CONTRIBUTIONS TOWARDS A MONOGRAPH OF PHOMA
(COELOMYCETES) VI – 1
Section Phylllostictoides: Characteristics and nomenclature of its type species
Phoma exigua

H.A. VAN DER AA¹, G.H. BOEREMA² & J. DE GRUYTER³

A description is given of the morphological characters of Phoma section Phylllostictoides
and its taxonomical position is discussed. A key is provided for the varieties of the type
species Phoma exigua Desm., followed by a host-fungus and a fungus-host index. Two
new varieties are proposed: Phoma exigua var. forsythiae (Sacc.) comb. nov. and Phoma
exigua var. noackiana (Allesch.) comb. nov. The synonymy, selected literature, a repre-
sentative culture and data on ecology and distribution are given for all varieties.

Previous papers of this series deal with the section Phoma (De Gruyter & Noordeloos, 1992;
De Gruyter et al., 1993, 1998), Peyronellaea (Boerema, 1993), Plenodomus (Boerema et
al., 1994, 1996 and Boerema & de Gruyter, 1999), Heterospora (Boerema et al., 1997, 1999)
and Sclerophomella (Boerema & de Gruyter, 1998).

The section Phylllostictoides was introduced by Van der Aa et al. (1990). The infrageneric
name was adopted from a cultural study by Žerbele (1971), who proposed it as a provisional
name of a ‘group-like section’ without a Latin description (personal information from Dr.
V.A. Mel’nik, St. Petersburg). The section name was formally validated by Boerema: Phoma
sect. Phylllostictoides Žerbele ex Boerema (Boerema, 1997). It comprised species with pyc-
nidia similar to those of the section Phoma: thin-walled, pseudoparenchymatous, glabrous
but sometimes with hyphal outgrowths, a predetermined opening or ostiole, but sometimes
remaining closed for a long time with final formation of a pore. The conidia have a broad
range of shapes and sizes and are mainly asceptate in vitro, but in vivo the larger conidia
often become two or even more celled by secondary septation (see Fig. 1). The percentage
of septate conidia depends on environmental conditions and may vary in vivo between 5
and 95 (Van der Aa & van Kesteren, 1979). Under normal laboratory conditions the majority
of conidia always remain asceptate in vitro, but usually some two- or more-celled conidia
also occur.

Section Phylllostictoides includes species with and without chlamydospores; if present
they are unicellular, solitary or formed in series or complexes. Many species of this section
are anamorphs of species of Didymella Sacc. The type species of section Phylllostictoides
is Phoma exigua Desm. Žerbele (1971) used the synonym Ascochyta althaeina Sacc. &
Bizz., see Van der Aa & van Kesteren (1971).

Phoma exigua is a plurivorous species, very common in Eurasia but also reported repeatedly
from Australasia and the Americas. The fungus has frequently been redescribed as a new
species since the middle of the nineteenth century, supposedly specific for at least every

1) Centraalbureau voor Schimmelcultures, Oosterstraat 1, 3742 SK Baarn, The Netherlands.
2) Karel Doormanstraat 45, 2041 HD Zandvoort, The Netherlands.
3) Plantenziektenkundige Dienst, P.O. Box 9102, 6700 HC Wageningen, The Netherlands.
Table I. Differential criteria of the infraspecific taxa of _Phoma exigua_ in vitro.

<table>
<thead>
<tr>
<th>variety (item)</th>
<th>Margin colony OA, MA</th>
<th>Growth-rate OA</th>
<th>Growth-rate MA</th>
<th>CA</th>
<th>E</th>
<th>Aerial mycelium OA</th>
<th>Colony OA</th>
<th>Reverse OA</th>
<th>Colony MA</th>
<th>Reverse MA</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>exigua</em> (1)</td>
<td>irregular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>variable</td>
<td>variable</td>
<td>variable</td>
<td>variable</td>
<td>variable</td>
</tr>
<tr>
<td><em>linicola</em> (2)</td>
<td>irregular</td>
<td>20–45</td>
<td>20–45</td>
<td></td>
<td></td>
<td>+ velvety to floccose, white to olivaceous grey</td>
<td>olivaceous grey/olivaceous black</td>
<td>olivaceous grey/olivaceous black</td>
<td>olivaceous grey/olivaceous black</td>
<td>olivaceous grey/olivaceous black</td>
</tr>
<tr>
<td><em>heteromorpha</em> (3)</td>
<td>irregular</td>
<td>40–50</td>
<td>20–30</td>
<td></td>
<td></td>
<td>–/+ floccose, white, or pale olivaceous grey/glauceous grey</td>
<td>grey olivaceous to olivaceous grey/olivaceous black</td>
<td>grey olivaceous to olivaceous grey/olivaceous black</td>
<td>grey olivaceous to olivaceous grey/olivaceous black</td>
<td>leaden grey/leaden black, partly grey olivaceous, sometimes salmon near margin</td>
</tr>
<tr>
<td><em>populi</em> (4)</td>
<td>irregular</td>
<td>40–65</td>
<td>20–40</td>
<td></td>
<td></td>
<td>– floccose, pale olivaceous grey to glauceous grey</td>
<td>colourless to grey olivaceous at centre</td>
<td>colourless to pale olivaceous grey, grey olivaceous/olivaceous at centre</td>
<td>grey olivaceous, citrine to greenish olivaceous at margin</td>
<td>leaden grey to olivaceous black, greenish olivaceous/olivaceous near margin</td>
</tr>
<tr>
<td><em>diversispora</em> (5)</td>
<td>regular to slightly irregular</td>
<td>65–80</td>
<td>35–60</td>
<td>60–</td>
<td></td>
<td>– velvety to floccose/woolly, pale olivaceous grey/grey olivaceous</td>
<td>grey olivaceous to olivaceous grey</td>
<td>olivaceous to leaden grey</td>
<td>buff, to grey olivaceous/olivaceous black</td>
<td>leaden grey to olivaceous black, or umber/honey to olivaceous</td>
</tr>
<tr>
<td><em>noackiana</em> (6)</td>
<td>regular to slightly irregular</td>
<td>75–85</td>
<td>65–75</td>
<td>80–</td>
<td></td>
<td>– velvety to floccose, olivaceous grey, with compact tufts of white aerial mycelium</td>
<td>olivaceous to iron grey, or grey olivaceous to olivaceous grey</td>
<td>olivaceous to leaden grey/leaden black</td>
<td>greenish olivaceous to olivaceous</td>
<td>leaden grey to olivaceous black, olivaceous at margin</td>
</tr>
<tr>
<td><em>forsythiae</em> (7)</td>
<td>regular, on MA irregular</td>
<td>60–80</td>
<td>60–80</td>
<td>60–</td>
<td></td>
<td>– typical compact tufts, white</td>
<td>greenish olivaceous</td>
<td>greenish olivaceous</td>
<td>greenish olivaceous/grey olivaceous, olivaceous near margin</td>
<td>olivaceous, leaden grey</td>
</tr>
<tr>
<td><em>forsythiae</em> (9)</td>
<td>regular</td>
<td>65–85</td>
<td>65–85</td>
<td>65–</td>
<td></td>
<td>– velvety/finely floccose/woolly, white to (pale) olivaceous grey, partly tufted</td>
<td>colourless to grey olivaceous</td>
<td>olivaceous grey</td>
<td>olivaceous grey</td>
<td>leaden grey/grey olivaceous at margin</td>
</tr>
<tr>
<td><em>lilacis</em> (7)</td>
<td>regular, on MA irregular</td>
<td>60–80</td>
<td>60–80</td>
<td>60–</td>
<td></td>
<td>– tufted velvety to finely floccose, white to (pale) olivaceous grey</td>
<td>colourless to grey olivaceous/olivaceous grey</td>
<td>olivaceous grey</td>
<td>olivaceous grey</td>
<td>leaden grey/grey olivaceous at margin</td>
</tr>
</tbody>
</table>

PERSOONIA — Vol. 17, Part 3, 2000
new host genus, and placed in the coelomycetous genera Phoma, Phyllosticta and Ascochyta, due to the rigid application of criteria used in the Saccardoan system for anamorph genera. In this contribution nomenclature and synonymy of this species and a number of infraspecific taxa is given and their characters in vivo and in vitro are described. The subspecific taxonomy is supported by Amplified Fragment Length Polymorphism studies (AFLP), which will be published separately (Abeln et al., in press).

MATERIAL AND METHODS

Methods are as described in De Gruyter & Noordeloos (1992) and De Gruyter et al. (1993). In combination with other characteristics, the presence (+) or absence (−) of a colourless metabolite known as ‘antibiotic E’ is a useful diagnostic criterium for species of Phoma. The production of ‘E’ was first described from ubiquitous strains of Phoma exigua (E is derived from exigua), see Boerema & Höweler (1967). It can be demonstrated by adding a drop of concentrated NaOH to the margin of colonies on MA which produces an initial blue-green colour reaction, turning to brownish-red (oxidation reaction). Logan & O’Neill (1970) showed the metabolite to have bactericidal and fungicidal properties. The production of ‘antibiotic E’ is stimulated by light, so that the NaOH-test is best examined after the plates have been exposed to daylight for several days.

Isolates and original samples studied are present in herbarium and culture collections of CBS, Baarn and the Plant Protection Service, PD, Wageningen.

Synonyms in the respective genera Phoma, Ascochyta and Phyllosticta are listed in chronological order, and within the year in alphabetical order. The bulk of the synonyms was originally described in the genus Phyllosticta; this fits well with the name of the section. The synonyms described in the genus Phyllosticta are only briefly explicated, usually without information about host plant and the type specimen. All will be treated in more detail by Van der Aa, who will publish a revision of all species described in the genus Phyllosticta Pers. s.l. Herbaria and culture collections are abbreviated according to the codes in the Index Herbariorum (Holmgren et al., 1981).

It should be noted that only synonyms which have not been published previously are included. A complete synonymy will be published later in the monograph of the genus Phoma by Boerema et al.

KEY TO THE VARIETIES OF PHOMA EXIGUA s.l. — Table I

1a. NaOH oxidation reaction positive, green, later red (E reaction) ............... 2
b. NaOH oxidation reaction negative or varying ........................................... 3
2a. Growth-rate variable on OA and MA, (25-)50–85 mm; colonies colourless or with various grey to greenish tinges, or olivaceous to olivaceous black; plurivorous wound and weakly parasitic fungus\(^4\) ........................................ 1. *P. exigua var. exigua*
b. Growth-rate relatively slow on OA and MA, 20–45 mm; colonies compact, olivaceous grey to olivaceous black; seed-borne pathogen of *Linum usitatissimum* 2. *P. exigua var. linicola*

\(^4\) The concept of *Phoma exigua* may also include plurivorous wound and weak parasitic E⁻ strains, see Addendum under var. inoxydabilis.
3a. Growth-rate moderate to fast on OA, 35–65 mm, on MA and CA relatively slow, 20–45 mm ................................. 4
b. Growth-rate fast on OA, MA and CA, 60–85 mm ................................. 5
4a. Growth-rate moderate on OA, 40–50 mm, relatively slow on MA and CA, 20–25 (– 30) mm; on OA colonies rather dark, grey olivaceous to olivaceous grey/olivaceous black, with white to pale olivaceous grey/glaucous grey aerial mycelium; specific pathogen of Nerium oleander ................................. 3. P. exigua var. heteromorpha
b. Growth-rate on OA 41–66 mm, on MA and CA relatively slow, 20–40 mm; colonies on OA colourless to grey olivaceous, with pale olivaceous grey to glaucous grey aerial mycelium; an opportunistic pathogen on Populus spp. (occasionally on Salix)
4. P. exigua var. populi
5a. Colony on OA grey olivaceous/olivaceous to iron grey; on herbaceous plants ................................. 6
b. Colony on OA colourless to grey olivaceous/olivaceous grey or greenish olivaceous; on woody plants ................................. 7
6a. Growth-rate fast on OA and CA, 60–85 mm, on MA moderate, 40–60 mm; on OA with velvety to floccose/woolly, pale olivaceous grey/grey olivaceous aerial mycelium; chlamydospores may be produced; seed-borne pathogen of Phaseolus vulgaris and Vigna unguiculata in western Europe and Africa ................................. 5. P. exigua var. diversispora
b. Growth-rate fast on OA, MA and CA, 65–85 mm; on OA with velvety to floccose, olivaceous grey, and compact tufts of white aerial mycelium; chlamydospores may be produced; pathogen of Phaseolus vulgaris in (South) America
6. P. exigua var. noackiana
7a. On OA with abundant, compact tufted, white aerial mycelium, covering the entire greenish olivaceous colony; specific pathogen of Syringa vulgaris (occasionally on Forsythia) ................................. 7. P. exigua var. lilacis
b. On OA sparse to abundant, velvety to finely floccose tufted, mainly (pale) olivaceous grey aerial mycelium; colony colourless to grey olivaceous/olivaceous grey ................................. 8
8a. On OA abundant velvety/finely floccose, tufted, mainly (pale) olivaceous grey aerial mycelium; pathogen of Viburnum spp. (occasionally on Lonicera)
8. P. exigua var. viburni
b. On OA velvety to finely floccose/woolly, partly tufted, mainly (pale) olivaceous grey aerial mycelium; weak pathogenic on Forsythia spp. ................................. 9. P. exigua var. forsythiae

In general fresh isolates of the host-specific varieties of P. exigua show less variability in vitro than the plurivorous var. exigua, i.e. more stable cultural characters.
However, slower growing segments may be obtained from fast growing colonies.

INDICES TO THE HOST – SPECIFIC VARIETIES OF PHOMA EXIGUA (nos 2–11)
[The plurivorous var. exigua (1) may occur also on the hosts listed]

HOST–FUNGUS INDEX
The number of the variety in the descriptive part is listed (nos 2–11; incl. addendum) with additional data and distribution.

Capsicum annuum (Solanaceae) no. 11: ‘P. exigua var. capsici’
(Seed infection: ‘fruitrot-leafspot’) [invalidly published infraspecific taxon from China; identity doubtful, may refer to Phoma destructiva Plowr.]
Forsythia hybrids (Oleaceae)
(Disease: Shoot Blight)

Linum usitatissimum (Linaceae)
(Disease: Damping-off, Foot Rot)

Lonicera sp. (Caprifoliaceae)

Nerium oleander (Apocynaceae)
(Disease: Dieback; Leaf Necrosis)

Phaseolus vulgaris (Leguminosae)
(Disease: Black Node Disease)

Populus spp., esp. P. nigra and
P. (x) euramericana (Salicaceae)
(Disease: Necrotic Black Lesions)

Salix sp. (Salicaceae)

Syringa vulgaris (Oleaceae)
(Disease: Damping-off; Leaf Necrosis, Dieback of Shoots)

Viburnum spp. (Caprifoliaceae)
(Disease: Leaf Spot; Stem Lesions, Shoot Blackening)

Vigna unguiculata (Leguminosae)
(Disease: Black Node Disease)

Vinca spp., esp. V. minor (Apocynaceae)
(Disease: Stem Blight, Leaf Spot)

no. 9: P. exigua var. forsythiae
[known from weakened shrubs in Europe]

no. 7: P. exigua var. lilacis [only occasionally isolated]

no. 2: P. exigua var. linicola
[seed-borne pathogen known from Europe and New Zealand]

no. 8: P. exigua var. viburni
[only occasionally isolated]

no. 3: P. exigua var. heteromorpha
[pathogen recorded in Europe and North America]

no. 5: P. exigua var. diversispora
[pathogen known from Europe and East Africa]

no. 6: P. exigua var. noackiana
[pathogen recorded in S and C America]

no. 4: P. exigua var. populi
[pathogen found in Europe]

no. 4: P. exigua var. populi
[only occasionally isolated]

no. 7: P. exigua var. lilacis
[pathogen known from Europe, North America and New Zealand]

no. 8: P. exigua var. viburni
[pathogen recorded in Eurasia and North America]

no. 5: P. exigua var. diversispora
[pathogen indigenous to Africa]

no. 3: P. exigua var. heteromorpha
no. 10: P. exigua ‘var. inoxydabilis’
[applied to different E− strains from Europe and North America; identity doubtful, type lost]

FUNGUS–HOST INDEX

‘P. exigua var. capsici’ (11)
(not valid; identity doubtful)

P. exigua var. diversispora (5)

P. exigua var. forsythiae (9)

P. exigua var. heteromorpha (3)

Capsicum annuum
(Solanaceae)

Phaseolus vulgaris, Vigna unguiculata
(Leguminosae)

Forsythia hybrids
(Oleaceae)

Nerium oleander
Vinca minor
(Apocynaceae)
P. exigua ‘var. inoxydabilis’ (10)  
(type lost; identity doubtful)

P. exigua var. lilacis (7)

P. exigua var. linicola (2)

P. exigua var. noackiana (6)

P. exigua var. populi (4)

P. exigua var. viburni (8)

Vinca spp., esp. V. minor  
(Apocynaceae)

Syringa vulgaris  
(Forsythia hybr. (occasionally)  
(Oleaceae)

Linum usitatissimum  
(Linaceae)

Phaseolus vulgaris  
(P. (×) euramericana)  
(Leguminosae)

Populus spp., esp. P. nigra and  
Salix sp. (occasionally)  
(Salicaceae)

Viburnum spp.  
Lonicera sp. (occasionally)  
(Caprifoliaceae)

DESCRIPTIVE PART

1. Phoma exigua Desm. var. exigua — Fig. 1

Phoma exigua Desm., Annls Sci. nat., Bot. III, 11 (1849) 282, var. exigua [varietal name originally differentiated as ‘Var. a’ (p. 282), against ‘Var. b, minor’ (p. 283) = Phoma herbarum Westend., sect. Phoma (De Gruyter et al., 1993)].

Phoma niesslii Sacc., Michelia 2 (1882) 618 [cf. holotype, PAD].


Ascochyta potentillarum Sacc., Michelia 1 (2) (1878) 170 [cf. description and collections sub Phyllosticta argentinae auct.].


Phyllosticta daturae Westend., Herber L. Pire, Herbarium name, 1860 [cf. material on which the name was based, BR; living culture from type host Datura stramonium, CBS 587.67].

Phyllosticta alismatis Sacc. & Speg., Michelia 1 (2) (1878) 144. — Ascochyta boydii Grove, J. Bot. 56 (1918) 315, replaced name [cf. description and several secondary collections, in vivo and in vitro (CBS 476.69); (holo-)type not available and probably not preserved].

Phyllosticta calycanthi Sacc. & Speg., Michelia 1 (2) (1878) 139 [cf. holotype, PAD].

Phyllosticta capparidis Sacc. & Speg., Michelia 1 (2) (1878) 139 [cf. holotype, PAD].

Phyllosticta capsulicola Sacc. & Speg., Michelia 1 (2) (1878) 152 [cf. holotype, PAD].


Phyllosticta gomphrenaec Sacc., Michelia 1 (2) (1878) 151 [cf. holotype, PAD].

Phyllosticta erythraeae Sacc. & Speg., Michelia 1 (2) (1878) 152 [cf. holotype, PAD].

Phyllosticta lappae Sacc., Michelia 1 (2) (1878) 151. — Ascochyta lappae (Sacc.) Jaap, Annls mycol. 12 (1914) 26. — Ascochyta lappae (Sacc.) Petr., Annls mycol. 18 (1920) 119 = Ascochyta lappae Kabát & Bubák, Hedwigia 47 (1908) 357; further synonyms, see Mel'nik, 1977: 99 [cf. holotype, PAD].

Phyllosticta sonchi Sacc., Michelia 1 (2) (1878) 141. — Ascochyta sonchi (Sacc.) Grove, J. Bot. 40 (1922) 48; further synonyms listed by Mel’nik (1977: 102) [cf. holotype, PAD].


Phyllosticta verbasci Sacc., Michelia 1 (2) (1879) 531 [cf. holotype, PAD and secondary collections, confirmed in vitro, CBS449.81].

Phyllosticta eupatorina Thüm., Hedwigia 19 (1880) 179 [cf. isotype ex herb. Sydow, S].

Phyllosticta juliae Speg., An. Soc. cient. arg. 10 (1880) 28 [cf. holotype, LPS].


Phyllosticta orontii Ellis & Martin, Am. Naturalist 16 (1882) 1002 [cf. holotype, NY].


Phyllosticta filipendulina var. ulmariæ Sacc., Syll. Fung. 3 (1884) 41 [cf. holotype, PAD].

Phyllosticta pentastemonis Cooke, Grevillea 14 (1885) 90 [cf. holotype, K].

Phyllosticta potamia Cooke, Grevillea 14 (1885) 39 [cf. holotype, K].

Phyllosticta iavecola Ellis & Everh., J. Mycol. 2 (1886) 37 [cf. holotype, NY; sec. collections in Brenckle, Fungi dakotensis 338, NY, L].

Phyllosticta mentzeliae Ellis & Everh., J. Mycol. 2 (1886) 4 [cf. holotype, NY].

Phyllosticta dahliicola Brunaud, Bull. Soc. bot. Fr. 34 (1887) 429 [as ‘dahliicola’]. — Ascochyta dahliicola (Brunaud) Petr., Annls mycol. 25 (1927) 202 [cf. description; type not known to be in existence].

Phyllosticta fatiscens Peck, Rep. N. Y. St. Mus. nat. Hist. 40 (1887) 58 [cf. descriptions based on type material by Peck, l.c., Ellis & Everh. (1900) and Seaver (1922); additional sec. collections, NY, L].

Phyllosticta sagittifoliae [as ‘sagittifoliae’] Brunaud, Rev. mycol. 9 (1887) 13 [cf. description; type not known to be in existence].


Phyllosticta antennariae Ellis & Everh., J. Mycol. 5 (1888) 9 [cf. holotype, NY].

Phyllosticta calaminthae Ellis & Everh., J. Mycol. 5 (1889) 145 [cf. holotype, NY and isotypes, NY and L].

Phyllosticta orontii Ellis & Martin var. advena Ellis & Everh., J. Mycol. 5 (1889) 146 [cf. holotype, NY].

Phyllosticta molluginis Ellis & Halst., J. Mycol. 6 (1890) 33 [cf. holotype, NY].

Phyllosticta otites Brunaud, Actes Soc. linn. Bordeaux 44, Sér. 5, 4 (1890) 242 [cf. description; type not known to be in existence].


Phyllosticta melampyri Allesch., Hedwigia 33 (1894) 70 [cf. holotype, M].
Phyllosticta alpina Allesch., Hedwigia 34 (1895) 257 [cf. holotype, M].

Phyllosticta calthae Ellis & Everh., Ined. [cf. Cash, A record of the fungi named by J. B. Ellis, I–III (1952), 300], herbarium name [cf. the material on which the name is based; coll.: 1895, NY].

Phyllosticta eupatori Allesch., Hedwigia 34 (1895) 264 [cf. holotype, M].

Phyllosticta desertorum Sacc., Malpighia 10 (1896) 272 [cf. holotype, PAD].


Phyllosticta hieracii Allesch. in Sydow, Hedwigia 36 (1897) 159 [cf. holotype, S, isotypes in Sydow, Mycotheca marchica No. 4473, S and B, and several sec. collections, CBS; identification confirmed in vitro].

Phyllosticta inulae Allesch. in Sydow, Hedwigia 36 (1897) 159 [cf. holotype, M, isotypes in Sydow, Mycotheca marchica No. 4475, S and B].

Phyllosticta lampsanae Sydow, Hedwigia 36 (1897) 159 [cf. holotype, S and isotype, B].

Phyllosticta pygmaea Allesch. in Allesch. & P. Hen., Pilze aus dem Umanakdistrict, in C. Vanhöffen's Botanische Ergebnisse der von der Gesellschaft für Erdkunde zu Berlin unter Leitung Dr. v. Drygalski's ausgesandten Grönlandexpedition, nach Dr. Vanhöffen's Sammlungen bearbeitet; A, Kryptogamen. Bibltheca bot. 42 (1897) 10 [cf. description; type not available in herb. Allesch., M and B].

Phyllosticta spaethiana Allesch. in Sydow, Hedwigia 36 (1897) 160 [cf. holotype, M and topotypes in Sydow, Mycoth. marchica No. 4482, S and B].


Phyllosticta mimuli Ellis & Fautrey, Rev. Mycol. 20 (1898) 59 [cf. holotype, NY].

Phyllosticta monarda Ellis & Bartholomew, Trans. Kansas Acad. Sci. 16 (1898) 165 [cf. holotype, NY].


Phyllosticta datiscae Sydow, Hedwigia 38 (1899) 135 [cf. holotype, B].


Phyllosticta canescens Ellis & Everh., Bull. Torrey bot. Club 27 (1900) 54 [cf. holotype, NY].

Phyllosticta gei Bres., Hedwigia 39 (1900) 325, illegitimate name; a later homonym of Phyllosticta gei Thüm., Byull. Moskovsk. Obshch. Isp. Prir. 56 (1881) 130, which is quite another species [cf. holotype, S].


Phyllosticta pucciniophila C. Massal., Atti Ist. Veneto Sci. 59 (1900) 687 [cf. holotype, VER, and cf. Van der Aa & Van Kesteren (1971) and Boerema & Dorenbosch (1973), both under the misspelled name 'Phyllosticta pucciniophila'].

Phyllosticta ariaefolia f. ulmifolia Bres. in Krieger, Fungi saxon. No. 1632 (1901) [cf. syntypes, L and M].
Phyllosticta streltziacea Allesch., Rabenhorst, Krypt.-Flora 1, 7 (1903) 780. — Phoma streltziacea var. major Tassi, Atti Reale Accad. Fisiocrit. Siena, IV, 8 (1896) 5 [cf. holotype, SIENA].
Phyllosticta heliesiana Sacc., Annls mycol. 4 (1906) 491 [cf. holotype, PAD].
Phyllosticta heterospora Speg., Revista Mus. La Plata 15 (1908) 33 [cf. holotype, LPS and isotype, S].
Phyllosticta abutilonis P. Hunn., Hedwigia 48 (1908) 13 [cf. holotype, B and syntype, S].
Phyllosticta belgradensis Bubák & Ranoj., Annls mycol. 8 (1910) 381 [cf. holotype, S].
Phyllosticta bonaneseana Sacc., Annls mycol. 11 (1913) 547 [cf. holotype, PAD].
Phyllosticta mercurialicola C. Massal. in Sacc., Fungi veronensis ecc., Madonna Verona (1918), 10; Syll. Fung. 25 (1931) 36 [cf. holotype, VER].
Phyllosticta aconitina Petr., Annls mycol. 19 (1921) 87 [cf. isotypes L, S and B].
Phyllosticta sinapi Bond.-Mont., Bolezni Rast. 2 (1923) 70 [cf. holotype LE-41866].
Phyllosticta crinodendri Speg., Revista Chilena Hist. Nat. 27 (1924) 58 [cf. holotype, LPS].
Phyllosticta gueldenstaedtiae Murashk., Trudy Sibirsk. Sel'skokhoz. Akad. 5 (1925) 2 [cf. holotype, LEP].
Phyllosticta cardaminis-amarae Petr., Annls mycol. 25 (1927) 229 [cf. isotype, S].
Phyllosticta alliicola Lobik, Bolezni Rast. 17 (1928) 165 [cf. description; type not available].
Phyllosticta salviae Lobik, Bolezni Rast. 17 (3–4) (1928) 169 [cf. holotype, LE-41856].
Phyllosticta suaedae Lobik, Bolezni Rast. 17 (3–4) (1928) 164 [cf. holotype, LE-41876].
Phyllosticta xanthosomatis Petr. & Cif., Annls mycol. 28 (1930) 28 [cf. holotype, S].


Phyllosticta scrophulariaeocola [as 'scrophulariicola'] Petr., Annls mycol. 39 (1941) 259 [cf. isotypes, in F. Petrak, Mycoth. gener. No. 1345, W and B].


Phyllosticta elettariae Chowdhury, Lloydia 21 (1958) 152 [cf. Mathur, 1979 and in accordance with the description].


Phyllosticta monardicola Cejp, Česká Mykicol. 20 (1966) 210 [cf. holotype, PRC].

Phyllosticta caucasica Cejp, Nova Hedwigia 13 (1967 '66') 186 [according to the description; type not available].


Phyllosticta arboarea Cejp, Nova Hedwigia 13 (1967) 184 [cf. description; type not present in herbarium K. Cejp, PRC; pers. information from K. Cejp].


Phyllosticta daturicola Cejp, Nova Hedwigia 13 (1967) 188 [cf. the description; type not available, not in PRC (pers. information K. Cejp)].


Phyllosticta celosiae Cejp, Mycol. Pap. 117 (1969) 3; illegitimate, homonym of P. celosiae Thüm., 1878, l.c. [cf. isotype, IMI 119661].

Phyllosticta doellingeriae Cejp, Zprávy Vlastiv. Ustavu v Olomouci, Cislo 143 (1969) 6 [cf. holotype, PRC].

Phyllosticta hypericicola Cejp, Nova Hedwigia 18 (1969) 563 [cf. description; type not available; not in PRC: pers. information K. Cejp].

Phyllosticta lythri Cejp, Nova Hedwigia 18 (1969) 564 [cf. description; type not available; not in PRC: pers. information K. Cejp].

Phyllosticta macrospora Cejp, Zprávy Vlastiv. Ústavu v Olomouci, Cislo 143 (1969) 8 [cf. holotype, PRC].


Phyllosticta telekiae Cejp, Fassat. & Zavrel, Zprávy Vlastiv. Ústavu v Olomouci, Cišlo 153 (1971) 8 [cf. holotype, PRC].


Previous studies of this fungus added more than a hundred names to its synonymy (Boerema & Höweler (1967), Boerema (1970), Van der Aa & Van Kesteren (1971), Boerema (1972) and Boerema & Dorenbosch (1973)).

The history of the fungus is summarized by Morgan-Jones & Burch (1988). The most striking morphological character of the fungus in vivo is the great variability of size, shape and septation of the conidia. Therefore, the host-specific varieties can only be differentiated according to characters in vitro. They are also recognizable in the AFLP patterns which will be published separately by Abeln et al. (in press).

Description in vitro

OA: growth-rate (25–)50–85 mm, with irregularly scalloped or lobed margin and with floccose, white to pale olivaceous grey/olivaceous grey aerial mycelium; colony colourless or with various grey greenish tinges, olivaceous grey to greenish olivaceous/grey olivaceous or olivaceous to olivaceous black, usually colourless towards margin; reverse similar.

MA: growth-rate (25–)40–75 mm, with irregularly scalloped or lobed margin and with floccose, grey olivaceous to dull green aerial mycelium; colony grey olivaceous/dull green to olivaceous black, often with saffron/ochraceous to amber patches, and white near margin; reverse similar.

CA: growth-rate 35–50(–70) mm, with irregularly scalloped or lobed margin and with floccose, white to grey olivaceous aerial mycelium; colony grey olivaceous to olivaceous grey; reverse leaden grey to leaden black, often with cinnamon to greyish sepia/chestnut patches; reverse similar.

In general the growth-rate on OA is somewhat faster than those on MA and CA.

Pycnidia scarce to scattered, partly submerged in the agar, 75–200 μm diam., globose to subglobose or irregular, solitary or confluent, glabrous, with usually 1 (–2) non-papillate ostioles, olivaceous to olivaceous black; walls made up of 2–5(–7) layers of cells, outer layer(s) pigmented; conidial exudate white to yellowish or rosy buff/salmon or rosy vinaceous. Conidiogenous cells 3–8 × 3–8 μm, globose to bottle shaped. Conidia aseptate, (2.5–)4–7(–12) × 2–3.5 μm, av. 5.5–7.5 × 2.5–3.0, Q = 1.5–4.0, av. Q = 2.3–2.6 or 1(–2) septate, (5.5–)7–10(–13) × 2.5–3.5(–5) μm, variable in shape, subglobose, ellipsoidal to oblong, or allantoid, usually with small guttules.
NaOH spot test: positive on OA and MA: greenish, then red (E\textsuperscript+ reaction: production of antibiotic E).

Chlamydomospores absent, however, swollen olivaceous cells, constricted at the septa, occur.

Crystals absent.

**Description in vivo**

Pycnidia on leaves and stems of living or withering plants, usually irregularly scattered, seldom arranged concentrically, sometimes on typical leaf spots, but more often on old leaf spots caused by other organisms or on necrotic tips and borders of leaves or on irregular lesions on stem, single or some grown together, globose or somewhat depressed, 100–200 μm in diam., with a roundish ostiolum, lined with papillate subhyaline cells. Pycnidial wall 1–3 outer layers with pale to dark brown, isodiametrical cells, occasionnally intermixed with hyphal elements, and 1–3 layers inner cells which are hyaline, isodiametric or somewhat flattened. Conidiogenous cells ampulliform phialids, hardly differentiated from the inner wall cells but with a periclinal thickening of the conidiogenous locus. Blastoconidia ellipsoidal with rounded ends, or irregularly in shape, one celled or 1 (−2)-septate, with or without constrictions at the septae, one-celled conidia 5.5–11.0 × 1.8–4.0 (−6) μm, 2(−3)-celled conidia 7.5–14.0 (−16.0) × 2.5–4.0 (−6.0) μm. Conidial slime dirty white to pale salmon in colour.

**Ecology and distribution.** *Phoma exigua* var. *exigua* is a world-wide recorded wound and weak parasitic soil fungus, which in Eurasia has been isolated from more than 200 host genera. The fungus is an opportunistic plant parasite which may cause necroses on leaves and stems, and may produce a rot on fleshy roots and tubers, or at the bases of leaves and stems: Leaf- and Stem Necroses, Pod spot of legumes, Root Rot of carrot, chichory etc., Gangrene of potatoes, Tuber Rot of dahlia, Foot Rot of lettuce etc.

On dying plant substrates, in the close proximity of soil, it is the most common pycnidial fungus found in Europe. The extensive synonymy can be explained by the unlimited plurivorous character of the fungus and its extreme variability in size and septation of conidia. Notable are the many specific 'host-indicating names', formerly described in the genus *Phyllosticta*.

As a producer of notorious cytochalasins A and B (= phomine) the fungus was initially known as 'Phoma stam S 298'. For literature references see e.g. Boerema & Hamers (1990).

**Representative cultures.** CBS 431.74 ex *Solanum tuberosum* (Solanaceae), the Netherlands, CBS 101150 (PD 79/118) ex *Cichorium intybus* (Compositae), the Netherlands and CBS 101155 (PD 87/719) ex *Helianthus annuus* (Compositae), France.

Fig. 1. *Phoma exigua* var. *exigua*, type species of *Phoma* sect. *Phyllostictoides*. A. Vertical section of pycnidia and subtending mycelium, from 14-day-old colony; B. superficial view of an ostiolum, lined internally with papillate hyaline cells; C. conidiogenous cells and conidia; D→F. diagrammatic representation of electron-microscope observations on the frequently occurring secondary septation of the conidia. It occurs as an annular ingrowth from the lateral wall, leaving a pore (p) in the centre. The septum consists of a middle lamella, the septal-plate (sp.) at both sides covered with wall-layers which for some distance are 'attached' to the lateral conidial wall. Drawings A, C after Morgan-Jones & Burch (1988; with permission); B after Boerema & Höweler (1967); D, E after Boerema & Bollen (1975). Vertical section, bar 50 μm; ostiolum, conidiogenous cells and conidia, bar 10 μm.
Note. The present concept of the species separates a number of host-specific varieties, which are listed below. In general the varieties of *Phoma exigua* with a specific host relation show in vitro a little variability in general appearance.

2. **Phoma exigua** var. **linicola** (Naumov & Vassiljevsky) Maas


*Phoma bellica* Cash, in Trotter, Sylloge Fung. 26 (1972) 934.

*Diplodina lini* Moesz & Smarods in Moesz, Magy. bot. Lap. 29 (1930) 35.


**Differentiating characters.** Growth-rate on OA and MA is relatively slow, 20–45 mm; colonies compact, distinct pigmented, olivaceous grey to olivaceous black.

NaOH reaction is positive: production of antibiotic E.

**Ecology and distribution.** This variety represents a noxious seed-borne pathogen of cultivated flax (*Linum usitatissimum*), causing Damping-Off, Foot Rot and Dead Stalks. Checked records are from East and West Europe and New Zealand. Similar slow-growing E+ isolates are occasionally also isolated from other plants. AFLP studies (Abeln et al., in press) indicate a close relation to var. **heteromorpha** (no. 3), pathogen of the oleander (the hosts of both varieties are of Mediterranean origin).

**Representative culture.** CBS 116.76 (ATCC 32332, IMI 197074, PD 75/544) ex *Linum usitatissimum* (Linaceae), the Netherlands.

3. **Phoma exigua** var. **heteromorpha** (S. Schulz. & Sacc.) Noordel. & Boerema


*Phoma oleandrina* Delacr., Bull. Soc. mycol. Fr. 21 (1905) 190.


**Differentiating characters.** Diffs from the type variety *exigua* mainly by its extreme morphological variability ("heteromorpha"). Growth-rate is moderate on OA, 40–50 mm, and relatively slow on MA and CA, 20–25 (–30) mm; colonies are relatively dark, grey olivaceous to olivaceous black, with often white aerial mycelium.

Usually no demonstrable production of antibiotic E, but some strains showed on MA a slight positive reaction with NaOH.

5) It should be noted that two specific pathogens formerly classified as varieties of *Phoma exigua*, on account of additional comparative studies now are placed (again) in species rank: *P. exigua* var. **foveata** (Foister) Boerema = *Phoma foveata* Foister; *P. exigua* var. **sambuci-nigrae** (Sacc.) Boerema & Höweler = *Phoma sambuci-nigrae* (Sacc.) Monte et al. Both species will be treated in Contribution VI-2.
Ecology and distribution. This fungus is known as a noxious pathogen of oleander (*Nerium oleander*) in production nurseries: Dieback (Canker) and Leaf Necrosis.

Confirmed records are from France, Italy and the United States, but probably the pathogen occurs everywhere the host is commercially grown. Natural infection appeared to occur only through wounds. The fungus has been also isolated from necrotic stems and leaves of *Vinca minor* (also Apocynaceae).

Genetically var. *heteromorpha* belongs to the same group as var. *linicola* (no. 2), pathogen of flax (Abeln et al., in press).

Representative culture. CBS 443.94 (PD 98/2328) ex *Nerium oleander* (Apocynaceae), Italy.

4. Phoma exigua var. *populi* De Gruyter & Scheer

*Phoma exigua var. populi* De Gruyter & Scheer, J. Phytopathol. 146(1998) 413.


Differentiating characters. Growth-rate on OA 41–66 mm, on MA and CA relatively slow, 20–40 mm.

No production of antibiotic E (NaOH reaction is negative).

Ecology and distribution. This opportunistic pathogen of poplars causes distinct necrotic bark lesions; especially cultivars of *Populus nigra* and *Populus* (×) *euramericana* proved to be susceptible. In European literature before 1998 the disease has been ascribed to *Phoma urens* Ellis & Everh., but De Gruyter & Scheer (l.c.) established that the American holotype of that species contained a quite different species of *Sclerophoma*.

The disease symptoms resemble Canker of poplar caused by *Cryptodiaporthe populea* (Sacc.) Butin ex Butin [anam. *Chondroplea populea* (Sacc.) Kleb.]. *Phoma exigua* var. *populi* has also been isolated from a species of *Salix*.

The fungus on poplars is so far recorded in Germany, the Netherlands and Italy.

Representative culture. CBS 100167 (PD 93/217) ex *Populus* (×) *euramericana* 'Robusta' (Salicaceae), the Netherlands.

5. Phoma exigua var. *diversispora* (Bubák) Boerema


Differentiating characters. Growth-rate fast on OA and CA, 60–85 mm, on MA moderate, 35–60 mm; on OA with velvety to floccose/woolly, pale olivaceous grey/grey olivaceous aerial mycelium; reverse usually dark olivaceous black.

Unicellular conidia vary more widely in width than those of the type variety *exigua* ('*diversispora*').

Chlamydospores may be formed, best observed on water agar (WA), 10–25 μm diam.

No production of the antibiotic E (NaOH reaction is negative).

Ecology and distribution. The primary host of variety *diversispora* is probably cowpea (*Vigna unguiculata*), originally native of Central and West Africa. However, in Western
Europe and East Africa var. *diversispora* is particularly known as seed-borne pathogen of dwarf beans or snap beans (*Phaseolus vulgaris*). The African genus *Vigna* and the American genus *Phaseolus* are closely related and generally susceptible to their mutual pathogens. Affected hosts show a black discolouration of stem nodes and petioles: Black Node Disease.

*Representative culture.* CBS 102.80 (IMI331907, PD 79/61) ex *Phaseolus vulgaris* (Leguminosae), Kenya.

*Note.* In South America similar disease symptoms on beans are caused by the related var. *noackiana*, see below. The plurivorous weak parasite var. *exigua* may produce brown specks on mature bean pods (Speckle Disease).


*Differentiating characters.* This var. *noackiana* may be called an American nephew of the African var. *diversispora* (no. 5). It differs only little in cultural characters: growth-rate fast on OA, MA and CA, 65–85 mm; on OA with compact tufts of white aerial mycelium, as well as velvety to floccose olivaceous grey aerial mycelium. Chlamydospores may be formed, best observed on water agar (WA), up to 20 µm diam. No production of antibiotic E (NaOH reaction is negative).

Obando-Rojas (1989) proved that var. *noackiana* and var. *diversispora* are distinctly different in enzyme composition. Both varieties are genetically different, but belong to the same group (Abeln et al., in press).

*Ecology and distribution.* This variety is in South- and Central America repeatedly found on beans (*Phaseolus vulgaris*) with disease symptoms resembling the Black Node Disease, in (eastern) Africa and (western) Europe caused by *Phoma exigua* var. *diversispora* (no. 5). Study of herbarium material showed that in the 19th century the fungus has been described as a separate species of *Phyllosticta*, found on leaves of bean, collected in Brazil. The occurrence of large necrotic spots on the leaves is one of the symptoms of the disease, which usually starts at the nodes and at leaf junctions.

*Representative culture.* CBS 100353 (PD 87/718) ex *Phaseolus vulgaris* (Leguminosae), Guatamala.

7. **Phoma exigua** var. *lilacis* (Sacc.) Boerema


*Selected literature.* Boerema (1980).

*Differentiating characters.* Cultures of this variety on OA, MA and CA can easily be differentiated from var. *exigua* by a rather fast growth-rate, 60–80 mm diam. Colonies on OA have abundant, compact tufted, white aerial mycelium, covering the entire greenish olivaceous colony. No production of antibiotic E (NaOH reaction is negative).
Ecology and distribution. This variety is known as a pathogen of lilac (*Syringa vulgaris*), causing Damping-Off of seedlings, Leaf Necroses and Dieback of shoots. The fungus is also found on seed capsules which indicates the possibility of transmission by seeds. It is probably not always a primary pathogen and may follow Bacterial Blight caused by *Pseudomonas syringae* v. Hall. Occasionally *Phoma exigua* var. *lilacis* has been isolated from necrotic tissue of a *Forsythia* hybrid (also Oleaceae).

Confirmed records on lilac are from France, Germany, Italy, the Netherlands, USA and New Zealand. The fungus probably occurs wherever the host, originally native of Central and South-East Europe, is cultivated.

Representative culture. CBS 569.79 (IMI 331909, PD 72/741) ex *Syringa vulgaris* (Oleaceae), the Netherlands.

8. *Phoma exigua* var. *viburni* (Roum. ex Sacc.) Boerema


*Phyllosticta roumeguerei* Sacc., Michelia 2 (1880) 88 [as ‘Roumeguerri’]; not *Phoma roumeguerei* Sacc., Michelia 2 (1880) 89.

*Phyllosticta lantanoides* Peck, Rep. N. Y. State Mus. 38 (1885) 94.


Differentiating characters. Apart from the specific host relation this variety differs only little in cultural characters from var. *forsythiae* (no. 9). Growth-rate on OA, MA and CA relatively fast, 65–85 mm, regular, on OA with tufts of velvety to finely floccose, white to pale olivaceous grey aerial mycelium; slower growing colony sectors may occur.

No production of antibiotic E (NaOH reaction negative).

Var. *viburni* is genetically distinct from var. *forsythiae* (Abeln et al., in press).

Ecology and distribution. A common pathogen of cultivated *Viburnum* spp. Occasionally it has been isolated from *Lonicera* sp. (also Caprifoliaceae) and some other woody plants (mostly in the neighbourhood of *Viburnum* plants). The disease is known as Leaf Spot, Stem Lesions and Shoot Blackening. Most conspicuous are the necrotic leaf spots with a purplish margin. The variability of the conidia explains the various synonyms in the genus *Phyllosticta* sensu Sacc.. When treating it as a species of *Phoma*, Boerema & Griffin (1974) noted the difficulty of distinguishing it from E'-isolates of *P. exigua*.

The records of this fungus are from Europe (Germany, Great Britain, the Netherlands, France) and North America (Canada, United States); but probably it may be found everywhere the hosts are cultivated.

Representative culture. CBS 100354 (PD 84/448) ex *Viburnum opulus* (Caprifoliaceae), the Netherlands.
9. Phoma exigua var. forsythiae (Sacc.) Aa, Boerma & de Gruyter, comb. nov.


Differentiating characters. Growth-rate fast on OA, MA and CA , 65–85 mm after 7 days, on OA and MA regular, on CA lobed; on OA velvety to finely floccose/woolly, partly tufted, mainly (pale) olivaceous grey aerial mycelium.

No production of antibiotic E (NaOH reaction is negative).

The cultural characteristics of this variety resemble very much those of var. viburni, see no. 8.

Ecology and distribution. This variety is frequently isolated from weakened and badly growing shrubs of Forsythia hybrids in Europe. The fungus has been found on dead leaves and may occur in association with circular leaf spots, but most characteristic are dead flower buds encircled by brown bark lesions and with discoulouration of the wood. The identity of this variety with Saccardo's Phyllosticta forsythiae has been based on comparison with the lectotype and various secondary collections on the type host in PAD and CBS.

Representative culture. CBS 101213 (PD 92/959) ex Forsythia sp. (Oleaceae), the Netherlands.

ADDITIONUM

Doubtful infraspecific taxa of Phoma exigua (incorporated in index).

10. Phoma exigua 'var. inoxydabilis' Boerema & Vegh


The authors of this variety noticed that European and American isolates of P. exigua obtained from Stem Blight and Leaf Spot of Vinca minor (Apocynaceae) did not show the oxidation reaction with NaOH ("inoxydabilis"); no production of the antibiotic E. However, in the early seventies it was still not known that various strains or varieties of P. exigua do not produce the metabolite E.

Additional studies of P. exigua isolates from Vinca have shown that they do not represent one cultural type, but include strains quite different in growth-rate and other cultural as well as genetic characteristics (Abeln et al., in press).

The French type culture of var. inoxydabilis, PC 2198, has been lost (information Dr. J. Mouchacca, PC). A very similar slow growing Dutch isolate, CBS 101205 (= PD 77/434),
showed genetic similarity with the E− variety *heteromorpha*, no. 3 (pathogen of *Nerium oleander*, also Apocynaceae!).

The cultural characteristics of the Dutch isolate CBS 372.75 deposited in 1975 (PD 75/01, ATCC 32161, IMI 194763) fully agree with those of a *P. exigua* isolate (E−) from *Phlox*, CBS 101201, as does a recent Dutch isolate of *P. exigua* (E−) from *Vinca*, CBS 101204 (PD 98/2324). These isolates belong indeed to one separate group when studied by AFLP (Abeln et al., in press).

In summary, Stem Blight and Leaf Spot of *Vinca* is not associated with one host-specific ‘inoxydabilis’-variety of *P. exigua*. The listed synonyms may also refer to different strains of *P. exigua*. This conclusion agrees with the experimental study of the *Vinca* disease by Jansen (1965). She obtained the typical leaf spots and dieback of shoots after inoculating with isolates from *Vinca* spp., as well as with an arbitrary isolate of *P. exigua* (from *Dahlia tuber* rot). She supposed that the relevant disease of *Vinca* is primarily induced by unfavourable environmental conditions.

11. *Phoma exigua* ‘var. capsici L.Z. Liang’


This infraspecific taxon, based on pathogenic *Phoma* isolates from seeds of *Capsicum annuum* in Beijing, China, was introduced without a Latin description and type indication. Therefore this varietal name is not validly published (ICBN Arts 36.1, 37.1–5).

In the English summary of the Chinese paper by Liang (l.c.) the cultures of the fungus were characterized as black tinged, relatively fast growing with a regular margin, and showing no colour reaction with NaOH (no production of antibiotic E). Further it is noted that the fungus “does not agree with any of the 5 described varieties of *P. exigua* by Boerema & Höweler (1967), except for morphological similarity of conidia”. In pathogenicity tests it “could produce round or irregular lesions on leaves”. The annotation that the fungus “was found in 21 seed samples of *Capsicum annuum* out of 30 tested with infection ranging from 0.5–65.5%”, points to a true pathogen. Without a representative culture it is difficult to give a justified opinion on the identity of the pathogen. However, it should be noted that seeds of *Capsicum annuum* may be severely infected by *Phoma destructiva* Plowr. (Neergaard, 1956), a fungus often confused with *P. exigua* (e.g. in Japan), see Boerema & van Kesteren (1981). *Phoma destructiva* produces also dark colonies with a regular margin and gives no colour reaction with NaOH. It may cause foliar lesions and fruit rot (source of seed infection).

ACKNOWLEDGEMENTS

We are grateful to the curators of the following herbaria, who loaned type specimens: Alma-Ata (AA), Berlin (B), London (BM), Meise (BR), Bucuresti (BUCM), Baarn (CBS), Yerevan (ERHM), Egham (IMI), Kew (K), Leiden (L), St. Petersburg (LE, LECB and LEP), La Plata (LPS), München (M), New York (NY), Padova (PAD), Paris (PC), Praha (PRC), Stockholm (S), Siena (SIENA), Verona (VER), Vienna (W).

Thanks are expressed to Dr. D. van der Mei, who reviewed and corrected an earlier version of this paper, and to Mr. D. Yarrow for correcting the English text. The authors are much indebted to Maria M.J. Dorenbosch (Miek), former mycologist at the Plant Protection Service in Wageningen, whose cultural studies contributed substantially to the present concept of *Phoma exigua*. 
REFERENCES


6) The complete series ‘Check-list for scientific names of common parasitic fungi’ compiled by G. H. Boerema and Coworkers was reprinted in 1993 with a cumulative index. Libri Botanici 10. IHW Verlag, Eching, D.


7) The complete series ‘Check-list for scientific names of common parasitic fungi’ compiled by G.H. Boerema and Coworkers was reprinted in 1993 with a cumulative index. Libri Botanici 10. IHW Verlag, Eching, D.


