Redisposition of phoma-like anamorphs in *Pleosporales*

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Abstract: The anamorphic genus Phoma was subdivided into nine sections based on morphological characters, and included teleomorphs in Didymella, Leptosphaeria, Pleospora and Mycosphaerella, suggesting the polyphylly of the genus. Recent molecular, phylogenetic studies led to the conclusion that Phoma should be restricted to Didymellaceae. The present study focuses on the taxonomy of excluded Phoma species, currently classified in Phoma sections Plenodomus, Heterospora and Pilota. Species of Leptosphaeria and Phoma section Plenodomus are reclassified in Plenodomus, Subplenodomus gen. nov., Leptosphaeria and Paraleptosphaeria gen. nov., based on the phylogeny determined by analysis of sequence data of the large subunit 28S nrDNA (LSU) and Internal Transcribed Spacer regions 1 & 2 and 5.8S nrDNA (ITS). Phoma heteromorphospore, type species of Phoma section Plenodomus, is transferred to the genus Heterospora stat. nov. The Phoma acute complex (teleomorph Leptosphaeria diolii), is revised based on a multilocus sequence analysis of the LSU, ITS, small subunit 18S nrDNA (SSU), β-tubulin (TUB), and chitin synthase 1 (CHS-1) regions. Species of Phoma section Pilota and allied Ascochyta species were determined to belong to Pleosporaceae based on analysis of act (ACT) sequence data. Anamorphs that are similar morphologically to Phoma and described in Ascochyta, Asteromella, Coniothyrium, Plecostomella, Pleurophoma and Pyrenochaetae are included in this study. Phoma-like species, which grouped outside the Pleosporineae based on an LSU sequence analysis, are transferred to the genera Aposphaeria, Paraconiothyrium and Westerdykella. The genera Medicagoe gen. nov. and Ngigranoge gen. nov. are introduced to accommodate the medically important species formerly known as *Pleynora macrospora* and *Pleynora makinnonii*, respectively.

Key words: coelomycetes, Coniothyriaceae, Curcurbitariaceae, Leptosphaeriaceae, Melanommataceae, molecular phylogeny, Montagnulaceae, Phaeosphaeriaceae, Pleosporaceae, Sporormiaceae, taxonomy, Trematosphaeriaceae.

Taxonomic novelties: New genera: *Medicagoe* Gruyter, Verkley & Crous, *Ngigranoge* Gruyter, Verkley, & Crous, *Paraleptosphaeria* Gruyter, Verkley & Crous, *Subplenodomus* Gruyter, Verkley & Crous. New species: *Aposphaeria* corallinolutese Gruyter, Aveskamp & Verkley, *Coniothyrium maculiculits* Veldkamp & Gruyter. New combinations: *Coniothyrium carteni* (Gruyter & Boerema) Verkley & Gruyter & Veldkamp & Gruyter, *C. dolichit* (Mohanty) Verkley & Gruyter, *C. glycin* (R.B. Stewart) Verkley & Gruyter, *C. multipor* (V.H. Pawar, P.N. Mathur & Thirum.) Verkley & Gruyter, C. telephii (Allesch.) Gruyter & Gruyter, *Heterospora* (Boerema, Gruyter & Verkley, *Phoma* (Crous). H. chenopodioid (Westland.) Gruyter, Aveskamp & Verkley, *H. dimorphospora* (SpeG.) Gruyter, Veldkamp & Verkley, *Leptosphaeria* (Desm.) Gruyter, Aveskamp & Verkley, *L. macrospora* (L.) Gruyter, Aveskamp & Verkley, *L. rubefaciens* (Togliani) Gruyter, Aveskamp & Verkley, *L. sclerotiorum* (Sacc.) Gruyter, Aveskamp & Verkley, *Nigrograna* (Fuckel) (Henn.) Gruyter, Aveskamp & Verkley, *N. chrysanthemii* (Zachos, Constantino & Pagan,) Gruyter, Aveskamp & Verkley, *N. congestus* (Deem. & House) Gruyter, Aveskamp & Verkley, *N. confertus* (Niessl ex Sacc.) Gruyter, Veldkamp & Verkley, *N. congo* (M.T. Lucas) Gruyter, Aveskamp & Verkley, *N. enteroloeus* (Sacc.) Gruyter, Aveskamp & Verkley, *N. fallacius* (Ber.) Gruyter, Aveskamp & Verkley, *N. hendersoniae* (Fucikel) Gruyter, Aveskamp & Verkley, *N. inflorosens* (Boerema & Loer.) Gruyter, Aveskamp & Verkley, *N. ibonotidis* (Fucikel) Gruyter, Aveskamp & Verkley, *N. indoliquidi* (Frezzi) Gruyter, Aveskamp & Verkley, *N. lupini* (Ellis & Everh.) Gruyter, Aveskamp & Verkley, *N. pimplinellae* (Lowen & Sivan,) Gruyter, Aveskamp & Verkley, *N. trachiphilus* (Petri) Gruyter, Aveskamp & Verkley, *N. visci* (Moesz) Gruyter, Aveskamp & Verkley, *Phoma* fallens (Sacc.) Gruyter & Veldkamp, *Pleospora* flavigena (Constantino & Au) Gruyter & Veldkamp, *P. incompta* (Sacc. & Martelli) Gruyter & Verkley, *Pyrenochaetopsis paratorum* (P.R. Johnst. & Boerema) Gruyter, Aveskamp & Verkley, *Subplenodomus apicola* (Kleb.) Gruyter, Aveskamp & Verkley, *Subplenodomus vicinicus* (Sacc.) Gruyter, Aveskamp & Verkley, *Subplenodomus violaceum* (P.Syd.) Gruyter, Aveskamp & Verkley, *Verkleyella capitulum* (V.H. Pawar, P.N. Mathur & Thirum.) de Gruyter, Aveskamp & Verkley, W. minutispora (P.N. Mathur ex Gruyter & Noordel.) Gruyter, Aveskamp & Verkley. New names: *Pleospora* angustis Gruyter & Verkley, *Pleospora halimiones* Gruyter & Verkley.

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INTRODUCTION

The anamorphic genus *Phoma* includes many important plant pathogens. The taxonomy of *Phoma* has been studied intensively in the Netherlands for more than 40 years resulting in the development of a generic concept as an outline for identification of *Phoma* species (Boerema 1997). In this concept species of the genus *Phoma* are classified based on their morphological characters into nine sections: *Phoma*, *Heterospora*, *Macrospora*, *Paraphoma*, *Peyronellaea*, *Phyllistictoides*, *Pilota*, *Plenodomus* and *Sclerothriella* (Boerema 1997). The species placed in each of the sections were systematically described culminating in the publication of the “*Phoma Identification Manual*” (Boerema et al. 2004), which contained the descriptions of 223 specific and infra-specific taxa of *Phoma*, and more than 1000 synonyms in other coelomycetous genera. The classification of the *Phoma* species in...
sections based on morphology is artificial (Boerema et al. 2004), and several species can be classified in more than one section as they reveal multiple “section-specific” characters.

A large, well-studied Phoma culture collection that includes more than 1100 strains of Phoma resulted from the extensive morphological studies conducted on Phoma in The Netherlands. That culture collection is the basis of an intensive molecular phylogenetic study of the genus Phoma, which commenced in 2006. Molecular studies of species of Phoma prior to the onset of this project concentrated on the development of molecular detection methods for specific, important plant pathogenic Phoma species, such as *Ph. macdonalii*, *Ph. tracheiphila*, *Stagonosporopsis cucurbitacearum* (as *Ph. cucurbitacearum*) and *Boeremia foveata* (as *Ph. foveata*) (Aveskamp et al. 2008). The phylogeny of the type species of the nine *Phoma* sections and morphologically similar coelomycetes was determined utilising the sequence data of the large subunit 28S nrDNA (de Gruyter et al. 2009). Results of that study demonstrated that the type species of the nine *Phoma* sections all grouped in *Pleosporales*. The type species of five *Phoma* sections, *Phoma*, *Phyllostictoides*, *Sclerophomella*, *Macrospora* and *Peyronelleana* and similar genera, grouped in a distinct clade in *Didymellaceae*. The type species of the remaining four *Phoma* sections, *Heterospora*, *Paraphoma*, *Pliosa* and *Plenodomus*, clustered in several clades outside *Didymellaceae* based on the LSU and SSU sequence analysis leading to the conclusion that these species should be excluded from *Phoma* (de Gruyter et al. 2009, Aveskamp et al. 2010).

The molecular phylogeny of the *Phoma* species in *Didymellaceae* was determined in a subsequent study (Aveskamp et al. 2010) and, as the phylogenetic placement of the sectional type species already suggested, included species mainly from sections *Phoma*, *Phyllostictoides*, *Sclerophomella*, *Macrospora* and *Peyronelleana*. The molecular phylogeny of 11 *Phoma* species classified in *Phoma* section *Paraphoma* based on their setose pycnidia was investigated using LSU and SSU sequences (de Gruyter et al. 2010) and this section was highly polyphyletic, with species clustering mainly in *Phaeosphaeriaceae* and *Cucurbitariaceae*.

The purpose of the present study was to clarify the molecular phylogeny of the *Phoma* species currently classified in sections *Plenodomus* and *Pliosa*, along with *Phoma* species which were determined to be distantly related to the generic type species *Ph. herbarum* in previous molecular studies. Additionally, phoma-like isolates of coelomycetes currently classified in *Ascochyta* and *Coniothyrium* and clustering outside the *Didymellaceae* (de Gruyter et al. 2009, Aveskamp et al. 2010) are included in this study along with a number of phoma-like species that do not belong to *Pleosporineae*.

In the present study, the initial focus was to determine the molecular phylogeny of *Phoma betae* (teleom. *Pleospora betae*) and *Ph. lingam* (teleom. *Leptosphaeria maculans*), type species of the *Phoma* sections *Pliosa* and *Plenodomus*, respectively, at the generic rank based on the sequence data of the LSU and SSU regions. In a subsequent study, the sequence data of both the LSU and the ITS regions were used for a revised classification of the *Phoma* species currently classified in *Phoma* section *Plenodomus*. Only a limited number of the species currently classified in this section have a confirmed *Leptosphaeria* teleomorph.

The *Phoma acuta* species complex was subject of a more detailed study. The teleomorph of *P. acuta* is *Leptosphaeria doliolum*, type species of the genus *Leptosphaeria*. A multilocus analysis of sequence data of the SSU, LSU, ITS, β-tubulin (TUB), and chitin synthase 1 (CHS-1) regions was performed. The phylogeny of *Phoma* species of section *Pilosa*, with a *Pleospora* teleomorph (*Pleosporaceae*) was studied utilising actin (ACT) sequence data.

Phoma-like species currently attributed to the genera *Aposphaeria*, *Asteromella*, *Coniothyrium*, *Phoma*, *Plenodomus*, *Pleurophoma* and *Pyrenochaeta*, which could not be classified in the *Pleosporineae* based on their molecular phylogeny, were included in a LSU sequence analysis. All *Phoma* taxa that are unrelated to *Didymellaceae* and treated in this paper are redisplayed to other genera.

A further aim of this study was to establish a single nomenclature for well-resolved anamorph–teleomorph relationships as discussed by Hawksworth et al. (2011). In cases where one anamorph–teleomorph generic relation is involved in a monophyletic lineage, one generic name was chosen based on priority and the other named teleomorph or anamorph state is treated as a synonym. Similar approaches towards single nomenclature have been employed in *Botryosphaeriales* (Crous et al. 2006, 2009a, b, Phillips et al. 2008), *Pleosporales* (Aveskamp et al. 2010), and *Hypocreales* (Lombard et al. 2010a–c, Chaverri et al. 2011, Gräfenhan et al. 2011, Schroers et al. 2011).

**MATERIALS AND METHODS**

**Isolate selection, culture studies and DNA extraction**

The generic abbreviations used in this study are: *Ascochyta* (A.), *Coniothyrium* (C.), *Heterospora* (H.), *Leptosphaeria* (L.), *Paraconiothyrium* (Paracon.), *Paraleptosphaeria* (Paralep.), *Phoma* (Ph.), *Plenodomus* (Plen.), *Pleospora* (Pleo.), *Pyrenochaeta* (Py.), *Subplenodomus* (Subplen.) and *Westerdykella* (W.). The isolates included in this study were obtained from the culture collections of the Centraalbureau voor Schimmelcultures, Utrecht, The Netherlands (CBS-KNAW) and the Dutch National Plant Protection Organization, Wageningen, The Netherlands (PD) (Table 1). The freeze-dried isolates were revived overnight in 2 mL malt/peptone (50 % / 50 %) liquid medium and subsequently transferred and maintained on oatmeal agar (OA) (Crous et al. 2009c). The isolates, which were stored at -196 °C, were directly transferred to OA. Cultures growing on OA and malt extract agar (MEA) (Crous et al. 2009c) were studied morphologically as described in detail by Boerema et al. (2004). The genomic DNA isolation was performed using the Ultraclean Microbial DNA isolation kit (Mo Bio Laboratories, Carlsbad, California) according to the instructions of the manufacturer. All DNA extracts were diluted 10 x in milliQ water and stored at 4 °C before use.

**PCR and sequencing**

For nucleotide sequence comparisons, partial regions of SSU, LSU and ITS, as well as part of the ACT, TUB and CHS-1 genes were amplified. The SSU region was amplified with the primers NS1 and NS4 (White et al. 1990) and the LSU region was amplified with the primers LR0R (Rehner & Samuels 1994) and LR7 (Vilgalys & Hester 1990). The ITS and TUB regions were amplified as described by Aveskamp et al. (2009) using the primer pair V9G (de Hoog & Gerrits van den Ende 1998) and ITS4 (White et al. 1990) for the ITS and the BT2Fw and BT4Rd primer pair (Woudenberg et al. 2009) for the TUB locus. The ACT and CHS-1 regions
were amplified using the primer pairs ACT-512F / ACT-783R and CHS-354R / CHS-79F (Carbone & Kohn 1999). The amplification reactions were performed and analysed as described by de Gruyter et al. (2009).

Sequencing of the PCR amplicons was conducted using the same primer combinations, although the primer LRS5 (Vilgalys & Hester 1990) was used as an additional internal sequencing primer for LSU. The sequence products were purified using Sephadex columns (Sephadex G-50 Superfine, Amersham Biosciences, Rosendaal, Netherlands) and analysed with an ABI Prism 3730XL Sequencer (Applied Biosystems) according to the manufacturer’s instructions. Consensus sequences were computed from both forward and reverse sequences using the Bioinformatics v. 4.61 software package (Applied Maths, Sint-Martens-Latem, Belgium) and were lodged with GenBank. All sequences of reference isolates included in this study were obtained from GenBank (Table 1).

**Phylogenetic analyses**

To determine the phylogeny of Phoma betae and Ph. lingam at rank, the SSU and LSU sequence data of two isolates were aligned with the sequences of 46 reference isolates in the Pleosporales that were obtained from GenBank (Table 1), 14 of which were classified in the Pleosporaceae or Leptosphaeriaceae. The phylogeny of Phoma section Plenodomus was determined with the combined data set of LSU and ITS sequences of 87 isolates, including 53 isolates currently classified in Leptosphaeriaceae and Phoma section Plenodomus. Phoma apiicola, Ph. dimorphospora, Ph. heteromorphospora, Ph. lupini, Ph. valeriana, Ph. vasinfecta and Ph. violicola classified in Phoma sections Phoma or Heterospora (Boerema et al. 2004) grouped in previous molecular phylogenetic studies outside Didymellaceae (de Gruyter et al. 2009, Aveskamp et al. 2010), and are therefore treated here.

In the study of the Leptosphaeriaceae doliolum complex, that includes the subspecies of Ph. acuta, viz. subsp. acuta, errabunda and also Ph. acuta subsp. acuta f. sp. phlogis, a phylogenetic analysis was performed utilising the ITS, ACT, TUB, CHS-1 sequences of 18 isolates. Phoma macrocapsa, Ph. sydowi and Ph. veronicicola being closely related to this species complex were included.

The species concept of phoma-like anamorphs in Pleosporaceae was determined by alignments of the ACT sequences of 15 isolates and five reference isolates. Phoma fallens, Ph. glaucispora and Ph. flavigena were also included. These species were originally classified in Phoma sect. Phoma (de Gruyter & Noordeloos 1992, de Gruyter et al. 1998). However, a molecular phylogenetic study demonstrated that these species grouped in a clade representing Leptosphaeriaceae and Pleosporaceae (Aveskamp et al. 2010). Sequence data were compared with those of isolates currently classified in the genera Phoma, Ascochyta and Coniothyrium, as well as isolates of Leptosphaeria clavata and the generic type species Pleospora herbarum. Phoma incompta is the only species classified in Phoma section Sclerophomella, which proved to be unrelated to Didymellaceae (Aveskamp et al. 2010).

The phoma-like species that could not be attributed to Pleosporineae (Zhang et al. 2009) were studied with the LSU sequences of 40 isolates, including 20 reference isolates representing the anamorph genera Beverwyckella, Neotiosporina, Paraconiothyrium, as well as the teleomorph genera Byssothecium, Falciformispora, Herpotrichia, Melanomma, Paraphaeosphaeria, Pleomassaria, Preussia, Roussella, Splanchnonema, Sporormiella, Thyridaria, Trematosphaeria and Westerdykella.

Four Phoma species were included which are currently described in Phoma section Phoma, viz. Ph. capitulum, Ph. flavescens, Ph. lini, and Ph. minutispora (de Gruyter & Noordeloos 1992, de Gruyter et al. 1993). In addition, the human pathogens Pyrenochaeta romeroi and Py. mackinnonii, which could not be classified in a recent study dealing with phoma-like species with setose pycnidia (de Gruyter et al. 2010), were included.

The multiple alignments were automatically calculated by the BioNumerics software package, but manual adjustments for improvement were made by eye where necessary. For multilocus alignments, the phylogenetic analyses were done for each dataset individually, and where similar tree topologies were obtained, an analysis was performed on the combined alignment of all the gene regions in the multilocus alignment. Neighbour-Joining (NJ) distance analyses were conducted using PAUP (Phylogenetic Analysis Using Parsimony) v. 4.0b10 (Swoford 2003) with the uncorrected “p”, Jukes-Cantor and Kimura 2-parameter substitution models. The robustness of the trees obtained was evaluated by 1000 bootstrap replications. A Bayesian analysis was conducted with MrBayes v. 3.1.2 (Huelsenbeck & Ronquist 2001) in two parallel runs, using the default settings but with the following adjustments: the GTR model (trees 1–3, 5) with gamma-distributed rate and the HKY+ γ-model (tree 4) were selected for the partitions using the Findmodel freeware (http://hcv.lanl.gov/content/hcv/db/findmodel/findmodel.html), and a MCMC heated chain was set with a “temperature” value of 0.05. The number of generations and sample frequencies were set at 5 million and 10 (trees 3–5) or 100 (trees 1, 2) respectively and the run was automatically stopped as soon as the average standard deviation of split frequencies reached below 0.01. The resulting trees were printed with TreeView v. 1.6.6 (Page 1996) and alignments and trees were deposited into TreeBASE (www.treebase.org).

**RESULTS**

The data for the aligned sequence matrices for the trees obtained in the different studies are provided below. In the case that alignments of multiple loci are involved, the topologies of the obtained trees for each locus were compared by eye to confirm that the overall tree topology of the individual datasets were similar to each other and to that of the tree obtained from the combined alignment. The NJ analyses with the three substitution models showed similar tree topologies and were congruent to those obtained in the Bayesian analyses. The results of the molecular phylogenetic analyses are supplied below; the summarised additional ecology and distribution data of the taxa involved were adopted from Boerema et al. (2004), where the references to original literature are provided.

**Phylogeny of Phoma lingam and Ph. betae, the type species of Phoma sections Plenodomus and Pilosa (Pleosporineae)**

The aligned sequence matrix obtained for the SSU and LSU regions had a total length of 2 671 nucleotide characters. 1 367 and 1 304 respectively. In the alignment, an insertion in the SSU at the positions 478–532 was observed for the cultures CBS 216.75, CBS 165.78, CBS 138.86, CBS 331.37 and CBS 674.75. This insertion was excluded from further phylogenetic analyses. The combined dataset used in the analyses included 48 taxa and contained 2 316 characters with 101 and 213 unique site patterns for SSU and LSU.
Table 1. Isolates used in this study and their GenBank accession numbers. Name changes and newly generated sequences are indicated in bold.

| Species name, final identification | Former identification | CBS no. | Other no. | ITS   | SSU   | LSU   | ACT   | TUB   | CHS-1 | Host, substrate | Country |
|-----------------------------------|-----------------------|---------|-----------|-------|-------|-------|-------|-------|-------|-----------------|---------|
| Aposphaeria corallinolutea sp. nov. | Pleurophoma sp.       | CBS 131286 | PD 83/367 | JF740329 | Kerria japonica (Rosaceae) | Netherlands |
|                                    | Pleurophoma sp.       | CBS 131287 | PD 83/831 | JF740330 | Fraxinus excelsior (Oleaceae) | Netherlands |
| Aposphaeria populina               |                       | CBS 543.70 |           | EU754130 | Populus canadensis (Salicaceae) | Netherlands |
| Pyrenochaeta sp.                  |                       | CBS 130303 | PD 84/221 | JF740265 | Picea abies (Pinaceae) | Germany |
| Beversnykella pulmonaria           |                       | CBS 283.53 | ATCC 3283, IFO 6800 | GU301804 | Corus max (Cornaceae) | Netherlands |
| Pyrenochaeta ciricinans           |                       | CBS 675.92 | ATCC 52676, ATCC 52678, IMI 266220 | AY016357 | Medicago sativa (Fabaceae) | USA |
| Chaetodiplodia sp.                | Chaetodiplodia sp.    | CBS 453.68 |           | JF740115 | Halimione portulacoides (Chenopodiaceae) | Netherlands |
| Chaetosphaeroma hispidulum        |                       | CBS 216.75 |           | EU754045 | Anthyllis vulneraria (Fabaceae) | Germany |
| Cochliobolus sativus              |                       |          |           | DQ679955 | DQ679045 | Unknown |
| Coniothyrium carteri comb. nov.   | Phoma carteri         | CBS 101633 | PD 84/74  | JF740180 | Quercus sp. Fagaceae) | Netherlands |
|                                   | Phoma carteri         | CBS 105.91 |          | JF740181 | Quercus robur (Fagaceae) | Germany |
| Coniothyrium dolichi comb. nov.   | Pyrenochaeta dolichi  | CBS 124143 | IMI 217261 | JF740182 | Dolichos biforus (Fabaceae) | India |
|                                   | Pyrenochaeta dolichi  | CBS 124140 | IMI 217262 | JF740183 | Dolichos biforus (Fabaceae) | India |
| Coniothyrium glycines comb. nov.  | Phoma glycinicola     | CBS 124455 | IMI 29486 | JF740184 | Glycine max (Fabaceae) | Zambia |
|                                   | Phoma glycinicola     | CBS 124141 | PG-1      | JF740185 | Glycine max (Fabaceae) | Zimbabwe |
| Coniothyrium multiporum comb. nov.| Phoma multipora       | CBS 501.91 | PD 83/888 | JF740186 | Unknown | Egypt |
|                                   | Phoma multipora       | CBS 353.65 | IMI 11368, ATCC 16207, HACC 164 | JF740187 | Glycine max (Fabaceae) | Zimbabwe |
|                                   |                       | CBS 400.71 |           | AY720708 | EU754054 | EU754153 | Chamaeaprops humilis (Arecaceae) | Italy |
| Coniothyrium palmarum             |                       |          |           |                |              |              |                  |                 |
| Coniothyrium telephii comb. nov.  | Phoma septicidalis    | CBS 188.71 |          | JF740188 | G Q37538 | G Q37599 | Air | Finland |
|                                   | Phoma septicidalis    | CBS 866.97 |          | JF740189 | G Q37539 | G Q37600 | Mineral wool | Finland |
|                                   | Phoma septicidalis    | CBS 101636 | PD 86/1186 | JF740190 | G Q37540 | G Q37601 | Glycine max (Fabaceae) | Zimbabwe |
| Cucurbitaria berberidis, anam.    | Pyrenochaeta berberidis | CBS 363.93 |          | JF740191 | G Q37545 | G Q37606 | Berberis vulgaris (Berberidaceae) | Netherlands |
| Didymella exigua                  |                       | CBS 183.55 |           | EU754056 | EU754155 | Rumex arifolius (Polygonaceae) | France |
| Species name, final identification | Former identification | CBS no. | Other no. | ITS        | SSU      | LSU       | ACT        | TUB        | CHS-1        | Host, substrate                  | Country     |
|-----------------------------------|-----------------------|---------|-----------|------------|----------|-----------|------------|------------|--------------|-------------------------------|-------------|
| **Didymella lycopersici**, anam. Boeremia lycopersici |                      | CBS 378.67 |           |            | JF740097 | GU237950  |            |            |              | Lycopersicon esculentum (Solanaceae) | Netherlands |
| Falcisormispora ignatii |                      | BCC 21118 |           |            | GU371827  |            |            |            |              | Elaeis guineensis (Arecaceae) | Thailand    |
| Herpotrichia juniperi |                      | CBS 200.31 |           |            | DQ678080  |            |            |            |              | Juniperus nana (Cupressaceae) | Switzerland |
| **Heterospora chenopodii** comb. nov. |                      | CBS 448.68 |           |            | FJ427023  | EU754088  | EU754187  |            |              | Chenopodium album (Chenopodiaceae) | Netherlands |
| **Heterospora dimorphospora** comb. nov. |                      | CBS 445.78 |           |            | JF740227  | EU754188  |            |            |              | Chenopodium quinoa (Chenopodiaceae) | Peru         |
| Phoma doliolum |                      | CBS 165.78 |           |            | JF740204  | JF740098  | JF740281  |            |              | Chenopodium quinoa (Chenopodiaceae) | Peru         |
| **Leptosphaeria conoidea** | Leptosphaeria conoidea, anam. Phoma doliolum | CBS 616.75 | ATCC 32813, IMI 199777, PD 74/56 | JF740201 | JF740099 | JF740279  |            |            |              | Lunaria annua (Brassicaceae) | Netherlands |
| **Leptosphaeria doliolum** | **Leptosphaeria doliolum**, subsp. doliolum var. doliolum, anam. Phoma acuta subsp. acuta | CBS 505.75 | PD 75/141 |            | JF740205 | GQ387515  | GQ387576  | JF740126 | JF740144 | JF740162 | Urtica dioica (Urticaceae) | Netherlands |
| **Leptosphaeria doliolum** | **Leptosphaeria doliolum**, subsp. erabunda, anam. Phoma acuta subsp. erabunda | CBS 541.66 | PD 66/221 |            | JF740206 | JF740284  | JF740127 | JF740145 | JF740163 |              | Rudbeckia sp. (Asteraceae) | Netherlands |
| **Phoma acuta** subsp. acuta fsp. phloxis |                      | CBS 155.94 | PD 77/80 |            | JF740207 | JF740282  | JF740128  | JF740146 | JF740164 |              | Phlox paniculata (Polemoniaceae) | Netherlands |
| **Phoma acuta** subsp. acuta fsp. phloxis |                      | CBS 125977 | PD 82/888 |            | JF740208 | JF740283  | JF740129  | JF740147 | JF740165 |              | Phlox paniculata (Polemoniaceae) | Netherlands |
| **Leptosphaeria doliolum** | **Leptosphaeria doliolum**, subsp. doliolum var. doliolum, anam. Phoma acuta subsp. acuta | CBS 504.75 | PD 74/55 |            | JF740209 | JF740130  | JF740148  | JF740166 |              | Urtica dioica (Urticaceae) | Netherlands |
| **Leptosphaeria doliolum** | **Leptosphaeria doliolum**, subsp. erabunda, anam. Phoma acuta subsp. erabunda | CBS 130000 | PD 82/701 |            | JF740210 | JF740131  | JF740149  | JF740167 |              | Urtica dioica (Urticaceae) | Netherlands |
| **Leptosphaeria errabunda** comb. nov. | **Leptosphaeria doliolum**, subsp. erabunda, anam. Phoma acuta subsp. erabunda | CBS 617.75 | ATCC 32814, IMI 199775, PD 74/201 | JF740216 | JF740289 | JF740132  | JF740150  | JF740168 |              | Solidago sp. (hybrid) (Asteraceae) | Netherlands |
Table 1. (Continued).

| Species name, final identification | Former identification | CBS no. | Other no. | ITS    | SSU   | LSU   | ACT   | TUB   | CHS-1 | Host, substrate | Country       |
|-----------------------------------|-----------------------|---------|-----------|--------|-------|-------|-------|-------|-------|----------------|---------------|
| Leptosphaeria doliolum subsp. errabunda, anam. Phoma acuta subsp. errabunda | CBS 125978 | PD 74/61 |          | JF740217 |       | JF740290 | JF740133 | JF740151 | JF740169 | Delphinium sp. (Ranunculaceae) | Netherlands |
| Leptosphaeria doliolum subsp. errabunda, anam. Phoma acuta subsp. errabunda | CBS 129999 | PD 78/569 |          | JF740218 |       | JF740134 | JF740152 | JF740170 |           | Aconitum sp. (Ranunculaceae) | Netherlands |
| Leptosphaeria doliolum subsp. errabunda, anam. Phoma acuta subsp. errabunda | CBS 129998 | PD 84/462 |          | JF740219 |       | JF740135 | JF740153 | JF740171 |           | Galldaria (Asteraceae) | Netherlands |
| Leptosphaeria doliolum subsp. errabunda, anam. Phoma acuta subsp. errabunda | CBS 129997 | PD 78/631 |          | JF740220 |       | JF740136 | JF740154 | JF740172 |           | Achillea millefolium (Asteraceae) | Netherlands |
| Leptosphaeria etheridgei comb. nov. | Phoma etheridgei | CBS 126980 | DAOM 216539, PD 95/1483 | JF740221 |       | JF740291 |           |           |           | Populus tremuloides (Salicaceae) | Canada |
| Leptosphaeria macrocapsa comb. nov. | Phoma macrocapsa | CBS 640.93 | PD 78/139 | JF740237 |       | JF740304 | JF740138 | JF740156 | JF740174 | Mecurialis perennis (Euphorbiaceae) | Netherlands |
| Leptosphaeria pedicularis comb. nov. | Phoma pedicularis | CBS 126582 | PD 77/710 | JF740223 |       | JF740293 |           |           |           | Gentiana punctata (Gentianaceae) | Switzerland |
| Phoma pedicularis | CBS 390.80 | PD 77/711 |          | JF740224 |       | JF740294 | JF740137 | JF740155 | JF740173 | Pedicularis sp. (Scrophulariaceae) | Switzerland |
| Leptosphaeria rubefaciens comb. nov. | Phoma rubefaciens | CBS 387.80 | IMI 248-432, ATCC 42533, PD 78/809 | JF740242 |       | JF740311 |           |           |           | Tilia (x) euchaea (Malvaceae) | Netherlands |
| Phoma rubefaciens | CBS 222.77 |          |          | JF740243 |       | JF740312 |           |           |           | Quercus sp. (Fagaceae) | Switzerland |
| Leptosphaeria sclerotoides comb. nov. | Phoma sclerotoides | CBS 144.84 | CECT 20025, PD 82/1061 | JF740192 |       | JF740269 |           |           |           | Medicago sativa (Fabaceae) | Canada |
| Phoma sclerotoides | CBS 148.84 | PD 80/1242 |          | JF740193 |       | JF740270 |           |           |           | Medicago sativa (Fabaceae) | Canada |
| Leptosphaeria slovacica | Phoma slovacica, anam. Phoma leonuri | CBS 389.80 | PD 79/171 | JF740247 | JF740101 | JF740315 |           |           |           | Balota nigra (Lamiaceae) | Netherlands |
| Phoma slovacica, anam. Phoma leonuri | CBS 125975 | PD 77/1161 |          | JF740248 |       | JF740316 |           |           |           | Balota nigra (Lamiaceae) | Netherlands |
| Leptosphaeria sydowii comb. nov. | Phoma sydowii | CBS 385.80 | PD 74/477 | JF740244 | JF740133 | JF740157 | JF740175 |           |           | Senecio jacobaea (Asteraceae) | UK |
| Phoma sydowii | CBS 125976 | PD 84/472 |          | JF740245 |       | JF740140 | JF740158 | JF740176 |           | Senecio jacobaea (Asteraceae) | Netherlands |
| Species name, final identification | Former identification | CBS no. | Other no. | ITS     | SSU     | LSU     | ACT     | TUB     | CHS-1    | Host, substrate       | Country   |
|----------------------------------|-----------------------|---------|-----------|---------|---------|---------|---------|---------|----------|-----------------------|-----------|
| Phoma sydowii                    |                       | CBS 297.51 |           | JF740246 | JF740141 | JF740159 | JF740177 |         |          | Papaver rhoeas (Papaveraceae) | Switzerland |
| Leptosphaeria veronicae comb. nov. Phoma veronicicola | CBS 145.84 | CECT 20059, PD 78/273 | JF740254 | JF740142 | JF740159 | JF740178 |         |          | Veronica chartarum (Scrophulariaceae) | Netherlands |
| Phoma veronicicola               | CBS 126583 | PD 74/227 | JF740255 | JF740143 | JF740159 | JF740179 |         |          | Veronica ‘Shirley Blue’ (Scrophulariaceae) | Netherlands |
| Massarina eburnea                |                       | H 3953, HHUF 26521, JCM 14422 |         |         |         |         | AB521718 | AB521735 |          | Fagus sylvatica (Fagaceae) | UK        |
| Massarina eburnea                |                       | CBS 473.64 | ETH 2945 | GU301840 |         |         |         |          |          | Fagus sylvatica (Fagaceae) | Switzerland |
| Medcopsis romeroi comb. nov.     | Pyrenochaeta romeroi  | CBS 252.60 | ATCC 13735, FMC 151, UAMH 10341 | EU754108 | EU754207 |         |         |          | Human, maduromycosis (Gramineae) | Venezuela |
| Pyrenochaeta romeroi             | CBS 122764 | PD 84/1022 | EU754208 |         |         |          |          |          |          | Hordeum vulgare (Gramineae) | Unknown   |
| Melanomma pulvis-pyrius          |                       | CBS 371.75 |         |         |         |         | GU301845 |         |          | Wood (Gramineae) | France |
| Massarina eburnea                |                       | CBS 400.97 |         |         |         |         | DQ678020 | DQ678072 |          | Fagus sp. (Fagaceae) | Belgium |
| Neophaeosphaeria filamentosa     |                       | CBS 102202 | BPI 802755 | JF740259 | GU301840 | GU301877 |         |          | Yucca rostrata (Agavaceae) | Mexico |
| Neosetophoma samarorum           |                       | CBS 138.96 | PD 82/653 | GU301840 | GU301877 | GU301878 |         |          | Phlox paniculata (Polemoniaceae) | Netherlands |
| Neottiosporina paspali           |                       | CBS 331.37 |         |         |         |         | EU754073 | EU754172 |          | Paspalum notatum (Poaceae) | USA        |
| Nigrogana mackinnonii comb. nov. | Pyrenochaeta mackinnonii | CBS 674.75 | FMC 270 | GU301840 | GU301877 | GU301878 |         |          | Human, black grain mycetoma | Venezuela |
| Pyrenochaeta mackinnonii         | CBS 110022 |         |         | GU301840 | GU301877 | GU301878 |         |          | Human, mycetoma | Mexico |
| Paraconiothyrium flavescens comb. nov. |                       | CBS 178.93 | PD 82/1062 | GU238075 |         |         |          |          | Soil (Gramineae) | Netherlands |
| Paraconiothyrium fuckelii comb. nov. | Coniothyrium fuckelii  | CBS 797.95 |         | GU238075 | GU237960 |         |          |          | Rubus sp. (Rosaceae) | Denmark |
| Paraconiothyrium fusco-maculans comb. nov. | Plenotomus fusco- maculans | CBS 116.16 |         | GU238075 | GU237960 |         |          |          | Malus sp. (Rosaceae) | USA |
| Paraconiothyrium lini comb. nov. | Phoma lini           | CBS 253.92 | PD 70/998 | GU238075 | GU237960 |         |          |          | Wisconsin tank | Netherlands |
| Paraconiothyrium maculicrusiis sp. nov. | Pleurophoma pleurospora | CBS 10 1461 | IMI 320754, UTHSC 87-144 | EU754200 |         |         |          |          | Human, cutaneous lesions | USA |
| Paraconiothyrium minorans        |                       | CBS 122788 | PD 07/03486739 | EU754074 | EU754173 |         |          |          | Clematis sp. (Ranunculaceae) | UK |
| Paraconiothyrium tiliae comb. nov. | Asteromella tiliae     | CBS 265.94 |         |         |         |         | EU754139 |         |          | Tilia platyphyllos (Tiliaceae) | Austria |
| Paraleptosphaeria dryadis comb. nov. | Leptosphaeria dryadis  | CBS 643.86 |         | JF740213 | GU301828 |         |          |          | Dryas octopetala (Rosaceae) | Switzerland |
| Paraconiothyrium fusco-maculans comb. nov. | Plenotomus fusco- maculans | CBS 116.16 |         | GU238075 | GU237960 |         |          |          | Malus sp. (Rosaceae) | USA |
| Paraconiothyrium lini comb. nov. | Phoma lini           | CBS 253.92 | PD 70/998 | GU238075 | GU237960 |         |          |          | Wisconsin tank | Netherlands |
| Paraconiothyrium maculicrusiis sp. nov. | Pleurophoma pleurospora | CBS 10 1461 | IMI 320754, UTHSC 87-144 | EU754200 |         |         |          |          | Human, cutaneous lesions | USA |
| Paraconiothyrium minorans        |                       | CBS 122788 | PD 07/03486739 | EU754074 | EU754173 |         |          |          | Clematis sp. (Ranunculaceae) | UK |
| Paraconiothyrium tiliae comb. nov. | Asteromella tiliae     | CBS 265.94 |         |         |         |         | EU754139 |         |          | Tilia platyphyllos (Tiliaceae) | Austria |
| Paraleptosphaeria dryadis comb. nov. | Leptosphaeria dryadis  | CBS 643.86 |         | JF740213 | GU301828 |         |          |          | Dryas octopetala (Rosaceae) | Switzerland |


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|-----------------------------------|-----------------------|---------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|----------------|-------------|
| Paraleptosphaeria macrospora comb. nov. | Phoma macrospora      | CBS 114198 | UPSC 2686 | JF740238  | JF740305  |           |           |           |              | Rumex domesticus (Chenopodiaceae) | Norway      |
| Paraleptosphaeria nitschkei comb. nov. | Leptosphaeria nitschkei | CBS 306.51 |           | JF740239  | JF740308  |           |           |           |              | Cirsium spinosissimum (Asteraceae) | Switzerland |
| Paraleptosphaeria orobanches comb. nov. | Phoma korfii          | CBS 101638 | PD 97/12070 | JF400230   | JF740299  |           |           |           |              | Epilagus virginiana (Orobanchaceae) | USA         |
| Paraleptosphaeria praetermissa comb. nov. | Leptosphaeria praetermissa | CBS 114991 |           | JF740241   | JF740310  |           |           |           |              | Rubus idaeus (Rosaceae) | Sweden      |
| Paraphaeosphaeria micholii     |  | CBS 652.86 | ETH 9483  | GQ387520   | GQ387581  |           |           |           |              | Typha latifolia (Typhaceae) | Switzerland |
| Paraphoma radicina            |  | CBS 111.79 | IMI 366094, PD 76/437 | EU754092   | EU754191  |           |           |           |              | Malus sylvestris (Rosaceae) | Netherlands |
| Phaeosphaeria nodorum         |  | CBS 110109 |           | EU754076   | EU754175  |           |           |           |              | Lolium perenne (Gramineae) | Denmark     |
| Phoma herbarum               |  | CBS 615.75 |           | FJ427022   | EU754087  | EU754186  |           |           |              | Rosa multiflora (Rosaceae) | Netherlands |
| Phoma paspali                |  | CBS 560.81 | PD 92/1569 | GU238227   | C238124  |           |           |           |              | Paspalum dilatum (Poaceae) | New Zealand |
| Plenodomus agritus comb. nov. | Leptosphaeria agrita, anam. Phoma agrita | CBS 121.89 | PD 82/903  | JF740194   | JF740271  |           |           |           |              | Eupatorium cannabinum (Asteraceae) | Netherlands |
| Plenodomus biglobosus comb. nov. | Leptosphaeria biglobosa | CBS 119961 |           | JF740198   | JF740274  |           |           |           |              | Brassica rapa (Brassicaceae) | Netherlands |
| Plenodomus chrysanthemi comb. nov. | Phoma vasinfecta, synanam. Phialophora chrysanthemi | CBS 539.63 |           | JF740253   | GU238230  | GU238151  |           |           |              | Chrysanthemum sp. (Asteraceae) | Greece      |
| Plenodomus collinsoniae comb. nov. | Leptosphaeria collinsoniae | CBS 120227 | JCM 13073, MAFF 239583 | JF740200   | JF740276  |           |           |           |              | Vitis coignetiae (Vitaceae) | Japan       |
| Plenodomus confertus comb. nov. | Leptosphaeria conferta, anam. Phoma conferta | CBS 375.64 |           | AF439459   | JF740277  |           |           |           |              | Anacyclus radiatus (Asteraceae) | Spain       |
| Plenodomus congestus comb. nov. | Leptosphaeria congesta, anam. Phoma congesta | CBS 244.64 |           | AF439460   | JF740278  |           |           |           |              | Erigeron canadensis (Asteraceae) | Spain       |
| Plenodomus enteroleucus comb. nov. | Phoma enteroleuca var. enteroleuca | CBS 142.84 | PD 81/654, CECT20063 | JF740214   | JF740287  |           |           |           |              | Catalpa bicnadioides (Bignoniaceae) | Netherlands |
| Plenodomus fallaciosus comb. nov. | Leptosphaeria fallacosa | CBS 414.62 | ETH 2961  | JF740222   | JF740292  |           |           |           |              | Triticum aestivum (Poaceae) | Germany     |
|                           |                          |          |           |           |           |           |           |           |              | Salix montana (Lamiaceae) | France      |
| Species name, final identification | Former identification | CBS no. | Other no. | ITS   | SSU   | LSU   | ACT  | TUB  | CHS-1 | Host, substrate | Country   |
|-----------------------------------|-----------------------|---------|-----------|-------|-------|-------|------|------|--------|----------------|-----------|
| Plenodomus hendersoniae comb. nov.| Phoma hendersoniae    | CBS 113702 | UPSC 1943 | JF40225 | JF402095 | Salix cinerea (Salicaceae) | Sweden |
|                                   | Phoma intratans       | CBS 139.78 | PD 78/883 | CECT 20064 | JF400228 | JF400297 | Pyrus malus (Rosaceae) | Netherlands |
| Plenodomus influorescens comb. nov.| Phoma enteroleuca var. influorescens | CBS 143.84 | PD 73/132 | JF400229 | JF400298 | Fraxinus excelsior (Oleaceae) | Netherlands |
|                                   | Phoma enteroleuca var. influorescens | CBS 381.67 | PD 77/336 | JF400232 | JF400293 | Lilium sp. (Liliaceae) | Netherlands |
| Plenodomus libanotidis comb. nov.| Leptosphaeria libanotis | CBS 113795 | UPSC 2219 | JF400231 | JF400300 | Securidaca leucantha (Arecaceae) | Sweden |
| Plenodomus lindquistii comb. nov.| Leptosphaeria lindquistii, anam. Phoma macdonaldis | CBS 386.80 | PD 77/336 | JF400232 | JF400301 | Helianthus annuus (Asteraceae) | Netherlands |
|                                   | Leptosphaeria lindquistii, anam. Phoma macdonaldis | CBS 381.67 | PD 77/336 | JF400232 | JF400301 | Helianthus annuus (Asteraceae) | Italy |
| Plenodomus lingam                | Leptosphaeria maculans, anam. Phoma lingam | CBS 275.63 | MUCL 9901, UPSC 1025 | JF400234 | JF400103 | JF400306 | Brassica sp. (Brassicaceae) | UK |
|                                   | Leptosphaeria maculans, anam. Phoma lingam | CBS 260.94 | PD 78/989 | JF400235 | JF400307 | JF400116 | Brassica oleracea (Brassicaceae) | Netherlands |
|                                   | Leptosphaeria maculans, anam. Phoma lingam | CBS 147.24 | PD 78/989 | JF400235 | JF400307 | JF400116 | Unknown | Unknown |
| Plenodomus lupilini comb. nov.   | Phoma lupilini        | CBS 248.92 | PD 79/141 | JF400236 | JF400303 | Lupinus mutabilis (Fabaceae) | Peru |
| Plenodomus pimpinellae comb. nov.| Leptosphaeria pimpinellae, anam. Phoma pimpinellae | CBS 101637 | PD 92/41 | JF400240 | JF400309 | Pimpirela anisum (Apiaceae) | Israel |
| Plenodomus tracheiphilus comb. nov.| Phoma tracheiphila   | CBS 551.93 | PD 87/882 | JF400249 | JF400104 | JF400317 | Citrus limon (Rutaceae) | Israel |
|                                   | Phoma tracheiphila    | CBS 127250 | PD 09/59714 | JF400250 | JF400318 | JF400112 | Citrus sp. (Rutaceae) | Italy |
| Plenodomus visci comb. nov.      | Pleotomospora visci   | CBS 122783 | PD 74/1021 | JF400256 | EU754096 | EU754195 | Viscum album (Viscaceae) | France |
|                                   | Phoma wasabiæ        | CBS 120119 | FAU 559 | JF400257 | JF400323 | Wasabia japonica (Brassicaceae) | Taiwan |
|                                   | Phoma wasabiæ        | CBS 120120 | FAU 561 | JF400258 | JF400324 | Wasabia japonica (Brassicaceae) | Taiwan |
| Pleosporaria siparia             |                       | CBS 279.74 |                   | AY040431 |                  | Belula vernicosus (Betulaceae) | Netherlands |
| Pleospora angustissim. nov.      | Leptosphaeria flavida | CBS 296.51 |                   | EU754080 | EU754179 | JF400122 | Beta vulgaris (Chenopodiaceae) | Switzerland |
|                                   | Leptospora betae, anam. Phoma betae | CBS 523.66 | PD 66/270, IHEM 3235 | EU754080 | EU754179 | JF400118 | Beta vulgaris (Chenopodiaceae) | Netherlands |
|                                   | Leptospora betae, anam. Phoma betae | CBS 109410 | PD 77/113 | EU754178 | JF400119 | Beta vulgaris (Chenopodiaceae) | Netherlands |
| Pleospora calvescens             | Pleospora calvescens, anam. Ascochyta caulina | CBS 246.79 | PD 77/655 | EU754032 | EU754131 | JF400120 | Atriplex hastata (Chenopodiaceae) | Germany |
| Species name, final identification | Former identification | CBS no. | Other no. | ITS | SSU | LSU | ACT | TUB | CHS-1 | Host, substrate | Country |
|---------------------------------|-----------------------|---------|----------|-----|-----|-----|-----|-----|-------|----------------|---------|
| Pleospora calvescens, anam. Ascochyta caulina | | CBS 343.78 | | JF740121 | | | | | Atriplex halastata (Chenopodiaceae) | Netherlands |
| Pleospora chenopodi | Ascochyta hyalospora | CBS 206.80 | PD 74/1022 | JF740095 | JF740266 | JF740109 | | Chenopodium quinoa (Chenopodiaceae) | Bolivia |
| Pleospora calvescens, anam. Ascochyta caulina | | CBS 344.78 | PD 68/682 | JF740110 | | | | Atriplex halastata (Chenopodiaceae) | Netherlands |
| Pleospora fallens comb. nov. | Phoma fallens | CBS 161.78 | LEV 1131 | JF740106 | | | | Olea europaea (Oleaceae) | New Zealand |
| Pleospora flavigena comb. nov. | Phoma flavigena | CBS 314.80 | PD 91/1613 | JF740108 | | | | Water | Romania |
| Pleospora halimiones nom. nov. | Ascochyta obiones | CBS 432.77 | IMI 282137 | JF740096 | JF740267 | JF740113 | | Halimione portulacoides (Chenopodiaceae) | Netherlands |
| Pleospora herbarum | | CBS 191.86 | IMI 276975 | GU238232 | GU238160 | JF740123 | | Medicago sativa (Fabaceae) | India |
| Pleospora incompta comb. nov. | Phoma incompta | CBS 467.76 | | JF740111 | | | | Olea europaea (Oleaceae) | Greece |
| Pleospora typhicola | Pleospora typhicola, anam. Phoma typharum | CBS 132.69 | | JF740105 | JF740325 | JF740124 | | Typha angustifolia (Typhaceae) | Netherlands |
| Pleurophoma pleurospora | Pleurophoma sp. | CBS 116668 | | JF740326 | | | | Clytus scorpius (Fabaceae) | Netherlands |
| Preussia funiculata | | CBS 659.74 | PD 82/371 | GU296187 | GU301864 | JF740327 | | Lonicera sp. (Caprifoliaceae) | Netherlands |
| Pseudomonilla phragmitis | | CBS 396.61 | IMI 070678 | EU754203 | | | | Phragmites australis (Poaceae) | Senegal |
| Pyrenochaeta cava | | CBS 257.68 | IMI 331911 | JF740260 | EU754100 | EU754199 | | Wheat field soil | Germany |
| Pyrenochaeta lycopersici | | CBS 267.59 | | JF740261 | GQ387551 | GQ387612 | | Lycopersicon esculentum (Solanaceae) | Netherlands |
| Pyrenochaeta nobilis | | CBS 407.76 | | EU930011 | EU754107 | EU754206 | | Laurus nobilis (Lauraceae) | Italy |
| Pyrenochaetopsis leptospora | | CBS 101635 | PD 71/1027 | JF740262 | GQ387566 | GQ387627 | | Secale cereale (Poaceae) | Europe |
| Species name, final identification | Former identification | CBS no. | Other no. | ITS        | SSU       | LSU       | ACT       | TUB       | CHS-1 | Host, substrate                  | Country     |
|-----------------------------------|-----------------------|---------|-----------|------------|-----------|-----------|-----------|-----------|-------|---------------------------------|-------------|
| Pyrenochaetopsis pratorum comb. nov. | Phoma pratorum        | CBS 445.81 | PDDCC 7049, PD 80/1254 | JF740263  | GU238136 |           |           |           |       | Lolium perenne, leaf            | New Zealand |
|                                   |                       | CBS 286.93 | PD 90/1252 | JF740264  | JF740331 |           |           |           |       | Dactylis glomerata              | New Zealand |
| Pyrenophora tritici-repentis       |                       | OSC 100096 |            | AY544716  | AY544672 |           |           |           |       |                                 |             |
| Roussella hysterioides            |                       | CBS 125434 | HH 26988  | AB524622  |           |           |           |           |       | Sasa kurilensis                  | Japan       |
| Setomelanomma holmii              |                       | CBS 110217 |            | GC387572  | GC387633 |           |           |           |       | Picea pungens                   | USA         |
| Setophoma terrestris              |                       | CBS 335.29 |            | GC387526  | GC387587 |           |           |           |       | Allium sativum                   | USA         |
| Splanchnonema platani             |                       | CBS 221.37 |            | DQ678013  | DQ678065 |           |           |           |       | Platana occidentalis             | USA         |
| Splanchnonema platani             |                       | CBS 524.50 |            | DQ678003  | DQ678056 |           |           |           |       | Dung of goat                     | Panama      |
| Stagonosporopsis cucurbitacearum   |                       | CBS 133.96 |            | GU238234  | GU238181 |           |           |           |       | Cucurbita sp.                    | New Zealand |
| Subplenodomus apiicola comb. nov. | Phoma apiicola         | CBS 285.72 |            | JF740196  | GU238040 |           |           |           |       | Apium graveolens var. napiforme (Umbelliferae) | Germany     |
|                                   | Phoma apiicola         | CBS 504.91 | PD 78/1073 | JF740197  | JF740273 |           |           |           |       | Apium graveolens (Umbelliferae) | Netherlands |
| Subplenodomus drobnjacensis comb. nov. | Phoma drobnjacensis | CBS 269.92 | PD 88/896  | JF740211  | JF740100 | JF740285 |           |           |       | Eustoma exaltatum (Gentianaceae) | Netherlands |
|                                   | Phoma drobnjacensis | CBS 270.92 | PD 83/650  | JF740212  | JF740286 |           |           |           |       | Gentiana makinoi ‘Royal Blue’ (Gentianaceae) | Netherlands |
| Subplenodomus valerianae comb. nov. | Phoma valerianae      | CBS 630.68 | PD 68/141  | JF740251  | GU238150 |           |           |           |       | Valeriana phu (Valerianaceae)    | Netherlands |
|                                   | Phoma valerianae      | CBS 499.91 | PD 73/672  | JF740252  | JF740319 |           |           |           |       | Valeriana officinalis (Valerianaceae) | Netherlands |
| Subplenodomus violicola comb. nov. | Phoma violicola       | CBS 306.88 |            | FJ427054  | GU238231 | GU238156 |           |           |       | Viola tricolor (Violaceae)       | Netherlands |
|                                   | Phoma violicola       | CBS 100272 |            | FJ427055  | JF740322 |           |           |           |       | Viola tricolor (Violaceae)       | New Zealand |
| Thyridaria rubronotata            |                       | CBS 419.85 |            |           | GU301875 |           |           |           |       | Acer pseudoplatanus (Aceraceae) | Netherlands |
| Trematosphaeria pertusa           |                       | CBS 122368 |            | FJ201990  |           |           |           |           |       | Fraxinus excelsior (Oleaceae)    | France      |
| Westerdykella capitulum comb. nov. | Phoma capitulum       | CBS 337.65 | PD 91/1614, ATCC 16195, HACC 167, IMI 113993 | GU238054 |           |           |           |           |       | Saline soil                      | India       |
| Westerdykella minutispora comb. nov. | Phoma minutispora    | CBS 509.91 | PD 77/920  | GU238108 |           |           |           |           |       | Saline soil                      | India       |
| Westerdykella ornata              |                       | CBS 379.55 |            | GU301880  |           |           |           |           |       | Mangrove mud                    | Mozambique  |

Table 1. (Continued).
respectively. The tree (Fig. 1) was rooted to *Sporormiella minima* (CBS 524.50). The Bayesian analysis resulted in 6,542 trees after 3,272,000 generations, from which the burn-in was discarded and the consensus tree and posterior probabilities were calculated based on 56,028 trees (Fig. 1).

The families that belong to Pleosporineae, represented by the species grouping in clades A–G, clustered in a strongly supported clade (99% posterior probability). Clade A, representing those species classified in Pleosporaceae, was strongly supported (100%) and included two subclades. *Pleospora betae* (anam. *Phoma betae*), clustered with *Pleospora calvescens* (anam. *Ascochyta calvina*), *A. obiones* and *A. hyalospora*; all recorded as pathogens on Chenopodiaceae. The generic type species *Pleospora herbarum*, a plurivorous species, grouped with *Cochliobolus sativus*, *Pyrenophora tritici-repentis* and *Pleospora typhicola* (anam. *Ph. typhina*), all recorded from Poaceae. Clade B includes *Leptosphaeria maculans* (anam. *Phoma lingam*). In clade B also other important plant pathogens of *Phoma* section *Plenodomus* can be found, such as *Phoma tracheiphila*, *Ph. vasinfecta*, *Ph. drobnjacensis*, and *Plectophomella*.
Phoma sections Plenodomus, Pilosa

Phoma heteromorphospora, type species of Phoma section Heterospora (Boerema et al. 1997) and Ph. dimorphospora also grouped in this Leptosphaeria clade, in congruence with previous findings (de Gruyter et al. 2009, Aveskamp et al. 2010).

Leptosphaeria doliiolium (anam. Ph. acuta), type species of the genus Leptosphaeria, is found in Clade D, clustering with L. conoeida and L. slovaca. Leptosphaeria doliiolium and its relatives comprise a sister clade C with species classified in Cucurbitariaceae, including Cucurbitaria berberidis, the three Pyrenoacheta species, Py. cava, Py. lycopersici and Py. nobilis, and Pyrenoachetopsis leptospora.

Phaeosphaeria nodorum and its relatives Neosetophoma samarorum, Setophoma terresris, Chaetosphaeronomena hispidulum, Paraphoma radicina and Setomelanomma holmi, represent Phaeosphaeriaceae in clade E as has previously been found (de Gruyter et al. 2009, 2010).

A distinct clade F includes Ph. glycinicola, Ph. carteri, Ph. septicidalis, and the taxonomic confusing species Pyrenoacheta dolichi (Grondona et al. 1997). The position of Coniothyrium palmarum and Neophaeosphaeria filamentosa could not be clarified, but both species are also treated below in a phylogeny including close relatives based on ITS and LSU regions (Fig. 2). Didymella exigua, type species of the genus Didymella, and Ph. herbarum represent Didymellaceae, and clustered in a well-supported clade (G) in congruence with previous studies (de Gruyter et al. 2009, 2010; Aveskamp et al. 2010). The molecular phylogeny of species which group in this analysis outside of Pleosporineae in Montagunulae, Massarinaceae and Sporoniaceae were further analysed utilising LSU sequence data of a broader range of taxa (Fig. 5).

**Phoma section Plenodomus and close allies**

The aligned sequence matrix obtained for the LSU and ITS regions had a total length of 1 921 nucleotide characters, 1 332 and 589 respectively. The combined dataset used in the analyses included 87 taxa and contained 1921 characters with 298 and 118 unique site patterns for LSU and ITS respectively. The tree (Fig. 2) was rooted to Ph. herbarum (CBS 615.75), the representative isolate of the type species of Phoma (Boerema et al. 2004). The Bayesian analysis resulted in 100 002 trees after 5 000 000 generations, from which the burn-in was discarded and the consensus tree and posterior probabilities were calculated based on 90 930 trees (Fig. 2).

The species currently classified in Leptosphaeria and Phoma section Plenodomus grouped in clades A and B representing Leptosphaeriaceae, including the type species Ph. lingam and Leptosphaeria doliiolium, respectively. Isolates of the taxa that represent Cucurbitariaceae, Cucurbitaria berberidis and its related species Pyrenoacheta cava, Py. nobilis, Py. lycopersici and Pyrenoachetopsis leptospora, clustered in a distinct clade D only distantly related to Leptosphaeriaceae. This finding agrees with a recent study (de Gruyter et al. 2010). Phoma pratorum clustered with Pyrenoachetopsis leptospora.

Leptosphaeria biglobosa grouped in a subclade A1 with Ph. wasabiae, the cause of black rot disease on Wasabia japonica (Brassicaceae) and Ph. pimplinellae, a necrotroph on Pimpinella anism (Apiaceae). Leptosphaeria maculans, considered as closely related to the L. biglobosa complex, proved to be more distantly related in clade A1. In this subclade, other important pathogens can be found, such as Ph. tracheiphila, a quarantine organism on Citrus spp. (Rutaceae), Ph. vasinfecta, a pathogen on Chrysanthemum spp. (Asteraceae), L. lindquistii (anam. Ph. macdonaldii), a worldwide pathogen on Helianthus annuus (Asteraceae) and Ph. lupini, a seed borne pathogen known from Lupinus spp. (Fabaceae). Subclade A1 also comprises both varieties of Ph. enteroleuca, opportunistic pathogens on deciduous trees and shrubs, and the necrotrophic species L. agniita (anam. Ph. agniita), Ph. congesta (both recorded on Asteraceae), Ph. conferta (mainly on Brassicaceae), L. hendersoniae (on Salicaceae), L. fallacios, L. collinsoniae (mainly on Lamiaeae) and L. lindquistii (on Apiaceae). Plectophomella visci, recorded from leaves of Viscum album (Viscaceae), also clustered in the Leptosphaeriaceae. The genus Plenodomus is re-introduced here to accommodate the species in subclade A1, which are allied to Ph. lingam.

Subclade A2 comprises pathogenic species often causing leaf spots such as Ph. apicola on Apium graveolens (Apiaceae), Ph. drobajncensis (on Gentianaceae), Ph. violicola (on Violaceae) as well as the necrotrophic species Ph. valeriana, Ph. valeriana (Valerianaceae). Phoma apicola and Ph. valeriana were classified in Phoma section Phoma, and Ph. violicola was classified in Phoma sect. Pertronella; however, the relationship of these species in Leptosphaeriaceae is clearly demonstrated (Fig. 2), and therefore the species are transferred to the new genus Subplenodomus. These results are in congruence with a recent study where Ph. violicola, Ph. apicola and Ph. valeriana grouped in a clade representing both Leptosphaeriaceae and Pleosporaceae (Aveskamp et al. 2010).

Four Leptosphaeria species, L. macrospora (soil) and the necrotrophic species L. nitschkei (on Asteraceae), L. praetemissa, on Rubus ideus (Rosaceaee) and L. dryadis, on Dryas spp. (Rosaceaee) grouped in a subclade A3 and are transferred here to a new genus Paralectosphaeria. Phoma korfii also clustered in this subclade. The European species Ph. heteromorphospora, type species of Phoma section Heterospora, and the American counterpart Ph. dimorphospora, both pathogens in Chenopodiaceae, grouped in a distinct subclade A4. Phoma sect. Heterospora is raised to generic rank to accommodate both species in Leptosphaeriaceae.

Clade B comprises necrotrophic species related to the type species L. doliiolium (anam. Ph. acuta). The phylogeny of this species complex, and the closely related species Ph. veronicicola, Ph. macrocapsa and Ph. sydowi, is treated below. The necrotrophic species Ph. sclerotioides, L. conoeida (anam. Ph. doliiolium), L. slovaca (anam. Ph. leonur) and Ph. pediculuris also proved to be related. The species Ph. rubefaciens and Ph. etheridgei also belong to clade B, but these species, both recorded on trees, are more distantly related.

The Phoma species in clades A and B are in majority currently described as anamorphs of the genus Leptosphaeria, or belong to Phoma section Plenodomus. These Phoma anamorphs are only distantly related to the type species Ph. herbarum and its relatives in Didymellaceae, and therefore these species described in section Plenodomus are excluded from the genus Phoma. Clade C is more distantly related to Leptosphaeriaceae and comprises species that are related to Coniothyrium palmarum in Coniothyriaceae. Two subclades are recognised in clade C: Ph. glycinicola, Py. dolichi and Ph. carteri group with the generic type species C. palmarum, whereas two isolates of Ph. septicidalis group with Ph. multicorn. The teleomorph Neophaeosphaeria filamentosa clustered basal to this clade. Clade D includes the genera Cucurbitaria, Pyrenoachetopsis and Pyrenoacheta, which represent Cucurbitariaceae. This finding is in congruence with previous studies (de Gruyter et al. 2010).
Fig. 2. The phylogeny of Phoma section Plenodomus and Leptosphaeria, based on the strict consensus tree from a Bayesian analysis of 87 LSUITS sequences. The Bayesian posterior probabilities are given at the nodes. The tree was rooted to Phoma herbarum (CBS 615.75).
Phylogeny of the Leptosphaeria doliolum complex

The aligned sequence matrix obtained for the ITS, ACT, TUB and CHS-1 regions had a total length of 1,345 nucleotide characters; ITS 522, ACT 240, TUB 332 and CHS-1 251, respectively. The combined dataset used in the analyses included 18 taxa and contained 1,345 characters with 98 unique site patterns. The tree (Fig. 3) was rooted to “Ph. pediculata” (CBS 390.80). The Bayesian analysis resulted in 6,002 trees after 30,000 generations, from which the burn-in was discarded and the consensus tree and posterior probabilities were calculated based on 3,341 trees.

The phylogenetic tree revealed two clades with high posterior probabilities, 98 and 99 % respectively, clade A with Ph. acuta subsp. errabunda and Ph. macrocapsa, and clade B with Ph. acuta subsp. acuta (anamorph of Leptosphaeria doliolum) and Ph. acuta subsp. acuta f. sp. phlogis. Phoma sydowii, a nectrophor of Asteraceae, Senecio spp. in particular, proved to be closely related to Ph. acuta subsp. errabunda. The isolate CBS 297.51 preserved as Ph. acuta is similar to Ph. sydowii, a synonym of L. sydowii, see below. Phoma veronicicola, as a nectrophor specifically occurring on Veronica spp. (Scrophulariaceae), also proved to belong to Leptosphaeria doliolum.

Phylogeny of Phoma section Pilosa

The aligned sequence matrix obtained for the ACT region had a total length of 252 nucleotide characters (20 taxa), and contained 165 unique sites. The tree was rooted to Ph. lingam (CBS 147.24 and CBS 260.94). The Bayesian analysis resulted in 34,802 trees after 174,000 generations, from which the burn-in was discarded, and the consensus tree and posterior probabilities were calculated based on 11,728 trees (Fig. 4).

The phylogenetic tree representing the Pleosporaceae includes Ph. betae, type species of Phoma section Pilosa. This section is characterised by producing pycnidia that are covered by mycelial hairs. Phoma betae clearly groups with other pycnidial fungi pathogenic on Chenopodiaceae, including Ascochyta obions, A. hylaspora and A. caulina and Chaetodioidia sp. All species produce similar hairy pycnidia, but are classified in Ascochyta or Coniothyrium due to conidal septation, or brown pigmentation of conidia, respectively.

A subclade comprises the cosmopolitan Pleospora herbarum and related species. The species involved are associated with various hosts or substrates. The most closely related Ph. incompta is a specific pathogen on Olea europea (Oleaceae). Phoma incompta was classified in Phoma section Sclerophomella because of its thick-walled pycnidia (de Gruyter & Noordeloos 1992, Boerema & de Gruyter 1998). The pycnidial characters of Ph. incompta, pycnidia covered with mycelial hairs and with an indistinct ostiole visible as a pallid spot (de Gruyter & Noordeloos 1992) however, agrees with those of Ph. betae and Ph. typhina.

Phoma fallens proved to be closely related to Ph. glauca/pora in keeping with the similar in vitro characters, especially the low growth-rate and the size and shape of its conidia (Boerema et al. 2004). Both species originate from southern Europe, and have been associated with spots on fruits and leaves of Olea europea, or leaf spots on Nerium oleander, respectively. An isolate preserved as Leptosphaeria clavata, CBS 259.51, proved to be closely related. The origin of the isolate, deposited by E. Müller, is unknown; however, it is likely that the isolate was obtained from Poaceae, Triticum vulgare or Dactylis glomerata (Müller 1950). Phoma flavigena, once isolated from water and also recorded from southern Europe, proved to be more distantly related in Pleosporaceae.

Phylogeny of phoma-like anamorphs excluded from the suborder Pleosporineae

The aligned sequence matrix obtained for the LSU regions had a total length of 808 nucleotide characters, with 208 unique site patterns. The phylogenetic tree (Fig. 5) was rooted to Pseudonobillarda phragmites (CBS 398.61). The Bayesian analysis resulted in 48,402 trees after 242,000 generations, from which the burn-in was discarded and the consensus tree and posterior probabilities were calculated based on 24,876 trees.

Clade A includes the reference isolates of the teleomorph Paraphaeosphaeria and the anamorph Paraconiothyrium classified in Montagnulaceae. This teleomorph/anamorph relation agrees with previous molecular phylogenetic studies (Verkley et al. 2004, Damm et al. 2008, de Gruyter et al. 2009). Other phoma-like species in this clade are Ph. lini, Plenodomus fusco-maculans, Pleurophoma pleurospora (CBS 101461) and Asteromella tilliae. Phoma lini, a saprobe frequently recorded on dead stems of Linum spp., was described in Phoma section Phoma (de Gruyter et al. 1993). Re-examination of the conidia revealed that they are hyaline and thin-walled; however, also darker, greenish to yellowish coniothyrium-like conidia were observed. The conidigenous cells are phoma-like, doliiform to ampulliform.

The isolate Asteromella tilliae (CBS 265.94) clearly represents a species of Paraconiothyrium, and therefore, the teleomorph name Didymosphaeria petrakiana, Didymosphaeriaceae, is probably incorrect. It was already mentioned by Butin & Kehr (1995) that “considering the taxonomical placement of the teleomorph, the authors were informed about forthcoming taxonomic changes”.

The morphological characters of the isolate CBS 101461, considered as representing the generic type species Pleurophoma pleurospora, resembles Paraconiothyrium as was previously discussed (de Gruyter et al. 2009). The sterile ex-type strain of Plenodomus fusco-maculans, CBS 116.16, recorded from Malus sp., also grouped with the Paraconiothyrium isolates.

Coniothyrium fuckelii clustered in the Paraphaeosphaerid Paraconiothyrium clade, in agreement with previous studies (Damm et al. 2008, Aveskamp et al. 2010), and therefore, the species is transferred to the genus Paraconiothyrium. Two phoma-like species obtained from Cytisus scoparius and Lonicera sp. respectively (CBS 116668 and CBS 130329), cluster near Montagnulaceae and Massarinaceae. The morphological characters of the species are typical for Pleurophoma pleurospora. The taxonomic position of both isolates at familial rank could not be determined. The morphology of Phoma flavescens proved to be most similar to that of Paraconiothyrium, it definitely does not belong to Phoma, and therefore the species is transferred to Paraconiothyrium. Sequence data of additional species clustering nearby are required to resolve the current classification of Ph. flavescens. None of the phoma-like anamorphs included in this study grouped in clade B, which represents Massarinaceae.

Clade C includes the recently assigned ex-epitype strain of Trematosphaeria pertusa, isolate CBS 122368 (Zhang et al. 2008) and Falcisformispora lignatilis. Both T. perusa and F. lignatilis represent Trematosphaeriaceae (Suetrong et al. 2009). A second isolate preserved as Trematosphaeria pertusa, CBS 400.97, proved to be only distantly related, and clustered in clade D with Aposphaeria populina and Melanomma pulvis-pyris in
Fig. 3. The phylogeny of the *Leptosphaeria doliolum* complex, based on the strict consensus tree from a Bayesian analysis of 18 ITS/ACT/TUB/CHS-1 sequences. The Bayesian posterior probabilities are given at the nodes. The tree was rooted to *Leptosphaeria pedicularis* comb. nov. (CBS 390.80).

Fig. 4. The phylogeny of phoma-like anamorphs in the Pleosporaceae based on the strict consensus tree from a Bayesian analysis of 20 ACT sequences. The Bayesian posterior probabilities are given at the nodes. The tree was rooted to *Plenodomus lingam* (CBS 147.24, CBS 260.94).
Fig. 5. LSU The phylogeny of phoma-like isolates excluded from the Pleosporineae, based on the strict consensus tree from a Bayesian analysis of 40 LSU sequences. The Bayesian posterior probabilities are given at the nodes. The tree was rooted to Pseudorobillarda phragmitis (CBS 398.61).
Melanomataceae. This isolate is considered as an incorrect identification (Mugambi & Huhndorf 2009), and we consider this sterile isolate as representative of *Melanoma pulvis-pyriis*. Clade C also comprises the human pathogen *Pyrenochaeta romeroi*. This species certainly does not belong to *Pyrenochaeta* (de Gruyter et al. 2010) and therefore, we describe the new genus *Mediciposis in Trematosphaeriaceae* to accommodate this species.

A well-supported clade D represents the *Melanomataceae* and includes *Melanoma pulvis-pyriis*, *Herpotrichia juniperi* and *Beverwijkella pulmonaria*, in congruence with Zhang et al. (2009). There were four phoma-like isolates present in the collections of CBS and PD, i.e. CBS 350.82, PD 83/367, PD 83/831 and PD 84/221, which could not be identified according to their morphological characters. The isolates were preserved as *Plenophoma* spp. This study demonstrates that two strains represent *Aposphaeria populina*, whereas the other two strains represent the new species described here as *Aposphaeria corallinolutea*. Further studies in *Melanomataceae* are needed to clarify the phylogeny of *Aposphaeria* in *Melanomataceae*.

*Sporormiaceae* (clade E) is represented by *Sporormiella minima* and *Preussia funiculata*. *Phoma capitulum* and *Ph. minutispora*, well-defined soil-borne fungi from Asia, fall into this clade. Both species are related with the anamorph *Westerdykkella ornata*, and therefore the species are transferred to *Westerdykkella* in *Sporormiaceae*.

*Pyrenochaeta mackinnonii* could not be assigned to familial rank. A blast search in GenBank with its LSU sequence suggested a relation with *Versicolarisporum triseptum*. However, the typical 3-septate conidia of this anamorph are different. Neither could *V. triseptum* be assigned at familial rank in *Pleosporales* (Tanaka et al. 2009). We therefore introduce the new genus *Nigrograna* to accommodate *Py. mackinnonii*.

**TAXONOMY**

*Leptosphaeriaceae* M.E. Barr, Mycotaxon 29: 503. 1987.

*Heterospora* (Boerema, Gruyter & Noordel.) Gruyter, Verkley & Crous, stat. nov. MycoBank MB564701.

Basionym: *Phoma sect. Heterospora* Boerema, Gruyter & Noordel., Persoonia 16: 336. 1997.

Type species: *Heterospora chenopodii* (Westend.) Gruyter, Aveskamp & Verkley, see below (= *Phoma heteromorphospora* Aa & Kesteren).

*Heterospora chenopodii* (Westend.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564702.

Basionym: *Phyllosticta chenopodii* Westend., Bull. Acad. Roy. Sci. Belgique Ser. 2, 2: 567. 1857; not *Phyllosticta* s.l. Aposphaeriaceae

Type species: *Phyllosticta chenopodii* Aveskamp & Verkley, see below (= *Pleospora chenopodii* Nees ex Sacc. & Roum., Rev. Mycol. 6: 30. 1884).

≡ *Phoma variostroma* Aa & Kesteren, Persoonia 10: 268. 1979, nom. nov., nom. illeg. [not *Phoma variostroma* Shreem., Indian J. Mycol. Pl. Pathol. 8: 221. 1979 (‘1978’)].

≡ *Phoma heteromorphospora* Aa & Kesteren, Persoonia 10: 542. 1980, nom. nov.

Specimens examined: *Belgium*, Beverloo, from leaves of *Chenopodium suecicum* (album) and *Chenopodium urbicum* (Chenopodiaceae), no date, G.D. Westendorp. Herb. Crypt. (Ed. Bryant-Feyes), No. 959, BR, holotype of *Phyllosticta chenopodii* Westend. *ex herb.* G.D. Westendorp. *Netherlands*, Baarn, from leaf spots in *Chenopodium album* 3 Jul. 1968, H.A. van der Aa, epitype designated here CBS H-16386, culture ex-epitype CBS 448.88; Heeussum, from leaf spots in *Chenopodium album* sep. 1994, J. de Gruyter, CBS 115.96 = PD 94/1576.

Notes: Van der Aa & van Kesteren (1979) provided a nom. nov. since the epithet “chenopodii” was occupied in *Phoma*. For more details of the taxonomy of the species see van der Aa & van Kesteren (1979). Although *Leptosphaeria chenopodii-albi* was described from leaves of *Chenopodium album* (Crane & Shearer 1991) no cultures are available for comparison.

*Heterospora dimorphospora* (Speg.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564703.

Basionym: *Phyllosticta dimorphospora* Speg., Anales Mus. Nat. Buenos Aires 13: 334. 1910.

≡ *Phoma dimorphospora* (Speg.) Aa & Kesteren, Persoonia 10: 269. 1979.

≡ Stagonospora chenopodii Peck, Rep. (Annual) New York State Mus. Nat. Hist. 40: 60. 1887 (sometimes erroneously listed as stag. chenopodii "House").

Specimens examined: *Argentina*, La Plata, from leaves of *Chenopodium hircinum* (Chenopodiaceae), 13 Oct. 1906, C. Spegazzini, Collect. micol. Museo Inst. Spegazzini, No. 11.353, LPS, holotype of *Phyllosticta dimorphospora* Speg. *Lima*, from stem of *Chenopodium quinoa*, 1977, L.J. Turkensteen, CBS 165.78 = PD 77/884. *Peru*, from lesions in stems of *Chenopodium quinoa*, 1976, V. Otazu, epitype designated here CBS H-16203, culture ex-epitype CBS 345.78 = PD 76/1015.

Note: For more details of the taxonomy of the species see van der Aa & van Kesteren (1979).

*Leptosphaeria* Ces. & De Not., Comment. Soc. Cittog. Ital. 1: 234. 1863.

≡ *Leptosphaeria Hohn.,* Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1: 124: 73. 1915.

Type species: *Leptosphaeria doliotum* (Pers. : Fr.) Ces. & De Not., see below.

Note: For full synonymy, including the species listed below, see Crane & Shearer (1991) and Boerema et al. (2004).

*Leptosphaeria conoidea* (De Not.) Sacc., Fungi Venet. Nov. Vel. Crit. Ser. 2: 314. 1875.

Basionym: *Leptosphaeria doliotum var. conoidea* De Not., Mycoth. Veneti, No. 76. 1873.

≡ *Leptosphaeria doliotum* subsp. *pinguicula* Sacc., Michelia 2: 598. 1882.

≡ *Phoma acuta* subsp. *amplicola* Sacc. & Roum., Rev. Mycol. 6: 30. 1884.

≡ *Phoma hoehnelli* subsp. *amplicola* (Sacc. & Roum.) Boerema & Kesteren, Trans. Brit. Mycol. Soc. 67: 299. 1976.

≡ *Phoma doliotum* P. Karst., Meddel. Soc. Fauna Fl. Fenn. 16: 9. 1888.

≡ *Melanommata conospora* Berl., Bull. Soc. Mycol. France 5: 55. 1899.

Specimens examined: *Netherlands*, Zaltbommel, from dead stem of *Lunaria annua* (Brassicaceae), Jan. 1974, G.H. Boerema, CBS 616.75 = ATCC 32813 = IMI 199777 = PD 74/56; Montfoort, *Senecio sp.* (Asteraceae), 1982, CBS 125977 = PD 82/888.
**Leptosphaeria doliolum** (Pers.: Fr.) Ces. & de Not., Comment. Soc. Crittog. Ital. 1: 234. 1863.

**Basionym**: *Sphaeria doliolum* Pers.: Fr., Icon. Desc. Fung. Min. Cognit. (Leipzig) 2: 390. 1823.
- Sphaeria acuta Hoffm.: Fr., Veg. cryptog. 1: 22. 1787. Syst. Mycol. 2: 507. 1823.
- Phoma acuta (Hoffm.: Fr.) Fuckel. Jahrb. Nassauxischen Vereins Naturk. 23–24. 1257. 1870 (as "acutum").
- Leptophoma doliolum (Hoffm.: Fr.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1. 124: 73. 1915.
- Plenodomus doliolum (Hoffm.: Fr.) Bubák, Ann. Mycol. 13: 29. 1915 [as "Fucellii"].
- Phoma phloiog Roum., Rev. Mycol. 6: 160. 1884.
- Phoma hoehnelii var. urticae Boerema & Kesteren, Trans. Brit. Mycol. Soc. 67: 299. 1976.

Specimens examined: **Netherlands**, from stem of Rudbeckia sp. (Asteraceae), Sep. 1966, M.M.J. Dorenbosch, CBS 541.66 = PD 66/221; from stem of Urtica dioica (Urticaceae), 1974, G.H. Boerema, CBS 504.75 = PD 74/55; Rhenen, from Urtica dioica, Feb. 1975, G.H. Boerema, CBS 505.75 = PD 75/141; Wageningen, from stem of Phlox paniculata ( Polemoniaceae), 1977, G.H. Boerema, CBS 155.94 = PD 77/80; from stem of Phlox paniculata, 1978, G.H. Boerema, CBS 125979 = PD 78/37; from stem of Urtica dioica, 1982, G.H. Boerema, CBS 130000 = PD 82/701.

**Notes**: Isolate CBS 541.66 was preserved as *Phoma acuta* subsp. errabunda (teleom. *Leptosphaeria errabunda*, see below); however, the isolate clustered with *L. doliolum*. Both isolates CBS 155.94 and CBS 125979 were considered as forma specialis "phlogis" (Boerema et al. 1994) of the anamorph *Ph. acuta* subsp. acuta. The subspecies *acuta* was created by the differentiation of *Phoma acuta* subsp amplior Sacc. & Roum., but the latter is a synonym of *L. doliolum*, reclassified here as *Sphaeria doliolum* (see above).

**Leptosphaeria errabunda** (Desm.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564704.

**Basionym**: *Phoma errabunda* Desm., Ann. Sci. Nat., Bot. Ser. 3, 11: 282. 1849.
- Phoma acuta subsp. errabunda (Desm.) Boerema, Gruyter & Kesteren, Persoonia 15: 465. 1994.
- Leptophoma doliolum Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1. 124: 75. 1915 [not *Phoma doliolum* P. Karst. = *Leptosphaeria conioidea* (De Not.) Sacc., see above].
- Plenodomus doliolum (Höhn.) Höhn., Ber. Deutsch. Bot. Ges. 36: 139. 1918.
- Phoma hoehnelii Kesteren, Netherlands J. Pl. Pathol. 72: 116. 1972, nom. nov.
- Plenodomus doliolum subsp. errabunda Boerema, Gruyter & Kesteren, Persoonia 15: 466. 1994.

Specimens examined: **Netherlands**, Leuwarden, from stem of Delphinium sp. (Ranunculaceae), 1974, CBS 125978 = PD 74/61; Ferwerderadeel, from Oenothera sp. (Onagraceae), Aug. 1978, G.H. Boerema, CBS 125975 = PD 77/116; Arnhem, from wood of Populus tremuloides (Salicaceae), Jul. 1989, P. Crane, holotype DAOM 216539 = CBS 125980 = PD 95/1483.

**Leptosphaeria macrocapsa** (Trail) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564713.

**Basionym**: *Phoma macrocapsa* Trail, Scott. Naturalist (Perth) 8: 327. 1886.
- Plenodomus macrocapsa (Trail) H. Ruppr., Sydowia 13: 20. 1959.

Specimens examined: **Netherlands**, from stem of Mercurialis perennis (Euphorbiaceae), 1978, G.H. Boerema, CBS 640.93 = PD 78/139.

**Leptosphaeria pedicularis** (Fuckel) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564714.

**Basionym**: *Phoma pedicularis* Fuckel, Reisen Nordpolarmeer 3: 318. 1874 (as "pedicularis"); not *Phoma pedicularis* Wehm., Mycoflora 38: 319. 1946 (= *Phoma herbicola* Wehm).
- Leptosphaeria pedicularis (Fuckel) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

**Basionym**: *Phoma rubefaciens* Togliani Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

Specimens examined: **Switzerland**, Zürich, from twig of Quercus sp. (Fagaceae), Aug. 1976, W. Gams, CBS 223.77 = **Netherlands**, Oploo, from wood of Tilia × europaea (Tiliaceae), 1978, G.H. Boerema, CBS 125682 = PD 77/710.

**Leptosphaeria rubefaciens** (Togliani) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

**Basionym**: *Phoma rubefaciens* Togliani, Ann. Sper. Agr. II, 7: 1626. 1953.

**Leptosphaeria sclerotoides** (Sacc.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

**Basionym**: *Phoma sclerotoides* Sacc., Fungi Herb. Bruxelles 21: 1892; Syll. Fung. 11: 492. 1895.
- Plenodomus sclerotoides Preuss, Klotzsch. Herb. Vivum Mycol. Systems Fungorum German., No. 1281. 1849, nom. nud. (no description).
- Plenodomus melliloti Mark.-Let., Bolezni Rast. 16: 195. 1927.

Specimens examined: **Canada**, British Columbia, from Medicago sativa (Fabaceae), 1980, J. Drew Smith, CBS 148.84 = PD 80/1242; **Alaska**, from root of Populus balsamifera (Betulaceae), 1978, G.H. Boerema, CBS 387.80 = ATCC 42533 = IMI 214398 = PD 78/809.

**Leptosphaeria slovacica** (Preuss) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

**Basionym**: *Phoma slovacica* Preuss, Klotzsch. Herb. Vivum Mycol. Systems Fungorum German., No. 1281. 1849, nom. nud. (no description).

Specimens examined: **Canada**, British Columbia, from dead stem of *Ballota nigra* (Lamiaceae), 1977, G.H. Boerema, CBS 125979 = PD 77/116; Alaska, from dead stem of *Ballota nigra*, 1979, G.H. Boerema, CBS 398.80 = PD 79/171.

**Note**: Seven varieties of this species have been recognised (Wunsch et al. 2011) in a phylogenetic analysis using 10 loci.

**Leptosphaeria slovacica** (Preuss) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564715.

**Basionym**: *Phoma slovacica* Preuss, Klotzsch. Herb. Vivum Mycol. Systems Fungorum German., No. 1281. 1849, nom. nud. (no description).

Specimens examined: **Netherlands**, from stem of Mercurialis perennis (Euphorbiaceae), 1978, G.H. Boerema, CBS 640.93 = PD 78/139.

**Leptosphaeria etheridgei** (L.J. Hutchison & Y. Hirats.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564712.

**Basionym**: *Phoma etheridgei* L.J. Hutchison & Y. Hirats., Canad. J. Bot. 72: 1425. 1994.

Specimens examined: **Canada**, Alberta, from bark of gall, on trunk of Populus tremuloides (Salicaceae), Jul. 1989, P. Crane, holotype DAOM 216539, culture ex-holotype DAOM 216539 = CBS 125980 = PD 95/1483.
Leptosphaeria sydowi (Boerema, Kesteren & Loer.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564717.
Basionym: Phoma sydowi Boerema, Kesteren & Loer., Trans. Brit. Mycol. Soc. 77: 71. 1981, nom. nov.
≡ Sphaerenaena seneconis Synd. & P. Synd., Ann. Mycol. 3: 185. 1905; not Phoma seneconis Synd. & Beibl., Hedwigia 38: 136. 1899.
≡ Plenodomos seneconis (Synd. & P. Synd.) Bukab, Ann. Mycol. 13: 29. 1915.
≡ Plenodomos seneconis (Synd. & P. Synd.) Petr., Ann. Mycol. 19: 192. 1921, isonym.
≡ Plenodomos rostratus Petr., Ann. Mycol. 21: 199. 1923; not Phoma rostrata O’Gara, Mycologica 7: 41. 1915 (not Leptosphaeria rostrata M.L. Far & H.T. Horner, Nova Hedwigia 15: 250. 1968).

Specimens examined: **Switzerland**, Kt. Zürich, Zollikon, from Papaver rhoes (Papaveraceae), Oct. 1949, E. Müller, CBS 297.51. **Natl. Hung.** 4: 341. 1906.

Notes: Leptosphaeria seneconis (Fuckel) G. Winter was suggested as the possible teleomorph (Boerema et al. 2004). Because the teleomorph connection has not been proven, however, we did not include it as a synonym that would have priority as the correct name. The isolate CBS 297.51 was originally identified as L. doliolum var. doliolum.

Leptosphaeria veronicae (Hollós) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564718.
Basionym: Sphaerenaena veronicae Hollós, Ann. Hist.-Nat. Mus. Natl.Hung. 4: 341. 1906.
≡ Phoma veroniciscola Boerema & Loer., Trans. Brit. Mycol. Soc. 84: 297. 1985, nom. nov. (not Phoma veronicae R. & G., Revue Mycol. 6: 160. 1915).

Specimens examined: **Netherlands**, from stem of Veronica “Shirley Blue” (Scrophulariaceae), 1974, CBS 126583 = PD 74/472. **Scotland**, Isle of Lewis, Hebrides, from dead stem of Senecio jacobiaceae, 1977, R.W.G. Dennis, CBS 385.80 = PD 74/477.

**Notes**: A. Leuchtmann, CBS 643.86.

Leptosphaeria sydowi (Boerema, Kesteren & Loer.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564720.

Pseudothecia immersed, subglobose, solitary or aggregated, thick-walled, pseudoparenchymatous to scleroplectenchymatous, ostiolate, unilocular. Asci bitunicate, broadly ellipsoidal, 8-spored, interasal filaments pseudoparaphyses, Ascospores biseriate, broadly fusiform, transversally 3–5-septate, hyaline to yellow-brownish. Conidiomata pyxidial, globose to subglobose, scleroplectenchymatous, with papillate pore, unilocular. Conidigenous cells phialidic, ampulliform to doliiform. Conidia hyaline, aseptate, oblong to elliptoidal. Sclerotia sometimes produced.

Type species: *Paraleptosphaeria nitschkei* (Rehm ex G. Winter) Gruyter, Aveskamp & Verkley (see below).

**Notes**: Munk (1957) recognised Leptosphaeria section *Para-Leptosphaeria*, an invalid taxon, as a heterogenous group. The section was differentiated from Eu-Leptosphaeria, which included the generic type species *L. doliolum*. Leptosphaeria *nitschkei* was considered a typical representative of section *Eu-Leptosphaeria* (Müller & van Arx 1950). However, this molecular phylogeny demonstrates that *L. nitschkei* is only distantly related to *L. doliolum*. We introduce *Paraleptosphaeria* to accomodate *L. nitschkei* and its relatives. These necrotrophic species are morphologically closely allied to *Leptosphaeria*. The former classification of Leptosphaeria in sections *Eu-Leptosphaeria* and *Para-Leptosphaeria* cannot be upheld from a evolutionary point of view, as two other species attributed to section *Eu-Leptosphaeria*, namely *L. agnita* and *L. maculans* (Munk 1957), were found to group in *Plenodomus*.

**Paraleptosphaeria dryadis** (Johanson) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564721.
Basionym: Melanomma dryadis Johanson, Hedwigia 29: 160. 1890.
≡ Leptosphaeria dryadophila Huhndorf, Bull. Illinois Nat. Hist. Surv. 34: 484 (1992), nom. illeg. via nom. superfl.
≡ Leptosphaeria dryadis Rostr., Bot. Tidsskr. 25: 305. 1903.

**Note**: An explanation of the nomenclature of *Leptosphaeria dryadis* has been provided by Chen et al. (2002).

**Paraleptosphaeria macrospora** (Thümm.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564722.
Basionym: Leptosphaeria macrospora Thümm. Mycotheca Univ. 1359. 1879, nom. nov.
≡ Metasphaeria macrospora (Fuckel) Sacc., Syll. Fung. 2: 158. 1883.
Replaced synonym: Pleospora macrospora Fuckel, Jahrb. Nassausichen Vereins Naturk. 23–24: 138. 1870, nom. illeg., Art. 53.1. [not Pleospora macrospora (De Not.) Ces. & De Not., Comment. Soc. Cittigl. Ital. 1: 218. 1863].

Specimen examined: **Norway**, Troms, Tromsøya, from Rumex domesticus (Polygonaceae), 20 Aug. 1988, K. & L. Holm, CBS 114198 = UPSC 3866.

**Paraleptosphaeria nitschkei** (Rehm ex G. Winter) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564723.
Basionym: Leptosphaeria nitschkei Rehm ex G. Winter, Ascomyceten, Fascicle 1, No. 15. 1870, nom. nuda. (Flora, Jena 55: 510. 1872).

**Specimen examined**: Austria, Ötscher in Niederösterreich, c. 4500’, from Calcaria sp. (= Adenostyles sp, Asteraceae), June 1869, Lolka, **holotype** of Leptosphaeria nitschkei Rehm Ascomyceten 15b, S. **Switzerland**, Kt. Graubünden, Lü, from Cirsium spinosissimum (Asteraceae), 16 July 1948, E. Müller, **epitope designated here** CBS H-20822, culture ex-epitope CBS 306:51.

**Note**: The name *Leptosphaeria nitschkei* was considered a nom. nud. by Crane and Shearer (1991) who cited Art. 32.1 but gave no further explanation. In *Flora, Jena und Regensburg* 55: 510. 1872. *Rehm* refers to additional notes by G. Winter that include a Latin description. Therefore, we consider this name as valid, following Müller (1950) who provided a detailed description in vivo.

**Paraleptosphaeria orobanchae** (Schweinitz : Fr.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564724.
Basionym: Sclerotium orobanches Schweinitz, Schriften Naturf. Ges. Leipzig 1: 57. 1822; Fr., Syst. Mycol. 2: 257. 1822.
≡ Phoma korfi Boerema & Gruyter, Persoonia 17: 275. 1999.

Specimen examined: **USA**, Ringwood Swamp, Lloyd-Cornell, from stem of Epifagus virginiana (Orobanchaceae), 13 Sep. 1995, T. Uturraga, R.P. Korf, P. Mullin, **holotype** of Sclerotium orobanches Schweinitz, CUP 63537, culture ex-holotype CBS 101638 = PD 97/12070.
Note: A Phoma synanamorph of Sclerotium orobanches was reported by Yáñez-Morales et al. (1998) and described as Phoma korfi (Boerema & Gruyter 1999).

**Paraleptosphaeria praetermissa** (P. Karst.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564725.

Basionym: *Sphaeria praetermissa* P. Karst., Bidrag Kannedom Finlands Natur Folk 23: 89. 1873.

≡ *Leptosphaeria praetermissa* (P. Karst.) Sacc., Syll. Fung. 2: 26. 1883.

Specimen examined: **Sweden**, Dalarna, Folkåka, from *Rubus idaeus* (Rosaceae), 21 Mar. 1993, K. & L. Holm, CBS 114591.

**Plenodomus** Preuss, Linnaea 24: 145. 1851.

≡ Phoma sect. *Plenodomus* Boerema, Kesten & Loer., Trans. Brit. Mycol. Soc. 77: 61. 1981.

≡ Diplolenodomus Diederic, Ann. Mycol. 10: 140. 1912.

≡ Plectophomella Moesz, Magyar Bot. Lapok 21: 13. 1922.

≡ Apocyclospora Höhn., Mitt. Bot. Lab. TH Wien 1: 43. 1924.

≡ Deuterophoma Petri, Boll. R. Staz. Patalog. Veget. Roma 9: 396. 1929.

Type species: *Plenodomus rabenhorstii* Preuss, Linnaea 24: 145. 1851 (dubious synonym, see below) = *Plenodomus lingam* (Tode : Fr.) Höhn., see below.

Note: For full synonymy of the anamorph names of the species listed below, see Boerema et al. (1994). For additional synonyms of the teleomorph names of the species below that have been recorded on Asteraceae hosts, see Khashnobish et al. (1995).

**Plenodomus agnitus** (Desm.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564726.

Basionym: *Sphaeria agnita* Desm., Ann. Sci. Nat., Bot. Ser. 3, 16: 313. 1851.

≡ *Leptosphaeria agnita* (Desm.) Ces. & De Not., Comm. Soc. Citttog. Ital. 1: 236. 1863.

≡ *Plenodomus chondrillae* Died., Ann. Mycol. 9: 140. 1911; Krypt.-fl. Brandenburg 9: 236. 1912.

≡ *Phoma agnita* Gonz. Frag., Mem. Reál Acad. Ci. Barcelona 15: 6. 1920.

Specimens examined: **Netherlands**, from stem of *Eupatorium cannabinum* (Asteraceae), 1982, W.M. Loerakker, CBS 126584 = PD 82/903; from stem of *Eupatorium cannabinum*, 1982, W.M. Loerakker, CBS 121891 = PD 82/903.

**Plenodomus biglobosus** (Shoemaker & H. Brun) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564727.

Basionym: *Leptosphaeria biglobosa* Shoemaker & H. Brun, Canad. J. Bot. 79: 413. 2001.

Specimens examined: **France**, Le Rheu, from stem of *Brassica juncea* (Brassicaceae), CBS 127249 = DAOIM 222926, **Netherlands**, from *Brassica rapa* (Brassicaceae), 2006, R. Veenstra, CBS 119951.

Notes: *Leptosphaeria biglobosa* was originally described as a less virulent segregate of *L. maculans* (Shoemaker & Brun 2001). The species, also indicated as *Tox* isolates, has been described from cultivated *Brassica* species as the cause of upper stem lesions and considered as less damaging than *L. maculans* (West et al. 2002). However, in Poland *L. biglobosa* is the predominant cause of these symptoms (Jedryczka et al. 1999, Huang et al. 2005). The current species concept of *L. biglobosa* is broadly defined with six distinct subclades recognised by multilocus phylogenetic analyses of ITS, β-tubulin and actin sequences (Mendes-Pereira et al. 2003, Vincenot et al. 2008). These subclades are named after the host or geographic origin of the isolates involved. It has been suggested that the clades represent distinct subspecies formed over time by reproductive isolation (Mendes-Pereira et al. 2003). Alignments of the ITS sequences of *Ph. wasiae*, *Ph. pimpinellae* and *L. biglobosa* isolates were compared with those of the representative strains of the *L. biglobosa* subclades obtained from GenBank, and both *Ph. wasiae* and *Ph. pimpinellae* grouped in this species complex (unpubl. data). Both species are maintained here, awaiting a redescription of the taxa representing all clades in the *L. biglobosa* complex.

**Plenodomus chrysanthemi** (Zachos, Constantinou & Panag.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564728.

Basionym: *Cephalosporium chrysanthemi* Zachos, Constantinou & Panag., Ann. Inst. Phytopath. Benaki, N.S. 55. 1960.

≡ Phialophora chrysanthemi (Zachos, Constantinou & Panag.) W. Gams, Cephalosporium-artige Schimmel pilze (Stuttgart): 207. 1971.

≡ *Phoma wasinfecta* Boerema, Gruyter & Kesteren, Persoonia 15: 484. 1994.

Specimen examined: **Greece**, from *Chrysanthemum* sp. (Asteraceae), Apr. 1963, D.G. Zachos, holotype CBS H-7576, culture ex-holotype CBS 539.63.

Note: The species was also described as *Phoma trachephyila* f. sp. *chrysanthemi* (Baker et al. 1985).

**Plenodomus collinsoniae** (Dearn. & House) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564729.

Basionym: *Leptosphaeria collinsoniae* Dearn. & House, Bull. New York State Mus. Nat. Hist. 233–234: 36. 1921.

Specimen examined: **Japan**, Osawa river, Komukai, Miyagi, from *Vitis coignetiae* (Vitaceae), 27 Sep. 2003, Y. Takahashi, CBS 120227 = JCM 13073 = MAFF 239583.

**Plenodomus confertus** (Niessl ex Sacc.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564730.

Basionym: *Leptosphaeria conferta* Niessl ex Sacc., Syll. Fung. 2: 20. 1883.

≡ *Phoma conferta* P. Syd. ex Died., Krypt.-fl. Brandenburg 9: 142. 1912.

Specimen examined: **Spain**, Cais do Tejo, from dead stem of *Anacystis radiatus* (Asteraceae), Mar. 1961, M.T. Lucas, CBS 375.64.

**Plenodomus congestus** (M.T. Lucas) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564731.

Basionym: *Leptosphaeria congesta* M.T. Lucas, Trans. Brit. Mycol. Soc. 46: 362. 1963.

≡ *Phoma congesta* Boerema, Gruyter & Kesteren, Persoonia 15: 461. 1994.

Specimen examined: **Spain**, Póvoa de Santa Iria, Estremadura, from stem of *Erigeron canadensis* (Asteraceae), Mar. 1961, M.T. Lucas, holotype of *Leptosphaeria congesta* M.T. Lucas, dried culture LISE 1638, culture ex-holotype CBS 244.64.

**Plenodomus enteroleucus** (Sacc.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564753.

Basionym: *Phoma enteroleuca* Sacc. var. *enteroleuca*, Michelia 1: 358. 1878.

Specimens examined: **France**, Alençon, from *Pyrus communis* (Rosaceae), 1878, C. C. Gillet, holotype of *Phoma enteroleuca* var. *enteroleuca*, Herb. Sacc. 19, PAD. **Germany**, Monheim, from leaf spots of *Triticum aestivum* (Poaceae), 15 Aug. 1884, M. Hossfeld, CBS H-3684, culture CBS 831.84. **Netherlands**, Bennekom, from discoloured wood of *Catalpa bignonioides* (Bignoniaceae), 1981, G.H. Boerema, epitype designated here CBS H-16209, culture ex-epitype CBS 142.84 = PD 81/654 = CECT 20063.
Plenodomus fallaciosus (Berl.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564732. 
Basionym: Leptosphaeria fallaciosa Berl., Bull. Soc. Mycol. France. 5: 43. 1889.
Specimen examined: France, Var, Ste. Baume, from Satureia montana (Lamiaceae), July 1951, E. Müller, CBS 414.62 = ETH 2961.

Plenodomus hendersoniæ (Fückel) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564754. 
Basionym: Cucurbitaria hendersoniæ Fückel, Symb. Myc. p. 172. 1870.
≡ Melanomma hendersoniæ (Fückel) Sacc., Syll. Fung. 2: 109. 1883.
≡ Chiajæa hendersoniæ (Fückel) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1. 129. 1920.
≡ Leptosphaeria hendersoniæ (Fückel) L. Holm, Symb. Bot. Upsala. 14: 26. 1957.
≡ Phoma intricans M.B. Schwarz, Meded. Phytopath. Lab. Willie Commelin Schoten 8: 44. 1922.
Specimens examined: SWEDEN, Uppland, Gröna strand, from Seseli libanotis (Apiaceae), 19 May 1992, J. de Gruyter, CBS 248.92 = PD 79/141.

Plenodomus influentes (Boerema & Loer.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564755. 
Basionym: Phoma entereoleuca var. influentes Boerema & Loer., Trans. Brit. Mycol. Soc. 84: 290. 1985.
Specimens examined: NETHERLANDS, from Lilium sp. (Liliaceae), 1973, G.H. Boerema, PD 73/1382; Emmeloord, from Fraxinus excelsior (Oleaceae), 1978, J.C. Janse. holotype of Phoma entereoleuca var. influentes, CBS H-16208, culture ex holotype CBS 143.84 = PD 78/883 = CECT 20064.

Note: The isolate PD 73/1382 is no longer available for study.

Plenodomus libanotidis (Fückel) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564756. 
Basionym: Pleospora libanotidis Fückel, Jahrb. Nassauischen Vereins Naturk. 27–28: 24. 1873 (as "libanotis").
≡ Leptosphaeria libanotidis (Fückel) Sacc., Syll. Fung. 2: 16. 1883 (as "libanotis").
≡ Phoma sanguinolenta Rostr., Tidsskr. Landokon. 5(7): 384. 1888 (not Phoma sanguinolenta Grove, J. Bot. 23: 164. 1885).
≡ Phoma rostrupii Sacc., Syll. Fung. 19: 490. 1895, nom. nov.
Specimen examined: SWEDEN, Uppland, Gröna strand, from Seseli libanotis (Apiaceae), 19 May 1987, K. & L. Holm, CBS 113795 = UPSC 2219.

Plenodomus lingustii (Frezzi) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564757. 
Basionym: Leptosphaeria lingustii Frezzi, Revista Invest. Agropec., Sér. 5: 5: 79. 1968.
≡ Phoma macdonaldii Boerema, Persoonia 6: 20. 1970.
Specimens examined: CANADA, from Helianthus annuus (Asteraceae), 1967, W.C. McDonald, CBS 381.67. Former Yugoslavia, from stem of Helianthus annuus, 1977, A. Marc, CBS 386.80 = PD 77/336.

Note: Strain CBS 381.67 is ex-holotype of Phoma macdonaldii Boerema, pycnidial state of Leptosphaeria lingustii Frezzi (Boerema 1970).

Plenodomus lingam (Tode : Fr.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1. 120: 463. 1911.
Basionym: Sphaeria lingam Tode : Fr., Fungi mecklenb. 2: 51. 1791.: Fr., Syst. Mycol. 2: 507. 1823.
≡ Phoma lingam (Tode : Fr.) Desm., Ann. Sci. Nat., Bot. Ser. 3, 11: 281. 1849.
≡ Sphaeria maculans Desm., Ann. Sci. Nat., Bot. Ser. 3, 6: 77. 1846, nom. illeg.
≡ Leptosphaeria maculans (Desm.) Ces. & De Not., Comment. Soc. Crittog. Ital. 1: 235. 1863.
≡ Plenodomus rabenhorstii Preuss, Linnaea 24: 145. 1851, nom. dub.
Specimens examined: NETHERLANDS, near Goes, from Brassica oleracea (Brassicaceae), 1978, M.M.J. Dorenbosch, CBS 260.94 = PD 78/989. Origin unknown, Mar. 1924, A. Weber, CBS 147.24. UK, from Brassica sp. (Brassicaceae), 1963, B.C. Sutton, CBS 275.63 = MUCL 9901 = UPSF 1025.

Notes: The combination Plen. lingam as published by van Höhnel (1911) was preferred over Plen. rabenhorstii Preuss (1851) by Boerema & van Kesteren (1964) because the type material of Plen. rabenhorstii had been lost during the Second World War. Therefore, Plen. rabenhorstii is indicated here as a nomen dubium. Leptosphaeria maculans causes a serious stem base canker (blackleg) on cultivated Brassica spp. (Brassicaceae) in Europe, Australia and North America (West et al. 2001, Fitt et al. 2006).

Plenodomus lupini (Ellis & Everh.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564758. 
Basionym: Phoma lupini Ellis & Everh., Bull. Washburn Lab. Nat. Hist. 1: 6. 1884.
≡ Asteromella lupini (Ellis & Everh.) Petr., Sydowia 9: 495. 1955 (not Phoma lupini N.F. Buchw., Møller, Fungi Faeröes 2: 153. 1958, nom. illeg).
Specimen examined: PERU, Andes region, from stem lesion of Lupinus mutabilis (Fabaceae), May 1992, J. de Gruyter, CBS 248.92 = PD 79/141.

Plenodomus pimpinelliae (Lowen & Sivan.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564759. 
Basionym: Leptosphaeria pimpinelliae Lowen & Sivan., Mycotaxon 35: 205. 1989.
≡ Phoma pimpinelliae Boerema & Gruyter, Persoonia 17: 278. 1999.

Plenodomus trachephiilus (Petri) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564760. 
Basionym: Deuterophoma trachephiila Petri, Boll. Staz. Patol. Veg. Roma 9: 396. 1929.
≡ Bakerophoma trachephiila (Petri) Cif., Ist. Bot. Reale Univ. Reale Lab. Crittog. Pavia Atti Ser. 5, 5: 307. 1946.
≡ Phoma trachephiila (Petri) L.A. Kantsch. & Gikaschvili, Trudy Inst. Zasch. Rast. Tibilisi 5: 20. 1948.
Specimens examined: ISRAEL, from Citrus limonium (Rutaceae), Oct. 1993, J. de Gruyter, CBS 551.93 = PD 81/782. ITALY, from Citrus sp. (Rutaceae), CBS 127250 = PD 09/04597141.

Note: The species produces a phialophora-like synanamorph.

Plenodomus visci (Moesz) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564761. 
Basionym: Plectophomella visci Moesz, Magyar Bot. Lapok 21: 13. 1922.
≡ Apocytophthora visci Höhn., Mitt. Bot. Lab. TH Wien 1: 43. 1924.
Notes: Plectophomella visci is the type species of the genus Plectophomella. This genus was accepted by Sutton (1980) based on the eustromatic conidiomata; branched, septate conidiophores, phialidic conidiogenesis and small, hyaline conidia. However, the phylogenetic analyses clearly demonstrated the placement of Plectophomella grouping in the Plenodomus clade and therefore it is treated as a synonym.

Plenodomus wasabiae (Yokogi) J.F. White & P.V. Reddy, Canad. J. Bot. 76: 1920. 1999 (1998).

Basionym: Phoma wasabiae Yokogi, Ann. Phytopathol. Soc. Japan 2: 549. 1933.

Specimens examined: Taiwan, from Wasabia japonica (syn. Eutrema wasabai) (Brassicaceae), A. Rossman, CBS 120119 = FAU 559; from Wasabia japonica, A. Rossman, CBS 120120 = FAU 561.

Subplenodomus Gruyter, Verkley & Crous, gen. nov. MycoBank MB564769.

Etymology: Although the genus resembles Plenodomus in the production of thick-walled pycnidia, the pycnidial cell wall of Subplenodomus often remains pseudoparenchymatous, similar to the pycnidial wall of species of Phoma.

Conidiomata pycnidial, globose to papillate, or with an elongated neck, solitary or aggregated, thin-walled pseudoparenchymatous, or thick-walled scleroplectenchymatous, ostiolate, unicellular. Conidigenous cells phialidic, ampulliform to doliform. Conidia hyaline, aseptate, ellipsoid to cylindrical. Chlamydospores sometimes produced, olivaceous, unicellular in chains, or multicellular, dictyosporous, botryoidal or forming pseudosclerotoid structures.

Type species: Subplenodomus violicola (P. Syd.) Gruyter, Aveskamp & Verkley (see below)

Subplenodomus apiicola (Kleb.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564770.

Basionym: Phoma apiicola Kleb., Z. Pflanzenkrankh. 20: 22. 1910.

Specimens examined: Germany, from tuber of Apium graveolens var. rapaceum (Apiaceae), Feb. 1972, Diercks, culture CBS 630.68 = PD 68/141; Elburg, from stem base of Valeriana officinalis, 1991, Quercus robur (Fagaceae), 1997. Phoma apiicola: 1898. 115. 1957.

Subplenodomus drobnjancensis (Bubák) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564771.

Basionym: Phoma drobnjancensis Bubák, Bot. Közlem. 14: 63. 1915

= Pyrenochaeta gentianae Chevassut, Bull. Soc. Mycol. France. 81: 36. 1965.

Specimens examined: Netherlands, from stem base of Gentiana makinoi “Royal Blue” (Gentianaceae), 1983, M.M.J. Dorenbosch, CBS 270.92 = PD 83/650; Naaldwijk, from red-brown root of Eustoma exaltatum (Gentianaceae), 1988, M.M.J. Dorenbosch, CBS 269.92 = PD 88/696.

Subplenodomus valerianae (Henn.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564772.

Basionym: Phoma valerianae Henn., Nyt Mag. Naturvidensk. 42: 29. 1904.

= Phyllosticta valerianae-tripteris f. minor Unamuno, Mem. Real Soc. Esp. Hist. Nat. 15: 348. 1929.

Specimens examined: Netherlands, from leaf spot in Valeriana phu (Valerianaceae), Sep. 1968, G.H. Boerema, CBS 124140 = IMI 217262, CBS 124143 = IMI 217261.

Subplenodomus violicola (P. Syd.) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564774.

Basionym: Phoma violicola P. Syd., Beibl. Hedwigia 38: 137. 1899.

= Phyllosticta violae f. violae-hirtae Allesch. Rabenh.-Fl., Ed. 2, Pflze 6: 156. 1898.

= Phoma violae-tricolaris Died., Ann. Mycol. 2: 179. 1904.

= Phyllosticta violae f. violae-sylvaticae Gonz. Frag., Trab. Mus. Nac. Ci. Nat., Ser. Bot. 7: 35. 1914.

Specimens examined: Netherlands, from leaf spot in Viola tricolor, 10 Mar. 1968, H.A. van der Aa, CBS 306.68. New Zealand, Auckland, Henderson, from leaf spot in Viola tricolor (Violaeeae), 1997, J. Jury, CBS 100272.

Coniothyriaceae W.B. Cooke. Revista Biol. (Lisbon) 12: 289. 1983.

Coniothyrium carteri (Gruyter & Boerema) Verkley & Gruyter, comb. nov. MycoBank MB564775.

Basionym: Phoma carteri Gruyter & Boerema, Persoonia 17(4): 547. 2002 (“2001”), nom. nov.

Replaced synonym: Pyrenochaeta minuta J.C. Carter, Bull. Illinois Nat. Hist. Surv. 21: 214. 1941 [not Phoma minuta Wehm., Mycologia 38: 316. 1946, nor Phoma minuta Acalde, Anales Inst. Bot. Cavanilles 10: 235. 1952; not Coniothyrium minutum (Berl.) O. Kuntze, Revis. Gen. Pl. 3: 459. 1898 = Phoma cava, syn. of Pyrenochaeta cava, not Coniothyrium minutum (Died) Petr. & Syd., Feddes Repert. Spec. Nov. Regni Veg. Beih. 42: 349. 1927].

Specimens examined: Germany, isolated from Quercus robur (Fagaceae), 1991, CBS 105.91. Netherlands, from shoot of Quercus sp. (Fagaceae), 1984, M.M.J. Dorenbosch, CBS 101633 = PD 84/74.

Coniothyrium dolichii (Mohanty) Verkley & Gruyter, comb. nov. MycoBank MB564776.

Basionym: Pyrenochaeta dolichii Mohanty, Indian Phytopathol. 11: 85. 1958.

Specimens examined: India, Nani Tal, Saribuan, from leafspot of Dolichos bifurcus (Fabaceae), 20 Oct. 1955, N.N. Mohandy, CBS 124140 = IMI 217262, CBS 124143 = IMI 217261.

Notes: A synanamorph was noted and described as a Coniosporium state based on the dark brown to black, dictyosporous conidia (Mohanty 1958). This synanamorph was considered later as monodiclys-like (Grodena et al. 1997).

Coniothyrium glycines (R.B. Stewart) Verkley & Gruyter, comb. nov. MycoBank MB564777.

Basionym: Pyrenochaeta glycines R.B. Stewart, Mycologia 49: 115. 1957.

≡ Phoma glycinescica Gruyter & Boerema, Persoonia 17: 554. 2002 (“2001”), nom. nov., nom. inval. (not Phoma glycines Sawada, Special. Coll. Agric., Natl. Taiwan Univ. 8: 129. 1959, nom. inval.) = Phoma glycines Sawada ex J.K. Bai & G.Z. Li, Pit Fun gumori Sin. 15: 33. 2003.

Specimens examined: Zambia, on Mt. Makulu, from leaf of Glycine max (Fabaceae), Mar. 1985, J.M. Waller, CBS 124455 = IMI 294966. Zimbabwe, from a leaf of Glycine max (Fabaceae), 2001, C. Lavy, CBS 124114 = PG1.
Coniothyrium multiporum (V.H. Pawar, P.N. Mathur & Thirum.) Verkley & Gruyter, comb. nov. MycoBank MB564778.
Basionym: Phoma multipora V.H. Pawar, P.N. Mathur & Thirum., Trans. Brit. Mycol. Soc. 50: 260. 1967.
≡ Phoma multipora V.H. Pawar & Thirum., Nova Hedwigia 12: 501. 1966, nom. nud.

Specimens examined: Egypt, CBS 501.91 = PD 83/888. India, Bombay, Bandra, from saline soil, 15 Jan. 1958, M.J. Thirumalachar, culture CBS 445.81 = PDDCC 7049 = PD 80/1254; Poaceae, 1980, P.R. Johnston, isotype CBS H-7625, CBS H-7626, perennial, from leaf of Glycine max, Zimbabwe, Jan. 1971, CBS H-16567, culture CBS 188.71; Chenopodiaceae, from leaf of Atriplex hastata, netherlands, Zoutelande, from a dead petiole of Chenopodium quinoa, Bolivia, isolated from leaf spots in Atriplex hastata (Chenopodiaceae), 20 July 1977, G.H. Boerema, CBS H-89410 = PD 77/113.

Coniothyrium palmarum Corda, Icon. Fungorum. (Corda) 4: 38. 1840.
≡ Oïelliosporium palmarum (Corda) Kuntze, Revis. Gen. Pl. 3: 458. 1898.
≡ Microdiplodia palmarum (Corda) Died., Ann. Mycolog. 11: 47. 1913.

Specimens examined: Italy, Sardegna, near Dorgali, from a dead petiole of Chamaerops humilis (Arecaceae), Aug. 1970, W. Gams, CBS H-16492, culture CBS 343.78. Greece, Mycon, from leaf of Glycine max, Oulu, from mineral wool between walls, Dec. 1996, K. Poldmaa, CBS 855.97. Zimbabwe, from leaf of Glycine max (Fabaceae), CBS 101636 = PD 80/1168.

Coniothyrium telephii (Allesch.) Verkley & Gruyter, comb. nov. MycoBank MB564779.
Basionym: Pyrenochea telephii Allesch., Ber. bayer. bot. Ges. 4: 33. 1896.
≡ Phoma septicaequalis Boerema, Versl. Meded. Plantenziektek. Dienst Wageningen 153 (Jaarb. 1978); 20: 1979, nom. nov. isotype Phoma telephii (Vestergr.) Kesteren, Netherlands J. Pl. Pathol. 78: 117. 1972.

Specimens examined: Finland, Helsinki, Asko Kahanpää, obtained from air, Jan. 1971, CBS H-16567, culture CBS 188.71; Oulu, from mineral wool between walls, Dec. 1996, K. Poldmaa, CBS 855.97. Zimbabwe, from leaf of Glycine max (Fabaceae), CBS 101636 = PD 80/1168.

Cucurbitariaceae G. Winter, Rabenh., Krypt.-Fl., Ed 2, 308. 1885.

Neophaeosphaeria filamentosa (Ellis & Everh.) Câmara, M.E. Palm & A.W. Ramaley, Mycol. Res. 107: 519. 2003.
Basionym: Leptosphaeria filamentosa Ellis & Everh., J. Mycol. 4: 76. 1888.
≡ Paraphaeosphaeria filamentosa (Ellis & Everh.) M.E. Barr, Mycotaxon 43: 392. 1992.

Specimen examined: Mexico, from Yuca rostrata (Asparagaceae), Stevens, CBS 102202 = BPI 802755.

Pyrenocheatosis pratorum (P.R. Johnst. & Boerema) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564780.
Basionym: Phoma pratorum P.R. Johnst. & Boerema, New Zealand J. Bot. 19: 395. 1981.

Specimens examined: New Zealand, Rakura, near Hamilton, from a leaf of Lolium perenne (Poaceae), 1980, P.R. Johnston, isotype CBS H-7626, CBS H-7626, culture CBS 445.81 = PDDCC 7049 = PD 80/1254; Dactylis glomerata (Poaceae), 1980, CBS 286.93 = PD 80/1252.

Pleosporaceae Nitschke, Verh. Naturhist. Vereines Preuss. Rheinl. 26: 74. 1869.

Pleospora angustis Gruyter & Verkley, nom. nov. MycoBank MB564781.
≡ Leptosphaeria clavata A.L. Guyot, Revue Mycol. (Paris) 11: 62. 1946.
≡ Massariosphaena clavata (A.L. Guyot) Shoemaker & C.E. Babc., Canad. J. Bot. 67: 1582.1989; not Pleospora clavata Gučević ("as clavatis"), Novosti Sist. Nizsh. Rast. 7: 168. 1970.

Specimen examined: Switzerland, 1951, E. Müller, CBS 296.51.

Notes: The origin of the isolate deposited by E. Müller is unknown; however, it is likely that the isolate was obtained from Poaceae, Triticum vulgare or Dactylis glomerata (Müller 1950). Pleospora clavata Gučević was obtained from Lonicera alseuosmoids and refers to a different species.

Pleospora betae (Berl.) Nevod., Grib. ross. Exs., No. 247. 1915.
Basionym: Pyrenophora echinella var. betae Berl. Nuovo Giorn. Bot. Ital. 20: 208. 1888.
≡ Pleospora betae Björk., Bot. Not. 1944: 218. 1944. (later homonym), nom. illeg.
≡ Pleospora bjoerlingii Byford, Trans. Brit. Mycol. Soc. 46: 614. 1963, nom. nov.
≡ Phoma betae A.B. Frank, Z. Rübenzucker-Ind., 42: 904, tab. 20. 1982.
≡ Phyllosticta betae Oudem., Ned. Kruidk. Arch. Ser. 2: 2. 181. 1877.
≡ Gloeosporium betae Deam. & E.T. Barthol., Mycologia 9: 356. 1917.

Specimens examined: Netherlands, Wageningen, from Beta vulgaris (Chenopodiaceae), Sep. 1966, M.J.J. Dorenbosch, CBS H-16156, culture CBS 523.66 = IHEM 3915 = PD 60/270; from Beta vulgaris, 1977, G.H. Boerema, CBS 109410 = PD 77/113.

Note: The name Phoma betae A.B. Frank has been conserved against Phyllosticta tabifica and any combination based on that name (Shoemaker & Redhead 1999).

Pleospora calveccens (Fr.) Tul. & C. Tul., Selecta Fung. Carpol. (Paris) 2: 266. 1863.
Basionym: Sphaeria calveccens Fr., Ann. Sci. Nat., Bot. Ser. 2, 19: 353. 1843.
≡ Leptosphaeria calveccens (Fr.) Sacc., Syll. fung. 2: 24. 1883.
≡ Pyrenophora calveccens (Fr.) Sacc., Syll. fung. 2: 279. 1883.
≡ Chaetodiopodia calveccens (Fr.) K. Stuntz, Hedwigia 23: 62. 1884.
≡ Ascochyta calveccens (K. Karst.) v.d. Aa & Kesteren, Persoonia 10: 271. 1979.
≡ Microdiplodia henningsii Stuntz, Hedwigia 53: 163. 1913.

Specimens examined: Germany, Munkmarsch, from leaf spots in Atriplex hastata (Chenopodiaceae), 20 July 1977, G.H. Boerema, CBS H-9890, culture CBS 246.79 = PD 77/655. Netherlands, Texel, from dead stem of Atriplex hastata, June 1978, H.A. van der Aa, CBS H-8976, culture CBS 343.78.

Note: For additional synonyms see Boerema et al. (1993).

Pleospora chenopodioidis Ellis & Kellerman, Mycol. J. 4: 26. 1888.
≡ Diplodia hyalocephala Cooke & Ellis, Grevillea 7: 5. 1878 (not Pleospora hyalocephala Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia, 242. 1890).
≡ Ascochyta hyalocephala (Cooke & Ellis) Boerema, S.B. Mathur & Neerg., Netherlands J. Pl. Pathol. 83: 156. 1977.
≡ Diplodia ellisii Sacc., Syll Fung. 3: 417. 1884.

Specimens examined: Bolivia, isolated from Chenopodium quinoa (Chenopodiaceae), 1974, S.B. Mathur, CBS H-9051, CBS H-9052, culture CBS 206.80 = PD 74/1022. Netherlands, Zoutelande, from Atriplex hastata (Chenopodiaceae), Aug. 1969, H.A. van Kesteren, CBS 344.78 = PD 68/692.

Note: Isolate CBS 344.78 was originally identified as Ascochyta calveccana but was identical to Pleospora chenopodioidis in the present study.
**Phoma sections Plenodomus, Pilosa**

**Pleospora fallens** (Sacc.) Gruyter & Verkley, *comb. nov.*

MycoBank MB564782.

*Basionym: Phoma fallens Sacc., Syll. Fung. 10: 146. 1892.*

≡ *Phyllosticta glaucispora Delacr., Bull. Soc. Mycol. France 5: 266. 1893.*

≡ *Phoma glaucispora (Delacr.) Noordel. & Boerema, Verh. Bot. Vereins Prov. Schleswig-Holstein 14: 29. 1907 (not 1880).*

≡ *Microsphaeropsis fuckelii (Sacc.) Boerema, 2003, Persoonia 18: 160. 2004.*

Specimens examined: *Italy*, Capri, Villa Jovis, from a leaf spot of *Nerium oleander* (Apocynaceae), CBS H-16539, culture CBS 284.70 = PD 97/2400. *New Zealand*, Levin, from leaf spot of *Olea europaea* (Oleaceae), 1978, G.F. Laundon, CBS 161.78 = LEV 1131.

Specimens examined: *Romania*, Bucuresti, isolated from water, 1980, K. Fodor, CBS H-1418, holotype of *Pleospora flavigena Constantinou & Aa*, culture ex-holotype CBS 314.80 = PD 91/1613.

**Pleospora flavigena** (Constantinou & Aa) Gruyter & Verkley, *comb. nov.* MycoBank MB564783.

*Basionym: Phoma flavigena Constantinou & Aa, Trans. Brit. Mycol. Soc. 79: 343. 1982.*

Specimen examined: *Romania*, Bucuresti, isolated from water, 1980, K. Fodor, CBS H-1418, holotype of *Pleospora flavigena Constantinou & Aa*, culture ex-holotype CBS 314.80 = PD 91/1613.

**Pleospora halimiones** Gruyter & Verkley, *nom. nov.*

MycoBank MB564784.

≡ *Diplodia obiones Jaap* (as “obionis”), Verh. Bot. Vereins Prov. Brandenburg 47: 96. 1905 (not *Pleospora obiones P. Crouan & H. Crouan, Fl. Finistère*: 22. 1867).

≡ *Ascochyta obiones (Jaap)* P.K. Buchanan, Mycol. Pap. 156: 28. 1987.

≡ *Coniothyrium obiones Jaap* (as “obionis”), Schriften Naturwiss. Vereins Schleswig-Holstein 14: 25. 1907.

Specimens examined: *Netherlands*, Texel, from leaf spots in *Halimione portulacoides* (Chenopodiaceae), 27 Oct. 1968, H.A. van der Aa, CBS H-9127, CBS H-9125, culture CBS 432.77 = IMI 262137.

**Pleospora herbarum** (Pers.) Rabenh., *Bot. Zeitung* (Berlin) 15: 428. 1857; Klotzschii Herb. Viv. Mycol. 2: no. 547 (1854.).

*Basionym: Sphaeria herbarum Pers., Syn. Meth. Fung. 1: 78. 1801.*

≡ *Stemphylium herbarum* E.G. Simmons, Syn. Meth. Fung. 1: 291. 1896 (1965).

Specimen examined: *India*, Uttar Pradesh, from a dead stem of *Typha angustifolia* (Typhaceae), 1969, W. Gams, CBS H-16597, culture CBS 132.69; Staverden, from dead stems of *Typha sp.*, 24 June 1972, G.S. de Hoog, CBS H-16598, culture CBS 602.72.

**Pleospora incompta** (Sacc. & Martelli) Gruyter & Verkley, *comb. nov.* MycoBank MB564785.

*Basionym: Phoma incompta Sacc. & Martelli, Syll. Fung. 10: 146. 1892.*

Specimens examined: *Greece*, Crete, from branch of *Olea europaea* (Oleaceae), 1976, N. Malathrakis, CBS H-16394, culture CBS 467.76. *Italy*, from branch of *Olea europaea*, Mar. 1982, CBS H-16392, culture CBS 526.92.

**Pleospora tychicola** ( Cooke) Sacc., *Syll. Fung. 2: 264. 1883.*

*Basionym: Sphaeria tychicola Cooke, Grevillea 5: 121. 1877.*

≡ *Clathnospora tychicola* ( Cooke) Höhnn., Ann. Mycol. 16: 88. 1918.

≡ *Pyrenophora tychicola* ( Cooke) E. Müll., Sydowia 5: 256. 1951.

≡ *Macrospora tychicola* ( Cooke) Shoemaker & C.E. Babcock, Canad. J. Bot. 70: 1644. 1992.

≡ *Phyllosticta tychina* Sacc. & Mâbl., Sacc., Michelia 2: 88. 1880.

≡ *Phoma tychina* (Sacc. & Mâbl.; van der Aa & Vanev, A revision of the species described in *Phyllosticta* 468. 2002.

≡ *Phoma tycharum* Sacc., Syll. Fung. 3: 163. 1884.

Specimens examined: *Netherlands*, Texel, from dead leaves of *Typha angustifolia* (Typhaceae), 1969, W. Gams, CBS H-16597, culture CBS 132.69; Staverden, from leaf spots of *Typha sp.*, 24 June 1972, G.S. de Hoog, CBS H-16598, culture CBS 602.72.

**Phoma-like anamorphs excluded from the suborder Pleosporineae**

**Montagnulaceae** M.E. Barr, Mycotaxon 77: 194. 2001.

**Paraconiothyrium** Verkley, Stud. Mycol. 50: 327. 2004.

Type species: *Paraconiothyrium estuarinum* Verkley & M. da Silva, Stud. Mycol. 50: 327. 2004.

**Paraconiothyrium flavescens** (Gruyter, Noordel. & Boerema) Verkley & Gruyter, *comb. nov.* MycoBank MB564786.

*Basionym: Phoma flavescens Gruyter, Noordel. & Boerema, Persoonia 15(3): 375. 1993.*

Specimen examined: *Netherlands*, Nagele, from soil, rhizosphere of *Solanum tuberosum* (Solanaceae), CBS 178.93 = PD 82/1062.

**Paraconiothyrium fuckelii** (Sacc.) Verkley & Gruyter, *comb. nov.* MycoBank MB564787.

*Basionym: Coniothyrium fuckelii Sacc., Nuovo Giorn. Bot. Ital. 8: 200. 1876; Michelia 1: 207. 1878.

≡ *Clerosporium fuckelii* (Sacc.) Kurtze, Revis. Gen. Pl. 3: 458. 1898.

≡ *Microsphaeropsis fuckelii* (Sacc.) Boerema, 2003, Persoonia 18: 160. 2003.

Specimen examined: *Denmark*, Geelaskov, from a dead stem of *Rubus sp.* (Rosaceae), 1995, A.M. Dahl-Jensen, CBS 797.95.

**Notes:** Coniothyrium fuckelli var. sporulosus has been redisposed as *Paraconiothyrium sporulosum* (Verkley et al. 2004) and it is clearly different from *Paraconiothyrium fuckelii* (Damm et al. 2008).

**Paraconiothyrium fusco-maculans** (Sacc.) Verkley & Gruyter, *comb. nov.* MycoBank MB564788.

*Basionym: Phoma fusco-maculans Sacc., Michelia 2: 275. 1881.

≡ *Plenodomus fusco-maculans* (Sacc.) Coons, J. Agric. Res. 5: 714. 1916.

Specimens examined: *Italy*, Selva, from decorticated wood of *Malus pumila* (Rosaceae), Oct. 1980, PAD, holotype of *Phoma fusco-maculans* Sacc. USA, from wood of *Malus sp.* (Rosaceae), July 1916, G.H. Coons, epiotype designated here CBS H-20825, culture ex-epitype CBS 116.16.

**Notes:** *Plenodomus fusco-maculans* was discussed by Boerema & Loerakker (1985) and de Gruyter et al. (2010). The holotype of the basionym *Aposphaeria fusco-maculans* was studied and considered to be *Aposphaeria pulviscula* (Boerema et al. 1996). However, the description of *A. fusco-maculans* given by Boerema et al. (1996) fits the generic concept of *Paraconiothyrium*, in congruence with the molecular phylogeny of the culture CBS 116.16.
**Paraconiothyrium lini** (Pass.) Verkley & Gruyter, **comb. nov.** MycoBank MB564789.
*Basionym: Phoma lini* Pass., Diagn. Funghi Nuovi 4, No. 81. 1890.

Specimen examined: **Netherlands**, from Wisconsin tank, 1970, CBS 253.92 = PD 70/998.

**Paraconiothyrium maculicutis** Verkley & Gruyter, **sp. nov.** MycoBank MB564796. Fig. 6.

*Etymology:* Latin, *cutis* = skin; *maculae* = spots.

**Pycnidia in vitro** 50–125 μm diam, globose to subglobose, glabrous or with mycelial outgrowth, scattered, non-ostiolate or ostiolate, pycnidial wall made up of 5–7 layers of cells. **Conidiogenous cells** 1.5–3 × 0.5–2.5 μm, indeterminate or ampulliform to filiform in a later state, up to 10 μm in length. **Conidia** 1.5–2.5 × 0.5–1.5 μm, ellipsoidal, initially hyaline, then discoulering to olivaceous. **Chlamydospores** absent. **NaOH spot test:** negative. **Crystals** absent.

**Specimen examined:** **USA**, Texas; San Antonio, Fort Sam Houston, from human, cutaneous lesions, 1989, D.P. Dooley, **holotype** CBS H-20824, culture ex-holotype CBS 101461 = IMI 320754 = UTHSC 87-144.

**Notes:** Isolate CBS 101461 was identified as *Pleurophoma pleurospora* (Dooly *et al*. 1989). However, *in vitro* data and the molecular phylogeny demonstrate that this isolate does not belong to *Pleurophoma pleurospora*, see below, and therefore is described as a new species in the genus *Paraconiothyrium*.

**Paraconiothyrium minitans** (W.A. Campb.) Verkley, Stud. Mycol. 50: 332. 2004.
*Basionym: Coniothyrium minitans* W.A. Campb., Mycologia 39: 191. 1947.

**Specimens examined:** **Netherlands**, Boskoop, from stem of Clematis sp. (Ranunculaceae), 1999, J. de Gruyter, CBS 122786 = PD 99/1084-1, **UK**, CBS 122788 = PD 07/0346739.

**Paraconiothyrium tiliae** (F. Rudolphi) Verkley & Gruyter, **comb. nov.** MycoBank MB564790.
*Basionym: Asteroma tiliae* F. Rudolphi, Linnaea 4: 514. 1829.
Phoma sections Plenodomus, Pilosa

≡ Asteromella tiliae (F. Rudolphi) Butin & Kehr, Mycol. Res. 99: 1193. 1995, nom. inval., Art. 33.4.

Specimen examined: Austria, Amlach, from a leaf of Tilia platyphyllos (Tiliaceae), 10 Sep. 1993, H. Butin, neotype IMI 362854, lectotype designated here CBS H-20826, culture ex-lectotype CBS 265.94.

Description in vitro: Colonies on OA 14–18 mm diam after 7 d (18–28 mm after 14 d), margin entire to undulate; colony greenish olivaceous/olivaceous to rosy-buff and sepia, with white, fely aerial mycelium; reverse olivaceous grey to greenish olivaceous/olivaceous. Colonies on MEA 11–16 mm diam after 7 d (19–29 mm after 14 d), colony margin undulate; colony pale olivaceous grey/olivaceous grey to dark mouse-grey with rosy-buff tinges, with white, floccose, compact aerial mycelium, reverse umber/brown olivaceous to olivaceous/olivaceous black. Pycnidia globose to subglobose, olivaceous to olivaceous black, abundant, scattered, mainly on the agar, 30–120 μm diam, solitary or aggregated, covered by mycelial outgrowths or setae-like hyphae, up to 50 μm, non-papillated, without or with ostiole, walls made up of 2–5 layers of cells, outer layer(s) pigmented; conidial exude not observed.

Conidiogenous cells of two types; ampulliform to doliiform, 4–6.5 × 2–5.5 μm, or filiform, septate, branched, acropleurogenous, up to 60 μm long. Conidia 3.5–5.5 × 1.5–2.5 μm, av. 4.5 × 2 μm, length/width ratio = 1.5–3, av. 2.1, cylindrical to oblong, without or with some minute, polar oriented guttules. Chlamydospores absent. NaOH spot test: a weak reddish discolouring may occur on MA, not specific. Crystals absent.

Specimens examined: France, Perpignan, from leaf of Laurus nobilis (Lauraceae), PAD, holotype of Dendrophoma pleurospora Sacc. Netherlands, from wood of Lonicera sp. (Caprifoliaceae), lectotype designated here CBS H-20626, culture ex-lectotype CBS 130329 = PD 82/371; Molenhoek, Heumense Schans, from twig lesions of Cytisus scoparius (Fabaceae), 23 Aug. 2004, G. Verkley & M. Starink, CBS 116668.

Notes: A specimen derived from isolate CBS 130329 is assigned here as lectotype of Pleurophoma pleurospora, the type species of the genus (von Höhnel 1914). The species is known from branches and bare wood of trees and shrubs (Sutton 1980, Boerema et al. 1996) and the isolate from Cytisus scoparius demonstrates that the species also may occur on green twigs. The isolates showed two types of conidiogenesis characteristic for the genus Pleurophoma; phoma-like, ampulliform to doliiform conidiogenous cells, as well as pyrenochaeta-like branched, filiform, septe, acropleurogenous. As a result, species of the genus Pleurophoma can easily be confused with taxa classified in the genera Phoma, Paraphoma, Pyrenochaeta and Pyrenoectopsis.
Paraphaeosphaeria michotii (Westend.) O.E. Erikss., Arkiv för Botanik 6: 406. 1967.  
Basionym: Sphaeria michotii Westend., Bull. Acad. Roy. Sci. Belgique Ser. 2, 7: 87. 1859. 
Specimen examined: Switzerland, Kt. Obwalden, from Typha latifolia (Typhaceae), 18 May 1980; A. Leuchtmann, CBS 652.86 = ETH 9483.

Massarinaceae Munk, Friesia 5: 305. 1956.

Byssothecium circinans Fuckel, Bot. Zeitung (Berlin) 19: 251. 1861.  
≡ Leptosphaeria circinans (Fuckel) Sacc., Syll. Fung. 2: 88. 1883.  
≡ Passerinitella circinans (Fuckel) Sacc., Syll. Fung. 11: 326. 1895.  
≡ Trematosphaeria circinans (Fuckel) G. Winter, Rabenh. Krypt.-Fl., ed 1(2): 277. 1887.  
≡ Heptameria circinans (Fuckel) Cooke, Grevillea 18: 30. 1889.  
≡ Melanomma vindelicorum Rehm, Ber. Nat. Ver. Augsburg: 116. 1881.  
≡ Trematosphaeria vindelicorum (Rehm) Sacc., Syll. Fung. 2: 122. 1883.

Specimen examined: USA, South Dakota, from rotten crown of Medicago sativa (Fabaceae), G. Semeniuk, CBS 675.92 = ATCC 52767 = ATCC 52678 = IMI 266220.

Massarina eburnea (Tul. & C. Tul.) Sacc., Syll. Fung. 2: 153. 1883.  
Basionym: Massarina eburnea Tul. & C. Tul., Select. Fung. Carpol. (Paris) 2: 239. 1863.

Specimens examined: Switzerland, Zürich, from Fagus sylvatica (Fagaceae), S.K. Bose, CBS 473.64 = ETH 2945. UK, Wales, isolated from dead branch of Fagus sylvatica, HHUF 26621, JCM 14422 = H3953.

Neottiosporina paspali (G.F. Atk.) B. Sutton & Alcorn, Austral. J. Bot. 22: 519. 1974.  
Basionym: Stagonospora paspali G.F. Atk., Bull. Cornell Univ. (Science) 3: 33. 1897.

Specimen examined: USA, Florida, from Paspalum notatum (Poaceae), Oct. 1937, R.K. Voorhees, CBS 331.37.

Trematosphaeriaceae Suetrong et al. Cryptogamie Mycol. 32: 347. 2011.

Falciformispora lignatilis K.D. Hyde, Mycol. Res. 96: 27. 1992.

Specimen examined: Thailand, Pinnaun Ban Bang, from Elaeis guineensis (Areaceae), BCC 21118.

Medicopsis Gruyter, Verkley & Croux, gen. nov. MycoBank MB664791.

Etymology: refers to Medi- medica, Latin, -opsis, refers to, Greek. The description of the type species as the cause of a mycetoma suggests this is a human pathogen. However, the mycetoma described was secondary to a wound produced by a thorn of Palito blanco tree, and the species was found later on Hordeum vulgare.

Pycnidia solitary or confluent, on upper surface of the agar, globose to pyriform with elongated neck, setose, ostiolate, olivaceous to olivaceous-black, the wall with pseudoparenchymatous cells. Conidiogenous cells hyaline, phialidic, ampulliform to doliform, to elongated. Conidia sub-hyaline to yellowish, ellipsoid, aseptate, catenulate.

Type species: Medicopsis romeroi (Borelli) Gruyter, Verkley & Crous (see below).

Medicopsis romeroi (Borelli) Gruyter, Verkley & Crous, comb. nov. MycoBank MB564792.  
Basionym: Pyrenochea romeroi Borelli, Dermatol. Venez. 1: 326. 1959.

Specimens examined: Venezuela, from human, maduromycosis, no date, D. Borelli, UAMH 2892, holotype of Pyrenochea romeroi Borelli, culture ex-holotype CBS 252.60 = ATCC 13735 = PMC 151 = UAMH 10841. Country unknown, from Hordeum vulgare (Poaceae), 1984, M.M.J. Dorenbosch, CBS 122784 = PD 84/1022.

Notes: The species was described as a human pathogen of tropical origin, and it may cause suppulsive subcutaneous or deep nonmycetomatous infections, or a subcutaneous phaeohyphomycotic cyst (Badali et al. 2010). However, the species also occurs in plant material.

Trematosphaeria pertusa (Pers.) Fuckel, Jahrb. Nassauischen Vereins Naturk 23–24: 161. 1870.  
Basionym: Sphaeria pertusa Pers., Syn. Meth. Fung. 1: 83. 1801.

Specimen examined: France, Deux Sèvres, from bark of a dead stump of Fraxinus excelsior (Oleaceae), 25 Apr. 2004, Jacques Fournier, epitype IFRD 2002, culture ex-epitype CBS 122368.

Note: The epitype IFRD 2002 was designated by Zhang et al. (2008).

Lentitheciaceae Yin, Zhang, C.L. Schoch, J. Fourn., Crous & K.D. Hyde, Stud. Mycol. 64: 93. 2009.

Splanchnonema platani (Ces.) M.E. Barr, Mycotaxon 15: 364. 1982.  
Basionym: Sphaeria (Massaria) platani Ces., in Rabenhorst, Klotzschii Herb. Viv. Mycol.: no. 1842. 1854.

Specimen examined: USA, from Platanus occidentalis (Platanaceae), Jan. 1937, C.L. Shear, CBS 221.37.

Note: This taxon was shown by Zhang et al. (2012) to cluster basal to the Lentitheciaceae.

Melanomnataceae G. Winter, Rabenh. Krypt.-Fl., ed 1(2): 220 (1885) [as “Melanommeae”]  
Aposphaeria corallinolutea Gruyter, Aveskamp & Verkley, sp. nov. MycoBank MB664798. Fig. 8.

Etymology: The name refers to the coral coloured colony on OA, and the luteous exudate diffusing into the agar medium.

Pycnidia in vitro 65–215 μm diam, solitary or aggregated to confluent, globose to subglobose, ostiolate or non-ostiolate. Conidiogenous cells 7–9 × 2–4 μm, ampulliform to filiform. Conidia 3–5 × 1–2 μm, ellipsoidal to allantoid, eguttulate or with some small, polar guttules.

Description in vitro: Colonies on OA 13–15 mm diam after 14 d, margin entire to somewhat lobated; colony vinaceous to brick, with white at centre, ochraceous near margin due to a diffusible pigment, with
Phoma sections Plenodomus, Pilosa

Phoma sections Plenodomus, Pilosa

white, felty or poorly developed aerial mycelium; reverse cinnamon to brick. Colonies on MEA 15–20 mm diam after 14 d, margin entire to somewhat lobated; colony white with dull green and grey olivaceous sectors and primrose tinges, with white, felty aerial mycelium; reverse sepa to brown olivaceous, greenish grey at centre, white near margin. Pycnidia globose to subglobose, olivaceous to brick, then olivaceous black, solitary or aggregated, 65–215 μm diam, non-setose or with short setae-like outgrowths up to 25 μm long, with or without distinct ostiole, pycnidial wall consisting of 3–5 layers of cells. Conidiogenous cells 7–9 × 2–4 μm, ampulliform to filiform. Conidia 3–5 × 1–2 μm, av. 4 × 1.5 μm, length/width ratio is 1.7–3.3, av. = 2.5, ellipsoidal to allantoid, eguttulate or with some small, polar guttules. Chlamydospores absent, NaOH test negative. Crystals produced in the agar, small, orange coloured.

Specimens examined. Netherlands, from wood of Fraxinus excelsior (Oleaceae), 1983, M.M.J. Dorenbosch, holotype CBS H-20625, culture ex-holotype CBS 131287 = PD 83/831; from wood of Kerria japonica (Rosaceae), 1983, M.M.J. Dorenbosch, CBS 131286 = PD 83/367.

Aposphaeria populina Died., Krypt.-Fl. Brandenburg 9: 206. 1912 (vol. dated “1915”). Fig. 9.

Description in vitro: Colonies on OA 21–24 mm diam after 7 d (32–37 mm diam after 14 d), margin entire to undulate; colony grey olivaceous/olivaceous to pale luteous/luteous, with white to pale olivaceous grey, finely felty to woolly aerial mycelium; reverse luteous to orange, greenish olivaceous to olivaceous or grey olivaceous/grey olivaceous to iron-grey, a rosy-buff discolouring near margin may occur. Colonies on MEA 16–20 mm diam after 7 d (30–37 mm diam after 14 d), margin entire to undulate; colony pale olivaceous grey with rosy-vinaceous tinges to peach or olivaceous grey, with white, woolly aerial mycelium; reverse saffron to pale olivaceous/olivaceous grey, sometimes with dark vinaceous tinges, rosy-buff near margin. Pycnidia globose to subglobose, olivaceous to olivaceous black, scattered, 55–305 μm diam, glabrous or with mycelial outgrowths, non-ostiolate or ostiolate, pycnidial wall composed of up to 10 layers of cells. Conidiogenous cells 5–11.5 × 1.5–3 μm, ampulliform to filiform. Conidia hyaline, subglobose to ellipsoidal, with 1–3 minute guttules, 1–2 × 1–1.5 μm, av. 1.5 × 1 μm, length/width ratio is 1.0–2.0, av. = 1.4. Chlamydospores and crystals absent, NaOH test negative.

Specimens examined: Germany, Triglitz, from twigs of Populus canadensis (Salicaceae), Mar. 1904. O. Jaap, B, holotype; from branch scars of Picea abies, (Pinaceae), Feb. 1982, H. von Aufess, CBS 350.82. Netherlands, Valkenswaard, from fallen twig of Populus canadensis (Salicaceae), 23 Mar. 1970, H.A. van der Aa, epitype designated here CBS H-9336, culture ex lectotype CBS 543.70; from wood of Cornus mas (Cornaceae), 1984, M.M.J. Dorenbosch, CBS 130330 = PD 84/221.

Beverwykella pulmonaria (Beverw.) Tubaki, Trans. Mycol. Soc. Japan 16: 139. 1975. Basionym: Papulaspora pulmonaria Bever., Antonie van Leeuwenhoek 20: 11. 1915.

Description in vitro: Colonies on OA 50–55 mm diam after 7 d (103–106 mm diam after 14 d), margin entire to undulate; colony grey olivaceous to orange, with white, felty aerial mycelium; reverse orange to olivaceous, greenish grey, grey olivaceous, or grey. Pycnidia globose to subglobose, olivaceous to black, scattered, 55–305 μm diam, glabrous or with mycelial outgrowths, non-ostiolate or ostiolate, pycnidial wall composed of up to 10 layers of cells. Conidiogenous cells 5–11.5 × 1.5–3 μm, ampulliform to filiform. Conidia hyaline, subglobose to ellipsoidal, with 1–3 minute guttules, 1–2 × 1–1.5 μm, av. 1.5 × 1 μm, length/width ratio is 1.0–2.0, av. = 1.4. Chlamydospores and crystals absent, NaOH test negative. Crystals produced in the agar, small, orange coloured.

Specimens examined. Netherlands, from wood of Fraxinus excelsior (Oleaceae), 1983, M.M.J. Dorenbosch, holotype CBS H-20625, culture ex-holotype CBS 131287 = PD 83/831; from wood of Kerria japonica (Rosaceae), 1983, M.M.J. Dorenbosch, CBS 131286 = PD 83/367.

Aposphaeria populinasp. nov. 

Beverwykella pulmonariasp. nov.

Herpotrichia juniperis (Duby) Petr., Ann. Mycol. 23: 43. 1925.

Basionym: Sphaeria juniperi Duby, Klotzsch. Herb. Vivum Mycol. Sistems Fungorum German., no. 1833. 1854.
Melanoma pulvis-pyrius (Pers.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23–24: 160. 1870. 
Basionym: Sphaeria pulvis-pyrius Pers., Syn. Meth. Fung. 1: 86. 1801.

Specimens examined: Belgium, from wood of Fagus sp. (Fagaceae), CBS 400.97.
France, Vosges, Bot. Garden Le Chitelet, from unidentified decaying wood, CBS 371.75.

Notes: Phoma-like anamorphs have been reported by Chesters (1938) and Sivanesan (1984), but no anamorphic stage was observed in IFRDCC 2044, CBS 109.77 or CBS 371.75 after culturing 3 mo on PDA (Zhang et al. 2008). CBS 400.97 was preserved as Trematosphaeria pertusa.

Pleomassaria siparia (Berk. & Broome) Sacc., Syll. Fung. 2: 239. 1883.
Basionym: Sphaeria siparia Berk. & Broome, Ann. Mag. Nat. Hist. Ser. 2(9): 321. 1852.

Specimen examined: Netherlands, Uden, from dead branch of Betula verrucosa (Betulaceae), 8 Dec. 1973, W.M. Loerakker, CBS H-258, CBS H-260, culture CBS 279.74.

Sporormiaceae Munk, Dansk Bot. Ark. 17(1): 450. 1957, nom. inval., Art. 36.1.

Preussia funiculata (Preuss) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23–24: 91. 1870 (1869–70). 
Basionym: Perisporium funiculatum Preuss, Linnaea 24(1): 143. 1851.

Specimen examined: Senegal, from soil, CBS 659.74.

Sporormiella minima (Auersw.) S.I. Ahmed & Cain, Canad. J. Bot. 50: 449. 1972.
Basionym: Sporormia minima Auersw., Hedwigia 7: 66. 1868.

Specimen examined: Panama, from dung of goat, CBS 524.50.

Westerdykella Stolk, Trans. Brit. Mycol. Soc. 38: 422. 1955.
Type species: Westerdykella ornatula Stolk, see below.

Westerdykella capitulum (V.H. Pawar, P.N. Mathur & Thirum) Gruyter, Aveskamp & Verkley, comb. nov. MycoBank MB564801.
Basionym: Phoma capitulum V.H. Pawar, P.N. Mathur & Thirum., Trans. Brit. Mycol. Soc. 50: 261. 1967.
≡ Phoma capitulum V.H. Pawar & Thirum., Nova Hedwigia 12: 502. 1966 (as “capitula”), nom. nud., nom. inval.
≡ Phoma ostiolata V.H. Pawar, P.N. Mathur & Thirum., Trans. Brit. Mycol. Soc. 50: 262. 1967, var. ostiolata.
≡ Phoma ostiolata V.H. Pawar & Thirum., Nova Hedwigia 12: 502. 1966, nom. nud., nom. inval.
≡ Phoma ostiolata var. brunnea V.H. Pawar, P.N. Mathur & Thirum., Trans. Brit. Mycol. Soc. 50: 263. 1967.
≡ Phoma ostiolata var. brunnea V.H. Pawar & Thirum., Nova Hedwigia 12: 502. 1966, nom. nud., nom. inval.
Phoma sections Plenodomus, Pilosa

**Westernkyella minutispora** (P.N. Mathur ex Gruyter & Noordel.) Gruyter, Aveskamp & Verkley, **comb. nov.** MycoBank MB564793.

Basionym: *Phoma minutispora* P.N. Mathur ex Gruyter & Noordel., Persoonia 15: 75. 1992 (as ‘collection name’ originally also referred to Thirumalachar; = depositor).

Replaced synonym: *Phoma oryzae* Cooke & Massee, Grevillea 16: 15. 1887 (not *Phoma oryzae* Catt., Arch. Triennale Bot. Crittog. Pavia 2–3: 118. 1879, nom. illeg).

Specimen examined: **India**, from saline soil, 1977, M.J. Thirumalachar, CBS H-5941, culture CBS 509.91 = PD 77/920.

**Westernkyella ornata** Stolk, Trans. Brit. Mycol. Soc. 38: 422. 1955.

Specimen examined: **Mozambique**, from mangrove mud, CBS 379.55.

**Didymosphaeriaceae** Munk, Dansk Bot. Ark. 15(2): 128. 1953.

**Roussella hysterioides** (Ces.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1: 128: 563. 1919.

Basionym: *Dothisidea hysterioides* Ces., Atti Accad. Sci. Fis. 8: 24. 1879.

Specimen examined: **Japan**, Aomori, Shimokita Yagen, from culms of *Sasa kuriakensis* (Poaceae), Y. Ooki, culture CBS 125434 = HH 26988.

**Family incertae sedis**

**Nigrograna** Gruyter, Verkley & Crous, **gen. nov.** MycoBank MB564794.

Etymology: refers to Nigro-, black, Latin, -grana, grains, Latin. The description refers to the black grains produced by the type species.

**Pycnidia** solitary or rarely confluent, on upper surface or submerged in agar, globose to subglobose or pyriform, with dark brown, septate mycelial outgrowths, with papillate ostioles, olivaceous in agar, globose to subglobose or pyriform, with dark brown, 3-septate ascospores, which have been considered the primitive state with more recently evolved species producing ascospores that are paler in colour, longer and narrower, and more than 3-septate (Wehmeyer 1946). This hypothesis is supported by the results obtained in our study. *Paraleptosphaeria* is distinct but seems to be most closely related to *Leptosphaeria* producing 3–(5)-septate, yellow/brown or hyaline ascospores. Both genera include only necrotrophic species. *Plenodomus* and *Subplenodomus* include necrotophants and plant pathogens. Ascospores in *Plenodomus* are 3–7-septate, whereas in *Subplenodomus* no sexual state has thus far been recorded. The scleroplectenchymatous pycnidial cell wall is typical for *Plenodomus*, whereas in *Subplenodomus* the pycnidial cell wall is pseudoparenchymatous. *Heterospora* is closely allied to *Subplenodomus* and no sexual state has been recorded for this genus either. The distinctive characteristics of the genera *Heterospora*, *Leptosphaeria*, *Paraleptosphaeria*, *Plenodomus* and *Subplenodomus* are summarised in Table 2. A blast search in GenBank using ITS sequences of five selected species of the *Leptosphaeriaceae*, namely *L. doliolum*, *L. etheridgei*, *Plen. ingam*, *H. dimorphospora* and *Subplen. drobnjacensis*, did not reveal close matches to other

**Thyridaria rubronotata** (Berk. & Broome) Sacc., Syll. Fung. 2: 141. 1883.

Basionym: *Melogramma rubronotatum* Berk. & Broome, Ann. Mag. Nat. Hist. Ser. 3(3): 20. 1859.

Specimen examined: **Netherlands**, Zuidelijk Flevoland, from a dead branch of *Acer pseudoplatanus* (Aceraceae), 13 Apr. 1985, N. Ernste, CBS H-18824, culture CBS 419.85.

**DISCUSSION**

The genus *Phoma* has been shown to be highly polyphyletic and *Phoma* is now restricted to taxa in the *Didymellaceae* (de Gruyter et al. 2009, Aveskamp et al. 2010). *Phoma* anamorphs and phoma-like species in *Coniothyriaceae*, *Leptosphaeriaceae*, *Melanommataceae*, *Montagulaceae*, *Pleosporaceae*, *Sporormiaceae* and *Trematosphaeriaceae* are redisplayed here as a result of this and previous studies.

The delimitation of *Leptosphaeriaceae* in *Pleosporineae* from *Cucurbitariaceae*, *Didymellaceae*, *Phaeosphaeriaceae* and *Pleosporaceae* agrees with recent studies of phoma-like species in *Pleosporales* (de Gruyter et al. 2009, Aveskamp et al. 2010, de Gruyter et al. 2010). *Cucurbitariaceae* is recognised as the fifth family in *Pleosporineae* in addition to the four families accepted by Zhang et al. (2009), which are *Didymellaceae*, *Leptosphaeriaceae* *Phaeosphaeriaceae* and *Pleosporaceae*.

The genera *Leptosphaeria*, *Paraleptosphaeria*, *Plenodomus*, *Subplenodomus* and *Heterospora*

*Plenodomus lingam* and *L. doliolum*, the type species of *Plenodomus* and *Leptosphaeria* respectively, were found to be distinct genetically, which agrees with findings of previous molecular phylogenetic studies (Jasalavic et al. 1995, Morales et al. 1995, Dong et al. 1998, Câmara et al. 2002, Eriksson & Hawksworth 2003, Wunsch & Bergstrom 2011). In our study the generic type species grouped in sister clades, which represent *Leptosphaeria* and *Plenodomus*. Species of *Leptosphaeria* produce dark brown, 3-septate ascospores, which have been considered the primitive state with more recently evolved species producing ascospores that are paler in colour, longer and narrower, and more than 3-septate (Wehmeyer 1946). The hypothesis is supported by the results obtained in our study. *Paraleptosphaeria* is distinct but seems to be most closely related to *Leptosphaeria* producing 3–(5)-septate, yellow/brown or hyaline ascospores. Both genera include only necrotrophic species. *Plenodomus* and *Subplenodomus* include necrotophants and plant pathogens. Ascospores in *Plenodomus* are 3–7-septate, whereas in *Subplenodomus* no sexual state has thus far been recorded. The scleroplectenchymatous pycnidial cell wall is typical for *Plenodomus*, whereas in *Subplenodomus* the pycnidial cell wall is pseudoparenchymatous. *Heterospora* is closely allied to *Subplenodomus* and no sexual state has been recorded for this genus either. The distinctive characteristics of the genera *Heterospora*, *Leptosphaeria*, *Paraleptosphaeria*, *Plenodomus* and *Subplenodomus* are summarised in Table 2. A blast search in GenBank using ITS sequences of five selected species of the *Leptosphaeriaceae*, namely *L. doliolum*, *L. etheridgei*, *Plen. ingam*, *H. dimorphospora* and *Subplen. drobnjacensis*, did not reveal close matches to other
teleomorphic or anamorphic genera.

Plenodomus chrysanthemi could not be differentiated from Plen. tracheiphilus based on comparison of their LSU and ITS sequences. Plenodomus vasinfecta was proposed by Boerema et al. (1994) for the species originally described as Phoma tracheiphila f. sp. chrysanthemi (Baker et al. 1985). Because these are part of the Plenodomus clade the name Phoma chrysanthemi is proposed with P. tracheiphila f. sp. chrysanthemi and P. vasinfecta as synonyms. Plenodomus chrysanthemi and Plen. tracheiphilus are host specific (Chrysanthemum and Citrus, respectively) and the scleroplectenchymatous conidial wall of Plen. tracheiphilus differentiates this species from Plen. chrysanthemi, where only a parenchymatous wall has been observed (Boerema et al. 1994). The results of this molecular study and the production of a Phialophora synanamorph by both species demonstrate the close relationship of both taxa.

Plenodomus enteroleucus and Plen. fluorescens have a similar ecological niche as opportunistic pathogens on woody plants in Europe. Both taxa were formerly described as varieties of Ph. enteroleuca, var. enteroleuca and influentes, and could be differentiated only by the fluorescence of var. enteroleuca under black light. However, the molecular phylogeny demonstrates the two varieties are only distantly related and they are raised from varietal status to species rank. The close relation of Plen. wasabiae with Plen. biglobosus agrees with the results of a previous study on the production of Phomalignan A and other yellow pigments, as well as ITS sequence analyses (Pedras et al. 1995).

Subplenodomus apicola, Subplen. drobnjacenisis, Subplen. valerianae and Subplen. violicola all produce pycnidia with an elongated neck, resembling Plenodomus. The pycnidial wall remains usually pseudoparenchymatous. Pycnidia with a scleroplectenchymatous wall are only observed in Subplen. drobnjacenisis. Subplenodomus apicola, Subplen. drobnjacenisis and Subplen. valerianae produce relatively small conidia, up to 4.5 × 2 μm (de Gruyter & Noordeloos 1992) in congruence with many of the Plenodomus species described; however, in contrast Subplen. violicola produces relatively large conidia, up to 11 × 3 μm (Boerema 1993).

The grouping of species of Phoma section Plenodomus based on the host being either herbaceous plants or wood of trees and shrubs (Boerema 1982, Boerema et al. 1994) is not supported by the molecular phylogeny. The grouping of the species into two categories based on the production of pseudoparenchymatous pycnidia that become scleroplectenchymatous pycnidia (type 1), versus always scleroplectenchymatous pycnidia (type 2) (Boerema et al. 1981), is partly supported by the molecular phylogeny. In the Leptosphaeria clade most species directly develop scleroplectenchymatous pycnidia, whereas in the Plenodomus clade the pycnidia generally are pseudoparenchymatous and become scleroplectenchymatous.

Heterospora is established for two species of Phoma sect. Heterospora that cluster in the Leptosphaeriaceae, viz H. chenopodi and H. dimorphospora. All other species of Phoma sect. Heterospora are in the Didymellaceae (Aveskamp et al. 2010).

The Leptosphaeria doliolum species complex

The taxonomy of the generic type species Leptosphaeria doliolum and Phoma anamorphs is complex with a number of subspecies and varieties described in literature. Leptosphaeria doliolum subsp. doliolum and L. doliolum subsp. errabunda are morphologically very similar, as well as the anamorphs Ph. acuta subsp. errabunda and Ph. acuta subsp. acuta. It has been suggested that both taxa represent originally American and European counterparts (Boerema et al. 1994). Both subspecies of L. doliolum proved to be closely related in a phylogenetic analysis utilising LSU and ITS. A detailed multilocus phylogenetic study including the ITS, ACT, TUB and CHS genes, however, demonstrated that both subspecies could be clearly differentiated, and represent two subclades in the L. doliolum complex. All species allied with L. doliolum and L. errabunda are necrotrophic species. Surprisingly, L. macrocapsa grouped with the L. errabunda isolates. Leptosphaeria macrocapsa is described as a host-specialised necrotroph on Mercurialis perennis (Euphorbiaceae) in Europe (Boerema et al. 1994). The species is characterised by large pycnidia (Grove, 1935), with a conspicuously broad, long cylindrical neck (Boerema et al. 1994). This is different to the sharply delimited papilla or neck of variable

| Genus       | Ascospores                  | Mitosporic state                                      | Pathogenicity                      |
|-------------|-----------------------------|------------------------------------------------------|-----------------------------------|
| Leptosphaeria | Ascospores 3-septate, (dark) brown | Mitosporic state common, pycnidial cell wall usually directly scleroplectenchymatous, conidia mostly aseptate | Necrotrophic                      |
| Paraleptosphaeria | Ascospores 3–5-septate, hyaline to yellow/brown | Mitosporic state rare, pycnidial cell wall directly scleroplectenchymatous, conidia aseptate | Necrotrophic                      |
| Plenodomus   | Ascospores 3–7-septate, pale yellow to brown | Mitosporic state common, pycnidial cell wall initially pseudoparenchymatous, later scleroplectenchymatous, conidia aseptate | Necrotrophic or plant pathogenic  |
| Subplenodomus | No known sexual state       | Mitosporic state common, pycnidial cell wall mainly pseudoparenchymatous, conidia aseptate | Necrotrophic or plant pathogenic  |
| Heterospora  | No known sexual state       | Mitosporic state common, pycnidial cell wall pseudoparenchymatous, conidia of two types: small aseptate and large septate | Plant pathogenic                  |

Table 2. Characteristics of ascospores, mitosporic state and pathogenicity of Leptosphaeria, Paraleptosphaeria, Plenodomus and Subplenodomus in vivo.
length of the pycnidia of L. errabunda. Leptosphaeria sydowii, a
necrotroph on Senecio spp. in particular (Asteraceae), proved to
be closely related to L. errabunda. It can be concluded that the
Leptosphaeria dolichii complex includes several necrotrophic
species, with adapted host specificity.

The genus Coniothyrium

Coniothyrium palmarum is the type species of the genus
Coniothyrium. Coniothyrium is characterised by ostiolate pycnidial
conidiomata, anellidic conidiogenous cells, the absence of
conidiophores, and brown, thick-walled, 0- or 1-septate, verrucose
conidia. Coniothyrium is similar morphologically to some species
in the genus Microsphaeropsis. However, Microsphaeropsis is
characterised by the production of phialidic conidiogenous cells
with periclinal thickening, and thin-walled, pale greenish brown
conidia.

Coniothyrium, Microsphaeropsis and Paraconiothyrium clearly
grouped in different clades in a study of the partial SSU nrDNA
(Verkley et al. 2004). In a subsequent study utilising SSU and LSU
sequences, the generic type species Microsphaeropsis olivacea
grouped in Didymellaceae, whereas Coniothyrium palmarum
clustered with the genus Leptosphaeria in Leptosphaeriaceae
(de Gruyter et al. 2009). In the present study C. palmarum
and its relatives grouped in a distinct clade, which represents
Coniothyriaceae. Phoma carteri, Ph. glycinicola, Ph. septicidalis
and Pyrenochaeta dolichii grouped in this clade and are transferred
to the genus Coniothyrium. The inclusion of these species with
setose pycnidia and conidigenous with elongated conidiophores
expands the morphological circumscription of Coniothyrium.
Species with those characters are also found in other genera
treated in this paper in the Cucurbitariaceae, Didymellaceae,
Phaeosphaeriaceae, Leptosphaeriaceae, Montagnulaceae and
Sporormiaceae, indicating convergent evolution.

The Coniothyrium species included here are plurivorous or soil-
borne, such as C. palmarum, C. septicidalis and C. multiporum, or
are associated with a specific host such as C. carteri on Quercus
spp. (Fagaceae), C. glycinicola on Glycine max (Fabaceae) and
C. dolichii on Dolichos biflorus (Fabaceae). The species also are
diverse geographically.

Coniothyrium palmarum was frequently found associated
with leaf spots on Phoenix dactylifera (Arecaceae) in India and
Cyprus (Sutton 1980). The C. palmarum isolates regularly used
in phylogenetic studies are CBS 758.73, from leaf spots on
Phoenix dactylifera in Israel, and CBS 400.71, from a dead petiole
of Chaenomorphus humulis (Arecaceae) in Italy. The subtropical
distribution of these species is similar to that of the most closely
allied C. dolichii and C. glycinicola. Coniothyrium multiporum,
recorded from marine soil, also is found in warm regions.
Coniothyrium carteri, in contrast, is reported from North America
and Europe.

Coniothyrium dolichii produces setose pycnidia with hyaline
conidia (Mohanty 1958). The conidiogenesis was studied in
detail later. Phoma-like ampulliform conidiogenous cells as well
as conidiogenous cells on filiform, septate conidiophores were
found in the same pycnidia leading to confusion regarding the
classification of this species in Phoma or Pyrenochaeta (Grodon
et al. 1997). This study clearly supports the classification in
Coniothyrium. Coniothyrium glycinicola was originally placed
in the genus Pyrenochaeta as Py. glycines due to its setose
pycnidia (Stewart 1957). The conidiogenesis and hyaline
conidia are phoma-like and therefore, it was reclassified as Ph.
glycinicola in Phoma sect. Paraphoma (de Gruyter & Boerema
2002). However, in the original description it was noted that the
conidia were greenish-yellow in mass (Stewart 1957), resembling
Microsphaeropsis or coniothyrium-like conidia. This study clearly
supports the classification in Coniothyrium. Coniothyrium carteri
produces setose pycnidia with hyaline conidia and therefore, the
species was classified in Phoma section Paraphoma (de Gruyter
& Boerema 2002). In spite of this similarity, C. carteri was
determined to be only distantly related to the generic type species
Paraphoma radicina (de Gruyter et al. 2010). Coniothyrium multiporum
was described in Phoma section Phoma; however, it proved to be
unrelated to Phoma in Didymellaceae (Aveskamp et al. 2010). The
conidiogenesis may comprise elongated conidiophores (Pawar
et al. 1967). Two isolates originally described as Ph. septicidalis
are placed here in Coniothyrium telephii. Other strains deposited as
Ph. septicidalis proved to be Pyrenochaeta unguis-hominis (de
Gruyter et al. 2010).

The anamorph of the genus Neophaeosphaeria was described
as coniothyrium-like, producing pigmented, aseptate conidia
from holoblastic, percurrently proliferating conidiogenous cells
with conspicuous annellations (Câmara et al. 2003). Although
Neophaeosphaeria is related to Coniothyrium based on the
molecular data, Neophaeosphaeria probably belongs to a separate
phylogenetic clade. The grouping of N. filamentosa with the
Coniothyrium species included in this study was poorly supported
and N. filamentosa proved to be more distantly related in previous
molecular phylogenetic studies (Verkley et al. 2004, Damm et al.
2008, de Gruyter et al. 2010).

Both anamorph genera Cyclothryum and Cytoplea were
considered to be related to Coniothyrium and Microsphaeropsis
(Sutton 1980) based on morphological similarities. Cyclothryum
also resembles Paraconiothyrium but produces conidiogenous cells
that are more elongated than in most species of Paraconiothyrium
and the conidia are almost truncate at the base, or at least they are
much less rounded at the base than the conidia of
Paraconiothyrium (Verkley et al. 2004). The generic type species
Cyclothryum juglandis, the anamorph of Thyridaria rubronotata,
proved to be related to Roussoeilla hysterioides, teleomorph of
Cytoplea (Verkley et al. 2004). Based on present results R.
hysterioides could not be assigned to familial rank. The clustering
of this species in Massariaceae (Zhang et al. 2009) could not be
confirmed. Moreover, Roussoeilla probably is not a monophyletic
genus (Tanaka et al. 2009). Thyridaria rubronotata, the teleomorph
of Cyclothryum juglandis, proved to be related to Massariosphaeria
phaeospora but was not assigned to familial rank (Schoch et al.
2009).

Coniothyrium-like anamorphs also have been linked to
Mycosphaerella in the past. However, these species were
subsequently accommodated in Colletogloeopsis (Cortinas
et al. 2006), Readeriella/Kirramyces (Crous et al. 2007) and are now
known to be species of Teratosphaeria (Crous et al. 2009).

The genus Pleospora

Pleospora is a large genus in Pleosporaceae, Pleosporales, and
includes important pathogens that occur on both monocotyledons
and dicotyledons. Anamorphs of Pleospora s. lat. have been
described in various genera of coelomycetes and hyphomycetes as
summarised by Zhang et al. (2009, 2012). A delimitation of Pleospora
into two sections, Pyrenophora and Eu-Pleospora was made based
Paraconiothyrium fuckelii is a serious plant pathogen of Rosaceae (Horst & Cloyd 2007), but it also is recorded as an opportunistic human pathogen as summarised by de Hoog et al. (2000). The teleomorph is currently known as Leptosphaeria coniothyrium, but this is not likely considering the phylogeny of Leptosphaeriaceae in Pleosporales (Fig 1). The species was also described as Melanomma coniothyrium (Holm 1957); however, Melanomma is more distantly related in Melanommataceae.

Neoellipsoidina capniospora was previously recorded from the Teleomorph of Paraconiothyrium. However, this species is characterised by conidia and a glabrous ascospores of Pleosporaceae, and the paraphyletic character of the genus Chondrosphaera was demonstrated by Boerema et al. (2006, 2007). A phylogenetic study of the genus Massariosphaeria demonstrated the polyphyly in the genera Pleospora, Kirschsteiniothelia, Massarina, Melanomma, Trematosphaeria and Massariosphaeria in the Loculoascomycetes (Wang et al. 2007) and the paraphyletic character of the genus Chondrosphaera was demonstrated (Kodseub et al. 2006, Muggabi & Huhndorf 2009). These findings support the previous speculation by several authors that ascosporal and ascossomal morphologies have undergone convergent evolution. The previous speculation by several authors that ascomatal and ascosporal morphologies have undergone convergent evolution (Sutton 1980) and resembles members of Massarinaeae. Pyrenochaeta romerorum is redescribed in the new genus Medicago, and its taxonomic position is most close to Trematosphaeriaceae.

Apothecia corielloluta was considered to be a new species in Melanommataceae, Phoma capitulum and Ph. minutispora (Phoma section Phoma) clustered in the Sporormiaeae, most closely related to the holotype isolate of Westerdykella ornata. Other phoma-like anamorphs have been recorded in Sporormiaeae, such as anamorphs of Sporormia aemulans (= Preussia aemulans) and Westerdykella dispersa (= Pycnidiotheca dispersa) (van Arc & Storm 1967). The in vitro characters of W. capitulum and W. oryzae agree with the in vitro characters of phoma-like anamorphs in the Sporormiaeae summarised by Boerema et al. (2004). The conidia are produced in abundance. No matching sequences were found in a blast search in GenBank using the partial LSU sequences of W. capitulum and W. minutispora. Westerdykella minutispora from India was most similar to a sequence of Westerdykella nigra, isolate CBS 416.72, obtained from soil in Pakistan, and W. capitulum was most similar to a sequence of W. dispersa, isolate CBS 297.56, obtained from a seedling of Phlox drummondii, USA. These blast results support the redisposition of both species in the genus Westerdykella.

Phoma-like species excluded from the Pleosporineae

The genus Paraconiothyrium was described by Verkley et al. (2004) as the anamorph of Paraphaeosphaeria. The morphological characters of Paraconiothyrium are variable. The conidiomata can be eustromatic to pycnidial, the phialidic conidiogenous cells are discrete or integrated, and the thin-walled conidia are aseptate or septate, smooth-walled or minutely warted, and hyaline to brown in a later stage (Verkley et al. 2004). The morphological characters of Ph. ini and Asteromella tilliae, redisposed here in Paraconiothyrium, fit this description.
Holm L (1957). Etudes taxonomiques sur les Pleosporacées. Symboles Botaniquea Upsaliensis 14: 5–188.

Hooi GS de, Gerits van den Ende AHG (1998). Molecular diagnostics of clinical strains of filamentous Basidiomycetes. Mycoses 41: 183–189.

Hooi GS de, Guarro J, Gené J, Figueras MJ (2000). Atlas of Clinical Fungi. 2nd edition. Centre for Schimmelcultures, Utrecht, Netherlands.

Horst RK, Cloyd R (2007). Compendium of rose diseases and pests. 2nd edition. APS Press, MN, USA.

Huang YJ, Fitt BDL, Jedryczka M, Dakowska S, West JS, Gladders P, Steed JM, Compendium of rose diseases and pests. 2nd edition. Centraalbureau voor Schimmelcultures, Utrecht, Netherlands.

Khashnobish A, Shearer CA, Crane JL (1995). Reexamination of species of Pleospora. Mycologia 87: 5–16.

Koedam R, Dhanasekaran V, Aptroot A, Lumyong S, McKenzie EHC, et al. (2006). The family Pleosporales: intergeneric relationships and phylogenetic perspectives based on sequence analyses of partial 28S rDNA. Mycologia 98: 571–583.

Lombard L, Crous PW, Wingfield MJ (2010a). Species concepts in Calonectria (Cylindrocladium). Studies in Mycology 66: 1–13.

Lombard L, Crous PW, Wingfield MJ (2010b). Multigene phylogeny and mating tests reveal three cryptic species related to Calonectria paeaformis. Studies in Mycology 66: 15–30.

Lombard L, Crous PW, Wingfield MJ (2010c). Phylogeny and systematics of the genus Calonectria. Studies in Mycology 66: 31–69.

Mendes-Pereira E, Balesdent MH, Brun H, Rouxel T (2003). Molecular phylogeny of the Leptosphaeria maculans - L. biglobosa species complex. Mycological Research 107: 1287–1304.

Moesz G (1922). Mycologische közlemények V. (Mycologische Mitteilungen V.). Magyar Botanikai Lapok 21: 5–16.

Mohanty NN (1958). An undescribed species of Pleospora tritici-repentis and related species with Fusarium-like anamorphs. Mycoses 1: 85–87.

Munk A (1957). Die schweizerischen arten der gattung Leptosphaeria und ihrer verwandten. Sydowia, Annalles Mycologici edit in Notitiam Scientiae Mycologicae Universalis. Hurn, Austria 4: 185–319.

Müller E, Aa JA von (1950). Einige ats zur systematik pseudohalierer Ascomyceten. Berichte der Schweizerischen Botanischen Gesellschaft 21: 329–397.

Munk A (1957). Danish Pyrenymycetes: a preliminary flora. Danish botanik Arv 17, Dansk Dansk Botanik Forening. Ejnar Munksgaard, Copenhagen, Denmark.

Page RDM (1996). Treeview: An application to display phylogenetic trees on Computer Applications in the Biosciences 12: 357–359.

Pawar, V.H, Mathur, P.N, Thirumalachar MJ (1967). Species of Phoma isolated from marine soils in India. Transactions of the British Mycological Society 50: 259–265.

Pedras MSC, Taylor JL, Morales VM (1995). Phomalin A and other yellow pigments in Phoma lingam and P. vasinfecta. Phytochemistry 38: 1215–1222.

Phillip JF, Albers JK, Mycock SR, Johnston PR, Pawar, VH, Mathur, P.N, Thirumalachar MJ, et al. (2008). Resolving the phylogenetic and taxonomic status of dark-spored teleomorph genera in the Botryosphaeriaceae. Persoonia 21: 29–55.

Redfern DB, Sutton BC (1981). Cancry and dieback of Ulmus glabra caused by Plecophoma concentrica, and its relationship to P. ulmi. Transactions of the British Mycological Society 77: 381–390.

Rehner SA, Samuels GJ (1994). Taxonomy and phylogeny of Gilicolorium analysed from nuclear large subunit ribosomal DNA sequences. Mycological Research 98: 625–634.

Schoch CL, Crous PW, Groenewald JZ, Boehm EWA, Burgess TI (2009). A class-wide phylogenetic assessment of Dothideomycetes. Studies in Mycology 64: 1–15.

Schooers H-J, Graffenhan T, Nienberg HI, Siefert KA (2011). A revision of Cynonectria and Gejeayasenia gen. nov., and related species with Fusarium-like anamorphs. Studies in Mycology 68: 115–138.

Shoemaker RA, Brun H (2001). The teleomorph of the weakly aggressive segregate of Leptosphaeria maculans. Canadian Journal of Botany 79: 412–419.

Shoemaker RA, Redhead SA (1999). Proposals to conserve the names of four species of fungi (Helmithosporum avenuea, Pyencophora avenuea and Pleospora triniti-repentis) against competing earlier synonyms. Taxon 48: 381–384.

Sivanesan A (1984). The Bitunicate Ascomycetes and their Anamorphs. J. Cramer, Vaduz, Liechtenstein.

Stewart RB (1957). An undescribed species of Pyrenochaeta on soybean. Mycologia 49: 115–117.

Suetoong S, Schoch CL, Spatafora JW, Kohlmeyer J, Vollmann-Kohlmeyer B (2009). Molecular systematics of the marine Dothideomycetes. Studies in Mycology 64: 155–173.

Sutton BC (1980). The Coelomycetes. Fungi Imperfecti with Pycnidia, Acervuli and Stromata. CMI, Kew, UK.

Swofford DL (2003). PAUP*: Phylogenetic analysis using parsimony and other methods, version 4b10. Sinauer Associates, Sunderland, Massachusetts.

Tanaka K, Hirayama K, Yonezawa H, Hatakeyama S, Harada Y, Sano T, Shirouzu T, Hosoya T (2009). Molecular taxonomy of bambusicolous fungi: Tetraplosporiaceae, a new pleosporalean family with Tetraplospora-like anamorphs. Studies in Mycology 64: 175–209.

Verkley GJM, Silva M da, Wiltok DT, Crous PW (2004). Paraconiothyrium, a new genus to accommodate the mycoperispid Coniothyrium minitians, anamorphs of Paraphaeosphaeria, and four new species. Studies in Mycology 50: 323–335.

Verkley GJM, Woudenberg JHC, Gruyter J de (2010). Ascochytta manawaeae Verkley, Woudenberg & de Gruyter, sp. nov. Persoonia 24: 128–129.

Vilgalys R, Hester M (1990). Rapid genetic identification and mapping of enzymatically amplified ribosomal DNA from several Cryptococcus species. Journal of Bacteriology 172: 4238–4246.

Vincenot L, Balesdent MH, Li H, Barbetti MJ, Sivasithamparam K, Gout L, Rouxel T (2008). Occurrence of a new subclade of Leptosphaeria biglobosa in Western Australia. Psytopathyology 38: 321–329.

Wang HK, Aptroot A, Crous PW, Hyde KD, Jeewon R (2007). The polyphyletic nature of Pleosporales: an example from Massaniosphaeria based on rDNA and RBP2 gene phylogeny. Mycological Research 111: 1288–1276.

Wehmeyer LE (1946). Studies on some fungi of northwestern Wyoming. Ill. Pleospora and Leptosphaeria. Lloydia. A quarterly Journal of Biological Science, Manasota 9: 203–240.

Wehmeyer LE (1961). A world monograph of the genus Pleospora and its segregates. Univ. Michigan Press, USA.

West JS, Balesdent MH, Rouxel T, Narcy JP, Huang YJ (2002). Colonization of winter oilseed rape tissue by A/Tox+ and B/Tox0 (phoma stem canker) in France and England. European Journal of Plant Pathology 106: 412–419.

West JS, Kharbanda PD, Barbetti MJ, Fitt BDL (2001). Epidemiology and management of Leptosphaeria maculans (phoma stem canker) on oilseed rape in Australia, Canada and Europe. Plant Pathology 50: 10–27.

White TJ, Bruns T, Lee S, Taylor J (1990). Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: PCR protocols: a guide to methods and applications. Innis MA, Gelfand DH, Sninsky JJ, White TJ, eds. Academic press, San Diego, CA, USA: 315–322.

Woudenberg JHC, Aveskamp MM, Gruyter J de, Spiers AG, Crous PW (2009). Multiple Didymella teleomorphs are linked to the Phoma cladiatina morphotype. Persoonia 22: 56–62.

Wunsch MJ, Bergstrom GC (2011). Genetic and morphological evidence that Phoma sclerotiorum, causal agent of brown rot of alfalfa, is composed of a species complex. Phytopathyology 101: 594–610.

Yáñez-Morales M de J, Korf RR, Babcock JF (1998). Fungi on Epilagus (Orobanchaceae) – I. On Sclerotiorum orobanchae and its Phoma synanamorph. Mycota 67: 275–286.

Zhang Y, Crous PW, Schoch CL, Hyde KD (2012). Pleosporales. Fungal Diversity 53: 1–22.

Zhang Y, Fournier J, Pointing SB, Hyde KD (2008). Are Melanoma pulvis-pyrius and Trematosphaeria pertusa congeneric? Fungal Diversity 33: 47–60.

Zhang Y, Schoch CL, Fournier J, Crous PW, Gruyter J de (2009). Multi-locus phylogeny of the Pleosporales: a taxonomic, ecological and evolutionary reevaluation. Studies in Mycology 64: 85–102.