: Darien, on rachis of *Sabal palmetto* (Palmae). Cooke 2436, distributed in Ravenel, Fungi Americani Exsiccati 369 (NY, isotype).


Type — USA, FLORIDA: Lake Apopka, on petioles of *Sabal palmetto* (Palmae). Shear P108a, 17 XII 1941 (M, isotype), also distributed in Reliquiae Petrakianae 1227 (W 09484, holotype; GZU, L, M, isotypes). Synonymy already suggested by Barr (1992).

For additional illustrations see Hyde & Aptroot (1997a).
Ascomata 200–400 μm diam., sphaeroid to irregularly flattened, immersed below a black clypeus/stroma uniting several ascocarps, each with an erumpent, often papil­late ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, spar­sely anastomosing above the asci, filaments c. 2-2.5 μm wide. Ascospores long ellip­soid, 1-3-septate, (16-21-24(-26) × 6-8 μm, with a median constriction, cell nearly equal, when 1-septate both cells often with pseudosepta, ends rounded, with a c. 2 μm thick gelatinous sheath. Conidiomata unknown. In vitro unknown.

Notes: An additional specimen from Sarasota, cited by Barr (1992), belongs to a spe­cies of the Microthyriaceae; the specimen from Winter Park cited below is in agree­ment with the type.

Distribution and ecology: So far only known from the Southern USA.

Host plant recorded: Sabal palmetto (Palmae).

Additional material seen: USA, FLORIDA: Winter Park, on petioles of Sabal palmetto (Palmae). Shear P108, 9 XII 1941 (W 14623, sub M. floridana; no type, but original material which was not cited, but examined by Petrak).

1.30 Massarina palmicola K.D. Hyde & Aptroot, Nova Hedwigia 64: 499. 1997. Fig. 27.

For additional illustrations see Hyde & Aptroot (1997a).

Ascomata 300-400 μm diam., sphaeroid to irregularly flattened, immersed to erum­pent, with an erumpent, papillate ostiole. Hamathecium consisting of branched, sep­tate pseudoparaphyses, sparsely anastomosing above the asci, filaments up to c. 2.5 μm wide. Ascospores fusiform, (3-)5-septate, 37-53 × 10-12.5 μm, with a median con­striction, upper middle cell largest and bulging out, end cells smallest, ends pointed, with a 1-2 μm thick gelatinous sheath, which may expand at the upper end. Conidiom­ata unknown. In vitro unknown.

Distribution and ecology: So far only known from a palm rachis in Malaysia.

Host plant recorded: Livistona (Palmae).

1.31 Massarina papulosa (Durieu de Maisonneuve & Montagne) Bose, Phytopathol. Z. 41: 176. 1961. Fig. 28.
Type — ALGERIA: On dead leaves of Citrus aurantium (Rutaceae). Durieu de Maisonneuve s.n. (PC, lect­otype, Hyde & Aptroot 1997b; PC, isotype). Paratypes are mentioned below under additional material seen.


Massarina marcucciana Auerswald & Rabenhorst, Unio Itineraria Cryptogamica 59. 1866 ≡ Massaria marcucciana (Auerswald & Rabenhorst) Auerswald & Rabenhorst, Fungi Europaei Exsiccati 2665. 1881

≡ Metasphaeria papulosa f. marcucciana (Auerswald & Rabenhorst) Berlese, Icones Fungorum 1: 140. 1894.
Type — Italy: Sardinia, Alghero, on Ampelodesmos tenax (Gramineae). Marcucci s.n., VI 1866, distributed in Unio Itineraria Cryptogamica 59 (L (3 ×), M, isotypes), also distributed in Rabenhorst, Fungi Europaei Exsiccati 2665 (BR, L, isotypes). Synonymy cited by Bose (1961).

Sphaeria peruviana Cooke, Grevillea 8: 35. 1880 ≡ Metasphaeria peruviana (Cooke) Saccardo, Syll. Fung. 2: 164. 1883.


*Sphaeria epipteridis* Cooke & Harkness, Grevillea 9: 8. 1880 \(\equiv\) Metasphaeria epipteridis (Cooke & Harkness) Saccardo, Syll. Fung. 2: 183. 1883 [as *epipteridea*].

Type — USA, CALIFORNIA: On stipes of Pteridium aquilinum (Pteridophyta). Harkness 1288 (K, lectotype, here designated). Synonymy already cited by Bose (1961). The lectotypification was necessary because the syntype cited in the original publication was annotated as belonging to the (unpublished) var. *tecta* by the original authors. Moreover, this specimen is a *Mycosphaerella* (see below).

*Sphaeria anisometra* Cooke & Harkness, Grevillea 9: 86. 1881 \(\equiv\) Metasphaeria anisometra (Cooke & Harkness) Saccardo, Syll. Fung. 2: 163. 1883 \(\equiv\) Endophlaea anisometra (Cooke & Harkness) Cooke, Grevillea 17: 89. 1889.

Type — USA, CALIFORNIA: on Cupressus macrocarpa (Cupressaceae). Harkness 1439 (K, lectotype, here designated). The lectotype is selected among various syntypes on other hosts. These are cited below, see additional material seen. Synonymy already cited by Bose (1961).

*Metasphaeria spatharum* Cesati ex Saccardo, Syll. Fung. 2: 179. 1883 \(\equiv\) Leptosphaeria spatharum Cesati in Rabenhorst, Fungi Europaei Exsiccati 2530. 1881 [nom. inval., Art. 32.1, no description].


Type — USA, CALIFORNIA: On Sarothamnus scoparius (Leguminosae). Harkness 2299 (K, lectotype, here designated). The lectotype is selected among various syntypes, mostly on other hosts. These are cited below, see additional material seen. Synonymy already cited by Bose (1961).


*Metasphaeria algeriensis* Saccardo & Berlese, Rev. Mycol. (Toulouse) 8: 34. 1886.


*Metasphaeria papulosa* subsp. *viridarii* Saccardo, Syll. Fung. 9: 838. 1891 [as *papulata* ssp.'].

Type — ITALY: Roma, Villa Corsini, on leaves of Euonymus japonica [as ‘europaes’ in publication] (Celastraceae). Parotta s.n. (PAD, holotype), also distributed in Fungi Romani 27. Synonymy already cited by Bose (1961).


*Massarina eucalypti* L.A. Kantschaweli, Bolezni Rast. 17: 85. 1928 [as 'eucalipti'].
Type — **GEORGIA**: Prov. Batum, Bacuriani ['Bucknari'], on *Eucalyptus* (Myrtaceae). Newodowski s.n., II 1912 (LE 34818, isotype). New synonymy.

Type — **PAKISTAN**: Tret, on *Olea cuspidata* (Oleaceae). Ahmad 23586, IV 1972 (LAH, holotype, not seen).
No material of this species was found in ZT, where many specimens from this author are kept. No material was sent on loan from LAH. According to the description, it is probably a synonym of *Massarina papulosa*, because of the 4-5-septate ascospores with thick sheaths.

For additional illustrations see Hyde & Aptroot (1997a).

Ascomata 100-300 μm diam., sphaeroid to irregularly flattened, immersed to erumpent, often papillate ostiole. Hamathecium consisting of branched, septate pseudo-paraphyses, filaments c. 2 μm wide. Ascospores long ellipsoid to broadly fusiform, (3-4)-septate, (16-)21-24-(26) × 6-8 μm, with a constriction well below the middle at the primary septum, upper middle cell largest, end cells smallest, upper half wider than lower half, ends rounded, with a c. 1-2 μm thick gelatinous sheath. Conidiomata coelomycetous, classified in *Diplodia* Fries. In vitro forming greenish grey aerial mycelium. All cultures examined are sterile, but reported to form conidiomata by Bose (1961).

**Notes:** The following three species are not synonymous, although they were synonymized by Bose (1961):

*Leptosphaeria debeauxii* Saccardo & Roumeguère in Saccardo, Michelia 2: 318. 1882 ≡ *Metasphaeria debeauxii* (Saccardo & Roumeguère) Saccardo, Syll. Fung. 2: 182. 1883. Type - **ALGERIA**: Oran, on petiole of *Chamaerops humilis* (Palmae). Debeaux s.n. (PAD, holotype), also distributed in Roumeguère, Fungi Gallici Exsiccati 1241. This is a new synonym of *Anthostomella lucens* Saccardo.

*Sphaeria epippteridis* var. *tecta* Cooke & Harkness, nom. herb. Material examined: USA, **CALIFORNIA**: On stipes of *Pteridium aquilinum* (Pteridophyta). Harkness 1290 (K). This is a species of *Mycosphaerella*. The specimen was cited as syntype of the species in the original publication, but annotated as belonging to a different variety on the specimen.

*Metasphaeria papulosa* f. *limbalis* Gonzalez Fragoso, Mem. Real Soc. Esp. Hist. Nat. 9(3): 89. 1919. Type — **SPAIN**: Cataluña, Centellas, on living leaves of *Buxus sempervirens* (Buxaceae). Caballero s.n., IV 1918 (L, isotype). This is a species of *Mycosphaerella* with the ascospores c. 10 × 3.5 μm.

**Distribution and ecology:** Widespread in Europe, North America and North Africa, predominantly occurring on leaves, but also on stems and bark of various herbaceous and woody plants.

**Host plants recorded:** *Acacia* (Leguminosae), *Ampelodesmos tenax* (Gramineae), *Araucaria bidwillii* and *A. imbricata* (Araucariaceae), *Arceuthobium campylodendron* (Loranthaceae), *Arundo mauretanica* (Gramineae), *Chamaerops humilis* (Palmae), *Cirsopogon nutans* (Gramineae), *Cirsium giganteum* (Compositae), *Citrus aurantium* (Rutaceae), *Cupressus macrocarpa* (Cupressaceae), *Dracaena* (Agavaceae), *Eucalyptus globosus* (Myrtaceae), *Euonymus japonica* (Celastraceae), *Ferula communis* (Um-
belliferae), Hedera helix (Araliaceae), Jasminum fruticans (Oleaceae), Jubea speci-
tabilis (Palmae), Mesembryanthemum edule (Aizoaceae), Mimulus glutinosus (Scro-
phulariaceae), Olea cuspidata (Oleaceae), Phoenix dactylifera (Palmae), Pteridium
aquilinum (Pteridophyta), Rhododendron (Ericaceae), Robinia (Leguminosae), Ru-
bus (Rosaceae), Sarothamnus scoparius (Leguminosae), Smilax mauretanica (Smila-
caceae), Ulmus carpinifolia (Ulmaceae) and Vitis vinifera (Vitaceae).

Additional material seen: USA, CALIFORNIA: On leaves of Eucalyptus globosus
(Myrtaceae). Harkness 2308 (K (2 x), paratypes of Sphaeria anisometra); On bark of
Eucalyptus globosus (Myrtaceae). Harkness 1287, 2373, 2410 (K, paratypes of
Sphaeria anisometra), also distributed in Ellis, North American Fungi 890 (K (3 x),
paratypes of Sphaeria anisometra); On stems of Mimulus glutinosus (Scrophu-
lariaeae). Harkness 1445 (K, paratype of Sphaeria anisometra); On stems of Rubus
(Rosaceae). Harkness 1262, 1486 (K, paratypes of Sphaeria anisometra); On leaves of
Dracaena (Agavaceae). Harkness 1447 (K, paratype of Sphaeria anisometra);
On branches of Araucaria imbricata (Araucariaceae). Harkness 2330, 2331 (2 x),
2332 (K, paratypes of Sphaeria californica); On Sarothamnmus scoparius (Legumi-
nosae). Harkness 2396 (K, paratype of Sphaeria californica); On Rhododendron
(Ericaceae). Harkness 2538 (K (3 x), paratypes of Sphaeria californica); On leaves of
Euonymus (Celastraceae). Harkness 2238, 2358 (K, paratypes of Sphaeria californica);
On branches of Euonymus (Celastraceae). Harkness 2059, 2238 (3 x) (K, paratypes of
Sphaeria californica); On branches of Acacia (Leguminosae). Harkness 2194 (K,
sub Sphaeria anisometra); On branches of Acacia (Leguminosae). Harkness 2355 (K,
sub Leptosphaeria californica).

ALGERIA: Hammam, on dead leaves of Hedera helix (Araliaceae). Durieu de Maisonneuve
s.n., I 1840 (PC, paratype); Alger, on dead leaves of Smilax mauretanica (Smilacaceae).
Durieu de Maisonneuve s.n., I 1840 (PC, paratype); Same locality, substrate and collector,
II 1840 (PC, paratype); Same locality, substrate and collector, III 1840 (PC, paratype);
On leaves of Mesembryanthemum edule (Aizoaceae). Trabut 38 (PAD, paratype of
Metasphaeria algeriensis).

FRANCE: Alpes Maritimes, Antibes, Villa Thuret, on leaves of Araucaria bidwellii
(Araucariaceae). Müller s.n., IV 1959 (CBS 422.62, living culture); Antibes, Pimeau,
on Jasminum fruticans (Oleaceae). Müller s.n., IV 1959 (CBS 472.64, living culture); Biot,
on Ulmus carpinifolia (Ulmaceae). Müller s.n., IV 1959 (CBS 471.64, living culture).

Note: The distributed exsiccate material of Metasphaeria epipteridis from GERMANY:
Königstein, on stipes of Pteridium aquilinum (Pteridophyta). Krieger s.n., distributed in
Fungi Saxonici 730 (L) belongs to a species of Mycosphaerella.


Type — MAURITIUS: Black River, on submerged wood. Hyde & Poonyth MAUR 51,
VII 1995 (HKU, holotype).

For additional illustrations see Hyde & Aptroot (1997b).

Ascomata 200-250 μm diam., hemispherical, erumpent, with a papillate ostiole. Hama-
theicum consisting of branched, septate pseudoparaphyses, sparsely anastomosing
above the ascii, filaments c. 1.5-2 μm wide. Ascospores broadly fusiform, 1-septate,
often curved, 38-46 × 10-12.5 μm, with a strong median constriction, upper cell slight-
ly shorter and broader than lower cell, ends rounded, without gelatinous sheath. Sen-

Notes: This species is similar to M. thalassioidea, but has larger ascospores.

Distribution and ecology: An aquatic species which is known from Australia, Maur-
itius and the Philippines (Hyde & Aptroot 1997b).


For additional illustrations see Hyde & Aptroot (1997b).

Ascomata 300-750 μm diam., sphaeroid, immersed, often staining the surrounding wood purple, with a papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments 2-4 μm wide. Ascospores fusiform, 1-septate, often curved, 40-50 × 13-17 μm, with a strong median constriction, upper cell slightly longer and broader than lower cell, upper end rounded, lower end pointed, with a 2-5 μm thick gelatinous sheath. Conidiomata coelomycetous, belonging to Phoma, probably to Phoma sect. Plenodomus (Preuss) Boerema, van Kesteren & Loerkker. Conidia hyaline, 2.5-3.5 × 1-1.5 μm, ellipsoid to ovoid, not guttulate. In vitro very slow-growing (3 cm diam. in 6 months), starting as a reddish-purplish aerial mycelium, after one month becoming greyish to blackish brown, forming conidiomata after 4 months.

Distribution and ecology: A usually aquatic species which is so far known from Australia and Papua New Guinea.

Additional material seen: PAPUA NEW GUINEA: Madang Province, foothills of Finisterre range, 40.8 km along road Madang-Lae, on submerged branch. Aptroot 36619, XI 1995 (CBS 204.96, also living culture); Central Province, Owen Stanley Range, Naduri, on grass roots (Gramineae). Aptroot 38134, X 1995 (CBS).

1.34 Massarina ramunculicola K.D. Hyde, Mycologia 83: 839. 1992 ['1991']. Fig. 31.

Type — THAILAND: Straits of Malacca, Ranong Mangrove, on immersed wood of Rhizophora apiculata (Rhizophoraceae). Hyde s.n., XI 1988 (BRIP 17082, holotype).

For additional illustrations see Hyde (1991).

Ascomata 450-550 μm diam., conical, immersed to erumpent, with an erumpent, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments up to c. 2.5 μm wide. Ascospores broadly fusiform, 1-septate, 32-42 × 11-18 μm, with a strong median constriction, upper cells equal, often bulging out near the septum, ends rounded, with a 3-5 μm thick gelatinous sheath, which bulges out at the ends to form hemispherical appendages of c. 5 μm diam. The sheath expands to form an even larger sticky mass when the enveloping membrane is broken. Senescent ascospores pale brown, often with two pseudosepta and with internal, longitudinally arranged, needle-like crystals. Conidiomata unknown. In vitro unknown.

Distribution and ecology: So far only known from mangroves in Thailand and Japan (Nakagiri 1993).

Host plants recorded: Rhizophora apiculata and R. mucronata (Rhizophoraceae).

Additional material seen: THAILAND: Straits of Malacca, Ranong mangrove, on immersed wood of Rhizophora mucronata (Rhizophoraceae). Hyde s.n., X 1988 (BRIP 17111, paratype).

Type — USA, NORTH CAROLINA: Carteret Co., Broad Creek, on Juncus roemerianus (Juncaceae). Kohlmeyer 5539, XII 1993 (IMS, holotype; UME, isotype, not seen).

For illustrations see Kohlmeyer, Volkmann-Kohlmeyer & Eriksson (1995a).

Ascomata 100-150 μm diam., sphaeroid, immersed, with a papillate, erumpent to projecting ostiole. Hamathecium consisting of unbranched, septate pseudoparaphyses, filaments c. 3 μm wide. Ascospores long ellipsoid, 3-septate, 19-25 × 5.5-7 μm, strongly constricted at all septa, middle cells shorter than end cells, lower end cell longer than upper end cell, ends rounded, with a two-layered, 2-4 μm thick gelatinous sheath, which expands to form an even larger sticky mass when the enveloping membranes are broken. Conidiomata unknown. In vitro unknown.

Notes: No material of this recently described species was seen. It may represent a true Massarina, but it may also belong to Wettsteinina. It is reported as close to M. carolinensis, but the hamathecium of M. carolinensis is described as consisting of dense, anastomosing, septate pseudoparaphyses, whereas the hamathecium of M. ricifera is said to be ‘a few thick unbranched pseudoparaphyses’.

Distribution and ecology: So far known standing culms in a salt marsh in N. Carolina.

Host plant recorded: Juncus roemerianus (Juncaceae).

Massarina rubi (Fuckel) Saccardo, Syll. Fung. 2: 155. 1883.  

Type — GERMANY: Eberbach, on Rubus fruticosus (Rosaceae). Fuckel s.n., 1894 (G, holotype). Additional material found under this name (in C) belongs to two different species of Didymella.


Type — GERMANY: Thüringen, Eisleben, Unterrissdorf, on Tilia platyphyllo (Tiliaceae). Kunze s.n., IV 1875, also distributed as Fungi Selecti Exsiccati 95 (L, isotype). New synonymy. Additional material found under this name (from Denmark) belongs to Epiphegia microcarpa.


Type — ROMANIA: Transsylvania, Hunyad, Retyezát, Holčváler, on Rosa (Rosaceae). Lojka s.n., VIII 1873, distributed in Rehm, Ascomyceten 242 (sub ‘Sphäria internixa’) (S, holotype). New synonymy.


Type — CZECH REPUBLIC: Weissskirchen, on Spiraea salicifolia (Rosaceae). Petrak s.n., VI 1923 (ZT, holotype). New synonymy. The ascocarps are not conspicuously eccentric, contrary to the name and the description.
Ascomata 150-350 μm diam., sphaeroid to globose or hemispherical, immersed to erumpent, rarely superficial, with an erumpent, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, sparsely anastomosing above the asci, filaments c. 1-2 μm wide. Ascospores fusiform, 1-septate, sometimes a bit curved, (15-)17-25(-28) × 4-6(-7) μm, with a strong median constriction, upper cell usually slightly shorter but broader than lower cell and bulging out above the septum, ends pointed, with a c. 1-3 μm thick gelatinous sheath. Conidiomata unknown. In vitro slow-growing (2 cm diam. in 3 months), forming copious greyish to blackish brown aerial mycelium.

Notes: This species is resurrected here; Bose (1961) synonymized this species with Epiphegia microcarpa. As already indicated by Holm (1957), many different species have been preserved under this name, including Lophiostroma nucula (Fries : Fries) Saccardo and Keissleriella sambucina (Rehm) Hohnel. Most material of this species has been found under various other Massarina names.

Distribution and ecology: Widespread in Europe, North America and Asia. A specimen from temperate South America is somewhat aberrant (see below). Mostly on bark of trees and shrubs, often associated with other ascomycetes, also on wood and culms.

Host plants recorded: Acer campestre, A. macrophyllum, A. saccharum and A. spicatum (Aceraceae), Amphipsphaerella xylostei (Amphisphaeriaceae, Ascomycota), Artemisia vulgaris (Compositae), Asteromassaria (Pleomassariaceae, Ascomycota), Betula nana (Betulaceae), Colpoma (Rhytismataceae, Ascomycota), Diaporthe (Diaphoraceae, Ascomycota), Fagus sylvatica (Fagaceae), Fraxinus excelsior (Oleaceae), Hypoxylon (Xylariaceae, Ascomycota), Ilex verticillata (Aquifoliaceae), Lonicera coerulescens and L. xilotheum (Caprifoliaceae), Myrica (Myricaceae), Ostrya virginiana (Betulaceae), Quercus petraea (Fagaceae), Rhus typhina (Anacardiaceae), Rosa (Rosaceae), Rubus fruticosus (Rosaceae), Salix alba (Salicaceae), Spiraea salicina (Rosaceae), Tilia platyphyllos (Tiliaceae), Ulmus glabra (Ulmaceae), Vaccinium vitis-idaea (Ericaceae), Viburnum alnifolium and V. lantana (Caprifoliaceae).

Selected additional material seen: USA, California: San Mateo Co., Boulder Creek Road, on Myrica (Myricaceae). Barr 5980a, XII 1971 (NY, sub Massarina microcarpa); same locality, on Lithocarpus densifolia (Fagaceae). Bigelow, Barr & Thiers 5976e, XII 1971 (NY, sub Massarina microcarpa); Massachusetts: Conway, on ascomycetes on Populus grandidentata (Salicaceae). Barr 6672, I 1980 (NY, sub Massarina albocarnis); Conway, on Ostrya virginiana (Betulaceae). Barr 5777, VI 1971 (NY, sub Massarina corni); Hampshire Co., Florence, on Acer spicatum (Aceraceae). Ahles 79916, IX 1974 (NY, sub Massarina microcarpa); Conway, on cf. Diaporthe (Diaphoraceae, Ascomycota) on Rhus typhina (Anacardiaceae). Barr 2864, XI 1960 (NY, sub Massarina albocarnis); Conway, on ascomycete on Rhus typhina (Anacardiaceae). Barr 6625, XI 1979 (NY, sub Massarina albocarnis); Conway, on ascomycete on Ilex verticillata (Aquifoliaceae). Barr 6634, XII 1979 (NY, sub Massarina albocarnis); Conway, on wood of Acer saccharum (Aceraceae). Barr 6034, III 1973 (NY, sub Massarina albocarnis); Conway, on Salix alba (Salicaceae). Barr 6310, IV 1976 (NY, sub Massarina canadensis); New Salem, on Asteromassaria (Pleomassariaceae, Ascomycota), on Fagus sylvatica (Fagaceae). Bigelow & Barr 5222b, VIII 1968 (NY, sub Massarina albocarnis); Hadley, on Colpoma (Rhytismataceae, Ascomycota) on Quercus (Fagaceae). Barr 6312, IV 1976 (NY, sub Massarina albocarnis); New Hampshire: White Mts. National Forest, on Acer spicatum (Aceraceae). Bigelow & Barr 3995b, VII 1963 (NY, sub Massarina microcarpa); Vermont: Mt. Mansfield State Forest, on Viburnum alnifolium (Caprifoliaceae). Bigelow & Barr 4178a, VI 1964 (NY, sub Massarina microcarpa); Newfane, on Hypoxylon (Xylariaceae, Ascomycota) on Fagus sylvatica (Fagaceae). Barr 2982a, VII 1961 (NY, sub Massarina albocarnis).


DENMARK: Birkerød, on *Salix* (Salicaceae). Munk s.n., II 1963 (C (2x), sub Massarina salicicola); Sjaelland, Ermelunden, on *Rosa* (Rosaceae). Munk s.n., XI 1963 (C (2x), sub Massarina polymorpha).

FAEROES: Nolsoes have, Thorshavn, on *Rubus* (Rosaceae). Meller s.n., VII 1938 (C).

FINLAND: Lahti, on wood of *Populus tremula* (Salicaceae). Karsten 3618, III 1872 (H).

FRANCE: Corsica, Bastia, on twigs. Hohnel s.n., IV 1905 (FH-Hohnel, sub Massarina sp.).


GREECE: Korfu ("Kerkyra"), Agios Gordis, on culm. Poier s.n., V 1989 (GZU, sub Massarina sp.).

SWEDEN: Härjedalen, Tännäs, on dead twigs of *Betula nana* (Betulaceae). Santesson s.n., VI 1992 (UPS, sub Massarina sp.); Uppland, on wood. Almquist s.n. (UPS, sub Massarina sp.); Skåne, Helsingborg, on *Fagus sylvatica* (Fagaceae). Hanson s.n., VII 1996 (C, CBS).


PAKISTAN: Naran, Kaghan Valley, on decorticated woody stems of *Artemisia vulgaris* (Compositae). Iqbal 507, VIII 1966 (CBS, sub Massarina sp.).

Additional material with 3-septate ascospores, but which is otherwise identical: TIERRA DEL FUEGO: Río Grande, Estancia Río Apen, on wood. Poelt s.n., I 1989 (GZU, sub Massarina sp.).


Type — ARGENTINA: La Plata, Ensenada, on *Celtis talae* (Celtidaceae). Spegazzini 5577, 1889 (LPS, holotype).

Ascomata 400-550 μm diam., pyriform to hemispherical, erumpent to superficial, with a large, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1.5-2 μm wide. Ascospores fusiform, 5-septate, rarely 7-septate, 43-50 × 10-12(-14) μm, with a strong median constriction, upper half slightly longer and broader than lower half, end cells smallest, ends pointed, with a c. 1-2 μm thick gelatinous sheath. Conidiomata unknown. In vitro unknown.

Distribution and ecology: So far only known from *Celtis* branches in Argentina.

Host plant recorded: *Celtis talae* (Celtidaceae).

**Type** — **BRITISH ISLES**: Exeter, Exminster Marshes, on dead leaves of *Carex acutiformis* (Cyperaceae). Scheuer 190, XI 1988 (GZU, holotype, also dried culture).


**Type** — **BRITISH ISLES**: King’s Cliffe, on grass. Berkeley s.n., 1850 (not seen).

Ascomata 150-250 μm diam., sphaeroid to globose, immersed, with an erumpent, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, richly anastomosing above the asci, filaments c. 1-2 μm wide. Ascospores fusiform, 1-septate, often curved, 29-35(-42) × 5-6(-7) μm, with a strong median constriction, upper cell usually slightly shorter but broader than lower cell and bulging out above the septum, ends pointed, with a c. 3-7 μm thick gelatinous sheath. Senescent ascospores pale brownish, (5-)-6-septate, usually with two additional septa in the upper half and three in the lower half. Conidiomata hyphomycetous, belonging to *Tetraploa aristata* Berkeley & Broome. In vitro slow-growing (2 cm diam. in one month), forming copious greyish to blackish aerial mycelium in which after 2 months the conidia are formed.

**Distribution and ecology**: The teleomorph is so far only known from *Carex* in the British Isles, whereas the anamorph is common and widespread on various substrata.

**Host plant recorded**: *Carex acutiformis* (Cyperaceae).

**Additional material seen**: **BRITISH ISLES**: Exeter, Exminster Marshes, on dead leaves of *Carex acutiformis* (Cyperaceae). Scheuer 293, I 1989 (GZU, paratype and topotype).


**Type** — **BELIZE**: Carrie Bow Cay, on submerged marine wood. Kohlmeyer 4804a, XII 1985 (FH, isotype, slides only ['4804b']).

For additional illustration see Read, Moss & Jones (1994).

Ascomata 200-450 μm diam., pyriform to sphaeroid, immersed to erumpent, with a large, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1.5-2 μm wide. Ascospores broadly fusiform, 1-3-septate, (28-)33-45(-47) × (9.5-)11-14(-15) μm, with a strong median constriction, only slightly constricted at the additional septa, cells equal when 1-septate, end cells smaller than middle cells when 3-septate, ends rounded, with a c. 2-4 μm thick gelatinous sheath, which is constricted at the primary septum. Senescent ascospores becoming dark brown and verruculose. Conidiomata unknown. In vitro unknown.

**Notes**: This species is most closely related to *Massarina australiensis*. Senescent spores become dark brown and verruculose. The ultrastructure of asci and ascospore sheaths has been studied by Read, Moss & Jones (1994).

**Distribution and ecology**: So far known from e.g. Australia, Florida, Aldabra, India, Mexico (Baja California), the Galapagos Islands, Malaysia and Belize, so probably pantropical in mangroves.
Host plants recorded: *Avicennia germinans* (Verbenaceae), *Ceriops* (Rhizophoraceae), *Cocos nucifera* (Palmae), *Conocarpus erecta* (Combretaceae), *Laguncularia racemosa* (Combretaceae) and *Rhizophora mucronata* (Rhizophoraceae).

Additional material seen: AUSTRALIA: Queensland, Cairns, on *Ceriops* (Rhizophoraceae). Hyde 1715, IX 1989 (BRIP 19826, slide only).


For additional illustrations see Hyde & Aptroot (1997b).

Ascomata 500-750 μm diam., conical to sphaeroid, immersed, with an erumpent, papillate to rostrate, up to 800 μm long, ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1.5-2.5 μm wide. Ascospores broadly fusiform, 1-septate, but often with 2 pseudosepta, 25-31 × 7-9 μm, with a strong median constriction, only slightly constricted at the pseudosepta, symmetrically septate, ends rounded, without gelatinous sheath. Senescent ascospores pale brown. Conidiomata unknown. In vitro unknown.

Distribution and ecology: An aquatic species which is so far known from Australia, Brunei and the Philippines.


1.41 **Massarina velatispora** K.D. Hyde & Borse, Mycotaxon 27: 163. 1986 [as ‘velataspora’, cited also several times by the authors as ‘velatospora’]. Fig. 37.

Type — SEYCHELLES: on intertidal *Rhizophora mucronata* (Rhizophoraceae). Hyde s.n., XII 1983 (IMI 297770, holotype).

For additional illustrations see Hyde (1991).

Ascomata 700-1200 μm diam., conical to sphaeroid or globose, immersed to erumpent, with an erumpent, papillate ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1-2 μm wide. Ascospores broadly fusiform, 3-septate (1-septate only when young), 42-50(-56) × 14-16(-19) μm, with a strong median constriction, also strongly constricted at the additional septa, upper half usually slightly larger and broader than lower half, end cells much smaller than middle cells and more or less hemispherical, ends rounded, with a c. 2-6 μm thick gelatinous sheath, which expands to form an even larger sticky mass when the enveloping membrane is broken. Senescent ascospores becoming dark brown, purplish in mass. Conidiomata unknown. In vitro growing slowly, forming aerial mycelium which is initially white, but becomes purplish later on, ascomatal initials are formed, but do not mature (Hyde 1991).

**Distribution and ecology:** So far known from Australia, Bali, Belize, Brunei, India, Malaysia, Martinique, Mauritius, Sumatra, the Philippines, Trinidad, Thailand and the Seychelles, thus pantropically distributed in mangroves.

**Host plants recorded:** *Aegiceras corniculatum* (Myrsinaceae), *Avicennia alba* (Verbenaceae), *Rhizophora apiculata*, *R. mangle*, *R. mucronata* and *R. stylosa* (Rhizo-
phoraceae), Sonneratia alba, S. caseolaris and S. griffithii (Sonneratiaceae) and Xylocarpus granatum (Meliaceae).

Additional material seen: THAILAND: Ranong, on intertidal Rhizophora apiculata (Rhizophoraceae). Hyde 1741, XI 1988 (BRIP 17083 ['19851' on slide]).

1.42 **Massarina waikanaënsis** (G.S. Ridley) Shoemaker & C.E. Babcock, Canad. J. Bot. 67: 1581. 1989. Fig. 38.

For additional illustrations see Shoemaker & Babcock (1989).

Ascomata 200-250 μm diam., globose to sphaeroid, erumpent to superficial, with a flush ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, filaments c. 2-3 μm wide. Ascospores fusiform, 3-septate, 20-24(-27) × 5-6 μm, with a slight median constriction, not constricted at the additional septa, primary septum median, upper middle cell broader than lower middle cell, but not bulging out, end cells smaller than middle cells, ends rounded, with a c. 2-4 μm thick gelatinous sheath. Conidiomata unknown. In vitro unknown.

Notes: This species, as well as *M. walkeri* only doubtfully belong to *Massarina*, as they share many characters with *Leptosphaeria* Cesati & De Notaris. However, it has been deliberately excluded from that genus by the monographer, Shoemaker (1984).

**Distribution and ecology:** So far only known from wood in New Zealand.

1.43 **Massarina walkeri** Shoemaker, C.E. Babcock & J.A.G. Irwin, Canad. J. Bot. 69: 569. 1991. Fig. 39.

Type — AUSTRALIA: Queensland, Gatton, Hunter River, cultivated from Medicago sativa (Leguminosae). Irwin UQ109, VII 1987 (BRIP 15938, dried cultures and slides; CBS 257.93, living culture; IMI 320072, badly preserved dried culture, all isotypes).

Type — AUSTRALIA: Queensland, Hermitage, from stem of *Medicago sativa* (Leguminosae). Irwin 19591, III 1972 (BRIP, not seen).

Ascomata 150-250 μm diam., globose to sphaeroid, superficial, with a large, papillate to beak-like, up to 170 μm long ostiole. Hamathecium consisting of branched, septate pseudoparaphyses, anastomosing above the asci, filaments c. 1-1.5 μm wide. Ascospores fusiform, 1-septate, 19-22 × 4.5-5.5 μm, with a slight median constriction, upper cell longer and broader than lower cell, slightly bulging out, ends pointed, with a c. 1-2 μm thick gelatinous sheath. Senescent ascospores 3-septate, middle cells dark brown, end cells smaller, pale brown, ends becoming more rounded. Conidiomata coelomycetous, belonging to Acrocalymma medicaginis Alcorn & J.A.G. Irwin. In vitro usually producing the anamorph, only once the teleomorph was produced, in a culture from which the species was described.
Notes: This species, as well as the preceding one, only doubtfully belong to *Massarina*, as they share many characters with *Leptosphaeria* Cesati & DeNotaris. However, it has been deliberately described in another genus by the monographers of *Leptosphaeria*, Shoemaker and Babcock. In addition, the associated anamorph reported would suggest exclusion.

**Distribution and ecology:** So far only known from the type locality.

**Host plant recorded:** *Medicago sativa* (Leguminosae).

1.44 *Massarina* sp. (undescribed)

This undescribed species is characterized by the 5-7-septate ascospores of c. 27-33 × 9-12 μm. For a formal description additional material is required.

**Host plant recorded:** *Ulmus glabra* (Ulmaceae).

**Specimen seen:** AUSTRIA: Oberösterreich, Mühlvielet, Rannatal, on *Ulmus glabra* (Ulmaceae). Berger 8542, III 1995 (herb. Berger).


Type — *Epiphegia alni* Nitschke ex G.H. Otth, holotype (= *Massarina alni* (Nitschke ex G.H. Otth) Saccardo = *Epiphegia microcarpa* (Fuckel) Aptroot).

The genus *Epiphegia* is reinstated here to accommodate a species which combines the ascocarp organization of *Phragmoporthe* Petrak (ascocarps grouped in stromatic tissues) with the internal structures of *Massarina* (bitunicate asci, pseudoparaphyses, hyaline, septate ascospores). Consequently, this fungus was previously assigned to both (and other) genera. For illustrations and a description of *Phragmoporthe* see Reid & Booth (1967).

For a description see below under *E. microcarpa*.

**Distribution and ecology:** The genus contains one species that is widespread in Europe and North America, occurring on various trees and shrubs.

2.1 *Epiphegia microcarpa* (Fuckel) Aptroot, comb. nov. Fig. 40.  


Type — GERMANY: Oestrich, on *Carpinus betulus* (Betulaceae). Fuckel s.n., 1894 (G, holotype).


Type — FINLAND: Mustiala, on *Corylus avellana* (Betulaceae). Karsten s.n. (not seen). No type material of this species was found in H, but the material examined from the same host (but from Bosnia) belongs to *Epiphegia microcarpa*, with which it was synonymized by Bose (1961, sub *Massarina microcarpa*).


Type — SWITZERLAND: Bern, Steffisberg, on *Alnus glutinosa* (Betulaceae). Otth s.n. (BERN, holotype).

Type — USA, NEW YORK: Karner ['Center'], on Alnus (Betulaceae). Peck s.n., V 1874 (NYS, holotype). New synonym, although this synonymy was already supposed by e.g. Holm (1968).


Type — BRITISH ISLES: London, Kew Botanical Gardens, on Alnus glutinosa (Betulaceae). Cooke s.n., 1887 (K, holotype, not seen).


Type — GERMANY: Brandenburg, Rathenow, on Alnus glutinosa (Betulaceae). Ploettner s.n., IV 1899 (B, holotype). New synonymy. This species was synonymized by Petrak (1941) with Phragmoporethe conformis (Hennings) Petrak. It was also synonymized with Massarina alnea.

For additional illustrations see Bose (1961).

Stroma black, forming an irregular to conical carbonaceous mass below the bark of the host in which the ascomata are immersed in groups of 1-8, reaching the surface through slits in the bark. Ascomata 500-750 μm diam., globose to sphaeroid, immersed, with papillate, erumpent ostioles which may form a brownish disc at the surface of the stroma. The ostioles are usually fused with their walls. Hamathecium consisting of sparse branched, cellular pseudoparaphyses, filaments up to c. 2 μm wide. Ascospores broadly fusiform to long ellipsoid, 3-septate (only young 1-septate), (18-)22-26(-30) × 6-8.5 μm, not constricted at the septa, primary septum median, middle cells equal and shorter but broader than end cells, ends rounded, without gelatinous sheath. Conidiomata unknown. In vitro forming greyish white aerial mycelium, remaining sterile.

Notes: This species has been synonymized with Phragmoporethe conformis (Berkeley & Broome) Petrak by Petrak (1941). Phragmoporethe differs from Epiphigia, however, in the ascus tip, which shows the refractive ring characteristic of the Diaporthaceae.

Material of Phragmoporethe conformis examined: NETHERLANDS: Den Haag, on Alnus glutinosa (Betulaceae). Destrees s.n., 1893, distributed in Rehm, Ascomyceten 1139 (L, sub 'Metaspharia' [sic] conformis).

A further species, which has been synonymized by e.g. Reid & Booth (1967) with Phragmoporethe conformis, viz. Sphaerulina alni A.L. Smith, differs in the polysporous asci and the 1-septate ascospores. It is a new synonym of Gnomonia ditopa (Fries) Monod.

Material of Gnomonia ditopa examined: BRITISH ISLES: Ayrshire, West Kilbride, on Alnus glutinosa (Betulaceae). Boyd s.n., IV 1918 (K, holotype of Sphaerulina alni); NETHERLANDS: Amsterdam, Vliegenbosch, on Alnus glutinosa (Betulaceae). Van Luyk 4400, III 1921 (L, sub Massarina ploettneriana).

An additional synonym, according to Bose (1961), is Sclerodothis sepincola (Berkeley & Broome) Petrak, Ann. Mycol. 19: 41. 1921 ≡ Metasphaeria sepincola (Berkeley & Broome) Saccardo, Syll. Fung. 9: 836. 1891, nom. illeg., Art. 53.1 [non Metasphaeria sepincola (Fries) Saccardo 1883]. This species is said, e.g. by Bose (1961), to be based on Sphaeria sepincola Berkeley & Broome. The latter authors, however,
only listed an existing species called 'Sphaeria sepincola', undoubtedly referring to *Sphaeria saepincola* Fries. The latter species is accepted, e.g. by Eriksson (1992), as *Saccothecium saepincola* (Fries : Fries) Fries.

**Distribution and ecology:** Widespread in Europe and North America, on dead branches and bark of various trees and shrubs.
**Host plants recorded:** *Aesculus* (Hippocastanaceae), *Alnus glutinosa* and *A. incana* (Betulaceae), *Betula alba* (Betulaceae), *Carpinus betulus* (Betulaceae), *Corylus avellana* (Betulaceae), *Juglans regia* (Juglandaceae), *Rhus typhina* (Anacardiaceae), *Tilia cordata* (Tiliaceae).

**Additional material seen:** USA, CALIFORNIA: Marin Co., Muir Woods, on *Aesculus* (Hippocastanaceae). Barr 5951b, XII 1971 (NY, sub *Massarina microcarpa*); MASSACHUSETTS: Conway, on *Rhus typhina* (Anacardiaceae). Barr 6548, IV 1979 (NY, sub *Massarina microcarpa*).

**AUSTRIA:** Wienerwald, Tullnerbach, on *Betula alba* (Betulaceae). Höhnel s.n., V 1915 (FH-Höhnel, sub *Massarina microcarpa*); Hüttdorf, on *Betula* (Betulaceae). Niessl s.n., IX 1908 (C, M, sub *Massarina eburnea*); Wulfersberg, on *Betula* (Betulaceae). Niessl s.n., 1912 (M, sub *Massarina eburnea*); Salzburg, Pinzgau, Obersulzbachtal, on bark of *Alnus incana* (Betulaceae). Scheuer s.n., 22 VII 1992 (GZU, sub *Massarina sp.*).

**BOSNIA:** Herzegowina, Jabloniza, on *Corylus avellana* (Betulaceae). Höhnel s.n. IV 1903 (FH-Höhnel, sub *Massarina coryli*).

**DENMARK:** Kolding, on *Tilia cordata* (Tiliaceae). Larsen s.n., II 1932 (C, sub *Massarina micacea*).

**NETHERLANDS:** Noord-Holland, Vogelenzang, on *Alnus glutinosa* (Betulaceae). Van Luyk 1219, VI 1929 (CBS, sub *Massarina ploeotmeriana*).

**SWITZERLAND:** Tessin, Brione, on *Juglans regia* (Juglandaceae). Bazzigher s.n., III 1955 (CBS 420.62, living culture).

3. **Exarmidium** P. Karsten, Mycol. Fenn. 2: 29. 1873

Type — *Exarmidium hysteriiforme* (P. Karsten) P. Karsten, holotype.


Type — *Xylopezia hemisphaerica* (Fries : Fries) Sherwood, holotype (≡ *Exarmidium hemisphaericum* (Fries : Fries) Aptroot). New synonymy.


The genus *Exarmidium* was recently revised by Barr & Boise (1985). It is characterized by, e.g., unitunicate asci, free paraphyses, long ellipsoid and irregularly biseriate, hyalophragmosporous ascospores. During my revision of *Massarina*, many specimens were found to belong to this genus, including the type species of the genera *Clypeothecium* and *Trematostoma*, which were synonymized with *Exarmidium* by Barr & Boise (1985). In addition, all species accepted in *Xylopezia* by Sherwood & Boise (1986) are placed here in *Exarmidium*. This genus was recently treated as pyrenomycetous (Barr & Boise 1985), whereas *Xylopezia* had been treated as (excluded) discomycetous, partly by the same author (Sherwood-Pike & Boise 1986), but the connection was apparently not noticed. Both revisions roughly treat the same set of species. Unfortunately, the genus *Exarmidium* has priority, whereas the epithets used in *Xylopezia* are older.
The genus *Exarmidium* is described well in both papers cited above. It is especially characterized by ascomata which start perithecium-like, usually with a concave top, but become exposed, revealing a small disc. Its most enigmatic character is the iodine reaction of the ascus tip, which is reported to be only present in some specimens. However, a positive bluing can often be observed when applying IKI (Lugol) after pretreatment with 10% KOH. This iodine reaction indicates that the genus belongs to the unitunicate ascomycetes, and seems to be most appropriately classified in the Hyponectriaceae Petrak (Barr & Boise 1985). Its synonym *Xylopezia* was listed by Eriksson & Hawksworth (1993) as belonging to an unknown family in the Dothideales.

For descriptions of the genus, see Barr & Boise (1985) and Sherwood & Boise (1986, sub *Xylopezia*).

**Notes:** The specimens often cause a white or pinkish discoloration of the wood, which is UV-positive (whitish). This character has not been commented upon before and makes some specimens somewhat reminiscent of species of *Mycomicrothelia* Keissler (Hawksworth 1985).

**Key to the species of *Exarmidium***

1a. Ascomata aggregated below a clypeus .................................................. 3.4 *E. hysteriforme*
1b. Ascomata solitary .................................................................................. 2

2a. Ascospores 2-septate ........................................................................... 3.1 *E. biseptatum*
2b. Ascospores 3-5-septate ................................................................. 3

3a. Ascospores in majority less than 12 μm long ..................................... 3.2 *E. excellens*
3b. Ascospores in majority more than 12 μm long .................................. 4

4a. Ascomata black; ascospores in majority more than 17 μm long ........ 3.3 *E. hemisphaericum*
4b. Ascomata dark brown; ascospores in majority less than 17 μm long ........ 3.5 *E. inclusion*

3.1 *Exarmidium biseptatum* (Sherwood) Aptroot, comb. nov.


Type — USA, OREGON: Lake Co., Picture Rock Pass, on wood of *Juniperus occidentalis* (Cupressaceae). Sherwood s.n., VI 1984 (BPI, holotype, not seen).

For a description of this species see Sherwood & Boise (1986, sub *Xylopezia biseptata*).

**Distribution and ecology:** Up to now only known from the type locality in Oregon; the material from New Jersey shows that the species is more widespread.

**Host plants recorded:** *Chrysothamnus nauseosus* (Compositae), *Juniperus occidentalis* (Cupressaceae), *Quercus* (Fagaceae).

**Material seen:** USA, NEW JERSEY: Newfield, on wood of *Quercus* (Fagaceae). Ellis s.n., II 1880 (NY, sub *Sphaeria diaphana*).
3.2 Exarmidium excellens (Rehm ex Saccardo) Aptroot, comb. nov.


For a description of this species see Sherwood & Boise (1986, sub *Xylopezia excellens*).

**Distribution and ecology:** So far only known from the syntypes. The new record from Papua New Guinea was rather unexpected and extends the distribution range to the Southern Hemisphere. However, the ecology, withered wood in alpine areas, is identical.

**Host plant recorded:** *Pinus cembra* (Pinaceae).

**Material seen:** PAPUA NEW GUINEA: Simbu Prov., Mount Wilhelm area, along new road from Gembogl to Goroka, on wood. Aptroot 32869, VIII 1992 (CBS).

3.3 Exarmidium hemisphaericum (Fries : Fries) Aptroot, comb. nov. Fig. 41.


**Type** — FRANCE: Jura, on wood of *Picea abies* (Pinaceae). Morthier 184, III 1866 (G, holotype), also distributed in Fuckel, *Fungi Rhenani* 2447. New synonymy. This is the type species of *Trematostoma* Shear, which becomes a synonym of *Exarmidium*.

**Sphaeria soluta** Cooke & Ellis, *Grevillea* 5: 54. 1876 [as ‘solutae’] ≡ *Zignoëlla diaphana* var. *soluta* (Cooke & Ellis) Ellis & Everhart, *North American Pyrenomycetes*: 188. 1892.

**Type** — USA, NEW JERSEY: Newfield, on wood of *Pinus* (Pinaceae). Ellis 2408 (NY, not seen). According to the toptype examined, this is a new synonym of *Exarmidium hemisphaericum*, but it had already been synonymized with *Massarina morthieri* by Shear (1942). Material seen: USA, NEW JERSEY: Newfield, on wood of *Thuja* (Cupressaceae). Ellis s.n., V 1881 (NY, toptype).


**Type** — USA, NEW JERSEY: Newfield, on wood of *Thuja occidentalis* (Cupressaceae). Ellis 2866, IV 1877 (NY, holotype; NY, isotype). This is a new synonym of *Exarmidium hemisphaericum*, but it had already been synonymized with *Massarina morthieri* by Shear (1942).


**Type** — USA, IDAHO: Kooskia, on *Thuja plicata* (Cupressaceae). Weir 16638, V 1920 (W, holotype, not seen). This synonymy follows Von Arx & Müller (1975). This is the type species of *Clypeothecium* Petrak,
which becomes a synonym of *Exarmidium*, rather than of *Massarina*, with which it was synonymized by Von Arx & Müller (1975).


Type — SWITZERLAND: Graubünden, Arosa Isla, on wood of *Juniperus nana* (Cupressaceae). Müller s.n., VII 1959 (ZT, holotype). New synonymy.


Type — INDIA: Rajasthan, Jodhpur, on wood of *Azadirachta indica* (Meliaceae). Purohit s.n., III 1979 (IMI 236247, lectotype, here designated; also mentioned as syntype: JAC 732 ['JUMLt']). New synonymy.

For a description of this species see Barr & Boise (1985, sub *Exarmidium morthieri*) and Sherwood & Boise (1986, sub *Xylopezia hemisphaerica*). A living culture of *E. hemisphaericum* (CBS 259.96) produced an apparently undescribed coelomycetous anamorph, which cannot be assigned to any known genus. It can be described as follows: Conidioma globose, solitary or confluent, thin-walled, blackish to olivaceous, without differentiated ostiole, opening by dissolution or rupture of the wall, superficial to partly immersed in the agar. Wall cells variable, thin- to thick-walled, hyaline to greenish brown, in layers of 1 to 4 cells. Conidiogenous cells broadly lageniform or ampulliform, discrete, holoblastic, occasionally with a percurrent proliferation, c. 7-12 × 4.5-5.5 μm. Conidia hyaline, irregularly ellipsoid, mostly 6-9 × 3-4 μm, with few small oil droplets near the ends, pale yellowish brown in mass, partly once or repeatedly (on separate loci) budding to form new conidia in a yeast-like fashion.

**Distribution and ecology:** Widespread in Europe and North America, also in Asia. On withered wood, mostly of conifers and *Sambucus*. The report from CHILE in Butin & Peredo, Bibliotheca Mycologica 101: 39, 1986 (sub *Massarina morthieri*) was a misidentification. The specimen (Valdivia, on *Pinus radiata* (Pinaceae). Peredo s.n., X 1974 (CBS, sub *Massarina morthieri*)) belongs to *Arthopyrenia plumbaria* (Stizenberger) R.C. Harris, for which it represents a range extension from N. America to S. America.

**Host plants recorded:** *Abies concolor* (Pinaceae), *Azadirachta indica* (Meliaceae), *Ceanothus velutinus* (Rhamnaceae), *Cistus symphytifolius* (Cistaceae), *Juniperus nana* (Cupressaceae), *Picea abies* (Pinaceae), *Pinus cembra, P. lambertiana* and *P. ponderosa* (Pinaceae), *Pseudotsuga menziesii* (Pinaceae), *Quercus* (Fagaceae), *Sambucus nigra* (Caprifoliaceae), *Thuja occidentalis* and *T. plicata* (Cupressaceae) and *Vaccinium* (Ericaceae).

**Additional material seen:** CANADA: British Columbia, Vancouver Island, Sidney, on dry wood on the seashore. Aptroot 35181, VIII 1994 (CBS); Vancouver, on wood. Aptroot 34725, VIII 1994 (CBS).

USA, DELAWARE: Faulkland, on wood of *Thuja* (Cupressaceae). Commons 789, III 1887 (NY (2 x), sub *Zignoëlla diaphana*); MONTANA: Mt. Helena, on wood of *Pseudotsuga menziesii* (Pinaceae). Anderson & Kelsey 14 (NY, sub *Zignoëlla diaphana*); NEW JERSEY: Newfield, on wood of *Thuja occidentalis* (Cupressaceae). Ellis 2866a, III 1877 (NY, topotype of *Sphaeria albocincta*); same locality, host and collector, V 1882 (NY (3 x), sub *Sphaeria diaphana*); same locality, host and collector, III 1788 (NY, sub *Sphaeria diaphana*); same locality, host and collector, V 1881 (NY, sub *Sphaeria sp.); same locality, on wood of *Quercus* (Fagaceae). Ellis s.n., II 1880 (NY, sub *Sphaeria diaphana*); same locality, on wood of *Pinus* (Pinaceae). Ellis s.n., II 1879 (NY, sub *Sphaeria diaphana*), also distributed in North American Fungi 781 (NY, as on 'oak', sub *Sphaeria diaphana*, see also below sub *Exarmidium inclusum*); WASHINGTON: On wood. Suksdorf 250, XII 1883 (NY, sub *Sphaeria diaphana*).
CANARY ISLES: La Palma, Mirador La Cumbrecita, on wood of *Cistus symphytifolius* (Cistaceae). Korf, Denison, Kohn & Sherwood 758, 1 1976 (CUP-MM 758).


ITALY: Ortler Alps, on wood of *Pinus cembra* (Pinaceae). Rehm s.n. (NY, sub *Sphaeria diaphana*).

NETHERLANDS: Friesland, Schiermonnikoog, on wood of *Sambucus nigra* (Caprifoliaceae). Aptroot 40001, 40003, 40008, IX 1996 (ABL, CBS); Ameland, on wood of *Sambucus nigra* (Caprifoliaceae). Aptroot 36302, IX 1995 (CBS, also living culture 259.96).

3.4 *Exarmidium hysteriiforme* (P. Karsten) P. Karsten

For a description and documentation of this species, see Barr & Boise (1985). No material was studied during this revision of *Massarina*.

3.5 *Exarmidium inclusum* (Persoon) Aptroot, comb. nov.


Type — GERMANY: On wood of *Salix caprea* (Salicaceae). Persoon s.n. (L, holotype, destroyed). The type was reported as lost in the mail by Sherwood & Boise (1986).


Type — USA, NEW JERSEY: Newfield, on wood of *Quercus* (Fagaceae). Ellis 2407, I 1876 (NY, isotype). New synonymy. This fungus is not identical with *Exarmidium hemisphaericum*, with which it was synonymized by Shear (1942) [sub 'Massarina mortieri']. Additional material seen in NY was partly this species, but for the most part *Exarmidium hemisphaericum*. In addition specimens preserved under this name proved to belong to *Exarmidium biseptatum, Julella sericea* (Massalongo) Coppins and to the lichen *Anisomeridium subprostans* (Nylander) R.C. Harris.


Type — FINLAND: Saksola, Padasjoki, on wood. Vainio s.n., 1872 ['1877' in publication] (H, holotype). New synonymy.


Type — SWITZERLAND: Neuchâtel, on wood of *Lonicera* (Caprifoliaceae). Morthier s.n., VI 1879 (PAD, holotype). New synonymy.


Type — FINLAND: Vaasa, Lahti, on wood of *Picea abies* (Pinaceae). Karsten 4042, VIII 1867 (H, holotype; H, isotype ['4043']). New synonymy.

For a description of this species, see Barr & Boise (1985, sub *Exarmidium diaphanum*) and Sherwood & Boise (1986, sub *Xylopezia inclusa*).
**Distribution and ecology:** Widespread in Europe and North America. On withered wood, mostly of angiosperms, rarely on stems.

**Host plants recorded:** *Acer pseudoplatanus* (Aceraceae), *Amelanchier* (Rosaceae), *Aplopappus* (Compositae), *Astragalus* (Leguminosae), *Betula alba* (Betulaceae), *Calluna vulgaris* (Ericaceae), *Cornus* (Cornaceae), *Fagus sylvatica* (Fagaceae), *Lonicera* (Caprifoliaceae), *Phyllocladus* (Ericaceae), *Picea abies* (Pinaceae), *Platanus* (Platanaceae), *Populus* (Salicaceae), *Potentilla* (Rosaceae), *Quercus* (Fagaceae), *Salix caprea* (Salicaceae).

**Additional material seen:** USA, NEW JERSEY: Malaga, on wood of *Cornus* (Cornaceae). Ellis s.n., II 1877 (NY, sub *Sphaeria diaphana*); Newfield, on wood of *Quercus* (Fagaceae). Ellis s.n., II 1879, distributed in North American Fungi 781 (NY, sub *Sphaeria diaphana*, see also above sub *Exarmidium hemisphaericum*).


Type — *Oraniella coffeicola* Spegazzini, holotype (= *Massarina coffeicola* (Spegazzini) Bose).

This genus is reinstated here to accommodate a single species of an unidentified family in the Melanommatales. The genus was synonymized with *Massarina* by Bose (1961), but differs, e.g., by the hamathecium.

For a description see below under *O. coffeicola*.

**Distribution and ecology:** The only species of the genus is found on branches of *Coffea* in South America.


Type — ARGENTINA: Jujuy, Orán, in wood and bark of *Coffea arabica* (Rubiaceae). Spegazzini 1218, III 1905 (LPS, holotype).

Stroma absent. Ascomata 100-300 μm diam., pyriform to sphaeroid, immersed, with a large, erumpent, papillate to beak-like, up to 200 μm long ostiole. Hamathecium consisting of anastomosing trabeculae, filaments c. 1-1.5 μm wide. Ascospores fusiform, 3-septate, 22-27 × 6-7(-9) μm, with slight constrictions at the septa, middle cells shorter but broader than end cells, ends rounded, with a c. 1-2 μm thick gelatinous sheath. Conidiomata unknown. In vitro slow-growing, producing whitish to grey aerial mycelium, remaining sterile, but formation of ascomata was reported by Bose (1961).

**Notes:** This fungus belongs to the Melanommatales and is the type species of *Oraniella* Spegazzini. It is characterized by hyaline, 3-septate ascospores, trabeculae and pyriform, beaked ascomata. It does not seem to be closely related to any other genus currently accepted in the order. Therefore, the genus is reinstated here with a single species. The additional material seen is a sterile culture.
**Distribution and ecology:** So far only known from South America.

**Host plant recorded:** *Coffea arabica* (Rubiaceae).

**Additional material seen:** COLOMBIA: On *Coffea arabica* (Rubiaceae). Collector unknown, 1959 (CBS 418.62, living culture).


Type — *Wettsteinina gigaspora* Höhnel, holotype.

This genus has recently been revised by Shoemaker & Babcock (1987). Several species described in *Massarina* match the generic circumscription of *Wettsteinina* perfectly.

5.1 **Wettsteinina corni** (Fuckel) Aptroot, comb. nov.  


Type — GERMANY: Johannisberg, on *Cornus sanguinea* (Cornaceae). Fuckel 179, 1871 (NY, isotype).


Type — SWITZERLAND: Zürich, on *Cornus* (Cornaceae). Winter s.n., IX 1878, distributed in Kunze, Fungi Selecti Exsiccati 338 (NY, isotype, sub *Massarina corni*), also distributed in Fungi Helvetici 38 (L, isotype, sub *Massarina corni*). New synonymy.

Stroma absent. Ascomata 200-300 μm diam., globose to sphaeroid, immersed, often almost without carbonization, with a pale, up to 100 μm wide, broad, flush ostiole which is visible from above. Hamathecium consisting of rounded, oily cells, which are the remnants of the initial interascal tissue, cells up to 1-1.5 μm wide. Ascospores broadly fusiform to long ellipsoid, (1)-3-septate, the 2 secondary septa often not completely closed (pseudosepta), 25-33(-38) × 7-11(-13) μm, with slight constrictions at the septa, middle cells shorter but broader than end cells, ends rounded, with a 2-5 μm thick gelatinous sheath. Conidiomata coelomycetous, belonging to *Coniothyrium* Corda s.l. In vitro slow-growing, producing whitish to grey aerial mycelium, remaining sterile, but the formation of conidiomata and ascomata was described by Bose (1961).

**Distribution and ecology:** Widespread in Europe, exclusively on *Cornus*. All collections from North America, including the specimen cited by Barr (1992), proved to belong to other *Massarina* species, mainly *M. eburnea* and *M. rubi*.

**Host plant recorded:** *Cornus sanguinea* (Cornaceae).

**Additional material seen** (all on *Cornus sanguinea* (Cornaceae)): AUSTRIA: Wien, Hüttdorf. Niesl s.n., XI 1910 (C, CUP-F 3449).


GERMANY: Sachsen, Leipzig. Winter s.n., IX 1874 (C); Eisleben. Winter s.n., VIII 1870 (L); Nossen. Krieger s.n. VII 1883, distributed in Fungi Saxonici 19 (NY); same locality and collector, VIII 1882, distributed in Rehm, Ascomyceten 698 (NY).

SWITZERLAND: Zürich. Winter s.n., IX 1878, distributed in Fungi Helvetici 38 (L, this is an isotype of Massaria winteri); also distributed in Kunze, Fungi Selecti Exsiccati 338 (NY, also an isotype of M. winteri); Graubünden, Alvaschein. Müller s.n., VIII 1959 (CBS 419.62, living culture); Bern, Rubigen. Müller s.n., V 1959 (CBS 496.64, living culture).

Note: The published exsiccatum: GERMANY: Brandenburg, Charlottenburg, on Cornus sanguinea (Cornaceae). Sydow s.n., VI 1884, distributed in Mycotheca Marchica 542 (NY) contains only a Guignardia sp.


Type — GREENLAND: Shannon-Oerne, on leaves of Dryas octopetala (Rosaceae). Rostrup 3, 1869-1870 (C, holotype).

For a description see Shoemaker & Babcock (1987).

Distribution and ecology: A distinct boreo-alpine element, occurring in Europe and North America, always on leaves of Dryas.

Host plants recorded: Dryas drummondii, D. integrifolia and D. octopetala (Rosaceae).

Selected additional specimens seen (all on leaves of Dryas spp. (Rosaceae)): CANADA: Hudson Bay, on D. integrifolia. Macoun s.n., VII 1910 (C).

GREENLAND: Danmarks Havn, on D. octopetala. Lundager s.n., VII 1908 (C); Same locality and host. Hartz s.n., 1892 (C); Cape Hamilton, on D. octopetala. Nygaard s.n., VI 1921 (C); Wright Bay, on D. octopetala. Nygaard s.n., VI 1921 (C); Washington Land, on D. octopetala. Koch s.n., VIII 1921 (C); John Murray Island, on D. octopetala. Wulff s.n., VII 19178 (C (2x)); Gunnar Andersen Valley, on D. octopetala. Wulff s.n., VII 1917 (C).

ICELAND: Hof, on D. octopetala. Davidsson 439, VI 1899 (C); same origin, no. 532 (C); same locality, host and collector, no. 70, V 1899 (C).

NORWAY: Kongiaard, on leaves of Dryas octopetala (Rosaceae). Rostrup s.n., VII 1887 (C).

SWITZERLAND: Corviglia, St. Moritz, on leaves of Dryas octopetala (Rosaceae). Wehmeyer s.n., VII 1953 (CBS 448.54, living culture).


Type — GERMANY: Budenheim, on dead leaves of Typha angustifolia (Typhaceae). Fuckel s.n. (G, holotype), also distributed in Fungi Rhenani 2436.

For a description see Shoemaker & Babcock (1989).

Notes: As already mentioned by Shoemaker & Babcock (1989), most of the material listed under this name, e.g. by Leuchtmann (1985), belongs to Massarina, but the type is a Wettsteinina.
Distribution and ecology: So far only known from the type locality.

**Host plant recorded:** *Typha angustifolia* (Typhaceae).


Synonyms placed in *Massarina* include the following:


*Massarina spectabilis* Ade, Hedwigia 64: 319. 1923.

Type — GERMANY: Unterfranken, Gambach, on *Dictamnus fraxinella* (Rutaceae). Ade s.n., V 1920 (GZU, isotype). New synonymy.

*Massaria moenana* Ade, Hedwigia 64: 297. 1923 ≡ 'Massarinula moenana' (Ade) Rehm, nom. herb.

Type — GERMANY: Aschaffenburg, Mainufer, on *Verbascum nigrum* (Scrophulariaceae). Ade s.n., X 1913 (GZU, holotype). This is also a new synonym of *Wettsteinina mirabilis* (Niessl) Höhnel, although it was described in the same publication as the above species, but in a different genus.

For a description, see Shoemaker & Babcock (1987).

Distribution and ecology: Widespread in Europe and North America, on stems of herbaceous plants.

**Host plants recorded:** *Adonis vernalis* (Ranunculaceae), *Artemisia borealis* and *A. campestris* (Compositae), *Bupleurum ranunculoides* (Umbelliferae), *Campanula caespitosa* (Campanulaceae), *Centaurea nervosa* (Compositae), *Chamaespartium sagittale* (Leguminosae), *Dictamnus fraxinella* (Rutaceae), *Euphorbia cyparissias* (Euphorbiaceae), *Hieracium bupleuroides* (Compositae), *Primula auricula* (Primulaceae), *Valeriana tripteris* (Valerianaceae), *Verbascum nigrum* (Scrophulariaceae) and *Vincetoxicum officinale* (Asclepiadaceae).

Additional material seen: SWITZERLAND: Glarus, Schwändi, on *Vincetoxicum officinale* (Asclepiadaceae). Müller s.n., 1949 (CBS 459.51, living culture); Zermatt, on *Trifolium* (Leguminosae). Wehmeyer s.n., 1953 (CBS 449.54, living culture).

5.5 *Wettsteinina xerophylli* (Ellis) Aptroot, comb. nov.


Type — USA, NEW JERSEY: Willow Grove, on dead leaves of *Xerophyllum asphodeloides* (Liliaceae). Ellis s.n., V 1882 (isotype), also distributed in North American Fungi 1340 (NY, lectotype, designated here; NY (3 x), isotypes).


For a description, see Shoemaker (1984, sub Leptosphaeria xerophylli).

**Distribution and ecology:** Widespread in North America, always on dead *Xerophyllum* leaves.

**Host plants recorded:** *Xerophyllum asphodeloides*, *X. douglasii* and *X. tenax* (Liliaceae).

**Additional material seen:** USA, MONTANA: Deer Lodge, on dead leaves of *Xerophyllum douglasii* (Liliaceae). Kelsey 145, VI 1887 (NY (3×)); NEW JERSEY: Willow Grove, on dead leaves of *Xerophyllum asphodeloides* (Liliaceae). Ellis s.n., V 1880 (NY, topotype); OREGON: Clackamas Co., Mt. Hood National Forest, on dead leaves of *Xerophyllum* (Liliaceae). Huhndorf 113, VIII 1992 (NY).

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6. **Annotated alphabetical list of *Massarina* species and their disposition**

6.1 **Massarina acrostichi** K.D. Hyde. Accepted species, see 1.1.


  *Type—CANARY ISLES:* Tenerife, Anaga, Las Carboneros, on wood of *Pyrus communis* (Rosaceae). Ade s.n., V 1926 (W 17243, lectotype, designated by Yue & Eriksson 1985).

  This is a specimen of *Acrocordia gemmata* (Acharius) Massalongo, with which the species was already synonymized by Yue & Eriksson (1985). It is the type species of *Amphididymella* Petrak, which is therefore a synonym of *Acrocordia* Massalongo rather than of *Massarina*, with which it was synonymized by Petrak (1959). The two remaining syntypes seen from the same locality, host, date and collector both belong to *Amphisphaeria* sp., as was indicated already by Yue & Eriksson (1985).

6.3 **Massarina albizziae** S. Ahmad, Biologia (Lahore) 17: 83. 1971.

  *Type—PAKISTAN:* Lahore, Ravi Reserve, on *Albizzia lebbek* (Leguminosae). Ahmad 22140, VIII 1970 (LAH, holotype, not seen).

  No material of this species was found in ZT. According to the description, this species has pigmented ascospores. Therefore it probably does not belong to *Massarina*.

6.4 **Massarina albocarnis** (Ellis & Everhart) M. Barr. Accepted species, see 1.2. Most additional material seen (partly reported by Barr, 1992) proved to belong to different species.

6.5 **Massarina almeidana** Sousa da Camara, Revista Agron. (Lisbon) 17: 8. 1929.

  *Type—PORTUGAL:* (LISVA, holotype, not seen).

  No material of this species was found in LISE, it is probably in LISVA, from where no material has been received. Its identity remains uncertain.

6.6 **Massarina alnea** (Peck) L. Holm. This is a synonym of 2.1 *Epiphegia microcarpa*.

6.7 **Massarina alni** (Nitschke ex G.H. Otth) Saccardo. This is a synonym of 2.1 *Epiphegia microcarpa*.

6.8 **Massarina alnicola** (Cooke & Massee) Berlese. Synonymized here with 2.1 *Epiphegia microcarpa* (see above). Not identical with *Phragmoporthe conformis* (Berkeley & Broome) Petrak, with which it was synonymized by Petrak (1941).


  *Type—UGANDA:* Nyamuleju-Nyabiiba, Mount Ruwenzori, on *Arundinaria alpina* (Gramineae). Kobayashi s.n., VII 1974 (YAM 23835, holotype, not seen).

  No answer was received upon a request for the loan of material from YAM. According to the description, this species has rounded ascospores. Therefore it probably does not belong to *Massarina*.

6.10 **Massarina ambigua** (Berlese & Bresadola) O.E. Eriksson. No type material of this species was found in PAD, and the type is presumably lost. Other material seen, which agrees well with the protologue, belongs to 1.17 *Massarina corticola*. It is therefore treated as a probable synonym of the latter species.
6.11 Massarina amphibia Magnes & Hafellner. Accepted species, see 1.3.
6.12 Massarina appendiculata Panwar, Purohit & Gehlot. Accepted species, see 1.4.
6.13 Massarina aquatica J. Webster. Accepted species, see 1.5.
6.14 Massarina armatispora K.D. Hyde, Vrijmoed, Chinnaraj & E.B.G. Jones. Accepted species, see 1.6.
6.15 Massarina arundinacea (Sowerby : Fries) Leuchtmann. Accepted species, see 1.7.
6.16 Massarina arundinariae (Ellis & Everhart) M. Barr. Accepted species, see 1.8.
6.17 Massarina australiensis K.D. Hyde. Accepted species, see 1.9.
Type — SOUTH AFRICA: Cape Province, near Knysna, on wood of branches. Schüpp 72, X 1959 (ZT, holotype).
Examination of the type shows that this is a specimen of the lichen Anisomeridium tamarindi (Fée) R.C. Harris on wood.
6.19 Massarina azadirachticola Purohit & Joshi. This is a new synonym of 3.3 Exarmidium hemisphaericum (Fries : Fries) Aptroot.
6.20 Massarina balnei-ursi (Rehm) K. Holm & L. Holm. Accepted species, see 1.10.
Type — ITALY: Belluno, on stems of Dryas octopetala (Rosaceae). Spegazzini 5819, IX 1879 (LPS, holotype). Examination of the type shows that this is a new synonym of Didymosphaeria futilis (Berkeley & Broome) Fuckel, as already anticipated in a footnote by L. & K. Holm (1986).
6.21 Massarina bambusina Teng, Sinensia 7: 512. 1936.
Type — CHINA: Szechuan, on Bambusoideae (Gramineae). Teng s.n. (not seen).
According to the description and illustration, this might represent an additional species of Massarina.
6.22 Massarina berchemiae Petrak. This is a new synonym of 1.20 Massarina eburnea.
6.23 Massarina biconica Petch. Accepted species, see 1.11.
6.24 Massarina bipolaris K.D. Hyde. Accepted species, see 1.12.
Type — INDIA: Maharashtra, Sindhudurg, Amboli Ghat, on dead twigs. Jadhav s.n., 1 1982. (AMH 7154, holotype).
The type specimen is badly preserved. It contains Chaetomium globosum Kunze, Heterosphaeria patella (Tode : Fries) Greville and Didymosphaeria conoidea Niessl, probably also Diaporthe eves Nitschke.
Type — FRANCE: on Spartium junceum (Leguminosae). Collector unknown (not seen).
No material of this species was found in either PAD, PC or ZT. Only the living culture in CBS could be examined, which is sterile and cannot be identified. No species of Massarina was ever recorded on Spartium. However, specimens of Cainia desmazieresii Moreau & E. Müller ex Krug and Montagnula partii (Castagne) Aptroot with young, colourless ascospores have sometimes been taken for a Massarina (see Massarina maritima).
6.27 Massarina canadensis (Ellis & Everhart) M. Barr. Accepted species, see 1.13.
Type — INDIA: West Bengal, Purulia, Raghunathpur, on Capparis horrida (Capparidaceae). Maity PCC720, II 1966 (DAOM 126814, isotype).
This is an immature pyrenocarpous ascomycete of uncertain affinities. It can be described as follows: Exciple pale. Asci dextrinoid, probably unitunicate, resembling *Exarmidium*. Ascospores immature, bisieriate, ellipsoid, hyaline, 3-5-septate, 16-18 × 7-8 μm.

6.29 *Massarina carolinensis* Kohlmeyer, Volkmann-Kohlmeyer & O. Eriksson. Accepted species, see 1.14.

6.30 *Massarina chamaecyparissi* (Rehm) L. Holm & K. Holm. Accepted species, see 1.15.

6.31 *Massarina chrysopogonis* Atkinson. This is a new synonym of 1.31 *Massarina papulosa*.

6.32 *Massarina cisti* Bose. Accepted species.


Type — USA, FLORIDA: Winter Park, on wood of *Andromeda ferruginea* (Ericaceae). Shear 840, II 1945 (W 12139, lectotype, designated here; M, W 05949, isotypes).

Examination of the type shows that this is the lichen *Anisomeridium biforme* (Borrer) R.C. Harris, of which the species is a new synonym.


Type — FRANCE: Antibes, on branches of *Quercus coccifera* (Fagaceae). Müller s.n., IV 1959 (ZT, holotype).

Most ascocarps in the type belong to *Peridiothelia fuliguncta* (Norman) D. Hawksworth. A few ascocarps belong to an unidentifiable *Arthopyrenia* with ornamented spores with roughly the same dimensions (17-19 × 7-8 μm).


Type — FINLAND: Turku ‘Abo’; ‘Mustiala’ according to the description’, on *Calamagrostis* (Gramineae). Karsten s.n., distributed in Fungi Fennici Exsiccati 963 (H, lectotype, designated here).

This is a species of *Lophiostoma*, related to or identical with *L. semilibrum* (Desmazières) Cesati & De Notaris. The ostioles vary between round and slit-like to even somewhat branched.

6.36 *Massarina coffeae* (Spegazzini) Bose. This is a new synonym of 1.17 *Massarina corticola*. It is the type species of *Pseudodiaporthe* Spegazzini.

The additional material found under this name (cited below) belongs to *Mycomicrothelia subfallens* (Müller Argoviensis) D. Hawksworth.

Additional material seen: COLOMBIA: Boyacá, Chocontá-Aguaclara Road, km 94, on branch. Dumont, Carpenter, Sherwood & Molina 4539 (NY).

6.37 *Massarina coffeicola* (Spegazzini) Bose. Accepted as 4.1 *Oraniella coffeicola* Spegazzini.


Type — INDIA: Aurangabad, Mahabaleshwar, on *Colebrookea oppositifolia* (Labiateae). Srinivasulu s.n., X 1967 (MAH 1200, holotype, not seen).

No material of this species was received on loan from MAH. According to the description, this species has unbranched paraphyses. Therefore it probably does not belong to *Massarina*. It may be a synonym of *M. kamatii*, described from the same host in the same country.

6.39 *Massarina coniferarum* Butin. This is a new synonym of 1.17 *Massarina corticola*.


Type — GERMANY: On *Prunus padus* (Rosaceae). Wallroth s.n., distributed in Flora Cryptogamica 3775 (not seen).

According to the published exsiccate specimen cited below [on which the combination in *Massarina* was made], this is a new synonym of *Massaria inquinans* (Tode : Fries) De Notaris.

6.41 Massarina contraria (Sydow) v. Arx & E. Müller, Stud. Mycol. 9: 77. 1975 ≡ Parasphaeria contraria Sydow, Ann. Mycol. 22: 297. 1924 [the basionym volume cited by Von Arx & Müller as '24', which does not render the combination invalid, as it can be interpreted as a typing error].

Type — NEW ZEALAND: Otago, Lake Harris Track, on leaves of Aciphylla lyallii (Umbelliferae). Reid 1058, V 1921 (B, holotype, not found). No material of this species was found in either B or S. Therefore the type should be regarded as lost, possibly destroyed in Berlin during World War II. It is the type species of Parasphaeria Sydow, the application of which remains obscure.

6.42 Massarina corni (Fuckel) Saccardo. Accepted as 5.1 Wettsteinina corni (Fuckel) Aptroot.

6.43 Massarina corticola (Fuckel) L. Holm. Accepted species, see 1.17.

6.44 Massarina coryli (P. Karsten) Saccardo. No type material of this species was found in H, but the material examined from the same host (but from Bosnia) belongs to 2.1 Epiphegia microcarpa, with which the species was synonymized by Bose (1961).


Type — INDIA: Bombay, Poona, Katraj, on Cosmos sulphureus (Compositae). Chiplonkar s.n., VIII 1966 (AMH [MACS] 479, holotype; IMI 162541, isotype). No identifiable fungus was found on the type material of this species, probably due to deterioration following preservation.

6.46 Massarina cystophorae (Cribb & Herbert) Kohlmeyer & E. Kohlmeyer. Accepted species, see 1.18.

6.47 Massarina desmonci (Sydow & P. Sydow) K.D. Hyde & Aptroot. Accepted species, see 1.19.


Type — SPAIN: Huesca, Campo, on Dianthus monspessulanus (Caryophyllaceae). Riofrío s.n. (not seen). No material of this species was found in MA. According to the description, this species has 6-septate ascospores. Therefore it probably does not belong to Massarina.

6.49 Massarina dickasonii (Wehmeyer) S. Ahmad. This is a new synonym of 1.17 Massarina corticola.


Type — BRITISH ISLES: North Somerset, Batheaston, on twigs of Ulmus (Ulmaceae). Collector unknown, I 1851 (K, holotype). The type of this species is an immature specimen of unknown affinities. According to Aptroot (1995a), this is probably a species of Massarina with the following characters: Ascomata erumpent, c. 1 mm diam., wall of strongly compressed cells, c. 100 μm thick. Ostiole c. 70 μm wide. Hamathecium gelatinous, interspersed with oil droplets. Ascospores 3-septate, fusiform, hyaline, 17.5-19.5 × 5-6.5 μm, ends pointed.


6.52 Massarina dryopteridis Bose, Phytopathol. Z. 41: 169. 1961 as ['dryopteri'].

Type — SWITZERLAND: Graubünden, Oberhalstein, on dead fronds of Dryopteris filix-mas (Pteridophyta). Müller 2549, VI 1955 (ZT, holotype). This is a species of Paraphaeosphaeria. The additional material represents other species of this genus. Additional material seen: USA, MASSACHUSETTS: Hampshire Co., Amherst, on dead fronds of Dryopteris filix-mas (Pteridophyta). Müller 2549, VI 1955 (ZT, holotype).

6.53 Massarina dubia (Wehmeyer & S. Ahmad) S. Ahmad. New synonym of 1.17 Massarina corticola.

6.54 Massarina eburnea (Tulasne & C. Tulasne) Saccardo. Accepted species, see 1.20. It is the type of Massarina.


6.58 "*Massaria eburnea* f. *ulmi*" Niessl, nom. herb. New synonym of 1.20 *Massarina eburnea*.


6.60 *Massarina eburnella* Saccardo. New synonym of 1.20 *Massarina eburnea*.

6.61 *Massarina eburnoides* (Saccardo) Saccardo. As already indicated by Bose (1961), this is a synonym of 1.20 *Massarina eburnea*.

6.62 *Massarina eburnoides* f. *quercus* Hohnel. New synonym of 1.20 *Massarina eburnea*. The publication of this forma was overlooked by the various indices.

6.63 *Massarina eccentrica* M. Barr. New synonym of 1.36 *Massarina rubi*.


Type — FINLAND: Mustiala, on wood of *Populus tremula* (Salicaceae). Karsten 3616, IV 1870 (H, lectotype, here designated), also distributed in Fungi Fennici Exsiccati 853 (H, isotype). Accepted here as *Keissleriella emergens* (P. Karsten) Bose. Part of the material filed under this name belongs to other species, e.g. *Lophiostoma nuclula* (Fries: Fries) Saccardo.


Type — INDIA: Aurangabad, Mahabaleshwar, on *Syzygium jambolanum* [as ‘*Eugenia jambulina*’] (Myrtaceae). Srinivasulu s.n., X 1967 (MAH 1201, holotype, not seen).

No material of this species has been received from MAH. According to the description, this species has unbranched paraphyses. Therefore it probably does not belong to *Massarina*.

6.67 *Massarina flagelotiana* Saccardo, Grevillea 21: 66. 1893 [as ‘*Massaria flagelotiana*’].

Type — FRANCE: Saône et Loire, Rigny-sur-Arroux, on *Viburnum opulus* (Caprifoliaceae). Flageolet s.n., I 1893 (PAD, holotype), also distributed in Roumeguère, Fungi Selecti Exsiccati 6359 (NY (2 ×), isotypes). This is a new synonym of *Massaria laniana* (G.H. Otth) Shoemaker & Leclair. It represents material of this species with asci with 8 ascospores.

6.68 *Massarina floridana* Petrak (1951). As already suggested by Barr (1992), this is a synonym of 1.29 *Massarina palmetta*.


Type — USA, FLORIDA: Wekiwa Spa, on *Staphylea rufa* (Staphyleaceae). Shear P787 p.p., I 1947 (W 06039, holotype).

The type contains three different fungi, viz. *Anisomeridium tamarindi* (Fée) R.C. Harris, *Diatrypella* sp. and *Microsphaeropsis* sp. The first species shows much resemblance to the protologue, but differs, e.g., by the 1-septate, ellipsoid instead of 3-septate, angular ascospores. It may be that the original material was senescent. Therefore *Massarina floridana* Petrak [1952] may be considered, with some hesitation, as a new synonym of *Anisomeridium cf. tamarindi* (Fée) R.C. Harris.

6.70 *Massarina fronsisubmersa* K.D. Hyde. Accepted species, see 1.21.


Type — BRITISH ISLES: Fleetwood, on Artemisia absinthium (Compositae). Bloxam s.n. (K, holotype).

The type now contains only a coelomycete.


Type — PAKISTAN: Punjab, Ladhar, on Eleusine flagellifera (Gramineae). Ahmad 922, VIII 1944 (LAH, holotype, not seen).

No material of this species was found in ZT, where many specimens of Ahmad are kept. No material was sent on loan from LAH. According to the description, this species has 5-septate to submuriform ascospores. It does probably not belong to Massarina.


Type — USA, NEW JERSEY: Newfield, on Lyonia ligustrina (Ericaceae). Ellis 2234, VII 1874 (NY, lectotype, selected by Aptroot 1995a) also distributed in North American Fungi 185, V 1877 (CUP-A, FH, L, NY (2x), NYS, S (3x), UPS, isotypes), also distributed in Rehm, Ascomyceten 441, VII 1877 (H, NY, isotypes), also distributed in Thttmen, Mycotheca Universalis 460, 1875 (BR (2x), FH, FH-Höhnel, L, NY (2x), W, isotypes). Fig. 44.

The specimens cited above are regarded as isotypes rather than topotypes because they had been collected before the species was described and they are undoubtedly part of one population or even one or two collections. In addition, there may have been some errors with the collecting dates. This fungus is a slightly lichenized species of Anisomeridium. The thallus is UV-negative, the ostioles are apical, the asci are cylindrical with a small ocular chamber and contain 8 ascospores, the paraphysoids are branched and anastomosing above the asci, the ascospores are ornamented with small warts and measure 20-28 × 8-11 μm, and the thalli are surrounded by conidiomata with rod-like conidia of c. 8 × 1 μm. The species seems to be different from all other species known in the genus, but it is close to Anisomeridium terminatum (Nylander) Aptroot. Therefore the following new combination is proposed here: Anisomeridium grumatum (Cooke) Aptroot, comb. nov., basionym: Didymosphaeria grumata Cooke in Saccardo, Syll. Fung. 1: 714. 1882.

6.75 Massarina hepaticarum (Crouan) Dobbeler. Accepted species, see 1.22.

6.76 Massarina himalayensis E. Müller, Sydowia 11: 461. 1958 (‘1957’, as ‘himalayense’).

Type — INDIA: Himalaya, Gahrwal, Bhuna, on branches and spines of Rosa webbiana (Rosaceae). Müller s.n., VI 1957 (ZT, holotype, sub ‘hymalayense’).

This is a species of Didymella, although it was synonymized with Massarina polymorpha by Bose (1961).

6.77 Massarina hysteroides (Ellis & Everhart) Berlese. As already indicated by Shoemaker (1984), this is a synonym of 5.5 Wettsteinina xerophylli (Ellis) Aptroot (as Leptosphaeria xerophylli Ellis).

6.78 Massarina igniaria (C. Booth) Aptroot. Accepted species, see 1.23.

6.79 Massarina immersa Dobbeler. Accepted species, see 1.24.


6.81 Massarina ingoldiana Shearer & K.D. Hyde. Accepted species, see 1.25.


Type — INDIA: Bombay State, Poona, on Jasminum malabaricum (Oleaceae). Viswanathan 2942, II 1959 (CBS, ZT, isotypes).

This is a species of Didymella.

6.83 Massarina juniperi Bose. This is a new synonym of 3.3 Exarmidium hemisphaericum.
6.84 Massarina kamati Tilak & Jadhav, Sydowia 25: 64. 1972 ['1971'].
Type — INDIA: Mysore, on Colebrookea oppositifolia (Labiatae). Srinivasulu s.n., 1966 (MUH, not seen).
No material of this species has been received from MUH. According to the description, this species has 5-septate ascospores and massive, superficial pseudostromata. It probably does not belong to Massarina. The illustration is strongly reminiscent of a Leptosphaeria species. Moreover, it may be identical with M. colebrookeae, described from the same host in the same country.

This species does not belong to any described genus known to me. Although it is not mentioned in the description, the ascomata are immersed in an extensive, thick, black stroma.

6.86 Massarina lacustris (Fuckel) Leuchtmann. Accepted as 5.3 Wettsteinina lacustris (Fuckel) Shoemaker & Babcock.

Type — INDIA: Maharashatra, on Lantana camara (Verbenaceae). Ramesh s.n. (LFM 70, holotype, not seen).
No information is available about the type. This fungus might be identical with M. mucosa, described from the same host from the same country, and thus belong to Didymella.

6.88 Massarina leucosarca (Ellis & Everhart) M. Barr. This is a form of 1.20 Massarina eburnea, of which it is a new synonym, with 1-septate ascospores.

6.89 Massarina lignorum (Wehmeyer) M. Barr. Accepted species, see 1.26.

Type — SWITZERLAND: Bern, Steffisburg, on Ligustrum vulgare (Oleaceae). Otth s.n. (not seen).
No material of this species was found in BERN. According to the description, the species has greenish ascospores. It does probably not belong to Massarina.

Type — INDIA: Uttar Pradesh, Chaubattia, Ranikhet, on Lonicera quinquelocularis (Caprifoliaceae). Bose s.n., V 1966 (ZT, holotype, not found).
No material of this species was found in ZT, although it was explicitly mentioned in the original publication that the type was deposited there. Therefore it should be regarded as lost. It may have been a species of Massarina, and if so, it could be close to or identical with 1.37 M. talae or with the undescribed 1.44 Massarina sp., because of the large, 5-7-septate ascospores.

6.92 Massarina lumulata (Tulasne & C. Tulasne) Saccardo. New synonym of 1.20 Massarina eburnea, representing material with 1-septate ascospores.

Type — SWEDEN: Uppsala, Slottsbacken, on Acer platanoides (Aceraceae). Vestergren s.n., X 1896 (S, lectotype; S, isotype).
This is a species of Massaria, close to or identical with M. lantanae (G.H. Otth) Shoemaker & LeClair, characterized by hyaline ascospores of 62-71 x 20-24 μm, which are arranged by 4-7 in the ascus.

6.94 Massarina macrospora (Saccardo) O.E. Eriksson & J.Z. Yue. Accepted species, see 1.27.

Type — SWITZERLAND: Bern, Bremgartenwald, on Lonicera nigra (Caprifoliaceae). Otth s.n. (not seen).
No material of this species was found in BERN. Its identity remains unknown.
6.96 **Massarina marcucciana** Auerswald & Rabenhorst. As already mentioned by Bose (1961), this is a synonym of 1.31 *Massarina papulosa*.


This is a new synonym of *Cainia desmazieresii* Moreau & E. Müller ex Krug, partly young material with many hyaline ascospores, but also partly well developed.

6.98 **Massarina micacea** (J. Kunze) Saccardo. New synonym of *Massarina rubi*.

6.99 **Massarina microcarpa** (Fuckel) Saccardo. Accepted as 2.1 *Epiphegia microcarpa*.


No type material was available for study. According to the description, the ascomata are minutely pilose. The species probably does not belong to *Massarina*. The additional material seen on *Larix* is *Arthopyre­nia punctiformis* Massalongo; the living culture is sterile.

Additional material seen: AUSTRIA: Nier.. [illegible], on *Larix* (Pinaceae). Höhnel s.n., VI 1900 (FH-Höhnels).

FRANCE: Alpes Maritimes, Biot, on *Lavandula stoechas* (Labiatae). Müller s.n., IV 1959 (CBS 421.62, living culture).

6.101 **Massarina moeszii** Tóth. Accepted species, see 1.28.

6.102 **Massarina mori** (Fabre) Boise. New synonym of 1.17 *Massarina corticola*.

6.103 **Massarina mortieri** (Fuckel) v. Arx & E. Müller. New synonym of 3.3 *Exarmidium hemisphaericum*.


The very sparse type shows that this is probably a species of *Didymella* with mostly 1-septate ascospores of c. 16 × 5 μm. *Massarina lantanae* is described from the same host from the same country and might be identical.

6.105 **Massarina myricae** (Peck) Berlese. New synonym of 1.17 *Massarina corticola*.


The type specimen contains two common pantropical lichens, viz. *Pyrenula marginata* Hooker and *Pyrenula aspístea* (Acharius) Acharius. The protologue gives very few characters, and does not mention ascospore dimensions, lichenization, or the presence or absence of oil droplets in the hamathecium. Moreover the ascospores were given as hyaline, whereas they are pale brown in the first and medium brown in the latter species. The only decisive character (ascoma size, given to be 1 mm), shows that this should be regarded as a new synonym of *Pyrenula marginata* Hooker.


The distoseptate ascospores (24-29 × 11-13 μm) and the oily hamathecium consisting of cellular pseudo-paraphyses with cells 5-8 × 2-3 μm show that this is a species of *Requienella*, most probably *R. seminuda* (Persoon : Fries) Boise, although the ascospores are colourless, whereas they are brown in that species. However, the ascospores may have been young. The species is already known from *Olea*. However, the distribution range is herewith extended to Asia. It was so far known from Europa and North America.

6.108 **Massarina oleina** S. Ahmad. According to the description, this is probably a synonym of 1.31 *Massarina papulosa*, because of the 4-5-septate ascospores with thick sheaths.
This is a new synonym of the barely lichenized *Polymeridium subcinereum* (Nylander) R.C. Harris, with a range extension to Europe. It was so far known from North America, South America Africa and Asia. There exists no correlation between the presence of the bark gall and the presence of the fungus, which is strictly superficial.

Type — JAPAN: Bonin Islands, Hahajima, Mount Chibusa, on leaves of *Oplismenus compositus* (Gra­mineae). Harada 188, XII 1977 (YAM, holotype, not seen).
No material has been sent on loan from YAM. According to the description, the species has a massive, often linear, stroma in which the ascocarps are immersed. Moreover the ascospores are ellipsoid. It probably does not belong to *Massarina*.

Type — PAKISTAN: Mussafarabad, Loon Bagla, on wood. Ahmad 16594, VII 1963 (DAOM, isotype, slide only).
This is a species of *Didymella*.

6.112 Massarina palmetta (Cooke) M. Barr. Accepted species, see 1.29.

6.113 Massarina palmicola K.D. Hyde & Aptroot. Accepted species, see 1.30.

6.114 Massarina papulosa (Durieu de Maisonneuve & Montagne) Bose. Accepted species, see 1.31.

Type — INDIA: Himalaya, Chaubettia, Ranikhet, Kumaon, on living leaves of *Michelia duthei* (Magnoli­aceae). Roy s.n., VII 1962 (ZT, holotype).
This is a new synonym of the lichen *Strigula smaragdula* Fries : Fries (syn. *Strigula elegans* (Fée) Müller Argoviensis). The type shows rich material of this species, which is a common, widespread foliicolous lichen.

6.116 Massarina peerallyi K.D. Hyde & Aptroot. Accepted species, see 1.32.

Type — ITALY: Montello, on *Cytisus nigricans* (Leguminosae). Saccardo s.n., IX 1877 (PAD, holotype).
This is a new synonym of *Keissleriella sambucina* (Rehm) Höhnel, characterized, e.g., by the black setae around the ostiole.


6.119 Massarina ploetterniana Hennings. New synonym of 2.1 *Epiphegia microcarpa*.

Type — USA, NEW JERSEY: Newfield, on *Viburnum lentago* (Caprifoliaceae). Ellis 679, XI 1879 (NY, holotype).
As already indicated by Shoemaker & LeClair (1975), this is a synonym of *Massaria lantanae* (G.H. Otth) Shoemaker & LeClair.
Selected additional material seen: CANADA: Ontario, London, on *Corylus americana* (Betulaceae). Dea­ness s.n., IV 1912 (NY), also distributed in Bartholomew, Fungi Columbiani 4826 (NY (4 x), as ‘plumin­gera’); same locality, host and collector, V 1912, distributed in Rehm, Ascomyceten 2044 (NY); same locality, on *Viburnum lentago* (Caprifoliaceae). Dearness s.n., VII 1892 (NY); XII 1891 (NY); VIII 1895 (NY).
USA, NEW HAMPSHIRE: Hillsboro Co., on *Hamamelis virginiana* (Hamamelidaceae). Rogerson s.n., VI­II 1956 (NY); NEW YORK: Albany, Shakers, on *Viburnum recognitum* (Caprifoliaceae). Smith 32148,
32149, X 1961 (NY); Alcove, on *Hamamelis virginiana* (Hamamelidaceae). Shear s.n., IV 1893 (NY), also distributed in New York Fungi 356 (NY (5 ×)); VIRGINIA: Rock Creek, on *Hamamelis* (Hamamelidaceae). Shear s.n., V 1903 (M), also distributed in Reliquiae Petrakianae (L); Arlington Farm, on *Viburnum dentatum* (Caprifoliaceae). Shear s.n., III 1929 (NY).


Type — USA, NEW YORK: Albany, on *Viburnum* (Caprifoliaceae). House s.n., II 1915 (NYS, holotype, not seen).

As already indicated by Shoemaker & LeClair (1975), this is a synonym of *Massaria lanata* (G.H. Otth) Shoemaker & LeClair. The combination in *Massarina* was apparently never made for this variety.


6.122 *Massarina polycarpa* (Fuisting) Saccardo & Traverse. According to the description, it is most probably a new synonym of 1.20 *Massarina eburnea*.


Type — INDIA: Delhi, Azadpur, on wood of *Psidium guajava* (Myrtaceae). Kapoor 24203, X 1955 (HCIO, holotype).

This is a species of *Mycosphaerella*.

6.126 *Massarina purpurascens* K.D. Hyde & Aptroot. Accepted species, see 1.33.


Type — JAPAN: Hondo, Nagato, on *Sasa veitchii* subsp. *tyugokensis* (Gramineae). Hino & Katamoto s.n. (YAM, holotype, not seen).

No material has been received on loan from YAM. According to the description, this species has simple paraphyses. Therefore it probably does not belong to *Massarina*.


Type — FRANCE: Fontainebleau, on *Quercus pedunculata* (Fagaceae). Géneau de Lamarlière s.n. (not seen).

No material of this species was found in PC. It is the type species of *Massarinula* Géneau de Lamarlière, the application of which remains obscure. According to the original description, the species could be a synonym of *Arthopyrenia punctiformis* Massalongo, and the genus would then become a synonym of *Arthopyrenia* Massalongo. The description by Müller & Von Arx (1962) is virtually identical with the original description and it is not clear if they studied original material.


This is a species of *Splanchnonema* with asymmetrically 4-5-septate ascospores of c. 30 × 10 μm. It does not agree with any of the species mentioned in Barr (1993). Therefore the following combination is proposed here for this species: *Splanchnonema quinqueseptatum* (M. Barr) Aptroot, comb. nov., basionym: *Massarina quinqueseptata* M. Barr, Mycotaxon 45: 217. 1992.


Type — PHILIPPINES: Luzon, Los Baños, on *Citrus nobilis* (Rutaceae). Raimundo.s.n., X 1913, sub Baker 1868. (S, holotype).

The type now contains only a coelomycete.

6.131 *Massarina ramunculicola* K.D. Hyde. Accepted species, see 1.34.

Type — GERMANY: Niederbayern, Eisenstein, on Prunus avium (Rosaceae). Kirschstein s.n., VII 1937 (B, holotype).

The type contains many small and few larger ascomata. The large ascomata are mature and belong to a species of Strickeria, probably S. nitida (Ellis & Everhart) Kuntze, with uniseriate, brown, muriform ascospores of c. 21 × 8 μm. The small ascomata contain young, colourless, 1-septate ascospores. Hamatheciun and ascocarp wall of all ascomata are identical, and in the larger ascomata also some young, colourless, 1-septate ascospores can be found. Therefore this is a new synonym of Strickeria cf. nitida. As this is the type species of Abaphospora Kirschstein, this genus becomes a synonym of Strickeria Koerner rather than of Massarina, with which it was synonymized by Petrak (1959).


Type — RUSSIA: Karelia, Viborg, on Ribes grossularia (Grossulariaceae). Vainio s.n., 1875 (H-NYL 858, lectotype, designated by Hawksworth (1985), not seen; IMI 250042, type slide). Redisposed by Aiptroot (1995b) as Phaeothisis ribesiella (Nylander ex Vainio) Aiptroot.

6.134 Massarina rieflera Kohlmeyer, Volkmann-Kohlmeyer & O. Eriksson. Accepted species, see 1.35.

6.135 Massarina rubi (Fuckel) Saccardo. Accepted species, see 1.36, although it was synonymized with Epiphegia microcarpa by Bose (1961).


6.137 Massarina salicicola var. minor Batista & Maia, Broteria Cl. Nat. 29: 134. 1960 [as 'Massaria salicina', illustrations sub 'Massaria salicina' and 'Massaria [sic] salicina'].

Type — BRAZIL: Bahia, Serrinha, on unidentified stems. Batista 11646, III 1959 [‘959’] (URM 16277, holotype [‘IMUR 16234’]).

The type contains normal specimens of two common pantropical lichen species, viz. Trypethelium aeneum (Eschweiler) Zahlbruckner and Trypethelium tropicum (Acharius) Muller Argoviensis. It is most probable that this is a new synonym of the latter species, T. tropicum, although so many mistakes occur in the published description, that it cannot be ruled out that both species were included in the protologue.


Type — INDIA: Chingleput, Tambaram, Christian College, on Sarcostemma brevistigma (Asclepiadaceae). Subramanian s.n., IV 1953 (MUBL 891, holotype, not seen).

No material of this species was available for study. According to the description, the 1-septate ascospores show three constrictions, viz. at the septa and also in the middle of the cells. The species probably does not belong to Massarina; the illustration is reminiscent of certain species of Arthopyrenia, e.g. A. cinchonae (Ach.) Müll. Arg.


Type — INDIA: Goa, Anmod, [‘Castle Rock’], on stems of Abrus precatorius (Leguminosae). Subedar s.n., XII 1974 (AMH 2672, holotype [‘2672b’]).

No fungus was present on the stems on the part of the holotype sent on loan, only Physalospora abrussae Subedar & V.G. Rao on the leaves.


Type — ITALY: Parma, San Marino del Taro, on Sarothamnus scoparius (Leguminosae). Passerini s.n. (PARMA, holotype, not seen).

No material of this species was available for study. According to the description, the ascospores are brown. The species is most probably a synonym of either Cainia desmazieresii Moreau & E. Müller ex Krug or Montagnula spartii (Castagne) Aiptroot.

155
6.141 **Massarina spectabilis** Ade. New synonym of 5.4 *Wettsteinina mirabilis* (Niessl) Höhnel.

6.142 **Massarina spiraeae** Bose. New synonym of 1.36 *Massarina rubi*.


Type — USA, FLORIDA: Wekiwa Spa, on *Staphylea rufa* (Staphyleaceae). Shear P787 p.p., I 1947 (W 06032, holotype).

This is a species of *Pseudopyrenula* Müll. Arg. in the Trypetheliaceae. It has larger ascospores than any species known in the genus. Therefore the following new combination is proposed here: *Pseudopyrenula staphyleae* (Petrak) Aptroot, comb. nov., Basionym: *Massarina staphyleae* Petrak, Sydowia 6: 7. 1952.

Although the family consists mainly of lichenized species, this species is not lichenized. There is only one other non-lichenized species known in the genus, the recently described *Pseudopyrenula papuana* Aptroot (Aptroot et al., 1997), which differs, e.g., by the pointed, acuminate ostioles and the smaller ascospores.


Type — GERMANY: Brandenburg, Krossen an der Oder, Friedhof Baudach, on *Syringa vulgaris* (Oleaceae). Kirschstein s.n., IV 1908 (B, holotype).

This is a new synonym of *Melomastia mastoidea* (Fries : Fries) Schroeter.

6.145 **Massarina talae** Spegazzini. Accepted species, see 1.37.


Type — SWEDEN: Småland, Femsjö, on wood. Fries s.n. (UPS-Fries, lectotype, Eriksson 1992).

Examination of the type shows that this is a lignicolous specimen of the lichen *Anisomeridium bifforme* (Borr) R.C. Harris of which the species is a new synonym.

6.147 **Massarina tetraploa** Scheuer. Accepted species, see 1.38.

6.148 **Massarina thalassiae** Kohlmeyer & Volkmann-Kohlmeyer. Accepted species, see 1.39.

6.149 **Massarina thalassioidea** K.D. Hyde & Aptroot. Accepted species, see 1.40.


Type — BRITISH ISLES: Forres, on *Tilia* (Tiliaceae). Keith s.n., V 1880 (K, holotype, not found).

No material of this species could be found in K and the type should be regarded as lost. According to the description, the ascospores are very large, viz. 40-60 μm long. It is probably a species of *Massaria*, e.g. *M. inquinans* (Tode : Fries) De Notaris, rather than a *Massarina*.

6.151 **Massarina tricellularis** Panwar & Kaur, Curr. Sci. 44: 523. 1975 (as ‘tricellula’).


This is a new synonym of *Melomastia mastoidea* (Fries : Fries) Schroeter.

6.152 ‘**Massarina usambarensis**’ (P. Hennings) Höhnel, nom. herb. (as *Holstiella usambarensis* P. Hennings, in Engler, Die Pflanzenwelt Ostafrikas, C: 33. 1895).

Type — TANZANIA (‘Ostafrika’): Dodo, on branches. Holst s.n. (FH-Höhnel, lectotype, designated here).

This is a new synonym of the common pantropical lichen *Trypethelium eluteriae* Sprengel. As it is the type species of *Holstiella* P. Hennings, this genus becomes a synonym of *Trypethelium* Sprengel and not of *Massarina*, with which it was synonymized by Von Arx & Müller (1975). It is remarkable that the copious algae and strikingly yellow coloration of the pseudostromata have been overlooked by Hennings, Höhnel, Müller and Von Arx. The lectotype selected is the only specimen known to have survived World War II, as Hennings had sent duplicates to Von Höhnel. The other syntypes perished in B.

6.153 **Massarina velatispora** K.D. Hyde & Borse. Accepted species, see 1.41.

Type — **FRANCE**: Finistère, on *Viburnum tinus* (Caprifoliaceae). Crouan s.n., V 1865 (CO, holotype).


Type — **ITALY**: Conegliano, on *Vitis vinifera* (Vitaceae). Spegazzini s.n., I 1878 ['1876'], distributed in Saccardo, Mycotheca Veneta 1275 (BR, isotype). Synonymy already indicated by Rossman (1979).


Type — **ITALY**: Treviso, on *Gleditsia triacantha* (Leguminosae). Spegazzini 1689, II 1878 (LPS, holotype, as 'tarvisina'). Synonymy already indicated by Rossman (1979).

The above three type specimens belong to a single species of uncertain affinity, described by Rossman (1979).


Type — **INDIA** (not seen).

No material of this species was found in AMH or HCIO. Its identity remains unknown.

6.156 *Massarina waikanaensis* (G.S. Ridley) Shoemaker & C.E. Babcock. Accepted species, see 1.42.

6.157 *Massarina walkeri* Shoemaker, C.E. Babcock & J.A.G. Irwin. Accepted species, see 1.43.

6.158 *Massarina winteri* (Rehm) Höhn. This is a new synonym of 5.1 *Wettsteinina corni* (Fuckel) Aptroot.

6.159 *Massarina xerophylli* (Ellis) M. Barr. Accepted as 5.5 *Wettsteinina xerophylli* (Ellis) Aptroot.


Type — **JAPAN**: Hokkaidô, Prov. Iburi, Oiwake, on *Sasa kurilensis* (Gramineae). Hino s.n., IX 1956 (YAM, holotype, not seen).

No material was received on loan from YAM. According to the description, this species has simple paraphyses. Therefore it probably does not belong to *Massarina*.

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**References**


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HOST INDEX

Numbers refer to species numbers

Acanthaceae, Barleria: 1.17
Aceraceae, Acer campestre: 1.36
-- A. glabrum: 1.26
-- A. grandidentatum: 1.17
-- A. macrophyllum: 1.36
-- A. platanoides: 1.17, 6.93
-- A. pseudoplatanus: 1.17, 3.5

-- A. saccharum: 1.20, 1.36
-- A. spicatum: 1.36

Agavaceae, Dracaena: 1.31
Aizoaceae, Mesembryanthemum edule: 1.31
Anacardiaceae, Rhus typhina: 1.36, 2.1
Apocynaceae, Apocynum androsaemifolium: 1.17
Aquifoliaceae, Ilex verticillata: 1.36

159
Araliaceae, *Hedera helix*: 1.31
Araucariaceae, *Araucaria bidwillii*: 1.31
-- *A. imbricata*: 1.31
Asclepiadaceae, *Sarcostemma brevistigma*: 6.138
-- *Vincetoxicum officinale*: 5.4
Betulaceae, *Alnus*: 1.20
-- *A. glutinosa*: 1.5, 1.17, 2.1
-- *A. incana*: 1.17, 2.1
-- *A. viridis*: 1.17
-- *Betula alba*: 1.20, 2.1, 3.5
-- *B. nana*: 1.36
-- *Carpinus betulus*: 1.20, 2.1
-- *C. caroliniana*: 1.20
-- *Corylus americana*: 6.120
-- *C. avellana*: 1.20, 2.1
-- *Ostrya virginiana*: 1.2, 1.20, 1.36
Buxaceae, *Buxus sempervirens*: 1.31
Campanulaceae, *Campanula caespitosa*: 5.4
Capparidaceae, *Capparis horrida*: 6.28
Caprifoliaceae, *Lonicera*: 3.5
-- *coerulea*: 1.36
-- *L. quinquelocularis*: 6.91
-- *L. xylosteum*: 1.36
-- *Sambucus caerulea*: 6.129
-- *S. e&wfas*: 1.17
-- *S. nigra*: 3.3
-- *S. nigra*: 1.17
-- *S. viridis*: 1.36
Caryophyllaceae, *Dianthus monspessulanus*: 6.48
Celastraceae, *Euonymus japonica*: 1.31
Celtidaceae, *Celtis alba*: 1.37
Cistaceae, *Cistus albidus*: 1.16
-- *C. symphytifolius*: 3.3
-- *Fumana procumbens*: 1.28
Combretaceae, *Conocarpus erecta*: 1.39
-- *Laguncularia racemosa*: 1.39
Compositae, *Alopappus*: 3.5
-- *Artemisia absinthium*: 6.72
-- *A. borealis*: 5.4
-- *A. campestris*: 1.17, 5.4
-- *A. vulgaris*: 1.36
-- *Aster mollissimus*: 1.17
-- *Centaurea nervosa*: 5.4
-- *Chrysanthemum nauseosum*: 3.1
-- *Cirsium giganteum*: 1.31
-- *Cosmos sulphureus*: 6.45
-- *Hieracium bupleuroides*: 5.4
-- *Rudbeckia*: 1.17
Coraceae, *Aucuba japonica*: 1.17
-- *Cornus*: 1.2, 1.20, 3.5
-- *C. sanguinea*: 5.1
Cupressaceae, *Cupressus macrocarpa*: 1.31
-- *Juniperus nana*: 3.3
-- *J. occidentalis*: 3.1
-- *Thuja occidentalis*: 3.3
-- *T. plicata*: 3.3
Cyperaceae, *Carex acutiformis*: 1.38
-- *C. nigra*: 1.3
-- *C. rostrata*: 1.3
-- *Scirpus lacustris*: 1.3
Equisetaceae, *Equisetum fluviatile*: 1.3
Ericaceae, *Andromeda ferruginea*: 6.33
-- *Calluna vulgaris*: 3.5
-- *Ledum groenlandicum*: 1.17
-- *Lyonia ligustrina*: 6.74
-- *Phyllodoce*: 3.5
-- *Rhododendron*: 1.31
-- *R. ferrugineum*: 1.17
-- *Vaccinium*: 3.3
-- *V. myrtillus*: 1.17
-- *V. vitis-idea*: 1.17, 1.36
Euphorbiaceae, *Euphorbia cyparissias*: 5.4
-- *Hevea brasiliensis*: 1.11
Fagaceae, *Fagus sylvatica*: 1.17, 1.20, 1.27, 1.36, 3.5
-- *Lithocarpus densifolia*: 1.36
-- *Quercus*: 1.5, 1.20, 3.1, 3.3, 3.5
-- *Q. coccifera*: 6.34
-- *Q. pedunculata*: 6.128
-- *Q. petraea*: 1.17, 1.36
Gramineae, *Ampelodesmos tenax*: 1.31
-- *Arundinaria*: 1.8
-- *A. alpina*: 6.9
-- *Arundo mauretanica*: 1.31
-- *Bambusoideae*: 1.14, 6.21
-- *Calamagrostis*: 6.35
-- *Chrysopogon nutans*: 1.31
-- *Eleusine flagellifera*: 6.73
-- *Opismenus compositus*: 6.110
-- *Phalaris arundinacea*: 1.23
-- *Phragmites*: 1.5
-- *P. australis*: 1.7
-- *Sasa veitchii subsp. tyugokensis*: 6.127
-- *S. kurilensis*: 6.160
Grossulariaceae, *Ribes grossularia*: 6.133
-- *R. montigenum*: 1.17
Hamamelidaceae, *Hamamelis*: 6.120
-- *H. virginicum*: 6.120
Hippocastanaceae, *Aesculus*: 2.1
Juglandaceae, *Juglans regia*: 2.1
Junciaceae, *Juncus roemerianus*: 1.14, 1.35
Labiatae, *Colebrookea oppositifolia*: 6.38, 6.84
-- *Lavandula stoechas*: 6.100
Leguminosae, *Albizzia lebbek*: 6.139
-- *Analoggus*: 6.3
-- Acacia: 1.31
-- Astragalus: 3.5
-- Chamaespartium sagittate: 5.4
-- Cytisus nigricans: 6.106
-- Derris elliptica: 6.154
-- Indigofera gerardiana: 1.17
-- Liliaceae, Xerophyllum asphodelioides: 5.5
-- X. douglasii: 5.5
-- X. tenax: 5.5
-- Loranthaceae, Arceuthobium campylopodium: 1.31
-- Magnoliaceae, Michelia duthei: 6.115
-- Meliaceae, Azadirachta indica: 3.3
-- Oleaceae, Fraxinus: 1.20
-- Potentilla: 3.5
-- Primulaceae, Primula auricula: 5.4
-- Ranunculaceae, Adonis vernalis: 5.4
-- Rhamnaceae, Berchemia scandens: 1.20
-- Ceanothus velutinus: 3.3
-- Zizyphus rugosa: 1.4
-- Rhizophoraceae, Ceriops: 1.39
-- Rhizophora apiculata: 1.34, 1.41
-- R. mangle: 1.41
-- R. mucronata: 1.34, 1.39, 1.41
-- R. stylosa: 1.41, 6.85
-- Rosaceae, Amelanchier: 3.5
-- Crataegus monogyna: 1.20
-- Dryas drummondii: 5.2
-- D. integrifolia: 5.2
-- Potentilla: 3.5
-- Prunus avium: 6.132
-- P. padus: 6.40
-- Pyrus communis: 6.2
-- Rosa: 1.36
-- R. webbiana: 6.76
-- Rubus: 1.31
-- R. fruticosus: 1.36
-- Spiraea salicifolia: 1.36
-- Halesia diptera: 1.17
-- Rutaceae, Citrus aurantium: 1.31
-- C. nobilis: 6.130
-- Distamnum fraxinnella: 5.4
-- Salicaceae, Populus: 3.5
-- P. candicans: 1.17
-- P. grandidentata: 1.36
-- P. tremula: 1.36, 6.64
-- P. tremuloides: 1.17
-- Salix: 1.13
-- S. alba: 1.36
-- S. caprea: 3.5
-- S. cinerea: 1.20
-- S. fragilis: 1.17
-- S. scouleriana: 1.17
-- S. viminalis: 1.17
-- Scrophulariaceae, Mimulus gutinosus: 1.31
-- Verbascum nigrum: 5.4
-- Smilacaceae, Smilax mauretanica: 1.31
-- Sonneratiaceae, Sonneratia alba: 1.41
-- S. caseolaris: 1.41
-- S. griffithii: 1.41
-- Staphyleaceae, Staphylea rafa: 6.69, 6.143
-- Tamaricaceae, Tamarix articulata: 1.17
-- Tiliaeae, Tilia: 6.150
-- T. americana: 1.17
-- T. cordata: 2.1
-- T. platypylla: 1.17, 1.36
-- Typhaceae, Typha angustifolia: 5.3
-- T. latifolia: 1.3
-- Umbelliferae, Aciphylia kyallii: 6.41
-- Bupleurum ranunculoides: 5.4
-- Ferula communis: 1.31
Ulmaceae, *Ulmus*: 6.50
-- *U. campestris*: 1.17, 1.20
-- *U. carpinifolia*: 1.31
-- *U. glabra*: 1.17, 1.36, 1.44

Urticaceae, *Urtica*: 5.4

Valerianaceae, *Valeriana tripteris*: 5.4

Verbenaceae, *Avicennia alba*: 1.41
-- *A. germinans*: 1.39
-- *Lantana camara*: 6.87, 6.104, 6.151

Vitaceae, *Vitis vinifera*: 1.31, 6.154

Pteridophyta, *Acrostichum speciosum*: 1.1
-- *Dryopteris filix-mas*: 6.52
-- *Osmunda cinnamomea*: 6.52
-- *O. claytoniana*: 6.52
-- *O. regalis*: 6.52
-- *Pteridium aquilinum*: 1.31

Lycopodiaceae, *Lycopodium annotinum*: 1.15
-- *L. complanatum*: 1.15
-- *L. tristachyum*: 1.15

Musci, *Polytrichum juniperinum*: 1.24

Hepaticae, *Reboulia hemisphaerica*: 1.22

Phaeophyta, *Cystophora retroflexa*: 1.18
-- *C. subfarcinata*: 1.18

Ascomycota, *Amphisphaeriaceae, Amphisphaerella xylostei*: 1.36

Diaporthaceae, *Diaporthe*: 1.36

Pleomassariaceae, *Asteromassaria*: 1.36

Rhytismataceae, *Colpoma*: 1.36

Xylariaceae, *Hypoxylon*: 1.17, 1.36