

Cercosporoid fungi (*Mycosphaerellaceae*) 4. Species on dicots (*Acanthaceae* to *Amaranthaceae*)

Uwe Braun¹, Pedro W. Crous², and Chiharu Nakashima³

¹Martin-Luther-Universität, Institut für Biologie, Bereich Geobotanik und Botanischer Garten, Herbarium, Neuwerk 21, 06099 Halle (Saale), Germany; corresponding author e-mail: uwe.braun@botanik.uni-halle.de

²CBS-KNAW, Fungal Biodiversity Centre, Uppsalalaan 8, 3584 CT Utrecht, The Netherlands

³Graduate School of Bioresources, Mie University, 1577 Kurima-machiya, Tsu, Mie 514-8507, Japan

Abstract: The present paper continues a series of comprehensive taxonomic treatments of cercosporoid fungi (formerly *Cercospora s. lat.*), belonging to the *Mycosphaerellaceae* (*Ascomycota*). The fourth contribution of this series initiates treatments of cercosporoid fungi on dicots and comprises species occurring on hosts belonging to the families *Acanthaceae*, *Actinidiaceae*, *Adoxaceae*, *Aizoaceae*, *Altingiaceae*, and *Amaranthaceae*. The species are described and illustrated in alphabetical order under the particular cercosporoid genera, supplemented by keys to the species concerned. A detailed introduction, a survey of currently recognised cercosporoid genera, a key to the genera concerned, and a discussion of taxonomically relevant characters were published in the first part of this series. The following taxonomic novelties are introduced: *Cercospora blepharidicola* nom. nov., *C. celosiigena* sp. nov., *C. justiciae-adhatodae* sp. nov., *C. justiciigena* nom. nov., *C. sambucicola* nom. nov., *C. thunbergiigena* nom. nov., *Cercospora pseudachyranthis* comb. nov., *Pseudocercospora cyathulae* comb. nov., *P. depazeoides* comb. nov., *P. varia* var. *viburni-sargentii* var. nov., *P. viburnicola* sp. nov., *P. viburni-erosi* sp. nov., and *P. viburni-nudi* sp. nov.

Key words:

Ascomycota
Cercospora s. lat.
hyphomycetes
taxonomy

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INTRODUCTION

True cercosporoid fungi belong to *Mycosphaerellaceae* (*Capnodiales*, *Ascomycota*) and comprise a very large group of plant pathogenic, leaf-spotting, economically relevant species that cause diseases on a wide range of hosts, including numerous cultivated plants. In spite of the enormous relevance of this fungal group, there is no modern comprehensive treatment of *Cercospora* and allied genera, and the only monograph published by Chupp (1954) is seriously outdated. Therefore, a monographic series with treatments of cercosporoid fungi based on host families was initiated (Braun *et al.* 2013) with the aim of working towards a comprehensive monograph of this generic complex. So far three contributions have been published: part one dealing with cercosporoid fungi on other fungi (mycophylic taxa), on ferns as well as gymnosperms (Braun *et al.* 2013); part two dedicated to species on monocots, excluding true grasses (Braun *et al.* 2014); and part three with a treatment of cercosporoids on hosts of *Poaceae* (Braun *et al.* 2015). General chapters with generic descriptions and keys to accepted genera are included in the first part. The present contribution is the first part devoted to cercosporoid fungi on dicots, encompassing species on hosts of the families *Acanthaceae*, *Actinidiaceae*, *Adoxaceae*, *Aizoaceae*, *Altingiaceae*, and *Amaranthaceae*. The structure of part 4

follows the principles circumscribed in part 1 (Braun *et al.* 2013).

MATERIALS AND METHODS

The present work is a compilation based on our papers and unpublished data, as well as the global literature. Details of methods are given in the papers cited under references. As far as new examinations are concerned, fungal structures have been examined by standard methods of light microscopy, using an Olympus BX50 microscope, with distilled water and lactic acid as media, but without any staining. If possible, measurements of 30 conidia and other structures have been made at a magnification of ×1000. All illustrations have been prepared by UB. The following abbreviations are used: author names follow Brummit & Powell (1992), journals Bridson (2004a, b), and exsiccatae <http://www.botanischestaatssammlung.de/DatabaseClient/IndExs/index.jsp> (IndExs – Index of Exsiccatae). Taxonomy and nomenclature of plant families, genera and species are based on the “Angiosperm Phylogeny Website” (<http://www.mobot.org/mobot/research/apweb/>), Tropicos database (<http://www.tropicos.org/>), and The Plant List (<http://www.theplantlist.org>).

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TAXONOMIC TREATMENT

Cercosporoid species on dicots s. lat. (*Acanthaceae* to *Amaranthaceae*)*Acanthaceae**Cercospora*Key to *Cercospora* species on *Acanthaceae*

- 1 Conidia in chains, 8–40 × 2–3 µm, (0–)1–3(–4)-septate, hyaline; on *Justicia adhatoda* [*Adhatoda vasica*] ***Cercospora justiciae-adhatodae***
Conidia formed singly 2
- 2 (1) Stromata large, 20–85 µm; conidiophores short, 10–40 × 3–5 µm, 0–4-septate; conidia short, acicular-subcylindrical, 20–50 × 2–4 µm, 0–5-septate ***C. balaghatensis***
Stromata lacking or smaller, 10–30 µm diam; and/or conidiophores much longer, 10–500 µm, pluriseptate throughout; conidia longer, 15–360 µm, pluriseptate 3
- 3 (2) Conidia obclavate-cylindrical with obconically truncate base 4
Conidia consistently acicular, base truncate, or at least longer conidia acicular, mixed with shorter obclavate-cylindrical conidia 6
- 4 (3) Conidiophores short, 10–40 × 2.5–5 µm, 0–1-septate; conidia 25–80 µm long; on *Justicia spicigera*, Central America (Guatemala) ***C. jacobiniicola***
Conidiophores longer, about 30–185 µm, with more than two septa; conidia longer, about 20–170 µm 5
- 5 (4) Stromata 30–50 µm diam; conidiophores long and aseptate, 35–120 × 3–6 µm; on *Justicia betonica*, Asia (India) ***C. justiciigena***
Stromata lacking or very small, < 25 µm diam; length of the conidiophores similar, but 1–6-septate; on *Lepidagathis* spp. ***C. lepidagathidis***
- 6 (3) Conidia acicular to obclavate-cylindrical, base truncate to obconically truncate 7
Conidia consistently acicular, base truncate 10
- 7 (6) Conidiophores relatively short, 10–30(–70) µm; stromata 10–70 µm diam; on *Acanthus* spp. ***C. acanthi***
Conidiophores longer, 25–155 µm; stromata lacking or small, 10–30 µm; on other hosts 8
- 8 (7) Conidia narrow, 30–150 × 2–4 µm, average < 3 µm wide; on *Andrographis* spp. ***C. andrographidis***
Conidia wider, 3–5 µm, average > 3 µm; on other hosts 9
- 9 (8) Conidiophores to 195 µm long; on *Justicia* spp. ***C. justiciicola***
Conidiophores much shorter, to 62.5 µm; on *Crossandra* spp. ***C. crossandrae***
- 10 (6) Stromata well-developed, 10–70 µm diam; conidiophores short, 10–40(–7) µm; on *Acanthus* sp. ***C. acanthi***
Stromata lacking or small, about 10–45 µm diam; and/or conidiophores much longer, at least partly longer than 50 µm; on other hosts 11
- 11 (10) Conidiophores 40–310 × 4–8.5 µm; conidia rather broad, 40–360 × 3–8 µm; on *Thunbergia* spp. ***C. thunbergiana***
Conidiophores and conidia narrower; conidia about 1.5–5 µm wide; on other hosts or if on *Thunbergia* conidia only 2–3 µm wide 12
- 12 (11) Conidia (2–)2.5–5.5(–6) µm wide, average > 3 13
Conidia narrower, 1.5–4 µm, average < 3 µm 17
- 13 (12) Conidiophores long, 30–500 × 3–8 µm; on *Hygrophila* spp. ***C. hygrophilae***
Conidiophores much shorter, to 250 µm; on other hosts 14
- 14 (13) Stromata well-developed, about 15–55 µm diam; on *Andrographis* spp. ***C. andrographidicola***
Stromata lacking or small, about 10–25 µm diam; on other hosts 15

- 15 (14) Lesions formed as brown leaf spots with indefinite margin; on *Asystasia* spp. **C. asystasiana**
 Lesion visible as greyish white leaf spots; on other hosts 16
- 16 (15) Conidiogenous loci 2–3 µm wide; on *Justicia adhatoda* **C. adhatodae**
 Conidiogenous loci somewhat narrower, 1.5–2.5 µm wide; on *Strobilathes* **C. strobilanthis**
- 17 (12) Stromata well-developed, to 60 µm diam; on *Barleria* and *Blepharis* spp. 18
 Stromata lacking or small, 10–25 µm diam; on other hosts 19
- 18 (17) Conidiophores long, 10–210 µm; on *Barleria* spp. **C. barleriicola**
 Conidiophores much shorter, 15–65 µm; on *Blepharis* spp. **C. blepharidicola**
- 19 (17) Conidia very narrow, about 1.5–2.5 µm; on *Ruellia* spp. **C. ruellina**
 Conidia wider, 2–4 µm; on other hosts 20
- 20 (19) Conidiophores 10–100 µm long; on *Justicia* and *Rhytoglossa* spp. **C. diantherae**
 Conidiophores longer, to 220 µm; on other hosts 21
- 21 (20) Leaf spots yellowish brown to dark brown, later greyish white with dark border, 0.5–4 mm diam;
 on *Peristrophe* spp. **C. peristrophes**
 Leaf spots dark brown to black, vein-limited, 3–10 mm diam; on *Thunbergia* **C. thunbergiigena**

Tabular key to *Cercospora* species on Acanthaceae according to host genera

Acanthus

A single species **C. acanthi**

Adhatoda, see ***Justicia***

Andrographis

- 1 Conidia acicular, base truncate, 200–240 × 3.3–5 µm **C. andrographidicola**
 Conidia acicular to obclavate, base truncate to obconically truncate, shorter and narrower,
 30–150 × 2–4 µm **C. andrographidis**

Asystasia

A single species **C. asystasiana**

Barleria

A single species **C. barleriicola**

Blepharis

A single species **C. blepharidicola**

Crossandra

A single species **C. crossandrae**

Hygrophila

A single species **C. hygrophilae**

Justicia

- 1 Conidia in chains, 8–40 × 2–3 µm, (0–)1–3(–4)-septate, hyaline;
 on *Justicia adhatoda* [*Adhatoda vasica*] **Cercospora justiciae-adhatodae**
 Conidia formed singly, much longer and pluriseptate 2
- 2 (1) Stromata large, 20–85 µm diam; conidiophores short, 10–40 × 3–5 µm, 0–4-septate; conidia short,
 acicular-subcylindrical, 20–50 × 2–4 µm, 0–5-septate **C. balaghatensis**
 Stromata lacking or smaller, 10–30 µm diam; conidiophores much longer, 10–195 µm,
 pluriseptate throughout; conidia longer, 15–250 µm, pluriseptate 3

- 3 (2) Conidia consistently acicular, base truncate, or at least longer conidia acicular, mixed with shorter obclavate-cylindrical conidia 4
 Conidia obclavate-cylindrical with obconically truncate base, acicular conidia lacking 6
- 4 (3) Conidia acicular to obclavate-cylindrical, base truncate to obconically truncate **C. justiciicola**
 Conidia consistently acicular, base truncate 5
- 5 (4) Conidia, 35–250 × 2.5–5 µm; on *Justicia adhatodae* [*Adhatoda vasica*], Asia (India) **C. adhatodae**
 Conidia narrower, 40–180 × 2–4 µm; on *Justicia* spp., common in North America (records from Africa and Asia rare and unproven) **C. diantherae**
- 6 (3) Stromata 30–50 µm diam; conidiophores long and aseptate, 35–120 × 3–6 µm; conidia 50–100 µm long; on *Justicia betonica*, Asia (India) **C. justiciigena**
 Stromata smaller, 10–25 µm diam; conidiophores much shorter, 10–40 × 2.5–5 µm, 0–1-septate; conidia 25–80 µm long; on *Justicia spicigera*, Central America (Guatemala) **C. jacobiniicola**

Lepidagathis

A single species **C. lepidagathidis**

Pachystachys

A single species **C. justiciicola**

Peristrophe

A single species **C. peristrophes**

Rhytiglossa

A single species **C. diantherae**

Ruellia

A single species **C. ruellina**

Rungia

A single species **C. justiciicola**

Strobilanthes

A single species **C. strobilanthis**

Thunbergia

- 1 Conidia acicular to somewhat obclavate, 40–360 × (2–)3–8 µm, base truncate to somewhat obconically truncate **C. thunbergiana**
 Conidia acicular, narrower, 45–155 × 2–3 µm, base truncate **C. thunbergiigena**

Cercospora species on Acanthaceae

Cercospora acanthi Pass., in Rabenh., *Fungi Eur. Exs.*, Edn Nov., Ser. Sec., Cent. 3 (Resp. Cent. 23), no. 2273 (1876).

(Fig. 1)

Synonyms: *Cercospora acanthi* (Pass.) D. Sacc., *Suppl. Micol. 'Flora Veneta Critt.'* 1: 93 (1899).

Cercospora compacta Traverso, *Hedwigia* 43: 422 (1904) [*lectotype* (designated by Crous & Braun 2003): **Italy:** Padova, botanical garden, Jun. 1904, A. Pigal [P. Sacc., *Mycoth. Ital.* 1580] (B 700016201); *isoelectotypes:* Sacc., *Mycoth. Ital.* 1580, e.g. BPI 420644].

Cercospora acanthi-longifolii Săvul. & Sandu, *Acad. Române Mem. Sec. Şti.*, ser. 3, 15: 484 (1941) [*holotype:* Romania: Distr. Severin, near Cazane, on *Acanthus longifolius*, 16 Jul. 1937 (BUCM)].

Literature: Saccardo (1886: 448; 1906: 562; 1972: 1367), Lindau (1910: 133), Chupp (1954: 21), Braun (1995: 100), Crous & Braun (2003: 40).

Illustration: Chupp (1954: 21, fig. 1).

Exsiccatae: Rabenh., *Fungi Eur. Exs.* 2273. D. Sacc., *Mycoth. Ital.* 191, 1580.

Description: Leaf spots amphigenous, circular, subcircular to angular-irregular, 1–12 mm diam, sometimes confluent and larger, sometimes zonate, at first pale greenish, later yellowish to ochraceous, brown, finally greyish brown to greyish white, usually with a narrow darker border, occasionally somewhat raised. *Caespituli* amphigenous, punctiform, dark brown, later greyish white by abundant conidiation, scattered. *Mycelium* internal. *Stromata* well-

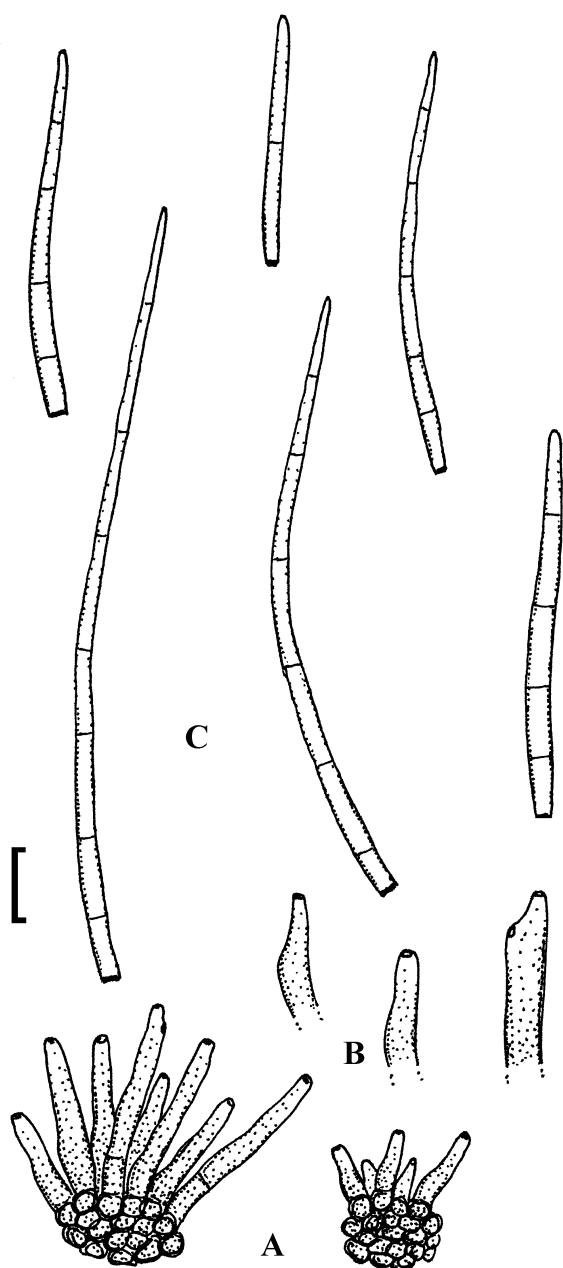


Fig. 1. *Cercospora acanthi* (Rabenh., Fungi Eur. Exs. 2273, HAL, lectotype). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. Bar = 10 μ m.

developed, 10–70 μ m diam, substomatal to immersed, large stromata often rupturing the stomata, somewhat erumpent, pale, subhyaline to yellowish brown, later dark brown, composed of swollen hyphal cells, 2.5–10 μ m diam, circular to somewhat irregular in shape. *Conidiophores* in small to large fascicles, dense, arising from stromata, through stomata or erumpent, erect, straight to curved or somewhat geniculate-sinuous, unbranched, 10–40(–60) \times 3–7 μ m, 0–2-septate, subhyaline, yellowish to pale olivaceous, paler towards the tip, somewhat darker in mass, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–30 μ m long, mostly with a single or two, occasionally several conspicuous conidiogenous loci, 1.5–2.5 μ m diam. *Conidia* solitary, acicular, smaller conidia narrowly obclavate-

cylindrical, straight to curved, 20–130 \times 2–5 μ m, rarely longer, shorter conidia 1–5-septate, longer ones indistinctly pluriseptate, hyaline, thin-walled, smooth, apex pointed, base truncate to short obconically truncate, (1.5–)2–2.5(–3) μ m wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202779): **Italy**: Parma, Botanical Garden, on *Acanthus spinosus*, Jul. 1875, G. Passerini [Rabenh., Fungi Eur. Exs. 2273] (HAL). **Isolectotypes**: e.g., B, BPI 432370, HBG, LE 40368.

Host range and distribution: On *Acanthus* (*hungaricus* [*balcanicus*], *mollis* [*longifolius*, *niger*], *spinosus* [*spinosissimus*], *Acanthus* spp., *Ruttya fruticosa*), *Acanthaceae*, Africa (Algeria, Ethiopia), Europe (Germany, Hungary, Italy, Romania).

Notes: The first valid description of *Cercospora acanthi* dates back to 1876 (in Rabenh., Fungi Eur. Exs. 2273), with a brief description on the label. The secondary description in "*Hedwigia* 16: 123 (1877)", usually cited as the original description, is younger; this is a consequence of Saccardo not accepting publication in exsiccate labels as acceptable. This species is a true *Cercospora* readily distinguishable from the *C. apii* s. lat. complex by its short, aseptate or sparingly septate, pale conidiophores and acicular to obclavate conidia. Records of this species on *Peristrophe bicalyculata* from Myanmar (Thaung 1984) are very doubtful and excluded.

Cercospora adhatodae S. Chowdhury, *Lloydia* 18: 84 "1955" (1956). (Fig. 2)

Literature: Vasudeva (1963: 32), Crous & Braun (2003: 44), Kamal (2010: 13).

Illustration: Chowdhury (1956: 85, fig. 1).

Description: *Leaf spots* amphigenous, 0.5–8 mm diam, often confluent, forming larger patches, subcircular to irregularly shaped, greyish white. *Caespituli* amphigenous, fine, dark. *Mycelium* internal. *Stromata* lacking or small, substomatal, brown. *Conidiophores* in small, divergent fascicles, arising from internal hyphae or stromatic hyphal aggregations, through stomata or erumpent, erect, straight, subcylindrical to geniculate in the upper half, 40–190 \times 4–6 μ m, 0–7-septate, brown to dark brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci conspicuous, about 2–3 μ m wide, thickened and darkened. *Conidia* solitary, acicular, straight to curved, 35–250 \times 2.5–5.5 μ m, 2–22-septate, hyaline, thin-walled, smooth, apex pointed, base truncate, about 2–3 μ m wide, hila thickened and darkened.

Holotype: **India**: Asom (Assam): Kokilamukh, on *Justicia adhatoda*, 12 Feb. 1951, S. Chowdhury (HCIO).

Host range and distribution: On *Justicia adhatoda* [*Adhatoda vasica*], *Acanthaceae*, Asia (India, Asom, Karnataka, Uttar Pradesh, West Bengal).

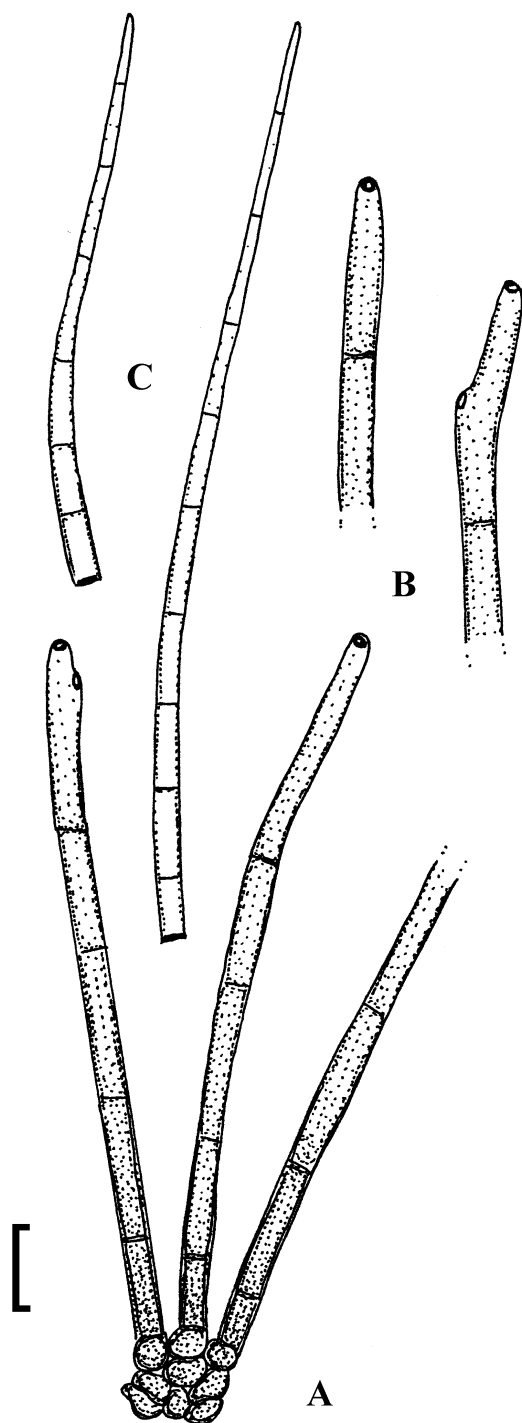


Fig. 2. *Cercospora adhatodae* (K(M) IMI 135861). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

Notes: This is a species of the *Cercospora apii* s. lat. complex. Several Indian collections from Karnataka, West Bengal and Uttar Pradesh have been examined (K(M) IMI 135861, 293593 and 330436).

Cercospora andrographidicola S.Q. Chen & P.K. Chi, *J. S. China Agric. Univ.* **11**(3): 61 (1990); as “*andrographicola*”. (Fig. 3)

Literature: Chi (1994: 94).

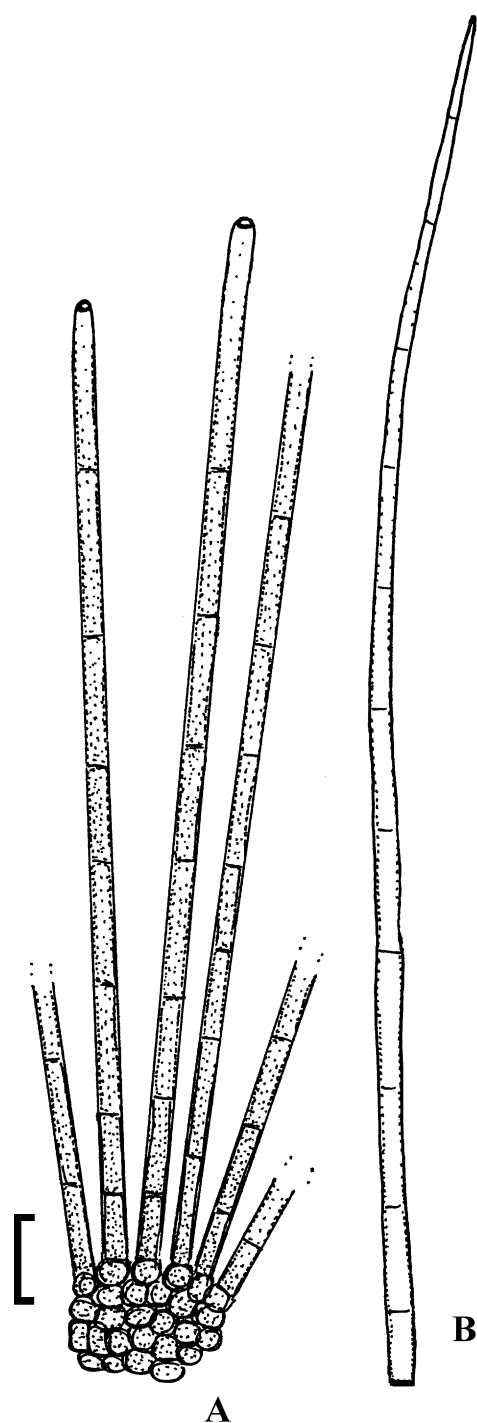


Fig. 3. *Cercospora andrographidicola* (based on Chi 1994: 94, fig. 86). **A.** Conidiophore fascicle. **B.** Conidium. Bar = 10 μ m.

Illustration: Chi (1994: 94, fig. 86).

Description: *Leaf spots* amphigenous, circular, elliptical to irregular, centre pale, margin indistinct, greyish green below. *Caespituli* amphigenous. *Mycelium* internal. *Stromata* well-developed, 16–57 μ m diam, brown. *Conidiophores* in loose fascicles, 4–15, arising from stromata, erect, straight, subcylindrical, non-geniculate, unbranched, 150–233 \times 3.3–6.7 μ m, 2–10-septate, olivaceous; conidiogenous cells integrated, terminal, usually with a single terminal conidiogenous locus, thickened and darkened. *Conidia*

solitary, acicular, straight to somewhat curved, $200\text{--}240 \times 3.3\text{--}5 \mu\text{m}$, hyaline, thin-walled, smooth, apex pointed, base truncate, hila thickened and darkened.

Holotype: **China:** Guangdong: Gaoyao, on *Andrographis paniculata*, Oct. 1986, S. G. Chen 123 (Hb. S. China Agric. Univ., Guangzhou).

Host range and distribution: On *Andrographis paniculata*, *Acanthaceae*, Asia (China).

Notes: Belonging to the *Cercospora apii* s. lat. complex, but type material was not available for a re-examination. To-anun et al. (2011) described and illustrated "*C. andrographidicola*" on *Andrographis paniculata* from Thailand. This material is, however, morphologically distinct by lacking or small stromata, up to $30 \mu\text{m}$ diam, shorter, geniculate conidiophores, and much shorter, acicular to obclavate conidia, and rather belongs to *C. andrographidis*.

Cercospora andrographidis Thirum. & Govindu, *Sydowia* 7: 310 (1953). (Fig. 4)

Literature: Vasudeva (1963: 36), Braun & Crous (2003: 57), Kamal (2010: 16), To-anun et al. (2011: 30), as "*C. andrographidicola*".

Illustrations: Thirumalachar & Govindu (1953: plate VI, figs 5–6), To-anun et al. (2011: 30, fig. 12), as "*C. andrographidicola*".

Description: Leaf spots amphigenous, circular to somewhat angular-irregular, 2–6 mm diam, at first dingy greenish, olivaceous or brown, later greyish white, surrounded by a narrow brown margin or marginal line, slightly raised or margin broader, pinkish brown. *Caespituli* amphigenous, mainly epiphyllous, not very conspicuous. *Mycelium* internal. *Stromata* lacking or inconspicuous and small, only a few swollen hyphal cells, $5\text{--}20 \mu\text{m}$ diam, usually intraepidermal, if present to $30 \mu\text{m}$ diam, brown, cells $3\text{--}8 \mu\text{m}$ diam, wall slightly thickened. *Conidiophores* solitary or in small divergent fascicles, arising from internal hyphae or aggregations of swollen hyphal cells, erumpent, erect, straight to geniculate, unbranched, $15\text{--}165 \times 3\text{--}6.5 \mu\text{m}$, 1–9-septate, light to medium dark brown, wall thin to slightly thickened, smooth; conidiogenous cells integrated, terminal, occasionally intercalary, $15\text{--}30 \mu\text{m}$ long, sympodial, conidiogenous loci conspicuous, thickened and darkened, $2\text{--}3 \mu\text{m}$ diam. *Conidia* solitary, acicular to somewhat obclavate, straight to curved, $30\text{--}150 \times 2\text{--}4 \mu\text{m}$, 1–16-septate, hyaline, thin-walled, smooth, apex subacute, base truncate to somewhat obconically truncate, $2\text{--}2.5 \mu\text{m}$ wide, hila thickened and darkened.

Holotype: **India:** Bihar: Patna, on *Andrographis* sp., 20 Jan. 1951, M. J. Thirumalachar (not traced).

Host range and distribution: On *Andrographis* (*paniculata*, *Andrographis* sp.), *Acanthaceae*, Asia (India, Bihar, Andhra Pradesh, West Bengal; Thailand).

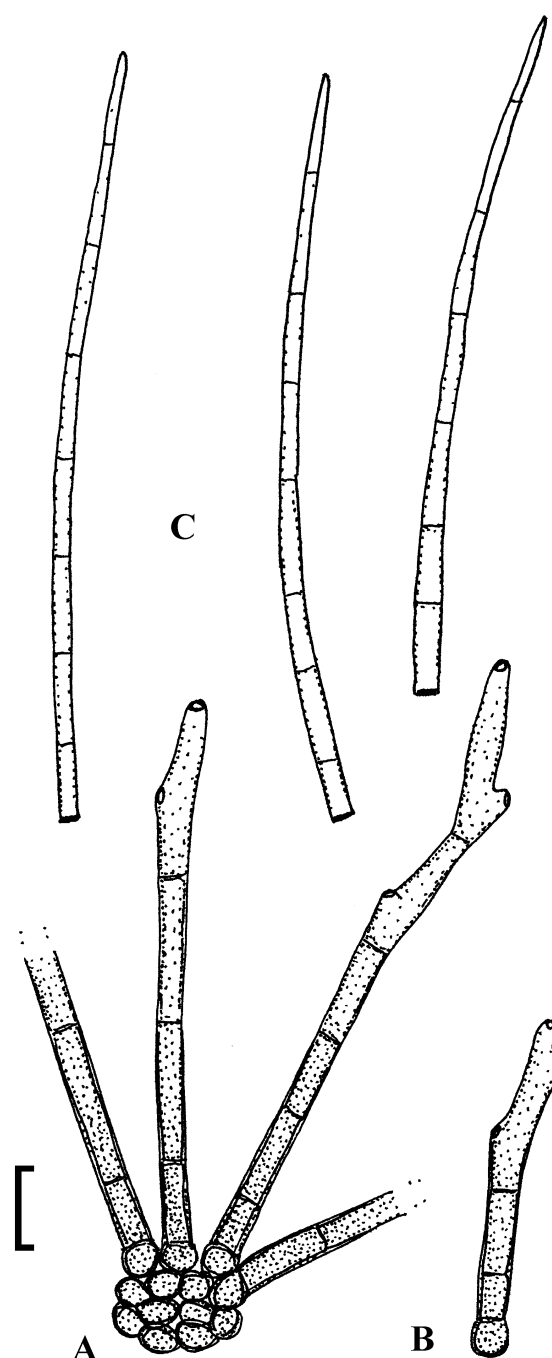


Fig. 4. *Cercospora andrographidis* (BPI 432654). A. Conidiophore fascicle. B. Solitary conidiophore. C. Conidia. Bar = $10 \mu\text{m}$.

Note: The conidia of this species were described to be "acicular" with obconically truncate base, i.e. they are, at least partly, obclavate as depicted in Thirumalachar & Govindu (1953: plate VI, fig. 6). This could be confirmed on the base of an examined collection from India (West Bengal, Midnapur, Daspur, 20 Mar. 1967, M. Mandal, BPI 432654). To-anun et al. (2011) described and illustrated "*C. andrographidicola*" on *Andrographis paniculata* from Thailand. This material, characterised by lacking or small stromata and acicular to obclavate conidia, is quite distinct from true *C. andrographidicola* and rather belongs to *C. andrographidis*. An additional sample from India (Daspur, BPI 432654) has been examined.

Cercospora asystasiana J.M. Yen, *Rev. Mycol.* **32**: 180 (1967).
(Fig. 5)

Literature: Yen & Lim (1980: 155), Crous & Braun (2003: 70), Nakashima et al. (2010).

Illustration: Yen (1967: 181, fig. 2), Yen & Lim (1980: 206, fig. 9).

Description: Leaf spots amphigenous, on faded leaves, scattered, subcircular, 2–5 mm diam, brown, margin indefinite. *Caespituli* hypophyllous, rather inconspicuous. *Mycelium* internal. *Stromata* lacking or almost so. *Conidiophores* solitary or in small divergent fascicles, 2–5, arising from internal hyphae or small substomatal hyphal aggregations, through stomata, erect, straight to somewhat curved, subcylindrical to distinctly geniculate-sinuous, unbranched, 30–120(–135) × 3–6 µm, 0–5-septate, brown to dark brown, thin-walled, smooth; conidiogenous cells integrated, terminal or intercalary, about 15–30 µm long, conidiogenous loci thickened and darkened, about 2–2.5 µm diam. *Conidia* solitary, acicular to somewhat obclavate, straight to curved or somewhat sigmoid, 45–185 × 2.5–5 µm, 4–20-septate, hyaline, thin-walled, smooth, apex subacute, base truncate or slightly obconically truncate, 2–3 µm wide, hila thickened and darkened.

Holotype: **Singapore**: Botanical Garden, on *Asystasia chelonoides*, 5 Jan. 1966, J. M. Yen 769 (PC).

Host range and distribution: On *Asystasia* (*chelonoides*, *nemorum*), *Acanthaceae*, known from the type collection [records of *Cercospora justiciicola* on *Asystasia gangetica* and *C. cf. malloti* on *A. salicifolia* might belong to this species – see notes].

Notes: This species is part of the *Cercospora apii* s. lat. complex. Records of *Cercospora justiciicola* on *Asystasia gangetica* [*coromandeliana*] (see Crous & Braun 2003: 234) are unclear but might belong to *C. asystasiana*.

Nguanhom et al. (2015) examined *Cercospora* species from northern Thailand using molecular methods. Sequences derived from several collections on various unrelated host species, including *Asystasia salicifolia*, clustered in a clade tentatively denominated as *C. cf. malloti* in Groenewald et al. (2013: 157). Taxa belonging to this clade represented the most common *Cercospora* encountered in this study. *Cercospora* cf. *malloti* is morphologically part of the *C. apii* complex. The true *C. malloti* was based on North American *Cercospora* material infecting *Mallotus japonicus*. The tentative allocation of this clade comprising plurivorous *C. apii*-like races to *C. malloti* is neither settled nor finally proven since cultures and sequences based on North American collections retrieved from *Mallotus* are not yet available. Due to the wide but hitherto little known host range of this taxon, it is not yet possible to exclude that several other host species and older species names of *Cercospora* might be involved. Therefore, it is currently impossible to resolve the clade concerned.

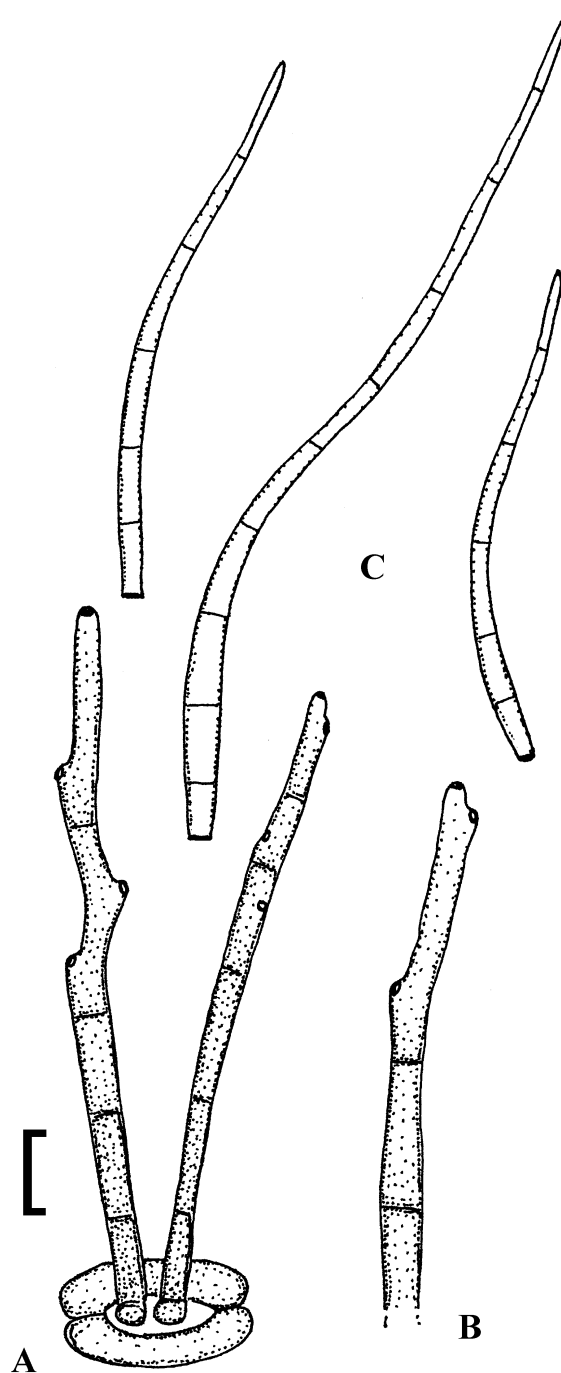


Fig. 5. *Cercospora asystasiana* (PC, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore, **C.** Conidia. Bar = 10 µm.

Cercospora balaghatensis S.M. Singh, *Indian Phytopathol.* **29**: 17 “1976” (1977).
(Fig. 6)

Literature: Crous & Braun (2003: 74), Kamal (2010: 20).

Illustration: Singh (1977: 18, fig. 1).

Description: Leaf spots dingy grey with light to dark brown irregular margin. *Caespituli* amphigenous, scattered, punctiform, dark. *Mycelium* internal. *Stromata* 20–85 µm diam, immersed, olivaceous-brown. *Conidiophores* in large,

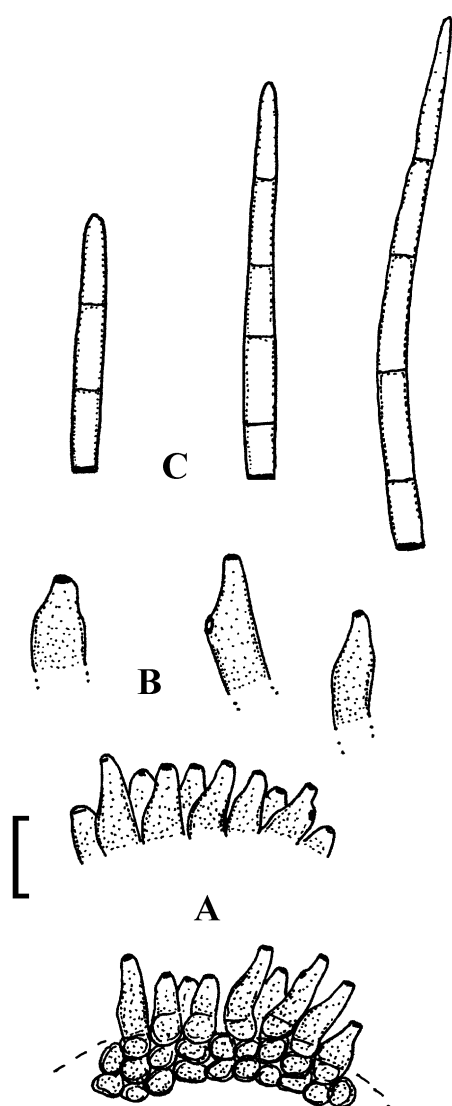


Fig. 6. *Cercospora balaghatensis* (K(M) IMI 150920a, holotype). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. Bar = 10 μ m.

loose to usually dense fascicles, arising from stromata, erect, straight, subcylindrical, barely geniculate, unbranched, about $10\text{--}40 \times 3\text{--}5 \mu\text{m}$, 0–4-septate, pale olivaceous to brownish, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci conspicuous, thickened and darkened, about $2\text{--}2.5 \mu\text{m}$ diam. *Conidia* solitary, acicular or subcylindrical, straight to slightly curved, $20\text{--}50 \times 2\text{--}4 \mu\text{m}$, 0–5-septate, hyaline, thin-walled, smooth, apex subacute or subobtuse, base truncate, $1.5\text{--}3 \mu\text{m}$ wide, hila thickened and darkened.

Holotype: India: Madhya Pradesh: Balaghat, on *Justicia* sp., *Acanthaceae*, Jun. 1970, S. M. Singh (K(M) IMI 150920a).

Host range and distribution: Only known from the type collection.

Notes: A true *Cercospora* s. str. distinct from *C. apii* s. lat. by having very large stromata, short, densely fasciculate conidiophores and short, 0–4-septate conidia.

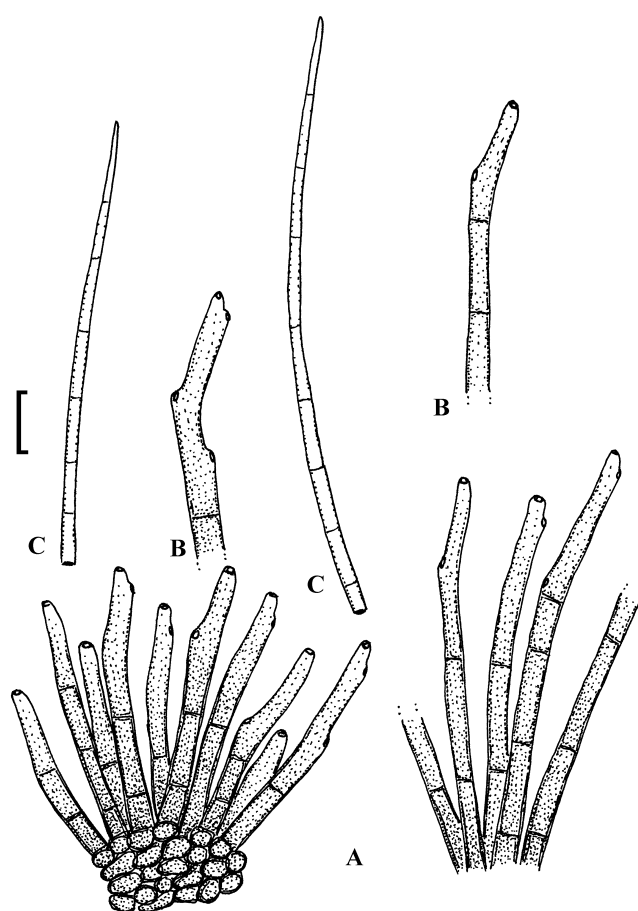


Fig. 7. *Cercospora barleriicola* (K(M) IMI 102433). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. Bar = 10 μ m.

Cercospora barleriicola Payak & Thirum., *Indian Phytopathol.* 2: 191 (1949); as “*barlericola*” (Fig. 7)

Synonym: *Cercospora barleriae-cristatae* Govindu & Thirum., *Sydowia* 10: 273 “1956” (1957) [*holotype*: India: Karnataka: Bangalore, on *Barleria cristata*, 10 Dec. 1953, H. C. Govindu (not traced)].

Literature: Chupp (1954: 22), Vasudeva (1963: 46–47), Crous & Braun (2003: 76), Kamal (2010: 21), Meeboon *et al.* (2007a,b), To-anun *et al.* (2011: 31)

Illustrations: Govindu & Thirumalachar (1957: plate VIII, fig. 10), Vasudeva (1963: 47, fig. 16), To-anun *et al.* (2011: 31, fig. 13).

Description: Leaf spots amphigenous, subcircular to angular-irregular, 2–8 mm diam, diffuse discolorations, yellowish to dark reddish brown, later pale brownish to greyish brown or greyish white with darker border. *Caespituli* amphigenous, subeffuse to punctiform, dark brown. *Mycelium* internal. *Stromata* almost lacking or small to moderately large, $10\text{--}60 \mu\text{m}$ diam, olivaceous-brown to dark brown, substomatal to immersed. *Conidiophores* in small to moderately large fascicles, loose to dense, arising from stromata, through stomata or erumpent, erect, straight, subcylindrical to

moderately geniculate-sinuous, unbranched, $10\text{--}210 \times 2.5\text{--}6 \mu\text{m}$, 1- to pluriseptate throughout, pale to medium olivaceous-brown or brown throughout or paler towards the tip, wall thin to slightly thickened, smooth; conidiogenous cells integrated, terminal, $10\text{--}30 \mu\text{m}$ long, conidiogenous loci conspicuous, thickened and darkened, $(1.5\text{--})2\text{--}3 \mu\text{m}$ diam. *Conidia* solitary, longer conidia acicular with truncate base, shorter ones may be obclavate-cylindrical with obconically truncate base, straight to curved, $30\text{--}220 \times 2\text{--}4 \mu\text{m}$, 3–18-septate, hyaline, thin-walled, smooth, apex pointed, base truncate to somewhat obconically truncate, $1.5\text{--}3 \mu\text{m}$ wide, hila thickened and darkened.

Holotype: **India:** *Uttar Pradesh:* Varanasi, Baranares Hindu University, on *Barleria cristata*, 9 Dec. 1949, M. M. Payak (not traced).

Host range and distribution: On *Barleria* (*cristata*, *prionitis*, *Barleria* sp.), *Acanthaceae*, Asia (India, Jammu and Kashmir, Karnataka, Maharashtra, Madhya Pradesh, Uttar Pradesh; Thailand), West Indies (Jamaica).

Notes: Several Indian collections and a sample from Jamaica on *Barleria* spp. (K(M) IMI 102433, 163693, 226980, 265815) have been examined and proved to belong to a single variable *Cercospora* s. str. species belonging to the *C. apii* s. lat. complex. Since phylogenetic data are not yet available, it remains unclear if a single polymorphous species or several cryptic species are involved.

***Cercospora blepharidicola* U. Braun, nom. nov.**

MycoBank MB814564

(Fig. 8)

Basionym: *Cercospora blepharidis* R.K. Dubey et al., *J. Mycol. Pl. Pathol.* **41**: 514 (2011), as "*blepharia*", nom. illeg. (Art. 53.1), non *C. blepharidis* Chidd, 1960.

Illustration: Dubey et al. (2011: 516, fig. 3).

Description: *Leaf spots* amphigenous, mainly epiphyllous, small to large, scattered, dark brown. *Caespituli* amphigenous, effuse, uniformly distributed. *Mycelium* internal. *Stromata* well-developed, to $45 \mu\text{m}$ diam, dark olivaceous. *Conidiophores* in loose fascicles, erect, straight, subcylindrical, flexuous, unbranched, arising from a swollen base, about $15\text{--}65 \times 4\text{--}6 \mu\text{m}$, 1–3-septate, light olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal, cylindrical, cicatrized, thickened and darkened. *Conidia* solitary, acicular, straight to curved, $20\text{--}112 \times 1\text{--}4 \mu\text{m}$, to 10-septate, hyaline, thin-walled, smooth, apex pointed, base truncate or subtruncate, hila thickened and darkened.

Holotype: **India:** *Madhya Pradesh:* North Sagar Forest Division, Toda Khurai, on *Blepharis maderaspatensis*, *Acanthaceae*, Dec. 1996, R. K. Dubey AR-58 (HCIO 439724).

Host range and distribution: Only known from the type collection.

Notes: The name *C. blepharidis* R.K. Dubey et al. is a homonym of *C. blepharidis* Chidd. (Chiddarwar 1960).

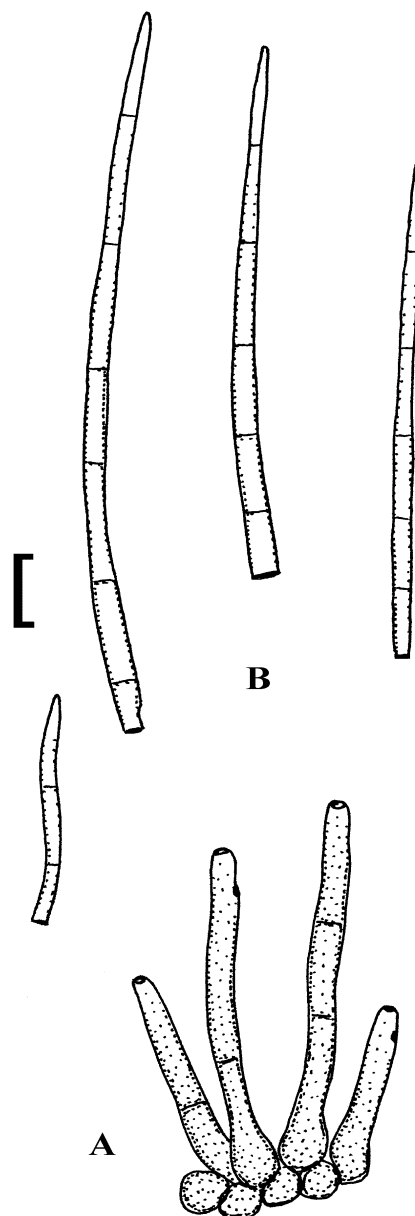


Fig. 8. *Cercospora blepharidicola* (based on Dubey et al. 2011: 516, fig. 3). **A.** Conidiophore fascicle. **B.** Conidia. Bar = $10 \mu\text{m}$.

***Cercospora crossandrae* Jagan., Palan. & Narayans., *Madras Agric. J.* **59**: 672 (1972).**

Literature: Crous & Braun (2003: 143), Kamal (2010: 36).

Illustration: Jaganathan et al. (1972: 671, fig. 1).

Description: *Leaf spots* circular to irregular, 2–5 mm diam, confluent, foliage finally drying up, brown, border yellow, sometimes with concentric rings. *Colonies* white, later with dark brown margin. *Mycelium* internal. *Conidiophores* fasciculate, geniculate, unbranched, about $37.5\text{--}62.5 \times 6 \mu\text{m}$, 4–7-septate, brown. *Conidia* solitary, acicular to obclavate ("filiform according to the original description), about $53\text{--}106 \times 3\text{--}6 \mu\text{m}$, 5–11-septate, hyaline, apex pointed, base truncate to short obconically truncate, probably thickened and darkened.

Holotype: India: Tamil Nadu: Coimbatore, College Orchard of the Tamil Nadu Agricultural University, on *Crossandra infundibuliformis*, Acanthaceae (T.N. Agric. Univ., Coimbatore, Pl. Pathol. Herb. No. 231).

Host range and distribution: Only known from the type collection.

Notes: It is unknown if type material of this species is maintained. It was not available for examination. Based on the original description and illustration, we suppose that this species belongs to *Cercospora* s. str. although details of the conidiogenous loci and hila were not described.

Cercospora diantherae Ellis & Kellerm., *J. Mycol.* 1: 2 (1885).

(Fig. 9)

Synonym: *Cercospora jacobinae* Mendoza, *Philipp. J. Sci.* 75: 169 (1941) [holotype: Philippines: Manila, on *Justicia carnea*, Mendoza, no. 7124 (not traced)].

Literature: Saccardo (1886: 448), Chupp (1954: 23), Crous & Braun (2003: 159).

Illustration: Chupp (1954: 23, fig. 4).

Exsiccatae: Ellis & Everh., *Fungi Columb.* 695. Ellis & Everh., *N. Amer. Fungi* 1750. Kellerm. & Swingle, *Kansas Fungi* 33. Roum., *Fungi Sel. Gall. Exs.* 5190.

Description: Leaf spots circular to somewhat angular-irregular, 1–5 mm diam, occasionally confluent and larger, slightly zonate, centre greyish white with narrow to often broad brown border. *Caespituli* amphigenous, dark brown. *Mycelium* internal. *Stromata* lacking to small, 10–25 µm diam, composed of a few swollen hyphal cells, brown, substomatal to intraepidermal. *Conidiophores* in small to moderately large fascicles, 2–15, divergent to moderately dense, arising from internal hyphae or stromatic hyphal aggregations, through stomata or erumpent, erect, straight, subcylindrical to sinuous or somewhat geniculate, unbranched or rarely branched, 10–100 × 3.5–6 µm, aseptate to pluriseptate throughout, pale to medium brown, wall thin to slightly thickened, smooth; conidiogenous cells integrated, terminal, 10–25 µm long, with a single to several conidiogenous loci, 2.5–3.5 µm diam. *Conidia* solitary, acicular or subacicular, straight to curved or occasionally somewhat sigmoid, 40–160(–180) × 2–4 µm, pluriseptate, distance between septa 5–15 µm, hyaline, thin-walled, smooth, apex acute to subobtuse, base usually truncate, occasionally somewhat obconically truncate, 2–3 µm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202780): USA: Kansas: on *Justicia americana*, Sep. 1884, W. A. Kellerman (CUP 39680). **Isolectotype:** PH 1798.

Host range and distribution: On *Justicia* (*americana*, *carnea*, *ovata*, *Justicia* sp.), *Rhytiglossa humilis* [*Justicia humilis*], Acanthaceae, Asia (Philippines), North America (USA,

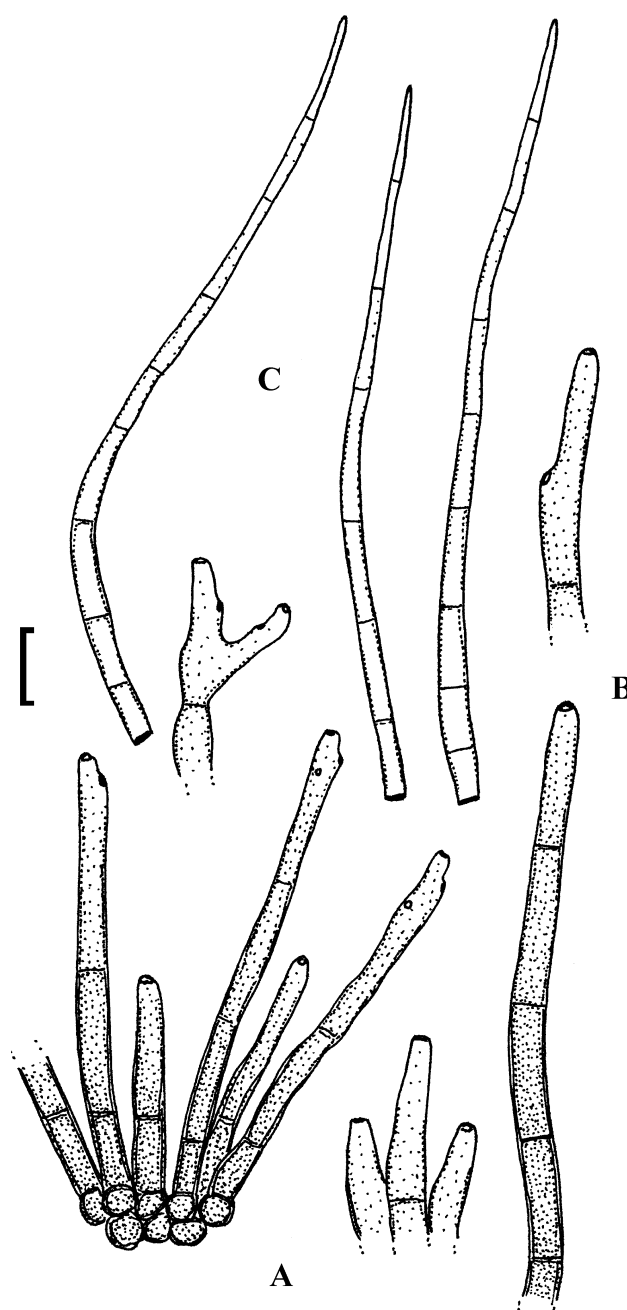


Fig. 9. *Cercospora diantherae* (CUP 39680, lectotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

Delaware, Florida, Illinois, Indiana, Kansas, Maryland, Missouri, Oklahoma, Texas, Washington, West Virginia), South America (Venezuela).

Notes: This species belongs to the *Cercospora apii* (s. lat.) complex. Type material (collected in Sep. 1884) is not preserved at NY. There are numerous topotypes from 1886, e.g. B; BPI 435404, 435692, 435700, 435701; NY 270701. However, the type material collected in Sep. 1884 was traced in CUP and FH. The CUP material is designated as lectotype. Records of *C. diantherae* on *Jacobinia* spp. are doubtful. The hosts concerned probably refer to *Justicia* spp. in the current sense.

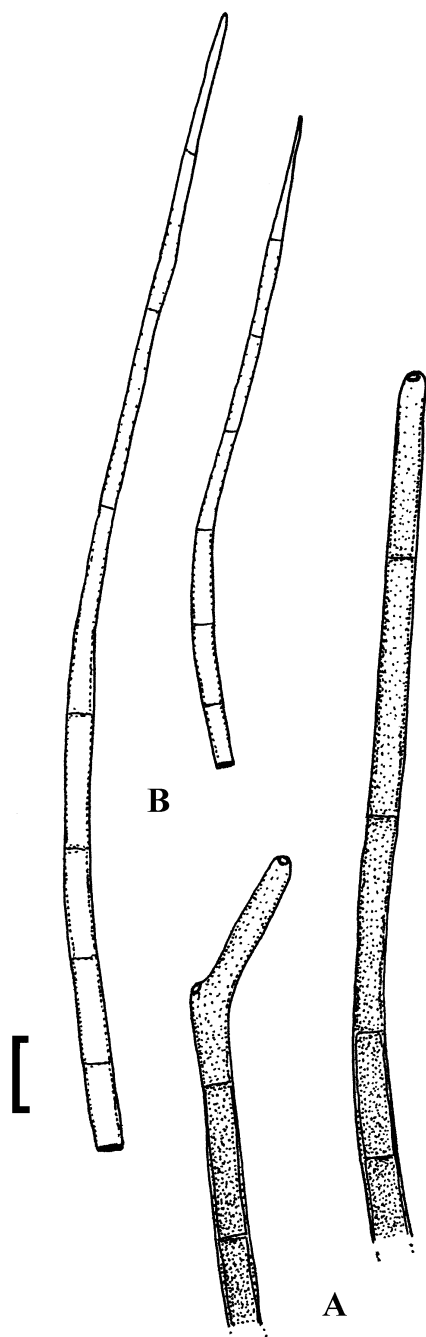


Fig. 10. *Cercospora hygrophilae* (K(M) IMI 126157). A. Conidiophores. B. Conidia. Bar = 10 μ m.

Cercospora hygrophilae Ponnappa, *Proc. Indian Acad. Sci., sect. B*, **67**: 31 (1968). (Fig. 10)

Literature: Crous & Braun (2003: 222), Kamal (2010: 52).

Illustration: Ponnappa (1968: 32, fig. 1).

Description: *Leaf spots* amphigenous, often marginal, oblong, oval to irregular, 5–15 mm diam, dark brown to blackish. *Caespituli* amphigenous, fine, dark. *Mycelium* internal. *Stromata* lacking or small, formed as aggregations of some swollen hyphal cells, 10–30 μ m diam, substomatal or immersed, globose to somewhat irregular, brown.

Conidiophores in divergent to moderately dense fascicles, 2–15, arising from internal hyphae or stromatic hyphal aggregations, erumpent or through stomata, erect, straight, subcylindrical to somewhat geniculate above, unbranched, 30–500 \times 3–8 μ m, 1- to pluriseptate throughout, brown, wall somewhat thickened, smooth; conidiogenous cells integrated, terminal, about 10–35 μ m long, conidiogenous loci conspicuous, thickened and darkened, 2.5–4 μ m diam. *Conidia* solitary, acicular, straight, curved to sigmoid, 50–250 \times 2–5(–6) μ m, 5–22-septate, hyaline, thin-walled, smooth, apex pointed, base truncate, 2–4 μ m wide, hila thickened and darkened.

Holotype: **India**: Karnataka: Bannerghatta, on *Hygrophila auriculata*, 21 Feb. 1967, K. M. Ponnappa (K(M) IMI 126157).

Host range and distribution: On *Hygrophila* (*auriculata* [*spinosa*, *Asteracantha longifolia*], *polysperma*, *ringens* [*quadri-valvis*]), *Acanthaceae*, Asia (India, Karnataka, West Bengal).

Notes: This species is a typical member of *Cercospora* s. str. belonging to the *C. apii* s. lat. complex, but the conidiophores are very long, 30–500 \times 3–8 μ m. The original description is misleading and possibly based on not fully developed conidiophores and conidia.

Cercospora jacobiniicola A.S. Mull. & Chupp, *Ceiba* **1**: 174 (1950); as “*jacobinicola*”. (Fig. 11)

Literature: Chupp (1954: 24).

Description: *Leaf spots* amphigenous, subcircular to irregular, 2–6 mm diam, lead-coloured to blackish, with somewhat raised narrow border line. *Caespituli* amphigenous, mainly hypophyllous, punctiform, brown. *Mycelium* internal. *Stromata* lacking or small, substomatal, about 10–25 μ m diam, dark olivaceous to brown. *Conidiophores* in small to moderately large fascicles, divergent to dense, arising from internal hyphae or stromata, through stomata, erect, straight, subcylindrical-conical to slightly geniculate-sinuous, unbranched, 10–40 \times 2.5–5 μ m, 0–1-septate, subhyaline to pale olivaceous-brown, thin-walled, smooth; conidiophores reduced to conidiogenous cells or conidiogenous cells integrated, terminal, 10–30 μ m long, conidiogenous loci conspicuous, formed as minute circles, about 1 μ m diam, only margin slightly thickened and darkened (paracercosporoid). *Conidia* solitary, cylindrical to obclavate-subcylindrical, straight to slightly curved, 25–80(–105) \times (2.5–)3–4(–5) μ m, 2–7(–9)-septate, hyaline to very pale greenish or olivaceous, thin-walled, smooth, apex obtuse to subacute, base short obconically truncate, occasionally truncate, 1–1.5 μ m wide, barely thickened and darkened.

Holotype: **Guatemala**: Chimaltenango, on *Justicia spicigera* [*Jacobinia spicigera*], *Acanthaceae*, 2 Oct. 1941, A. S. Muller 42 (CUP 40082).

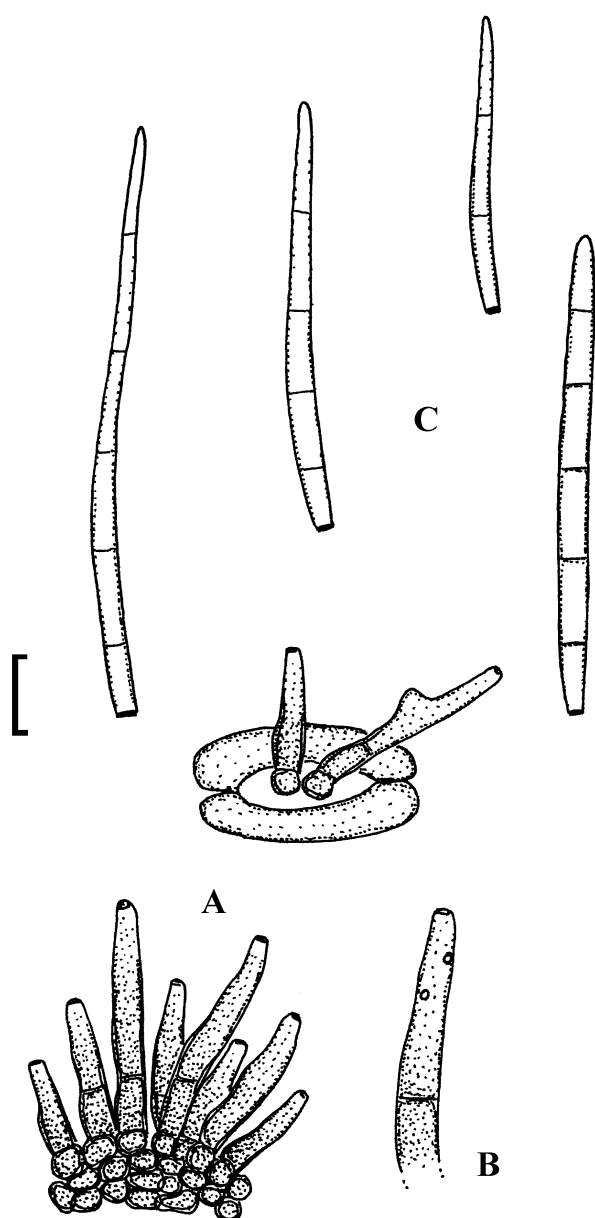


Fig. 11. *Cercospora jacobiniicola* (CUP 40082, holotype). A. Conidiophore fascicles. B. Conidiophore. C. Conidia. Bar = 10 μ m.

Host range and distribution: Only known from the type collection.

Note: Tentatively maintained in *Cercospora*. The conidia are colourless or almost so, the conidiogenous loci are conspicuous, but minute, ca. 1 μ m wide, and somewhat paracercospora-like. Cultures and results based on molecular sequence analyses are necessary to resolve the true generic affinity of this species.

***Cercospora justiciae-adhatodae* U. Braun, sp. nov.**
Mycobank MB814556
(Fig. 12a,b)

Diagnosis: Differs from *Cercospora adhatodae* and all other *Cercospora* species on hosts of the *Acanthaceae* in forming small catenate conidia, (8–)12–35(–40) \times 2–3 μ m, (0–)1–3(–4)-septate.

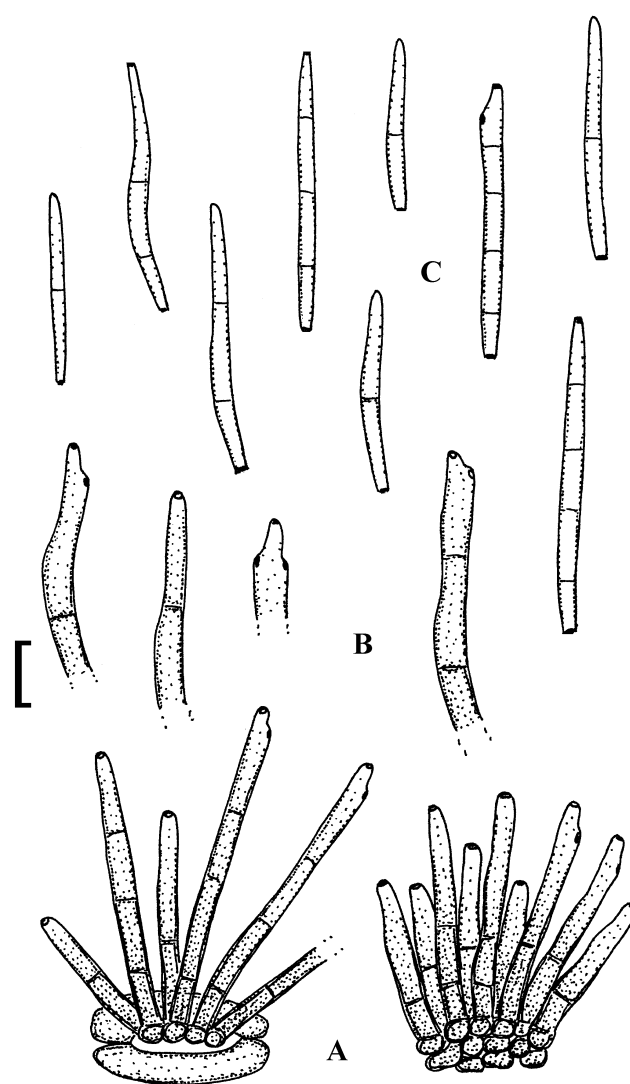


Fig. 12a. *Cercospora justiciae-adhatodae* (BPI 1103659, holotype). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. Bar = 10 μ m.

Description: *Leaf spots* amphigenous, circular, subcircular to slightly angular-irregular, 0.5–4 mm diam, at first brown, but soon turning greyish white to white, margin narrow, somewhat raised, dark, brown, dark violet to almost blackish. *Caespituli* amphigenous, punctiform, scattered to dense, brown to dark brown. *Mycelium* internal. *Stromata* lacking or almost so to well-developed, 10–30 μ m diam, substomatal to intraepidermal, brown, cells 2–5 μ m diam, wall at first thin, later slightly thickened. *Conidiophores* in small, loose to moderately large and dense fascicles, arising from substomatal or intraepidermal hyphae or stromata, emerging through stomata or erumpent, erect, straight to curved, subcylindrical or somewhat attenuated towards the tip to moderately geniculate-sinuous, unbranched, 10–50 \times 2–5 μ m, 0–3-septate, pale olivaceous to olivaceous-brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–25 μ m long, proliferation sympodial, conidiogenous loci conspicuous, 1–2 μ m wide, somewhat thickened and darkened. *Conidia* solitary and catenate, in simple or occasionally branched chains, narrowly cylindrical-fusiform, short obclavate, (8–)12–35(–40) \times 2–3



Fig. 12b. *Cercospora justiciae-adhatodae* (BPI 1103659, holotype). Symptoms on leaves.

μm , (0–)1–3(–4)-septate, hyaline, thin-walled, smooth, apex subacute, subobtuse or short conically truncate, base subtruncate to short obconically truncate, 1–1.5 μm wide, hila slightly thickened and darkened.

Holotype: **India:** Karnataka: Chikkaballapur District, Nandi Hills, on *Justicia adhatoda* [*Adhatoda vasica*], *Acanthaceae*, 10 Jan. 1969, V. S. Seshadri & K. A. Lucy Channamma (BPI 1103659).

Host range and distribution: Only known from the type collection.

Notes: Type material of this species was originally deposited as *Cercospora adhatodae*, but it is quite distinct from the latter species, which belongs to the *C. apii* complex, by much shorter, narrower, usually 1–3-septate conidia formed in chains. These characteristics distinguish the new species from all other *Cercospora* species described on hosts belonging to the *Acanthaceae*. Previously one were inclined to put this species in *Passalora* s. lat. (including *Phaeoramularia*), but catenate, colourless conidia are rather

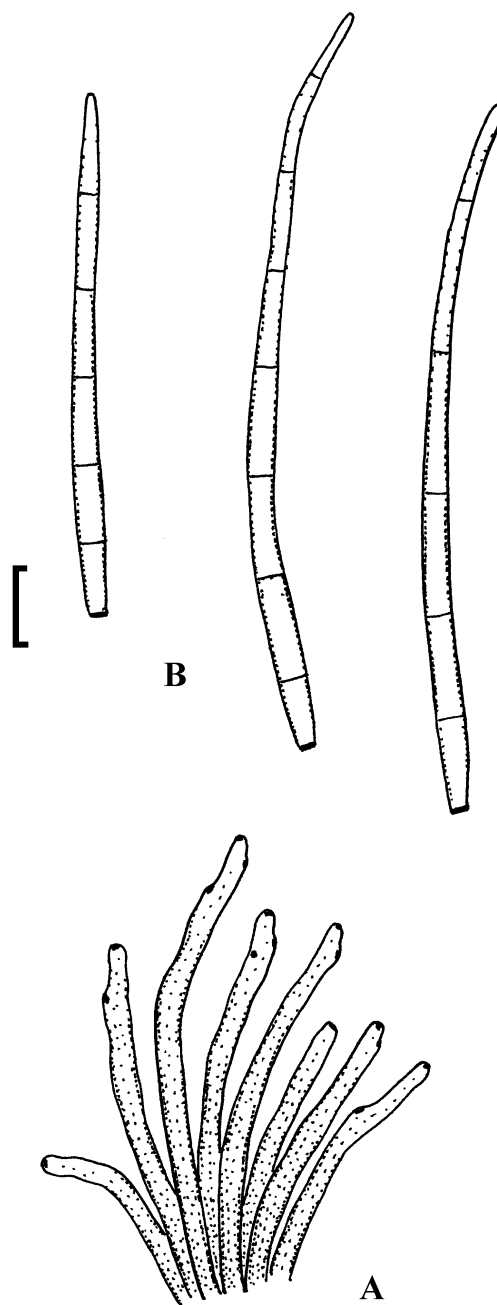


Fig. 13. *Cercospora justiciigena* (based on Karan & Manoharachary 1978: 158, fig. 1–2). **A.** Conidiophore fascicle. **B.** Conidia. Bar = 10 μm .

in favour of *Cercospora* s. str., which has recently been shown in the course of phylogenetic studies of cercosporoid hyphomycetes (see Braun et al. 2013). Therefore, the present new species is, at least for the interim, placed in *Cercospora* although cultures and molecular data are not yet available.

***Cercospora justiciigena* U. Braun, nom. nov.**

Mycobank MB814565

(Fig. 13)

Basionym: *Cercospora acanthacearum* var. *macrospora* Karan & Manohar., *Botanique* 7: 159 “1976” (1978), non *Cercospora macrospora* Bres., 1886.

Literature: Crous & Braun (2003: 40), Kamal (2010: 12).

Illustration: Karan & Manoharachary (1978: 158, fig. 1–2).

Description: *Leaf spots* epiphyllous, zonate, 4–6 mm diam, white, surrounded by a pinkish border. *Mycelium* internal. *Stromata* about 30–50 µm diam, dark brown, pseudoparenchymatic. *Conidiophores* fasciculate, arising from stromata, erect, straight to curved, unbranched, geniculate in the upper half, about 35–120 × 3–6 µm, aseptate, brown, colourless towards the tip; conidiophores reduced to conidiogenous cells, apex rounded with dark annular conidiogenous loci. *Conidia* solitary, obclavate, straight, about 50–100 × 3–4.5 µm, pluriseptate, hyaline, thin-walled, smooth, tips pointed, base short obconically truncate, hila somewhat thickened and darkened.

Holotype: **India:** Andhra Pradesh: Hyderabad, University, green house, on *Justicia betonica*, *Acanthaceae*, 10 Dec. 1964, D. Karan & C. Manoharachary (HY 197).

Host range and distribution: Only known from the type collection.

Notes: This fungus was introduced as variety of *C. acanthacearum*, although quite different from the latter species by its much longer conidiophores and much wider conidia. Owing to the description and illustration of conspicuous, dark conidiogenous loci and hila as well as colourless conidia formed singly, *C. acanthacearum* var. *macrospora* is undoubtedly a true *Cercospora* (s. str.) species. The generic affinity of *C. acanthacearum* is unclear, but this species might rather be a member of *Pseudocercospora*.

Cercospora justiciicola F.L. Tai, *Lloydia* 11: 47 (1948); as “*justiciaecola*”. (Fig. 14)

Literature: Chupp (1954: 24), Ellis (1976: 244), Guo *et al.* (2005: 17), Kamal (2010: 55).

Illustrations: Tai (1948: 44, fig. 9), Ellis (1976: 243, fig. 183 A), Guo *et al.* (2005: 17, fig. 1).

Description: *Leaf spots* amphigenous, subcircular, 3–10 mm diam, yellowish, ochraceous, pale brown to finally greyish white, often somewhat zonate, sometimes with yellowish halo. *Caespituli* amphigenous, punctiform, brown. *Mycelium* internal. *Stromata* almost lacking to developed, 10–30 µm diam, brown, substomatal to immersed. *Conidiophores* in small to moderately large fascicles, divergent, arising from stromata, through stomata or erumpent, erect, straight, subcylindrical to usually geniculate-sinuous, unbranched, 25–195 × 3–6 µm, 2–10-septate, olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal to intercalary, about 15–35 µm long, conidiogenous loci thickened and darkened, 1.5–3 µm diam. *Conidia* solitary, acicular to obclavate-subcylindrical, straight to curved, (15–)40–140(–155) × 3–4.5(–5) µm, (2–)3–10(–17)-septate, hyaline, thin-walled, apex subacute, base truncate to short obconically truncate, 2–3 µm wide, hila thickened and darkened.

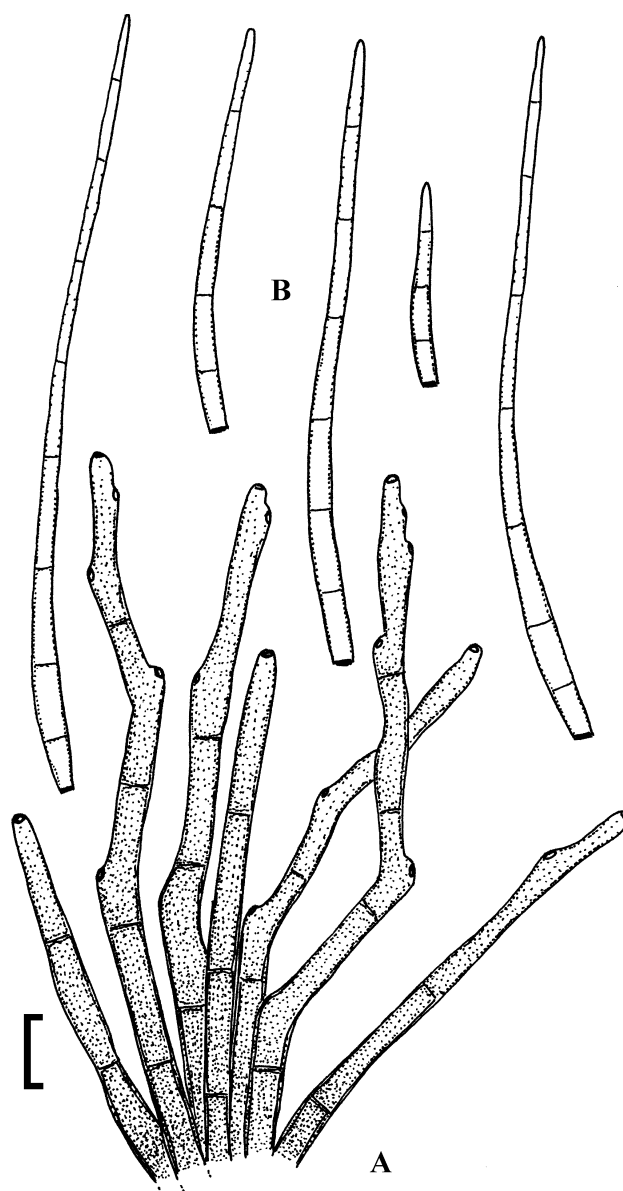


Fig. 14. *Cercospora justiciicola* (based on Guo *et al.* 2005: 17, fig. 1). A. Conidiophore fascicle. B. Conidia. Bar = 10 µm.

Holotype: **China:** Sichuan: Chengtu, on *Justicia* sp., 15 Oct. 1944, H. C. Lin (HMAS 12127).

Host range and distribution: On *Justicia* (*betonica*, *carnea* [*Jacobinia obtusior*], *diffusa*, *flava*, *gendarussa*, *procumbens*, *simplex*, *Justicia* sp.), *Pachystachys lutea* [*Justicia lutea*], *Rungia* (*pectinata* [*Justicia pectinata*, *Rungia parviflora*], *repens* [*Justicia repens*], *Rungia* sp.), *Acanthaceae*, Africa (Guinea, Mauritius), Asia (Brunei, China; India, Andhra Pradesh, Madhyar Pradesh, Uttar Pradesh; Nepal), North America (USA, Florida).

Notes: A true *Cercospora* s. str. close to or conspecific with *C. apii* s. lat. Records of *C. justiciicola* on *Asystasia gangetica* [*coromandeliana*] (Crous & Braun 2003) are unclear, doubtful and might belong to *C. asystasiana*.

Cercospora lepidagathidis Govindu & Thirum., *Sydowia* 9: 222 (1955).

Literature: Vasudeva (1963:133–134), Crous & Braun (2003: 248), Kamal (2010: 59).

Illustrations: Govindu & Thirumalachar (1955: plate 3, fig. 3), Vasudeva (1963: 134, fig. 92).

Description: *Leaf spots* amphigenous, circular or subcircular, 4–7 mm diam, centre greyish white, margin pinkish or brown. *Caespituli* amphigenous. *Mycelium* internal. *Stromata* lacking or small, composed of a few swollen hyphal cells, brown. *Conidiophores* in well-developed, dense fascicles, erect, mostly unbranched, strongly geniculate-sinuous, $33\text{--}183 \times 2.8\text{--}5.7 \mu\text{m}$, 1–6-septate, pale olivaceous to brown, tips colourless; conidiogenous cells integrated, terminal or intercalary, with several conspicuous conidiogenous loci. *Conidia* solitary, obclavate-cylindrical, straight to slightly curved, $23\text{--}170 \times 2.8\text{--}4.2 \mu\text{m}$, 1–14-septate, hyaline, thin-walled, smooth, apex pointed, base short obconically truncate, hila thickened.

Holotype: **India:** Karnataka, Mysore, Bababudans, on *Lepidagathis cuspidata*, 20 May 1953, H. C. Govindu (not traced).

Host range and distribution: On *Lepidagathis* (*cuspidata*, *incurva* [*hyalina*]), *Acanthaceae*, Asia (India, Karnataka, Maharashtra, Uttar Pradesh; Pakistan).

Notes: In the original publication, Govindu & Thirumalachar (1955) mentioned that type material of this species was deposited at BPI, HCIO and IMI. However, type collections could neither be traced at BPI nor IMI. Based on the original description and illustration, this species is undoubtedly a true *Cercospora* s. str. Records of this species from West Indies (Puerto Rico, and Virgin Islands) on *Lepidagathis alopecuroides* are results of misidentifications and belong to *Pseudocercospora lepidagathidis*.

Cercospora peristrophes Thirum. & Govindu, *Sydowia* 7: 47 (1953).

(Fig. 15)

Synonyms: *Cercospora peristrophigena* R.K. Chaudhary et al., *J. Living World* 2: 38 (1995) [**holotype:** **India:** Uttar Pradesh: Nichlaul, Maharajanj, on *Peristrophe bicalyculata*, Nov. 1993, S. Narayan (HCIO 41989)].

Cercospora peristrophigena S. Narayan et al., in Rao et al., *Sugarcane Pathology*, Vol. 1: *Fungal Diseases*: 82 (1999), *nom. inval.* (Art. 39.1) and *nom. illeg.* (Art. 53.1) [**holotype:** **India:** Uttar Pradesh: Nichlaul, Maharajanj, on *Peristrophe bicalyculata*, Nov. 1993, S. Narayan (HCIO 41989); *isotype:* GPU 5070]; as “*peristrophegena*”.

Literature: Vasudeva (1963: 162), Crous & Braun (2003: 316), Kamal (2010: 73).

Illustrations: Thirumalachar & Govindu (1953: pl. 2, figs 11–12), Vasudeva (1963: 163, fig. 115), Chaudhary et al. (1995: 41, fig. 2), Rao et al. (1999: 83, fig. 11).

Description: *Leaf spots* amphigenous, circular to somewhat

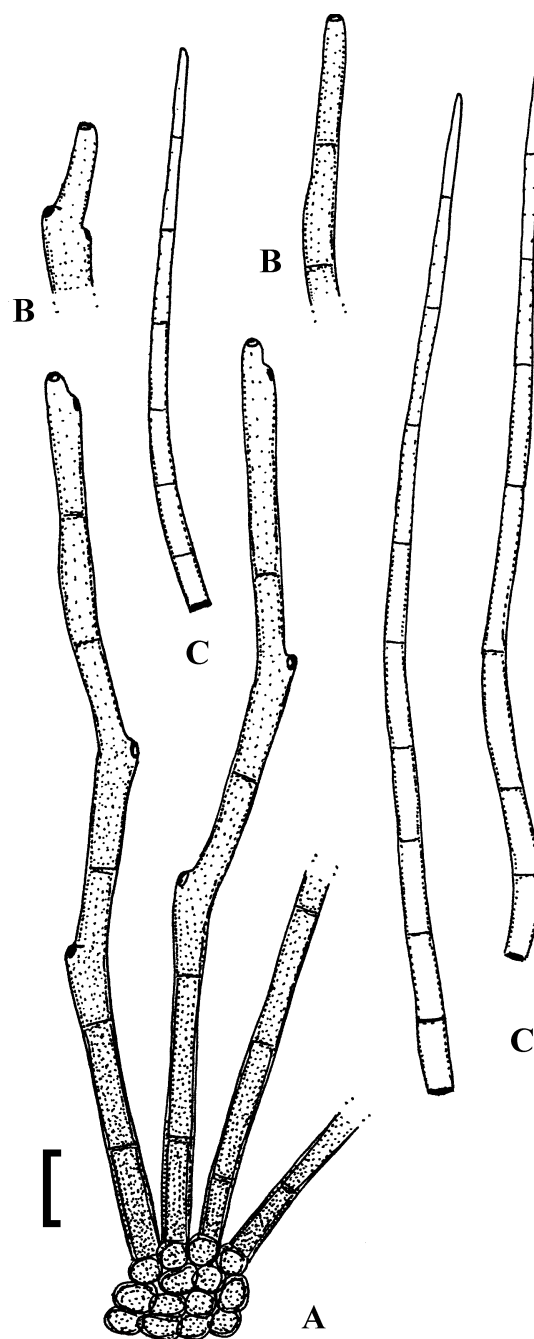


Fig. 15. *Cercospora peristrophes* (BPI 439429, isolectotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μm .

angular-irregular, scattered, 0.5–8 mm diam, yellowish brown, brown to dark brown, centre finally dingy grey to greyish white, margin indefinite, marginal slightly raised or surrounded by a darker border. *Caespituli* amphigenous, scattered, finely punctiform to effuse, greyish white by abundant conidial formation or brownish. *Mycelium* internal; hyphae branched, septate, pale olivaceous or brownish. *Stromata* almost lacking or small, 10–25 μm diam, substomatal, olivaceous-brown or brown. *Conidiophores* solitary or in small fascicles, 2–7, divergent, arising from internal hyphae or stromata, through stomata, erect, straight, somewhat curved to geniculate-sinuous, unbranched, $30\text{--}220 \times (2.5\text{--})3\text{--}7 \mu\text{m}$, 1–16-septate, pale olivaceous

to olivaceous brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, 10–35 μm long, conidiogenous loci thickened and darkened, 2.5–3.5 μm diam. *Conidia* solitary, acicular or subacicular to somewhat obclavate-subcylindrical when shorter, 30–130(–150) \times 2.5–4.5 μm , 1–15-septate, hyaline, thin-walled, smooth, apex subacute to obtuse, base truncate or almost so, 2–3 μm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202781): **India:** Bihar: Patna, on *Peristrophe bicalyculata*, 25 Nov. 1952, M. J. Thirumalachar (K(M) IMI 55521). *Isolectotypes:* BPI 439429, CUP 40770.

Host range and distribution: On *Peristrophe bicalyculata*, *Acanthaceae*, Asia (India, Bihar, Maharashtra, Uttar Pradesh; Myanmar), Africa (Somalia).

Notes: This species belongs to the *Cercospora apii* s. lat. complex. Records from “Nepal” (Crous & Braun 2003, MycoBank and Index Fungorum) refer to the type of *C. peristrophigena* (Rao et al. 1999), which is, however, incorrect since this species was described from India (Uttar Pradesh).

***Cercospora ruellina* R.K. Chaudhary et al., *J. Living World* 2(2): 43 (1995).**

(Fig. 16)

Synonym: *Cercospora ruelliae* S. Narayan et al., in Rao et al., *Sugarcane Pathology*, Vol. 1: *Fungal Diseases*: 86 (1999), *nom. inval.* (Art. 39.1) [*holotype:* **India:** Uttar Pradesh: Gorakhpur, Maharajganj, on *Ruellia prostrata*, Dec. 1993, S. Narayan (HCIO 41994); *isotype:* GPU 5077].

Literature: Crous & Braun (2003: 360), Kamal (2010: 83).

Illustration: Rao et al. (1999: 87, fig. 13).

Description: *Leaf spots* amphigenous, circular or almost so, 1–6 mm diam, brown to blackish on the upper leaf surface, whitish green with olivaceous margin below. *Caespituli* amphigenous, effuse. *Mycelium* internal; hyphae branched, septate, hyaline to pale olivaceous. *Stromata* substomatal, 10–35 μm diam, olivaceous to olivaceous-brown. *Conidiophores* solitary or in small fascicles, 2–5, arising from stromata, through stomata, erect, straight to geniculate-sinuous, unbranched, about 20–125 \times 2.5–5 μm , 2–9-septate, light olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary; conidiogenous loci conspicuous, thickened and darkened. *Conidia* solitary, narrowly acicular, shorter conidia sometimes subcylindrical to somewhat obclavate, straight to curved, often with short lateral germ tubes which may give rise to secondary conidia, about 30–145 \times 1.5–2.5 μm , 3–18-septate, hyaline, thin-walled, smooth, apex obtuse to subacute, base truncate, hila thickened and darkened.

Holotype: **India:** Uttar Pradesh: Gorakhpur, Maharajganj, on *Ruellia prostrata*, Dec. 1993, S. Narayan (HCIO 41994). *Isotype:* GPU 5077.

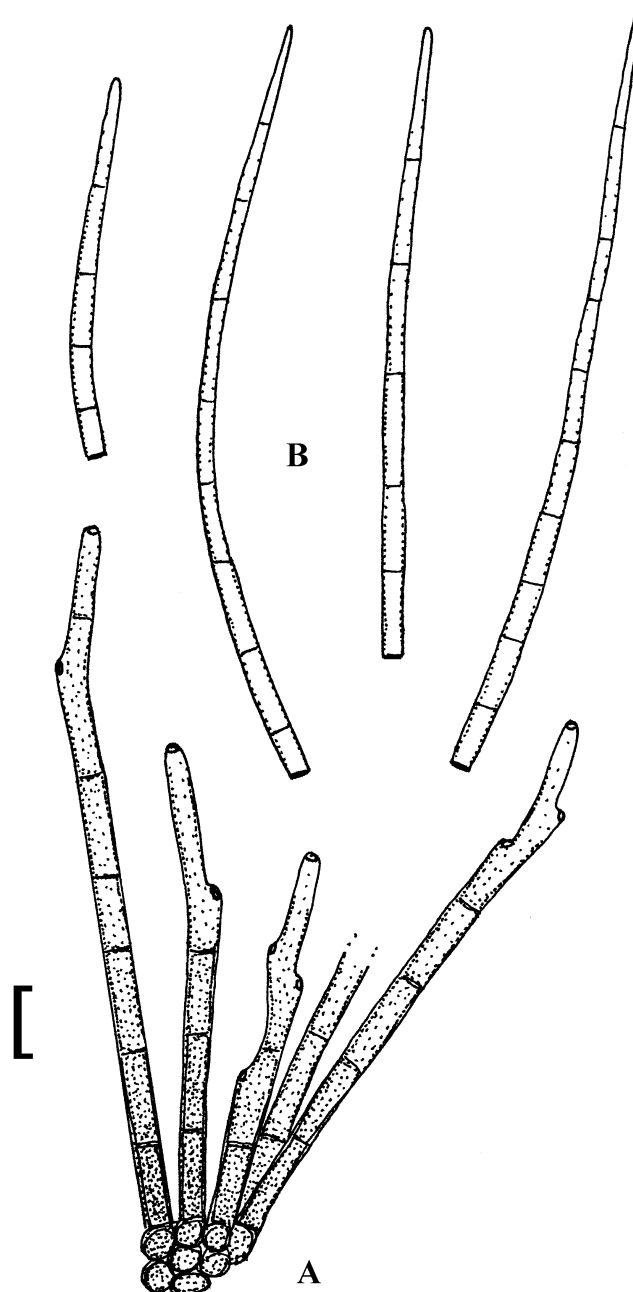


Fig. 16. *Cercospora ruellina* (based on Rao et al. 1999: 87, fig. 13). **A.** Conidiophore fascicle. **B. C.** Conidia. Bar = 10 μm .

Host range and distribution: Only known from the type collection.

Notes: This species is a typical member of the *Cercospora apii* s. lat. complex with acicular conidia. A morphologically well agreeing North American sample on *Ruellia ciliosa* has been examined (USA, Illinois, Chandlerville, 18 Aug. 1886, A. B. Seymour, BPI 435186), although the conidiophores in the latter collection are much longer and somewhat broader, 60–280 \times 4–7 μm . However, if Indian and North America collections are conspecific requires phylogenetic examination and confirmation. Indian as well as North American samples seems to pertain to plurivorous species of the *C. apii* complex.

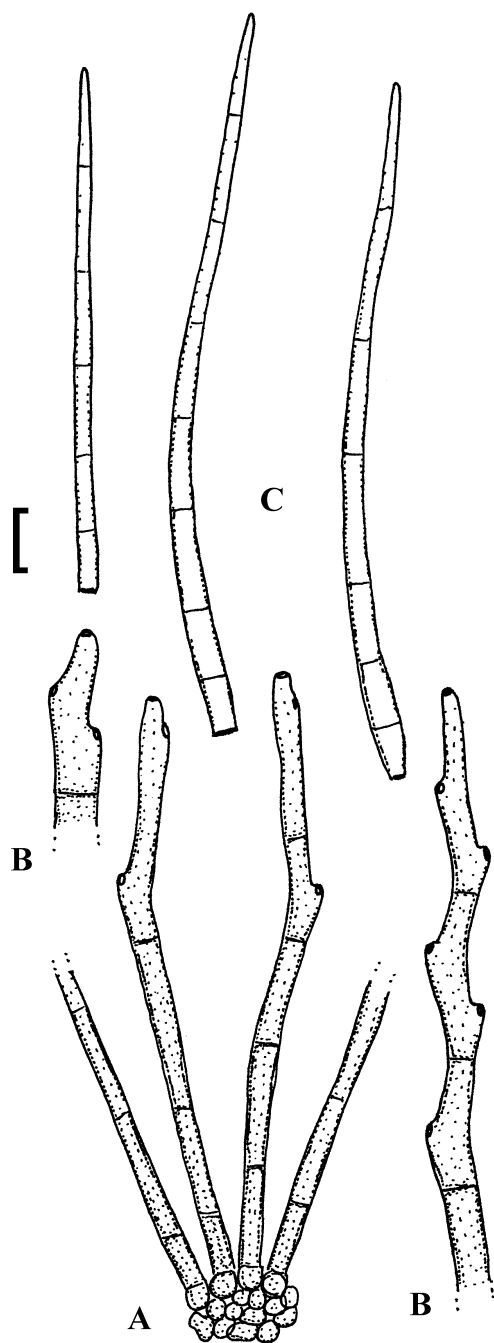


Fig. 17. *Cercospora strobilanthis* (K(M) IMI 83190, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

Cercospora strobilanthis Chidd., *Mycopathol. Mycol. Appl.* **17**: 77 (1962); as "*strobilanthidis*". (Fig. 17)

Literature: Crous & Braun (2003: 390), Guo (2001: 343–344), Guo et al. (2005: 18), Kamal (2010: 89).

Illustration: Chiddarwar (1962: 78, pl. II, figs 1–3), Guo et al. (2005: 19, fig. 2).

Description: *Leaf spots* amphigenous, circular to irregular, 2–10 mm diam, at first pale greenish, later brownish, finally greyish white or white, with darker border, narrow to moderately wide,

brown to almost black. *Caespituli* hypophyllous, scattered, punctiform, fine, dark. *Mycelium* internal. *Stromata* almost absent or small, mainly substomatal, 10–25 µm diam, brown. *Conidiophores* in divergent fascicles, 2–15, rarely solitary, arising from stromata, through stomata, erect, straight, subcylindrical to distinctly geniculate, 1–6 times, unbranched, 35–250 × 4–5.5 µm, 1–7-septate throughout, pale brown or olivaceous-brown, wall thin or slightly thickened, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci thickened and darkened, 1.5–2.5 µm diam. *Conidia* solitary, acicular to slightly obclavate, straight to curved, 30–195 × 3–5(–5.5) µm, 3–16-septate, hyaline, thin-walled, smooth, apex pointed, base truncate to usually somewhat attenuated at the very base (very short obconically truncate), 1.5–2.5 µm, hila thickened and darkened.

Holotype: **India:** *Maharashtra:* Mumbai, Matheran, on *Strobilanthes* sp., 12 Dec. 1956, P. P. Chiddarwar 29 (K(M) IMI 83190).

Host range and distribution: On *Strobilanthes* sp., *Acanthaceae*, Asia (China, Guangdong; India, Maharashtra).

Note: A true *Cercospora* s. str. belonging to the *C. apii* s. lat. complex, but well characterised by conidia that are often somewhat attenuated at the very base.

Cercospora thunbergiana J.M. Yen, *Rev. Mycol.* **30**: 198 (1965); as "*thunbergiaena*". (Fig. 18)

Literature: Yen & Lim (1980: 165), Braun & Castañeda Ruiz (1991: 291), Braun et al. (1992: 363), Crous & Braun (2003: 403), Braun & Uriaga (2008: 485), Kamal (2010: 93), Guo et al. (2005: 18).

Illustrations: Yen (1965: 199, fig. 13), Yen & Lim (1980: 223, fig. 26), Guo et al. (2005: 20, fig. 3).

Description: *Leaf spots* amphigenous, circular, subcircular or somewhat irregular, 1–7 mm diam, brown, greyish brown, finally greyish white, with dark brown border, sometimes with diffuse brownish halo, finally sometimes with shot-hole symptoms. *Caespituli* amphigenous, mostly hypophyllous, not very distinct or finely punctiform, dark. *Mycelium* internal. *Stromata* lacking or small, forming small aggregations of swollen hyphal cells, 10–30 µm diam, brown. *Conidiophores* in small fascicles, 2–15, divergent, occasionally solitary, arising from internal hyphae or small stromata, through stomata, erect, straight to geniculate-sinuous, unbranched, 40–220 × (3–)4–8 µm, 2–9-septate, brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, 10–40 µm long, conidiogenous loci conspicuous, thickened and darkened, (1.5–)2–5 µm wide. *Conidia* solitary, acicular to somewhat obclavate, straight to curved, 40–360 × (2–)3–8 µm, 3–34-septate, occasionally somewhat constricted at septa, hyaline, thin-walled, smooth, base truncate or slightly obconically truncate, 2–5 µm wide, hila thickened and darkened.

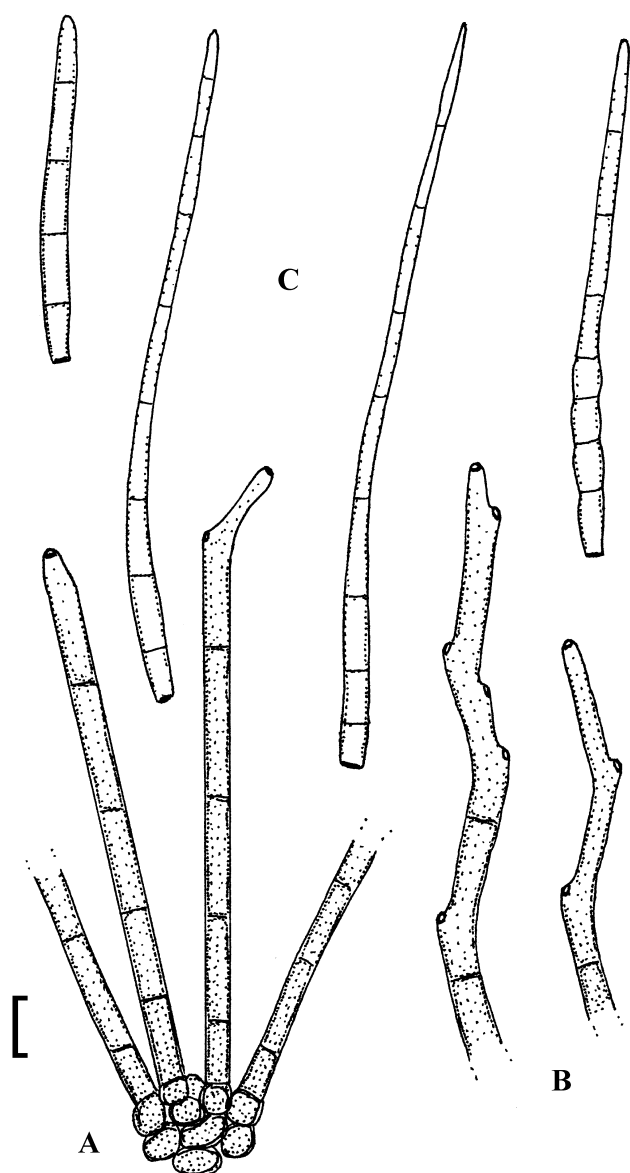


Fig. 18. *Cercospora thunbergiana* (PC, lectotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

Lectotype (designated here, MycoBank, MBT202782): **Singapore:** Bukit Timah (Hwa Chung College), on *Thunbergia alata*, 3 Aug. 1964, S. H. Yen 73 (PC). **Isolectotype:** K(M) IMI 120995.

Host range and distribution: On *Thunbergia* (*alata*, *erecta*, *grandiflora*, *Thunbergia* sp.), *Acanthaceae*, Asia (Brunei; India, Andhra Pradesh, Uttar Pradesh; Singapore), South America (Venezuela), West Indies (Cuba).

Cercospora thunbergiigena* U. Braun & Crous, *nom. nov.

MycoBank MB814567

(Fig. 19)

Basionym: *Cercospora thunbergiana* R.K. Srivast et al., *Kavaka* 20/21: 42 “1992/1993” (1995), *nom. illeg.* (Art. 53.1), non *C. thunbergiana* J.M. Yen, 1965; as “*thunbergiana*”.

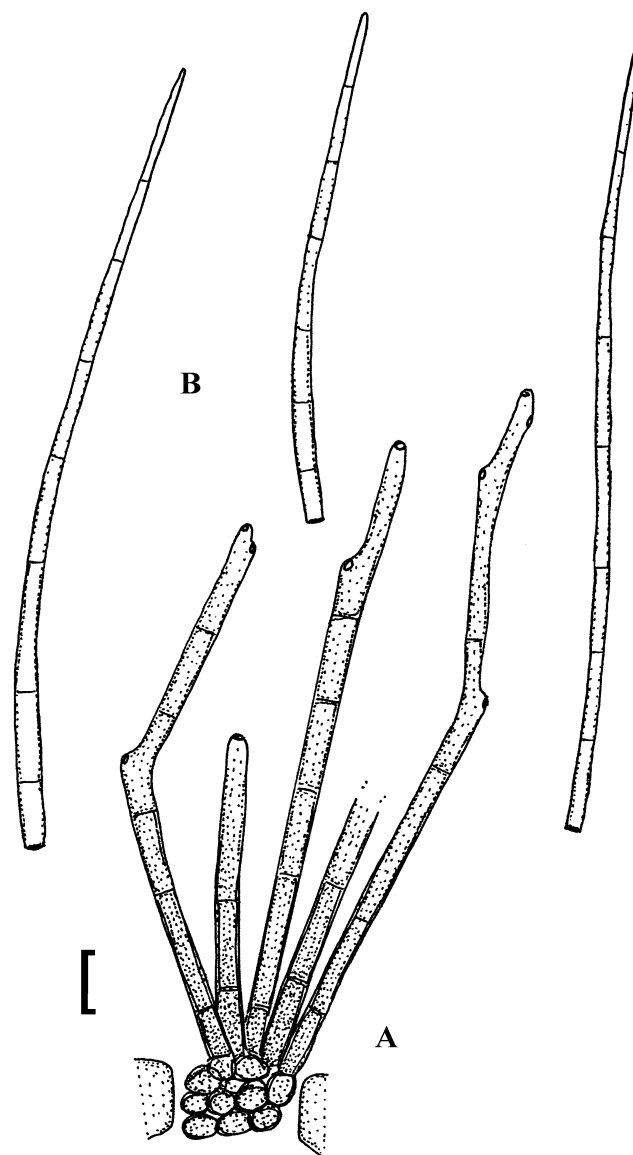


Fig. 19. *Cercospora thunbergiigena* (K(M) IMI 345300, holotype). **A.** Conidiophore fascicle. **B.** Conidia. Bar = 10 μ m.

Literature: Crous & Braun (2003: 403), Kamal (2010: 93).

Illustration: Srivastava et al. (1995: 41, fig. 4).

Description: *Leaf spots* amphigenous, often vein-limited, mostly marginal, 3–10 mm diam, dark brown to blackish. *Caespituli* amphigenous, fine. *Mycelium* internal. *Stromata* absent or small, substomatal, 10–20 μ m diam, brown. *Conidiophores* in small, loose fascicles, arising from small stromata, through stomata, erect, straight to moderately geniculate, unbranched, about 50–220 \times 4–5 μ m, 3–10-septate, brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci conspicuous, thickened and darkened, about 2 μ m diam. *Conidia* solitary, narrowly acicular, straight to curved, 45–155 \times 2–3 μ m, 4–14-septate, hyaline, thin-walled, smooth, apex pointed, base truncate, 1.5–2 μ m wide, hila thickened and darkened.

Holotype: **India:** *Uttar Pradesh:* Gorakhpur, Ramgarh area, on *Thunbergia grandiflora*, *Acanthaceae*, Dec. 1989, V. P. Pandey (K(M) IMI 345300).

Host range and distribution: Only known from the type collection).

Notes: This species belongs to the *C. apii* s. lat. complex. It resembles *C. thunbergiana*, but differs in having much narrower conidia.

Doubtful, excluded and insufficiently known species

Cercospora acanthacearum Govindu & Thirum., *Sydowia* **8**: 221 (1954).

Literature: Vasudeva (1963: 30), Crous & Braun (2003: 40). Kamal (2010: 12).

Illustration: Govindu & Thirumalachar (1954: pl. 6, fig. 1).

Description: *Leaf spots* circular to irregular, 2–4 mm diam, centre greyish white, surrounded by a pinkish or light brown border. *Caespituli* mostly epiphyllous. *Mycelium* internal. *Stromata* small, only composed of a few brown swollen hyphal cells, 15–30 µm diam. *Conidiophores* fasciculate, arising from stromatic hyphal aggregations, erect, straight to sinuous, geniculate, unbranched, 14–28.5 × 2.8–4.2 µm, aseptate, pale brown, thin-walled, smooth; conidiophores reduced to conidiogenous cells. *Conidia* solitary, narrowly obclavate, 14–35.5 × 2–3 µm, 1–6-septate, hyaline, thin-

walled, smooth, apex pointed, base short obconically truncate.

Holotype: **India:** *Karnataka:* Mysore, Nandi Hills, on *Justicia betonica*, *Acanthaceae*, 31 Jan. 1953, H. C. Govindu (not traced).

Host range and distribution: Only known from the type collection.

Notes: According to Govindu & Thirumalachar (1954), type material of new species described in their paper had been deposited at BPI, IMI, and HCIO. However, type material could not be traced, neither in BPI nor in IMI (now K). Details of the structure of the conidiogenous loci were not provided by Govindu & Thirumalachar (1954), but based on the original description this species does probably not belong to *Cercospora* s. str. It might be a species of *Pseudocercospora*, but a re-examination of type material or new collections agreeing with the original description are necessary to answer this question.

Cercospora peristrophes E. Castell., *Elenco Annotato dei Funghi della Somalia (Biblioteca Agraria Tropicale)*: 65 (1988), as “*peristrophis*”, *nom. illeg.* (Art. 53.1), non *C. peristrophes* Thirum. & Govindu, 1953.

Literature: Crous & Braun (2003: 316).

Note: *Cercospora peristrophes* E. Castell. is a homonym of *C. peristrophes* Thirum. & Govindu, 1953.

Passalora

Key to *Passalora* species on *Acanthaceae*

- 1 Conidia solitary, obclavate, short, 25–50 × 3.5–5 µm, 1–3(–4)-septate; on *Barleria lupulina* ***P. barleriigena***
Conidia in chains, either much longer, 20–95 µm, or much narrower, 2–3 µm; on other hosts 2
- 2 (1) Conidiophores 100–325 µm long, pluriseptate; conidia cylindrical or somewhat cylindrical-obclavate, 20–95 × 4–6 µm, 1–6-septate, pale olivaceous; on *Acanthus arboreus* ***P. acanthicola***
Conidiophores much shorter, 10–50 µm; conidia 8–40 × 2–3 µm, (0–)1–3(–4)-septate, hyaline;
on *Adhatoda vasica* see ***Cercospora justiciae-adhatodae***

Passalora* species on *Acanthaceae

Passalora acanthicola (Hansf.) U. Braun & Crous, *Mycosphaerella and Anam.* **1**: 40 (2003).

(Fig. 20)

Basionym: *Cercospora acanthicola* Hansf., *Proc. Linn. Soc. London* **156**: 121 (1944).

Synonym: *Phaeoramularia acanthicola* (Hansf.) Deighton, *Trans. Brit. Mycol. Soc.* **88**: 385 (1987).

Literature: Chupp (1954: 22).

Illustration: Deighton (1987: 387, fig. 17).

Description: *Leaf spots* at first diffuse, yellowish, later angular, 5–8 mm diam, brown. *Caespituli* hypophyllous, effuse, deep reddish brown, more or less vein-limited. *Mycelium* internal; hyphae 2.5–4 µm wide, colourless. *Stromata* lacking or almost so. *Conidiophores* in small loose fascicles, to 10, arising from internal hyphae or small aggregations of swollen hyphal cells, emerging through stomata, erect, geniculate-sinuous, simple or branched, 100–325 × 4–6 µm, pluriseptate throughout, moderately brown or reddish brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci conspicuous, thickened and darkened, about 1.5–2 µm diam. *Conidia* catenate, in simple or branched chains, cylindrical or somewhat obclavate-cylindrical, straight or slightly curved, 20–95 × 4–6

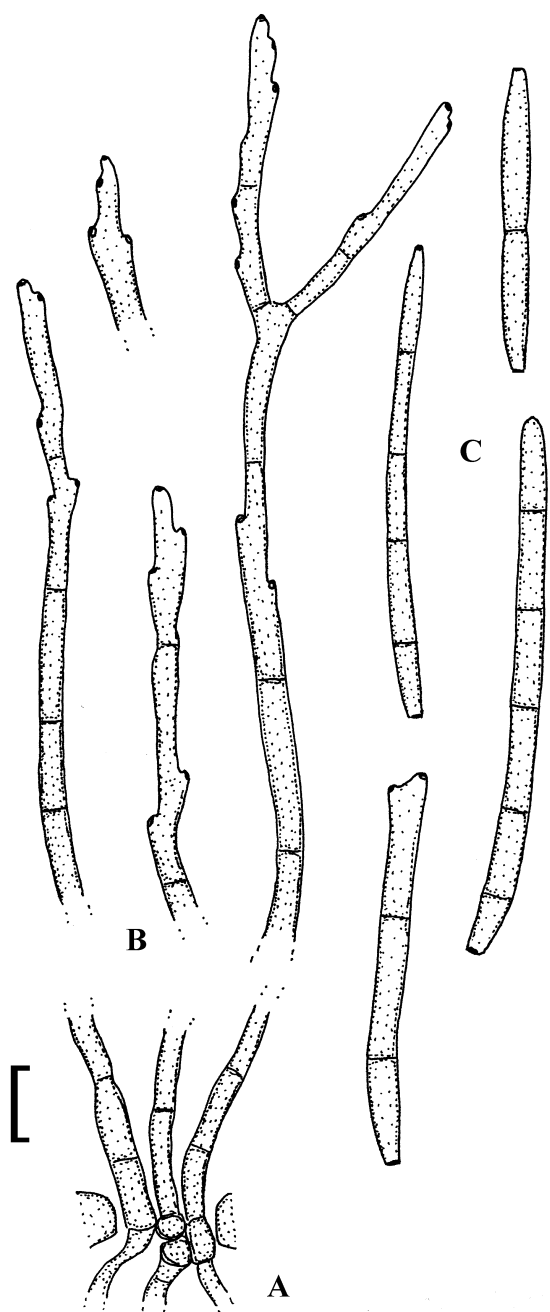


Fig. 20. *Passalora acanthicola* (K(M) IMI 4557a, holotype). **A.** Base of conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

μ m, 1–6-septate, pale olivaceous, thin-walled, smooth, apex obtuse or subtruncate, base short obconically truncate, 1.5–2 μ m wide, hila thickened and darkened.

Holotype: **Uganda:** Kampala, Kawandra, on *Acanthus arboreus*, *Acanthaceae*, Jan. 1943, C. G. Hansford 3144 (K(M) IMI 4557a).

Host range and distribution: Only known from the type collection.

Passalora barleriigena Meeboon & Hidayat, *Mycotaxon* **102**: 140 (2007). (Fig. 21)

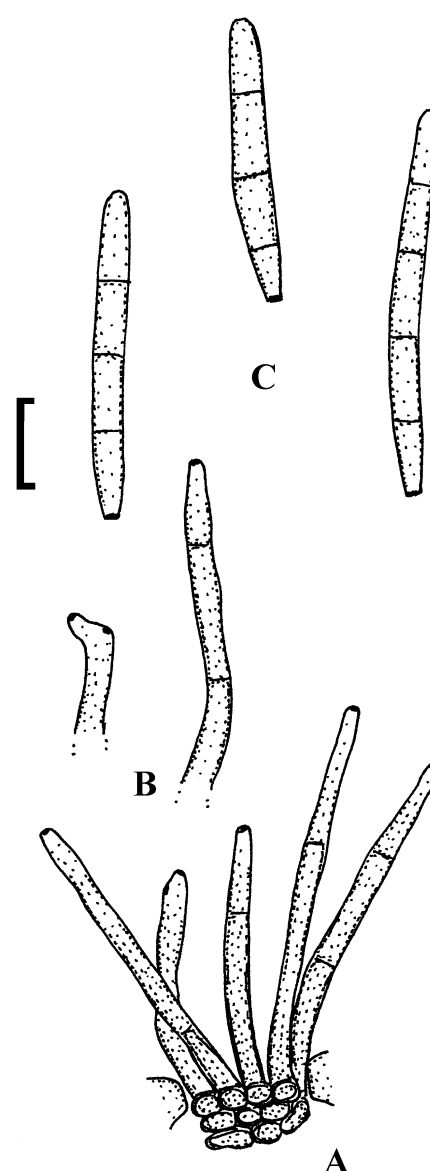


Fig. 21. *Passalora barleriigena* (based on Meeboon *et al.* 2007a: 141, fig. 1). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

Illustration: Meeboon *et al.* (2007a: 141, fig. 1).

Description: *Leaf spots* amphigenous, subcircular to irregular, 1–14 mm diam, pale to pale brown, margin at first indefinite, later conspicuous, dark. *Caespituli* amphigenous. *Mycelium* internal. *Stromata* substomatal, small, 7.5–20 μ m diam, composed of 3–7 swollen hyphal cells, brown. *Conidiophores* in dense fascicles, 4–7, arising from stromata, through stomata, erect, straight, subcylindrical, somewhat attenuated towards the tip, unbranched, 1–2 times geniculate, about 20–65 \times 3.5–5 μ m, 1–3-septate, darker brown below, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci conspicuous, thickened and darkened, 1–2 μ m diam. *Conidia* solitary, mostly obclavate, occasionally oblong cylindrical, straight to occasionally somewhat curved, 25–50 \times 3.5–5 μ m, 1–3(–4)-septate, subhyaline to pale brown, thin-walled, smooth, apex obtuse, base short obconically truncate, 1–2 μ m wide, hila thickened and darkened.

Holotype: Thailand: Chiang Mai Province: Doi Suthep-Pui National Park, on *Barleria lupulina*, 30 Dec. 2005, J. Meeboon (CMU 28212). **Paratype:** the same locality, 10 Dec. 2006, J. Meeboon & I. Araki (CMU 28213).

Host range and distribution: On *Barleria lupulina*, *Acanthaceae*, Asia (Thailand).

Pseudocercospora

Key to *Pseudocercospora* species on *Acanthaceae*

- 1 Mycelium internal and external; superficial hyphae with solitary conidiophore *in vivo* developed 2
Mycelium internal; superficial hyphae with solitary conidiophores *in vivo* not developed 12
- 2 (1) Stromata lacking; conidiophores 50–130 × 4–6.5 µm; conidia 3.5–6.5 µm long; on *Justicia* spp. ***P. justiciae***
Stromata developed; and/or conidiophores shorter, to about 80 µm, and/or narrower, 2–4 µm;
and/or conidia much narrower, 1.5–4 µm 3
- 3 (2) Stromata lacking or almost so 4
Stromata developed, 10–40 µm diam 7
- 4 (3) Conidiophores relatively short, 5–50(–60) µm 5
Conidiophores longer and broader, to 120 × 2.5–6 µm, longer conidiophores with more than two septa
(pluriseptate); on other hosts 6
- 5 (4) Conidiophores short, 5–30 × 1.5–3 µm, 0–1-septate; on *Thunbergia* spp. ***P. thunbergiae***
Conidiophores 5–50(–60) × 2–5 µm, 0–3-septate; on *Rhinacanthus nasutus* ***P. rhinacanthi***
- 6 (4) Conidia cylindrical or subcylindrical, base truncate to somewhat obconically truncate;
conidiophores to 120 µm long; on *Strobilanthes cusia* ***P. baphiacanthi***
Conidia obclavate-cylindrical, base consistently obconically truncate; conidiophores shorter, to 80 µm long;
on *Lepidagathis alopecuroidea* ***P. lepidagathidis***
- 7 (3) Conidiophores 10–80 × 3–5 µm, 0–5-septate; conidia rather long, 60–175 × 3.5–5 µm, 4–11-septate,
hila 2–2.5 µm wide; on *Thunbergia alata* ***P. thunbergiicola***
Conidiophores shorter, 5–50 × 1.5–5 µm; conidial hila 0.8–2 µm wide; on other hosts 8
- 8 (7) Conidiophores 20–50 µm long, 2–6-septate; on *Justicia japonica* ***P. justiciicola***
Conidiophores 0–3-septate; on other hosts 9
- 9 (8) Conidia obclavate-cylindrical to subacicular; conidia with pointed apex; on *Acanthus guineensis* ***P. acanthi***
Conidia obclavate-cylindrical, subacicular conidia lacking; on other hosts 10
- 10 (9) Conidial base truncate to obconically truncate; on *Odontonema callistachyum* ***P. odontonematis***
Conidial base consistently obconically truncate 11
- 11 (10) Conidiophores 5–30 × 1.5–4 µm, 0–1(–2)-septate; on *Justicia galapagana* ***P. consociata* var. *dimorpha***
Conidiophores to 60 µm long, 0–3-septate; on *Rhinacanthus nasutus* ***P. rhinacanthi***
- 12 (1) Stromata lacking; conidia 15–65 × 2–4 µm, hila 1–1.5 µm wide; on *Blechum pyramidatum* ***P. blechi***
Stromata developed; and/or conidia longer, to 150 µm, hila broader, 1.5–2.5 µm; on other hosts 13
- 13 (12) Stromata lacking or almost so; conidiophores 20–130 × 4–7 µm; on *Barleria cristata* ***P. barleriae***
Stromata developed; and/or conidiophores shorter, to 75 µm, and above all narrower, 2–5 µm wide;
on other hosts 14
- 14 (13) Conidiophores short, 5–40 µm, 0–1(–2)-septate; on *Cynarospermum*, *Dyschoriste*, *Justicia*,
Rhinacanthus, *Ruellia* 15
Conidiophores longer, to 125 µm, and/or (if shorter) 0–5-septate 17
- 15 (14) Conidia acicular to obclavate-cylindrical, base truncate to long obconically truncate, 2–2.5 µm wide;
on *Cynarospermum* ***P. blepharidis***

- Conidia obclavate-cylindrical, acicular conidia not formed, base 1.5–2 μ wide; on other hosts 16
- 16 (15) Conidiophores 5–30 \times 1.5–4 μ m, 0–1(–2)-septate (external mycelium lacking);
 on *Dyschoriste*, *Justicia*, *Ruellia* **P. consociata** var. **consociata**
 Conidiophores to 60 μ m long, 0–3-septate (external mycelium usually developed);
 on *Rhinacanthus nasutus* **P. rhinacanthi**
- 17 (14) Conidiophores long, 20–125 μ m; on *Asystasia gangetica* **P. asystasiae**
 Conidiophores shorter, to 75 μ m, average < 50 μ m; on other hosts
 (see “Tabular key to *Pseudocercospora* species on *Acanthaceae* according to host genera”
 – further identification just based on morphology barely possible)

Tabular key to *Pseudocercospora* species on *Acanthaceae* according to host genera

Acanthus

A single species **P. acanthi**

Asystasia

A single species **C. asystasiae**

Baphicacanthus, see ***Strobilanthes***

Barleria

A single species **P. barleriae**

Blechnum

A single species **P. blechi**

Blephris, see ***Cynarospermum***

Cynarospermum

A single species **P. blepharidis**

Dicliptera

A single species **P. diclipterae**

Dyschoriste

A single species **P. consociata** var. **consociata**

Ecbolium

A single species **P. ecbolii**

Justicia

- 1 Mycelium internal, superficial hyphae with solitary conidiophores lacking **P. consociata** var. **consociata**
 Mycelium internal and external, superficial hyphae with solitary conidiophores developed 2
- 2 (1) Stroma lacking; conidiophores 50–130 \times 4–6.5 μ m; conidia cylindrical to obclavate-subcylindrical,
 40–110 \times 3.5–6.5 μ m, hila 2–2.5 μ m wide **P. justiciae**
 Stromata developed, 10–25 μ m diam; conidiophores shorter and narrower, 20–50 \times 1–5 μ m;
 conidia narrower, obclavate, 35–120 \times 1.5–5 μ m, hila 1–2 μ m wide **P. justiciicola**

Lepidagathis

A single species **P. lepidagathidis**

Odontonema

A single species **P. odontonematis**

Rhinacanthus

A single species **P. rhinacanthi**

Ruellia

A single species ***P. consociata* var. *consociata*** (and ? *P. justiciicola*)

Rungia

A single species ***P. rungiae***

Strobilanthes

A single species ***C. baphicacanthi***

Thunbergia

- 1 Stromata lacking; conidiophores short and narrow, $5\text{--}30 \times 1.5\text{--}3\ \mu\text{m}$; conidia $20\text{--}95 \times 1.5\text{--}4\ \mu\text{m}$,
 0–8-septate, subhyaline, pale yellowish green to very pale olivaceous ***P. thunbergiae***
 Stromata to $30\ \mu\text{m}$ diam; conidiophores longer and broader, $10\text{--}80 \times 3\text{--}5\ \mu\text{m}$; conidia also longer and broader,
 $60\text{--}175 \times 3.5\text{--}5\ \mu\text{m}$, 4–11-septate, pale olivaceous-brown ***P. thunbergicola***

***Pseudocercospora* species on Acanthaceae**

Pseudocercospora acanthi Deighton, *Trans. Brit. Mycol. Soc.* **88**: 381 (1987).
 (Fig. 22)

Illustration: Deighton (1987: 383, fig. 14).

Description: Leaf spots amphigenous, subcircular, to 5 mm diam, grey-brown, with narrow dark brown border, somewhat raised. *Caespituli* amphigenous rather pale olivaceous, punctiform, scattered. *Mycelium* internal and external; internal hyphae $2.5\text{--}6.5\ \mu\text{m}$ wide, subhyaline, superficial hyphae $1.5\text{--}3\ \mu\text{m}$ wide, pale olivaceous, septate, thin-walled, smooth. *Stromata* well-developed, $20\text{--}40\ \mu\text{m}$ diam, compact, brown. *Conidiophores* in small to sometimes large and dense fascicles, 8–50, arising from stromata, or occasionally solitary, arising from superficial hyphae, erect, straight, subcylindrical-conical to somewhat geniculate-sinuous, unbranched, $20\text{--}40 \times 3\text{--}4.5\ \mu\text{m}$, 0–1(–2)-septate, pale brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, $20\text{--}30\ \mu\text{m}$ long, conidiogenous loci inconspicuous to subdenticulate, but always unthickened and not darkened. *Conidia* solitary, obclavate-subcylindrical to subacicular, straight to curved or somewhat sigmoid, $30\text{--}90 \times 2.5\text{--}4\ \mu\text{m}$, 3–8-septate, pale olivaceous, apex pointed, base obconically truncate to almost rounded, $1.5\text{--}2\ \mu\text{m}$ wide, hila unthickened, not darkened.

Holotype: **Sierra Leone**: Gorahun (Tunkia), on *Acanthus guineensis*, *Acanthaceae*, 3 Apr. 1939, F. C. Deighton, M 1937 (K(M) IMI 7695).

Host range and distribution: Only known from the type collection.

Pseudocercospora asystasiae (J.M. Yen) J.M. Yen, *Gard. Bull., Singapore* **33**: 169 (1980).
 (Fig. 23)

Basionym: *Cercospora asystasiae* J.M. Yen, *Rev. Mycol.* **32**: 178 (1967).

Literature: Yen & Lim (1980: 169), Crous & Braun (2003: 70), Nakashima et al. (2010).

Illustrations: Yen (1967: 179, fig. 1), Yen & Lim (1980: 228, fig. 31).

Description: Leaf spots amphigenous, subcircular to somewhat irregular, 2–10 mm diam, at first pale greenish, greyish green,

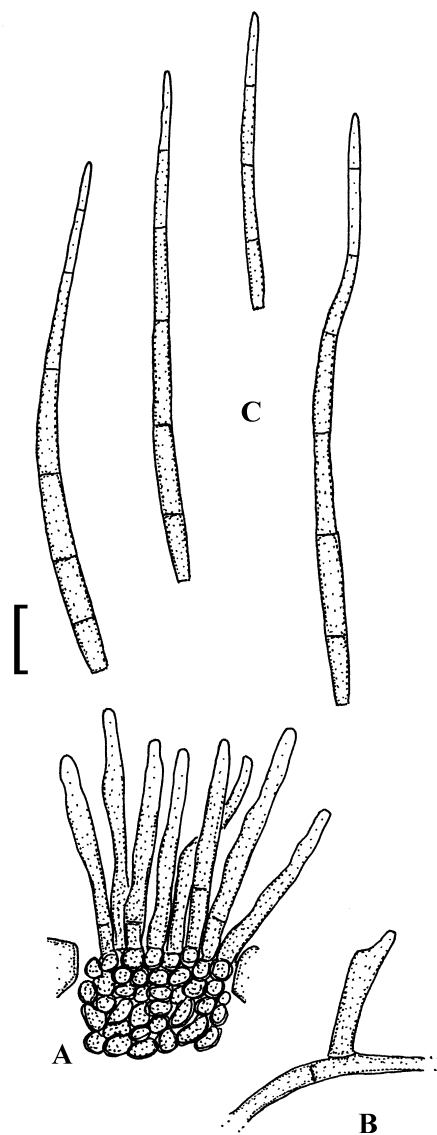


Fig. 22. *Pseudocercospora acanthi* (K(M) IMI 7695, holotype). **A.** Conidiophore fascicles. **B.** Solitary conidiophore arising from superficial hypha. **C.** Conidia. Bar = $10\ \mu\text{m}$.

later yellowish brown to brownish, greyish brown, finally greyish white, occasionally zonate, margin indistinct to distinct, dark brown to blackish. *Caespituli* amphigenous, indistinct to punctiform, brown, scattered to confluent and denser. *Mycelium* internal. *Stromata* lacking or small, substomatal, 10–30 μm diam, subglobose, brown. *Conidiophores* in small to moderately large fascicles, loose to moderately dense, arising from stromata, emerging through stomata, erect, straight, subcylindrical to flexuous, sinuous or somewhat geniculate-sinuous, unbranched, 20–125 \times 3–5 μm , 0–5-septate, olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal, about 10–40 μm long, conidiogenous loci inconspicuous to subdenticulate, neither thickened nor darkened. *Conidia* solitary, obclavate-cylindrical, straight to curved, 25–90(–110) \times (2.5–)3–4.5(–5) μm , 2–8(–9)-septate, subhyaline to pale olivaceous-brown, thin-walled, smooth, apex obtuse to subacute, base short obconically truncate, 1–2 μm wide, hila unthickened, not darkened.

Holotype: Singapore: Botanical Garden, on *Asystasia gangetica*, 5 Jan. 1966, J. M. Yen 731 (PC).

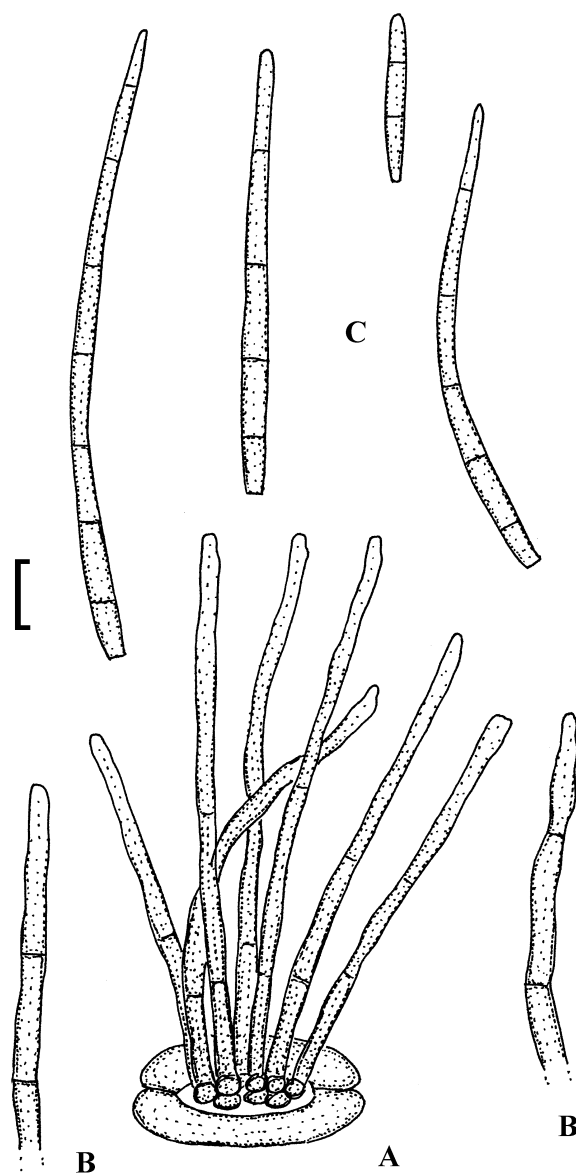


Fig. 23. *Pseudocercospora asystasiae* (PC, holotype). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 μm .

Host range and distribution: On *Asystasia gangetica* [*coromandeliana*], *nemorum*), *Acanthaceae*, Africa (Ivory Coast), Asia (Indonesia, Japan, Singapore).

Note: A second collection on *Asystasia gangetica* from Ivory Coast (29 Dec. 1974, G. Gilles 47), deposited at PC, has been examined.

Pseudocercospora baphicacanthi W.H. Hsieh & Goh, *Bot. Bull. Acad. Sin.* **30**: 123 (1989). (Fig. 24)

Literature: Hsieh & Goh (1990: 12), Guo & Hsieh (1995: 1), Guo *et al.* (1998: 11).

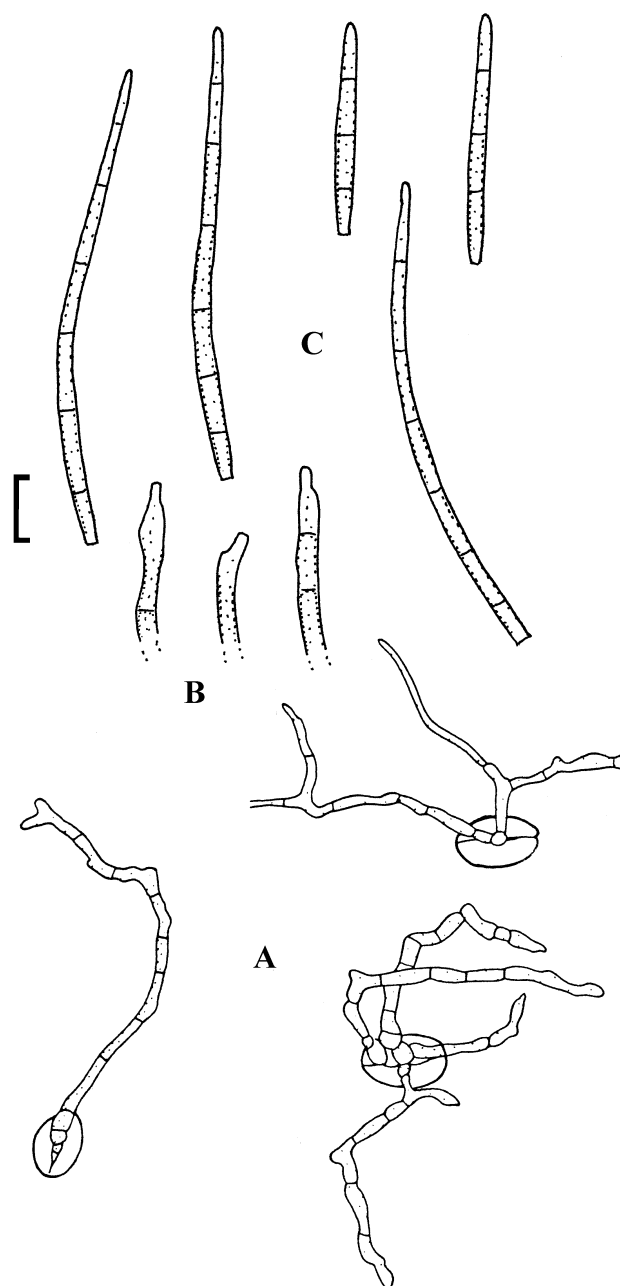


Fig. 24. *Pseudocercospora baphicacanthi* (based on Hsieh & Goh 1990: 13, fig. 2). **A.** Solitary conidiophore, arising from superficial hyphae or emerging through stomata. **B.** Conidiophores. **C.** Conidia. Bar = 10 μm .

Illustration: Hsieh & Goh (1990: 13, fig. 2), Guo & Hsieh (1995: 2, fig. 1), Guo et al. (1998: 10, fig. 1).

Description: Leaf spots irregularly shaped, 2–12 mm diam, sometimes confluent, forming yellowish patches on the upper leaf surface, yellowish brown below, margin indefinite. *Caespituli* hypophyllous. *Mycelium* internal and external; superficial hyphae emerging through stomata. *Stromata* lacking. *Conidiophores* solitary or in small, loose fascicles, emerging through stomata or solitary, arising from superficial hyphae, lateral, erect to decumbent, straight to curved, geniculate-sinuous, simple or branched, $20\text{--}120 \times 3\text{--}6 \mu\text{m}$, septate, pale brown throughout or paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci inconspicuous or visible as truncate tips, about $2 \mu\text{m}$ wide, unthickened, not darkened. *Conidia* solitary, cylindrical or subcylindrical, straight to somewhat curved, $30\text{--}100 \times 3\text{--}4 \mu\text{m}$, 2–7-septate, greenish to pale olivaceous, thin-walled, smooth, apex obtuse or subobtuse, base truncate to short obconically truncate, hila unthickened, not darkened.

Holotype: Taiwan: Hsitou, Nantou Hsien, on *Strobilanthes cusia* [*Baphicacanthus cusia*], Acanthaceae, 28 Mar. 1985, W. H. Hsieh (NCHUPP-162). **Isotype:** K(M) IMI 312069.

Host range and distribution: Only known from the type collection.

Pseudocercospora barleriae (J.M. Yen & Lim) U. Braun, *Fungal Diversity* 8: 60 (2001). (Fig. 25)

Basionym: *Cercospora barleriae* J.M. Yen & Lim, *Cah. Pacifique* 17: 100 (1973).

Literature: Yen & Lim (1980: 156), Crous & Braun (2003: 76).

Illustrations: Yen & Lim (1973: 110, fig. 3; 1980: 207, fig. 10), Braun (2001: 58, fig. 15).

Description: Leaf spots amphigenous, angular, vein-limited, 1–5 mm diam or confluent and larger, blackish on the upper leaf surface, dark brown below, sometimes forming large blackish brown patches, covering large leaf segments. *Caespituli* hypophyllous, effuse, dark brown, sometimes velvety. *Mycelium* internal. *Stromata* lacking or almost so. *Conidiophores* in small to moderately large fascicles, loose, arising from internal hyphal or small hyphal aggregations, through stomata, erect to decumbent, flexuous, simple or occasionally branched, somewhat geniculate-sinuous, $20\text{--}130 \times 4\text{--}7 \mu\text{m}$, (0–)1–7-septate, olivaceous to olivaceous-brown, tips paler, thin-walled, smooth; conidiogenous cells integrated, terminal, $10\text{--}40 \mu\text{m}$ long, conidiogenous loci inconspicuous or subconspicuous by being subdenticulate or somewhat refractive, but neither thickened nor darkened. *Conidia* solitary, obclavate to obclavate-cylindrical, straight to somewhat curved, $(10\text{--})15\text{--}80 \times 4\text{--}5 \mu\text{m}$, 1–8-septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth, apex subacute to obtuse, base obconically truncate, $2\text{--}2.5 \mu\text{m}$ wide, hila unthickened, not darkened.

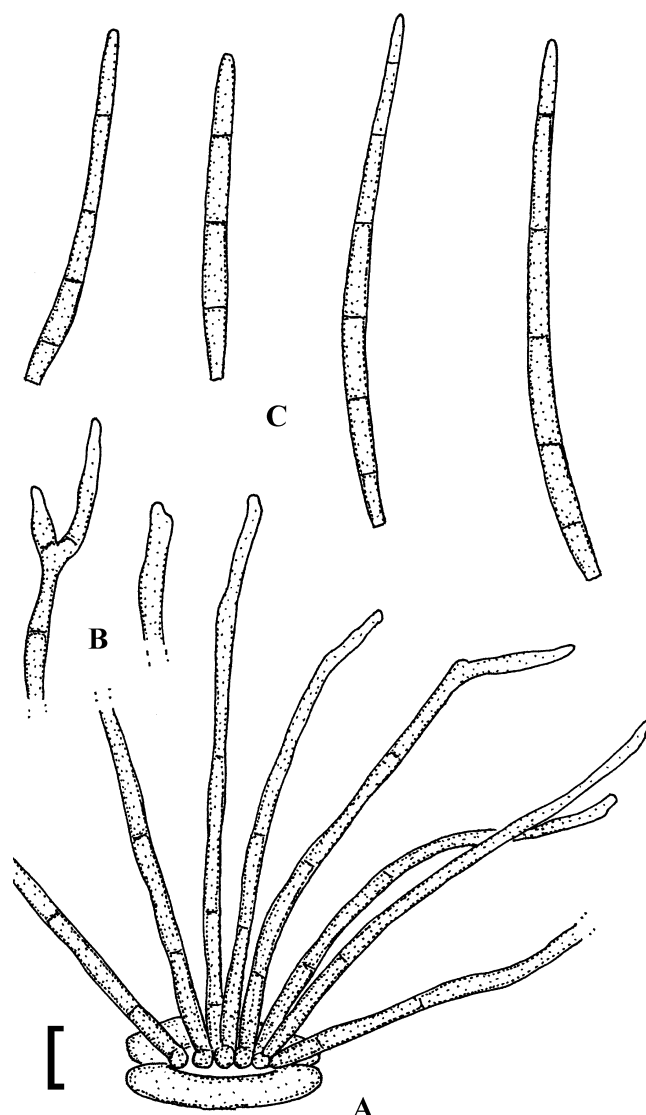


Fig. 25. *Pseudocercospora barleriae* (PC, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = $10 \mu\text{m}$.

Holotype: Singapore: on *Barleria cristata*, 3 Mar. 1972, G. Lim 73 (PC). **Topotype:** June 1972 (PC).

Host range and distribution: On *Barleria cristata*, Acanthaceae, Asia (Singapore).

Notes: Yen & Lim (1980) retained this species in *Cercospora* and described "brown scars". However, the examination of type material showed that this species has to be reallocated to *Pseudocercospora*.

Pseudocercospora blechi U. Braun et al., *Feddes Repert.* 113: 120 (2002). (Fig. 26)

Synonym: *Cercospora blechi* Chupp & A.S. Mull., *Bol. Soc. Venez. Ci. Nat.* 8: 37 (1942), *nom. inval.* (Art. 39.1).

Literature: Chupp (1954: 22), Crous & Braun (2003: 82).

Illustrations: Chupp (1954: 21, fig. 2), Braun et al. (2002: 121, fig. 8).

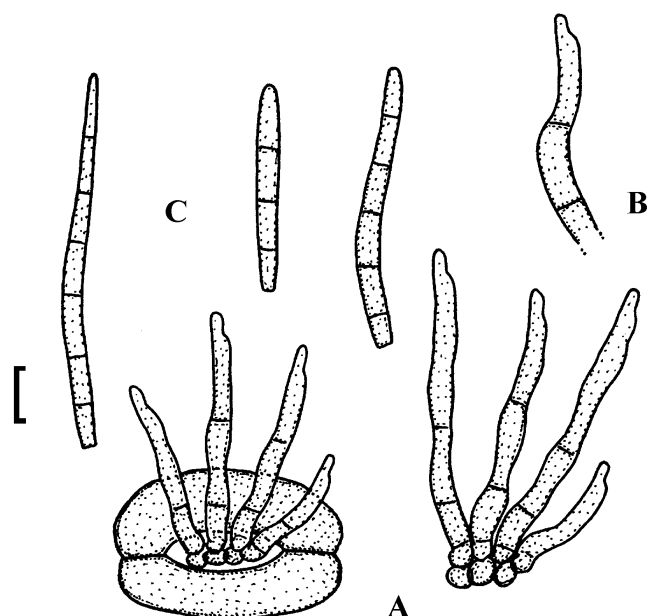


Fig. 26. *Pseudocercospora blechi* (CUP-VZ-002240, holotype). A. Conidiophore fascicles. B. Conidiophore. C. Conidia. Bar = 10 μ m.

Description: Leaf spots mainly epiphyllous, indistinct to irregular and somewhat reddish, 0.5–3 mm diam, sometimes confluent, margin indefinite. *Caespituli* hypophyllous, subeffuse, dark olivaceous to blackish. *Mycelium* internal. *Stromata* lacking or small, composed of a few swollen hyphal cells, brown. *Conidiophores* in small, loose fascicles, arising from internal hyphae or hyphal aggregations, emerging through stomata, erect, flexuous, geniculate-sinuuous, simple or rarely branched, 10–90 \times 2–4 μ m, 0–3-septate, pale olivaceous or olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–30 μ m long, conidiogenous loci inconspicuous, unthickened, not darkened. *Conidia* solitary, cylindrical to obclavate-cylindrical, straight to slightly curved, 15–65 \times 2–4 μ m, 1–6-septate, subhyaline to pale olivaceous, apex obtuse to subacute, base obconically truncate, 1–1.5 μ m wide, hila unthickened, not darkened.

Holotype: Venezuela: Caracas, on *Blechnum pyramidatum*, 28 Jul. 1938, A. S. Muller 2240 (CUP-VZ-002240). *Isotype:* VIA.

Host range and distribution: On *Blechnum pyramidatum* [brownell], *Acanthaceae*, Central and South America (Panama, Venezuela), West Indies (Cuba, Puerto Rico, Virgin Islands).

Pseudocercospora blepharidis (Chidd.) U. Braun & Crous, *Mycosphaerella and Anam.*: 82 (2003). (Fig. 27)

Basionym: *Cercospora blepharidis* Chidd., *Sydowia* 13: 154 "1959" (1960).

Literature: Kamal (2010: 155).

Illustration: Chiddarwar (1960: plate V, figs 4–5).

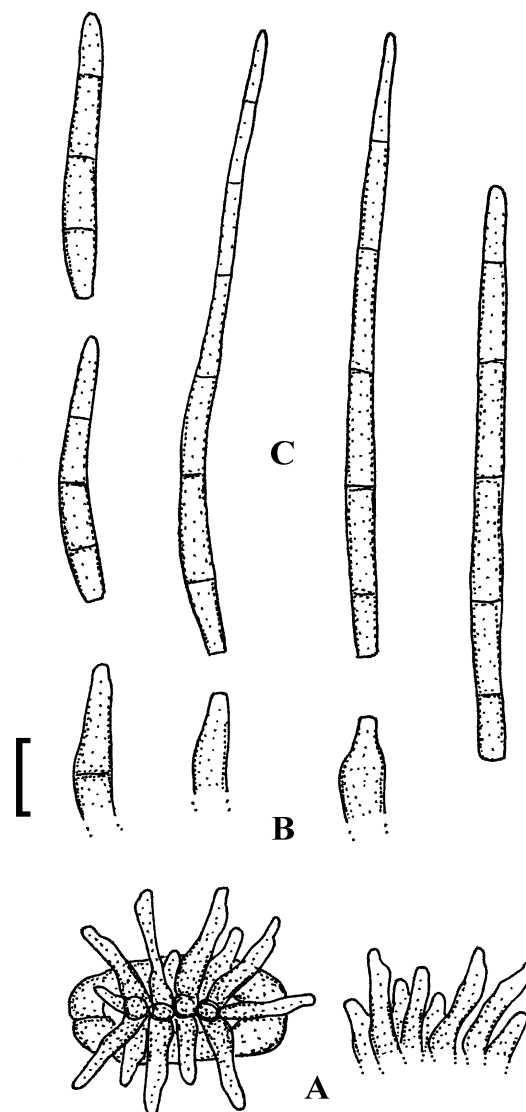


Fig. 27. *Pseudocercospora blepharidis* (K(M) IMI 83163, holotype). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. Bar = 10 μ m.

Description: Leaf spots amphigenous, subcircular, ovoid to irregular, 3–18 mm diam, pale to dark brown, sometimes somewhat zonate, above all on the lower leaf surface. *Caespituli* amphigenous, punctiform, brown. *Mycelium* internal. *Stromata* well-developed, substomatal, 20–30 μ m diam, olivaceous-brown. *Conidiophores* in small to moderately large fascicles, arising from stromata, through stomata, divergent to dense, straight, subcylindrical-conical to slightly geniculate-sinuuous, unbranched, 5–40 \times 3–5 μ m, 0–1(–2)-septate, pale to medium brown or olivaceous-brown, wall thin or only slightly thickened, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–25 μ m long, conidiogenous loci inconspicuous. *Conidia* solitary, acicular to obclavate-cylindrical, straight to curved, 30–80 \times 2.5–3.5 μ m, 3–8-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex subacute to obtuse, base truncate to long obconically truncate, 2–2.5 μ m wide, hila unthickened, not darkened.

Holotype: India: Maharashtra: Khandala, on *Cynarospermum asperimum* [*Blepharis asperima*], Acanthaceae, 9 Nov. 1956, P. P. Chiddarwar 2 (K(M) IMI 83163).

Host range and distribution: Only known from the type collection.

Pseudocercospora consociata (G. Winter) Y.L. Guo & X.J. Liu, *Mycosystema* 2: 232 (1989).
var. ***consociata***

(Fig. 28a)

Basionym: *Cercospora consociata* G. Winter, *Hedwigia* 22: 70 (1883).

Literature: Saccardo (1886: 470), Chupp (1954: 23), Katsuki (1965: 7), Guo & Hsieh (1995: 1), Guo et al. (1998: 11), Crous & Braun (2003: 136), Braun & Freire (2006: 236), Kamal (2010: 166), Phengsintham et al. 2013: 110).

Illustration: Chupp (1954: 21, fig. 3), Guo & Hsieh (1995: 3, fig. 2), Guo et al. (1998: 12, fig. 2), Phengsintham et al. 2013: 111, fig. 67).

Exsiccatae: Ellis & Everh., N. Amer. Fungi 2477.

Description: Leaf spots lacking or almost so, inconspicuous to diffuse yellowish to brownish discolorations, or forming

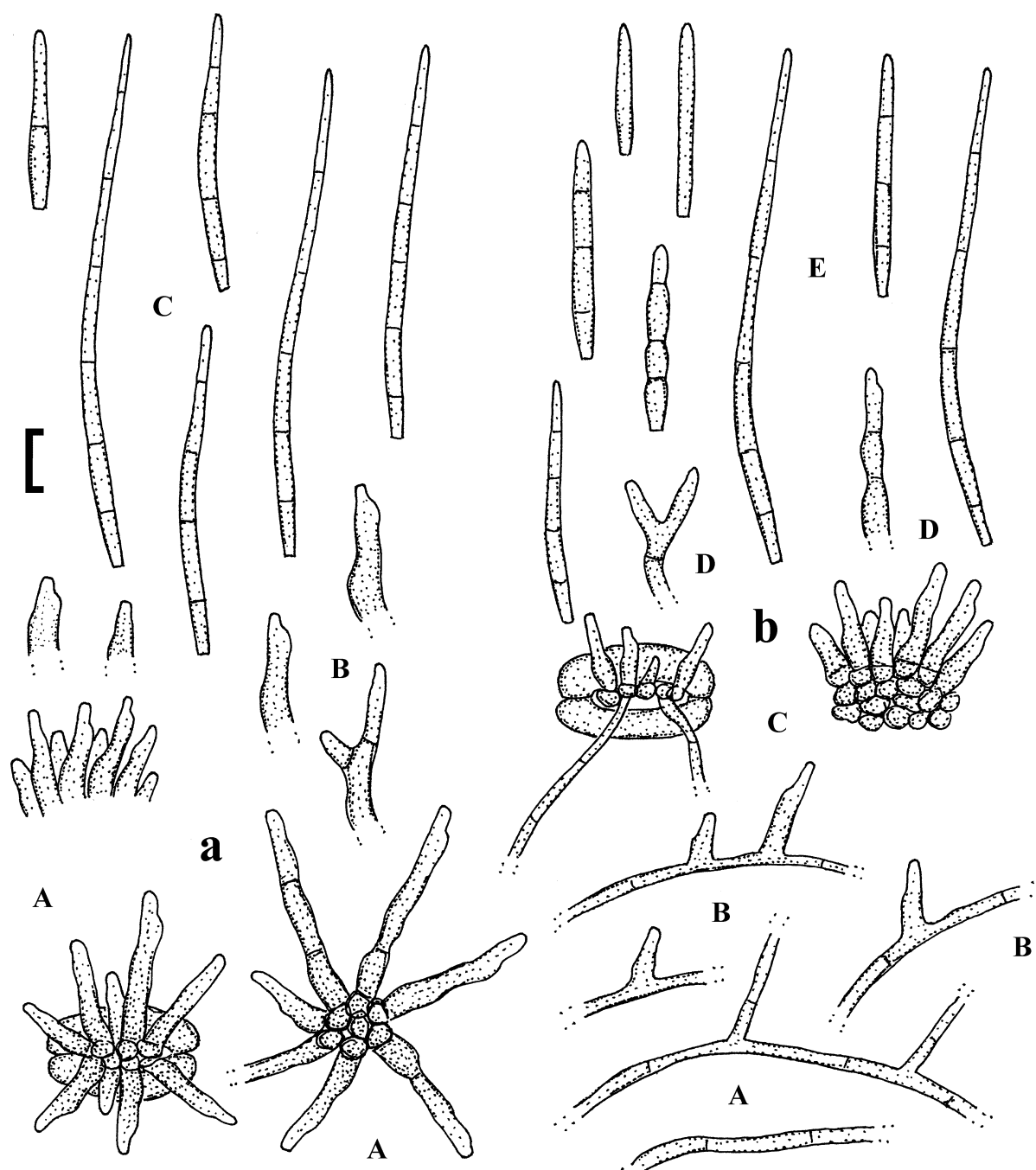


Fig. 28a, b. a. *Pseudocercospora consociata* var. *consociata* (BPI 435187, neotype). A. Conidiophore fascicles. B. Conidiophores. C. Conidia. b. *P. consociata* var. *dimorpha* (HAL 2190 F, holotype). A. Superficial hyphae. B. Solitary conidiophores arising from superficial hyphae. C. Conidiophore fascicles. D. Conidiophores. E. Conidia. Bar = 10 µm.

subcircular to angular-irregular lesions, 1–10(–15) mm diam, brownish, finally greyish brown to greyish white, margin indefinite or darker brown, occasionally reddish brown, sometimes slightly raised, narrow, often only formed as marginal line. *Caespituli* amphigenous, punctiform to effuse, dark brown to blackish, later greyish by abundant conidiation. *Mycelium* internal; hyphae branched, septate, occasionally constricted at septa, 1.5–5 µm wide, subhyaline to brownish, thin-walled, smooth. *Stromata* variable, almost lacking, small to medium in size, subglobose to somewhat irregular, 10–30 µm diam, occasionally larger, to 80 µm diam, substomatal to immersed, olivaceous-brown to dark brown, cells subglobose to somewhat angular-irregular in outline, 2–6(–11) µm diam, wall to 0.8 µm wide. *Conidiophores* in small to moderately large fascicles, occasionally in large fascicles, divergent to dense, arising from substomatal swollen hyphal cells or stromata, emerging through stomata or erumpent, erect, straight, subcylindrical or attenuated towards the tip, slightly to distinctly geniculate-sinuous, unbranched or rarely branched, 5–50(–80) × 2–6 µm, 0–4-septate, longer ones plainly pluriseptate, subhyaline to pale or medium olivaceous, olivaceous-brown or brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous or visible as truncate tips or shoulders, always unthickened and not darkened. *Conidia* solitary, obclavate-cylindrical, straight to curved, 20–110(–150) × 2–4.5(–5) µm, 0–10(–12)-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex acute to obtuse, base short to sometimes long obconically truncate, 0.8–2 µm wide, hila unthickened, not darkened.

[*Holotype*: **USA**: Illinois: on *Ruellia ciliosa*, A. B. Seymour]. *Neotype* (designated here, MycoBank, MBT202783): **USA**: Missouri: near Emma, on *Ruellia ciliosa*, Aug. 1889, C. H. Demetrio [Ellis & Everh., N. Amer. Fungi 2477] (BPI 435187). *Isoneotypes*: Ellis & Everh., N. Amer. Fungi 2477, e.g. DAOM, FH.

Host range and distribution: On *Dyschoriste oblongifolia*, *Justicia* (*gendarussa*, *procumbens*), *Ruellia* (*ciliosa*, *prostrata*, *strepens*, *tuberosa*), *Acanthaceae*, Asia (China; India, Uttar Pradesh, West Bengal; Japan, Thailand), North America (USA, Alabama, Florida, Iowa, Illinois, Mississippi, Missouri, Oklahoma), South America (Brazil, Venezuela).

var. **dimorpha** U. Braun & Urtiaga, *Feddes Repert.* **119**: 489 (2008).
(Fig. 28b)

Illustration: Braun & Urtiaga (2008: 490, fig. 4).

Description: Differs *in vivo* from var. *consociata* by the formation of superficial hyphae with solitary conidiophores (superficial hyphae emerging through stomata, branched, septate, 1.5–2.5(–3) µm wide, subhyaline to pale olivaceous, thin-walled, smooth; solitary conidiophores arising from superficial hyphae, lateral, erect, straight, subcylindrical-conical to somewhat geniculate-sinuous, unbranched, 5–30 × 1.5–4 µm, 0–1(–2)-septate, subhyaline to pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated,

terminal or conidiophores often reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous; otherwise as in var. *consociata*.

Holotype: **Venezuela**: Lara State: Quibor, on *Justicia galapagana*, *Acanthaceae*, Jan. 2007, R. Urtiaga (HAL 2190 F).

Host range and distribution: Only known from the type collection.

Notes: *Pseudocercospora consociata*, known from Asia, North and South America on hosts of various genera of the *Acanthaceae*, is probably taxonomically heterogeneous. This species is morphologically rather variable in all basic traits. However, a further splitting needs cultures and molecular sequence analyses based on material from all continents and host genera involved. Type material of this species, collected by Seymour before 1884, could not be traced. Records of *Pseudocercospora consociata* on *Dicliptera chinensis* from China (Guo & Hsieh 1995, Guo *et al.* 1998) are undoubtedly incorrect and belong to *P. diclipterae*. The two species are morphologically barely distinguishable.

Pseudocercospora diclipterae (A.K. Kar & M. Mandal) Deighton, *Trans. Brit. Mycol. Soc.* **88**: 388 (1987).

(Fig. 29)

Basionym: *Cercospora diclipterae* A.K. Kar & M. Mandal, *Trans. Brit. Mycol. Soc.* **53**: 337 (1969).

Literature: Crous & Braun (2003: 159), Kamal (2010: 171).

Illustration: Kar & Mandal (1969: 338, fig. 1).

Description: *Leaf spots* amphigenous, subcircular, 1–6 mm diam, scattered, sometimes confluent, uniformly yellowish to dull yellowish brown, later olivaceous by abundant fructification. *Caespituli* amphigenous, mostly hypophyllous, punctiform to effuse, brown or deep olivaceous. *Mycelium* internal. *Stromata* lacking or small, 10–20 µm diam, subglobose or somewhat oblong, substomatal, brown. *Conidiophores* in small to moderately large fascicles, usually 2–15, divergent, arising from substomatal hyphae or stromata, through stomata, erect, straight to curved or geniculate-sinuous, unbranched, 10–55 × 3–5 µm, 0–5-septate, yellowish brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores sometimes reduced to conidiogenous cells, 10–20 µm long, conidiogenous loci inconspicuous to subdentate, unthickened, not darkened. *Conidia* solitary, obclavate-subcylindrical, straight to curved, 30–150 × 3–4 µm, 2–16-septate, pale yellowish brown, olivaceous, thin-walled, smooth, apex subacute or subobtuse, base short obconically truncate, 1.5–2 µm wide, hila unthickened, not darkened.

Holotype: **India**: West Bengal, Darjeeling, Sevak Road, on *Dicliptera chinensis* [*roxburghiana*], 11 Nov. 1967, M. Mandal (K(M) IMI 135116). *Isotype*: BPI 435712.

Host range and distribution: On *Dicliptera chinensis*, *Acanthaceae*, Asia (?China; India, West Bengal).

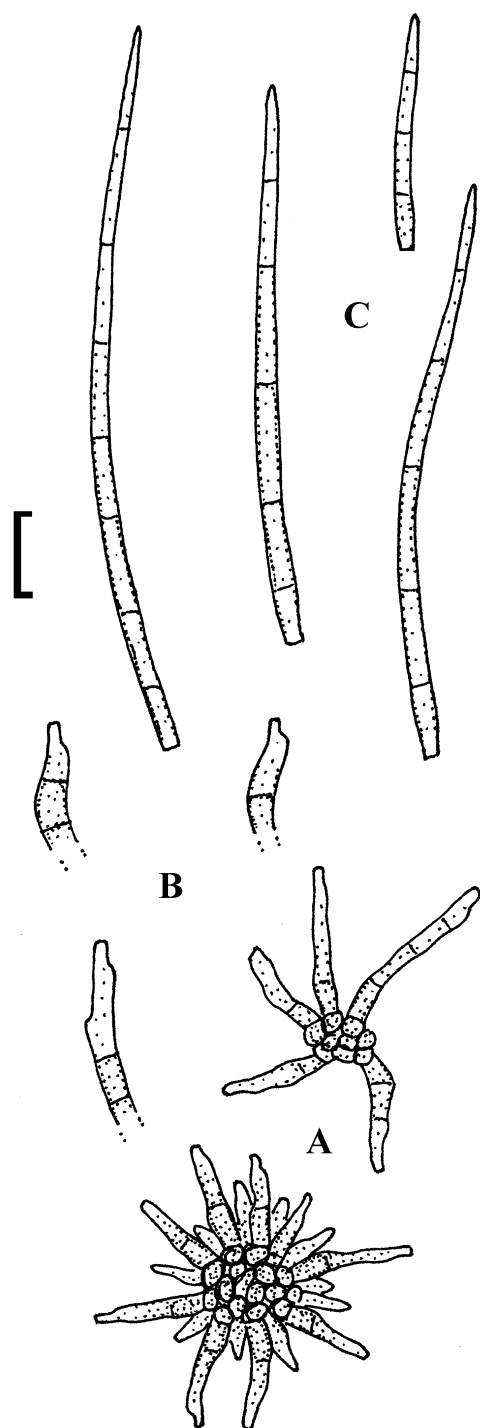


Fig. 29. *Pseudocercospora diclipterae* (K(M) IMI 135116, holotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

Note: Records of *Pseudocercospora consociata* on *Dicliptera chinensis*, from China belong possibly to *P. diclipterae* (see notes under *P. consociata*).

Pseudocercospora ecbolii (A.K. Kar & M. Mandal)
Deighton, *Trans. Brit. Mycol. Soc.* **88**: 388 (1987).
(Fig. 30)

Basionym: *Cercospora ecbolii* A.K. Kar & M. Mandal, *Trans. Brit. Mycol. Soc.* **53**: 338 (1969).

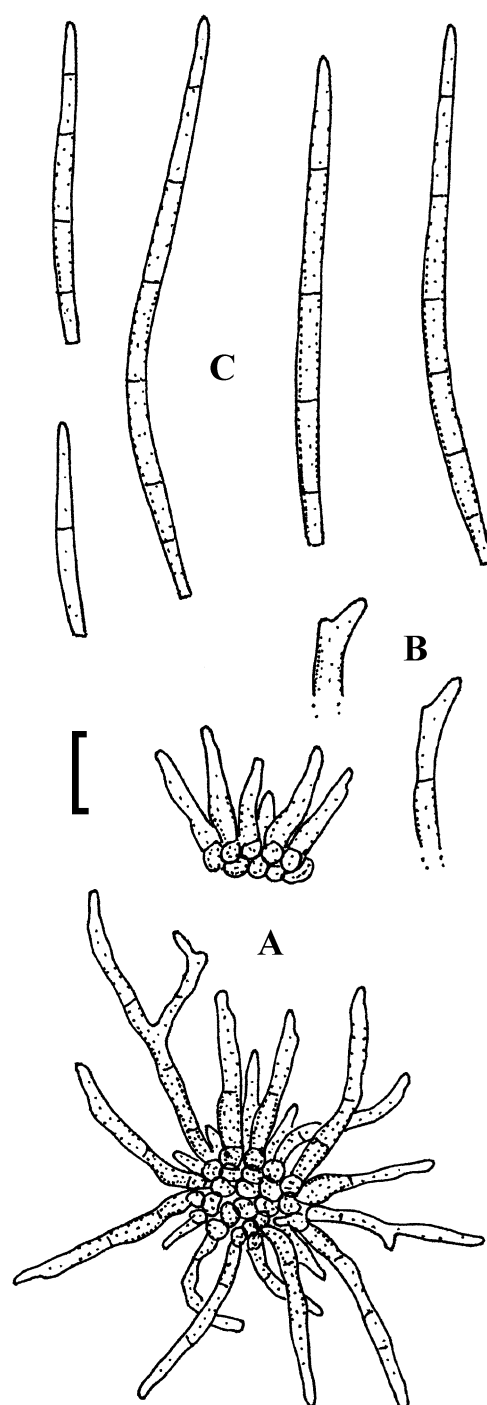


Fig. 30. *Pseudocercospora ecbolii* (K(M) IMI 135117, holotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

Literature: Crous & Braun (2003: 168), Kamal (2010: 172).

Illustration: Kar & Mandal (1969: 339, fig. 2).

Description: *Leaf spots* amphigenous, formed as vein-limited, yellowish discolorations, 4–10 mm diam, scattered, finally deep olivaceous below by abundant fructification. *Caespituli* hypophyllous, effuse, olivaceous. *Mycelium* internal. *Stromata* lacking or small, substomatal, 5–25 μ m diam, subglobose to oblong, dark olivaceous to olivaceous-brown. *Conidiophores* in small to moderately large fascicles, mostly 2–15, arising from stromata, through

stomata, divergent to moderately dense, erect, straight, subcylindrical-conical to geniculate-sinuous, unbranched or occasionally 1–2 times branched, $15\text{--}65 \times 3\text{--}5 \mu\text{m}$, 0–6-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores sometimes reduced to conidiogenous cells, $10\text{--}25 \mu\text{m}$ long, conidiogenous loci inconspicuous to subdenticulate, unthickened, not darkened. *Conidia* solitary, narrowly obclavate-cylindrical, straight to curved, $20\text{--}100 \times 2.5\text{--}4 \mu\text{m}$, 1–10-septate, pale olivaceous to very pale olivaceous-brown, thin-walled, smooth, apex subacute or subobtuse, base obconically truncate, $1\text{--}2 \mu\text{m}$ wide, hila neither thickened nor darkened.

Holotype: India: West Bengal: 24-Parganas, Rajarhat, on *Ecbolium ligustrinum*, Acanthaceae, 16 Jul. 1967, M. Mandal (K(M) IMI 135117). **Isotype:** BPI 436048.

Host range and distribution: Only known from the type collection.

Pseudocercospora justiciae (F.L. Tai) Y.L. Guo & X.J. Liu, *Mycosystema* 4: 103 (1991). (Fig. 31)

Basionym: *Cercospora justiciae* F.L. Tai, *Lloydia* 11: 47 (1948).

Literature: Chupp (1954: 24), Guo & Hsieh (1995: 2), Guo *et al.* (1998: 11).

Illustrations: Tai (1948: 44, fig. 11), Guo & Hsieh (1995: 4, fig. 3), Guo *et al.* (1998: 13, fig. 3).

Description: Leaf spots lacking or only formed as yellowish to yellowish brown discolorations on the upper leaf surface, circular, 2–5 mm diam, grey to greyish brown below, margin indefinite. *Caespituli* hypophyllous, effuse, sooty. *Mycelium* internal and external, superficial; hyphae emerging through stomata, branched, septate, $2\text{--}3.5 \mu\text{m}$ wide, pale olivaceous to olivaceous-brown, thin-walled, smooth. *Stromata* not developed. *Conidiophores* in loose fascicles, 2–11, arising from internal hyphae, through stomata or solitary, arising from superficial hyphae, erect, subcylindrical, flexuous, curved-sinuous to somewhat geniculate-sinuous, unbranched or branched, $50\text{--}130 \times 4\text{--}6.5 \mu\text{m}$, 3–8-septate, olivaceous-brown to pale brown, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci inconspicuous, occasionally subdenticulate. *Conidia* solitary, cylindrical to obclavate-subcylindrical, straight to curved, $40\text{--}110 \times 3.5\text{--}6.5 \mu\text{m}$, 3–11-septate, pale olivaceous to olivaceous, thin-walled, smooth, apex obtuse to subacute, base obconically truncate, about $2\text{--}2.5 \mu\text{m}$ wide, hila neither thickened nor darkened.

Holotype: China: Sichuan: Chengtu, on *Justicia procumbens*, 1943, Lee Ling 125 (HMAS 12126).

Host range and distribution: On *Justicia* (*procumbens*, *Justicia* sp.), Acanthaceae, Asia (China), ?North America (USA, Florida).

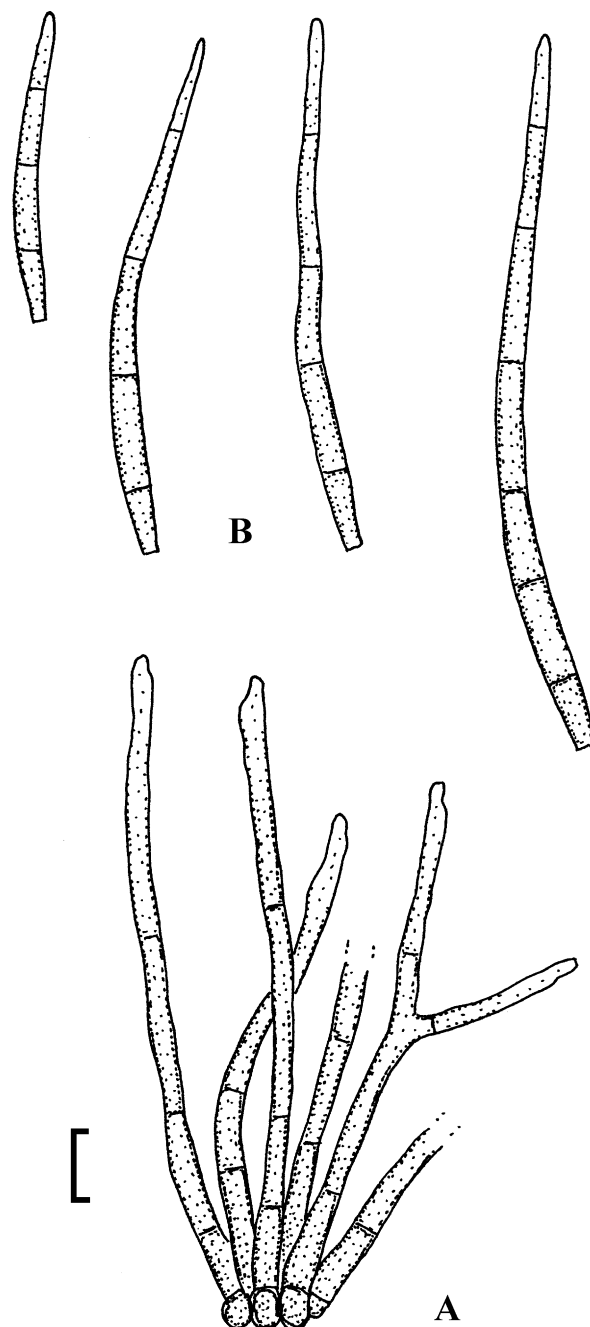


Fig. 31. *Pseudocercospora justiciae* (based on Guo & Hsieh 1995: 4, fig. 3). **A.** Conidiophore fascicle. **B.** Conidia. Bar = $10 \mu\text{m}$.

Notes: A record of *P. justiciae* on *Justicia* sp. from Florida, USA (Alfieri *et al.* 1984) is unclear and doubtful. Material could not be traced.

Pseudocercospora justiciicola P.N. Singh *et al.*, *Mycol. Res.* 100: 1129 (1996). (Fig. 32)

Illustration: Singh *et al.* (1996: 1129, figs 1–5).

Description: Leaf spots lacking or almost so, lesions indistinct, occasionally formed as greyish discolorations. *Caespituli* hypophyllous, greyish, discrete to effuse. *Mycelium* internal and external; superficial hyphae branched, septate,

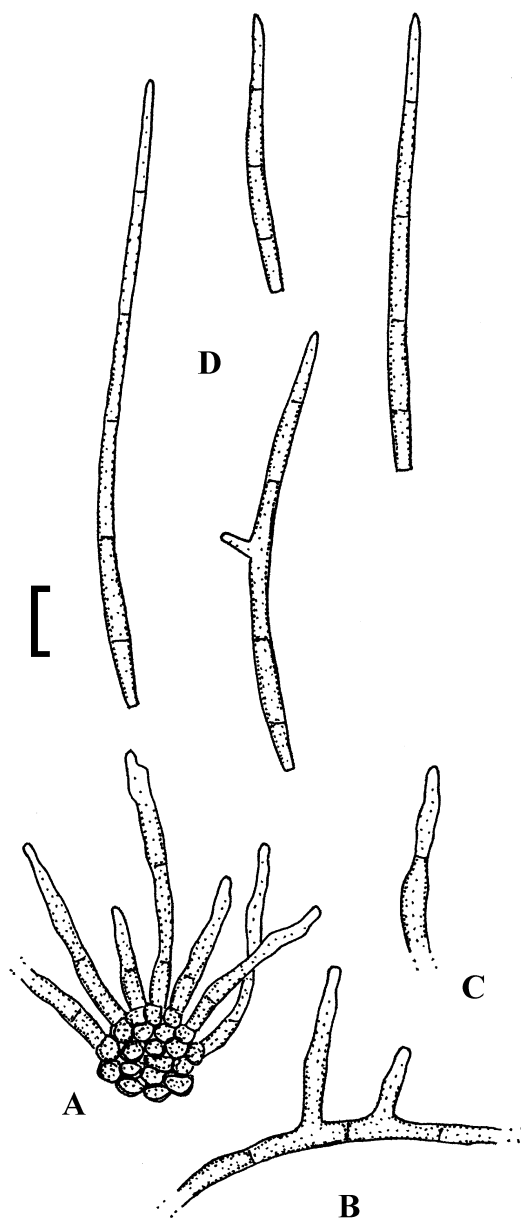


Fig. 32. *Pseudocercospora justiciicola* (K(M) IMI 366368, holotype). **A.** Conidiophore fascicle. **B.** Solitary conidiophores arising from a superficial hypha. **C.** Conidiophore. **D.** Conidia. Bar = 10 µm.

subhyaline, 1–3 µm diam, thin-walled, smooth. *Stromata* developed, small, about 10–25 µm diam, subglobose to somewhat oblong, brown. *Conidiophores* in loose fascicles, arising from stromata or solitary arising from superficial hyphae, lateral, occasionally terminal, erect, straight to flexuous, somewhat geniculate-sinuous, unbranched, 20–50 × 1–5 µm, 2–6-septate, olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci unthickened, not darkened. *Conidia* solitary, obclavate, straight to curved, occasionally with short lateral branchlets, 35–120 × 1.5–5 µm, 4–14-septate, olivaceous, thin-walled, smooth, apex acute to subobtuse, base short obconically truncate, about 1–2 µm wide, hila unthickened, not darkened.

Holotype: Nepal: Kathmandu valley, on *Justicia japonica* [simplex], Acanthaceae, Nov.–Dec. 1993, Kamal (K(M) IMI 366368). **Isotype:** GPU 4004.

Host range and distribution: Only known from the type collection.

Notes: There is a second collection from Nepal that probably pertains to *P. justiciicola*. Verma & Kamal (1991) cited it as paratype material of *P. rungiae* [on "*Ruellia prostrata*" (on the original label as *Justicia* sp.), Nepal, Kathmandu Valley, Jan. 1986, R. K. Verma (GPU, KK 221, K(M) IMI 303480)]. See discussion under *P. rungiae*.

Pseudocercospora lepidagathidis U. Braun & Crous, *Mycotaxon* 92: 399 (2005). (Fig. 33)

Illustration: Braun & Crous (2005: 402, fig. 5).

Description: *Leaf spots* amphigenous, 1–5 mm diam, subcircular to somewhat irregular or even diffuse, brownish, dingy olivaceous-brown to blackish brown or with blackish purple tinge, margin indistinct. *Caespituli* hypophyllous, subeffuse, rather inconspicuous. *Mycelium* internal and external; superficial hyphae emerging through stomata, sparingly branched, 1–3 µm wide, septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth. *Stromata* lacking or only with very small substomatal hyphal aggregations, brown. *Conidiophores* in small, usually loose fascicles, arising from internal hyphae or stomatic hyphal aggregations, through stomata, or conidiophores solitary, arising from superficial hyphae, lateral or terminal, erect, straight to flexuous, geniculate-sinuous, unbranched or only rarely branched, 5–80 × 2.5–5.5 µm, 0–4-septate, pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–25 µm long, conidiogenous loci neither thickened nor darkened, occasionally subdentate. *Conidia* solitary, straight to curved, narrowly obclavate-cylindrical, 20–120 × 2–4 µm, 1–9-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex obtuse to subacute, base obconically truncate, 1–2 µm wide, hila unthickened, not darkened.

Holotype: Puerto Rico: San Juan, on *Lepidagathis alopecuroidea*, Acanthaceae, 10 Feb. 1962, H. L. Rubin 16490 (BPI 437637).

Host range and distribution: Only known from the type collection.

Note: The material on *Lepidagathis alopecuroidea* was previously falsely referred to as *Cercospora lepidagathidis* (Stevenson 1975, Minter et al. 2001, Crous & Braun 2003), which is, however, a genuine species of *Cercospora* s. str.

Pseudocercospora odontonematis (Chupp) U. Braun & Crous, *Mycosphaerella and Anam.*: 296 (2003). (Fig. 34)

Basionym: *Cercospora odontonematis* Chupp, *Monograph of Cercospora*: 25 (1954); as "*odontonemae*".

Literature: Chupp (1954: 25).

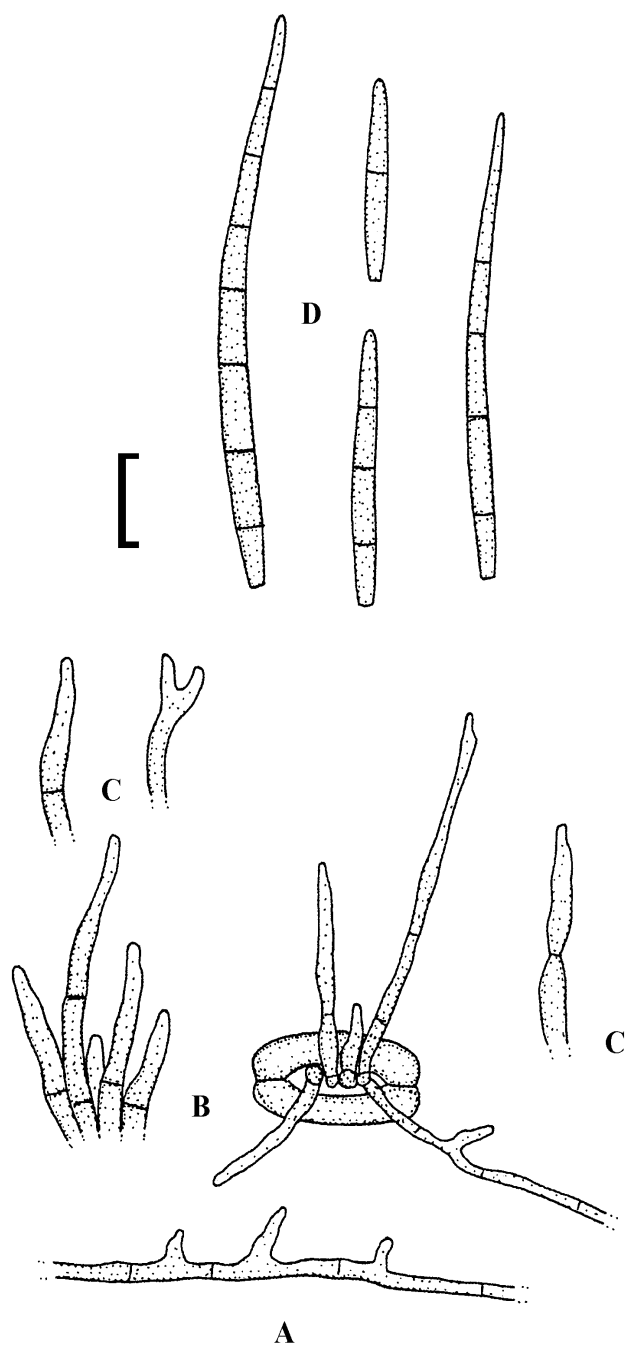


Fig. 33. *Pseudocercospora lepidagathidis* (BPI 437637, holotype). **A.** Solitary conidiophores arising from superficial hyphae. **B.** Conidiophore fascicles. **C.** Conidia. Bar = 10 µm.

Description: Leaf spots amphigenous, circular to somewhat angular-irregular, 2–5 mm diam, brown, later with greyish brown to dingy grey centre and darker border. *Caespituli* hypophyllous, punctiform to effuse. *Mycelium* internal and external; superficial hyphae branched, septate, 1–3 µm wide, subhyaline or pale olivaceous, thin-walled, smooth; *stromata* substomatal, 10–40 µm diam, brown. *Conidiophores* in small to moderately large fascicles, loose to dense, arising from stromata, through stomata or erumpent, also solitary, arising from superficial hyphae, lateral, rarely terminal, erect, straight, subcylindrical-conical to strongly geniculate-sinuous, unbranched, 10–40 × 2–4.5 µm, 0–2-septate, very pale or pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiophores reduced to conidiogenous

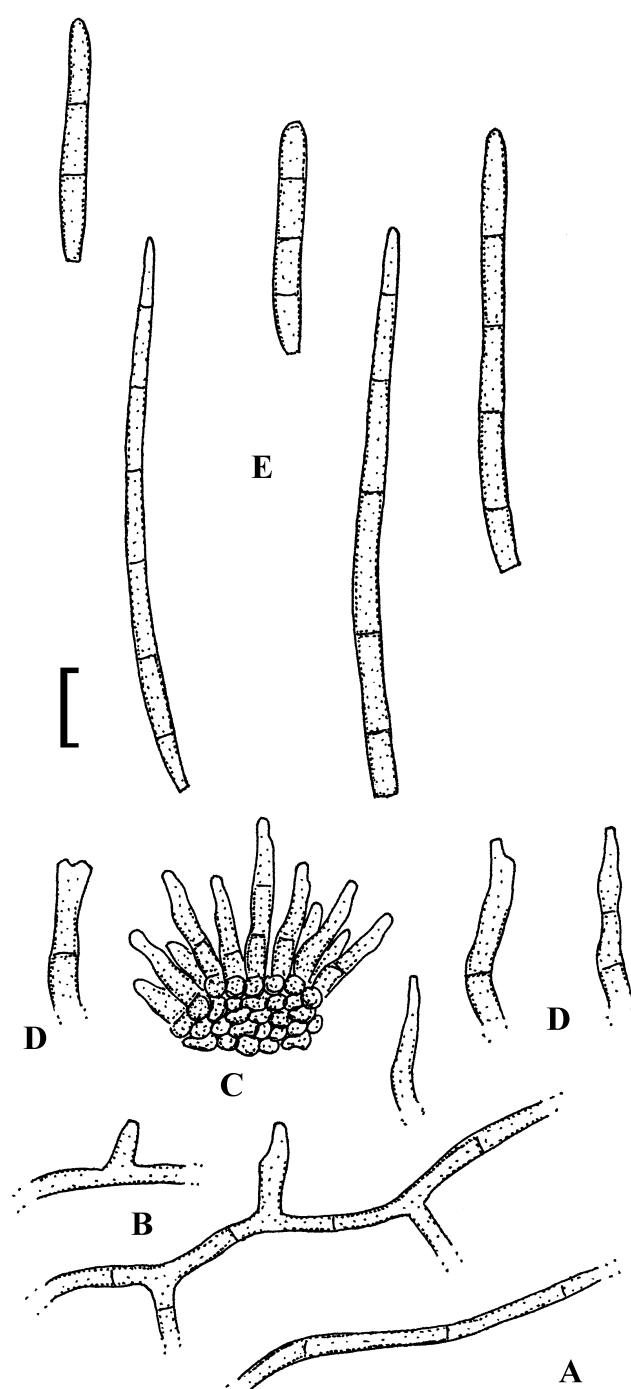


Fig. 34. *Pseudocercospora odontonematis* (CUP 40422, lectotype). **A.** Superficial hypha, **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidiophore fascicle. **D.** Conidiophores. **E.** Conidia. Bar = 10 µm.

cells or integrated, terminal, 10–25 µm long, conidiogenous loci inconspicuous to subdenticulate, but always unthickened and not darkened. *Conidia* solitary, narrowly cylindrical to obclavate-cylindrical, 20–90 × 2–4 µm, (2–)3–8-septate, very pale olivaceous, thin-walled, apex obtuse to subacute, base more or less truncate to distinctly obconically truncate, 1.5–2 µm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202784): Mexico: Veracruz: Cordoba, on *Odontonema callistachyum*,

Acanthaceae, 25 Jul. 1932, O. A. Plunkett (CUP 40422).
Isolectotype: CUP 60863.

Host range and distribution: Only known from the type collection.

Pseudocercospora rhinacanthi (Höhn.) Deighton,
Mycol. Pap. **140**: 152 (1976).

(Fig. 35)

Basionym: *Cercospora rhinacanthi* Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Wien*, **121**: 414 (1912); as "*rhynacanthi*".

Synonym: *Cercosporina rhinacanthi* (Höhn.) Sacc., *Syll. Fung.* **25**: 917 (1931).

Literature: Chupp (1954: 25), Guo & Hsieh (1995: 357), Guo et al. (1998: 376), Crous & Braun (2003: 351).

Exsiccatae: Kabát & Bubák, *Fungi Imp. Exs.* 847.

Description: *Leaf spots* amphigenous, formed as diffuse yellowish to brown discolorations or diffuse brown spots with yellowish halo to circular or angular-irregular, 2–10 mm diam, brown or later with dingy grey centre, rather indistinct on dry leaves. *Caespituli* amphigenous, mainly hypophyllous. *Mycelium* internal and external; superficial hyphae branched, septate, 1–4 µm wide, subhyaline to olivaceous-brown, thin-walled, smooth. *Stromata* lacking or small, substomatal, 10–25 µm diam, olivaceous-brown to brown. *Conidiophores* in loose to moderately dense, small fascicles, usually 2–6, arising from stromata, through stomata, erect to decumbent, or solitary, arising from superficial hyphae, lateral, straight, subcylindrical to moderately geniculate-sinuous, unbranched or occasionally branched, 5–60(–80) × 2–5 µm, 0–3-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiophores reduced to conidiogenous cells or integrated, terminal, about 10–25 µm long, conidiogenous loci inconspicuous or visible as truncate, subdentate tips or shoulders. *Conidia* solitary, narrowly obclavate-cylindrical, straight to somewhat curved, (25–)40–120(–130) × 2–5 µm, indistinctly (2–)3–10(–12)-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex more or less pointed, base usually long obconically truncate, 1–1.5 µm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202785): **Indonesia**: Java: Bogor (Buitenzorg), Botanic Garden, on *Rhinacanthus* sp., 1907, F. v. Höhnelt [Kabát & Bubák, *Fungi Imp. Exs.* 847] (BPI 440801). *Isolectotypes*: Kabát & Bubák, *Fungi Imp. Exs.* 847, e.g., K(M) IMI 89002 (slide), HBG, W.

Host range and distribution: On *Rhinacanthus* (*nasutus* [Justicia *nasuta*], *Rhinacanthus* sp.), Acanthaceae, Asia (Indonesia, Philippines, Thailand).

Notes: Chinese records of *P. rhinacanthi* on *Justicia procumbens* (Tai 1979, Guo & Hsieh 1995, Guo et al. 1998) are unclear, unproven and might belong to *P. consociata*. The two species are morphologically barely distinguishable.

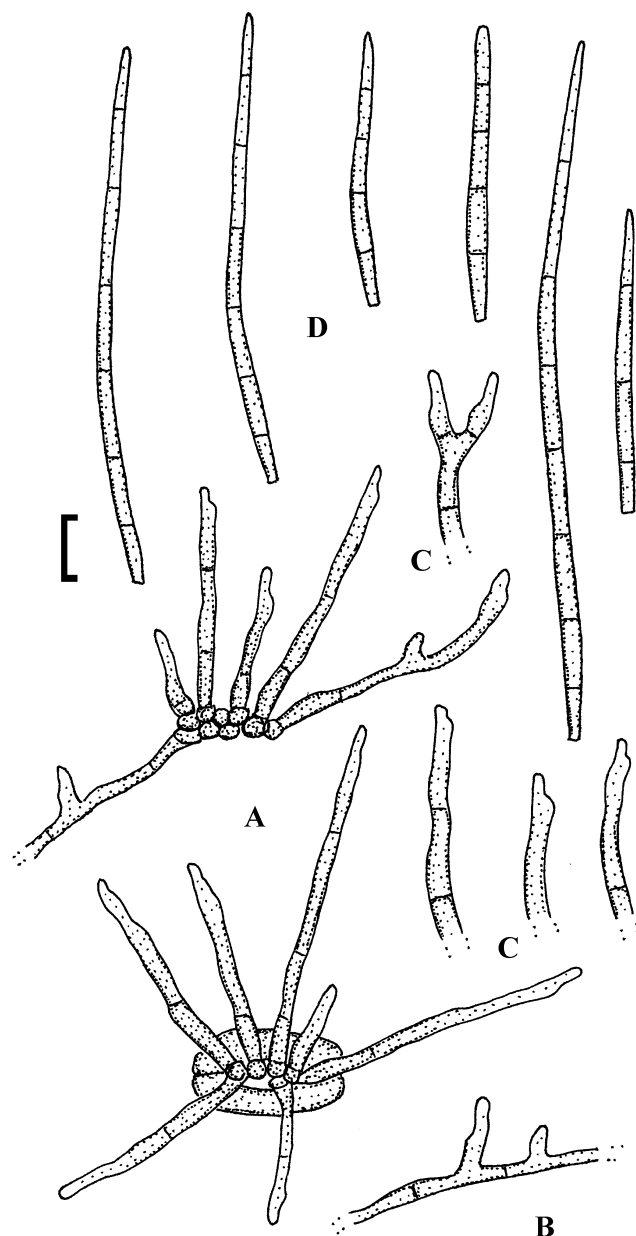


Fig. 35. *Pseudocercospora rhinacanthi* (BPI 440801, lectotype). A. Conidiophore fascicles. B. Solitary conidiophores arising from a superficial hypha. C. Conidiophores. D. Conidia. Bar = 10 µm.

Pseudocercospora rungiae R.K. Verma & Kamal,
Indian Phytopathol. **44**: 446 (1991).

(Fig. 36)

Synonym: *Cercospora rungiae* M.S. Patil, *Botanique* (Nagpur) **8**: 69 "1977" (1978) [*holotype*: **India**: Maharashtra: Kolhapur, on *Rungia repens*, 11 Dec. 1975, M. S. Patil (HCIO 32003)].

Literature: Crous & Braun (2003: 361), Kamal (2010: 216).

Illustrations: Patil (1978: 70, fig. 1), Verma & Kamal (1991: 444–445, figs 4–5).

Description: *Leaf spots* mainly hypophyllous, circular to angular-irregular or diffuse, 3–5 mm diam, greenish white, yellowish. *Caespituli* hypophyllous, scattered, rather

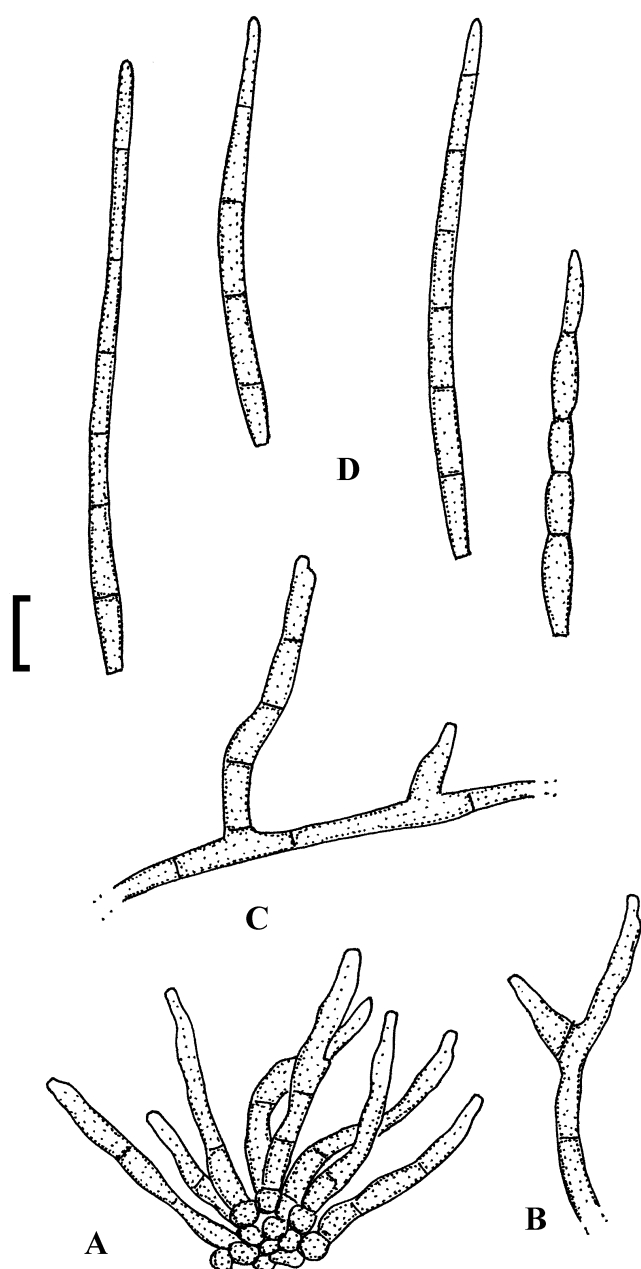


Fig. 36. *Pseudocercospora rungiae* (K(M) IMI 299176, isotype). A. Conidiophore fascicle. B. Conidiophore (branched). C. Solitary conidiophores arising from a superficial hypha. D. Conidia. Bar = 10 µm.

inconspicuous. *Mycelium* internal; hyphae branched, septate, colourless, 1–2 µm wide, somewhat wider near stromata. *Stromata* lacking or poorly developed, substomatal, small, to about 25 µm diam. *Conidiophores* fasciculate, 2–10, divergent, arising from small stromata, through stomata, erect, straight, subcylindrical-conical to distinctly geniculate-sinuous, unbranched to branched, 10–75 × 2–5 µm, 0–3(–6)-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiophores occasionally reduced to conidiogenous cells, but mostly integrated, terminal, 10–30 µm long, conidiogenous loci inconspicuous to subdenticulate, but always unbranched and not darkened. *Conidia* solitary, obclavate-subcylindrical, straight to curved, 30–145 × 2–4 µm, 1–10-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex obtuse or subacute, base short obconically

truncate, 1–2 µm wide, hila unthickened, not darkened.

Holotype: India: Uttarakhand: Kath Godam, Nainital, on *Rungia pectinata*, Oct. 1985, R. K. Verma (GPU, KK 125). **Isotype:** K(M) IMI 299176.

Host range and distribution: On *Rungia* (*pectinata* [parviflora], *repens*), *Acanthaceae*, Asia (India, Maharashtra, Uttarakhand; Nepal).

Note: The identity of *Cercospora rungiae* and *Pseudocercospora rungiae* has been proven by Kamal (2010). A record of *C. rungiae* from Andhra Pradesh (Braun *et al.* 1992: 363) refers to a true *Cercospora* (see *C. justiciicola*) and not to this species. Verma & Kamal (1991) cited a collection on "*Ruellia prostrata*" (on the original label as *Justicia* sp.) as paratype material (Nepal: Kathmandu Valley, Jan. 1986, R. K. Verma (GPU, KK 221, K(M) IMI 303480). This collection, characterised by forming superficial hyphae with solitary conidiophores is excluded from *P. rungiae*. The identification of the host is uncertain, and the identity of this fungus is not quite clear, but it probably belongs to *Pseudocercospora justiciicola*.

Pseudocercospora thunbergiae (Boedijn) U. Braun & Sivapalan, *Fungal Diversity* 3: 21 (1999).

(Fig. 37)

Basionym: *Cercospora thunbergiae* Boedijn, *Nova Hedwigia* 3: 411 (1961).

Literature: Crous & Braun (2003: 403), Kamal (2010: 225).

Illustrations: Boedijn (1961: tab. 108, fig. 1), Braun & Sivapalan (1999: 20, fig. 13).

Description: *Leaf spots* amphigenous, angular-irregular, often vein-limited, 1–10 mm diam, sometimes confluent and larger, dark brown, later greyish brown to dingy grey, margin indefinite. *Caespituli* hypophyllous, inconspicuous. *Mycelium* internal and external; superficial hyphae sparingly branched, 1–3 µm wide, septate, subhyaline to pale olivaceous, thin-walled, smooth. *Stromata* lacking or very small, only composed of a few swollen hyphal cells, 1.5–4 µm diam, olivaceous to brownish. *Conidiophores* solitary, arising from superficial hyphae, lateral, rarely terminal, occasionally emerging through stomata, solitary or in small, loose fascicle, erect, straight, subcylindrical-conical to somewhat geniculate-sinuous, unbranched, 5–30 × 1.5–3 µm, 0–1-septate, subhyaline to pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores aseptate, reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous, neither thickened nor darkened. *Conidia* solitary, narrowly obclavate-cylindrical, 20–95 × 1.5–4 µm, (0–)1–8-septate, subhyaline, pale yellowish green to very pale olivaceous, thin-walled, smooth, apex subacute, base obconically truncate, 1–2.5 µm wide, hila unthickened, not darkened.

Holotype: Indonesia: Jawa Barat: Bogor, botanical garden, *Thunbergia alata*, Apr. 1950, K. B. Boedijn (L 53879). **Isotype:** K(M) IMI 91586.

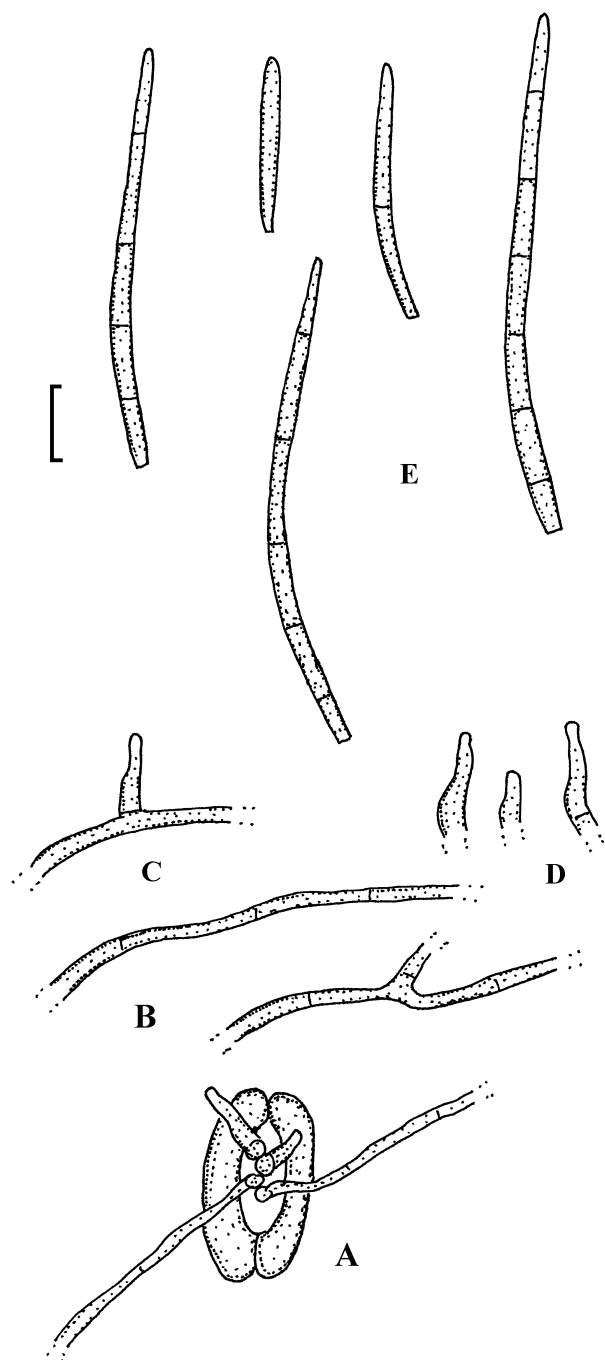


Fig. 37. *Pseudocercospora thunbergiae* (L 53879, holotype). **A.** Conidiophores and hyphae emerging through a stoma. **B.** superficial hyphae. **C.** Solitary conidiophore arising from a superficial hypha. **D.** Conidiophores. **E.** Conidia. Bar = 10 µm.

Host range and distribution: On *Thunbergia* (*alata*, *erecta*, *grandiflora*), *Acanthaceae*, Asia (Brunei; India, Uttar Pradesh; Indonesia).

Pseudocercospora thunbergiicola (J.M. Yen) Deighton, *Mycol. Pap.* **140**: 154 (1976). (Fig. 38)

Basionym: *Cercospora thunbergiicola* J.M. Yen, *Rev. Mycol.* **30**: 195 (1965); as "*thunbergicola*".

Literature: Yen & Lim (1980: 188), Crous & Braun (2003: 403).

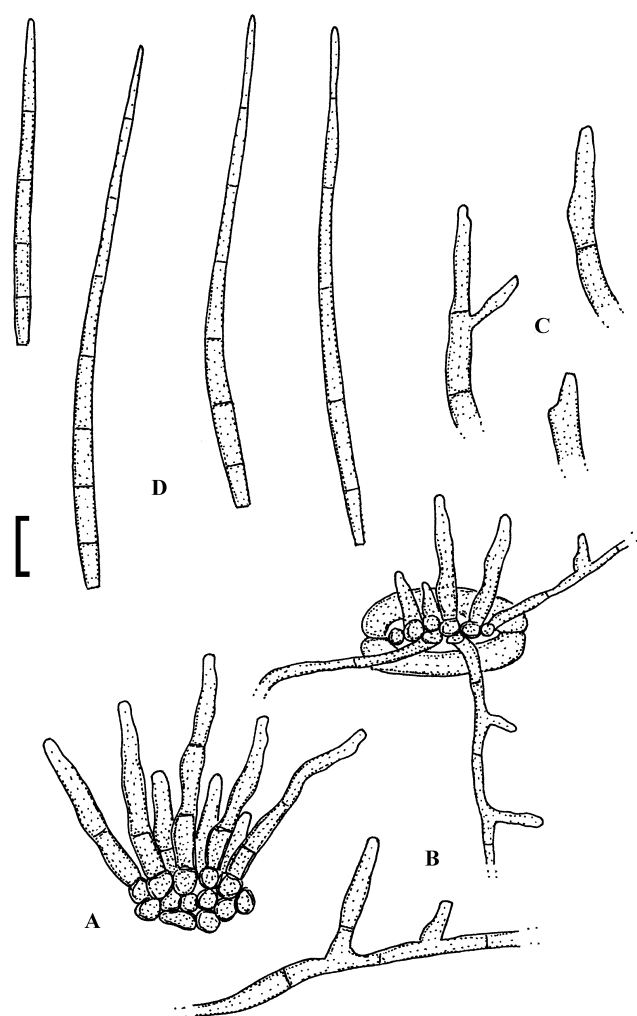


Fig. 38. *Pseudocercospora thunbergiicola* (PC, holotype). **A.** Conidiophore fascicles. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidiophores. **D.** Conidia. Bar = 10 µm.

Illustrations: Yen (1965: 197, fig. 12), Yen & Lim (1980: 258, fig. 68),

Description: *Leaf spots* amphigenous, circular to angular-irregular, 0.5–3 mm diam, centre pale, whitish, margin dark brown. *Caespituli* amphigenous, not very conspicuous. *Mycelium* internal and external; superficial hyphae emerging through stomata, sparingly branched, 2–3 µm wide, pale olivaceous-brown, thin-walled, smooth. *Stromata* almost lacking or small, 10–30 µm diam, substomatal, subglobose, brown. *Conidiophores* in small to moderately large fascicles, 2–22, arising from substomatal hyphae or stomata, emerging through stomata, divergent to moderately dense, or solitary, arising from superficial hyphae, lateral, erect, straight, subcylindrical or somewhat narrower towards the tip, to geniculate-sinuous, unbranched or occasionally once branched, 10–80 × 3–5 µm, 0–5-septate, pale olivaceous or olivaceous-brown, somewhat paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, 10–30 µm long, conidiogenous loci inconspicuous or visible as truncate tips or shoulders. *Conidia* solitary, cylindrical or obclavate-cylindrical, straight to curved, about 60–175 × 3.5–5 µm,

4–11-septate, pale olivaceous-brown, thin-walled, smooth, apex subacute, base short to long obconically truncate, 2–2.5 μm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202786): **Singapore:** Botanic Garden, on *Thunbergia alata*, 20 Jun. 1964, S. H. Yen 60 (PC). **Isolectotype:** K(M) IMI 120991.

Host range and distribution: On *Thunbergia alata*, *Acanthaceae*, Asia (Singapore).

Semipseudocercospora

A single species.

Semipseudocercospora peristrophes-acuminatae

(J.M. Yen) J.M. Yen, *Mycotaxon* **17**: 363 (1983).

(Fig. 39)

Basionym: *Cercospora peristrophes-acuminatae* J.M. Yen, *Rev. Mycol.* **29**: 230 (1964).

Literature: Yen & Lim (1980: 163), Crous & Braun (2003: 316).

Illustrations: Yen (1964: 233, fig. 10), Yen & Lim (1980: 219, fig. 22), Yen (1983: 362, fig. A–B).

Description: *Leaf spots* lacking or rather indistinct, forming diffuse dark brown discolorations. *Caespituli* hypophyllous, rarely amphigenous, effuse, brown. *Mycelium* internal. *Stromata* lacking. *Conidiophores* solitary or in small, divergent fascicles, arising from internal hyphae, through stomata, erect, straight to curved or somewhat flexuous, long, filiform, not or barely geniculate, unbranched, 140–260(–300) \times 5–7 μm , 3–15-septate throughout, medium brown, paler towards the tip, wall somewhat thickened, smooth; conidiogenous cells integrated, terminal, about 10–30 μm long, conidiogenous loci subconspicuous, 1.5–2 μm diam, in front view visible as small circle with darker rim and minute central pore, unthickened, but somewhat refractive or slightly darkened-refractive, loci somewhat bulging, denticle-like. *Conidia* solitary, short obclavate or clavate, ellipsoid, subcylindrical or obovoid, usually straight, 30–45 \times 5.5–8.5 μm , pale olivaceous to olivaceous-brown, thin-walled, smooth, apex broadly rounded, base short obconically truncate, 1.5–2 μm wide, hila unthickened, but occasionally slightly refractive or darkened-refractive.

Lectotype (designated here, MycoBank, MBT202787): **Singapore:** Katong, on *Peristrophe acuminata*, *Acanthaceae*, S. H. Yen 20 (PC). **Isolectotype:** K(M) IMI 122324.

Host range and distribution: Only known from the type collection.

Notes: The generic affinity of *Semipseudocercospora* is quite unclear, and it is unknown if it is a true cercosporoid genus (Braun *et al.* 2013). Molecular sequence analyses are necessary to elucidate the phylogenetic position of this genus.

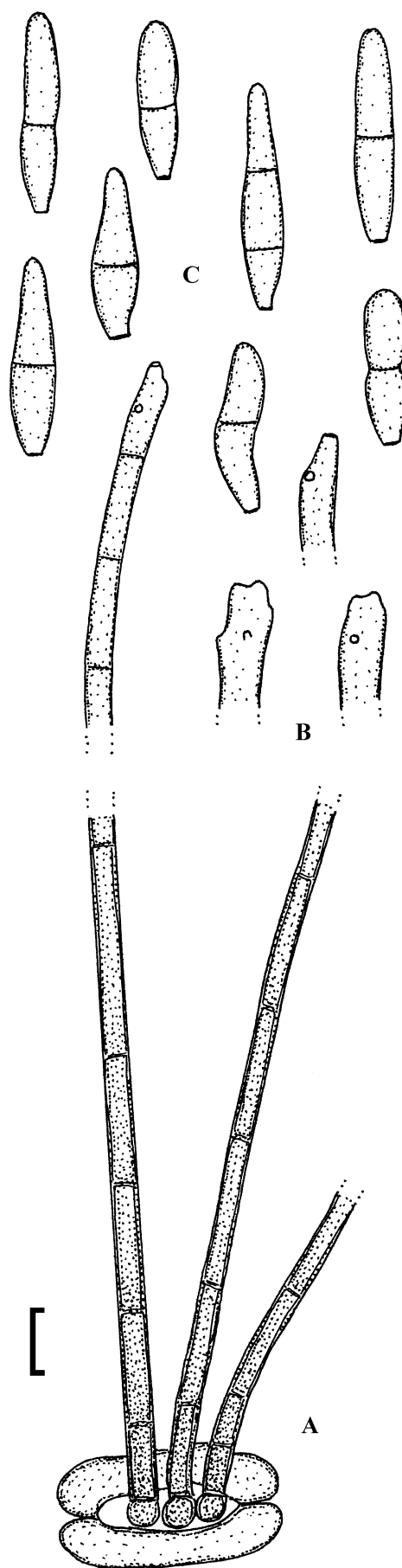


Fig. 39. *Semipseudocercospora peristrophes-acuminatae* (PC, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μm .

Actinidiaceae***Cercospora* species on Actinidiaceae**

A single species

Cercospora actinidiae X.J. Liu & Y.L. Guo, *Acta Mycol. Sin. Suppl.* 1: 353 "1986" (1987). (Fig. 40)

Literature: Guo et al. (2005: 23).

Illustrations: Liu & Guo (1987: 354, fig. 1), Guo et al. (2005: 23, fig. 6).

Description: *Leaf spots* amphigenous, subcircular to irregular, 2–8 mm diam, centre greyish brown or yellowish brown, with narrow dark brown border. *Caespituli* amphigenous. *Mycelium* internal. *Stromata* lacking or small, composed of a few swollen hyphal cells, brown. *Conidiophores* solitary or in small fascicles, 2–8, divergent, arising from internal hyphae or swollen hyphal cells, erect, straight, curved to geniculate, usually unbranched, about $60\text{--}280 \times 4\text{--}4.5\text{--}5.5$ μm , pluriseptate, medium brown to brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci thickened and darkened, $2.2\text{--}2.6$ μm diam. *Conidia* solitary, acicular, straight to curved, sometimes sigmoid, $40\text{--}160\text{--}220 \times 2\text{--}3\text{--}4$ μm , pluriseptate, hyaline, thin-walled, smooth, apex pointed, base truncate or slightly attenuated, $1\text{--}2.5$ μm wide, hila thickened and darkened.

Holotype: **China:** Jiangsu: Nanjing, on *Actinidia* sp., Actinidiaceae, 11 Sep. 1961, X. J. Liu & Q. M. Ma 249 (HMAS 50000).

Host range and distribution: Only known from the type collection.

Note: Belonging to the *C. apii* s. lat. complex.

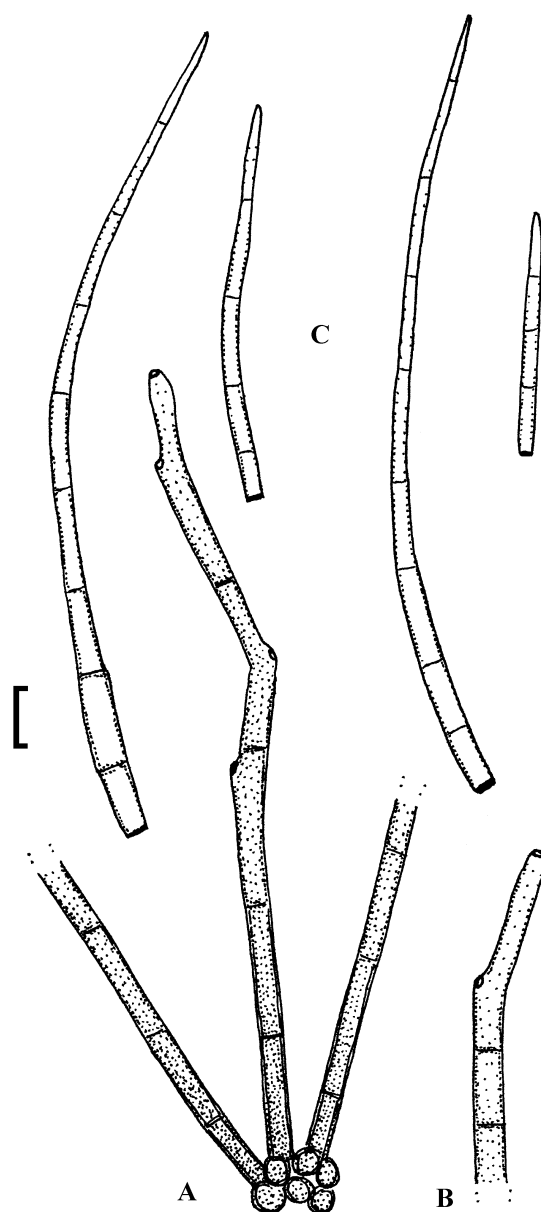


Fig. 40. *Cercospora actinidiae* (based on Guo et al. 2005: 23, fig. 6). **A.** Conidiophore fascicle. **B.** Conidiophore tip. **C.** Conidia. Bar = 10 μm .

Pseudocercospora* species on Actinidiaceae*Key to *Pseudocercospora* species on Actinidiaceae**

- | | | |
|---|--|--------------------------------|
| 1 | Conidia broadly obclavate-subcylindrical, $25\text{--}85\text{--}100 \times 5\text{--}8.5$ μm , base $2\text{--}2.5$ μm wide;
on <i>Actinidia</i> spp. | <i>P. actinidiae</i> |
| | Conidia narrowly obclavate-filiform, $15\text{--}110 \times 1\text{--}4$ μm , base $1\text{--}2$ μm wide | <i>P. hangzhouensis</i> |

Pseudocercospora actinidiae Deighton, *Mycol. Pap.* 140: 10 (1976). (Fig. 41)

Literature: Liu & Guo (1987: 355), Hsieh & Goh (1990: 12–13), Guo & Hsieh (1995: 4–5), Guo et al. (1998: 15–16).

Illustrations: Deighton (1976: 11–12, figs 1–2), Liu & Guo (1987: 356, fig. 2), Hsieh & Goh (1990: 14, fig. 3), Guo & Hsieh (1995: 6, fig. 5), Guo et al. (1998: 15–16, fig. 5).

Exsiccatae: Reliquiae Farlowianae 829.

Description: *Leaf spots* at first lacking, later subcircular to angular-irregular, 1–10 mm diam, sometimes confluent and larger, brown to dark brown, later with paler centre, pale brown to greyish brown, margin indefinite. *Caespituli* amphigenous, mainly hypophyllous, finely punctiform to effuse, deep olivaceous, floccose. *Mycelium* internal and external; superficial hyphae emerging through stomata, branched, $1\text{--}3.5$ μm wide, sometimes anastomosing,

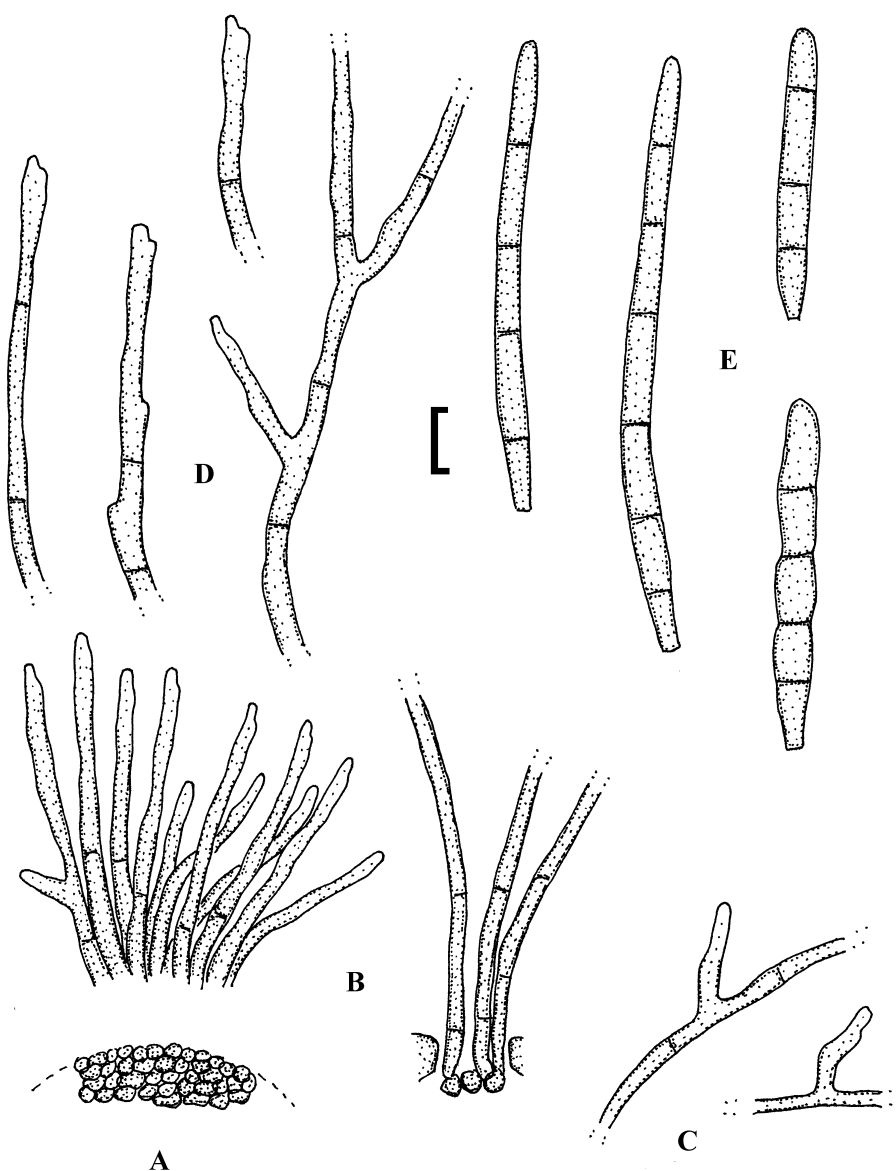


Fig. 41. *Pseudocercospora actinidiae* (FH, holotype). **A.** Stroma. **B.** Conidiophore fascicles. **C.** Solitary conidiophores arising from superficial hyphae. **D.** Conidiophores. **E.** Conidia. Bar = 10 μ m.

pale olivaceous to pale brown, thin-walled, smooth. *Stromata* lacking below to well-developed on the upper leaf surface, 10–50 μ m diam, substomatal, subglobose, pale brown. *Conidiophores* in loose to dense fascicles, to 100 conidiophores or even more, arising from stromata, through stomata, above all when epiphyllous, and solitary, arising from superficial hyphae, lateral, occasionally terminal, differentiation between hypophyllously formed erect to decumbent branched conidiophores and superficial hyphae difficult, fertile threads to 700 μ m long, simple or branched, individual solitary conidiophores formed as lateral branchlets 2–45 μ m long, 3–6.5 μ m wide, aseptate to pluriseptate, pale to medium olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci inconspicuous to subdentate, 1.5–2 μ m diam, unthickened, not darkened. *Conidia* solitary, obclavate-subcylindrical, straight to curved or somewhat sigmoid, 25–85(–100) \times 5–8.5 μ m, 3–9-septate, pale to medium olivaceous, thin-walled, smooth, apex obtuse, base short or rarely long obconically truncate, about 2–2.5 μ m wide, hila unthickened, not darkened.

Holotype: China: Guizhou (Kweichow): Fan Ching Shan, on *Actinidia callosa*, 21 Sep. 1931, S. Y. Cheo 570 (FH). *Isotypes:* BPI 437420, 876607; HMAS 12125 and Reliquiae Farlowianae 829.

Host range and distribution: On *Actinidia* (*callosa*, *chinensis*, *Actinidia* sp.), *Actinidiaceae*, Asia (China, Anhui, Fujian, Guizhou; Korea, Japan, Taiwan).

Pseudocercospora hangzhouensis X.J. Liu & Y.L. Guo, *Acta Mycol. Sin. Suppl.* 1: 357 “1986” (1987). (Fig. 42)

Synonym: *Pseudocercospora actinidiicola* Goh & W.H. Hsieh, *Bot. Bull. Acad. Sin. (Taipei)* 30: 122 (1989) [*holotype:* Taiwan: Taichung, NCHU Campus, on *Actinidia chinensis*, 14 Aug. 1984, T. K. Goh (NCHUPP-49); *isotype:* K(M) IMI 312075].

Literature: Hsieh & Goh (1990: 12–13), Guo & Hsieh (1995: 5–6), Guo *et al.* (1998: 16–17).

Illustrations: Liu & Guo (1987: 357, fig. 3), Hsieh & Goh (1990: 15, fig. 4), Guo & Hsieh (1995: 7, fig. 6), Guo et al. (1998: 17, fig. 6).

Description: *Leaf spots* amphigenous, subcircular to angular-irregular and vein-limited, 1–18 mm diam, brown to dark brown, yellowish brown below, later centre greyish white with dark margin, sometimes with yellowish brown halo. *Caespituli* amphigenous. *Mycelium* internal and external; superficial hyphae branched, 1.5–3 µm wide, subhyaline to olivaceous, thin-walled, smooth. *Stromata* 10–70 µm diam, subglobose to oblong, mainly epiphyllous, brown. *Conidiophores* in dense fascicles, arising from stromata, through stomata or erumpent, or solitary, arising from superficial hyphae, erect, straight to curved, subcylindrical to geniculate-sinuous, unbranched, 2–40 × 1–3.5(–4.5) µm, 0–3-septate, subhyaline to pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 2–20 µm long, conidiogenous loci inconspicuous. *Conidia* solitary, narrowly obclavate-filiform, 15–110 × 1–4 µm, 2–11-septate, hyaline to pale olivaceous, thin-walled, smooth,

apex subacute, base subtruncate to short obconically truncate, 1–2 µm wide, hila unthickened, not darkened.

Holotype: **China:** Zhejiang: Hangzhou, on *Actinidia arguta*, 28 Sep. 1961, X.-J. Liu & Q.-M. Ma 671 (HMAS 50001).

Host range and distribution: On *Actinidia* (*arguta*, *chinensis*, *Actinidia* sp.), *Actinidiaceae*, Asia (China, Anhui, Zhejiang; Japan, Korea, Taiwan).

Doubtful, excluded and insufficiently known species

Pseudocercospora clematoclethrae X.J. Liu & Y.L. Guo, *Mycosystema* 5: 100 (1992).

Notes: Guo & Liu (1992) described *P. clematoclethrae* from China on "*Clematoclethra fabri*" [*C. scandens* subsp. *actinidioides*] (*Actinidiaceae*), but later Guo & Hsieh (1995) and Guo et al. (1998) changed the identification of the host to *Clethra* sp. (*Clethraceae*).

Adoxaceae

Cercospora

Tabular key to Cercospora species on Adoxaceae according to host genera

Sambucus

A single species **C. sambucicola**

Viburnum

A single species **C. viburnicola**

Cercospora species on Adoxaceae

Cercospora sambucicola Y.L. Guo, **nom. nov.**

Mycobank MB814566

(Fig. 43)

Basionym: *Cercospora sambuci* Y.L. Guo & Y. Jiang, *Mycotaxon* 74: 262 (2000), *nom. illeg.* (Art. 53.1), non *C. sambuci* F. Stevens & C.J. King, 1927.

Literature: Guo et al. (2005: 55–56).

Illustrations: Guo & Jiang (2000: 263, fig. 3), Guo et al. (2005: 56, fig. 32).

Description: *Leaf spots* amphigenous, circular or subcircular, 2–8 mm diam, pale yellowish brown to brown, later with greyish white centre on the upper leaf surface, surrounded by a greyish black marginal line, pale yellowish brown to pale greyish brown below. *Caespituli* amphigenous. *Mycelium* internal. *Stromata* lacking or small, only formed as aggregations of a few swollen hyphal cells, globose, 10–25 µm diam, substomatal or intraepidermal, brown, cells 2–8 µm diam, wall slightly thickened. *Conidiophores* solitary or in small, loose fascicles, 2–13, arising from internal hyphae

or hyphal aggregations, through stomata or erumpent, erect, straight, subcylindrical to geniculate-sinuous, unbranched, width irregular, 42.5–140(–400) × 3.5–7 µm, to 8 µm wide at the base, 1–6(–13)-septate, medium brown, paler and narrower towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci thickened and darkened, 2–3.5(–4) µm diam. *Conidia* solitary, acicular, straight to somewhat curved or slightly sigmoid, 37.5–175 × 3–5 µm, 5- to pluriseptate, hyaline, thin-walled, smooth, apex pointed or subobtuse, base truncate, 2–3.5 µm wide, hila thickened and darkened.

Holotype: **China:** Jilin Province: Yongji, on *Sambucus williamsii*, *Adoxaceae*, Sep. 1962, J. K. Bai (HMAS 77346).

Host range and distribution: On *Sambucus* (?*canadensis*, *javanica*, *williamsii* [*buergeriana*]), *Adoxaceae*, Asia (China, Jilin, Zhejiang), ?North America (USA, Alabama).

Notes: This species belongs to the *Cercospora apii* s. lat. complex. Type material of *Passalora catenosporea* contains a second cercosporoid hyphomycete which is morphologically barely distinguishable from *C. sambucicola* (conidiophores in small fascicles, to 140 µm long and 4–7 µm wide; conidia

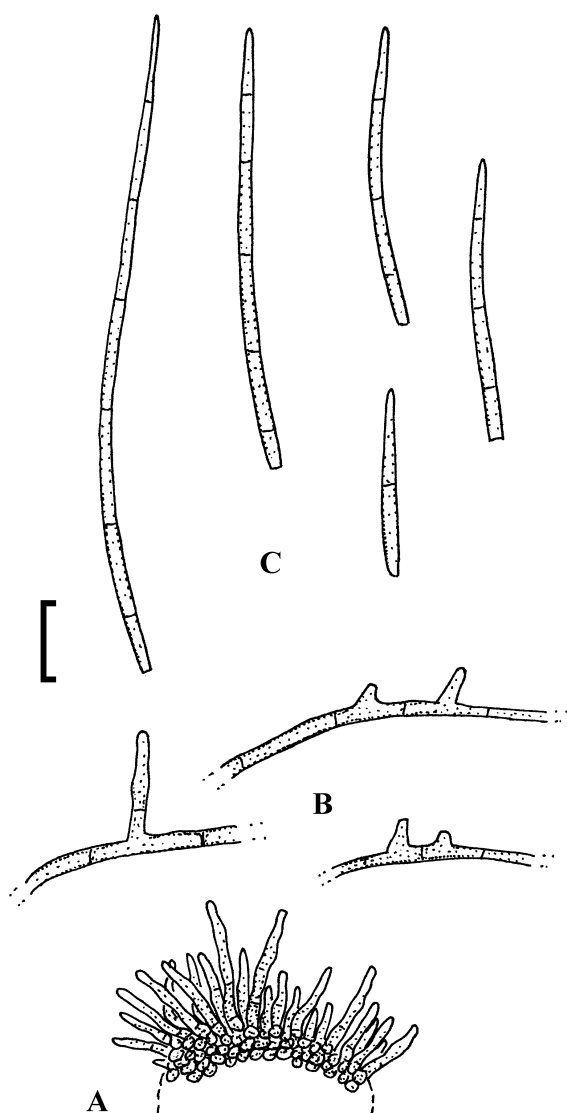


Fig. 42. *Pseudocercospora hangzhouensis* (based on Guo & Hsieh 1995: 7, fig. 6). **A.** Conidiophore fascicle. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidia. Bar = 10 µm. U. Braun del.

acicular, hyaline, 3–4.5 µm wide). The conspecificity of Chinese collections and material from the USA remains to be proven via phylogenetic analyses.

Cercospora viburnicola W.W. Ray, *Mycologia* **33**: 174 (1941).
(Fig. 44)

Literature: Chupp (1954: 106), Crous & Braun (2003: 421).

Illustration: Guo *et al.* (2005: 57, fig. 33).

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, 2–12 mm diam, different shades of brown, pale to medium brown, reddish brown to greyish brown. *Caespituli* amphigenous, fine, dark. *Mycelium* internal. *Stromata* lacking or small, about 10–25 µm diam, brown. *Conidiophores* in small to moderately large fascicles, mostly dense, arising from internal hyphae or stromata, through stomata or

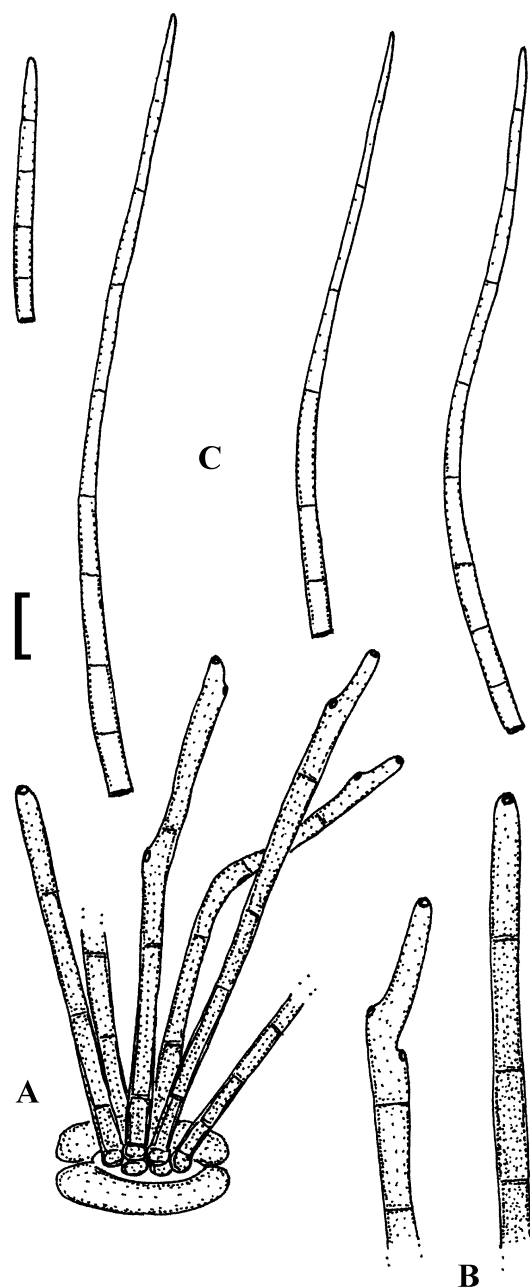


Fig. 43. *Cercospora sambucicola* (HMAS 77346, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

erumpent, erect, straight, subcylindrical to geniculate-sinuous, unbranched, 25–175 × 4–6 µm, septate throughout, uniformly pale olivaceous-brown or somewhat paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, about 15–35 µm long, conidiogenous loci conspicuous, thickened and darkened, 2–3 µm diam. *Conidia* solitary, acicular, shorter conidia narrowly obclavate, straight to curved, 20–90 × 2–4 µm, pluriseptate, hyaline, thin-walled, smooth, apex acute or subacute, base truncate or somewhat obconically truncate in obclavate conidia, 2–2.5 µm wide, hila thickened and darkened.

Holotype: **USA**: *Oklahoma*: Payne County, Stillwater, college garden, on *Viburnum opulus*, 18 Aug. 1939, W. W. Ray 286 (CUP 29236).

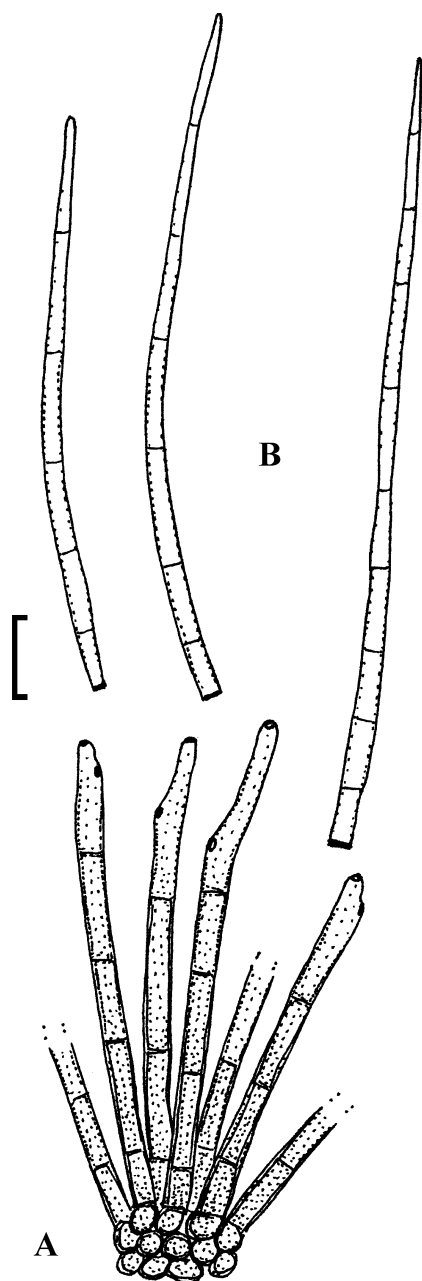


Fig. 44. *Cercospora viburnicola* (CUP 29236, holotype). A. Conidiophore fascicle. B. Conidia. Bar = 10 µm.

Host range and distribution: On *Viburnum* (*carlesii*, *odoratissimum*, *opulus*, *plicatum* var. *tomentosum* [*tomentosum*], *suspensum*, *Viburnum* spp.), *Adoxaceae*, ?Asia (China, Jiangsu, Shaanxi, Sichuan), USA (Florida, Oklahoma, Wisconsin).

Notes: *Cercospora viburnicola* W.W. Ray is morphologically part of the *Cercospora apii* s. lat. complex. Records of this species on *Viburnum cylindricum* from China are incorrect and based on a confusion with *C. viburnicola* F.L. Tai. Authentic material collected at the type locality (21 Aug. 1942, on *Viburnum tomentosum*) is deposited in several herbaria (BPI 442264–442266, CUP-C.H.OK-0032, ILL 29523, NY 945736). A record of *C. viburnicola* from Poland on *Viburnum opulus* (Świdarska-Burek & Muleńko 2014) is undoubtedly based on confusion and misidentification. The described and illustrated obclavate

conidia with obconically truncate base, 30–90(–205) × 3–5(–5.5) µm, are not consistent with *C. viburnicola*. The collection concerned has been re-examined and turned out to belong to *Pseudocercospora opuli* which is common on *Viburnum opulus* and also known from Poland. Chinese collections on *Viburnum buddleifolium* and *Viburnum* sp. (Guo 1996: 92; Guo & Jiang 2000: 264; Guo et al. 2005: 56–57, fig. 33), referred to as *C. viburnicola*, represent typical *C. apii* s. lat., but these specimens are probably not conspecific with the latter species. The conidiophores are formed in small, divergent fascicles, to about 450 µm long, and the conidia are acicular, about 35–385 µm long. Without any molecular data based on Asian and North Americal samples, the Chinese collections are currently better classified as *Cercospora apii* s. lat.

Doubtful, excluded and insufficiently known species

Cercospora adoxae Roum., *Fungi Sel. Gall. Exs., Cent.* XIX, no. 1871, Toulouse 1882, *nom. nud.* (Art. 38.1).

Literature: Chupp (1954: 98), Crous & Braun (2003: 46).

Type: France: on *Adoxa moschatellina*, Roum., *Fungi Sel. Gall. Exs.* 1871 (e.g., B, HBG, PC).

Host range and distribution: On *Adoxa moschatellina*, *Adoxaceae*, Europe (France).

Notes: Although listed in literature, this species was never described (Chupp 1954). Numerous duplicates of the original material have been examined, but all were without any trace of fructification. The name *C. adoxae* might refer to *Ramularia adoxae* (Rabenh.) P. Karst.

Cercospora prolificans Ellis & Holw., *Bull. Lab. Nat. Hist. Iowa State Univ.* II, 3: 42 (1896).

Synonym: *Cercosporella prolificans* (Ellis & Holw.) Sacc., *Syll. Fung.* 15: 84 (1901).

Literature: Saccardo (1895: 606), Chupp (1954: 104), Braun (1995: 80).

Illustration: Braun (1995: 79, fig. 75).

Exsiccatae: Calif. Fungi 403.

Lectotype (designated by Braun 1995: 80): **USA: California:** San Bernadino Valley, San Bernadino County, on *Sambucus cerulea*, Aug. 1893, *Parish* 2735 (NY 234139). **Isolectotypes:** BPI 439986, NY 234138.

Host range and distribution: On *Sambucus* (*cerulea*, *glauca*, *melanocarpa*), *Adoxaceae*, North America (USA, Alaska, California, Minnesota, Missouri, New Mexico, Oregon).

Notes: *Cercospora prolificans* has colourless conidiophores and conidia as well as cercosporelloid conidiogenous loci and belongs to *Cercosporella* (Braun 1995). This species was recorded and described from Bulgaria on *Sambucus ebulus*

(Bakalova & Borisova 2010: 49–50). This record is, however, doubtful and probably wrong. Conidia were described to be

2–4 µm wide, which is in contradiction with the much broader conidia (3–8 µm wide) of true *C. prolificans*.

Passalora

Key to *Passalora* species on *Adoxaceae*

- 1 Colonies in pale reddish brown to fuliginous patches; mycelium internal and external, superficial; conidiophores fasciculate as well as solitary, arising from superficial hyphae; conidia subhyaline to reddish brown; on *Sambucus* spp. ***P. lateritia***
- Colonies (caespituli) without reddish tinge; mycelium internal, superficial hyphae lacking *in vivo*; conidia not reddish brown 2
- 2 (1) Conidiophores short, 5–25 × 2–4 µm, 0–1-septate; conidia 8–45 × 1.5–4 µm, 0–4-septate; on *Viburnum* spp. ***P. viburni***
- Conidiophores much larger, 15–80 × 4–6 µm, 0–4-septate; conidia much longer and somewhat broader, 20–100(–125) × 3–5.5 µm, 1–8-septate; on *Sambucus* spp. ***P. catenospora***

Passalora catenospora (G.F. Atk.) U. Braun & Crous, *Mycosphaerella and Anam.*: 112 (2003).

(Fig. 45)

Basionym: *Cercospora catenospora* G.F. Atk., *J. Elisha Mitchell Sci. Soc.* 8: 66 “1891” (1892).

Synonyms: *Phaeoramularia catenospora* (G.F. Atk.) Deighton, *More Dematiaceous Hyphomycetes*: 317 (1976).

Cercospora affinis G. Winter, *in herb.* [USA: Pennsylvania, on *Sambucus canadensis*, ex herb. G. Winter (B 700016202)].

Literature: Saccardo (1892: 645), Chupp (1954: 100).

Illustration: Ellis (1976: 318, fig. 240 A).

Exsiccatae: Barthol., *Fungi Columb.* 2309.

Description: Leaf spots indistinct. *Caespituli* forming effuse, irregular patches, hypophyllous, ochraceous, dark olivaceous to brownish. *Mycelium* internal. *Stromata* lacking, only formed as small aggregations of swollen hyphal cells or small, 10–25 µm diam, substomatal, yellowish to ochraceous-brown. *Conidiophores* in small to moderately large fascicles, usually 3–12, arising from swollen hyphal cells or small stromata, emerging through stomata, erect, straight, subcylindrical or attenuated towards the tip, not or only slightly geniculate, somewhat curved-sinuous, unbranched, 15–80 × 4–6 µm, rarely longer, usually 0–4-septate, subhyaline, pale ochraceous to golden brown or olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–30 µm long, conidiogenous loci conspicuous, thickened and darkened, (1–)1.5–2 µm wide. *Conidia* solitary to catenate, in simple or branched chains, cylindrical, subcylindrical, occasionally almost obclavate or broadly fusiform, straight to curved or slightly sinuous, 20–100(–125) × 3–5.5 µm, 1–8-septate, subhyaline, pale olivaceous to brownish, thin-walled, smooth, apex obtuse, rounded (in primary conidia) or short conically truncate in catenate conidia (with a single or two hila), base short obconically truncate, (1–)1.5–2 µm wide, hila somewhat thickened and darkened.

Lectotype (designated here, MycoBank, MBT202788): USA: Alabama: Lee County, Auburn, on *Sambucus canadensis*, 11 Oct. 1891, G. F. Atkinson (CUP-A-002255a). **Isolectotype**: CUP-A-002255b.

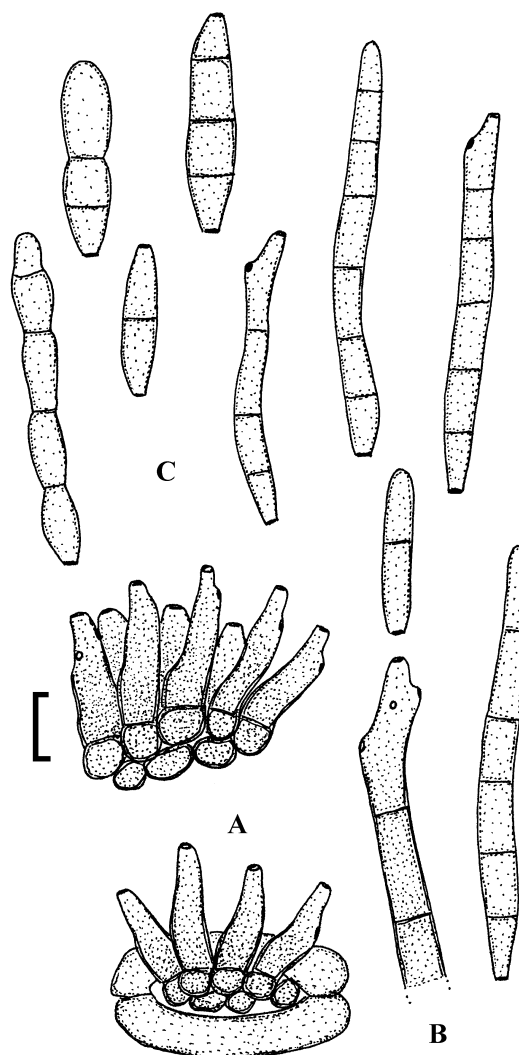


Fig. 45. *Passalora catenospora* (CUP-A-002255a, lectotype). **A.** Conidiophore fascicles. **B.** Conidiophore. **C.** Conidia. Bar = 10 µm.

Host range and distribution: on *Sambucus* (*cerulea*, *canadensis*, *intermedia*, *Sambucus* spp.), *Adoxaceae*, Central America (Dominican Republic), North America (Canada; USA, Alabama, Florida, Kansas, Mississippi, North Carolina, Oklahoma, Pennsylvania, Texas), West Indies (Haiti).

Note: The lectotype is a collection from October 1891. Other syntypes are from August 1891 (CUP-A-002245#1–3(AL)). Records of this species from Taiwan on *Sambucus javanica* [*formosana*] (Tai 1979) are incorrect and refer to *Pseudocercospora ebulicola* (*Cercospora ebulicola*) which was erroneously reduced to synonymy with *C. catenospora* in Chupp (1954). Type material of *C. catenospora* contains a second cercosporoid hyphomycete which might cause confusion. The second fungus belongs to the *Cercospora apii* s. lat. complex and is morphologically barely distinguishable from the Chinese *Cercospora sambucicola*. This species is readily distinguishable from *P. catenospora* by its much darker conidiophores with larger conidiogenous loci, 2–3 μ m diam, as well as hyaline, acicular conidia formed singly.

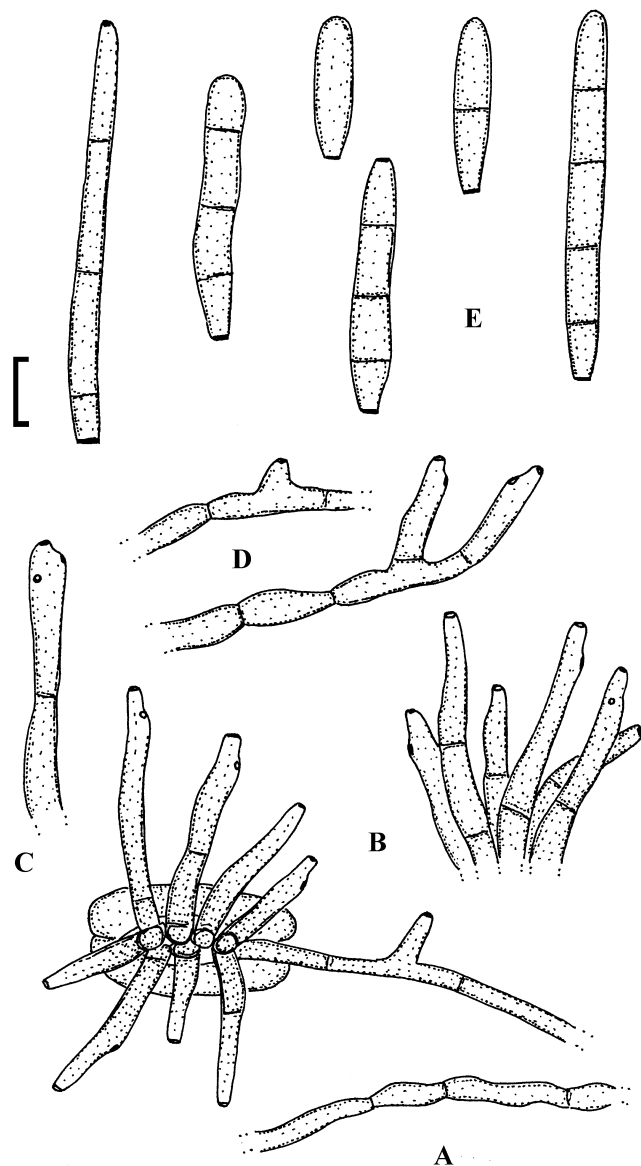


Fig. 46. *Passalora lateritia* (NY 838232, lectotype). **A.** Superficial hypha. **B.** Conidiophore fascicles. **C.** Conidiophore. **D.** Solitary conidiophores arising from superficial hyphae. **E.** Conidia. Bar = 10 μ m.

Passalora lateritia (Ellis & Halst.) U. Braun & Crous, *Mycosphaerella and Anam.*: 244 (2003).

(Fig. 46)

Basionym: *Cercospora lateritia* Ellis & Halst., *J. Mycol.* **4**: 7 (1888).

Literature: Saccardo (1892: 646), Chupp (1954: 102).

Exsiccatae: Ellis & Everh., *N. Amer. Fungi* 1994. Kellerman & Swingle, *Kansas Fungi* 6.

Description: *Leaf spots* lacking or indefinite. *Colonies* hypophyllous, effuse, forming reddish, pale reddish brown to ferruginous patches. *Mycelium* internal and external; superficial hyphae lacking or present, emerging through stomata, occasionally climbing leaf hairs, rarely anastomosing, unbranched or sparingly branched, 1–7 μ m wide, septate, concolorous with conidiophores or pale, thin-walled, smooth. *Stromata* lacking or formed as stromatic aggregations of swollen hyphal cells, substomatal, 10–50 μ m diam, reddish brown. *Conidiophores* in small to moderately large fascicles, divergent to moderately dense, arising from substomatal hyphae or stromata, through stomata or conidiophores solitary, arising from superficial hyphae, lateral or terminal, 5–75 \times 3–8 μ m, 0–4-septate, subhyaline to pale reddish brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–30 μ m long, conidiogenous loci conspicuous, thickened and darkened, about 1–2 μ m diam. *Conidia* solitary to catenate, usually in simple chains, cylindrical or subcylindrical or somewhat

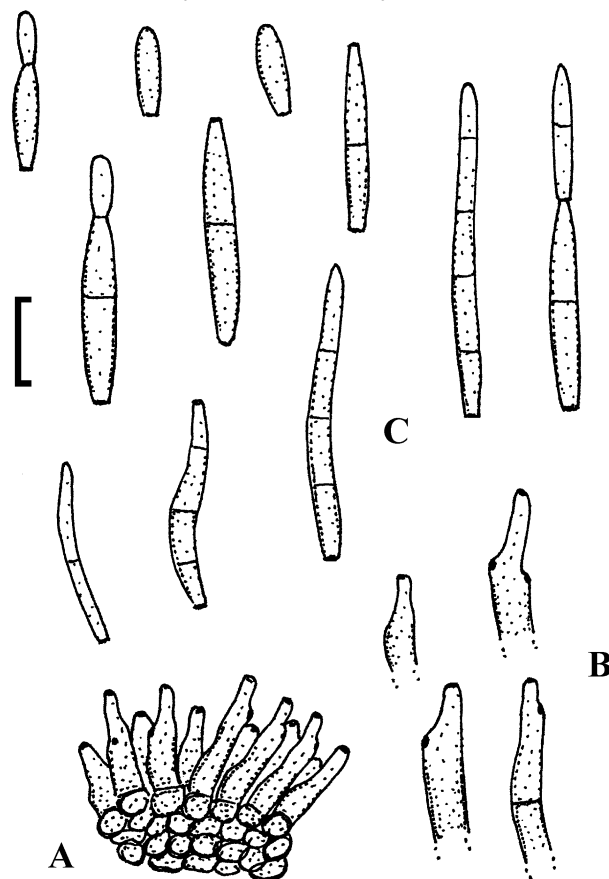


Fig. 47. *Passalora viburni* (NY 830558, lectotype). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

obclavate-cylindrical, straight to slightly curved, 15–70(–80) × 3–7 µm, (0–)1–6-septate, occasionally constricted at the septa, subhyaline to pale reddish brown, thin-walled, smooth, apex obtuse, rounded in solitary conidia, short conically truncate in catenate conidia, base obconically truncate, (1–)1.5–2(–2.5) µm wide, hila somewhat thickened and darkened.

Lectotype (designated by Crous & Braun 2003: 244): **USA**: Iowa: Story County, Ames, on *Sambucus pubens*, Sep. 1887, B. D. Halsted (NY 838232). **Isolectotypes**: BPI 437793, CUP-040123, NY 838230, 838233; Ellis & Everh., N. Amer. Fungi 1994, e.g., BPI 437794, MICH 15321.

Host range and distribution: On *Sambucus* (*canadensis*, *nigra*, *pubens*, *racemosa*), *Adoxaceae*, North America (USA, Iowa, Kansas).

Notes: This is a typical mycellosielloid member of *Passalora*, with fasciculate and solitary conidiophores arising from superficial hyphae, thickened, darkened conidiogenous loci and obclavate-cylindrical, pigmented conidia. This species is very characteristic by its effuse, reddish to reddish brown colonies and reddish tinge of conidiophores and conidia.

Passalora viburni (Ellis & Everh.) U. Braun & Crous, *Mycosphaerella and Anam.*: 474 (2003). (Fig. 47)

Basionym: *Ramularia viburni* Ellis & Everh., *J. Mycol.* 5: 69 (1889).

Synonym: *Phaeoramularia viburni* (Ellis & Everh.) U. Braun, *Mycotaxon* 48: 293 (1993).

Literature: Saccardo (1892: 554), Braun (1998: 387).

Illustrations: Braun (1993: 292, fig. 21), Braun (1998: 388, fig. 647).

Description: *Leaf spots* subcircular to angular-irregular, sometimes vein-limited, 2–10 mm diam, greyish green to brown, later centre greyish white, with darker margin. *Caespituli* amphigenous, punctiform, greyish white to brownish. *Mycelium* internal. *Stromata* intraepidermal, occasionally substomatal, 10–50 µm diam, occasionally confluent and larger, pale yellowish brown to medium brown, composed of swollen hyphal cells, 2–6 µm diam. *Conidiophores* in small to rather large fascicles, arising from stromata, erumpent, occasionally emerging through stomata, erect, straight, subcylindrical to geniculate-sinuous, unbranched, 5–25 × 2–4 µm, 0–1-septate, hyaline, yellowish, greenish to pale olivaceous or yellowish brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores mostly reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci conspicuous, minute, 1–1.5 µm diam, barely or very slightly thickened, somewhat darkened-refractive. *Conidia* solitary or catenate, in simple or rarely branched chains, shape and size variable, narrowly ellipsoid-ovoid, fusiform, subcylindrical, straight to slightly curved, 8–45 × 1.5–4 µm, 0–4-septate, hyaline to pale yellowish or greenish, smooth to faintly verruculose, thin-walled, ends attenuated, short obconically truncate when in chains, about 1 µm wide, hila minute, very slightly thickened and darkened-refractive.

Lectotype (designated by Braun 1993): **USA**: Wisconsin: Racine, on *Viburnum lentago*, 17 Jun. 1888, J. J. Davis (NY 830558). **Isolectotype**: NY 830559, WIS.

Host range and distribution: On *Viburnum* (*lentago*, *prunifolium*), *Adoxaceae*, North America (USA, Tennessee, Wisconsin).

Notes: The generic affinity of this species, which is intermediate between *Passalora* and *Ramularia*, is not quite clear. The general habit of this species is rather ramularioid, but the stromata and conidiophores are pigmented. Results of molecular sequence analyses would be helpful to elucidate the true generic affinity.

Pseudocercospora

Key to *Pseudocercospora* species on *Adoxaceae*

- 1 Stromata lacking; superficial hyphae developed, but without solitary conidiophores; conidiophores fasciculate, 50–190 µm long, pluriseptate; on *Sambucus javanica*, Asia **P. ebulicola**
- Stromata developed, 10–100 µm diam; superficial hyphae lacking or, if present, with conidiophores which are much shorter, 5–35 µm, and only 0–1-septate 2
- 2 (1) Superficial hyphae with solitary conidiophores developed, 5–35 µm long, 0–1-septate, geniculate, i.e. proliferation sympodial; on *Viburnum* spp. **P. tineae**
- Superficial hyphae with solitary conidiophores lacking; conidiophores longer, 10–200 µm, aseptate to pluriseptate (if short and mostly aseptate, then non-geniculate, proliferation percurrent, with annellations 3
- 3 (2) Conidiophores subcylindrical, non-geniculate, proliferation percurrent, with fine annellations, rather short, 5–30(–50) × 2–5(–6) µm, 0(–2)-septate; conidia cylindrical-filiform or occasionally somewhat obclavate; on *Viburnum* spp. **P. viburnigena**
- Conidiophores at least partly geniculate-sinuous, proliferation sympodial, without annellations or occasionally with a single enteroblastic rejuvenation, much longer, 10–200(–300) µm, 0–3-septate or pluriseptate throughout; conidia obclavate-cylindrical to somewhat fusiform 4

- 4 (3) Conidia short, 15–40 × 3–7 µm, 1–5-septate, pigmented; conidiophores in divergent fascicles, walls thickened, to 1 µm, medium to dark brown, occasionally with a single enteroblastic rejuvenation leaving a coarse annellation; on *Viburnum nudum*, North America **P. viburni-nudi**
Conidia longer, 25–150 µm, 1–12(–15)-septate; on other hosts 5
- 5 (4) Conidia broadly obclavate or obclavate-cylindrical, 25–125 × 4.5–8 µm, 2–10-septate, usually pale to medium olivaceous or olivaceous-brown, wall thin to somewhat thickened, to 0.8 µm; on *Viburnum* spp., North America **P. viburnicola**
Conidia narrower, 2–5 µm, if wider [2–6.5(–7) µm] conidia consistently pale, usually hyaline or subhyaline and/or thin-walled, or conidia at least partly catenate or disarticulating 6
- 6 (5) Conidiophores relatively short, usually 10–80 µm, average < 60 µm 7
Conidiophores longer, about 50–155 µm, average > 60 µm 9
- 7 (6) Conidia hyaline or subhyaline, finally sometime pale olivaceous, solitary or in short chains or disarticulating, conidiogenous loci inconspicuous to subconspicuous, i.e. unthickened, but somewhat refractive or even slightly darkened-refractive; on *Viburnum* spp. (*Viburnum* sect. *Opulus*), mainly *V. opulus* s. lat. (including subsp. *calvescens* and *trilobum*) **P. opuli**
Conidia formed singly 8
- 8 (7) Conidiogenous loci inconspicuous to subconspicuous, i.e. unthickened but somewhat refractive or even darkened-refractive; on *Sambucus* spp. **P. depazeoides**
Conidiogenous loci inconspicuous (conidiophores usually in small fascicles, 2–15, divergent, North American collections = var. **varia**; conidiophores in larger, dense fascicles, to 50 per fascicle, Asian collections on *Viburnum sargentii* = var. **viburni-sargentii**); on *Viburnum* spp. **P. varia**
- 9 (6) Conidiogenous loci inconspicuous to subconspicuous, i.e. unthickened but somewhat refractive or even darkened-refractive; conidiophores fasciculate; on *Sambucus* spp. **P. depazeoides**
Conidiogenous loci consistently inconspicuous; conidiophores fasciculate to coremioid; on *Viburnum* spp. 10
- 10 (9) Conidia cylindrical-filiform, 50–130 × 2.5–4 µm, 3–12-septate; on *Viburnum erosum* **P. viburni-erosi**
Conidia obclavate-cylindrical, 25–85 µm long, 2–7-septate 11
- 11 (10) Conidia 2.5–4 µm wide, 2–5-septate; on *Viburnum cylindricum*, China **P. viburni-cylindrici**
Conidia wider, 3–6.5 µm, 3–7-septate; on *Viburnum* sp., India **P. caprifoliacearum**

Tabular key to *Pseudocercospora* species on Adoxaceae according to host genera

Sambucus

- 1 Stromata lacking; superficial hyphae developed; conidiophores loosely fasciculate, simple to branched; on *Sambucus javanica*, Asia **P. ebulicola**
Stromata developed, 10–100 µm diam; superficial hyphae lacking; conidiophores mostly in denser fascicles, unbranched; on *Sambucus* spp., northern hemisphere **P. depazeoides**

Viburnum

- 1 Superficial hyphae with solitary conidiophores developed, 5–35 µm long, 0–1-septate, geniculate, i.e. proliferation sympodial **P. tineae**
Superficial hyphae with solitary conidiophores lacking; conidiophores longer, 10–200 µm, aseptate to pluriseptate (if short and mostly aseptate, then non-geniculate, proliferation percurrent, with annellations 2
- 2 (1) Conidiophores subcylindrical, non-geniculate, proliferation percurrent, with fine annellations, rather short, 5–30(–50) × 2–5(–6) µm, 0(–2)-septate; conidia cylindrical-filiform or occasionally somewhat obclavate **P. viburnigena**
Conidiophores at least partly geniculate-sinuous, proliferation sympodial, without annellations or only with a single enteroblastic rejuvenation, much longer, 10–200(–300) µm, 0–3-septate or pluriseptate throughout; conidia obclavate-cylindrical to somewhat fusiform 3

- 3 (2) Conidia broadly obclavate or obclavate-cylindrical, 25–125 × 4.5–8 µm, 2–10-septate, usually pale to medium olivaceous or olivaceous-brown, wall thin to somewhat thickened, to 0.8 µm; on *Viburnum* spp., North America **P. viburnicola**
Conidia narrower, 2–5 µm, if wider [2–6(–7) µm] conidia consistently pale, usually hyaline or subhyaline and thin-walled 4
- 4 (3) Conidiophores relatively short, usually 10–80 µm, average < 60 µm 5
Conidiophores longer, about 50–155 µm, average > 60 µm 7
- 5 (4) Conidia short, 15–40 × 3–7 µm, 1–4(–5)-septate, pigmented; conidiophores in divergent fascicles, walls thickened, to 1 µm, medium to dark brown, occasionally with a single enteroblastic rejuvenation leaving a coarse annellation; on *Viburnum nudum*, North America **P. viburni-nudi**
Conidia longer, 30–150 µm, 1–12(–15)-septate; on other hosts 6
- 6 (5) Conidia solitary, in short chains or disarticulating, conidiogenous loci inconspicuous to subconspicuous, i.e. unthickened, but somewhat refractive or even slightly darkened-refractive; on *Viburnum* spp. (*Viburnum* sect. *Opulus*), mainly *V. opulus* s. lat. (including subsp. *calvescens* and *trilobum*) **P. opuli**
Conidia solitary; conidiogenous loci inconspicuous, not darkened-refractive (conidiophores usually in small fascicles, 2–15, divergent, North American collections = var. **varia**; conidiophores in larger, sense fascicles, to 50 per fascicle, Asian collections on *Viburnum sargentii* = var. **viburni-sargentii**); on *Viburnum* spp. **P. varia**
- 7 (4) Conidia cylindrical-filiform, 50–130 × 2.5–4 µm, 3–12-septate; on *Viburnum erosum* **P. viburni-erosi**
Conidia obclavate-cylindrical, 25–85 µm long, 2–7-septate 8
- 8 (7) Conidia 2.5–4 µm wide, 2–5-septate; on *Viburnum cylindricum*, China **P. viburni-cylindrici**
Conidia wider, 3–6.5 µm, 3–7-septate; on *Viburnum* sp., India **P. caprifoliacearum**

Pseudocercospora caprifoliacearum (C. Gupta et al.) Kamal, *Cercosporoid Fungi of India*: 159 (2010). (Fig. 48)

Basionym: *Phaeoisariopsis caprifoliacearum* C. Gupta et al., *Perspectives in Mycological Research, Prof. G.P. Agarwal Festschrift Volume 1*: 9 (1987).

Synonym: *Pseudocercospora khasiana* B.K. Gupta & Kamal, *Perspectives in Mycological Research, Prof. G.P. Agarwal Festschrift Volume 1*: 25 (1987) [**holotype:** India: Meghalaya, Shillong, on *Viburnum* sp., B. K. Gupta KB 58 (K(M) IMI 274850)].

Literature: Braun (1992: 219), Kamal (2010: 230).

Illustrations: Gupta et al. (1987: 16, fig. 2), Gupta & Kamal (1987: 33, fig. 4).

Description: Leaf spots amphigenous, subcircular to angular-irregular, 2–20 mm diam, brown, olivaceous-brown, later greyish brown to dingy grey, margin indefinite or with narrow to broad darker border or halo. *Caespituli* amphigenous, scattered, finely punctiform, brown to blackish. *Mycelium* immersed, composed of subhyaline to pale brown, septate, thin-walled, smooth hyphae. *Stromata* about 10–50 µm diam, dark brown, substomatal, cells 2–6 µm diam. *Conidiophores* in loose to dense, almost coremoid fascicles, 7–18, arising from stromata, though stromata, erect, when coremioid then dense below and looser towards the apex, straight to flexuous, unbranched or only rarely branched, subcylindrical-filiform, width uniform throughout or tips somewhat swollen, geniculate-sinuous in the upper half, about 60–155 µm long and 2.5–4.5 µm wide, apex sometime

to 6 µm wide, pluriseptate throughout, olivaceous-brown, wall thin-walled to somewhat thickened, to 1 µm, at the very base occasionally to 1.3 µm, smooth; conidiogenous cells integrated, terminal, occasionally intercalary, sympodially proliferating, with several conidiogenous loci, inconspicuous or visible as truncate tips or shoulders, subdenticulate, but not thickened. *Conidia* solitary, obclavate-cylindrical, broadly fusiform, straight to slightly curved, about 30–85 × 3–6.5 µm, 1–7-septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth, apex obtuse, base obconically truncate, 1.5–2.5 µm wide, hila unthickened, not darkened.

Holotype: India: Uttar Pradesh: Gorakhpur, on *Viburnum* sp., *Adoxaceae*, Jan. 1985, C. Gupta (K(M) IMI 294111). **Isotype:** GPU, KC 62.

Host range and distribution: On *Viburnum* spp., *Adoxaceae*, Asia (India, Meghalaya, Uttarakhand, Uttar Pradesh).

Notes: *Pseudocercospora caprifoliacearum* and *P. khasiana*, both described from India on *Viburnum* sp., are morphologically barely distinguishable and undoubtedly conspecific. The two species have been simultaneously published in a single book. It is proposed to give precedence to *Phaeoisariopsis caprifoliacearum*, and to reduce *P. khasiana* to synonymy. Braun (1992) examined type material of *Pseudocercospora khasiana* and compared it with *P. viburni-cylindrici*, described from China. The two species are morphologically very similar. Therefore, Braun (1992) proposed to reduce *P. khasiana* to synonymy with *P. viburni-cylindrici*, a treatment followed by Crous & Braun (2003) and Kamal (2010). Differences

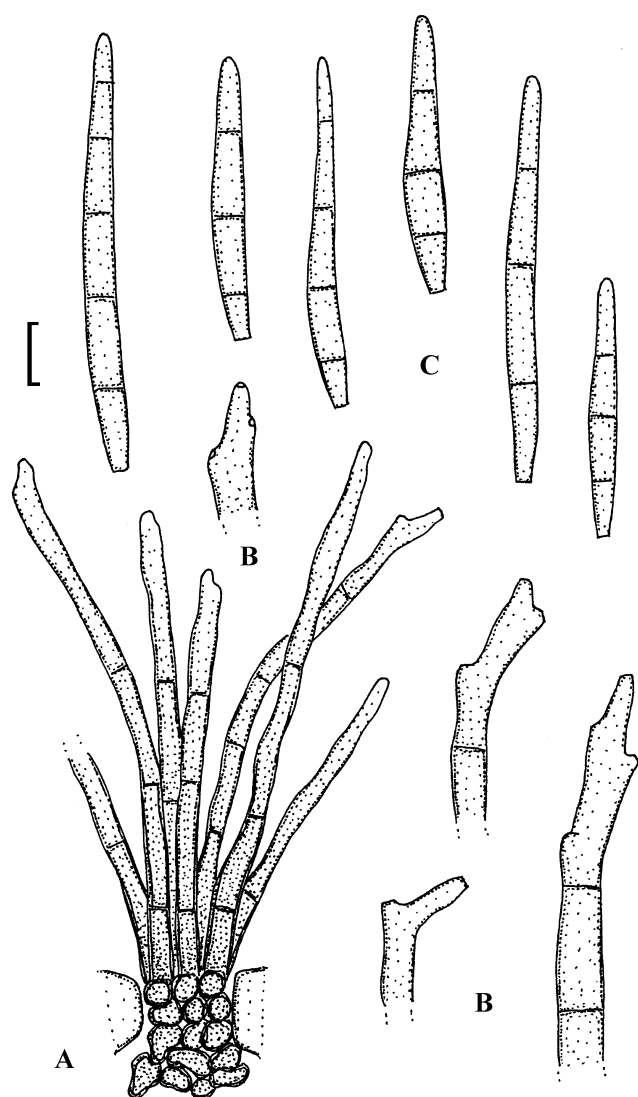


Fig. 48. *Pseudocercospora caprifoliacearum* (K(M) IMI 294111, holotype). A. Conidiophore fascicle. B. Conidiophore tips. C. Conidia. Bar = 10 μ m.

between Chinese and Indian collections were considered to be variation within a single species. The Chinese type material of *P. viburni-cylindrici* is characterised by having loose to often dense or even coremioid conidiophore fascicles, similar to *P. caprifoliacearum*, but narrower conidia, 2–4.5 μ m wide. We prefer to maintain *P. caprifoliacearum* (including *P. khasiana*) as separate species, at least for the interim until cultures and molecular data will be available.

Pseudocercospora depazeoides* (Desm.) U. Braun & Crous, *comb. nov.

Mycobank MB814570
(Fig. 49)

Basionym: *Exosporium depazeoides* Desm., *Ann. Sci. Nat., Bot.*, sér. 3, 11: 364 (1849).

Synonyms: *Passalora penicillata* Ces., in Rabenh., *Herb. Viv. Mycol.*, no. 587 (1857), with description on label [lectotype (designated here, MycoBank, MBT202789): Italy: Vercellis, on *Sambucus nigra*, 1856, V. de Cesati, Rabenh., *Herb. Viv. Mycol.* 587 (HAL)].

Cercospora penicillata (Ces.) Fresen., *Beitr. Mykol.*: 93 (1863).

Cercospora depazeoides (Desm.) Sacc., *Mycoth. Ven.*, Cent. III, no. 280 (1875).

Cercospora sambucina Ellis & Kellerm., *Amer. Naturalist* 17: 1166 (1883) [lectotype (designated here, MycoBank, MBT202790): USA: Ohio, on *Sambucus canadensis*, Jul. 1883, W. A. Kellerman 401 (NY 2343036); isoelectotypes: CUP 41160, NY 2343037].

Cercospora depazeoides var. *sambucina* (Ellis & Kellerm.) Sacc., *Syll. Fung.* 4: 469 (1886).

Cercospora ticinensis Cavara, in Briosi & Cavara, *Funghi Paras. Piante Colt. Util. Ess.*, no. 336 (1900) [lectotype (designated here, MycoBank, MBT202792): Italy: Pavia, Botanic Garden, on *Sambucus nigra*, Briosi & Cavara, *Funghi Paras. Piante Colt. Util. Ess.* 336 (HAL); isoelectotypes: Briosi & Cavara, *Funghi Paras. Piante Colt. Util. Ess.* 336, e.g. BPI 441927, CUP, FH, K, MICH 15376, OSU 35059, PAD].

Cercospora depazeoides var. *amphigena* Sousa da Câmara, *Revista Agron.* 1: 59 (1903) [type: Portugal: Chaves (Traz-os-Montes), on *Sambucus nigra*, Dec. 1902, A. Pereira].

Cercospora depazeoides var. *gagrensis* Elenkin & Oehl, *Bolez. Rast.* 6: 108 (1912) [type: Georgia: Abkhazia: Gagra [Gagry], upper waterfall Zhoekvary River, on *Sambucus nigra*, 9 Aug. 1912, A. Elenkin (LE 158291)].

Cercospora sambuci F. Stevens & King, *Illinois Biol. Monogr.* 11: 59 (1927) [holotype: Costa Rica: Cartago, on *Sambucus canadensis* [mexicana], 7 Jul. 1923, F. L. Stevens (ILL 15175); isotypes: CUP 14660, NY 2343299].

Phaeoramularia penicillata (Ces.) X.J. Liu & Y.L. Guo, *Acta Phytopathol. Sin.* 12: 13 (1982).

Pseudocercospora sambucigena U. Braun, Crous & K. Schub., *Mycotaxon* 92: 400 (2005) [holotype: USA: Pennsylvania: Dauphon County, on *Sambucus pubens*, 21 Aug. 1921, O. E. Jennings, Acc. 6736 (NY 142641)].

Literature: Saccardo (1886: 468–469), Lindau (1910: 134), Gonzáles Frago (1927: 252), Vassiljevsky & Karakulin (1937: 235), Chupp (1954, 100, 103), Katsuki (1965: 16), Ellis (1976: 247), Braun & Mel'nik (1997: 55), Crous & Braun (2003: 156), Guo et al. (2005: 279–280), Bakalova & Borisova (2010: 39–40), Crous et al. (2013: 105–106).

Illustrations: Briosi & Cavara, *Funghi Paras. Piante Colt. Util. Ess.* 336, figs 1–3, Ellis (1976: 246, fig. 185 D), Braun & Crous (2005: 402, fig. 6), Bakalova & Borisova (2010: 136, pl. 4), Crous et al. (2013: 106, fig. 60).

Exsiccatae: Briosi & Cav., *Funghi Paras. Piante Colt. Util. Ess.* 336. Cavara, *Fungi Longobard.* Exs. 245, 984. Ellis & Everh., *Fungi Columb.* 599. Ellis & Everh., *North Amer. Fungi* 1749. Kabát & Bubák, *Fungi Imperf.* Exs. 97. Kerner von Maurilaun, *Fl. Exs. Austr.-Hung.* 788. Krieger, *Fungi Saxon.* Exs. 898, 899. Krieger, Schäd., *Pilze Kulturgew.* 193, 898. Krypt. Exs. 727. Linh., *Fungi Hung.* Exs. 294. Petr., *Fungi Alban. Bosn.* Exs. 7. Petr., *Fl. Bohem. Morav.* Exs. *Pilze* 508. Petr., *Fungi Polon.* Exs. 19. Petr., *Mycoth. Gen.* 1414. Poelt & Scheuer, *Reliqu. Petr.* 943. Rabenh., *Fungi Eur.* Exs. 879, 2070. Roum., *Fungi Sel. Gall.* Exs. 158, 3596. Sacc., *Mycoth. Ven.* 280. D. Sacc., *Mycoth. Ital.* 199, 1587. Săvul., *Herb.*

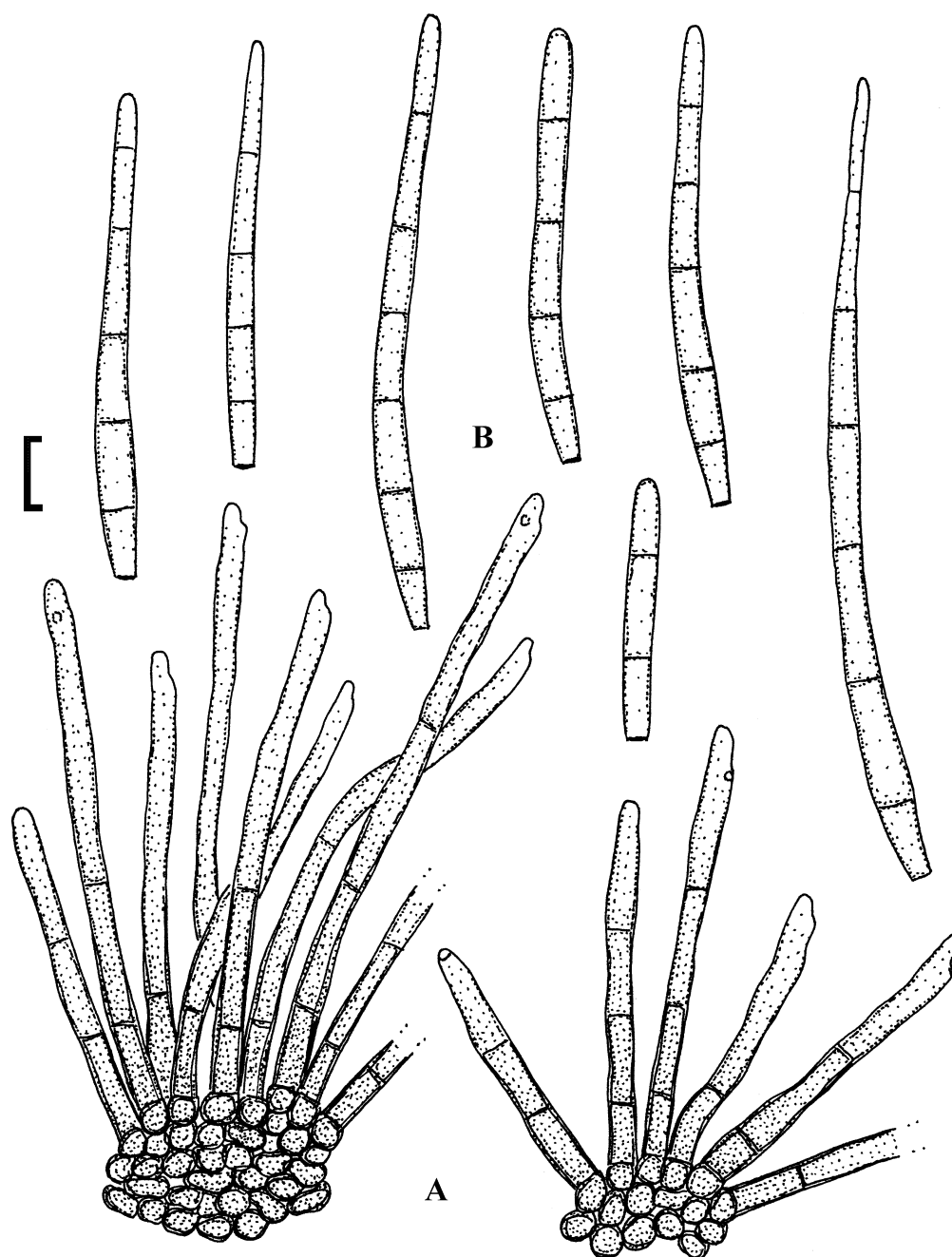


Fig. 49. *Pseudocercospora depazeoides* (Rabenh., *Herb. Viv. Mycol.*, no. 587, lectotype of *Passalora penicillata*, HAL). **A.** Conidiophore fascicles. **B.** Conidia. Bar = 10 μ m.

Mycol. Rom. 195. Scheuer, *Mycoth. Graec.* 433. Symb. & Earle, *Econ. Fungi* 476. Syd., *Mycoth. March.* 1290, 2177. Syd., *Mycoth. Germ.* 1045, 1774, Thüm., *Mycoth. Univ.* 984. Vill, *Fungi Bav.* 996. Zahlbruckner, *Krypt. Exs.* 727 A, B.

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, 1–10 mm diam, sometimes confluent and larger, at first pale greenish or greyish green, later brownish, finally grey to greyish white, often zonate, margin narrow, often formed as marginal line, somewhat raised, dark olivaceous-brown to blackish or dark purplish violet. *Caespituli* amphigenous, punctiform, dark brown to blackish, scattered. *Mycelium* internal; hyphae branched, septate, 2–4 μ m wide, subhyaline to pale olivaceous, thin-walled. *Stromata* well-developed, substomatal to intraepidermal, subglobose to somewhat irregular, 10–100

μ m diam, immersed to somewhat erumpent, medium to dark brown, composed of swollen hyphal cells, 3–7 μ m diam. *Conidiophores* in small to large fascicles, loose to very dense, occasionally even almost coremioid, arising from stromata, emerging through stomata or erumpent, erect, straight, subcylindrical to flexuous, somewhat geniculate-sinuous, unbranched, 20–200(–300) \times 3–7 μ m, short conidiophores 0–1-septate, longer ones pluriseptate throughout, pale olivaceous to dark olivaceous-brown or brown, tips often paler, thin-walled, smooth or almost so; conidiogenous cells integrated, terminal, occasionally conidiophores reduced to conidiogenous cells, 10–30 μ m long, sympodially or occasionally percurrently proliferating, conidiogenous loci inconspicuous, unthickened or almost so and not darkened to subconspicuous by being subdenticulate, tips truncate or subtruncate, 1.5–2.5 μ m wide, or slightly

refractive to darkened-refractive, in front view occasionally paracercosporoid, visible as minute circle, 1.5–2 µm diam. *Conidia* solitary, obclavate-cylindrical, straight to curved, 30–140(–155) × (3.5–)4–6.5(–7.5) µm, (1–)2–8(–9)-septate, hyaline, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth, occasionally somewhat rough-walled, apex obtuse, base short to occasionally long obconically truncate, (1.5–)2–2.5(–3) µm wide, hila unthickened or almost so, not darkened to somewhat refractive or slightly darkened-refractive.

Culture characteristics: Colonies on MEA reaching 16 mm diam after 30 d in the dark at 24°C, circular to subcircular, with smooth to slightly irregular margin, prominently convex, with moderate aerial mycelium, pale greenish grey to pale olivaceous-grey (surface) and olivaceous-black (reverse).

Lectotype (designated here, MycoBank, MBT202793): France: on *Sambucus nigra*, autumn, J. B. H. J. Desmazières, Desm., Pl. Crypt. France 1849 (NY 2343300). **Isolectotypes:** Desm., Pl. Crypt. France 1849, e.g. FH, G, PC. **Epitype (designated here, MycoBank, MBT202794):** The Netherlands: Milingerwaard, on *Sambucus nigra*, 2007, P. W. Crous (CBS H-20391). **Ex-epitype culture:** CBS 126000.

Host range and distribution: On *Sambucus* (*canadensis* [intermedia var. *insularis*, *mexicana*], *chinensis*, *ebulus*, *glauca*, *kamtschatica*, *nigra*, *pubens*, *racemosa*, *williamsii* [buergeriana], *Sambucus* sp.), *Adoxaceae*, Asia (China, Japan, Russia, Far East), Australia, Caucasus (Armenia, Azerbaijan, Georgia), Europe (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Germany, Greece, Hungary, Italy, Latvia, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, UK, Ukraine, former Yugoslavia), New Zealand, Central America and West Indies (Costa Rica, Haiti), North America (Canada; Mexico; USA, Connecticut, Florida, Illinois, Iowa, Kansas, Louisiana, Maine, Maryland, Mississippi, New York, New Jersey, Ohio, Pennsylvania, South Carolina, Washington, West Virginia, Wisconsin).

Notes: The generic affinity of *Cercospora depazeoides* has been confused and misinterpreted. Owing to the structure of the conidiogenous loci, ranging from inconspicuous to more conspicuous by being very slightly thickened or somewhat darker than the surrounding wall of the conidiogenous cell by being refractive, sometimes also visible as minute circle in front view (paracercosporoid), as well as usually colourless or almost so to pale olivaceous conidia, Crous & Braun (2003) maintained *C. depazeoides* as species of *Cercospora* s. str., and Braun & Crous (2005) introduced *Pseudocercospora sambucigena* for collections with quite indistinct conidiogenous loci. The variability and morphological range of the conidiogenous loci of this species are reminiscent of the locus characters of *Phaeoisariopsis griseola* (now *Pseudocercospora griseola*) and the species of the *Paracercospora* complex (Braun et al. 2013, Crous et al. 2013). Re-examinations of types and numerous other collections involved led to a reassessment of cercosporoid fungi on *Sambucus* spp. It emerged very clearly that a single species is involved which belongs in *Pseudocercospora*

in the current sense and circumscription of this genus (Braun et al. 2013, Crous et al. 2013). *Pseudocercospora sambucigena* must be reduced to synonymy with *P. depazeoides*. The phylogenetic position of this species in the *Pseudocercospora* clade has recently been confirmed by Crous et al. (2013).

Lectotype material of *Exosporium depazeoides* contains besides the typical cercosporoid hyphomycete also an alternarioid fungus. It cannot be excluded that the cercosporoid as well as the alternarioid hyphomycete were included in the very meagre original description. However, we follow Saccardo's treatment on the occasion of his introduction of the combination *Cercospora depazeoides* and confine this name to the cercosporoid element. Saccardo's combination is usually cited as "Nuovo Giorn. Bot. Ital. 8: 187 (1876)" but it was first validly published in Mycotheca Veneta 280 (1875). The designated epitype, the ex-epitype culture and sequences obtained from this material help to fix the phylogenetic position and affinity of this species. The reallocation of *C. depazeoides* to *Pseudocercospora* has serious consequences on genetic level since *Cercospora penicillata* (i.e. *C. depazeoides*) being the type species of the genus *Cercospora* (Braun 1995, Braun et al. 2013). Thus, the allocation of *C. depazeoides* to *Pseudocercospora*, based on morphological reassessments and results of molecular sequence analyses, renders *Cercospora* an older heterotypic synonym of *Pseudocercospora*, which is undesirable and requires a proposal to conserve *Cercospora* with *C. apii* as conserved type under Art. 14.9, which is being made.

Eriksson, Fungi Paras. Scand. Exs. 42, deposited at HAL, has been examined and turned out to be a mixture of *Ramularia sambucina* and *Cladosporium herbarum*.

Pseudocercospora ebulicola (W. Yamam.) Deighton, *Mycol. Pap.* 140: 143 (1976).

(Fig. 50)

Basionym: *Cercospora ebulicola* W. Yamam., *Trans. Sapporo Nat. Hist. Soc.* 13: 139 (1934).

Literature: Chupp (1954: 100), Hsieh & Goh (1990: 50), Guo & Hsieh (1995: 47–48), Guo et al. (1998: 60–61), Crous & Braun (2003: 168).

Illustrations: Hsieh & Goh (1990: 50, fig. 34), Guo & Hsieh (1995: 49, fig. 46), Guo et al. (1998: 60, fig. 46).

Description: Leaf spots amphigenous, indefinite discolorations, yellowish to brownish, or circular to irregular spots, 1–8 mm diam, pale brown, yellowish brown to brown, later greyish white, margin indefinite or brown on the upper surface. *Caespituli* hypophyllous, effuse, olivaceous to brownish, forming irregular patches. *Mycelium* internal or partly external; superficial hyphae branched, 2–3 µm wide, septate, pale olivaceous. *Stromata* lacking or very small, only a few substomatal swollen hyphal cells, brown. *Conidiophores* in loose fascicles, 3–15, arising from internal hyphae or small hyphal aggregations, through stomata, erect, subcylindrical, curved, geniculate-sinuous to somewhat tortuous, simple or branched, 50–190 × 4–5.5

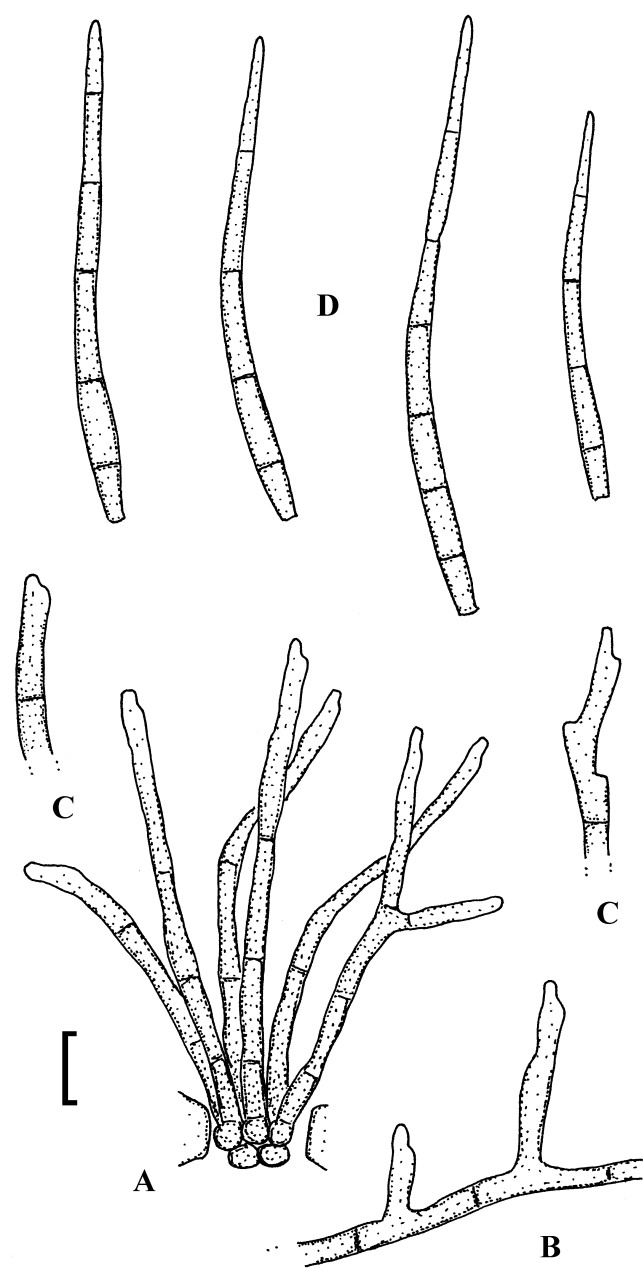


Fig. 50. *Pseudocercospora ebulicola* (CUP-039732, lectotype). **A.** Conidiophore fascicle. **B.** Solitary conidiophore arising from a superficial hypha. **C.** Conidiophore tips. **D.** Conidia. Bar = 10 µm.

µm, 2–8-septate, olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci inconspicuous or subdenticulate, but always unthickened, not darkened. *Conidia* solitary, obclavate-cylindrical, straight to curved, 20–130 × 3–5 µm, 2–11-septate, subhyaline, yellowish to pale olivaceous, thin-walled, smooth, apex obtuse to subacute, base subtruncate to short obconically truncate, 1.5–2.5 µm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202795): **Taiwan:** Sozan, on *Sambucus javanica*, 3 Dec. 1933, W. Yamamoto (CUP-039732). **Isolectotype:** HMAS 5197, K(M) IMI 7791. **Topotypes:** 20 Nov. 1933 (BPI 436018, 436019).

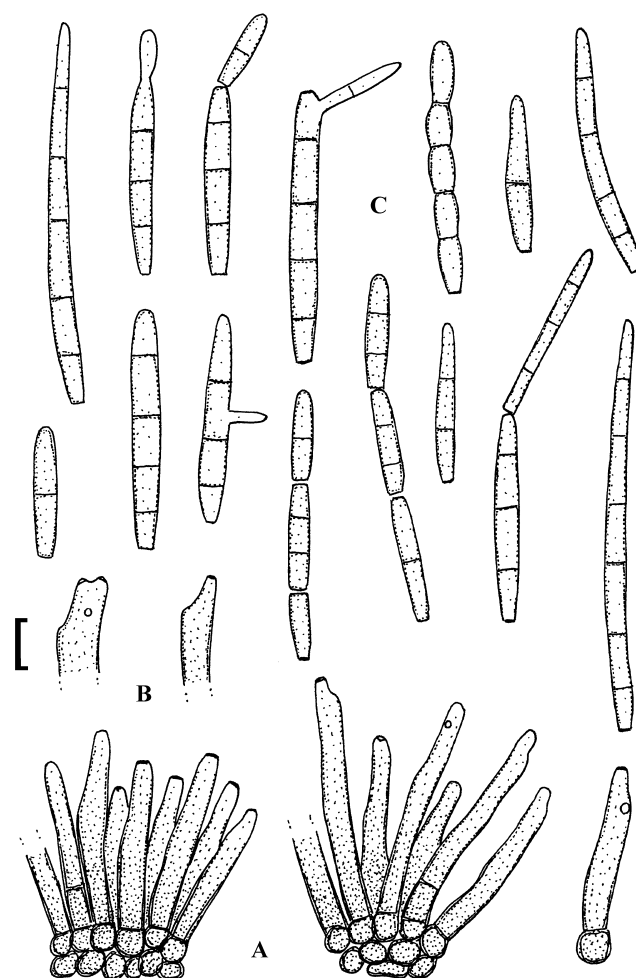


Fig. 51. *Pseudocercospora opuli* (Fuckel, *Fungi Rhen. Exs.* 118, HAL, lectotype). **A.** Conidiophore fascicles and solitary conidiophore. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm. U

Host range and distribution: On *Sambucus (javanica [formosana])*, Adoxaceae, Asia (China, Sichuan, Zhejiang; Japan, Taiwan).

Notes: Chupp (1954) reduced *Cercospora ebulicola* to synonym with *C. catenospora* which is, however, incorrect. *Cercospora ebulicola* is a species of the genus *Pseudocercospora* whereas *C. catenospora* is a *Phaeoramularia*-like species of *Passalora*.

Pseudocercospora opuli (Fuckel) U. Braun & Crous, *Mycophaerella and Anam.*: 299 (2003). (Fig. 51)

Basionym: *Cercospora penicillata* f. *opuli* Fuckel, *Fungi Rhen. Exs.* 118 (1863).

Synonyms: *Cercospora opuli* (Fuckel) Höhn., in Kabát & Bubák, *Fungi. Imperf. Exs.* 445 (1907).

Cercospora viburni Sacc., in Sydow, *Mycoth. March.* 2773 (1889), *nom. nud.* (ICN 38.1).

Pseudocercospora viburni U. Braun, *Nova Hedwigia* **55**: 219 (1992) [**holotype:** **China:** Hubei: Shennongjian, on *Viburnum opulus* subsp. *calvescens* [*sargentii* var. *calvescens*], 5 Aug. 1984, Y. L. Guo 266 (HMAS 47828)].

Pseudophaeoramularia opuli (Fuckel) U. Braun, *Trudy Bot.*

Inst. im. V.L. Komarova 20: 19 (1997).

Passalora viburni-sargentii Y.L. Guo, *Mycosystema* 31: 161 (2012) [holotype: **China**: Hubei: Shennongjian, on *Viburnum opulus* subsp. *calvescens* [sargentii var. *calvescens*], 5 Aug. 1984, Y. L. Guo 266 (HMAS 47828)].

Misapplied names: *Cercospora penicillata* sensu Saccardo (1886: 468) and Chupp (1954: 103).

Phaeoramularia penicillata (Ces.) X.J. Liu & Y.L. Guo, *Acta Phytopathol. Sin.* 12(4): 13 (1982).

Literature: Saccardo (1886: 468), Lindau (1910: 136), Ferraris (1910: 136), Vassiljevsky & Karakulin (1937: 236), Chupp (1954: 103), Ellis (1976: 247), Braun & Mel'nik (1997: 19, 77).

Illustrations: Chupp (1954: 103), Ellis (1976: 248, fig. 186A), Braun (1992: 216, fig. 9), Braun & Mel'nik (1997: appendix, fig. 82), Guo (2012: 161, fig. 2).

Exsiccatae: Fuckel, *Fungi Rhen. Exs.* 118. Kabát & Bubák, *Fungi Imperf. Exs.* 445. Liro, *Mycoth. Fenn.* 295. Petr., *Mycoth. Gen.* 1312. Sävul., *Herb. Mycol. Rom.* 432. Scheuer, *Mycoth. Graec.* 382. Smarods, *Fungi Lat. Exs.* 448.

Description: *Leaf spots* amphigenous, subcircular to somewhat angular-irregular, 1–8 mm diam, sometimes confluent and larger, occasionally somewhat zonate, dull greenish, ochraceous to brown, centre later greyish to greyish white, with narrow dark margin. *Caespituli* amphigenous, punctiform, scattered, dark brown to blackish. *Mycelium* internal. *Stromata* substomatal or immersed, 10–80 µm diam, brown, composed of swollen hyphal cells, 2–7 µm diam, walls somewhat thickened. *Conidiophores* in small to fairly large fascicles, loose to dense, arising from stromata, emerging through stomata or erumpent, erect, straight, subcylindrical to moderately geniculate-sinuous, unbranched or occasionally with a single branchlet, 15–70(–80) × (2.5–)3–7(–8) µm, aseptate or sparingly septate, usually with 0–3 septa, at first subhyaline and thin-walled, later pale olivaceous to olivaceous-brown and walls somewhat thickened, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, about 10–40 µm long; conidiogenous loci inconspicuous to subconspicuous by being truncate and somewhat refractive or darkened-refractive, but unthickened, in front view sometimes visible as minute circles, about 1.5–2.5 µm diam. *Conidia* solitary to catenate, in simple, short acropetal chains or disarticulating, obclavate-subcylindrical to cylindrical, straight to somewhat curved, (20–)30–90(–145) × (2.5–)3–6(–7) µm, 1–10-septate, occasionally somewhat constricted at the septa, hyaline, subhyaline, later pale olivaceous, thin-walled, smooth, apex of primary and solitary conidia obtuse, rounded, truncate to short conically truncate in catenate conidia, base truncate to short obconically truncate, 2–3 µm wide, hila unthickened, not to slightly refractive or darkened-refractive.

Lectotype (designated by Braun & Mel'nik 1997: 20): **Germany:** *Rheinland-Pfalz:* "in sylva Hostrichiensi", on *Viburnum opulus*, summer 1863 [Fuckel, *Fungi Rhen. Exs.* 118] (HAL). **Isolectotypes:** Fuckel, *Fungi Rhen. Exs.* 118, (FH, G, K(M), etc).

Host range and distribution: On *Viburnum* (*edule* [pauciflorum], *opulus* subsp. *opulus*, *opulus* subsp. *calvescens* [opulus var. *calvescens*, *sargentii* var. *calvescens*], *opulus* subsp. *trilobum* [opulus var. *americanum*, *trilobum*]), *Adoxaceae*, Asia (China, Kazakhstan, Russia, Turkey), Caucasus (Armenia, Azerbaijan, Georgia), Europe (Austria, Belarus, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Great Britain, Italy, Latvia, Poland, Portugal, Romania, Russia, Slovakia, Sweden, Ukraine), Central America (Costa Rica), North America (Canada; USA, Idaho, Iowa, Kansas, Mississippi, Oklahoma, Wisconsin).

Notes: A record of this species on *V. burejaeticum* from the Far East of Russia (Egorova 2007) is uncertain and unproven and might rather pertain to *P. varia*. *Viburnum burejaeticum* does not belong to *Viburnum* sect. *Opulus*, but *P. opuli* seems to be confined to species of this section, which has been confirmed as well supported clade in phylogenetic studies (Winkworth & Donoghue 2005, Clement et al. 2014). *Viburnum lantana* and *V. orientale* (Crous & Braun 2003) are additional unproven and doubtful hosts of *P. opuli* not belonging to sect. *Opuli*. The taxonomic history of this species is complicated and characterised by confusions and misinterpretations. *Passalora penicillata* (syn. *Cercospora penicillata*, now *Pseudocercospora depazeoides*) was introduced for a cercosporoid fungus on *Sambucus nigra*. Fuckel (1863) added *C. penicillata* f. *opuli*, and Fuckel (1870) treated the fungus on *Viburnum opulus* as sole species of *C. penicillata*, i.e. "f. *penicillata*" on *Sambucus nigra* was not mentioned, which seems to be the reason for Saccardo's (1886) misinterpretation of the name *C. penicillata*. Chupp (1954) followed Saccardo's misinterpretation, although the confusion of the names involved had already been discussed and corrected by Lindau (1910). The proposed combination *Phaeoramularia penicillata* (Liu & Guo 1982) was also based on Chupp's wrong interpretation of the name *Cercospora penicillata*. Höhnelt's name *C. opuli* can be interpreted as new species (see Braun & Mel'nik 1997, Crous & Braun 2003) or as new combination at new rank according to Art. 41.4. We prefer to follow the second version. The morphology of this species is unusual and caused additional confusion. The conidia are formed singly as well as in chains or disarticulate in smaller units. The conidiogenous loci range from being inconspicuous to subconspicuous by being somewhat refractive or darkened-refractive, but they are consistently unthickened. Braun (in Braun & Mel'nik 1997) classified loci and hila of this species as intermediate between *Passalora* and *Pseudocercospora* and proposed the new genus *Pseudophaeoramularia* for such species. However, based on results of molecular sequence analyses and morphological reassessments, *Pseudophaeoramularia* was reduced to synonymy with *Pseudocercospora* and *C. opuli* was reallocated to the latter genus (Crous & Braun 2003, Braun et al. 2013, Crous et al. 2013).

Pseudocercospora viburni and *Passalora viburni-sargentii* are homotypic synonyms. Chinese material on *Viburnum opulus* subsp. *calvescens* has been examined and found to be indistinguishable from European material of *P. opuli*.

A collection of this species from the Asian part of Turkey

has been examined (Kütahya, on *Viburnum opulus*, 9 Jul. 1953, ex herb. Petrak, GZU).

Pseudocercospora varia is morphologically very close to and confusable with *P. opuli*, but the conidia are formed singly. The latter species seems to be confined to species on *Viburnum* sect. *Opuli*. The taxonomic meaning of conidial catenation, which occurs in varying degrees in *P. opuli*, is not quite clear and has to be elucidated by means of molecular methods. Other morphological characters of *P. opuli* and *P. varia* are very similar. The two species are treated as separate species, at least tentatively.

Pseudocercospora tineae Y.L. Guo & W.H. Hsieh,
Mycosystema 7: 124 "1994" (1995).

(Fig. 52)

Misapplied name: Stigmata tineae sensu Hsieh & Goh 1990.

Literature: Hsieh & Goh (1990: 51–52, as *Stigmata tineae*), Guo *et al.* (1998: 63–64).

Illustrations: Hsieh & Goh (1990: 53, fig. 36, as *Stigmata tineae*), Guo (1995: 125, fig. 4), Guo *et al.* (1998: 64, fig. 49).

Description: Leaf spots amphigenous, subcircular to angular-irregular and vein-limited, 0.5–7 mm diam, often confluent and along the leaf margin, brown to dark brown, margin indefinite or centre later greyish brown, dingy grey to greyish white, margin dark brown above and paler brown below, sometimes with diffuse yellowish to greyish brown halo. *Caespituli* amphigenous, punctiform, dark brown. *Mycelium* internal and external; superficial hyphae hypophyllous, emerging through stomata or arising from the base of conidiophore fascicles, branched, septate, pale olivaceous, thin-walled, smooth, 1.5–2.5 µm wide. *Stromata* well-developed, substomatal, 15–75 µm diam, brown. *Conidiophores* in small to moderately large fascicles, divergent to usually dense, arising from stromata, through stomata or solitary, arising from superficial hyphae, erect, straight to curved, subcylindrical, somewhat attenuated towards the tip or irregular in width, geniculate-sinuous, unbranched, relatively short, 5–35 × 2–5 µm, 0–1-septate, pale olivaceous, olivaceous-brown to brownish, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores often reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous or subdenticulate, but always unthickened and not darkened. *Conidia* solitary, obclavate-cylindrical, 10–120 × 2–3.5(–4) µm, 1–11-septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth, apex obtuse to subacute, base subtruncate to usually obconically truncate, 1–2.5 µm wide, hila unthickened, not darkened.

Holotype: **China:** Guangdong Province: Guangzhou, on *Viburnum macrocephalum*, 6 Nov. 1961, Q. M. Ma & X. J. Liu 1079 (HMAS 67254).

Host range and distribution: On *Viburnum* (*luzonicum*, *macrocephalum*, *plicatum* var. *tomentosum* [*tomentosum*], *suspensum*, *Viburnum* sp.), *Adoxaceae*, Asia (China, Anhui, Guangdong, Sichuan, Zhejiang; Japan, Taiwan).

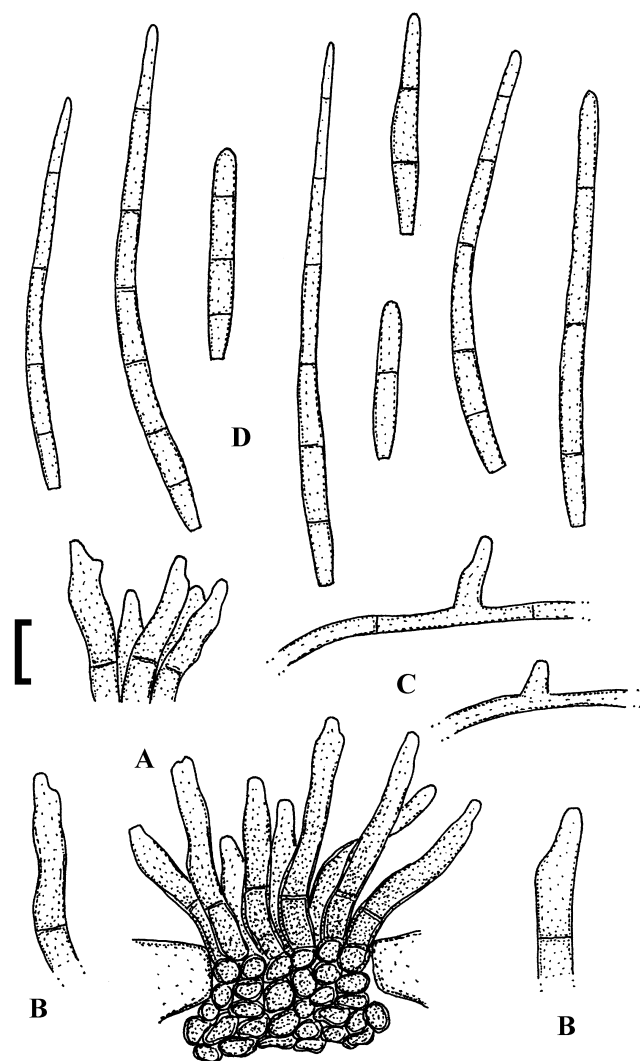


Fig. 52. *Pseudocercospora tineae* (based on Guo 1995: 125, fig. 4). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Solitary conidiophores arising from superficial hyphae. **D.** Conidia. Bar = 10 µm.

Notes: Guo and Hsieh (in Guo 1995) compared this species with *Cercospora tineae*, supposed that the two species could be synonymous, but hesitated to reduce them to synonymy. Therefore, they did not propose a new combination based on *Cercospora tineae*, but preferred to describe a new species with a Chinese type collection. Hence, the name *Pseudocercospora tineae* is valid. However, as already stated in Braun & Hill (2002), *Cercospora tineae* (now *Pseudocercospora viburnigena*) is clearly distinct from the Chinese species by having non-geniculate, only percurrently proliferating conidiogenous cells with fine annellations. Superficial hyphae are only rarely formed. *Pseudocercospora tineae* is possibly rather common in China and Taiwan. Two additional Taiwanese collections on *Viburnum* sp. have been examined and identified by C. Nakashima (TUA 40, 56), and Japanese collections on *Viburnum suspensum* and *V. plicatum* var. *tomentosum* [*V. tomentosum*] have been revised and confirmed as *P. tineae* by C. Nakashima (CNS567, CNS976).

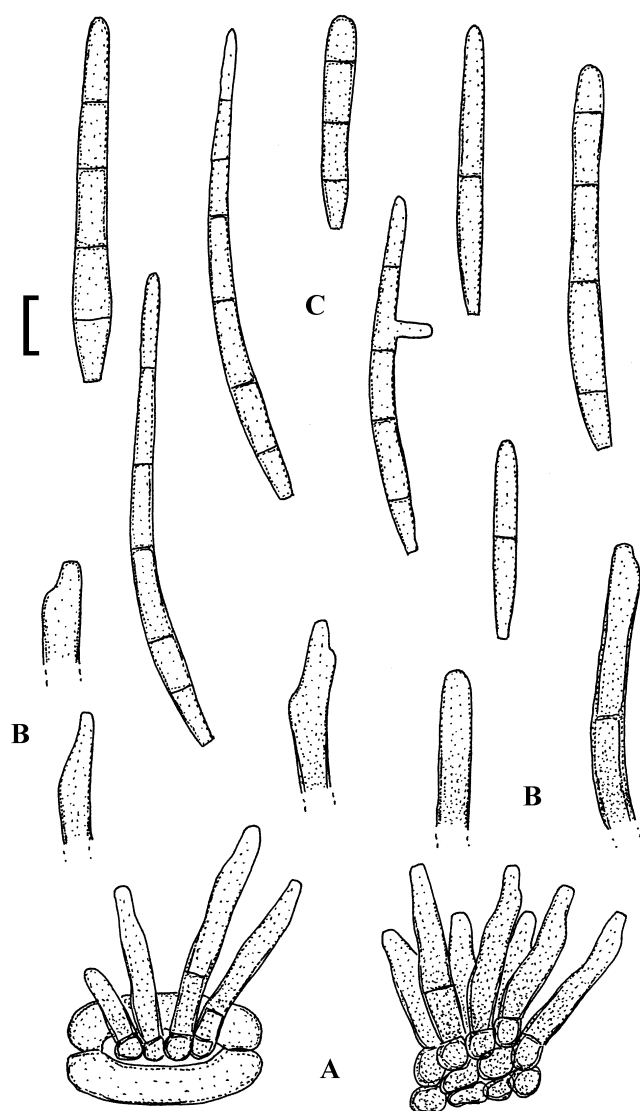


Fig. 53a. *Pseudocercospora varia* var. *varia* (BPI 442161, isotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

***Pseudocercospora varia* (Peck) J.K. Bai & M.Y. Cheng, *Acta Mycol. Sin.* 11: 123 (1992).**
var. *varia*

(Fig. 53a)

Basionym: *Cercospora varia* Peck, *Rep. (Annual) New York State Mus. Nat. Hist.* 35: 141 (1884).

Literature: Saccardo (1886: 468), Chupp (1954: 105), Guo & Hsieh (1995: 51), Crous & Braun (2003: 418).

Exsiccatae: Clements & Clements, *Crypt. Format. Colorad.* 280. Ellis & Everh., *N. Amer. Fungi* 3190.

Description: Leaf spots amphigenous, subcircular to angular-irregular, 1–8 mm diam, sometimes confluent and larger, pale to medium dark brown or reddish brown, later grey to greyish white, margin indistinct, formed as marginal line or with narrow to moderately wide, dark brown margin, sometimes somewhat raised, and sometimes with ochraceous, yellowish brown to brownish halo. *Caespituli* amphigenous, punctiform, scattered,

brown, dark brown to almost blackish. *Mycelium* internal (in some collections with superficial hyphae probably formed by conidial germination); hyphae branched, septate, pale, 1.5–3 µm wide, thin-walled, smooth. *Stromata* substomatal or intraepidermal, small to well-developed, 10–60 µm diam, subglobose, pale to medium brown or yellowish brown, cells globose or subglobose to somewhat irregular, 3–10 µm diam, wall thickened, to 1 µm. *Conidiophores* solitary or in usually small fascicles, mostly 2–15, usually divergent, rarely dense, arising from stromata, through stomata or erumpent, erect, straight to somewhat curved, subcylindrical or attenuated towards the tip, mostly not geniculate-sinuous, occasionally somewhat geniculate-sinuous in the upper half, unbranched, (5–)10–80(–100) × 2–9 µm, usually 0–3-septate, at first very pale, hyaline to subhyaline, later pale olivaceous, olivaceous-brown or yellowish brown, above all below, mostly paler towards the tip, wall thin to usually somewhat thickened, to 0.5 µm, above all below, sometimes to 1 µm thick, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 15–40 µm long, conidiogenous loci inconspicuous or visible by being truncate or subdentate, but always unthickened and not darkened, occasionally somewhat refractive or loci visible as minute circle. *Conidia* solitary, obclavate-cylindrical, cylindrical, rarely subacicular, straight to somewhat curved, (15–)20–85(–90) × 2–6.5 µm, 1–7-septate, hyaline to subhyaline, thin-walled, smooth, apex obtuse, occasionally subacute, base truncate to short or long obconically truncate, 1–2.5 µm wide, hila unthickened, not darkened.

Holotype: **USA:** New York: Albany County, East Berne, on *Viburnum acerifolium*, Aug., C. H. Peck (NYS). *Isotype:* BPI 442161.

Host range and distribution: On *Viburnum* (*acerifolium*, *alnifolium*, *cassinoides*, *dilatatum*, *lentago*, *odoratissimum*, *prunifolium*, *pubescens*, *rafinesquianum* var. *affine* [affine], *suspensum*, *Adoxaceae*, North America (Canada; USA, Alabama, Alaska, Florida, Idaho, Illinois, Iowa, Kansas, Massachusetts, Mississippi, New York, Oklahoma, Oregon, South Carolina, Texas, Vermont, Virginia, West Virginia, Wisconsin, Wyoming).

Notes: Collections on *Viburnum edule* [*V. pauciflorum*], *V. opulus* and *V. trilobum* have a tendency to form conidia in short chains and short lateral branchlets. They are referred to as *P. opuli*. Records of this species from New Zealand (Gagdil 2005) on *Viburnum lantata* and *V. carlesii* are quite unclear. The collections concerned have been examined (PDD 19826, 19843, 1985), but sufficient fructification for a final identification has not been found. Superficial hyphae with solitary conidiophores found on “*V. lantana*” are not in accordance with *P. varia*. The host identity is also uncertain (short petioles do not coincide with *V. lantana* but they are rather in favour of *V. burejaeticum*. Other records of *C. varia* on *Lonicera* spp. are also based on misidentifications. Collections on *L. japonica* belong to *Pseudocercospora lonicericola* (material examined: BPI 442155), other specimens, e.g. on *L. ciliata* (BPI 442168–442170), refer to *Passalora antipus* (Ellis & Holw.) U. Braun & Crous.

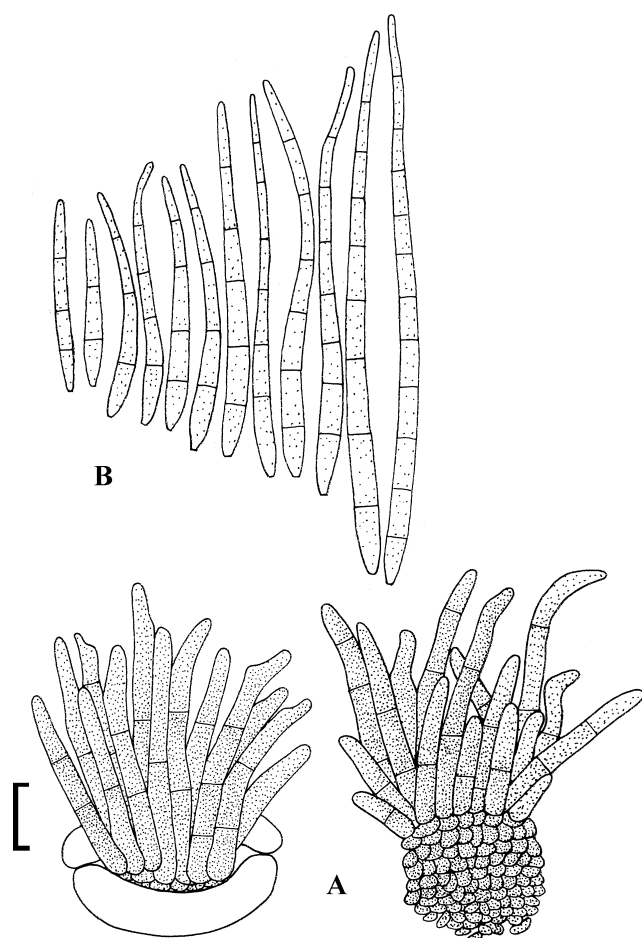


Fig. 53b. *Pseudocercospora varia* var. *viburni-sargentii* (KUS 14011, holotype). **A.** Conidiophore fascicles. **B.** Conidia. Bar = 10 µm.

var. ***viburni-sargentii*** U. Braun & H.D. Shin, **var. nov.**
 MycoBank MB814558
 (Fig. 53b)

Literature: Guo & Hsieh (1995: 51, as *Pseudocercospora varia*), Guo *et al.* (1998: 65, as *Pseudocercospora varia*), Kim & Shin (1999), Shin & Kim (2001: 226, as *Pseudocercospora varia*).

Illustrations: Guo & Hsieh (1995: 51, fig. 48), Guo *et al.* (1998: 66: 50), Shin & Kim (2001: 227, fig. 104).

Diagnosis: Morphologically close to North American collections of var. *varia*, but characterised by having conidiophores in larger, dense fascicles, about 10–30; conidia, 35–145 × 3.5–6.5 µm, 2–15-septate.

Holotype: **Korea:** Pyeongchang, on *Viburnum sargentii*, 25 Aug. 1997, H. D. Shin (KUS-F 14011).

Host range and distribution: On *Viburnum sargentii*, *Adoxaceae*, Asia (China, Heilongjian, Liaoning; Korea).

Notes: The Asian collections on *Viburnum sargentii* from China and Korea differ from North American specimens in

having much larger, dense fascicles of conidiophores. The taxonomic status of the Asian collections is not quite clear and in urgent need of molecular confirmation. It cannot be excluded that this is a separate species, but for the interim we prefer a conservative treatment as variety.

Pseudocercospora viburnicola U. Braun, **sp. nov.**
 MycoBank MB814559
 (Fig. 54)

Diagnosis: Differs from *Pseudocercospora viburni-nudi* in having much longer, usually obclavate conidia, 25–125 × 4.5–8 µm, with 2–10 septa and somewhat thickened walls and subconspicuous conidiogenous loci. *Pseudocercospora caprifoliacearum*, known from India on *Viburnum* sp., has longer conidiophores, 60–155 µm, and the conidia are 3–6.5 µm wide and thin-walled.

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, 1–8 mm diam, medium to dark brown, finally with pale centre, greyish brown to dingy greyish white, margin indefinite or narrow, darker, or surrounded by darker veins, occasionally somewhat raised. *Caespituli* amphigenous, punctiform, scattered, blackish. *Mycelium* internal. *Stromata* lacking or substomatal to intraepidermal, 10–50 µm diam, brown, swollen hyphal cells 2–7 µm diam, walls slightly thickened. *Conidiophores* in small, divergent fascicles, mostly 3–12, arising from substomatal hyphae or stromata, through stomata or erumpent, erect, straight, subcylindrical to distinctly geniculate or geniculate-sinuous in the upper fertile portion, unbranched, 20–100 × 3.5–8(–10) µm, (0–)1–4(–5)-septate, medium to dark brown throughout or somewhat paler towards the tip, wall somewhat thickened, to 0.8 µm, smooth; conidiogenous cells integrated, terminal, 10–30 µm long, proliferation sympodial, occasionally with enteroblastic, monopodial proliferation leaving coarse annellations, conidiogenous loci inconspicuous to conspicuous by being denticle-like, 1.5–3 µm diam, often somewhat refractive or even appearing darkened, in front view sometimes visible as minute circle with dark rim (caused by the relatively thick and dark walls of the conidiophores and conidiogenous cells), but loci not thickened. *Conidia* solitary, obclavate, often with almost rostrate apex, shorter conidia subcylindrical, 25–125 × 4.5–8 µm, 2–10-septate, occasionally subhyaline to pale olivaceous, but usually medium olivaceous or olivaceous-brown, wall thin to somewhat thickened (to 0.8 µm), smooth, apex obtuse to subacute, base obconically truncate, 2–3 µm wide, hila unthickened, not darkened, but often somewhat refractive or ultimate rim slightly darker.

Holotype: **USA:** *Wisconsin:* Madison, Arboretum, on *Viburnum* sp. [*rafinesquianum*] (as *Viburnum "lentago"*), 5 Sep. 1953, W. W. Diehl (BPI 442174).

Host range and distribution: On *Viburnum* (*cassinoides*, *Viburnum* sp.), *Adoxaceae*, North America (USA, Wisconsin, West Virginia).

Notes: An additional collection of this species has been examined [**USA:** *West Virginia:* Pocahontas County, on

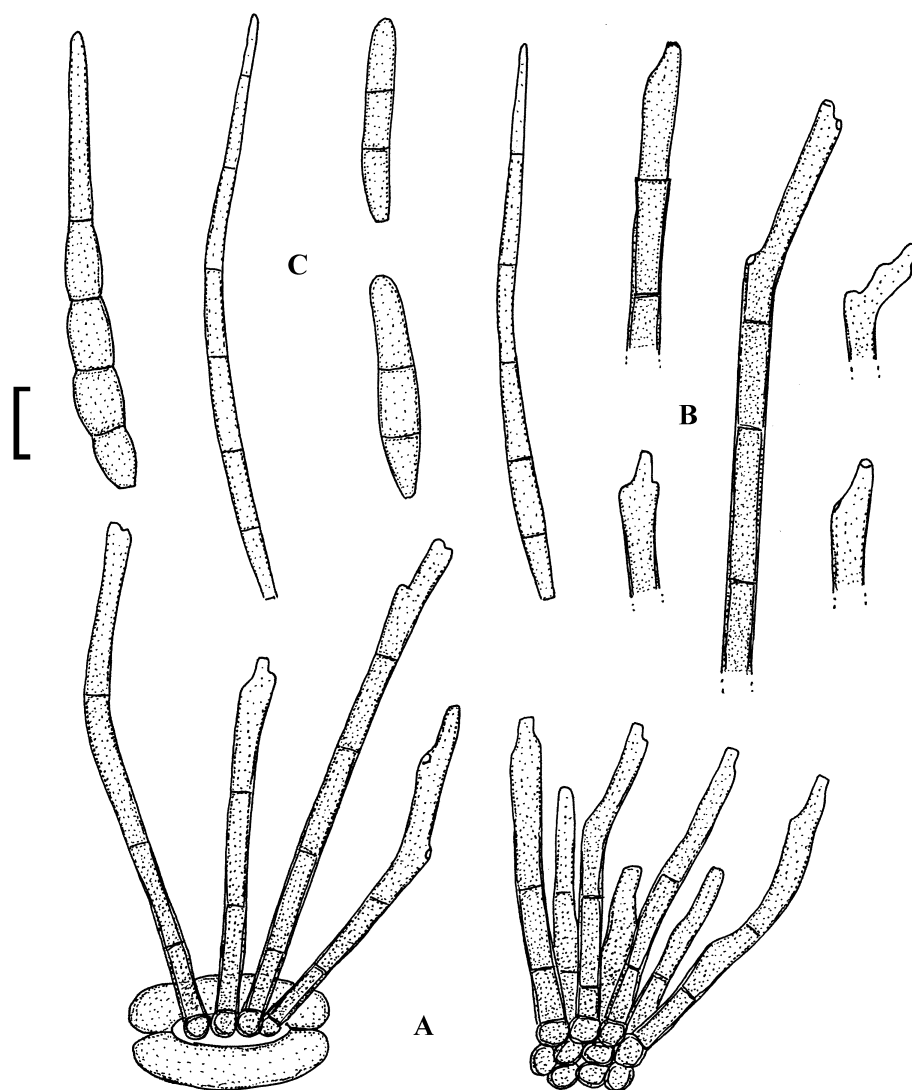


Fig. 54. *Pseudocercospora viburnicola* (BPI 442174, holotype). **A.** Conidiophore fascicles. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

Viburnum cassinoides, 6 Aug. 1909, B. Brooks, hb. J. L. Sheldon 3815 (BPI 439059)]. This species is easily distinguishable from all *Pseudocercospora* species on hosts of the *Adoxaceae* by its consistently solitary, pigmented, much wider conidia with somewhat thickened walls. Other comparable cercosporoid fungi on *Viburnum* spp., e.g. *Pseudocercospora varia*, are quite distinct by narrower, mostly subhyaline conidia and unthickened conidiogenous loci and conidial hila. The shape of the conidia with somewhat thickened walls and the structure of the conidiogenous loci in this species are reminiscent of former *Prathigada* species which have turned out to belong to *Pseudocercospora* (Braun et al. 2013).

Pseudocercospora viburni-cylindrici (F.L. Tai) U. Braun, *Nova Hedwigia* **55**: 219 (1992). (Fig. 55)

Basionym: *Cercospora viburni-cylindrici* F.L. Tai, *Syll. Fung. Sin.*: 907 (1979).

Synonyms: *Cercospora viburnicola* F.L. Tai, *Lloydia* **11**: 54 (1948), *nom. illeg.* (Art. 53.1), non *C. viburnicola* W.W. Ray, 1941.

Pseudocercospora viburni-cylindrici (F.L. Tai) Y.L. Guo & W.X. Zhao, *Acta Mycol. Sin.* **12**: 198 (1993).

Literature: Guo & Hsieh (1995: 52), Guo et al. (1998: 65); Crous & Braun (2003: 421).

Illustrations: Tai (1948: 37, fig. 1), Braun (1992: 216, plate 2, fig. 10), Guo & Hsieh (1995: 53, fig. 49), Guo et al. (1998: 67, fig. 51).

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, size variable, 1–8 mm diam, sometimes confluent, brown to dark brown or even blackish, margin indefinite or finally centre brown, greyish brown or greyish white with darker margin, brown, sometimes with a diffuse olivaceous halo. *Caespituli* hypophyllous, punctiform, scattered, effuse, dark, brown to dark brown. *Mycelium* internal. *Stromata* well-developed, subglobose to somewhat irregular, substomatal, 20–35 µm diam, brown. *Conidiophores* in small to moderately large, somewhat divergent to dense or even coremioid fascicles, arising from stromata, through stomata, erect, straight, subcylindrical to geniculate-sinuous, unbranched, 50–150 × 3–4.5 µm, 3–7-septate, medium olivaceous-brown to brown, wall somewhat thickened, smooth; conidiogenous cells integrated, terminal, about 10–30 µm long, conidiogenous loci inconspicuous unthickened and not darkened. *Conidia* solitary, obclavate-cylindrical, straight or only slightly curved, 25–75 × 2.5–4 µm, 2–5-septate, pale olivaceous, thin-walled,

smooth, apex obtuse to subacute, base short obconically truncate, 1–2 µm wide, hila unthickened, not darkened.

Holotype: **China:** Yunnan Province: Kunming, on *Viburnum cylindricum*, Adoxaceae, Jun. 1938, Xu Ren (HMAS 01929).

Host range and distribution: Only known from the type collection.

Notes: Braun (1992) reduced *Pseudocercospora khasiana* to synonymy with *P. viburni-cylindrici*, although the conidia in the Indian type material are distinctly wider and the conidiophore fascicles are smaller and not coremioid. Therefore, we prefer to consider *P. khasiana* (= *P. caprifoliacearum*) a distinct species of its own, at least for the interim (see notes under the latter species). Korean material on *Viburnum erosum*, referred to as *P. viburni-cylindrici* by Shin & Kim (2001: 228), differs in having much longer, pluriseptate, cylindrical conidia with truncate base. The material concerned is described as a new species, *Pseudocercospora viburni-erosi*.

Pseudocercospora viburni-erosi U. Braun & H.D. Shin, **sp. nov.**
MycoBank MB814560
(Fig. 56)

Literature: Shin & Kim (2001: 228).

Illustration: Shin & Kim (2001: 229, fig 105).

Diagnosis: Differs from *P. viburni-cylindrici* in having large, dense, often coremioid conidiophore fascicles and above all much longer, pluriseptate, cylindrical-filiform conidia, length 50–130 µm, with truncate base.

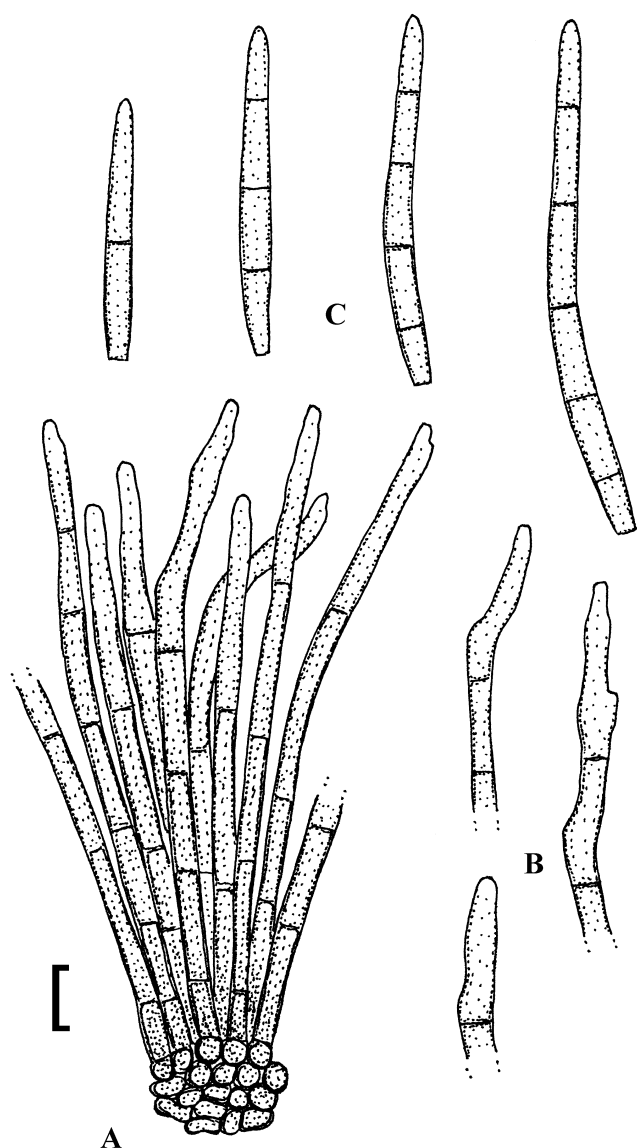


Fig. 55. *Pseudocercospora viburni-cylindrici* (HMAS 01929, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

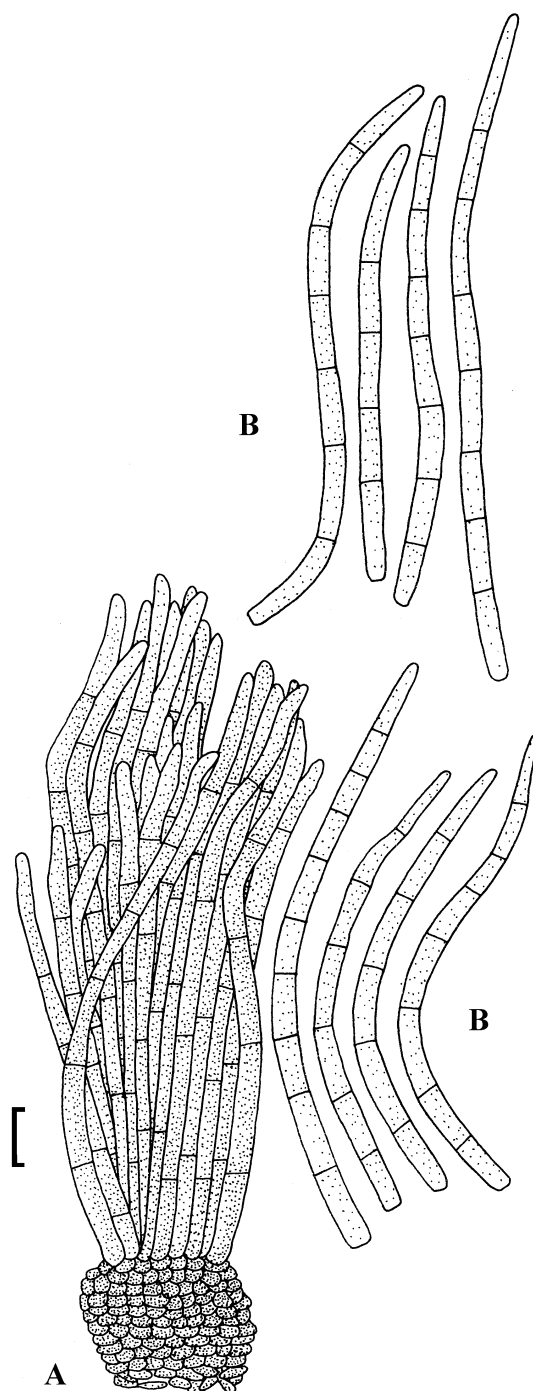


Fig. 56. *Pseudocercospora viburni-erosi* (KUS-F14126, holotype). **A.** Conidiophore fascicle. **B.** Conidia. Bar = 10 µm.

Description: *Leaf spots* amphigenous, scattered to confluent, circular or almost so to angular-irregular, 3–10 mm diam, sometimes confluent and larger, to 15 mm diam, at first brown to dark brown, later with greyish brown to grey centre surrounded by a brown to dark brown border, finally centre turning greyish white, with raised brown border line. *Caespituli* hypophyllous, brown, punctiform. *Mycelium* internal; hyphae branched, septate, hyaline, 2–3 µm wide. *Stromata* substomatal, small to well-developed, 15–30 µm diam, globose or subglobose, brown. *Conidiophores* in well-developed fascicles, to 30, dense to very dense, coremioid, arising from stromata, through stomata, erect, straight, subcylindrical or only slightly geniculate-sinuuous, above all in the upper portion, unbranched, 60–120 × 3–4 µm, 3–8-septate, olivaceous-brown to brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, conidiogenous loci inconspicuous, unthickened, not darkened. *Conidia* solitary, cylindrical-filiform, straight or almost so to moderately curved, 50–130 × 2.5–4 µm, 3–12-septate, subhyaline to very pale olivaceous, thin-walled, smooth, apex obtuse, base truncate or almost so, 2–2.5 µm wide, hila unthickened, not darkened.

Holotype: **Korea:** Kwachon, on *Viburnum erosum* var. *taquetii*, 4 Sep. 1997, H. D. Shin (KUS-F14126).

Host range and distribution: Only known from the type collection.

Notes: Type material of the new species was previously assigned to *Pseudocercospora viburni-cylindrici* (Shin & Kim 2001). The two species are morphologically very close, but Korean material on *Viburnum erosum* differs in having large, dense, often coremioid conidiophore fascicles and above all much longer, pluriseptate, cylindrical-filiform conidia, length 50–130 µm, with truncate base. Based on these obvious differences, the Korean material on *Viburnum erosum* is better excluded from *P. viburni-cylindrici* and treated as separate species.

***Pseudocercospora viburnigena* U. Braun & Crous,**
Mycol. Progr. 1: 23 (2002).

(Fig. 57)

Basionym: *Cercospora tineae* Sacc., *Michelia* 1: 268 (1878), non *Pseudocercospora tineae* Y.L. Guo & W.H. Hsieh 1994.

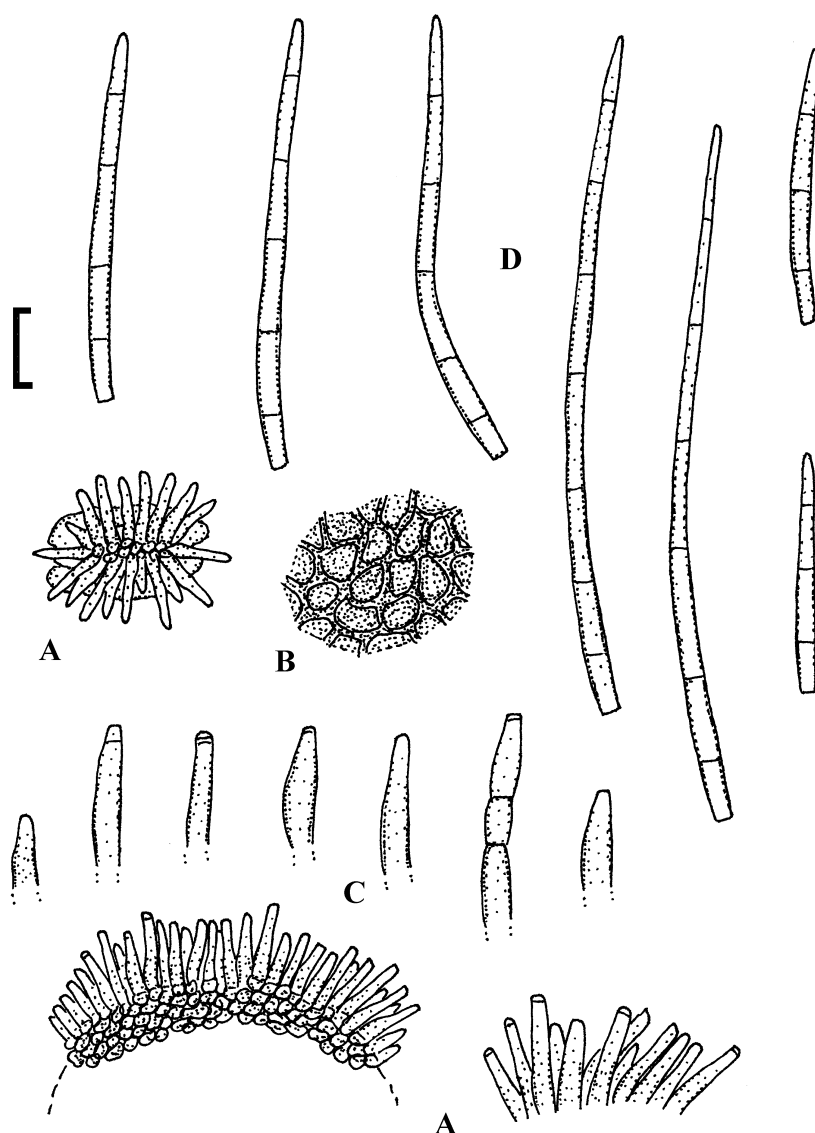


Fig. 57. *Pseudocercospora viburnigena* (Sacc., *Mycoth. Ven.* 1252, HAL, lectotype). **A.** Conidiophore fascicles. **B.** Stromata cells. **C.** Conidiophores. **D.** Conidia. Bars = 10 µm.

Synonyms: *Cercoseptoria tineae* (Sacc.) Deighton, *Mycol. Pap.* **140**: 167 (1976).

Stigmina tineae (Sacc.) M.B. Ellis, *More Dematiaceous Hyphomycetes*: 118 (1976).

Cercostigmina tineae (Sacc.) U. Braun, *Cryptog. Bot.* **4**: 108 (1993).

Literature: Chupp (1954: 105), Katsuki (1965: 16), Kirk (1999), Crous & Braun (2003: 421), Crous *et al.* (2013: 108).

Illustrations: Ellis (1976: 117, fig. 83B), Kirk (1999: fig., unnumbered), Crous *et al.* (2013: 109, fig. 65).

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, sometimes vein-limited, 2–15 mm diam, pale to darker brown or centre later greyish brown to dingy grey, margin indefinite or darker, sometimes with reddish tinge, occasionally slightly raised. *Caespituli* amphigenous, punctiform, olivaceous to dark or blackish brown, scattered. *Mycelium* internal, external mycelium lacking or occasionally with some external hyphae; hyphae branched, septate, 1.5–4 µm wide, subhyaline, thin-walled, smooth. *Stromata* substomatal or immersed, 15–80 µm diam, occasionally larger, to 120 µm diam (hypophyllous stromata smaller and substomatal, epiphyllous ones larger and immersed to somewhat erumpent), subglobose, brown to dark brown, composed of brown swollen hyphal cells, 3–6 µm diam, subglobose to somewhat irregular, walls thickened, 0.5–2 µm. *Conidiophores* in somewhat divergent to usually dense, sometimes very dense fascicles, larger fascicles sporodochial, arising from stromata, emerging through stomata or erumpent, occasionally with solitary conidiophores arising from superficial hyphae, straight to somewhat curved-sinuous, not geniculate, unbranched, cylindrical, subcylindrical or slightly attenuated towards the tip, sometimes ampulliform, apex at first rounded, later truncate or subtruncate, 5–30(–50) × 2–5(–6), 0(–2)-septate, pale brown or olivaceous-brown, thin-walled, smooth, occasionally slightly rough-walled; conidiophores mostly reduced to conidiogenous cells, occasionally integrated, terminal, 5–20 µm long, with a single terminal conidiogenous locus, 2–3 µm wide, neither thickened nor darkened, proliferation percurrent, with 1–3 not very conspicuous annellations. *Conidia* solitary, acicular to narrowly cylindrical-filiform, occasionally somewhat obclavate, straight to curved or somewhat sigmoid, (20–)30–110(–120) × 2–5 µm, (1–)3–11-septate, subhyaline to very pale olivaceous or somewhat brownish, thin-walled, smooth, guttulate when fresh, apex obtuse to subacute, base truncate to somewhat obconically truncate, 1.5–3 µm wide, hila unthickened, not darkened.

In vitro: *Colonies* on MEA reaching 23 mm diam after 30 d at 24°C in the dark, circular, convex, margin smooth, distinctly darker than the rest of colony, slightly folding occurs towards the margin of the colony, with moderate to profuse aerial mycelium, surface olivaceous-grey, reverse greenish black.

Lectotype (designated here, MycoBank, MBT202797): **Italy:** Padova, on *Viburnum tinus*, Oct. 1877, Bizzozero [Sacc., Mycoth. Ven. 1252] (HAL, s.n.). **Isolectotypes:** Sacc.,

Mycoth. Ven. 1252, e.g. B, BPI 441941, FH, HBG. *Epitype* (designated in Crous *et al.* 2013: 108): **The Netherlands:** Bilthoven, Sweelincklaan 87, on *Viburnum davidii*, 26 May 2008, M. K. Crous (CBS H-20393). *Ex-epitype culture:* CBS 125998.

Host range and distribution: On *Viburnum* (*davidii*, *plicatum* var. *plicatum*, *tinus*, *Viburnum* sp.), *Adoxaceae*, Europe (Germany, Great Britain, Italy, The Netherlands, Portugal, Spain), North America (USA, Louisiana).

Notes: A lectotypification of *Cercospora tineae* is necessary. Type material or any other samples are not listed for PAD in Gola (1930). Therefore, one of the syntypes distributed as “Sacc., Mycoth. Ven. 1252” is designated as lectotype. The phylogenetic affinity of this species, previously referred to as *Stigmina* and *Cercostigmina*, was elucidated by Crous *et al.* (2013). Based on molecular sequence analyses, it could be demonstrated that this species clusters in a big *Pseudocercospora* clade.

Pseudocercospora tineae (see above) is quite distinct from *Cercospora tineae* by having superficial hyphae with solitary conidiophores and conidiogenous cells sympodially proliferating. Katsuki (1965) recorded *Cercospora tineae* from Japan on *Viburnum dilatatum* and *V. suspensum*. Kobayashi (2007) added *V. davidii*, *V. erosum*, *V. plicatum* and *V. sieboldii* as host species for Japan. Japanese collections on *Viburnum suspensum* and *V. plicatum* var. *tomentosum* [*V. tomentosum*] have been examined by C. Nakashima (CNS567, CNS976) and turned out to belong to *P. tineae*. Therefore, all other Japanese records of *P. viburnigena* [*C. tineae*] remain unproven and doubtful, i.e. they seem rather to refer to *P. tineae*.

A single North America collection has been examined and confirmed (**USA:** *Louisiana:* Lafayette, on *Viburnum plicatum*, 21 Sep. 1886, A. B. Langlois, BPI 441939, 441940).

***Pseudocercospora viburni-nudi* U. Braun, sp. nov.**
MycoBank MB814562
(Fig. 58)

Diagnosis: Distinguished from all other species of *Pseudocercospora* on *Viburnum* spp. and other hosts of the *Adoxaceae* by having much shorter, 1–4(–5)-septate conidia, 15–40 × 3–7 µm.

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, sometimes vein-limited, 2–12 mm diam or confluent and larger, medium to dark brown, margin indefinite, later with paler centre, greyish brown, grey to greyish white, surrounded by a narrow to moderately wide darker border, dark brown to almost blackish, sometimes with diffuse reddish halo. *Caespituli* amphigenous, punctiform, scattered, dark brown to blackish. *Mycelium* internal. *Stromata* substomatal to intraepidermal, 15–45 µm diam, dark brown. *Conidiophores* in small to moderately large fascicles, 3–18, arising from stromata, through stomata or erumpent, divergent, erect, straight, subcylindrical, only terminal part somewhat geniculate-sinuous or subdenticulate, unbranched, 40–105 × 3–5 µm, base occasionally somewhat wider, to 7 µm, apex sometimes slightly swollen, to 8 µm wide,

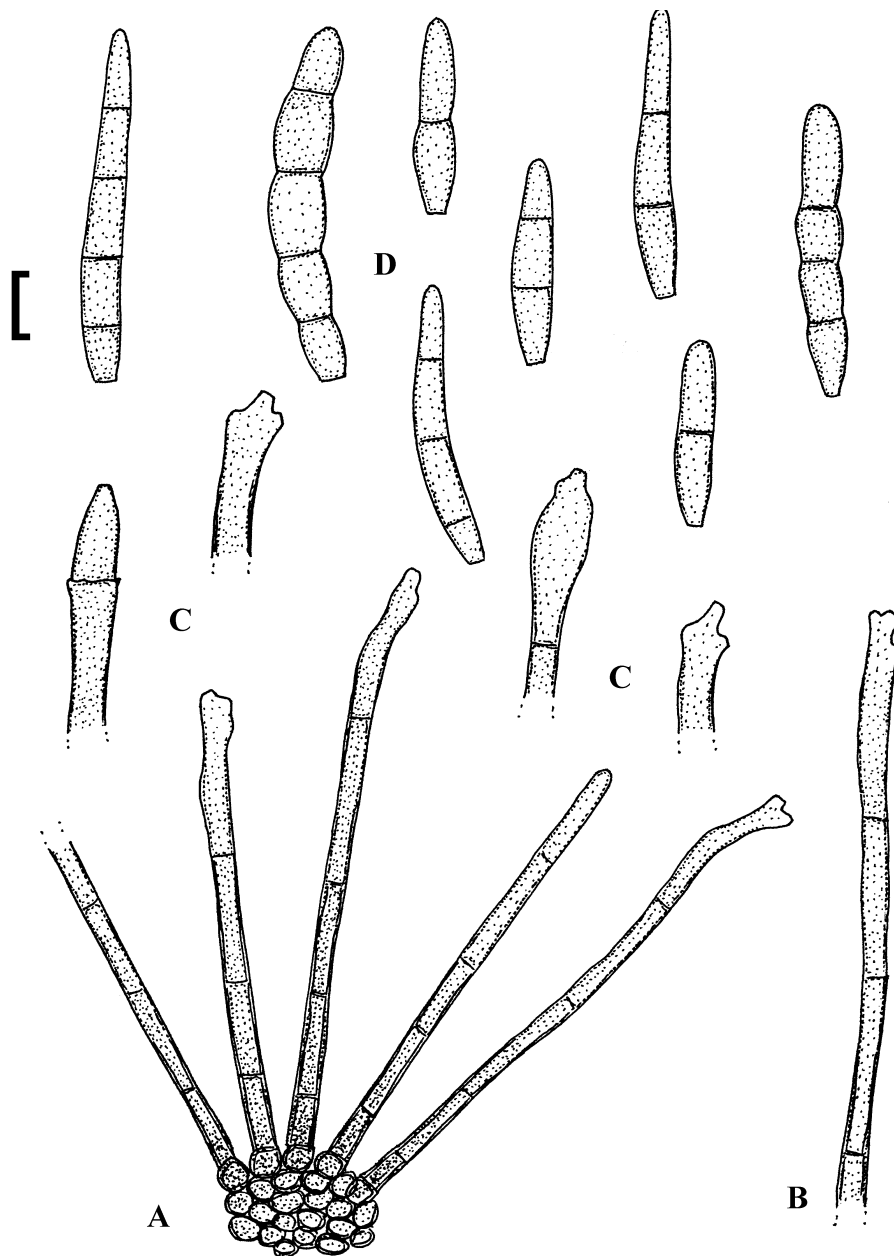


Fig. 58. *Pseudocercospora viburni-nudi* (BPI 442176, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore. **C.** Conidiophore tips. **D.** Conidia. Bar = 10 µm.

1–5-septate, medium to dark brown throughout or paler towards the tip, wall somewhat thickened, to 1 µm, conidiophores occasionally with a single enteroblastic rejuvenation leaving a single conspicuous annellation; conidiogenous cells integrated, terminal, 15–40 µm long, sympodially proliferating, conidiogenous loci inconspicuous to conspicuous by being subdentate, denticle-like loci about 1.5–2 µm diam, but loci always unthickened and not darkened. *Conidia* solitary, short obclavate-cylindrical, fusiform, ellipsoid, straight to curved, 15–40 × 3–7 µm, 1–4(–5)-septate, often slightly constricted

at the septa, subhyaline to mostly pale to medium olivaceous or olivaceous-brown, thin-walled, smooth, apex obtuse, base short obconically truncate, sometimes rounded, 1.5–2.5(–3) µm wide, hila unthickened, not darkened.

Holotype: **USA:** *South Carolina:* Murrells Inlet, on *Viburnum nudum*, *Adoxaceae*, 15 Oct. 1943, *Carter 855* (BPI 442176).

Host range and distribution: Only known from the type collection.

Aizoaceae

Cercospora

Key to *Cercospora* species on Aizoaceae

- 1 Conidia obclavate-cylindrical to acicular, to 125 µm long, base truncate to obconically truncate; on *Trianthema portulacastrum* **C. trianthematis**
- Conidia acicular, to 200 µm long, base truncate; on *Tetragonia tetragonoides* **C. tetragoniae**

***Cercospora* species on Aizoaceae**

Cercospora tetragoniae (Speg.) Siemaszko, *Mater. Mikol. Fitopatol. Rossii* 1(3): 40 (1915). (Fig. 59)

Basionym: *Cercosporina tetragoniae* Speg., *Anales Mus. Nac. Hist. Nat. Buenos Aires* 20: 429 (1911).

Synonyms: *Cercospora tetragoniae* (Speg.) Vassiljevsky, in Vassiljevsky & Karakulin, *Fungi imperfecti parasitici* 1. *Hyphomycetes*: 221 (1937).

Cercospora tetragoniae (Speg.) Chupp, in Viégas, *Bol. Soc. Bras. Agron.* 8: 54 (1945).

Literature: Chupp (1954: 27), Katsuki (1965: 7), Sutton & Pons (1980: 216), Braun & Mel'nik (1997: 97), Braun (2000b: 78), Crous & Braun (2003: 400).

Illustration: Sutton & Pons (1980: 207, fig. 1F).

Description: Leaf spots amphigenous, circular or subcircular, 2–10 mm diam, scattered to confluent and larger, up to 20

mm, pale brown, dingy olivaceous, greyish brown to grey or dingy greyish white, margin brown to reddish brown, occasionally somewhat zonate. *Caespituli* amphigenous, mostly epiphyllous, punctiform, dark brown to blackish. *Mycelium* internal. *Stromata* lacking or almost so to small, substomatal, 10–25(–40) μ m diam, brown. *Conidiophores* solitary or fasciculate, 2–10, divergent, arising from internal hyphae or stromata, through stomata or occasionally erumpent, erect, straight, subcylindrical to geniculate-sinuous, unbranched, 20–125 \times 3–7 μ m, 0–6-septate, pale yellowish, olivaceous-brown to brown, pale towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, sometimes conidiophores reduced to conidiogenous cells, 10–30 μ m long, conidiogenous loci conspicuous, thickened and darkened, 2.5–4 μ m diam. *Conidia* solitary, acicular, straight to curved, 30–200 \times 2.5–5 μ m, 3- to pluriseptate, hyaline, thin-walled, smooth, apex pointed, base truncate, 2.5–4 μ m wide, hila thickened and darkened.

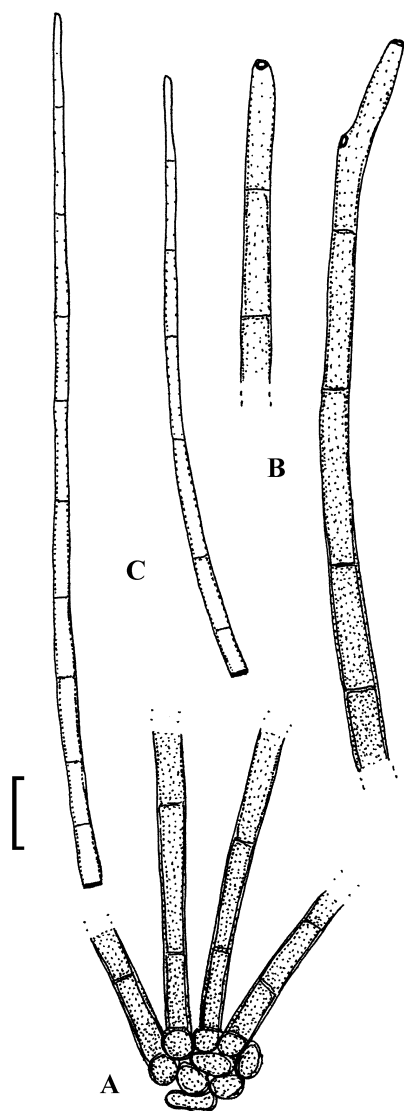


Fig. 59. *Cercospora tetragoniae* (LPS 16153, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

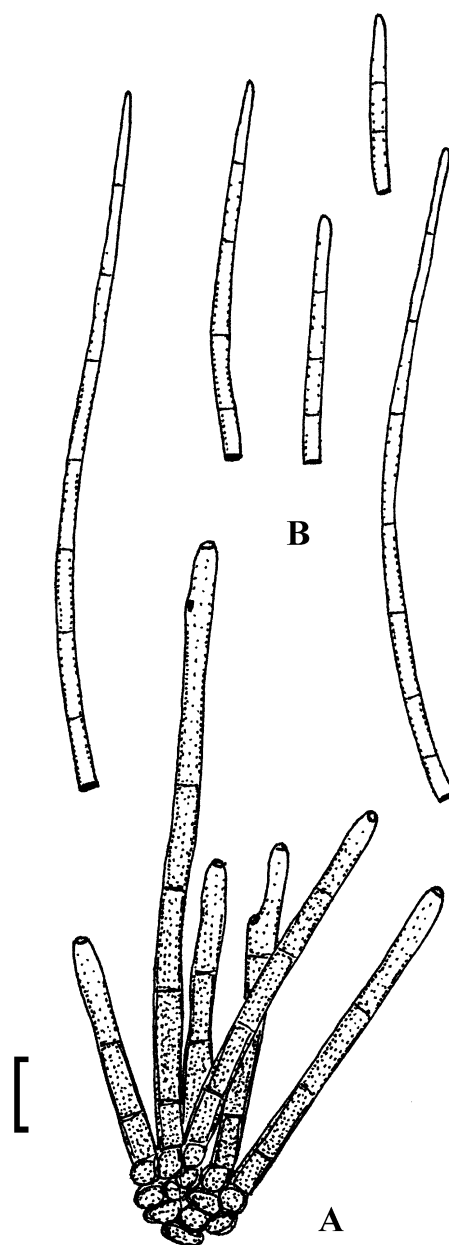


Fig. 60. *Cercospora trianthematis* (K(M) IMI 83193, lectotype). **A.** Conidiophores fascicle. **B.** Conidia. Bar = 10 μ m.

Holotype: **Argentina:** La Plata, on *Tetragonia tetragonoides*, 18 Nov. 1909, C. Spegazzini (LPS 16153). **Isotype:** K(M) IMI 241730 (slide).

Host range and distribution: On *Tetragonia (tetragonoides [expansa])*, *Aizoaceae*, Africa (Cameroon, Kenya, Malawi, Sierra Leone, Tanzania, Uganda, Zimbabwe), Asia (Brunei, Israel, Japan), Caucasus (Georgia), Central and South America (Argentina, El Salvador, Brazil), North America (USA, Maryland, Indiana, Texas).

Notes: This species belongs to the *C. apii* s. lat. complex. Records from Brazil on *Spinacia oleracea* (Mendes et al. 1998) are based on misidentifications.

Cercospora trianthematis Chidd., *Mycopathol. Mycol.*

Appl. 17: 80 (1962); as "*trianthema*".

(Fig. 60)

Synonym: *Cercospora aizoacearum* Bhartiya et al., *Kavaka* 25: 45 "1997" (1998) [**holotype:** **India:** Uttar Pradesh: Gorakhpur, on *Trianthema portulacastrum* [*monogyna*], *Aizoaceae*, Sep. 1998, H. D. Bhartiya (HCIO, s.n.); **isotype:** GPU 8073].

Literature: Crous & Braun (2003: 409), Kamal (2010: 14, 94).

Illustrations: Chiddarwar (1962: 78, plate II, figs 12–13), Bhartiya et al. (1998: 45, fig. 2).

Description: *Leaf spots* amphigenous, circular to oval or irregular, scattered, 0.5–6 mm diam, dark brown to blackish. *Caespituli* amphigenous, mainly hypophyllous, punctiform,

brown. *Mycelium* internal. *Stromata* substomatal, 15–45 µm diam, olivaceous to brown. *Conidiophores* in small to moderately large fascicles, 2–20, occasionally solitary, relatively dense to divergent, arising from stromata, through stomata, erect, straight, subcylindrical-conical to geniculate-sinuous, usually unbranched, 15–100 × 3–5 µm, 0–7-septate, dark olivaceous to brown, wall somewhat thickened, smooth; conidiogenous cells integrated, terminal, intercalary or conidiophores reduced to conidiogenous cells, 10–30 µm long, conidiogenous loci thickened and darkened, 2.5–3 µm diam. *Conidia* solitary, shorter conidia obclavate to subcylindrical, longer ones acicular, straight to curved, (10–)30–125 × 2.5–4 µm, occasionally broader, (1–)3–11-septate, hyaline, thin-walled, smooth, apex pointed to subobtuse, base truncate to short obconically truncate, about 2–2.5 µm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202798):

India: Maharashtra: Pune, Wanowri, Military Hospital, on *Trianthema portulacastrum*, 12 Oct. 1956, P. P. Chiddarwar 32 (K(M) IMI 83193). **Isolotypes:** BPI 441988, HCIO.

Host range and distribution: On *Trianthema portulacastrum*, *Aizoaceae*, Asia (India, Maharashtra).

Note: A true *Cercospora* s. str. distinct from the *C. apii* s. lat. complex by having obclavate-cylindrical to acicular conidia. *C. aizoacearum*, described from India on the same host, is undoubtedly conspecific. Type material was not available. The conidia were described to be cylindrical, but the illustration shows cylindrical to somewhat obclavate shorter and acicular longer conidia, a range similar to *C. trianthematis*.

Altingiaceae

Key to cercosporoid species on Altingiaceae

- 1 Leaf spots absent or almost so, sometimes with slight discolorations on the upper leaf surface; mycelium internal; superficial hyphae lacking; conidiophores fasciculate, 0–1-septate, 3–7 µm wide, conidiogenous loci unthickened, nor darkened; conidia 20–80 × 4–7.5 µm; on *Liquidambar styraciflua*, North America **Pseudocercospora tuberculans**
- With distinct leaf spots; mycelium internal and often also external; conidiophores fasciculate and often also solitary, arising from superficial hyphae if present, aseptate, narrower, 2–5 µm wide; conidia much narrower, 2–4 µm 2
- 2 (1) Leaf spots small, 0.5–4 mm diam, dingy greenish grey, brown, grey, finally usually greyish white, with dark, often somewhat raised margin; caespituli mainly epiphyllous, conspicuous, punctiform to almost pustulate, dark brown to blackish; conidiophores pale to medium dark brown, paler towards the tip, wall somewhat thickened (to 1 µm), (10–)25–90 µm long; conidiogenous loci conspicuous, slightly thickened, at least around the outer rim, somewhat darkened-refractive, 1–1.5 µm diam, in front view visible as minute circle; conidia to 150 µm long, subhyaline or very pale olivaceous, hila unthickened to slightly thickened, somewhat darkened-refractive; on *Liquidambar styraciflua*, North America **Cercospora liquidambaris**
- Leaf spots larger, usually 1–10 mm diam; caespituli less conspicuous, never pustulate; conidiophores paler, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, shorter, 5–35 µm long; conidiogenous loci inconspicuous, neither thickened nor darkened; conidia shorter, to 100 µm, subhyaline or pale to medium olivaceous or olivaceous-brown, hila unthickened, not darkened on *Liquidambar formosana* and *L. styraciflua*, Asia and North America **P. liquidambaricola**

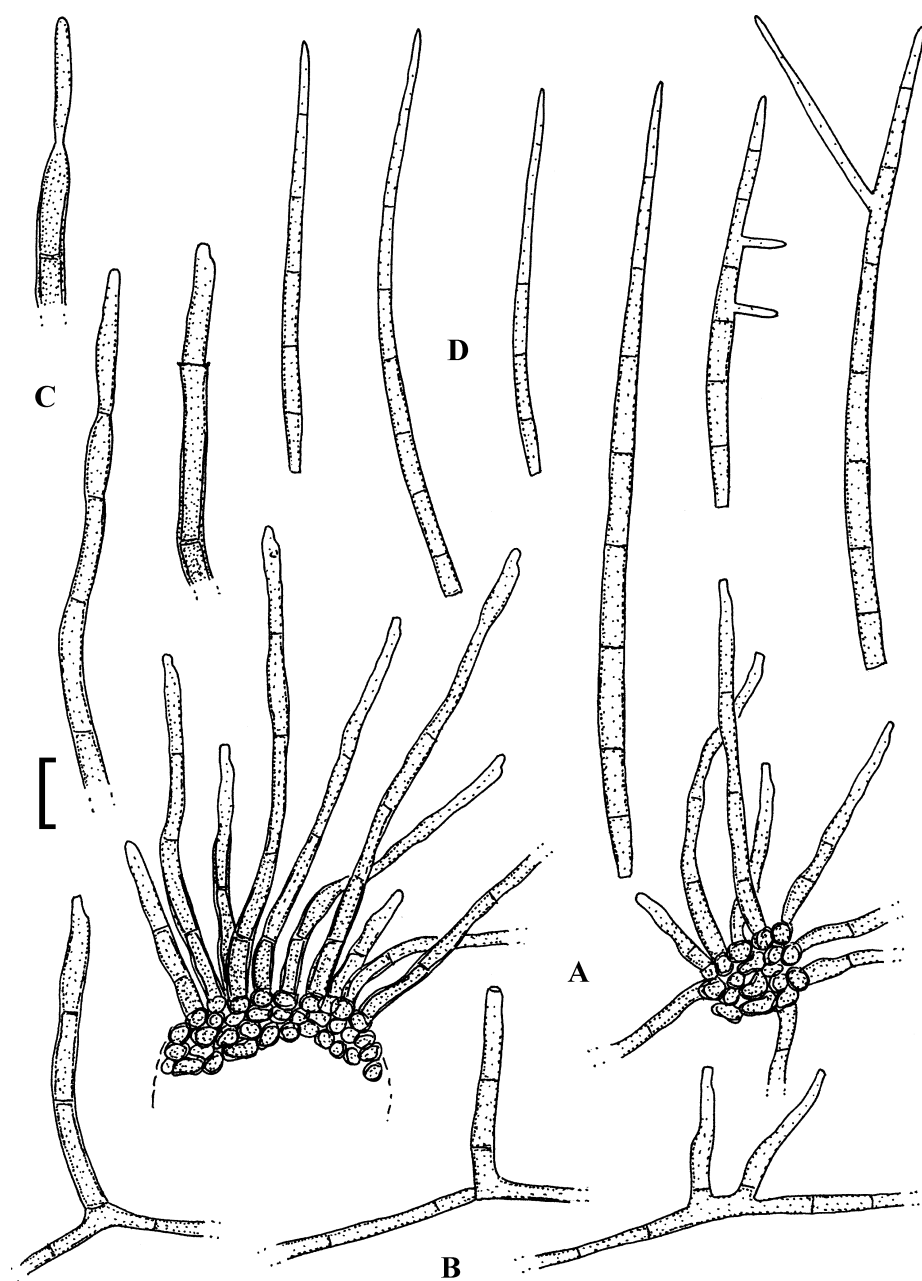


Fig. 61. *Cercospora liquidambaris* (CUP-A-002227(AL), lectotype). **A.** Conidiophore fascicles. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidiophores. **D.** Conidia. Bar = 10 μ m.

Cercospora (s. lat.)

Cercospora liquidambaris Cooke & Ellis ex G.F. Atk.,
J. Elisha Mitchell Sci. Soc. **8**: 48 (1892)
 (Fig. 61)

Literature: Chupp (1954: 259).

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, small, 0.5–4 mm diam, dingy greyish green, brown, to finally usually greyish white or white, sometimes somewhat raised, margin indefinite or usually darker, narrow. *Caespituli* amphigenous, usually epiphyllous, very conspicuous, punctiform to almost pustulate, scattered, dark brown to blackish. *Mycelium* internal and external; superficial hyphae lacking or almost so to well-developed, branched, septate, subhyaline to pale olivaceous or brownish, 1.5–4 μ m wide. *Stromata* almost lacking or small to usually well-developed,

substomatal or intraepidermal, 10–60 μ m diam, brown. *Conidiophores* in small to moderately large fascicles, arising from substomatal hyphae or stromata, though stomata or erumpent, divergent to moderately dense, or solitary, arising from superficial hyphae, lateral, erect, straight, subcylindrical or attenuated towards the apex to usually geniculate-sinuous, unbranched, (10–)25–90(–100) \times 3–5 μ m, (0–)1–8-septate, pale to medium brown, paler towards the tip, wall somewhat thickened, at least below, to 1 μ m, smooth or almost so, proliferation sympodial and occasionally percurrent (conidiophores with enteroblastic rejuvenation leaving delicate annellations); conidiogenous cells integrated, terminal, 10–25 μ m long, conidiogenous loci conspicuous, in front view visible as minute circle, 1–1.5 μ m diam, at least rim slightly thickened, somewhat darkened or refractive. *Conidia* solitary, narrowly obclavate-cylindrical, filiform-subacicular, straight to curved, occasionally germinating with short to moderately long lateral outgrowths, 40–150 \times (2–)2.5–4(–4.5) μ m, 3–12-septate,

subhyaline to pale olivaceous, thin-walled, smooth, apex acute to subobtuse, base usually short obconically truncate, sometimes truncate, 1–2 µm wide, hila unthickened or almost so to slightly thickened, somewhat darkened or refractive.

Lectotype (designated here, MycoBank, MBT202799):
USA: Alabama: Auburn, on *Liquidambar styraciflua*, 14 Oct. 1891, G. F. Atkinson [CUP-A-002227(AL)].

Host range and distribution: On *Liquidambar styraciflua*, *Altingiaceae*, North America (Mexico; USA, Alabama, Delaware, Florida, Indiana, Louisiana, Maryland, Mississippi, Montana, Massachusetts, North Carolina, Texas).

Notes: The taxonomy and nomenclature of *Cercospora liquidambaris* have been totally confused. Chupp (1954) reduced *C. liquidambaris* Sawada, based on Taiwanese material causing a leaf spot disease of *Liquidambar formosana*, to synonymy with *C. liquidambaris* Cooke & Ellis ex G.F. Atk., which is, however, incorrect since the cercosporoid fungus on these hosts in Asia belongs in *Pseudocercospora* and is now correctly assigned to *P. liquidambaricola* (see below). The later species is also known from North America on *Liquidambar styraciflua*. Several collections from Mexico and the USA have been examined. The identity of the true *C. liquidambaris* is clarified by lectotypification. Atkinson (1892) cited a specimen collected in Alabama in 1891. A corresponding sample from Atkinson's herbarium at CUP is designated as lectotype. The generic affinity of *C. liquidambaris* remains unclear. The conidiogenous loci and conidial hila are thickened and darkened. The conidia are cercospora-like, but pigmented as in the *Passalora* complex, which recently proved to be phylogenetically quite heterogeneous (S.I.R. Videira, unpubl.). Therefore, this species is tentatively retained in *Cercospora* s. lat. until phylogenetic data will be available.

Pseudocercospora

Pseudocercospora species on *Altingiaceae*

Pseudocercospora liquidambaricola (J.M. Yen) U. Braun, *Schlechtendalia* 5: 44 (2000).
 (Fig. 62)

Basionym: *Cercospora liquidambaricola* J.M. Yen, *Bull. Trimestriel Soc. Mycol. France* 94: 52 (1978).

Synonyms: *Cercospora liquidambaris* Sawada, *Rep. Gov. Agric. Res. Inst. Taiwan* 85: 112 (1943), *nom. inval.* (Art. 39.1), and *nom. illeg.* (Art. 53.1), non *C. liquidambaris* Cooke & Ellis ex G.F. Atk., 1892 [type: **Taiwan:** Taipei, on *Liquidambar formosana*, 14 Oct. 1928, K. Sawada (NTU-PPE, hb. Sawada)].

Cercoseptoria liquidambaricola (J.M. Yen) J.M. Yen, *Bull. Trimestriel Soc. Mycol. France* 97: 92 (1981).

Pseudocercospora liquidambaris Goh & W.H. Hsieh, in Hsieh & Goh, *Cercospora and similar fungi from Taiwan*: 150 (1990) [type: **Taiwan:** Taipei, on *Liquidambar formosana*, 14 Oct. 1928, K. Sawada (NTU-PPE, hb. Sawada)].

Pseudocercospora neoliquidambaris C. Nakash. & Tak. Kobay., *Mycoscience* 43: 224 (2002), *nom. illeg.* [*nom. superfl.*] (Art. 52.1).

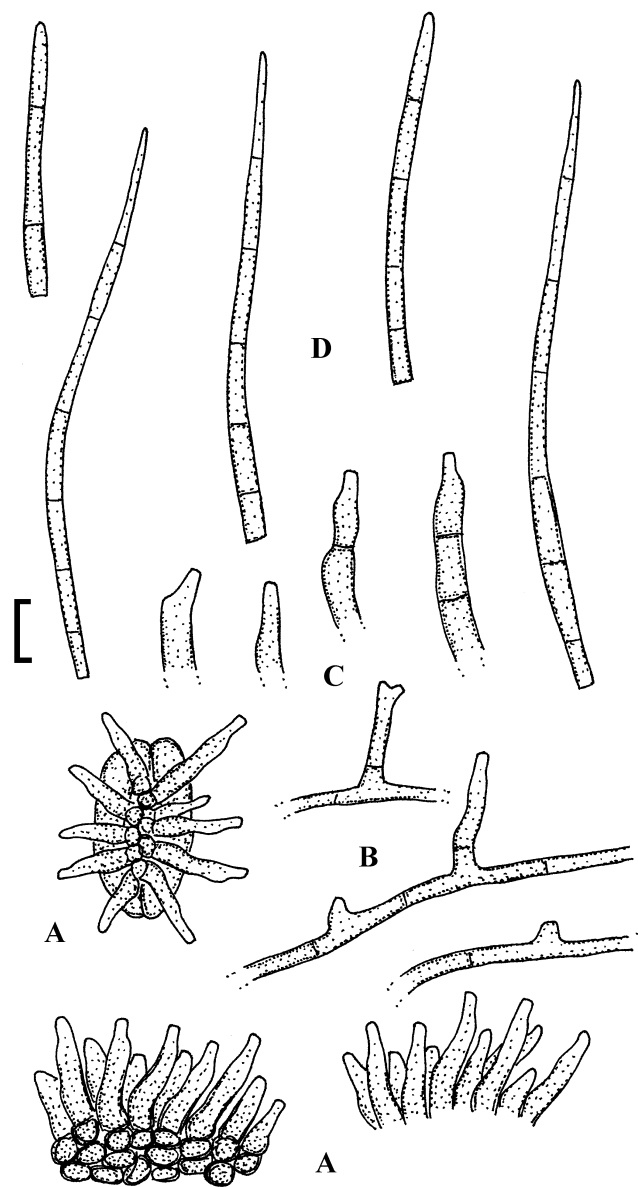


Fig. 62. *Pseudocercospora liquidambaricola* (Hsieh & Goh 1990: 151, fig. 113). **A.** Conidiophores fascicles. **B.** Conidiophores arising from superficial hyphae. **C.** Conidiophores. **D.** Conidia. Bar = 10 µm.

Literature: Chupp (1954: 259 p.p.), Hsieh & Goh (1990: 150), Guo & Hsieh (1995: 123–124), Guo et al. (1998: 138–140), Crous & Braun (2003: 253).

Illustrations: Yen (1978a: 53, fig. 3), Hsieh & Goh (1990: 151, fig. 113), Guo & Hsieh (1995: 125, fig. 110), Guo et al. (1998: 139, fig. 114), Kobayashi et al. (2002: 224, fig. 6).

Description: Leaf spots subcircular to angular-irregular, 1–10 mm diam or confluent and larger, angular spots often vein-limited, pale olivaceous, brown to dark brown or later greyish brown to greyish white, with dark border, brown to blackish, narrow, sometimes raised, with diffuse yellowish halo, occasionally somewhat zonate. *Caespituli* amphigenous, delicately punctiform to subeffuse, brown. *Mycelium* internal and external; superficial hyphae lacking or almost so to developed (mainly hypophyllous when developed), branched, 1.5–4

μm wide, subhyaline to pale olivaceous-brown, thin-walled, smooth. *Stromata* small to moderately large, 15–40 μm diam, rarely larger, substomatal to immersed, subglobose, brown. *Conidiophores* in small to moderately large fascicles, loose to dense, arising from stromata, through stomata or erumpent, also solitary, arising from superficial hyphae if present, lateral, erect, straight, subcylindrical-conical to geniculate-sinuous, unbranched, 5–35 \times 2–5 μm , 0–2-septate, subhyaline, pale olivaceous to olivaceous-brown, thin-walled, smooth to somewhat rough; conidiophores reduced to conidiogenous cells or integrated, terminal, 5–25 μm long, conidiogenous loci inconspicuous or visible as a truncate tip, but always unthickened and not darkened. *Conidia* solitary, cylindrical to obclavate-cylindrical, straight to curved, occasionally sigmoid, 20–100 \times 2–4 μm , 2–10-septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth, apex obtuse to subacute, base short obconically truncate, sometimes truncate, 1–2 μm wide, hila unthickened, not darkened

Neotype (designated here, MycoBank, MBT202800): Taiwan: Taipei, on *Liquidambar formosana*, 14 Oct. 1928, K. Sawada (NTU-PPE, hb. Sawada).

Host range and distribution: On *Liquidambar* (*formosana*, *styraciflua*), *Altingiaceae*, Asia (China, Japan, Taiwan), North America (Mexico; USA, Alabama, Florida, Louisiana, Texas).

Notes: The holotype material of *Cercospora liquidambaricola* (Taiwan: Taichung, on *Liquidambar formosana*, 29 Oct. 1971, J.-M. Yen 71277 bis) could not be traced in PC or UC. Therefore, we designate a neotype here. Collections of *Pseudocercospora* on *Liquidambar formosana* in Asia and *L. styraciflua* in North America are morphologically very similar. If they are truly conspecific or if two morphologically very close, but geographically and genetically distinct species are involved can only be clarified on the base of molecular sequence analyses. *Loropetalum chinense* (*Hamamelidaceae*) was reported as host of this species from China (Guo & Hsieh 1995; Guo *et al.* 1998). The identity of *Pseudocercospora* on this host is unclear and needs to be confirmed. Chupp (1954), who proposed the original synonymy, found material from the USA and Taiwan to represent the same fungus. However, Hsieh & Goh (1990) did not examine American material. Samples from Taiwan (Taichung, 8 Aug. 1945, K. Sawada, BPI 437752, 437753) are probably topotypes. Guo & Hsieh (1995) confirmed the synonymy of *C. liquidambaricola*. They mentioned that they had examined Yen's type material, but this material was not cited under "material examined". The material concerned is not preserved at PC. The complicated nomenclature and taxonomy of this species has been discussed by Braun (2000a: 44) who emphasized that identity and application of the name *C. liquidambaris* can only be clarified by lectotypification. Chupp (1954) interpreted this name in the sense of *P. liquidambaricola*, which is clearly distinct from *P. tuberculans* by much narrower conidia, but his interpretation was based on a specimen collected by Geo. V. Nash in 1895 (USA, Florida, Lake City, Plants of Florida No. 2231, 11–19 Jul. 1895, BPI 437755, 437761, 437812), which is non-type material. Atkinson (1892) cited a specimen collected in

Alabama in 1891, which can be used as lectotype. There is a single specimen in Atkinson's herbarium (now CUP) which undoubtedly refers to this collection.

***Pseudocercospora tuberculans* (Ellis & Everh.) U. Braun, *Schlechtendalia* 2: 27 (1999).**
(Fig. 63)

Basionym: *Cercospora tuberculans* Ellis & Everh., *J. Mycol.* 4: 115 (1888).

Literature: Saccardo (1892: 652), Chupp (1954: 259), Crous & Braun (2003: 412).

Exsiccatae: Ellis & Everh., *Fungi Columb.* 168. Ellis & Everh., *N. Amer. Fungi* 2292.

Description: *Leaf spots* absent or almost so, sometimes with slight discolorations on the upper leaf surface. *Caespituli* hypophyllous, punctiform, on small, brown, tubercle-like swellings, 0.5–1 mm diam, sometimes effuse between such swellings. *Mycelium* internal. *Stromata* almost absent to well-developed, 10–80 μm diam, dark brown to blackish, substomatal to immersed, composed of swollen hyphal cells, 3–8 μm diam. *Conidiophores* in small to large fascicles, loose to usually dense, subcylindrical to conical,

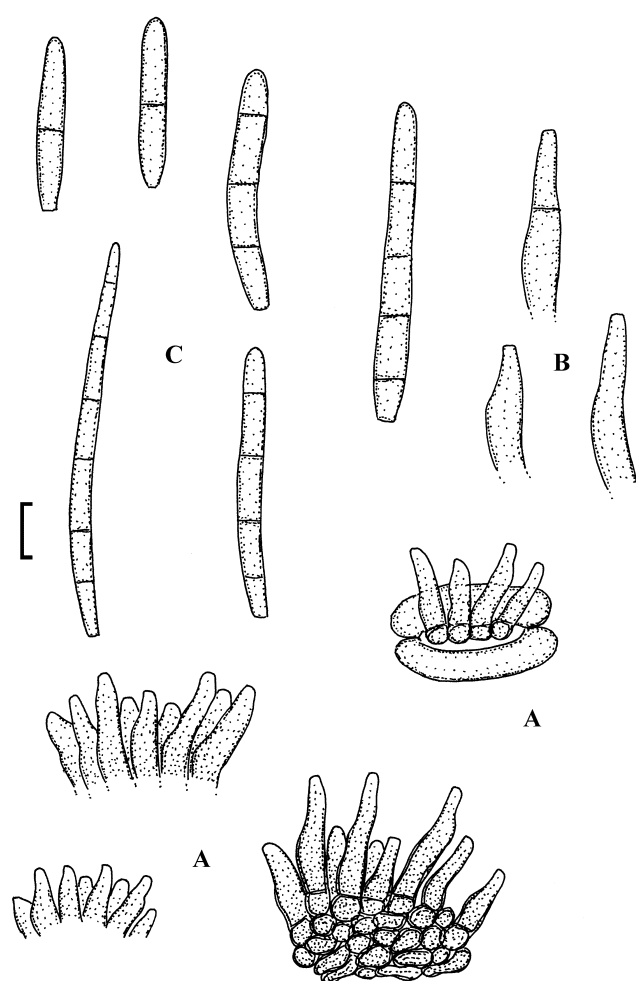


Fig. 63. *Pseudocercospora tuberculans* (NY 2425377, lectotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μm .

straight to slightly geniculate-sinuous, unbranched, 10–35 × 3–7 µm, rarely longer, 0–1-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–25 µm long, conidiogenous loci inconspicuous or visible as truncate tips, always unthickened and not darkened. *Conidia* solitary, cylindrical to somewhat obclavate-cylindrical, straight to slightly curved, 20–80 × 4–6.5 µm, 1–6-septate, pale olivaceous to brownish, thin-walled, smooth, apex obtuse, base subtruncate to short obconically truncate, rarely long obconically truncate, 2–3 µm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202801): USA: Mississippi: Oktibbeha County, Starkville, on *Liquidambar styraciflua*, 27 June 1888, S. M. Tracy (NY 2425377). **Isotypes:** BPI 442929, 442032, 1102025; Ellis & Everh., N. Amer. Fungi 2292, e.g. BPI 442930, MICH 15380, NY 2425378–2425383. **Topotypes:** June 1890–1893 (BPI 442031, 442033, 442034; CUP – A(S.M.T.[03]); HBG, Ellis & Everh., Fungi Columb. 168).

Cercospora

Key to *Cercospora* species on *Amaranthaceae*

- 1 Conidia cylindrical or obclavate-cylindrical 2
Conidia consistently acicular or at least longer conidia acicular and only shorter ones somewhat obclavate-cylindrical 5
- 2 (1) Stromata lacking or almost so; conidiophores short, 5–30 × 3–5 µm, 0(–1)-septate; conidia short, 25–35 × 2.5–3.5 µm, 0–5-septate; on *Celosia* sp. **C. celosiigena**
Stromata developed, 10–60 µm diam; conidiophores longer, 10–150 µm, 0–8-septate; and/or conidia longer, 15–150 µm, pluriseptate 3
- 3 (2) Conidiogenous loci cercospora-like, i.e. distinctly thickened and darkened, in front view visible as small dark circle with minute central pore; conidiophores distinctly brown; on *Celosia* sp. **C. gorakhanathii**
Conidiogenous loci not cercospora-like, i.e. unthickened to somewhat thickened, but not darkened, at most somewhat refractive, formed on characteristic, bulging, convex tips and shoulders caused by sympodial proliferation; conidiophores hyaline, only pale olivaceous at the base or pale olivaceous-brown, tips often hyaline or subhyaline 4
- 4 (3) Conidiophores hyaline or only pale olivaceous at the base; conidia obclavate-cylindrical, 20–80 × 3.5–7 µm; on *Achyranthes* spp. **Cercospora pseudachyranthis** (see “Doubtful, excluded and insufficiently known species of *Cercospora*”)
Conidiophores pale olivaceous-brown throughout or tips paler, hyaline or subhyaline; conidia narrowly cylindrical to subacicular, 15–90 × 2–4.5 µm; on *Gomphrena* spp. **C. pretoriensis** (see “Doubtful, excluded and insufficiently known species of *Cercospora*”)
- 5 (1) Leaf spots lacking or almost so; conidia acicular to obclavate-cylindrical, broad, 35–195 × (3–)4–6.5(–8) µm; on *Achyranthes* spp. **C. achyranthis**
Leaf spots developed, distinct; conidia consistently acicular and/or narrower, 1.5–5 µm 6
- 6 (5) Conidia narrowly cylindrical to subacicular, apex obtuse, not distinctly pointed; on *Gomphrena* spp., South Africa **C. pretoriensis**
At least longer conidia distinctly acicular with truncate base and acute or subacute apex; on other hosts 7
- 7 (6) Conidia consistently acicular, base truncate, various morphologically barely distinguishable species (see **Tabular key to *Cercospora* species on *Acanthaceae* according to host genera**)

Host range and distribution: On *Liquidambar styraciflua*, *Altingiaceae*, North America (USA, Florida, Louisiana, Missouri, Mississippi).

Notes: Records of this species from China on *Liquidambar formosana* (Keissler & Lohwag 1937, Tai 1979) are doubtful, unproven and not included in Guo & Hsieh (1995) and Guo *et al.* (1998). They refer to Chinese material on dead wood of *Liquidambar formosana* distributed as *Cercospora tuberculans* in Petr., Crypt. Exs. 3391 [Hunan, Changcha, Nov., C. Keissler & H. Handel-Mazzetti (W)]. The identity of this wood-inhabiting fungus is not quite clear, but it undoubtedly does not pertain to *C. tuberculans*.

Amaranthaceae s. str.

(The family *Chenopodiaceae* is phylogenetically close to *Amaranthaceae* and currently proposed to be included in the latter family (s. *lat.*), but we prefer to maintain the *Chenopodiaceae* as separate family, at least tentatively.)

- Conidia acicular to obclavate-cylindrical, at least shorter conidia obclavate-cylindrical, with obconically truncate base 8
- 8 (7) Stromata well-developed, large, 20–80 µm diam; conidiophores 10–80 µm long; conidial base 1–2 µm wide; on *Alternanthera* spp. **C. alternantherae**
- Stromata lacking or 10–50 µm diam; conidiophores to 250 µm long; conidial base 1.5–4 µm wide; on *Amaranthus* spp. **C. brachiata**

Tabular key to *Cercospora* species on Acanthaceae according to host genera

Achyranthes

- 1 Conidiophores colourless or only olivaceous at the base; conidiogenous loci conspicuous, but not cercospora-like (not darkened, only refractive, characteristically bulging, cercosporella-like) **Cercosporella pseudachyranthis**
(see “Doubtful, excluded and insufficiently known species of *Cercospora*”)
- Conidiophores brown, distinctly pigmented throughout; conidiogenous loci distinctly thickened and darkened, *Cercospora* type 2
- 2 (1) Leaf spots lacking or almost so; conidiophores to 450 µm long; conidia acicular to obclavate-cylindrical, 35–195 × (3–)4–6.5(–8) µm **C. achyranthis**
- Leaf spots distinct, well-developed; conidiophores to 250 µm long; conidia usually consistently acicular, much narrower, 25–240 × 2–5 µm **C. achyranthina**

Aerva

- A single species **C. aervae-lanatae**

Alternanthera

- A single species **C. alternantherae**

Amaranthus

- A single species **C. brachiata**

Celosia

- 1 Conidiophores short, 5–30 × 3–5 µm, 0(–1)-septate; conidia short, 25–35 × 2.5–3.5 µm, cylindrical to obclavate-cylindrical, 0–5-septate, hila 1–2 µm wide **C. celosiigena**
- Conidiophores much longer, 20–220 µm, 0–8-septate; conidia much longer, 15–150 µm, (0–)1–14-septate, hila 1.5–3 µm wide 2
- 2 (1) Stromata lacking or almost so; conidia acicular **C. celosiae**
- Stromata developed, 10–40 µm diam; conidia cylindrical or obclavate-cylindrical **C. gorakhanathii**

Cyathula

- A single species **C. apii s. lat.** (*C. cf. maloti sensu* Groenewald *et al.* 2013)

Digera

- A single species **C. achyranthina**

Gomphrena

- 1 Stromata lacking or small, 10–35 µm diam; conidia acicular, 30–450 µm long, apex pointed; mainly on *Gomphrena globosa*, Northeast Africa, Asia, North America, West Indies **C. gomphrenae**
- Stromata 15–60 µm diam; conidiogenous loci not cercospora-like (neither distinctly thickened, nor darkened), conidia narrowly cylindrical to subacicular, apex obtuse; on *Gomphrena* spp., South Africa **C. pretoriensis**
(see “Doubtful, excluded and insufficiently known species of *Cercospora*”)

Pupalia

- A single species **C. achyranthina**

Cercospora species on Amaranthaceae

Cercospora achyranthina Thirum. & Chupp,
Mycologia 40: 352 (1948).
(Fig. 64)

Literature: Chupp (1954: 29), Vasudeva (1963: 31), Ibrahim & El Nur Elamin (1974), Ellis (1976: 244), Crous & Braun (2001: 328), Crous & Braun (2003: 42), Guo *et al.* (2005: 27), Kamal (2010: 12), Braun & Urtiaga (2013: 177).

Illustrations: Ellis (1976: 243, fig. 183 B), Guo *et al.* (2005: 27, fig. 9).

Description: *Leaf spots* amphigenous, circular to angular-irregular, 0.5–6.5 mm diam, occasionally confluent and larger,

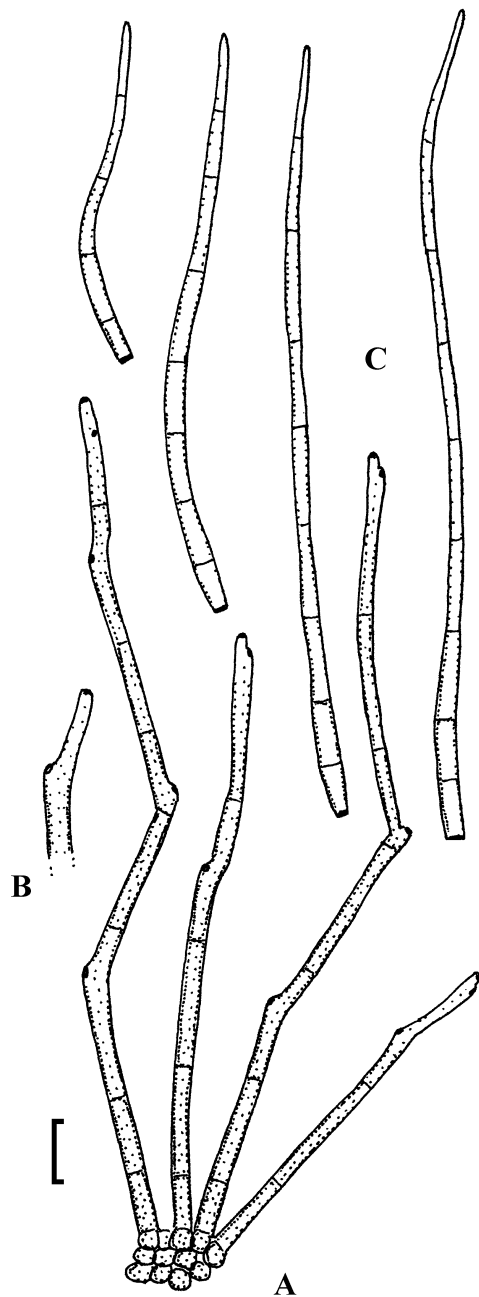


Fig. 64. *Cercospora achyranthina* (BPI 4323844, holotype).
A. Conidiophore fascicle. **B.** Conidiophore tip. **C.** Conidia. Bar = 10 μ m.

to 10 mm diam, brown to greyish brown, finally sometimes dull grey or greyish white, margin reddish brown to purple-violet, finally very dark, sometimes with diffuse darker halo, often purplish. *Caespituli* amphigenous, scattered, finely punctiform, dark. *Mycelium* internal. *Stromata* almost lacking or small, 10–25 μ m diam, substomatal to immersed, brown. *Conidiophores* in fascicles, 2–10, divergent, arising from swollen hyphal cells or stromata, through stomata or erumpent, erect, straight to curved, geniculate-sinuous, above all in the upper half, unbranched, 15–250 \times 3–8 μ m, (0–)1–10-septate, pale olivaceous-brown or brownish, wall somewhat thickened, smooth; conidiogenous cells integrated, terminal and intercalary, 10–40 μ m long, conidiogenous loci thickened and darkened, 2–3.5 μ m diam. *Conidia* solitary, acicular, shorter conidia occasionally slightly obclavate-cylindrical, (25–)35–150(–240) \times 2–5 μ m, usually 3–10-septate, hyaline, thin-walled, smooth, apex acute or subobtuse, base truncate, occasionally slightly obconically truncate, 2–3.5 μ m wide, hila thickened and darkened.

Holotype: **India:** **Karnataka:** Bangalore, on *Achyranthes aspera*, 20 Aug. 1944, M. J. Thirumalachar (BPI 4323844). **Topotype:** 2 Sep. 1945 (CUP 37201).

Host range and distribution: On *Achyranthes* (*aspera*, *Achyranthes* sp.), *Digera muricata*, *Pupalia lappacea* [*atropurpurea*]. **Amaranthaceae**, Africa (Sudan, Tanzania, Zimbabwe), Asia (China; India, Bihar, Karnataka, Andra Pradesh, Madhya Pradesh, Maharashtra, New Delhi, West Bengal; Myanmar, Pakistan, Philippines), South America (Venezuela).

Notes: This species is part of the *Cercospora apii* s. lat. complex. Thirumalachar & Chupp (1948) cited a single collection from 1944 as type. Chupp (1954) erroneously mentioned a collection from 2 Sep. 1945 as type material. This specimen, which can be considered topotype material, is maintained and deposited as CUP 37201.

Cercospora achyranthis Syd. & P. Syd., *Ann. Mycol.* 7: 171 (1909).
(Fig. 65)

Literature: Saccardo (1913: 1429), Vassiljevsky & Karakulin (1937: 222), Chupp (1954: 30), Vasudeva (1963: 31), Katsuki (1965: 8), Shin & Kim (2001: 24), Braun & Crous (2003: 42), Guo *et al.* (2005: 28–29), Kamal (2010: 12).

Illustrations: Shin & Kim (2001: 25, fig. 1), Guo *et al.* (2005: 28, fig. 10).

Exsiccatae: Cif., Mycofl. Doming. Exs. 147. Syd., Fungi Exot. Exs. 546.

Description: *Leaf spots* lacking or almost so, indistinct or only diffuse discolorations, greenish to brownish, finally sometimes vein-limited, greyish, margin indefinite. *Caespituli* hypophyllous, effuse, floccose-velutinous, dark, greyish to dark grey or brownish. *Mycelium* internal; hyphae branched, septate, somewhat pigmented. *Stromata* lacking or almost so. *Conidiophores* in small, loose fascicles, 2–12, arising from

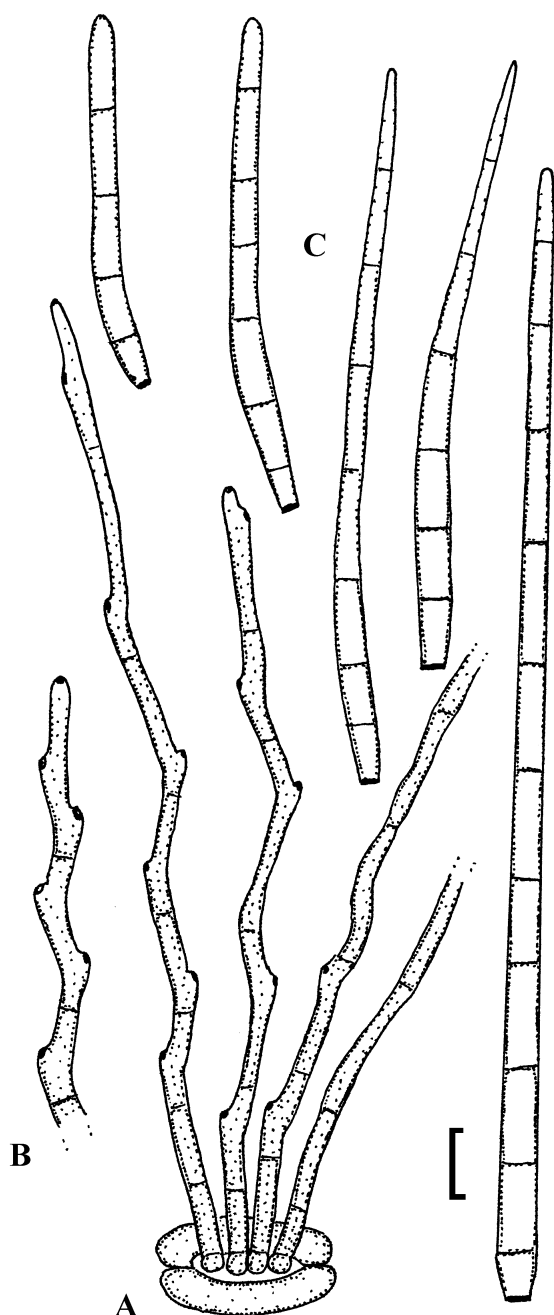


Fig. 65. *Cercospora achyranthis* (LEP, isoelectotype). A. Conidiophore fascicle. B. Conidiophore tip. C. Conidia. Bar = 10 µm.

substomatal swollen hyphal cells, through stomata, erect, straight to usually distinctly geniculate or geniculate-sinuous, often strongly geniculate, unbranched, 40–450 × 3.5–8 µm, pluriseptate, pale to medium dark olivaceous or olivaceous throughout or paler towards the tip, wall thin to somewhat thickened, smooth; conidiogenous cells integrated, terminal and intercalary, about 10–30 µm long, conidiogenous loci conspicuous, thickened and darkened, 1.5–2.5 µm diam. *Conidia* solitary, acicular to obclavate-cylindrical, straight to curved, 35–195 × (3–)4–6.5(–8) µm, 3–18-septate, hyaline or almost so, thin-walled, smooth, apex acute to subobtuse, base truncate to short obconically truncate, 1.5–4 µm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202802): **Japan**: Saitama Prefecture: Ome, Musashi, on *Achyranthes bidentata*, 22 Sep. 1905, I. Miyake (S-F23053). *Isoelectotypes*: LEP.

Host range and distribution: On *Achyranthes* (*aspera* [*indica*], *bidentata* [*japonica*]), *Amaranthaceae*, Asia (China; India, Andhra Pradesh, Maharashtra, Rajasthan; Japan, Korea, Pakistan, Taiwan), West Indies (Dominican Republ., Puerto Rico).

Note: A true *Cercospora* s. str. distinct from *C. apii* s. lat., including *C. achyranthina*, by having acicular to obclavate-cylindrical conidia with obconically truncate base. Obconically truncate conidial bases are not confined to shorter, young conidia, they are also evident in longer, fully developed conidia. In addition, different from *C. achyranthina* by lacking or indistinct leaf spots, effuse caespituli and somewhat wider conidia.

Cercospora aervae-lanatae Raghu Ram & Mallaiah, *Mycol. Res.* **100**: 296 (1996); as “*aervae-lanatae*”. (Fig. 66)

Synonym: *Cercospora aervae* R.K. Srivast. et al., *Indian Phytopathol.* **54**: 102 (2001); as “*aervae*” [*holotype*: **India**: Uttar Pradesh: Gorakhpur, on *Aerva sanguinolenta* [*scandens*], Nov. 1990, R. K. Srivastava 123 (GPU 1398). *Isotype*: HCIO 30878.].

Literature: Crous & Braun (2003: 47), Kamal (2003: 13).

Illustrations: Raghu Ram & Mallaiah (1996: 296, fig. 2), Srivastava et al. (2001: 102, fig. 1).

Description: *Leaf spots* amphigenous, necrotic, scattered, subcircular to angular-irregular, 2–9(–10) mm diam, greyish, sometimes with reddish or purplish margin. *Caespituli* epiphyllous. *Mycelium* immersed; hyphae branched, septate, subhyaline. *Stromata* well-developed, gobose, 20–40 µm diam, brown to black. *Conidiophores* in loose fascicles, to 15, arising from stromata, through stomata, erect, subcylindrical to 1–4 times geniculate, unbranched, about 45–230 × 3.5–5.5 µm, 2–11-septate, pale olivaceous to brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci thickened and darkened, 2–3.5 µm diam. *Conidia* solitary, acicular, straight to curved, 55–160 × 1.5–4 µm, 5–15-septate, hyaline, thin-walled, smooth, apex pointed, base truncate, 1.5–3 µm wide, hila thickened and darkened.

Holotype: **India**: Andhra Pradesh: Nagarjuna Nagar, University Campus, on *Aerva lanata*, Nov. 1991, M. Raghu Ram (K(M) IMI 351224).

Host range and distribution: On *Aerva* (*lanata*, *sanguinolenta* [*scandens*]), *Amaranthaceae*, Asia (India, Andhra Pradesh, Uttar Pradesh).

Note: This species is morphologically assignable to the *Cercospora apii* s. lat. complex.

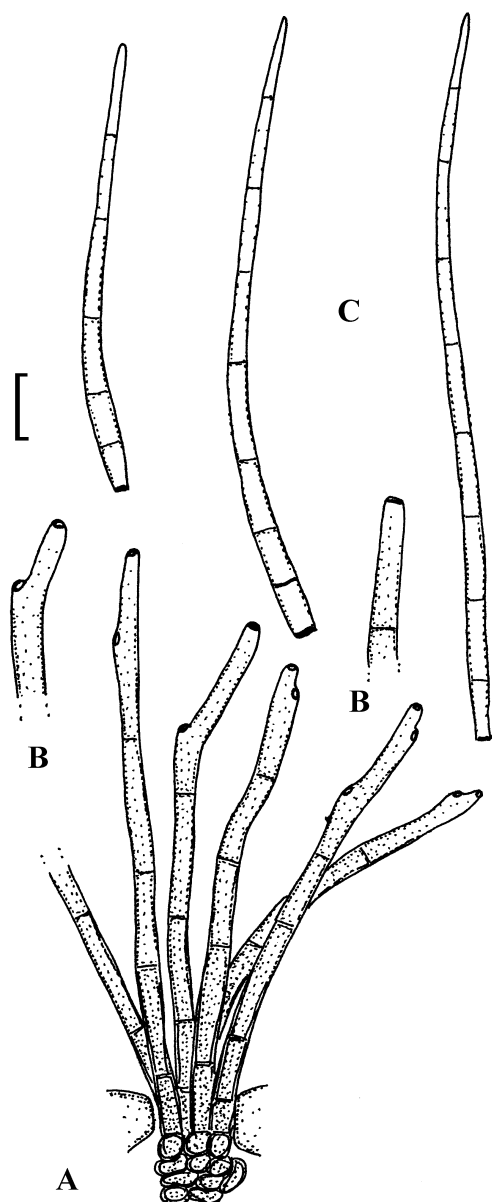


Fig. 66. *Cercospora aervae-lanatae* (K(M) IMI 351224, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

Cercospora alternantherae Ellis & Langl., *J. Mycol.* 6: 36 (1890).
(Fig. 67)

Literature: Saccardo (1892: 637), Chupp (1954: 30–31), Crous & Braun (2003: 53), Kamal (2010: 15).

Illustration: Chupp (1954: 31, fig. 7).

Description: *Leaf spots* amphigenous, circular or subcircular, 0.5–3 mm diam, pale greenish to dingy grey, margin brownish. *Caespituli* amphigenous, punctiform, scattered, dark brown to blackish. *Mycelium* internal. *Stromata* substomatal to immersed, large, 20–80 µm diam, brown. *Conidiophores* in well-developed, mostly rather large fascicles, divergent to dense, arising from stromata, through stomata or erumpent, erect, straight, subcylindrical-conical to oblong, geniculate-sinuous,

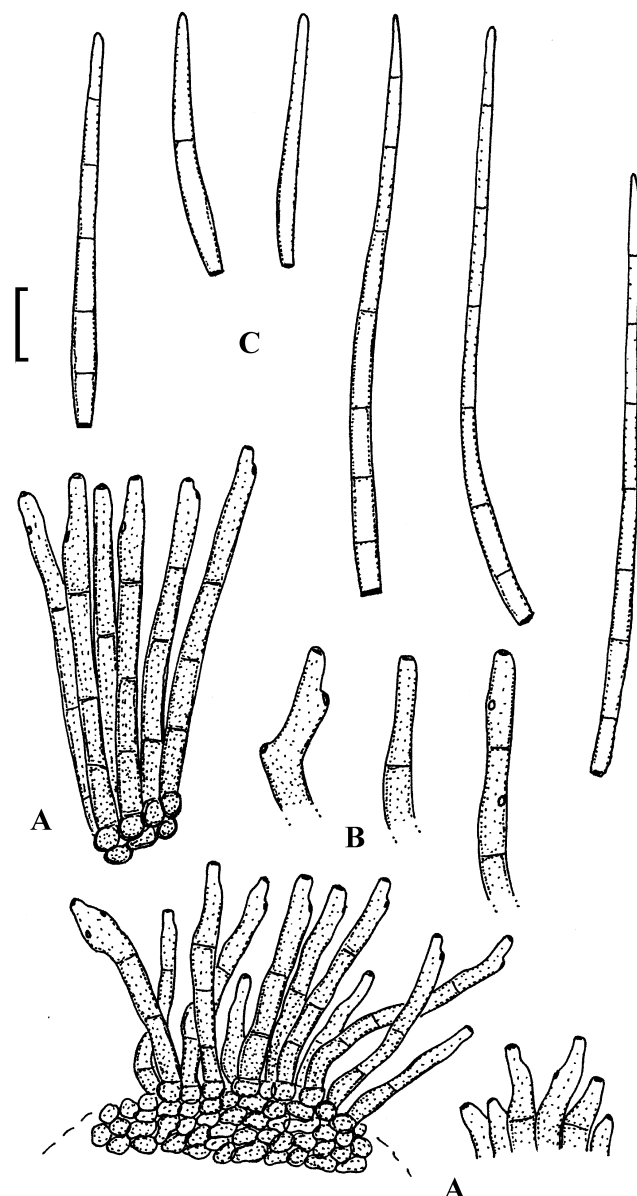


Fig. 67. *Cercospora alternantherae* (NY 830163, lectotype). **A.** Conidiophore fascicles. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

unbranched, 10–80 × 3–6 µm, 1–4-septate, subhyaline, pale olivaceous to brown, paler towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal, occasionally intercalary, 10–30 µm long, conidiogenous loci conspicuous, thickened and darkened, (1–)1.5–2(–2.5) µm diam. *Conidia* solitary, obclavate-cylindrical, acicular, straight to curved, 20–125 × 2–4 µm, 0–10-septate, hyaline, thin-walled, smooth, apex pointed or subobtuse, base truncate to obconically truncate, 1–2 µm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202806): USA: Louisiana: St. Martinsville, on *Alternanthera achyrantha*, 18 Jul. 1888, A. B. Langlois 1430 (NY 830163). *Isolectotype:* BPI 432464.

Host range and distribution: On *Alternanthera (ficoidea)*,

halimifolia, *crucis* [*portoricensis*], *pungens* [*achyrantha*, *repens*]), *Amaranthaceae*, North America (USA, Louisiana, Texas), South America (Brazil, Venezuela), West Indies (Cuba, Jamaica, Puerto Rico, Virgin Islands).

Notes. This is a true *Cercospora* s. str. close to *C. apii* s. lat., but distinct by having large stromata (20–80 µm diam) with numerous, densely arranged conidiophores, smaller conidiogenous loci (1–2 µm wide), and obclavate-cylindrical to acicular conidia. Indian records of this species from Uttar Pradesh and West Bengal on *A. sessilis* (Kamal 2010) are doubtful and in need of revision and confirmation. They might rather pertain to the illegitimate species *Cercospora sessilis* or to the invalid *C. alternantherina*, both described from India on *A. sessilis*.

***Cercospora apii* s. lat. (*C. cf. malloti* sensu Groenewald et al. 2013: 157).**

Notes: Nganhom et al. (2015) examined *Cercospora* species from northern Thailand by means of molecular methods. A plurivorous *Cercospora* species referred to as *Cercospora* cf. *malloti* in Groenewald et al. (2013) turned out to be the most common taxon found during the course of this study. The collections in the clade concerned belong to *C. apii* s. lat., i.e. they are characterised by having consistently acicular conidia. One of the specimens involved was collected on *Cyathula prostrata*. For further comments, see notes under *Cercospora asystasiana*.

***Cercospora brachiata* Ellis & Everh., *J. Mycol.* 4: 5 (1888).**

(Fig. 68)

Synonyms: *Cercospora acnidae* Ellis & Everh., *Proc. Acad. Nat. Sci. Philadelphia* 43: 89 (1891) [lectotype (designated here, MycoBank, MBT202807): USA: Delaware: Wilmington, on *Amaranthus cannabinus*, 30 Sep. 1889, *A. Commons* 1011 (NY 2408316); isoelectotypes: NY 2408317, 2408318].

Cercospora amaranthi Lobik, *Bolezni Rast.* 17: 193 (1928) [holotype: Russia: Stavropol Krai: Pyatigorsk, station of Yessentuki, garden, on *Amaranthus retroflexus*, 25 Sep. 1925, *A. I. Lobik* (not preserved)].

Literature: Saccardo (1892: 637), Vassiljevsky & Karakulin (1937: 222), Chupp (1954: 30–31), Katsuki (1965: 8), Braun & Mel'nik (1997: 43–44), Crous & Braun (2003: 43, 86), Guo et al. (2005: 29–30), Kamal (2010: 25).

Illustrations: Tai (1948: 37, fig. 2), Guo et al. (2005: 29, fig. 11), Pirnia et al. (2010: 185, fig. 1).

Exsiccatae: Ellis & Everh., *N. Amer. Fung.* 2582.

Description: *Leaf spots* amphigenous, circular, subcircular to somewhat angular-irregular, 0.5–12 mm diam, at first yellowish brown, later brown, reddish or dark brown, or finally with a tan, grey to greyish white centre surrounded by a brown, reddish to purplish brown or almost blackish margin. *Caespituli* amphigenous, mostly hypophyllous, punctiform scattered, dark. *Mycelium* internal. *Stromata*

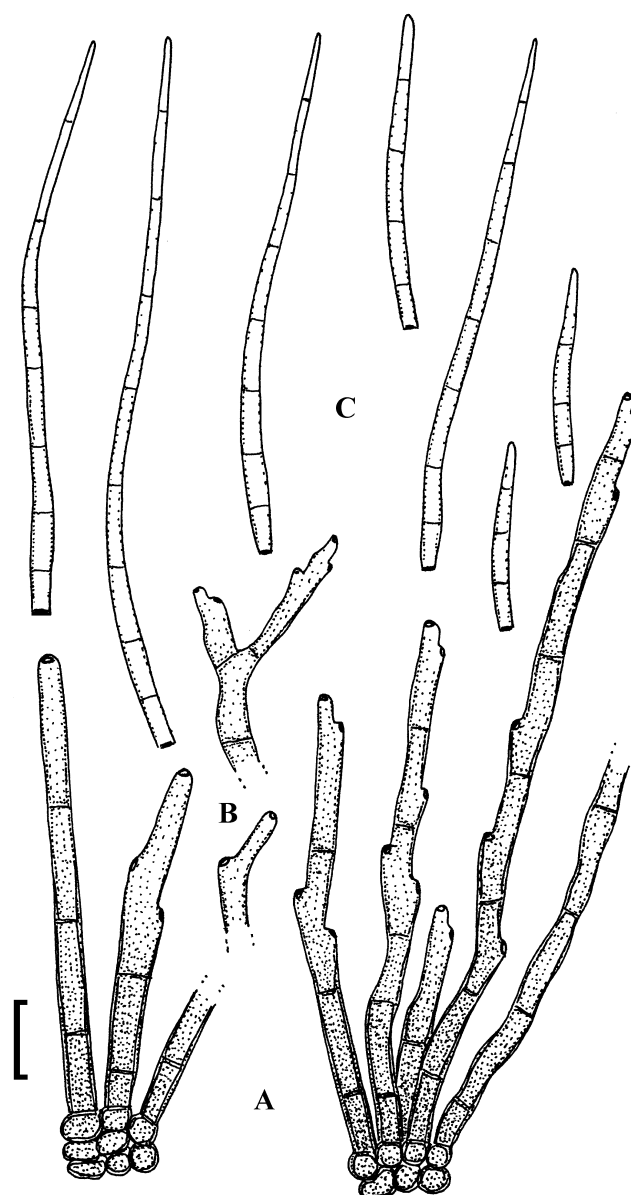


Fig. 68. *Cercospora brachiata* (NY 2408319, lectotype). **A.** Conidiophore fascicles. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 µm.

almost lacking or small to moderately large, substomatal to immersed, subglobose to somewhat irregular, 10–50 µm diam, olivaceous-brown to brown, cells 2–6 µm diam. *Conidiophores* fasciculate, 2–12(–20), rarely solitary, arising from swollen hyphal cells or stromata, emerging through stomata or erumpent, erect, straight, subcylindrical to usually distinctly geniculate or geniculate-sinuous, above all in the upper half, unbranched or tips occasionally furcate, 20–250 × 3–6.5 µm, usually 1–8-septate, very long conidiophores sometimes with additional septa, pale to medium dark brown or olivaceous-brown throughout or paler towards the tip, wall thin to slightly thickened, smooth; conidiogenous cells integrated, terminal and intercalary, 10–40(–70) µm long, conidiogenous loci conspicuous, thickened and darkened, 1.5–3.5 µm diam. *Conidia* solitary, acicular, shorter conidia may also be narrowly obclavate-cylindrical, straight to curved, 25–250 × 1.5–5(–

6) μm , 1–20-septate, hyaline, thin-walled, smooth, apex acute or subacute, sometimes subobtuse, base truncate or obconically truncate in shorter conidia, 1.5–4 μm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202808): **USA: Delaware:** Faulkland, on *Amaranthus retroflexus*, 18 Aug. 1887, A. Commons 626 (NY 2408319). **Isolectotypes:** NY 24083120, 2408321.

Host range and distribution: On *Amaranthus* (*albus*, *blitum*, *blitoides*, *cannabinus*, *caudatus*, *crassipes*, *cruentus* [*paniculatus*, *hybridus* subsp. *cruentus*], *dubius*, *hybridus*, *polygamus*, *retroflexus*, *spinosus*, *tamariscinus*, *tricolor* [*gangeticus*], *tuberculatus*, *viridis* [*blitum* subsp. *emarginatus*], *Amaranthus* sp.), *Amaranthaceae*, Africa (Kenya, South Africa, Uganda), Asia (Brunei, China; India, Andhra Pradesh, Delhi, Orissa, Maharashtra, Uttar Pradesh, West Bengal; Indonesia, Iran, Pakistan), Europe (Germany, Russia, Ukraine), Central and South America (Brazil, Ecuador, Panama, Venezuela), North America (USA, Delaware, Florida, Illinois, Nebraska, Texas, Wisconsin), West Indies (Barbados, Cuba, Dominican Republic, Haiti, Puerto Rico, Trinidad and Tobago, Virgin Islands).

Notes: This species belongs to the *Cercospora apii* s. lat. complex. *Cercospora brachiata* is morphologically rather variable, above all with regard to the length of conidiophores as well as length and width of conidia. Many host species and a wide distribution range covering different continents are involved. Thus, it remains unclear if all collections pertain to a single species or if we have to do with a complex of cryptic species. *Cercospora acnidae* is morphologically barely distinct from *C. brachiata*. Its introduction and recognition in Chupp (1954) were undoubtedly influenced by assumed host range differences. The hosts of *C. acnidae* were previously assigned to the genus *Acnida*, now a synonym of *Amaranthus* usually treated as subgenus, which reflects the close affinity of former *Acnida* and *Amaranthus* species. A careful search for type material of *Cercospora amaranthi* in LE failed. Type material of this species is probably not maintained. Records of *C. brachiata* on *Achyranthes bidentata* [*japonica*] (Crous & Braun 2003) are doubtful and belong probably to *C. achyranthina*. Some newer records not yet included in Crous & Braun (2003) refer to Germany (Jage & Braun 2004), Indonesia (Shivas et al. 1996) and Iran (Pirnia et al. 2010, Hesami et al. 2011).

Ellis & Everh., N. Amer. Fung. 2582 (BPI 432395, FH, GZU, NY, PH and numerous other herbaria) is authentic material (former syntypes) from the type locality, but collected in 1890.

Cercospora celosiae Syd., *Ann. Mycol.* 27: 430 (1929).
(Fig. 69)

Literature: Chupp (1954: 32), Vasudeva (1963: 76), Katsuki (1965: 9), Ibrahim & El Nur Elamin (1974), Ellis (1976: 244), Hsieh & Goh (1990: 15), Crous & Braun (2003: 113), Guo et

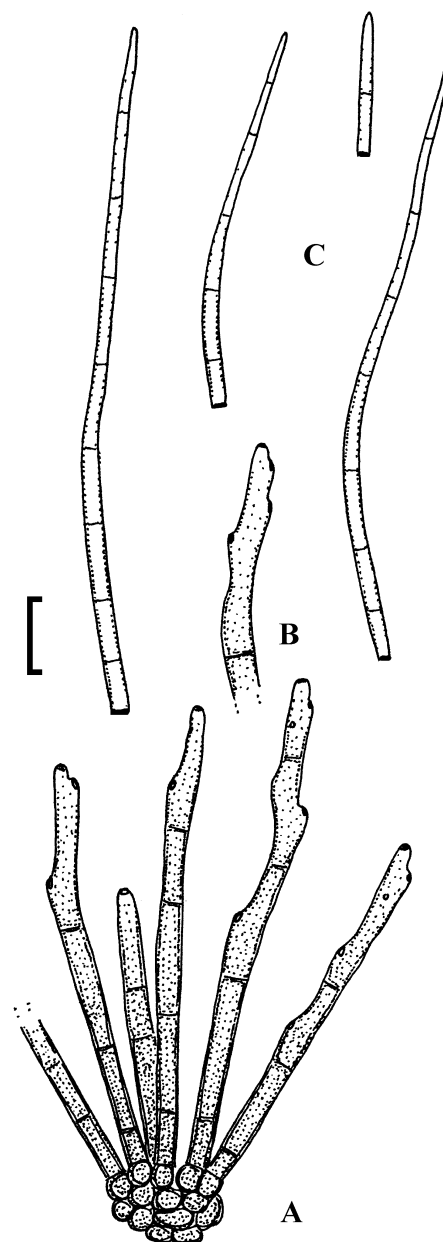


Fig. 69. *Cercospora celosiae* (BPI 434404, holotype). **A.** Conidiophore fascicle. **B.** Conidiophore tip. **C.** Conidia. Bar = 10 μm .

al. (2005: 30–31), Kamal (2010: 31).

Illustrations: Ellis (1976: 243, fig. 183 C), Hsieh & Goh (1990: 17, fig. 6), Guo et al. (2005: 31, fig. 12).

Description: *Leaf spots* amphigenous, circular or subcircular, 1–12 mm diam, occasionally larger, tan to pale brown, margin darker, occasionally somewhat raised, sometimes causing shot-hole symptoms. *Caespituli* usually hypophyllous, delicate, dark. *Mycelium* internal. *Stromata* lacking or small, brown, substomatal. *Conidiophores* in fascicles, 2–15, divergent, arising from internal hyphae or small hyphal aggregations, through stomata, erect, straight, usually unbranched, geniculate-sinuous, 20–220 \times 3–6 μm , 0–6-septate, pale to medium brown, paler and narrower towards the tip, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci

conspicuous, thickened and darkened, 1.5–3 μm diam. *Conidia* solitary, acicular, straight to curved, 25–150 \times 2–4(–4.5) μm , hyaline, 2–12-septate, apex acute, base truncate to somewhat obconically truncate, 1.5–3 μm wide, hila thickened and darkened.

Holotype: China: Hubei: Wang-Chia-Shau, on *Celosia argentea*, 4 Aug. 1928, T. F. Yu (BPI 434404).

Host range and distribution: On *Celosia* (*argentea* [*argentea* var. *crispata*, *crispata*, *plumosa*], *trigyna* [*laxa*], *Celosia* sp.), *Amaranthaceae*, Africa (Nigeria, Sudan, Uganda,), Asia (Bangladesh, Brunei, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Pakistan, Papua New Guinea, South Korea, Sri Lanka, Taiwan, Thailand), Central and South America (Brazil, Panama, Venezuela), North America (Mexico; USA, Alabama, Florida, Oklahoma), West Indies (Cuba).

Notes: This species is characterised by having colourless acicular conidia and thickened, darkened conidiogenous loci and hila, i.e. it belongs to the *Cercospora apii* s. lat. complex. Japanese records of this species (Katsuki 1965) are wrong and refer to *Pseudocercospora celosiarum* (confirmed by Ch. Nakashima).

***Cercospora celosiigena* U. Braun & Bagyan., sp. nov.**

MycoBank MB814563

(Fig. 70)

Literature: Bagyanarayana *et al.* (1991: 324).

Illustration: Bagyanarayana *et al.* (1991: 321, fig. 6).

Diagnosis: Differs from *C. celosiae* in having much shorter conidiophores, 5–30 \times 3–5 μm , 0(–1)-septate, and short, narrowly obclavate-cylindrical conidia, 25–35 \times 2.5–3.5 μm , only 0–5-septate,

Description: *Leaf spots* amphigenous, subcircular to angular-irregular, 1–3 mm diam, somewhat raised, greyish brown to greyish white, with a narrow purplish margin. *Caespituli* hypophyllous, scattered, fine, dark brown. *Mycelium* internal. *Stromata* lacking or small, formed by a few swollen hyphal cells, brown, substomatal. *Conidiophores* in small, divergent to dense fascicles, arising from substomatal hyphae or small stromatic hyphal aggregations, through stomata, erect, subcylindrical, conical, straight to somewhat curved or slightly geniculate-sinuous, unbranched, 5–30 \times 3–5 μm , 0(–1)-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiophores usually aseptate, i.e. reduced to conidiogenous cells, conidiogenous cells occasionally integrated, terminal, 5–25 μm long, conidiogenous loci conspicuous, thickened and darkened, 1–2 μm diam. *Conidia* solitary, narrowly obclavate-cylindrical, straight to slightly curved, 25–35 \times 2.5–3.5 μm , 0–5-septate, hyaline, thin-walled, smooth, apex acute to subobtuse, base truncate in cylindrical conidia to short obconically truncate in obclavate ones, 1–2 μm wide, hila slightly thickened and darkened.

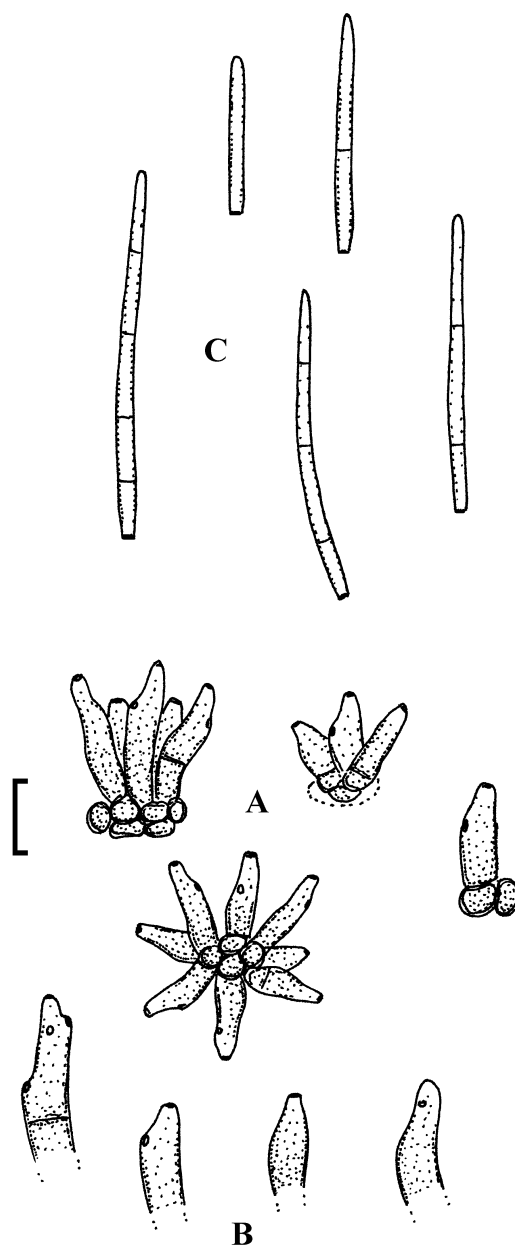


Fig. 70. *Cercospora celosiigena* (HAL 2898 F, holotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μm .

Holotype: India: Telangana: Hyderabad, on *Celosia argentea*, *Amaranthaceae*, Oct. 1990, G. Bagyanarayana & P. Jagadeeswar (HAL 2898 F).

Host range and distribution: Only known from the type collection.

Notes: Bagyanarayana *et al.* (1991) identified the type collection of this species as *Cercospora celosiae* which they considered a morphologically rather variable fungus. However, *C. celosiae* belongs to the *C. apii* s. lat. complex. The conidia are consistently acicular, and the conidiophores are much longer and septate.

***Cercospora gomphrenae* W.W. Ray, *Mycologia* 36: 172 (1944).**
(Fig. 71)

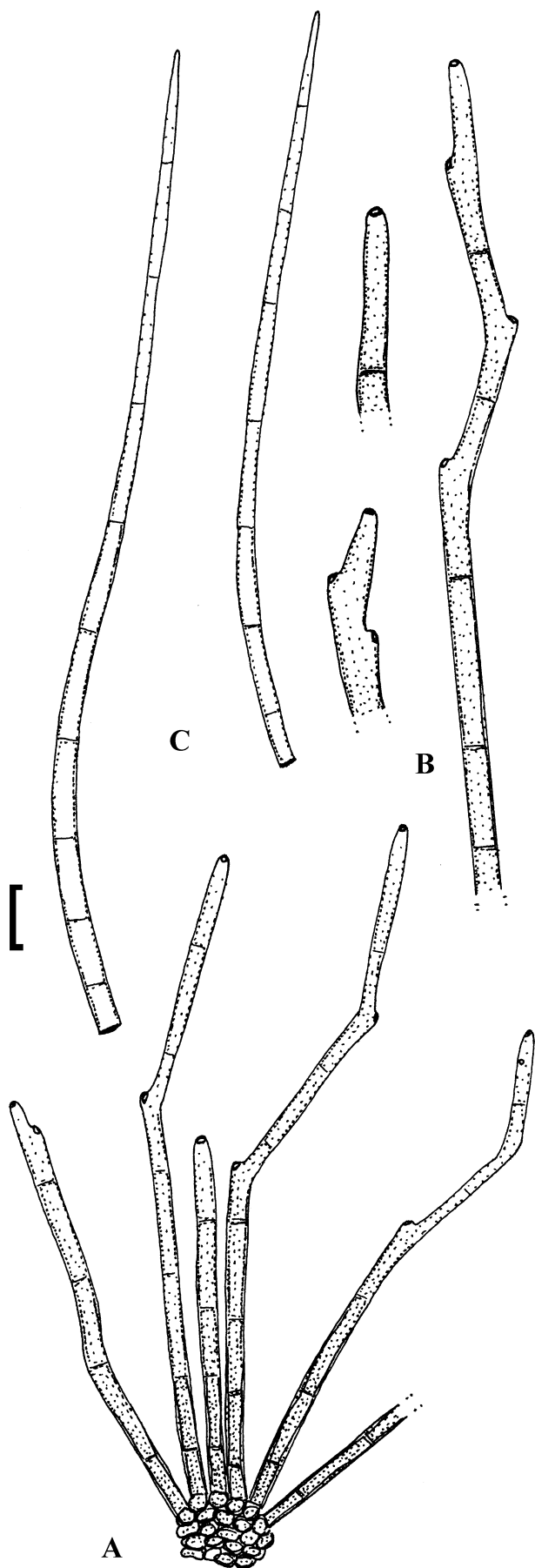


Fig. 71. *Cercospora gomphrenae* (CUP 33132, holotype). A. Conidiophore fascicle. B. Conidiophore tips. C. Conidia. Bar = 10 μ m.

Literature: Chupp (1954: 34), Ibrahim & El Nur Elamin (1974), Crous & Braun (2003: 201), Shin & Kim (2001: 67–69), Guo et al. (2005: 31), Kamal (2010: 47).

Illustrations: Shin & Kim (2001: 68, fig. 25), Guo et al. (2005: 32, fig. 13).

Description: *Leaf spots* amphigenous, circular to somewhat angular-irregular, 1–10 mm diam, at first brownish, greyish brown, later dingy grey to greyish white, margin darker, brown, yellowish brown, reddish brown to purplish brown. *Caespituli* amphigenous, punctiform, dark brown, scattered. *Mycelium* internal; hyphae branched, septate, subhyaline or pale, 2–3.5 μ m wide. *Stromata* almost lacking or 10–35 μ m diam, substomatal to immersed, brown, cells 2–5 μ m diam. *Conidiophores* in small, divergent fascicles, 3–15, arising from internal swollen hyphae or stromata, through stomata or erumpent, erect, straight, subcylindrical to distinctly geniculate-sinuous, unbranched, 30–300 \times 3–7 μ m, usually 3–10-septate, pale to medium brown, paler towards the tip, thin-walled, smooth; conidiogenous cells intergrated, terminal and intercalary, 10–30 μ m long, conidiogenous loci conspicuously thickened and darkened, 2–3.5 μ m diam. *Conidia* solitary, acicular, straight to curved, 30–300(–450) \times 2–5 μ m, 3–20-septate, hyaline, thin-walled, smooth, apex acute to subobtuse, base truncate, 2–4 μ m wide, hila thickened and darkened.

Holotype: USA: Oklahoma: Stillwater, Ray's yard, on *Gomphrena globosa*, 18 Aug. 1942, W. W. Ray (CUP 33132). **Isotype:** K(M) IMI 168993. **Topotype:** from 8 Aug. 1942 (CUP 39900).

Host range and distribution: On *Gomphrena* (*globosa*, *serrata* [*decumbens*]), *Amaranthaceae*, Africa (Sudan), Asia (China; India, Andhra Pradesh; Korea), North America (USA, Georgia, Oklahoma, Texas), West Indies (Cuba).

Notes: This species is part of the *Cercospora apii* s. lat. complex. Due to confusion with the name *Cercospora gomphrenae* Sawada, several records of *C. gomphrenae* W.W. Ray are undoubtedly wrong or doubtful, e.g. those from Iran, Nepal and Taiwan (Crous & Braun 2003).

Cercospora gorakhanathii A.N. Rai & Kamal, *Trans. Brit. Mycol. Soc.* **89**: 124 (1987). (Fig. 72)

Synonym: *Cercospora celosiicola* Bhartiya et al., *Indian Phytopathol.* **56**: 271 (2003) [**holotype:** India: Uttar Pradesh: Basti, on *Celosia* sp. (as "*coronata*"), Nov. 1997, H. D. Bhartiya (HCIO 42689); **isotype:** GPU 8026].

Literature: Kamal (2010: 31).

Illustrations: Rai & Kamal (1987: 125, fig. 1), Bhartiya et al. (2003: 271, fig. 2).

Description: *Leaf spots* amphigenous, circular to angular-irregular, sometimes vein-limited, 2–8 mm diam or confluent and larger, light brown to dingy grey. *Caespituli* amphigenous,

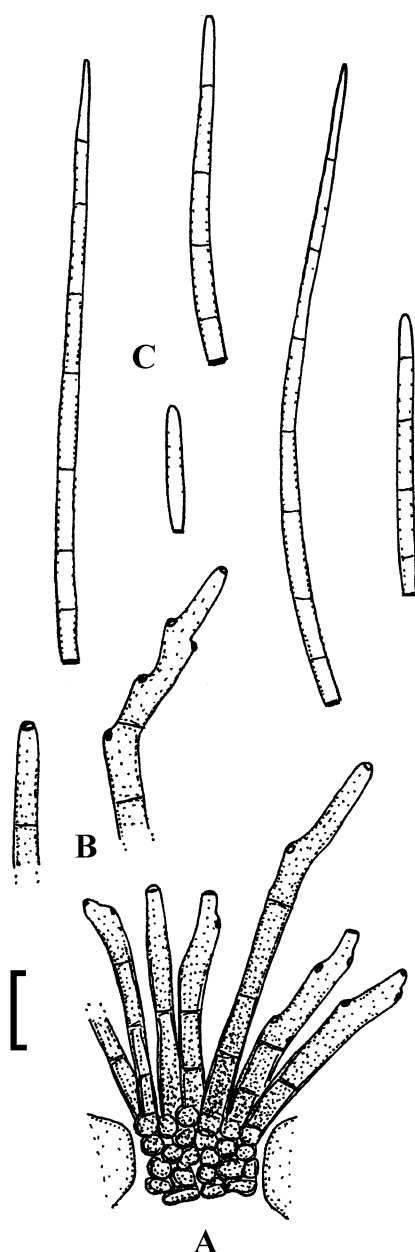


Fig. 72. *Cercospora gorakhanathii* (K(M) IMI 259305, holotype). **A.** Conidiophores fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

finely punctiform, effuse, dark dingy olivaceous to brown. *Mycelium* internal. *Stromata* developed, substomatal to immersed, 10–40 μ m diam, medium to dark olivaceous. *Conidiophores* fasciculate, divergent, 2–12 or occasionally solitary, arising from stromata, through stomata or erumpent, erect, straight, subcylindrical to geniculate-sinuous, usually unbranched, rarely branched, 20–150 \times 3–6 μ m, 1–8-septate, pale, subhyaline to pale olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal or occasionally intercalary, conidiogenous loci conspicuous, 1.5–2 μ m diam, thickened and darkened. *Conidia* solitary, cylindrical, somewhat cylindrical-obclavate to subacicular, straight to curved, 15–150 \times 1.5–4.5 μ m, (0–)1–14-septate, hyaline, thin-walled, smooth, apex subacute or subobtuse, base truncate to somewhat obconically truncate, 1.5–3 μ m wide, hila thickened and darkened.

Holotype: **India:** Uttar Pradesh: Gorakhpur, University, botanical garden, on *Celosia* sp., Feb. 1981, A. N. Rai KR 536 (K(M) IMI 259305).

Host range and distribution: On *Celosia* sp., *Amaranthaceae*, Asia (India, Uttar Pradesh).

Note: A true *Cercospora* s. str. well characterised by having cylindrical to somewhat obclavate or subacicular conidia.

Doubtful, excluded and insufficiently known species

Cercospora alternantherina S. Narayan et al., in Rao et al., *Sugarcane Pathology 1: Fungal Diseases*: 62 (1999), *nom. inval.* (Art. 39.1).

Literature: Crous & Braun (2003: 53), Kamal (2010: 15).

Illustration: Rao et al. (1999: 63, fig. 3).

Description: *Leaf spots* amphigenous, circular to subcircular, 0.5–4 mm diam, olivaceous to olivaceous-brown on the upper leaf surface, pale olivaceous with brown margin below. *Caespituli* amphigenous, effuse. *Mycelium* internal; hyphae branched, septate, subhyaline to light olivaceous, about 2.5 μ m wide. *Stromata* well-developed, substomatal, about 25 μ m diam, pale olivaceous to olivaceous. *Conidiophores* solitary or in fascicles of 2–6, arising from stromata, through stomata, about 15–130 \times 2–4.5 μ m, cylindrical, straight to slightly curved, unbranched, 1–4 times geniculate, pale to dark olivaceous, smooth; conidiogenous cells integrated, terminal and intercalary, with conspicuous conidiogenous cells, thickened and darkened. *Conidia* solitary, acicular, straight to curved, about 35–210 \times 2–4 μ m, 5–27-septate, hyaline, thin-walled, smooth, apex subacute to obtuse, base truncate, hila thickened and darkened.

Holotype: **India:** Uttar Pradesh: without detailed locality, on *Alternanthera sessilis*, *Amaranthaceae*, Oct. 1992, S. Narayan (GPU 5023). *Isotype:* HCIO 41940.

Host range and distribution: On *Alternanthera sessilis*, *Amaranthaceae*, Asia (India).

Notes: This invalid species name pertains to the *Cercospora apii* s. lat. complex. The conidia were described to be “cylindrical” although obviously acicular conidia were depicted in the original drawing.

Cercospora crassoides Davis, *Trans. Wisconsin Acad. Sci.* **21**: 298 (1924).

Synonym: *Nimbya crassoides* (Davis) E.G. Simmons, *Mycotaxon* **55**: 146 (1995).

Literature: Chupp (1954: 33), Crous & Braun (2003: 143).

Illustration: Simmons (1995: 147, fig. 117).

Holotype: USA: Wisconsin: Lone Rock, on *Froelichia floridana*, 23 Jul. 1921, J. J. Davis (WIS). **Isotypes:** BPI 435265, CUP 39528.

Host range and distribution: On *Froelichia floridana*, *Amaranthaceae*, North America (USA, Florida, Oklahoma, Texas, Wisconsin).

Cercospora gomphrenae-globosae S. Narayan et al., in Rao et al., *Sugarcane Pathology 1: Fungal Diseases*: 69 (1999), *nom. inval.* (Arts 37.3 and 39.1).

Literature: Crous & Braun (2003: 2001), Kamal (2010: 47).

Illustration: Rao et al. (1999: 70, fig. 6).

Description: *Leaf spots* amphigenous, circular or subcircular, 1–10 mm diam, later to 30 mm diam, withish brown above, rusty brown below, with margin. *Caespituli* amphigenous, effuse. *Mycelium* internal; hyphae branched, septate, light olivaceous. *Stromata* well-developed, compact, subepidermal, about 10–30 µm diam, light olivaceous to brown. *Conidiophores* solitary or in small fascicles, 3–7, arising from stromata, erect, straight or almost so, unbranched, cylindrical, 1–4 times geniculate, about 45–155 × 3.5–5 µm, 2–7-septate, olivaceous to light brown, thin-walled, smooth; conidiogenous cells integrated, terminal and intercalary, conidiogenous loci conspicuous, thickened and darkened. *Conidia* solitary, subcylindrical to subacicular (somewhat attenuated towards the tip), straight to somewhat curved, about 13–205 × 2–3 µm, usually 7–18-septate, hyaline, thin-walled, smooth, apex subacute to obtuse, base truncate, thickened and darkened.

Syntypes (holotype not clearly indicated): **India:** Uttar Pradesh: Gorakhpur, on *Gomphrena globosa*, Nov. 1993/1994, S. Narayan (GPU 5051, 5061; HCIO 41968, 41978).

Host range and distribution: On *Gomphrena globosa*, *Amaranthaceae*, Asia (India, Uttar Pradesh).

Notes: This species is well-characterised by having subcylindrical conidia, but a validation is not made since type material was not available. The authors cited collections from two years, 1993 and 1994, but a holotype was not clearly designated. Furthermore, the name *C. gomphrenae-globosae* is invalid since it was published without any Latin diagnosis or description.

Cercospora nothosaervae M.S. Patil, *Botanique* 6: 221 (1975).

Literature: Crous & Braun (2003: 292), Kamal (2010: 69).

Illustration: Patil (1975: 220, fig. 9).

Description: *Leaf spots* circular 1–2 mm diam, centre depressed, whitish grey, margin red. *Caespituli* amphigenous. *Mycelium*

internal. *Stromata* lacking. *Conidiophores* solitary or in small, loose groups, 2–3, erumpent, erect, straight to flexuous, non-geniculate, unbranched or occasionally branched, basal cells swollen, 20–70 × 5–5.5 µm, 1–2-septate, olivaceous-brown, paler towards the tip; conidiogenous loci conspicuous, prominent. *Conidia* solitary, broadly obclavate with attenuated, almost rostrate apex, straight to slightly curved, 20–70 × 5–6.5 µm, 1–5-septate, constricted at the septa, pale olivaceous-brown, apex subobtuse, base obconically truncate, with a prominent hilum, darkened and thickened.

Holotype: India: Maharashtra: Kolhapur, on *Nothosaerva brachiata*, *Amaranthaceae*, 17 Dec. 1973, M. S. Patil (HCIO 31692).

Host range and distribution: Only known from the type collections.

Notes: The general characters of this fungus are not cercosporoid. It seems to be a species of *Alternaria*, but it was not possible to confirm this assumption. Type material was not available.

Cercospora pretoriensis Chupp & Doidge, *Bothalia* 4: 890 (1948).
(Fig. 73)

Literature: Chupp (1954: 35), Crous & Braun (1996: 298), Crous & Braun (2003: 335).

Description: *Leaf spots* amphigenous, irregularly scattered, subcircular, 2–6 mm diam, sometimes confluent, on the upper surface centre pale brown to dingy grey, with reddish to red-brown border, on the lower surface paler. *Caespituli* hypophyllous, scattered to dense, punctiform, barely confluent, dark olivaceous. *Mycelium* internal. *Stromata* immersed, 15–60 µm diam, somewhat erumpent, olivaceous-brown, composed of swollen hyphal cells, angular-subglobose, about 3–9 µm diam. *Conidiophores* densely fasciculate, few to numerous, arising from stromata, erumpent, erect, subcylindrical, somewhat attenuated towards the tip, unbranched, straight to curved or usually distinctly, often strongly geniculate-sinuous, 10–50(–100) × 3–6 µm, 0–3-septate, rarely pluriseptate, pale olivaceous-brown, paler towards the tip, upper part subhyaline or sometime pigmented throughout, thin-walled, smooth; conidiogenous cells integrated, terminal, sometimes conidiophores reduced to conidiogenous cells, 10–25 µm long, conidiogenous loci conspicuous or subconspicuous, 1.5–2 µm diam, visible in lateral view as convex to truncate tip or shoulder caused by sympodial proliferation (light microscopy), unthickened or only slightly thickened, not to slightly darkened, often somewhat refractive, in front view sometimes visible as minute circle with somewhat darker rim. *Conidia* solitary, narrowly cylindrical, occasionally subacicular, straight to slightly curved, 15–90 × 2–4.5 µm, 1- to pluriseptate, hyaline or subhyaline, thin-walled, smooth, apex obtuse or subobtuse, base truncate, subtruncate or slightly short obconically truncate, 1–2.5 µm wide, hila unthickened or only very slightly thickened, not darkened, at most somewhat refractive.

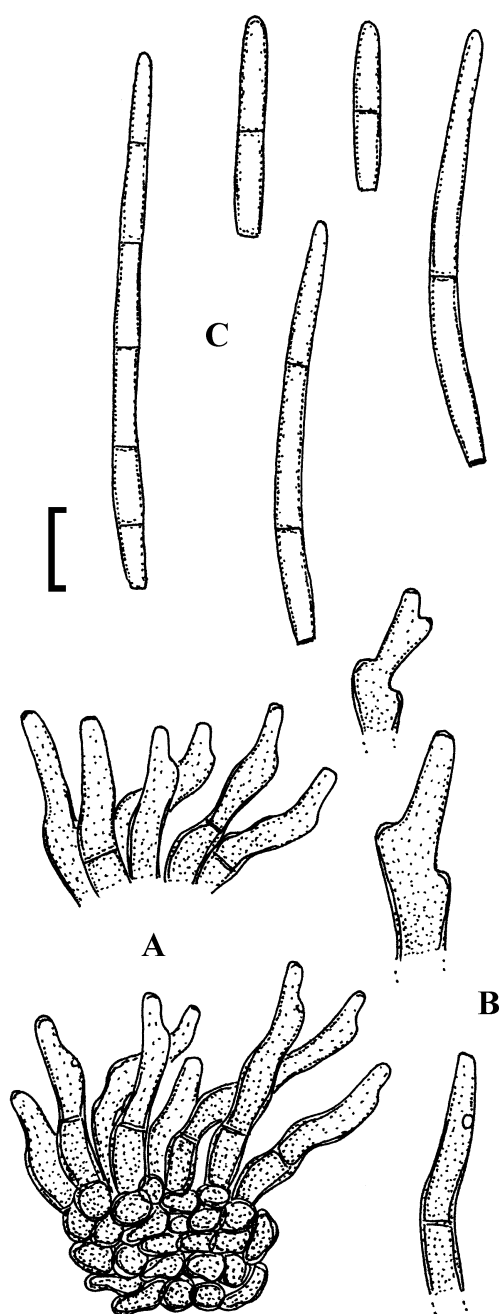


Fig. 73. *Cercospora pretoriensis* (CUP 40641, isotype). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm

Holotype: South Africa: Transvaal: Pretoria, Arcadia, on *Gomphrena globosa*, 14 Apr. 1913, collector not indicated (PREM 6593). **Isotype:** CUP 40641. **Paratypes:** CUP40639, 40640; PREM 775, 26316, 32789.

Host range and distribution: On *Gomphrena* (*celosioides*, *serrata* [*decumbens*], *globosa*), *Amaranthaceae*, South Africa.

Notes: *Cercospora pretoriensis* is a cercosporoid species that cannot be unequivocally assigned to any of the currently recognised cercosporoid genera just based on morphology. The structure of the conidiogenous loci does not agree with scars of *Cercospora* s. str. and *Passalora*

s. lat. Colourless conidia are also not in favour of the latter genus. The conidiogenous cells and conidiogenous loci are reminiscent of *Cercospora* species, but the conidiophores are pigmented, often even throughout, which would be very unusual for *Cercospora*. Moreover, relations to the complex around *Paracercospora* and *Pseudocercospora* can also not be excluded with certainty. Phylogenetic data are required to elucidate the correct generic affinity of this species. For the interim, we prefer to maintain this species in *Cercospora sensu latissimo*.

Cercospora pseudachyranthis R.F. Castañeda & U. Braun, *Cryptog. Bot.* 1: 43 (1989). (Fig. 74)

Synonym: *Cercospora pseudachyranthis* (R.F. Castañeda & U. Braun) U. Braun, **comb. nov.**

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Basionym: *Cercospora pseudachyranthis* R.F. Castañeda & U. Braun, *Cryptog. Bot.* 1: 43 (1989).

Synonyms: *Cercospora centrostachydis* Chupp, *Monograph of Cercospora*: 32 (1954), *nom. inval.* (Art. 39.1) [type: **Puerto Rico:** Mayaguez, on *Achyranthes aspera* var. *indica*, 2 Mar. 1916, Whetzel & Olive 464].

Passalora pseudachyranthis (R.F. Castañeda & U. Braun) U. Braun, *Nova Hedwigia* 55: 221 (1992).

Misapplied name: *Cercospora achyranthis sensu* Solheim & Stevens (1931: 378).

Literature: Solheim & Stevens (1931: 378, as *C. achyranthis*), Chupp (1954: 32), Crous & Braun (2003: 337).

Illustration: Castañeda & Braun (1989: 44, pl. 1, fig. 1).

Description: Leaf spots amphigenous, subcircular to somewhat irregular, 0.5–4 mm diam, yellowish, ochraceous to brownish, margin indefinite or narrow and darker. *Caespituli* hypophyllous, punctiform-effuse, greyish white. *Mycelium* internal. *Stromata* well-developed, substomatal, subglobose, 20–40 µm diam, brownish, composed of swollen hyphal cells, 2–8 µm diam, subglobose-angular. *Conidiophores* in small to large fascicles (to 50 or even more), divergent to dense, arising from stromata, emerging through stomata, erect, straight to flexuous, curved, in the upper part slightly to mostly distinctly geniculate-sinuous, simple, rarely branched, (40–)50–200(–220) × (2–)3–5(–6) µm, septate, longer conidiophores pluriseptate, hyaline or subhyaline throughout to pale olivaceous below, occasionally slightly darker near the base, thin-walled, smooth; conidiogenous cells integrated, terminal, 10–40 µm long, conidiogenous loci conspicuous, terminal or formed on lateral shoulders caused by sympodial proliferation, subtruncate to usually convex (light microscopy), slightly thickened, not darkened, but often somewhat refractive, 1.5–2.5 µm diam. *Conidia* solitary, obclavate-cylindrical, straight to slightly curved, 20–80 × 3.5–7 µm, 1–8-septate, hyaline or subhyaline, thin-walled, smooth, apex obtuse, base obconically truncate to rounded, 1.5–2 µm wide, hila almost unthickened or only very slightly thickened, not darkened, but somewhat refractive.

Holotype: Cuba: San Miguel de los Baños, on *Achyranthes*

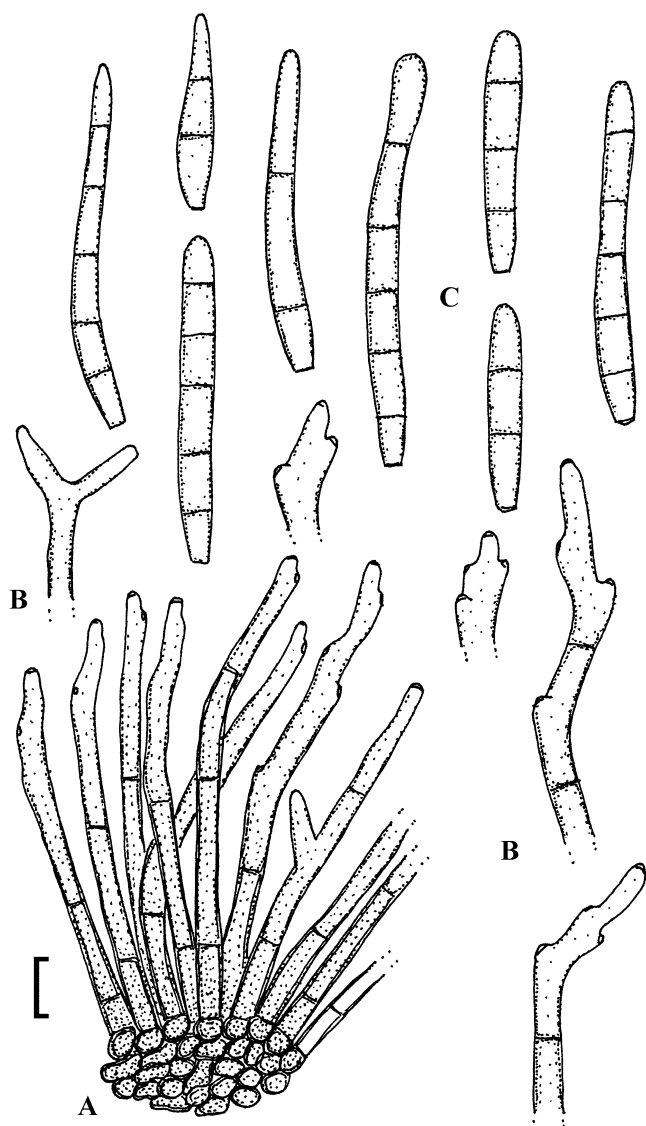


Fig. 74. *Cercospora pseudachyranthis* (HAL 1648 F, isotype). **A.** Conidiophore fascicle. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

aspera, 22 Dec. 1987, R.F. Castañeda (INIFAT C87/365). Isotype: HAL 1648 F. Paratypes: HAL 1761 F, INIFAT C87/375.

Host range and distribution: On *Achyranthes* (*aspera* var. *aspera*, *aspera* var. *indica* [*indica*, *Centrostachys indica*], *bidentata*, *Achyranthes* sp.), *Amaranthaceae*, ?Asia (Pakistan), West Indies (Cuba, Puerto Rico, Virgin Islands).

Notes: The morphological characters of this species have previously been misinterpreted. Due to colourless conidia and conspicuous conidiogenous loci, this species was originally assigned to *Cercospora* (Castañeda & Braun 1989), but later reallocated to *Passalora* (Braun 1992). However, the structure of the conidiogenous loci does not coincide with the concepts of the two genera, and colourless conidia are not consistent with the current concept of *Passalora*. Type material of this species has been re-examined and revealed that the conidia and the structure of conidiogenous cells and conidiogenous loci are in agreement with *Cercospora* (Braun 1995). The conidiophores are not quite colourless,

above all in the lower half, but this kind of pigmentation is known in some tropical-subtropical species of *Cercospora* (Braun 1995).

Chupp (1954) introduced the new species name *Cercospora centrostachydis* with reference to Solheim & Stevens (1931: 378, as *C. achyranthis*), but failed to add a Latin description or diagnosis which was necessary for a valid publication in 1954. The type material cited in Chupp (1954), not agreeing with the collections cited in Solheim & Stevens (1931), was not traced in Chupp's herbarium in CUP. A record of *C. centrostachydis* from Pakistan (Ahmad *et al.* 1997) is unclear and unproven.

Cercospora pupaliae Patwardhan & A.K. Pande, *Sydowia* **23**: 98 "1969" (1970); as "*pupalae*".

Literature: Crous & Braun (2003: 344), Kamal (2010: 79).

Illustration: Patwardhan & Pande (1970: 99, fig. 6).

Description: Leaf spots circular to irregular, grey to dirty brown, margin brown to black, mostly epiphyllous. Stromata 10–30 μ m diam, dark brown. Conidiophores in fascicles of 4–10, arising from stromata, divergent, unbranched, 18.5–96.6 \times 3.7 μ m, darker brown below, paler or subhyaline above. Conidia solitary, obclavate, straight, 51.8–70 \times 3.7 μ m, septate, hyaline to olivaceous.

Holotype: India: Maharashtra: Pune, on *Pupalia orbiculata*, *Amaranthaceae*, 23 Aug. 1966, G. P. Patwardhan (AMH 294).

Host range and distribution: Only known from the type collection.

Notes: Type material of this species was not available. The original description is meagre. Kamal (2010) alluded that he had examined type material of *C. pupaliae*. He emphasized that that this species is distinctly different from *C. apii*, but he did not provide any description or illustration and did not specify these differences, above all he did not refer to the original description of conidia (hyaline to olivaceous), although olivaceous conidia could be an indication for *Passalora* s. lat., i.e. based on the original description and illustration, this species might belong to the latter genus. Furthermore, the conidia were described to be "acicular" but the illustration shows them to be obclavate. Hence, the generic affinity of *C. pupaliae* is not quite clear and this species is in urgent need of revision.

Cercospora sessilis Pavgi & U.P. Singh, *Mycopathol. Mycol. Appl.* **23**: 190 (1964), *nom. illeg.* (Art. 53.1), non *C. sessilis* Sorokin, 1892.

Literature: Crous & Braun (2003: 375), Kamal (2010: 85).

Illustration: Pavgh & Singh (1964:192, figs 10–12).

Description (based on Pavgh & Singh 1964 and examination of type material): Leaf spots amphigenous, greenish brown, on the upper surface becoming chlorotic, 4–8 mm diam,

confluent. *Stromata* substomatal, 10–25 µm diam, pale olivaceous-brown. *Conidiophores* in small to moderately large fascicles, divergent to moderately dense, arising from stromata, erect, straight, subcylindrical to somewhat geniculate-sinuous, unbranched, 25–90 × 3–4 µm, continuous to septate, light brown, thin-walled, smooth; conidiogenous cells integrated, terminal. *Conidia* solitary, obclavate, 30–120 × 1.5–3 µm, 3–11-septate, hyaline or subhyaline, thin-walled, smooth, apex subacute, base short obconically truncate.

Syntypes: **India:** *Uttar Pradesh:* Varanasi, on *Alternanthera sessilis*, *Amaranthaceae*, 22 Oct. 1961, U. P. Singh (HCIO, K(M) IMI 113095).

Notes: Status and generic affinity unclear, type material deposited at K(M) has been examined, but it was too meagre for a final conclusion. According to the original publication, syntype material has been deposited in HCIO, but an accession number was not cited and the material concerned was not available. Some conidiophores were found, all without any conspicuous conidiogenous loci, and a single conidium which seemed to have a slightly thickened and darkened hilum.

Passalora

Key to *Passalora* species on *Amaranthaceae*

- 1 Conidia formed singly, obclavate-cylindrical, 30–85 × 3.5–6 µm, (1–)3–7-septate, pale olivaceous; mycelium internal; conidiophores fasciculate, arising from well-developed stromata, 25–75 µm diam; on *Pfaffia sericea* **P. pfaffiae**
Conidia at least partly catenate and/or superficial mycelium with solitary conidiophores formed and stromata lacking 2
- 2 (1) Superficial hyphae with solitary conidiophores formed; stromata lacking (mycovello-siella-like species) 3
Superficial hyphae and solitary conidiophores lacking; conidiophores fasciculate; stromata developed (phaeoramularia-like species) 4
- 3 (2) Conidiophores relatively long, 10–200 × 3–7 µm, longer conidiophores pluriseptate; on *Cyathula achyranthoides* **P. cyathulae**
Conidiophores shorter, 5–30 × 3–5 µm, 0–1-septate; on *Iresine* spp. **P. gonoclada**
- 4 (2) Conidia usually cylindrical or subcylindrical, hyaline or subhyaline, 20–60 × 2–5 µm, 0–5-septate; conidiophores narrow, 1.5–5 µm wide; on *Iresine diffusa* **P. gilbertii**
Conidial shape variable, cylindrical, fusiform to obclavate, olivaceous to olivaceous-brown, 3–8 µm wide; conidiophores broader, 2–8 µm 5
- 5 (4) Conidiophores occasionally branched; on *Iresine diffusa* **P. iresines**
Conidiophores unbranched; on *Gomphrena* and *Pfaffia* spp. **P. gomphrenicola**

Tabular key to *Passalora* species on *Amaranthaceae* according to host genera

Cyathula

A single species **P. cyathulae**

Gomphrena

A single species **P. gomphrenicola**

Iresine

- 1 Stromata lacking; conidiophores solitary, arising from superficial hyphae, 5–30 µm long, 0–1-septate **P. gonoclada**
Stromata developed; superficial hyphae and solitary conidiophores absent; conidiophores fasciculate, 20–60(–110) µm long, 0–5-septate 2
- 2 (1) Conidia usually cylindrical or subcylindrical, hyaline or subhyaline, 20–60 × 3.5–6 µm; conidiophores narrow, 1.5–5 µm wide, unbranched **P. gilbertii**
Conidial shape variable, cylindrical, fusiform to obclavate, olivaceous to olivaceous-brown, 3–8 µm wide; conidiophores broader, 4–6(–8) µm, occasionally branched **P. iresines**

Pfaffia

- 1 Conidia in chains, ellipsoid, ovoid, broadly fusiform, subcylindrical, (10–)15–60 × 3–8 µm, (0–)1–4(–5)-septate **P. gomphrenicola**
 Conidia solitary, obclavate-cylindrical, 30–85 × 3.5–6 µm, (1–)3–7-septate **P. pfaffiae**

Passalora species on Amaranthaceae

Passalora cyathulae (F. Stevens & Solheim) U. Braun & Crous, *Mycosphaerella and Anam.*: 148 (2003)

(Fig. 75)

Basionym: *Ragnhildiana cyathulae* F. Stevens & Solheim, *Mycologia* 23: 403 (1931).

Literature: Chupp (1954: 33).

Illustration: Solheim & Stevens (1931: 403, fig. 12).

Description: *Leaf spots* lacking or indistinct, yellowish discolorations or small circular, subcircular to somewhat irregular spots, 0.5–2 mm diam, brown above, olivaceous-brown below, margin indefinite. *Caespituli* hypophyllous, effuse, dark olivaceous. *Mycelium* internal and external; superficial hyphae emerging through stomata, branched, septate, 2–5 µm wide, subhyaline to pale brown, thin-walled, smooth. *Stromata* lacking. *Conidiophores* solitary, arising from superficial hyphae, lateral or terminal, erect to decumbent (differentiation between solitary conidiophores arising from superficial hyphae and long decumbent conidiophores difficult), straight, subcylindrical to geniculate-sinuous, unbranched to branched, length variable, 10–200 × 3–7 µm, aseptate to pluriseptate throughout, subhyaline to pale brown, thin-walled, smooth; conidiogenous cells integrated, terminal or intercalary, sometimes conidiophores reduced to conidiogenous cells, 10–30 µm long, conidiogenous loci conspicuous, thickened and darkened, (1.5–)2(–2.5) µm diam. *Conidia* in simple or sometimes branched chains, straight to somewhat curved, ellipsoid to cylindrical, 20–65 × 3–7.5 µm, 0–4-septate, subhyaline to pale brownish, thin-walled, smooth, ends short obconically truncate to rounded, about 2 µm wide, hila somewhat thickened and darkened.

Holotype: **Guyana**: Coverden, on *Cyathula achyranthoides*, *Amaranthaceae*, 4 Aug. 1922, F. L. Stevens 743 (ILL 11981).

Host range and distribution: Only known from the type collection.

Notes: This species is a typical mycovellosiella-like *Passalora* species with superficial hyphae with solitary conidiophores, thickened and darkened conidiogenous loci and conidial hila, and conidia formed in chains. Chupp (1954) confused *Ragnhildiana cyathulae* and the Indian *Cercospora cyathulae* described by Sydow (1937). Furthermore, he cited "*Cercospora cyathulae* (F. Stevens & Solheim) Syd." which is, however, incorrect. Sydow (in Sydow et al. 1937) described a new Indian species but did not introduced a new species based on *Ragnhildiana cyatheae*. Moreover, Chupp's (1954) description of *C. cyathulae* was based on

characters of both species, although the two species are readily distinguishable by obvious differences in the conidial length and septation.

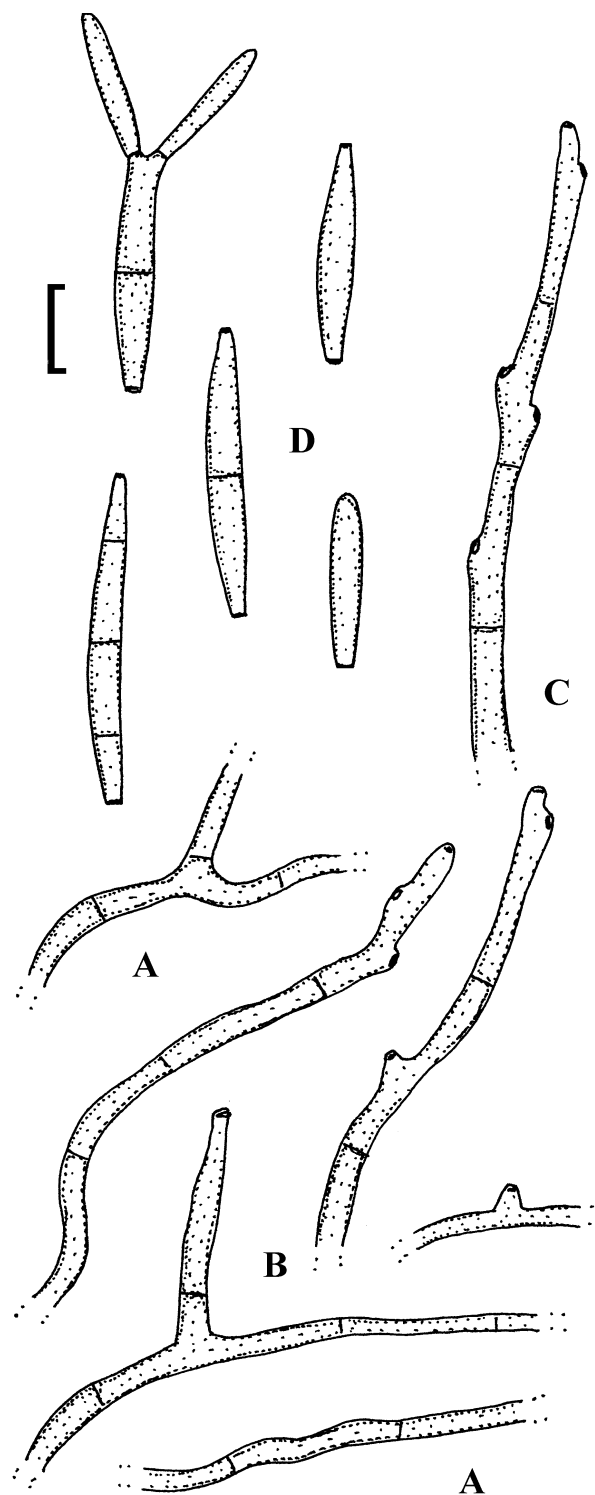


Fig. 75. *Passalora cyathulae* (ILL 11981, holotype). **A.** Superficial hyphae. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidiophore. **D.** Conidia. Bar = 10 µm.

Passalora gilbertii (Speg.) U. Braun, *Schlechtendalia* 5: 62 (2000).

(Fig. 76)

Basionym: *Cercospora gilbertii* Speg., *Anales Soc. Ci. Argent.* 10(1): 32 (1880).

Synonym: *Phaeoramularia gilbertii* (Speg.) U. Braun, *Schlechtendalia* 2: 11 (1999).

Literature: Saccardo (1886: 457), Chupp (1954: 33), Crous & Braun (2003: 197).

Illustration: Braun (1999: 12, fig. 14).

Exsiccatae: Syd., *Fungi Exot. Exs.* 1047.

Description: *Leaf spots* amphigenous, subcircular to irregular, 1–10 mm diam, oblong patches to 20 mm in length, brown to dingy grey, zonate, sometimes with

narrow brown margin. *Caespituli* amphigenous, punctiform, dark brown to blackish. *Mycelium* internal. *Stromata* well-developed, 20–60 µm diam, subglobose, immersed, brown. *Conidiophores* numerous, in loose to very dense fascicles, arising from stromata, erumpent, erect, filiform, flexuous, somewhat geniculate-sinuous, unbranched, 20–60 × 1.5–5 µm, aseptate to pluriseptate throughout, subhyaline to pale olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal, 10–30 µm long, conidiogenous loci subconspicuous, minute, 0.75–1.5 µm diam, slightly thickened and darkened-refractive. *Conidia* solitary or catenate, in short chains, subcylindrical, occasionally narrowly obclavate to fusiform, 20–60 × 2–5 µm, (0–)1–4-septate, hyaline or subhyaline, thin-walled, smooth, apex obtuse, subacute or truncate in catenate conidia, base short to long obconically truncate, about 1 µm wide, hila barely thickened, colourless to slightly darkened-refractive.

[*Holotype:* **Uruguay:** Montevideo, on *Iresine diffusa*, 1876, G. Gilbert 908 (not preserved).] *Neotype* (designated by Crous & Braun 2003): **Ecuador:** Quito, Pichincha Mt., 30 Sep. 1937, H. Sydow [Syd., *Fungi Exot. Exs.* 1047] (HBG). *Isoneotypes:* Syd., *Fungi Exot. Exs.* 1047 (e.g. BPI 436666).

Host range and distribution: On *Iresine diffusa* [*celosia*, *celosioides*, *paniculata*], *Amaranthaceae*, Africa (São Tomé e Príncipe), North America (Mexico), South America (Colombia, Ecuador, Uruguay), West Indies (Puerto Rico, Virgin Islands).

Note: The orthographic variant “*giberti*” sometimes used for this species is incorrect. The epithet was derived from the name of the collector, G. Gilbert. The phylogenetic affinity of *Cercospora gilbertii*, characterised by an unusual combination of morphological traits, is quite uncertain. Colourless conidia are in favour of *Cercospora* in its current circumscription, but catenate conidia and the structure of the conidiogenous loci argue against it. Molecular analyses are necessary to elucidate the true generic affinity of this species. For the interim we prefer to maintain this species in *Passalora* s. lat.

Passalora gomphrenicola (Speg.) U. Braun, *Schlechtendalia* 5: 64 (2000).

(Fig. 77)

Basionym: *Cercospora gomphrenicola* Speg., *Anales Soc. Ci. Argent.* 13: 29 (1882).

Synonym: *Phaeoramularia gomphrenicola* (Speg.) Munt.-Cvetk., *Lilloa* 30: 209 (1960).

Literature: Saccardo (1886: 457), Chupp (1954: 34), Ellis (1971: 308), Deighton (1979: 27), Pons & Sutton (1988: 31), Crous & Braun (2003: 201–202).

Illustrations: Muntañola (1960: 210–211, figs 16–17), Ellis (1971: 307, fig. 213), Deighton (1979: 27, fig. 13).

Exsiccatae: Speg., *Hongos Sud-Amer. Dec. Mycol. Argent.* 45.

Description: *Leaf spots* lacking or only visible as yellowish discolorations, turning dark olivaceous by abundant formation of caespituli, patches to 12 mm diam. *Caespituli*

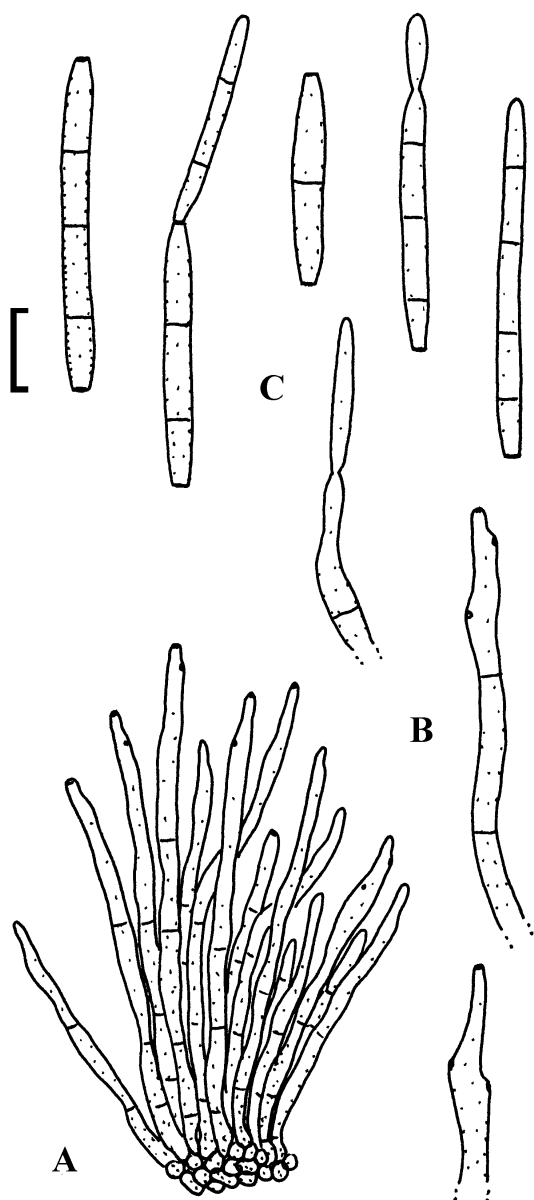


Fig. 76. *Passalora gilbertii* (Syd., *Fungi Exot. Exs.* 1047, HBG, neotype). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

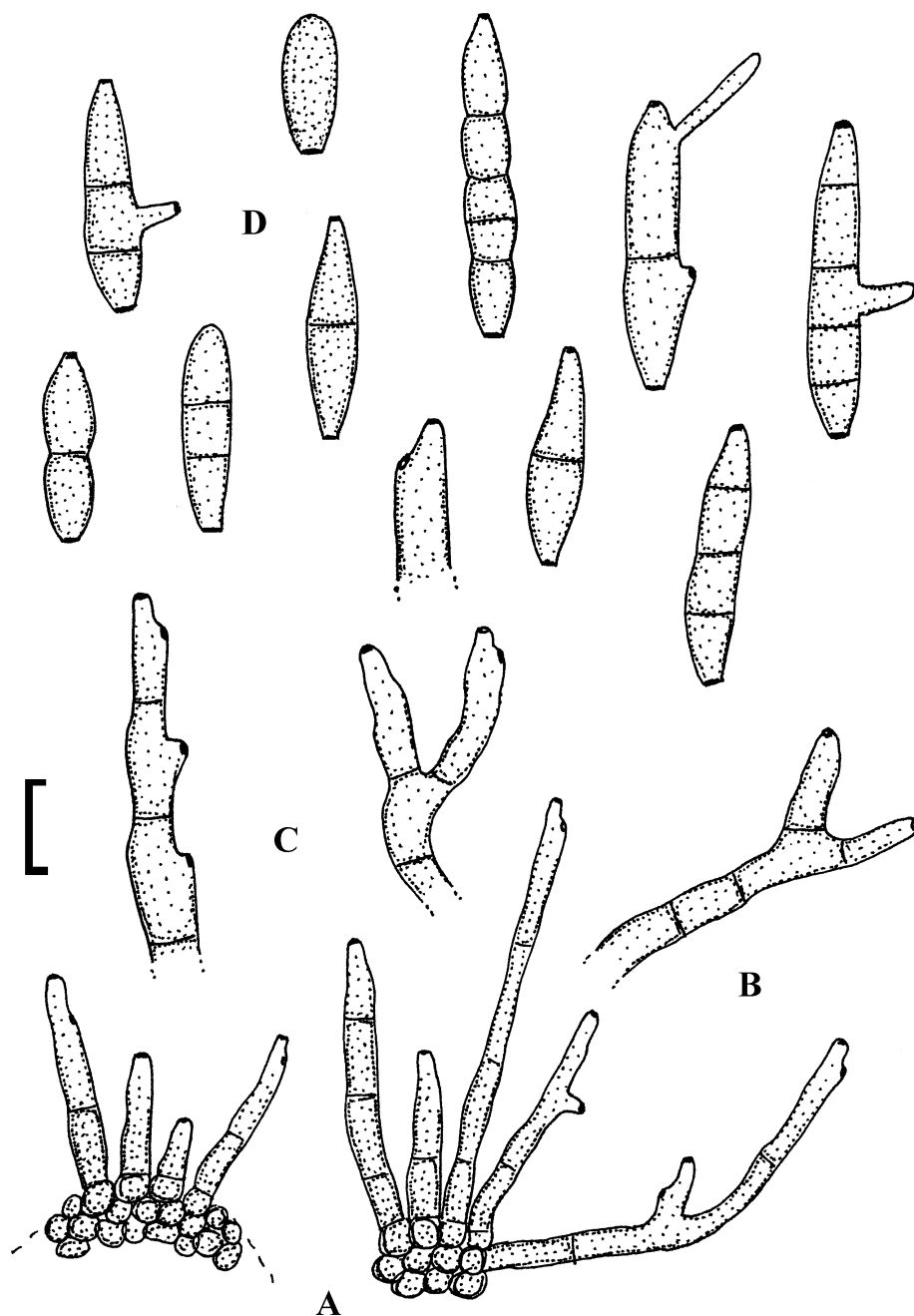


Fig. 77. *Passalora gomphrenicola* (LPS 914, holotype). **A.** Conidiophore fascicles. **B.** Solitary conidiophores arising from superficial hypha. **C.** Conidiophores. **D.** Conidia. Bar = 10 μ m.

hypophyllous, effuse, olivaceous, forming small patches or confluent. *Mycelium* internal, hyphae colourless, branched, septate, 2–4 μ m wide. *Stromata* absent or small, about 10–70 μ m diam, substomatal, pale to brown, composed of swollen hyphal cells, circular to somewhat angular-irregular in outline, 2–6 μ m diam. *Conidiophores* in small to large, loose to dense fascicles, larger fascicles composed of 50 or even more conidiophores, arising from internal hyphae or from stromata, through stomata or erumpent, erect to decumbent, straight, subcylindrical-conical to sinuous or somewhat geniculate-sinuous, unbranched or branched, decumbent branched conidiophores reminiscent of and confusable with superficial hyphae giving rise to solitary conidiophores, 20–70(–90) \times 2–7 μ m, often irregular in width, 1–5-septate, often somewhat constricted at the septa, pale olivaceous to olivaceous-brown, darker in mass, thin-walled, smooth; conidiogenous cells integrated, terminal, intercalary

and occasionally pleurogenous, 5–30 μ m long, proliferation sympodial, occasionally percurrent, conidiogenous loci conspicuous, sometimes subdenticulate, thickened and darkened, 1.5–2.5 μ m wide. *Conidia* in simple or branched chains, ellipsoid, ovoid, broadly fusiform, subcylindrical, straight to slightly curved, (10–)15–60 \times 3–8 μ m, (0–)1–4(–5)-septate, occasionally somewhat constricted at the septa, pale olivaceous to olivaceous-brown, thin-walled, smooth, occasionally faintly rough, apex rounded to truncate in catenate conidia, base short obconically truncate, (1.5–)2(–2.5) μ m wide, hila somewhat thickened and darkened.

Holotype: **Argentina:** Buenos Aires, Palermo, on *Pfaffia glomerata*, Feb. 1881, C. Spegazzini (LPS 914). **Isotypes:** Speg., Hongos Sud-Amer. Dec. Mycol. Argent. 45, e.g. BPI 436740, 722393; K(M) IMI 7706 (slide), MICH 15302.

Host range and distribution: On *Gomphrena globosa*, *Pfaffia* (*glomerata* [*glauca*, *stenophylla*; *Gomphrena glauca*], *iresinoides*), *Amaranthaceae*, Africa (South Africa, Transvaal), South America (Argentina, Brazil, Venezuela).

Passalora gonatoclada (Syd.) U. Braun & Crous, *Mycosphaerella and Anam.*: 202 (2003).

(Fig. 78)

Basionym: *Cercospora gonatoclada* Syd., *Ann. Mycol.* **23**: 425 (1925).

Synonyms: *Ragnhildiana gonatoclada* (Syd.) F. Stevens & Solheim, *Mycologia* **23**: 403 (1931).

Mycovellosiella gonatoclada (Syd.) Munt.-Cvetk., *Lilloa* **30**: 106 & 208 (1960), *nom. inval.* (Art. 41.5).

Mycovellosiella gonatoclada (Syd.) Deighton, *Mycol. Pap.* **137**: 69 (1974).

Literature: Chupp (1954: 35), Deighton (1974: 69), Crous & Braun (2003: 202).

Illustration: Muntañola (1960: 208, fig. 15 A).

Description: Leaf spots indistinct, formed as yellowish discolorations on the upper leaf surface. Colonies hypophyllous, effuse, brownish. Mycelium internal and external; superficial hyphae solitary, occasionally intertwined, branched, septate, subhyaline to olivaceous-brown, 2–8 µm wide (sterile hyphae paler and narrow, fertile hyphae with conidiophores broader and darker), thin-walled, smooth. Stromata lacking. Conidiophores solitary, arising from superficial hyphae, lateral or terminal, erect to decumbent, 5–30 × 3–10 µm, 0–1-septate (decumbent threats with terminal conidiophores may be much longer and pluriseptate), sometimes with intercalary cells giving rise to minute peg-like protuberances with a single terminal scar, only about 2–5 µm long and wide, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth; conidiophores mostly reduced to conidiogenous cells, conidiogenous loci conspicuous, somewhat thickened and darkened, 1.5–2 µm diam. Conidia catenate, in simple or branched chains, ellipsoid-ovoid to cylindrical, 12–60 × 3.5–8.5 µm, (0–)1–7-septate, subhyaline to pale olivaceous-brown or brownish, thin-walled, smooth, apex rounded in terminal primary conidia or conically truncate in secondary (catenate) conidia, subdenticulate when in branched chains, base short obconically truncate, 1.5–2.5 µm wide, hila thickened and darkened.

Lectotype (designated here, MycoBank, MBT202803):

Costa Rica: San José, La Caja, on *Iresine calcea*, 7 Jan. 1925, H. Sydow [Syd., *Fungi Exot. Exs.* 930] (S-F57194). **Isolectotypes:** Syd., *Fungi Exot. Exs.* 930, e.g., BPI 436742, CUP, HBG, K(M) IMI 7704, MICH 15303, NY 937030. Former syntypes (type locality but from 5 Jan. 1925 [H. Sydow, *Fungi itin. Costaricensi Coll.* 12]): E 417850, ILL 10671.

Host range and distribution: On *Iresine* (*calea*, *diffusa* [*paniculata*]), *Amaranthaceae*, Central America (Costa Rica), West Indies (Puerto Rico, Virgin Islands).

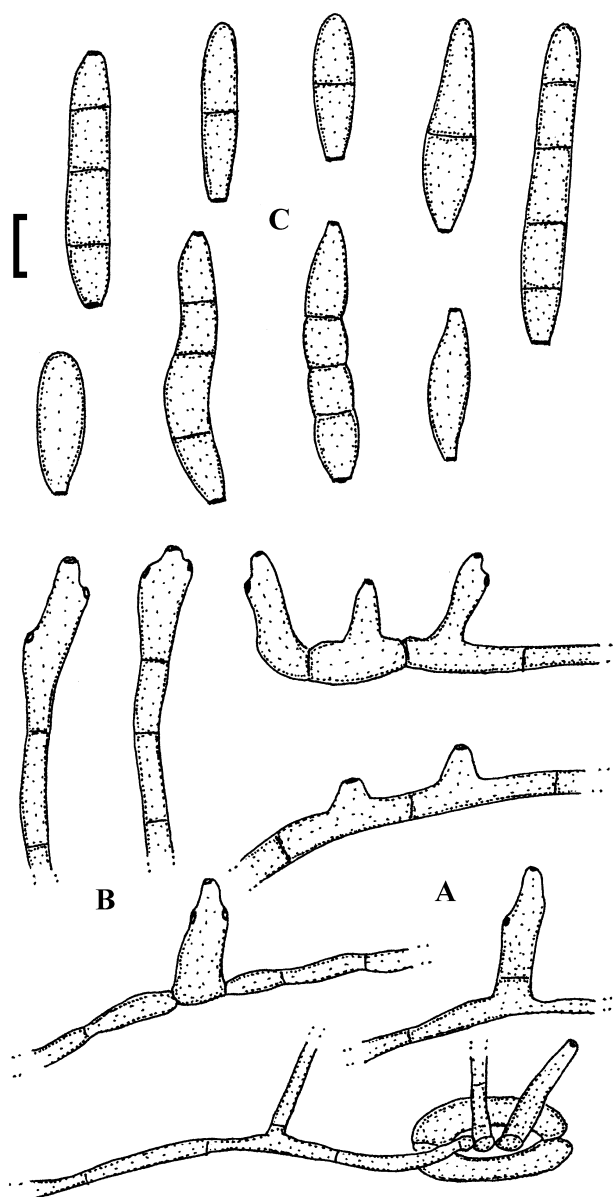


Fig. 78. *Passalora gonatoclada* (Syd., *Fungi Exot. Exs.* 930, CUP, isoelectotype). **A.** Solitary conidiophores arising from superficial hyphae and through a stoma. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

Passalora iresines (Munt.-Cvetk.) U. Braun & Crous, *Mycosphaerella and Anam.*: 456 (2003)

(Fig. 79)

Basionym: *Phaeoramularia iresines* Munt.-Cvetk., *Lilloa* **30**: 216 (1960).

Illustrations: Muntañola (1960: 217, fig. 20, 219, fig. 21).

Description: Leaf spots formed as epiphyllous chlorotic discolorations, scattered to confluent, circular, elliptical, diffuse, violaceous, finally ochraceous to brown. Caespituli hypophyllous, velutinous, brownish to brown-olivaceous, patches subcircular or sometimes vein-limited. Mycelium internal. Stromata moderately large, substomatal, olivaceous. Conidiophores in divergent to dense fascicles, arising from stromata, through stomata, erect, flexuous, geniculate-sinuous, simple or occasionally branched, 40–

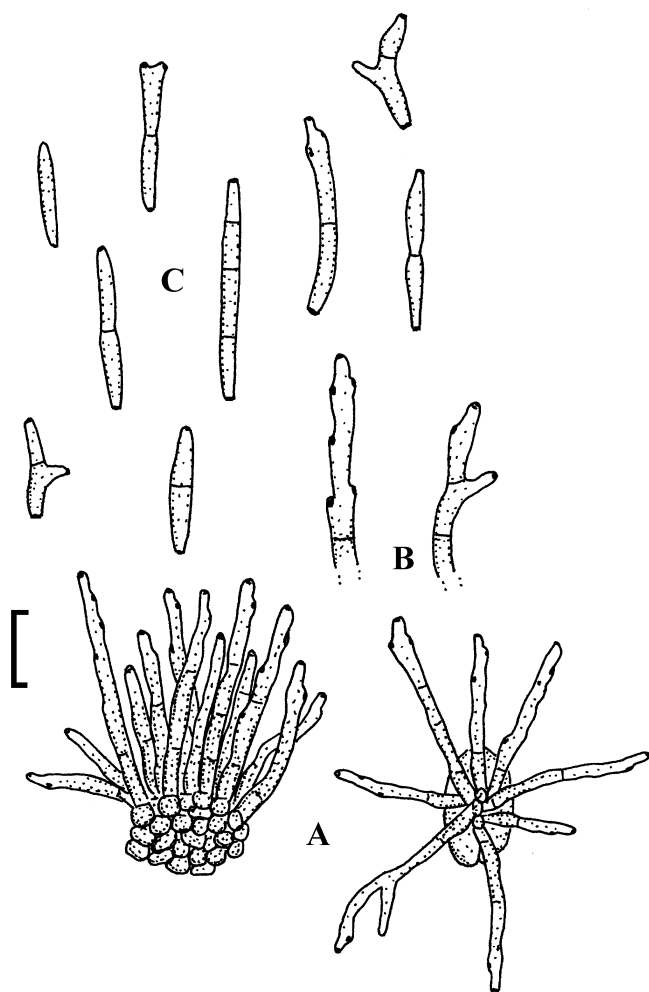


Fig. 79. *Passalora iresines* (based on Muntañola 1960: 217, fig. 20, 219, fig. 21). **A.** Conidiophore fascicles. **B.** Conidiophore tips. **C.** Conidia. Bar = 10 μ m.

60(–110) \times 4–6(–8) μ m, branchlets 15–20(–50) μ m long, base sometimes swollen, aseptate to sparingly septate, often somewhat constricted at septa, olivaceous, paler towards the tip, subhyaline, thin-walled, smooth; conidiogenous cells integrated, terminal or intercalary, sometimes lateral, or conidiophores reduced to conidiogenous cells, conidiogenous loci conspicuous, thickened and darkened. *Conidia* catenate, in simple or branched chains, variable in shape and size, cylindrical, fusiform, obclavate, straight to curved, rarely sigmoid, 20–60 \times 3.5–6 μ m, 0–3-septate, olivaceous, thin-walled, smooth, base obconically truncate, with a single somewhat thickened and darkened hilum, apex rounded or with 1–3 hila.

Holotype: **Argentina:** Tucumán: El Cerro San Javier, on *Iresine diffusa*, 1 Aug. 1959, M. Muntañola (not traced).

Host range and distribution: On *Iresine diffusa* [polymorpha], *Amaranthaceae*, South America (Argentina).

Note: Muntañola (1960) designated a collection in her private herbarium (no. 600) as type. Muntañola-Cvetković died in 2011. The fate of her herbarium could not yet be clarified. After her time in South America, she worked in Serbia (University

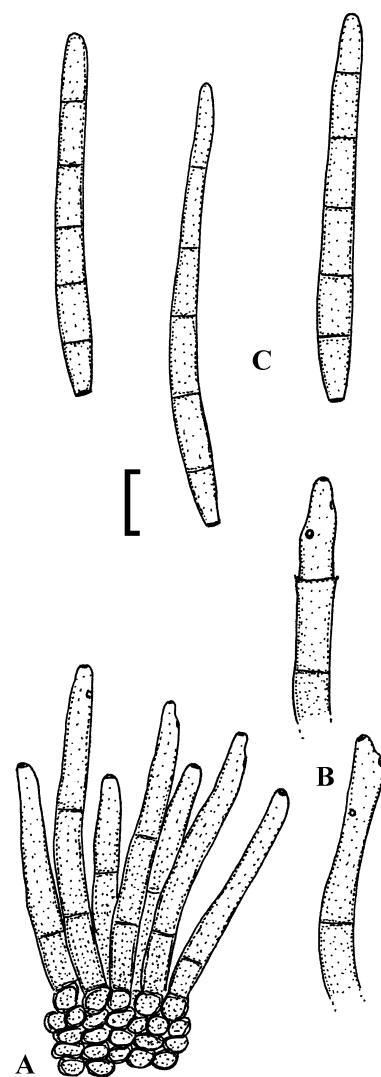


Fig. 80. *Passalora pfaffiae* (CUP 40533, holotype). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

of Belgrade, Faculty of Biology), and after her retirement she moved to Portugal (University of Barcelona, Faculty of Biology), but Muntañola's herbarium is not preserved in Belgrad (J. Vukojevic, pers. comm.). A part of her herbarium, mainly fungi collected in Portugal, are preserved in BCN, but South American collections are not included (according to the curator of BCN, Barcelona).

Passalora pfaffiae (Chupp) U. Braun & Crous, *Mycosphaerella and Anam.*: 318 (2003). (Fig. 80)

Basionym: *Cercospora pfaffiae* Chupp, *Monograph Cercospora*: 35 (1954).

Literature: Chupp (1954: 35).

Description: *Leaf spots* amphigenous, circular to somewhat angular-irregular, 1–6 mm diam, pale greyish brown to dingy grey, with narrow marginal line, somewhat raised. *Caespituli* amphigenous, punctiform, scattered, dark brown to blackish. *Mycelium* internal. *Stromata* substomatal to immersed, subglobose to oblong, 25–75 μ m diam, dark

brown, composed of subglobose cells, 2.5–5 µm diam. *Conidiophores* in moderately large fascicles, divergent to mostly dense, arising from stromata, erect, subcylindrical, sinuous or slightly geniculate, unbranched, 10–70 × 3.5–6 µm, 0–3-septate, pale olivaceous to brown, thin-walled, smooth; conidiogenous cells integrated, terminal, occasionally conidiophores reduced to conidiogenous cells, 10–30 µm long, proliferation sympodial, occasionally percurrent, with fine annellations, conidiogenous loci conspicuous, small, 1–1.5 µm diam, somewhat thickened and darkened. *Conidia* solitary, obclavate-cylindrical, straight to somewhat curved, 30–85 × 3.5–6 µm, (1–)3–7-septate, pale olivaceous, thin-walled, smooth, apex obtuse, base short obconically truncate, 1.5–2 µm wide, hila somewhat thickened and darkened.

Holotype: **Brazil:** *Rio Grande do Sul:* Taquari, Parque Apicola, on *Pfaffia sericea*, *Amaranthaceae*, 31 Dec. 1946, J. P. da Costa Neto 2224 (CUP 40533).

Host range and distribution: Only known from the type collection.

Note: Based on a combination of conspicuous conidiogenous loci, slightly thickened and darkened, 1–1.5 µm wide, and obclavate-cylindrical, pale olivaceous conidia, Crous & Braun (2003) reallocated this species to *Passalora*.

Pseudocercospora

Key to *Pseudocercospora* species on *Amaranthaceae*

- 1 Superficial hyphae with solitary conidiophores developed 2
Superficial hyphae with solitary conidiophores lacking; conidiophores consistently fasciculate 4
- 2 (1) Conidia broad, 4–8 µm; on *Cyathula tomentosa* ***P. cyathulae***
Conidia narrower, 2–4 µm 3
- 3 (2) Conidia obclavate-cylindrical, pale olivaceous-brown; on *Alternanthera* spp. ***P. alternantherae***
Conidia cylindrical, subacicular to obclavate-cylindrical, subhyaline to pale olivaceous;
on *Celosia* spp. ***P. celosiarum***
- 4 (1) Conidiophores 10–100 µm long; conidia narrowly filiform-subcylindrical, subacicular or narrowly obclavate-cylindrical,
(40–)60–130(–150) × 1.5–3.5 µm, 2–12-septate, hila 1–1.5 µm wide; on *Gomphrena* spp. ***P. globosae***
Conidiophores much shorter, 10–35 µm long; conidia obclavate-cylindrical, 10–90 µm long, 0–10-septate or,
if conidiophores longer, conidia 2.5–6 µm wide; on other hosts 5
- 5 (4) Conidiophores 10–70 × 3–5.5 µm, 0–5-septate; conidia 25–135 × 2.5–6 µm, 3–16-septate, pale olivaceous-brown;
on *Alternanthera* spp. ***P. alternantherae-nodosae***
Conidiophores shorter, 5–35 µm long, only 0–1(–2)-septate; conidia shorter and narrower, 15–90 × 2–4 µm or
subhyaline if broader; on other hosts 6
- 6 (5) Stromata lacking; conidiophores in small fascicles; on *Gomphrena* spp. ***P. gomphrenae***
Stromata developed, 10–100 µm diam; conidiophores mostly in larger fascicles arising from stromata 7
- 7 (6) Stromata large, 10–100 µm diam; conidia (2–)3–5(–6) µm wide, hila 1.5–3 µm wide, subhyaline; on *Gomphrena*
pulchella ***P. gomphrenae-pulchellae***
Stromata smaller, 10–65 µm; conidia 2–3.5 µm wide, hila 1–2 µm wide, subhyaline to pale olivaceous-brown;
on other hosts 8
- 8 (7) Conidia mostly narrowly cylindrical with truncate base, pale olivaceous-brown;
on *Amaranthus* spp. ***P. amaranthicola***
Conidia obclavate-cylindrical, base short obconically truncate, subhyaline to pale olivaceous; on other hosts
..... 9
- 9 (8) Forming distinct leaf spots; caespituli hypophyllous, punctiform; stromata substomatal; on *Chamissoa altissima*
..... ***P. chamissoana***
Leaf spots lacking or only with indistinct discolorations; caespituli epiphyllous, forming sooty patches; stromata
immersed; on *Froelichia* sp. ***P. froelichiae***

Tabular key to *Pseudocercospora* species on *Amaranthaceae* according to host genera***Alternanthera***

- 1 Superficial hyphae with solitary conidiophores developed ***P. alternantherae***
 Superficial hyphae and solitary conidiophores absent; conidiophores only in fascicles ***P. alternantherae-nodosae***

Amaranthus

- A single species ***P. amaranthicola***

Celosia

- A single species ***P. celosiarum***

Chamissoa

- A single species ***P. chamissoana***

Cyathula

- A single species ***P. cyathulae***

Froelichia

- A single species ***P. froelichiae***

Gomphrena

- 1 Stromata lacking, conidiophores in small fascicles ***P. gomphrenae***
 Stromata developed, 10–100 µm diam; conidiophores in small to large fascicles, arising from stromata 2
- 2 (1) Stromata 10–100 µm diam; conidiophores 10–30 × 2.5–6 µm; conidia obclavate-cylindrical, (2–)3–5(–6) µm wide, subhyaline; on *Gomphrena pulchella* ***P. gomphrenae-pulchellae***
 Stromata 10–40 µm diam; conidiophores 10–100 × 1.5–5.5 µm; conidia filiform-subcylindrical, subacicular to narrowly obclavate-cylindrical, narrower, 1.5–3.5 µm, subhyaline to pale olivaceous-brown; on *Gomphrena globosa* ***P. globosae***

Pseudocercospora* species on *Amaranthaceae

Pseudocercospora alternantherae J.M. Yen *et al.*,
Mycotaxon **16**: 39 (1982).
 (Fig. 81)

Literature: Kamal (2010: 147).

Illustration: Yen *et al.* (1982: 40, fig. 3).

Description: Leaf spots amphigenous, scattered, oval to fusiform, 3–12 × 2–4 mm, often confluent, greyish brown, margin indistinct. *Caespituli* amphigenous, mostly hypophyllous, not very conspicuous. *Mycelium* internal and external, superficial; hyphae branched, septate, olivaceous-brown, thin-walled, smooth, 2–5 µm wide, internal hyphae 2–5 µm wide, external hyphae 2–3.5 µm wide. *Stromata* globose, substomatal, 20–40 µm diam, brown to dark brown. *Conidiophores* in small to well-developed fascicles, about 5–60, divergent to dense, arising from stromata, through stomata, and solitary, arising from superficial hyphae, lateral, erect, straight, subcylindrical to sinuous, slightly geniculate, unbranched, 15–55 × 3–4.5 µm, 0–3-septate, pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidiogenous loci inconspicuous, unthickened, not darkened. *Conidia* solitary, obclavate-

cylindrical, straight to slightly curved, 30–90 × 2.5–4 µm, 3–10-septate, pale olivaceous-brown, thin-walled, smooth, apex obtuse, base short obconically truncate, hila unthickened, not darkened.

Holotype: **India**: West Bengal: Purulea, on *Alternanthera* sp., *Amaranthaceae*, 7 Jan. 1981, B. K. Das Pcc4483 [Yen 10583] (not traced).

Host range and distribution: Only known from the type collection.

Notes: Yen *et al.* (1982) cited “LAM, Yen #10583” as holotype. The mycological LAM collections are now housed at UC, but the type material concerned could currently not be traced. It is possible that this material is still among numerous unincorporated Yen collections in UC (unnamed, only provided with a collection number).

Pseudocercospora alternantherae-nodiflorae (Sawada) Goh & W.H. Hsieh, *Trans. Mycol. Soc. Republ. China* **2**: 135 (1987).
 (Fig. 82)

Basionym: *Cercospora alternantherae-nodiflorae* Sawada, *Rep. Gov. Agric. Res. Inst. Taiwan* **35**: 106 (1928).

Synonyms: *Cercospora alternanthericola* Pavgi & U.P. Singh, *Mycopathol. Mycol. Appl.* **27**: 93 (1965) [*holotype*: **India**:

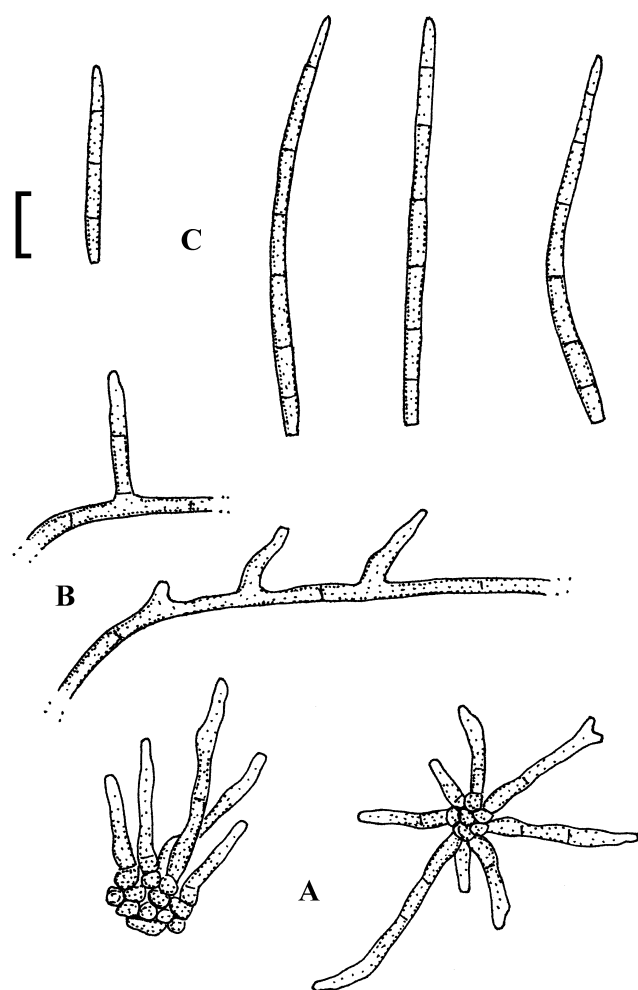


Fig. 81. *Pseudocercospora alternantherae* (based on Yen *et al.* 1982: 40, fig. 3). **A.** Conidiophore fascicles. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidia. Bar = 10 µm.

Uttar Pradesh: Varanasi, on Alternanthera sessilis, 17 Aug. 1963, U. P. Singh (MSP 273).

Pseudocercospora alternanthericola (Pavgi & U.P. Singh) Deighton, *Mycol. Pap.* **140**: 139 (1976).

Literature: Chupp (1954: 31), Hsieh & Goh (1990: 16), Guo & Hsieh (1995: 8), Guo *et al.* (1998: 19), Crous & Braun (2003: 53), Kamal (2010: 147).

Illustrations: Pavgi & Singh (1965: 94, pl. 1, figs 16–18), Hsieh & Goh (1990: 18, fig. 7), Guo & Hsieh (1995: 9, fig. 8), Guo *et al.* (1998: 19, fig. 8).

Description: Leaf spots at first indistinct or visible as small brown spots, about 2–4 mm diam, later lower leaf surface gradually turning brown, upper leaf surface also discoloured, leaves finally disfigured, faded, necrotic. *Caespituli* amphigenous, forming effuse, dark olivaceous patches, finally covering the whole leaf blade. *Mycelium* internal. *Stromata* small, substomatal, 10–20 µm diam, brown. *Conidiophores* in small to well-developed fascicles, 6–25, loose to moderately dense, arising from stromata, through stomata, erect, straight, subcylindrical to curved or distinctly geniculate-sinuous, unbranched, 10–70 ×

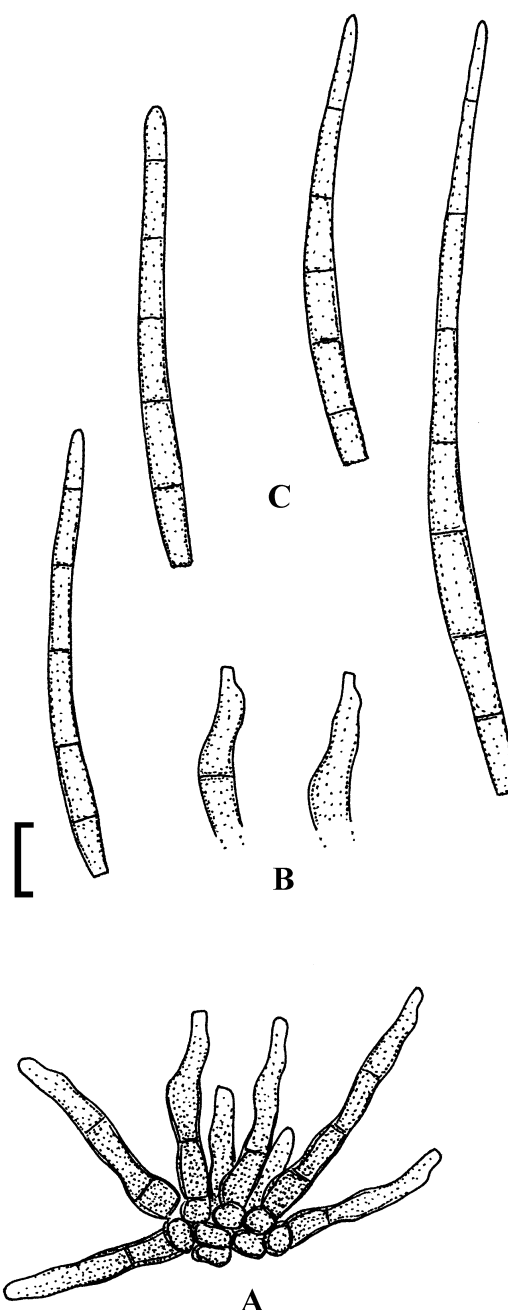


Fig. 82. *Pseudocercospora alternantherae-nodiflorae* (based on Hsieh & Goh (1990: 18, fig. 7). **A.** Conidiophore fascicle. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

3–5.5 µm, 0–5-septate, uniformly pale olivaceous-brown to brown, thin-walled, smooth; conidiogenous cells integrated, terminal, occasionally conidiophores reduced to conidiogenous cells, conidiogenous loci inconspicuous to visible as truncate or conically truncate tips or shoulders formed by sympodial proliferation, unthickened, not darkened. *Conidia* solitary obclavate-subcylindrical, straight to curved, 25–135 × 2.5–6 µm, 3–15-septate, pale olivaceous, thin-walled, smooth, apex obtuse, rounded to subacute, base obconically truncate, 2–2.5 µm wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202804): Taiwan: Taipei, on Alternanthera sessilis, 9 May 1924, K.

Sawada (NTU-PPE, hb. Sawada). *Isolectotypes*: HMAS 05136, TNS-F-220608.

Host range and distribution: On *Alternanthera sessilis* [nodiflora], *Alternanthera* sp., *Amaranthaceae*, Asia (China; India, Uttar Pradesh; Taiwan).

Notes: Three duplicates of an additional syntype collection from Taiwan have been examined [Taipei, on *Alternanthera sessilis*, 5 Aug. 1907, K. Kawakami (BPI 432466, 432467; K(M) IMI 31945). *Cercospora alternathericola*, described from India on *Alternanthera sessilis* is barely distinct from *Pseudocercospora alternantherae-nodiflorae* and is therefore reduced to synonymy.

Pseudocercospora amaranthicola (J.M. Yen) J.M. Yen, *Bull. Trimestriel Soc. Mycol. France* **94**: 385 (1978).

(Fig. 83)

Basionym: *Cercospora amaranthicola* J.M. Yen, *Bull. Trimestriel Soc. Mycol. France* **93**: 145 (1977).

Synonym: *Cercoseptoria amaranthicola* (J.M. Yen) J.M. Yen, *Bull. Trimestriel Soc. Mycol. France* **97**: 91 (1981); "as *amaranticola*".

Literature: Hsieh & Goh (1990: 17), Guo & Hsieh (1995: 357), Guo et al. (1998: 376), Crous & Braun (2003: 55).

Illustrations: Yen (1977: 146, fig. 1A–C), Guo et al. (1998: 377, fig. 307).

Description: *Leaf spots* circular or subcircular, 0.5–4 mm diam, pale brown, margin brown. *Caespituli* epiphyllous, rarely amphigenous, punctiform, dark brown to blackish. *Mycelium* internal. *Stromata* immersed, globose or subglobose, 25–65 µm diam, dark brown. *Conidiophores* in well-developed, dense fascicles, arising from stromata, erumpent, erect, straight, flexuous, subcylindrical to geniculate-sinuous, unbranched or occasionally branched, 8–30 × 2.5–3.5 µm, 0–3-septate, pale olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidiogenous loci inconspicuous or visible as truncate tips or lateral shoulders caused by sympodial proliferation. *Conidia* solitary, narrowly cylindrical or only slightly obclavate-cylindrical, straight to curved, 15–80 × 2–3 µm, 3–10-septate, pale olivaceous-brown, apex obtuse or subobtuse, base truncate to somewhat obconically truncate, hila neither thickened nor darkened.

Holotype: **Taiwan**: Peikuoshan, Yuanlin, Changhua Hsien, on *Amaranthus tricolor* [mangostanus], *Amaranthaceae*, 30 Oct. 1971, J. M. Yen 71282.

Host range and distribution: Only known from the type collection.

Notes: Type material of this species could not be traced, neither in PC nor UC. It is possible that the material concerned is still among the numerous untreated Yen collection in the latter herbarium.

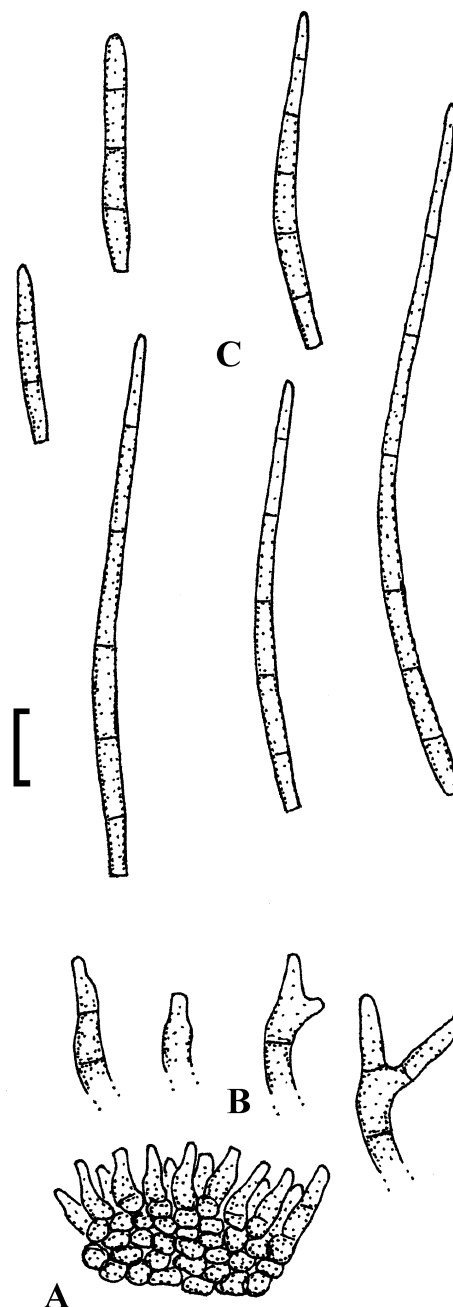


Fig. 83. *Pseudocercospora amaranthicola* (based on Yen 1977: 146, fig. 1 A–C). **A.** Conidiophore fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 µm.

Pseudocercospora celosiarum (A.K. Kar & M. Mandal) Deighton, *Mycol. Pap.* **140**: 141 (1976). (Fig. 84)

Basionym: *Cercospora celosiarum* A.K. Kar & M. Mandal, *Trans. Brit. Mycol. Soc.* **54**: 423 (1970).

Literature: Katsuki (1965: 9, as "*C. celosiae*"), Guo & Hsieh (1995: 9), Guo et al. (1998: 20), Nakashima et al. (2002: 98), Crous & Braun (2003: 114), Kamal (2010: 162).

Illustrations: Kar & Mandal (1970: 423, fig. 1), Guo & Hsieh (1995: 10, fig. 9), Guo et al. (1998: 20, fig. 9).

Description: *Leaf spots* amphigenous, subcircular to angular-

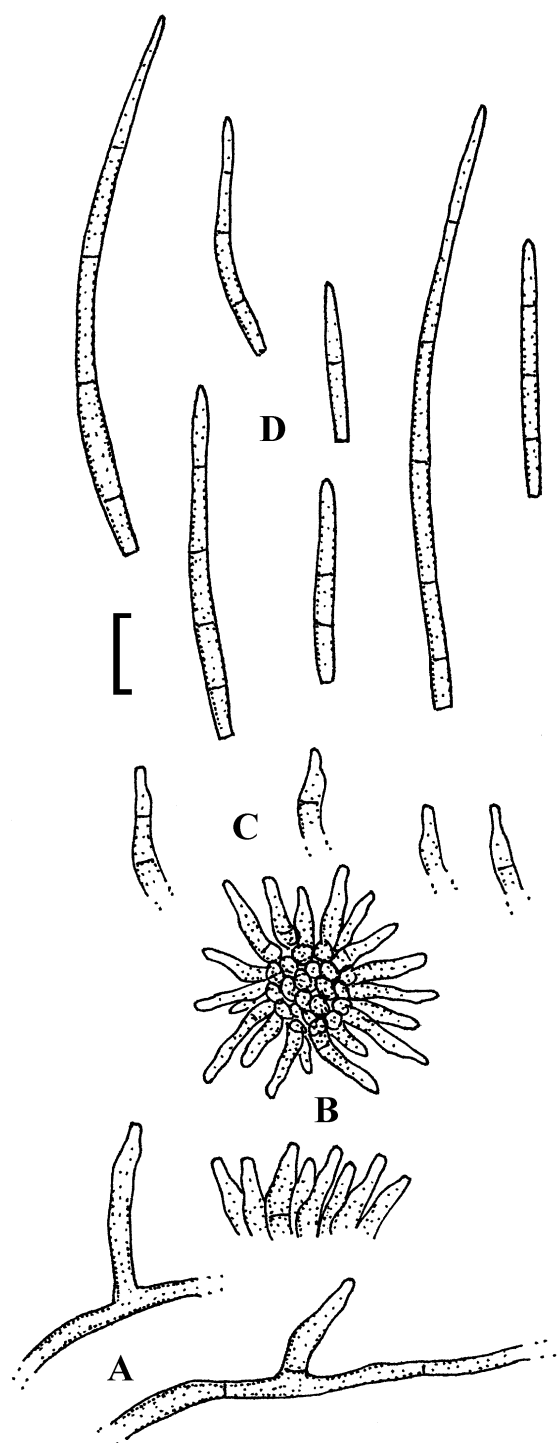


Fig. 84. *Pseudocercospora celosiarum* (K(M) IMI 135869, holotype). **A.** Conidiophore fascicles. **B.** Solitary conidiophores arising from superficial hyphae. **C.** Conidiophores **D.** Conidia. Bar = 10 µm.

irregular or diffuse, size variable, 1.5–30 mm diam, brown, dull brown to dark greyish brown, margin narrow, darker brown to reddish brown. *Caespituli* amphigenous, punctiform, dark brown or more greyish by abundant conidiation. *Mycelium* internal and external; superficial hyphae, if present, emerging through stomata, branched, septate, 2–3 µm diam, subhyaline, thin-walled, smooth. *Stromata* almost lacking to well-developed, substomatal, subglobose, sometimes oblong, 5–60 µm diam, pale olivaceous to brown. *Conidiophores* in small to large fascicles, divergent to very dense, arising from

stromata, through stomata or solitary, arising from superficial hyphae, lateral, erect, straight, subcylindrical-conical, not to strongly geniculate-sinuous, unbranched, 5–75 × 2–4 µm, 0–5-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous, neither thickened nor darkened. *Conidia* solitary, cylindrical, subacicular, long acicular to obclavate-cylindrical, 10–105 × 2–4 µm, straight to curved, 0–10-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex obtuse to subacute, base truncate to short obconically truncate, 1.5–2 µm wide, hila unthickened, not darkened.

Holotype: **India:** West Bengal: Calcutta, Presidency College, on *Celosia argentea*, 17 Feb. 1967, A. K. Kar & M. Mandal (K(M) IMI 135869).

Host range and distribution: On *Celosia argentea* [*cristata*], *Amaranthaceae*, Asia (China; India, West Bengal; Japan).

Notes: The conidial width in this species is uniform, but the length rather variable, and relatively short in the type material. The length of conidiophores is also rather variable. Japanese collections of this species were originally wrongly identified and published as *Cercospora celosiae* (Katsuki 1965), which was clarified in Nakashima *et al.* (2002).

Pseudocercospora chamissoana R.F. Castañeda & U. Braun, *Cryptog. Bot.* 1: 51 (1989). (Fig. 85)

Illustration: Castañeda Ruiz & Braun (1989: 47, pl. 3, fig. 18).

Description: *Leaf spots* amphigenous, subcircular to irregular, 1–10 mm diam, brownish, later pale, margin indefinite or narrow, light to dark brown, formed as marginal line. *Caespituli* hypophyllous, punctiform, dark brown to blackish, scattered. *Mycelium* internal. *Stromata* substomatal, 20–45 µm diam, brown, composed of swollen hyphal cells, subglobose to angular in outline, 2–5 µm diam. *Conidiophores* in small to moderately large fascicles, divergent to dense, arising from stromata, through stomata, erect, straight, subcylindrical-conical to geniculate-sinuous, unbranched, 5–25 × 2–5 µm, 0–1-septate, pale brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5–20 µm long, conidiogenous loci inconspicuous to subdentate, but always unthickened and not darkened. *Conidia* solitary, obclavate-cylindrical to somewhat fusoid, straight to slightly curved, 40–65 × 2–3 µm, indistinctly 3–6-septate, subhyaline to pale olivaceous, thin-walled, smooth, apex obtuse to subacute, base obconically truncate, 1–2 µm wide, hila neither thickened nor darkened.

Holotype: **Cuba:** Granma: Guisa, Los Corrales, on *Chamissoa altissima*, *Amaranthaceae*, 15 Jun. 1987, R. F. Castañeda Ruiz (INIFAT, C87/167). *Isotype:* HAL 1651 F.

Host range and distribution: Only known from the type collection.

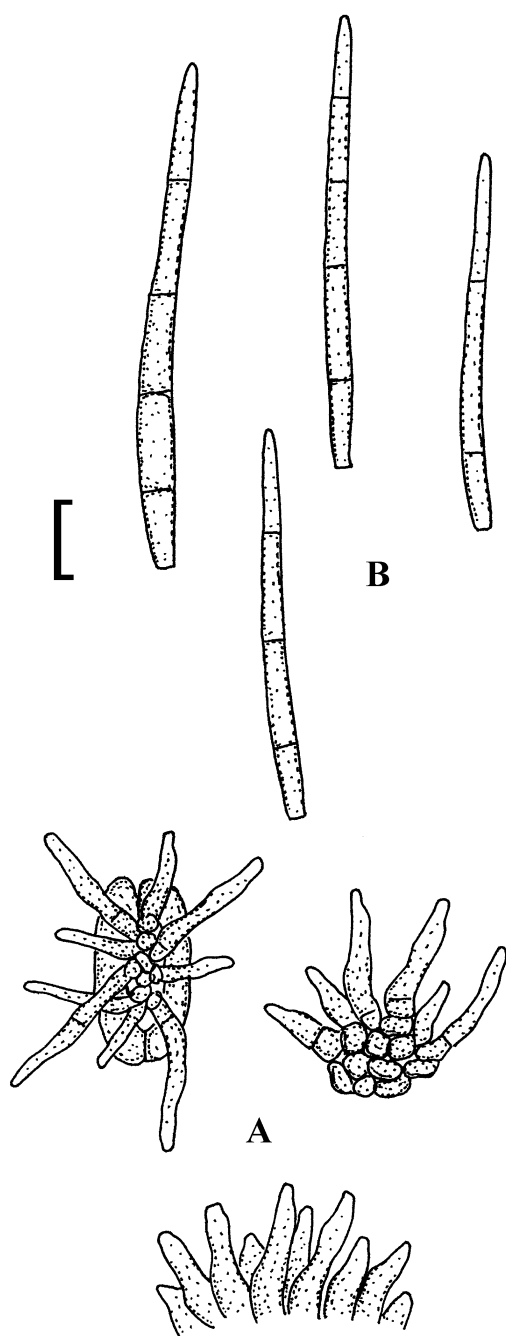


Fig. 85. *Pseudocercospora chamissoana* (HAL 1651 F, isotype). A. Conidiophores fascicles. B. Conidia. Bar = 10 µm.

***Pseudocercospora cyathulae* (Syd.) U. Braun, comb. nov.**

Mycobank MB814580

(Fig. 86)

Basionym: *Cercospora cyathulae* Syd., *Ann. Mycol.* **35**: 239 (1937).

Literature: Chupp (1954: 33), Vasudeva (1963: 95), Kamal (2010: 115–116).

Description: Leaf spots lacking or almost so, on the upper leaf surface only formed as yellowish discolorations, 5–10 mm diam or larger, diffuse, below visible as subcircular brownish patches caused by colonies of the fungus, margin indefinite.

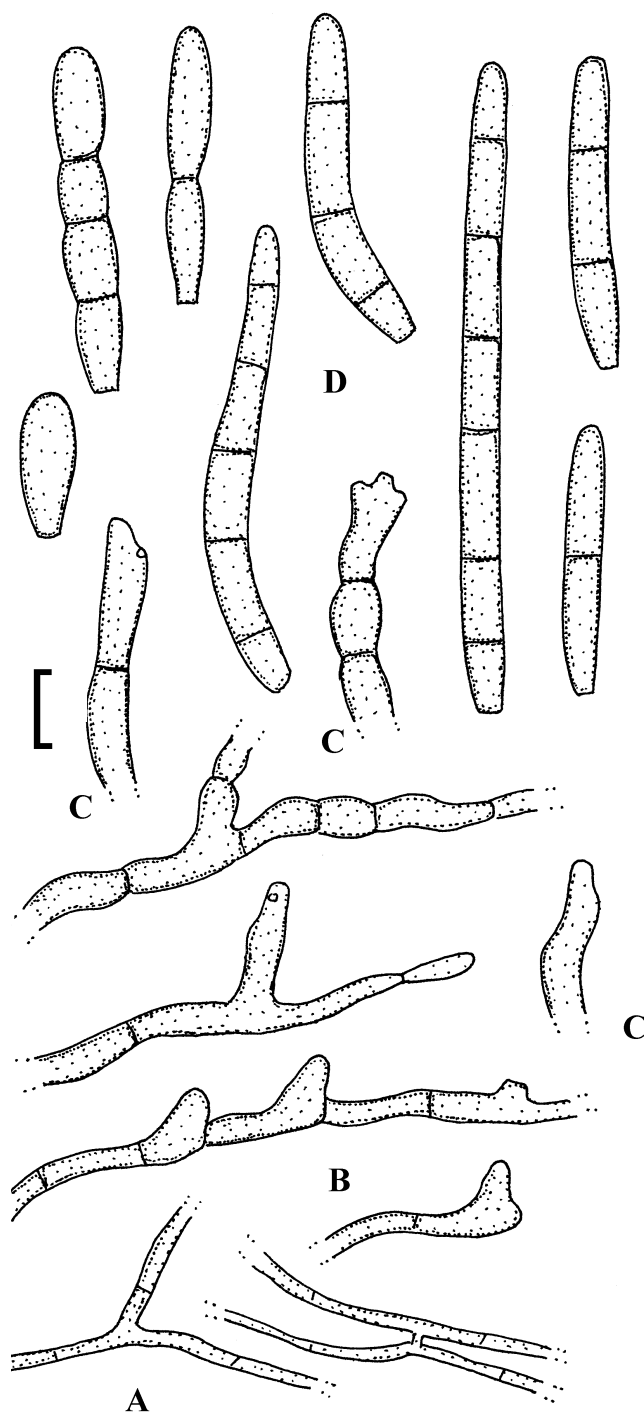


Fig. 86. *Pseudocercospora cyathulae* (CUP 39581, holotype). A. Superficial hyphae. B. Solitary conidiophores arising from superficial hyphae. C. Conidiophores. D. Conidia. Bar = 10 µm.

Caespituli hypophyllous, effuse, brownish or dark olivaceous-brown. *Mycelium* internal and external; superficial hyphae plagiotropous or climbing leaf hairs, forming a dense net or cover, branched, sometimes anastomosing, septate, sterile hyphae narrow, 1–3.5 µm, subhyaline to pale olivaceous or olivaceous-brown, mostly without constrictions at septa, fertile hyphae with conidiophores or conidiogenous cells broader and darker, 3–8 µm wide, swollen cells occasionally to 12 µm diam, olivaceous to medium olivaceous-brown, often with constrictions at septa, thin-walled, smooth. *Stromata* lacking. *Conidiophores* solitary, arising from superficial hyphae,

lateral or terminal, length indefinite (forming decumbent fertile threats, but differentiation between individual conidiophores and hyphal portions difficult or even impossible), shorter lateral conidiophores arising from decumbent threats about 5–30 μm long, width about 3–8 μm , erect to decumbent, straight, subcylindrical to geniculate-sinuous, unbranched or branched, aseptate to pluriseptate, olivaceous, olivaceous-brown to light brown, thin-walled, smooth; conidiogenous cells integrated, terminal, 10–25 μm long, conidiogenous loci inconspicuous to subconspicuous by being slightly refractive, but unthickened, occasionally visible in front view as minute circle (paracercosporoid) or subdenticulate, 1.5–2 μm diam. *Conidia* solitary, rarely in short chains, cylindrical to vermiform, shorter conidia sometimes ovoid, obovoid, short cylindrical, broadly fusiform, straight to curved, occasionally sigmoid, 15–100 \times (4–)5–8 μm , 0–7-septate, occasionally somewhat constricted at the septa, pale brown, thin-walled, smooth, apex broadly rounded, rarely subtruncate or somewhat attenuated, base rounded to short obconically truncate, 1.5–2 μm wide, hila unthickened, not darkened, sometimes somewhat darker by being refractive.

Holotype: India: Uttarakhand: Dehradun, Mussoorie, Rajpur, *Cyathula tomentosa*, *Amaranthaceae*, 18 Sep. 1933, R. N. Tandon 205 (CUP 39581).

Host range and distribution: Only known from the type collection.

Notes: The CUP collection is the only material of this species that could be traced and examined. Chupp (1954) confused this species with *Ragnhildiana cyathulae* (\equiv *Passalora cyathulae*) and used the wrong citation "*Cercospora cyathulae* (Stev. & Solh.) Sydow" although Sydow (1937) did not intend to introduce a new combination based on *Ragnhildiana cyathulae*. He undoubtedly published a new species without any reference to *R. cyathulae*. The two species are neither conspecific nor congeneric.

Pseudocercospora froelichiae U. Braun & F.O. Freire, *Cryptog. Mycol.* **25**: 230 (2004). (Fig. 87)

Illustrations: Braun & Freire (2004: 231, fig. 7).

Description: *Leaf spots* lacking or only with inconspicuous discolorations, yellowish ochraceous, brownish or occasionally purplish, 1–5 mm diam. *Colonies* formed on the upper leaf surface as sooty patches caused by dense fructification. *Mycelium* internal. *Stromata* immersed or somewhat erumpent, 10–50 μm diam, olivaceous-brown, composed of swollen hyphal cells, 2–7 μm diam, walls somewhat thickened. *Conidiophores* in small to moderately large fascicles, loose to dense, arising from stromata, erumpent, erect, straight, subcylindrical-conical, slightly geniculate-sinuous, unbranched, 10–35 \times 2–5 μm , 0–1(–2)-septate, pale olivaceous to olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–25 μm long, conidiogenous loci inconspicuous. *Conidia* solitary,

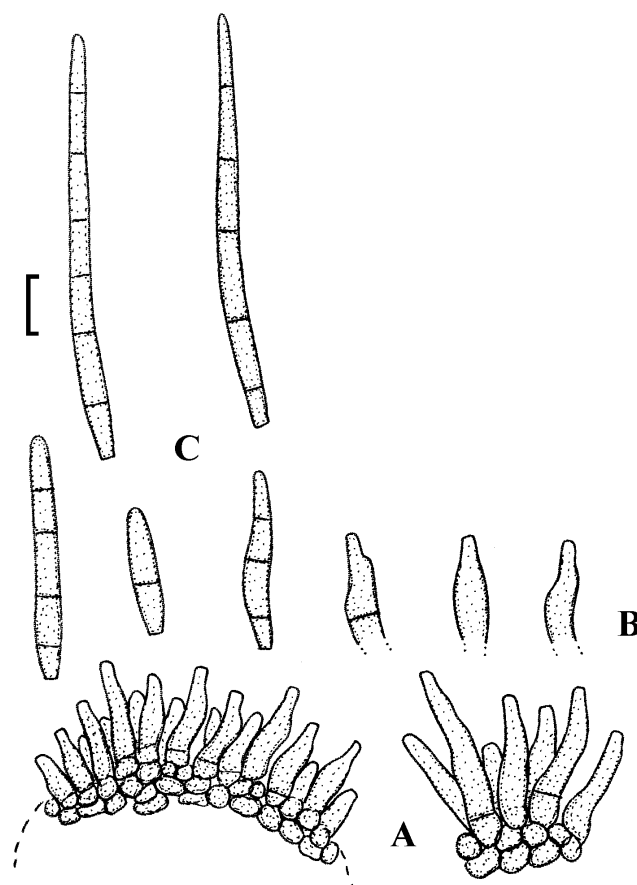


Fig. 87. *Pseudocercospora froelichiae* (HAL 1779 F, holotype). **A.** Conidiophores fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μm .

obclavate-cylindrical, 10–80 \times 2–3.5 μm , 1–7-septate, pale olivaceous, thin-walled, smooth, apex obtuse or subacute, base short obconically truncate, 1–2 μm wide, hila unthickened, not darkened.

Holotype: Brazil: State of Ceará: Paraipaba City, on *Froelichia* sp., 6 Aug. 2002, F. O. Freire (HAL 1779 F). **Paratype:** Brazil: Rio Grande do Norte State: Areia Branca City, on *Froelichia* sp., 25 Aug. 2003, F. O. Freire (HAL 1780 F).

Host range and distribution: On *Froelichia* sp., *Amaranthaceae*, South America (Brazil, State of Ceará, Rio Grande do Norte State).

Note: *Pseudocercospora froelichiae* on *Froelichia* sp. (*Amaranthaceae*, *Gomphrenoideae*) is morphologically close to *P. chamissoana*, described from Cuba on *Chamissoa altissima* (*Amaranthaceae*, *Amaranthoideae*), which differs, however, in forming distinct leaf spots, hypophyllous caespituli and substomatal stromata.

Pseudocercospora globosae (J.M. Yen) Deighton, *Mycol. Pap.* **140**: 144 (1976). (Fig. 88)

Basionym: *Cercospora globosae* J.M. Yen, *Rev. Mycol.* **29**: 224 (1964).

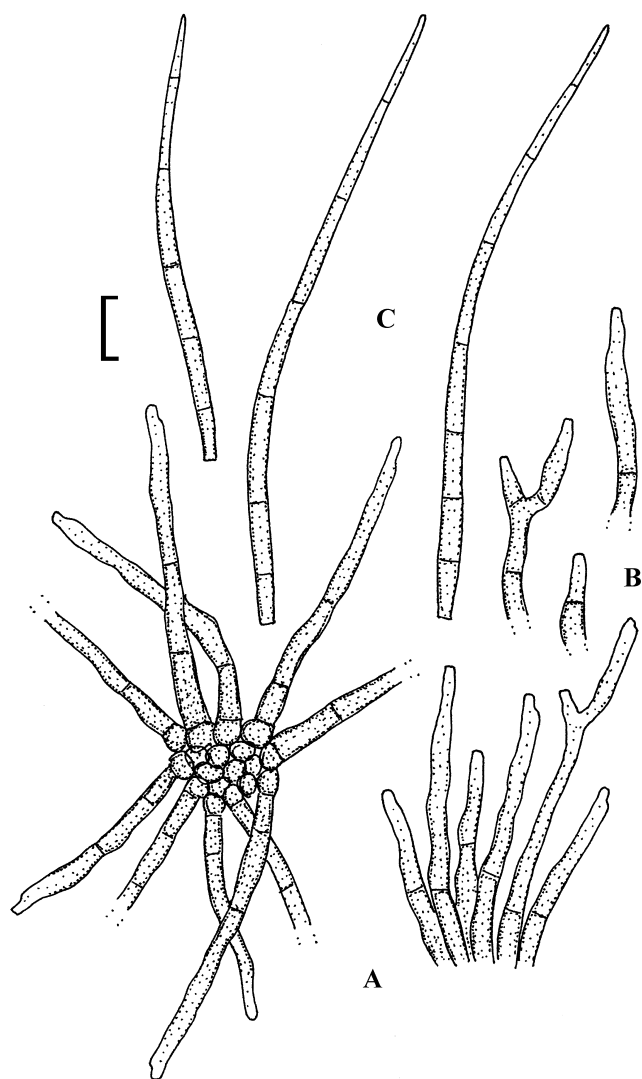


Fig. 88. *Pseudocercospora globosae* (PC, holotype). A. Conidiophores fascicles. B. Conidiophores. C. Conidia. Bar = 10 µm.

Literature: Yen & Lim (1980: 177), Braun & Sivapalan (1999: 14), Crous & Braun (2003: 199).

Illustrations: Yen (1964: 227, fig. 7), Yen & Lim (1980: 239, fig. 42).

Description: *Leaf spots* at first inconspicuous, later subcircular to somewhat irregular, greyish white to dark grey by abundant fungal colonies. *Caespituli* amphigenous, effuse to dense, velvety, greyish white. *Mycelium* internal. *Stromata* subglobose to somewhat irregular, substomatal to immersed, 10–40 µm diam, yellowish brown. *Conidiophores* in small to moderately large fascicles, loose to moderately dense, arising from stromata, through stomata or erumpent, straight and subcylindrical-conical to distinctly geniculate-sinuous, unbranched to branched, 10–100 × 1.5–5.5 µm, 0–6-septate, subhyaline to pale yellowish or olivaceous-brown, thin-walled, smooth; conidiogenous cells integrated, terminal, occasionally intercalary, 10–25 µm long, conidiogenous loci inconspicuous to distinctly denticle-like, subcylindrical-conical, apex truncate, 1–2 µm wide, always unthickened and not darkened. *Conidia* solitary, filiform-subcylindrical,

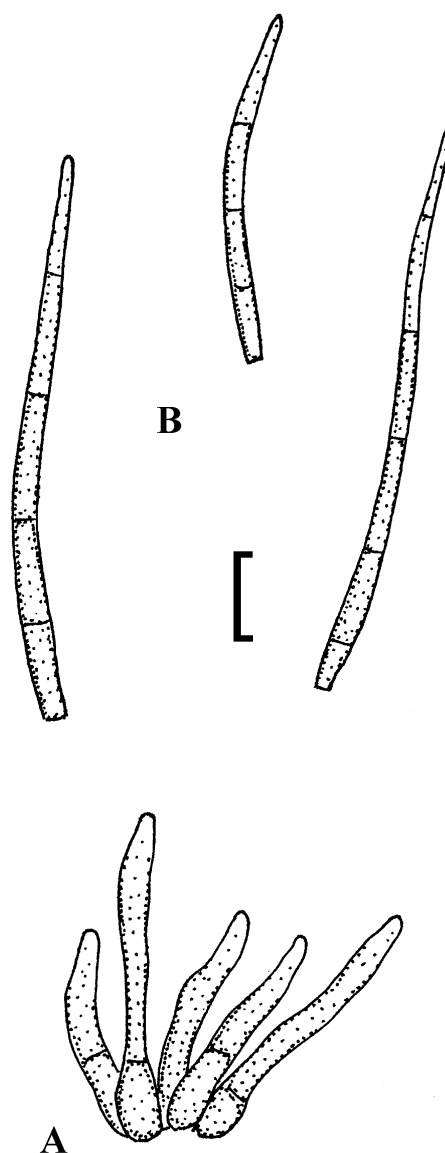


Fig. 89. *Pseudocercospora gomphrenae* (based on Hsieh & Goh 1990: 19, fig. 8). A. Conidiophore fascicle. B. Conidia. Bar = 10 µm.

subacicular to narrowly obclavate-subcylindrical, (40–)60–130(–150) × 1.5–3.5 µm, 2–12-septate, subhyaline to very pale olivaceous or olivaceous-brown, thin-walled, smooth, apex subacute to subobtuse, base truncate to short or long obconically truncate, 1–1.5 µm wide, hila unthickened, not darkened.

Holotype: **Singapore:** Katong, on *Gomphrena globosa*, 20 Apr. 1964, S. H. Yen 19 (PC).

Host range and distribution: On *Gomphrena (globosa, Gomphrena sp.)*, *Amaranthaceae*, Asia (Brunei, Singapore).

Pseudocercospora gomphrenae Goh & W.H. Hsieh, *Trans. Mycol. Soc. Republ. China* 4(2–3): 8 (1989). (Fig. 89)

Synonym: *Cercospora gomphrenae* Sawada, *Rep. Gov. Res. Inst. Formosa* 85: 107 (1943), *nom. inval.* (Art. 39.1) [type: see *Pseudocercospora gomphrenae*].

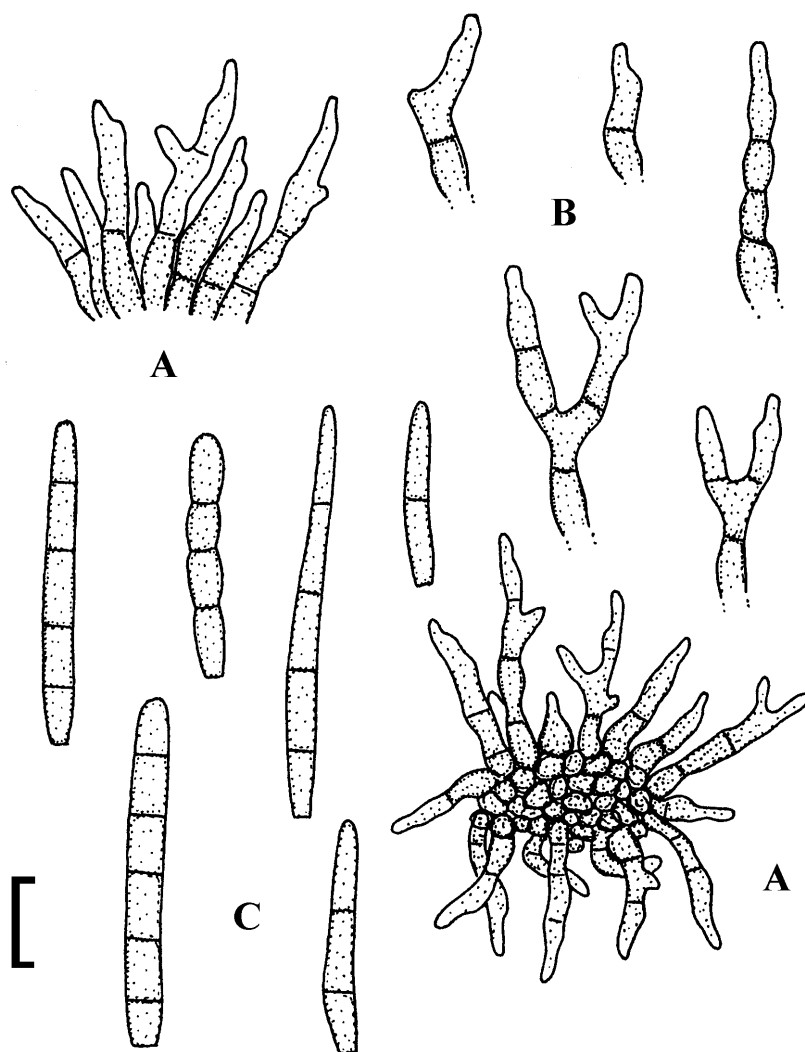


Fig. 90. *Pseudocercospora gomphrenae-pulchellae* (HAL 1635 F, isotype). **A.** Conidiophores fascicles. **B.** Conidiophores. **C.** Conidia. Bar = 10 μ m.

Literature: Hsieh & Goh (1990: 18–19), Guo & Hsieh (1995: 10), Guo *et al.* (1998: 21).

Illustrations: Hsieh & Goh (1990: 19, fig. 8), Guo & Hsieh (1995: 11, fig. 10), Guo *et al.* (1998: 21, fig. 10).

Description: *Leaf spots* amphigenous, subcircular to elliptical, 2–10 mm diam, centre greyish white, margin reddish, on the upper surface with yellowish halo, below olivaceous with dark olivaceous to brown border. *Caespituli* hypophyllous. *Mycelium* internal. *Stromata* lacking. *Conidiophores* in small fascicles, not more than six, arising from internal hyphae, erect, straight, subcylindrical to somewhat attenuated towards the tip, slightly geniculate-sinuous, unbranched, 20–30 \times 3.5–4 μ m, 0–2-septate, olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidiogenous loci inconspicuous, unthickened, not darkened. *Conidia* solitary, cylindrical, obclavate-cylindrical to subacicular, straight to curved, 30–90 \times 2.5–4 μ m, 4–7-septate, subhyaline to very pale olivaceous, thin-walled, smooth, apex obtuse to subacute, base subtruncate to obconically truncate, about 1.5–2 μ m wide, hila unthickened, not darkened.

Lectotype (designated here, MycoBank, MBT202805): **Taiwan:** Taipei, on *Gomphrena globosa*, 15 Nov. 1925, K. Sawada (NTU-PPE, hb. Sawada). *Isolectotype:* TNS-F-220432

Host range and distribution: On *Gomphrena globosa*, *Amaranthaceae*, Asia (Brunei, China, Iran, Singapore, Taiwan).

Notes: Records of this species from Iran are based on Hedjaroude (1976) and Bakshi *et al.* (2012).

***Pseudocercospora gomphrenae-pulchellae* U. Braun *et al.*, *Fungal Diversity* 6: 28 (2001). (Fig. 90)**

Illustration: Braun *et al.* (2001: 29, fig. 8).

Description: *Leaf spots* amphigenous, subcircular to irregular, 1–5(–8) mm diam, centre pale, yellowish to ochraceous or greyish white, margin narrow, dark reddish brown to blackish brown. *Caespituli* amphigenous, punctiform, loose to dense, blackish, later greyish white by abundant

conidial formation. *Mycelium* internal; hyphae branched, 1.5–6 µm diam, septate, subhyaline to pale brown, smooth. *Stromata* substomatal to intraepidermal, 10–100 µm diam, olivaceous-brown. *Conidiophores* in small to large fascicles, moderately dense, arising from stromata, through stomata or erumpent. erect, straight, subcylindrical or attenuated towards the tip, geniculate-sinuous, unbranched, 10–30 × 2.5–6 µm, 0–1-septate, subhyaline to pale olivaceous, thin-walled, smooth; conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10–25 µm long, conidiogenous loci inconspicuous, occasionally subconspicuous, paracercosporoid, i.e. rim very slightly darkened or thickened, in front view visible as minute circle. *Conidia* solitary, obclavate-cylindrical, 20–90 × (2–)3–5(–6) µm, (0–)1–8-septate, subhyaline (with a very pale greenish tinge), smooth, apex obtuse, occasionally subacute, base rounded, truncate to obconically truncate, 1.5–3 µm wide, hila unthickened, not darkened.

Holotype: **Argentina:** Prov. Buenos Aires: Bahia Blanca, on *Gomphrena pulchella*, *Amaranthaceae*, 17 Mar. 2000, R. Delhey 1340 (BB). **Isotype:** HAL 1635 F.

Host range and distribution: Only known from the type collection.

Note: *Pseudocercospora gomphrenae* differs from *P. gomphrenae-pulchellae* in lacking stromata, and *P. globosa* has smaller stromata, much longer, septate conidiophores and narrower conidia, only 1.5–3.5 µm wide.

Doubtful, excluded and insufficiently known species

Pseudocercospora gomphrenicola Chidd., *Sci. & Cult.* **22**: 511 (1957).

Synonym: *Alternaria gomphrenae* Togashi, *Bull. Imp. Coll. Agric. For. Morioka* **9**: 6 (1926).

Literature: Kamal (2010: 179).

Type: **India:** Maharashtra: Pune, on *Gomphrena globosa*, *P. Chiddarwar* (otherwise not specified).

Note: Type material of this species was not indicated, but based on the original description and illustration of a species with cicatrized conidiogenous cells and rostrate conidia, Kamal (2010) reduced *P. gomphrenicola* to synonymy with *Alternaria gomphrenae*.

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REFERENCES

- Ahmad S, Iqbal SH, Khalid AN (1997) *Fungi of Pakistan*. Lahore: Sultan Ahmad Mycological Society of Pakistan.
- Alfieri JrSA, Langdon KR, Wehburg C, Kimbrough JW (1984) Index of Plant Diseases on Florida (Revised). *Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Bulletin* **11**: 1–389.
- Atkinson GF (1892) Some *Cercosporae* from Alabama. *Journal of the Elisha Mitchel Science Society* **8**: 33–76.
- Bagyanarayana G, Jagadeeswar P, Braun U (1991) Miscellaneous notes on Indian *Cercosporae*. *Mycotaxon* **42**: 319–326.
- Bakalova GG, Borisova TI (2010) *Cercosporoid Hyphomycetous Fungi*. [Fungi of Bulgaria vol. 7.] Sofia: Institute of Botany, Bulgarian Academy of Sciences.
- Bakshi M, Arzanlou M, Babai-Ahari A (2012) Comprehensive check list of cercosporoid fungi from Iran. *Plant Pathology & Quarantine* **2**: 44–55.
- Bhartiya HD, Narayan S, Singh AN, Kumari N (2003) Additions to *Cercospora* from North-Eastern Uttar Pradesh. *Indian Phytopathology* **56**: 270–275.
- Bhartiya HD, Singh AN, Kumari N, Singh PN (1998) [“1997”] Follicolous fungi in the forest flora of North-Eastern Uttar Pradesh. *Kavaka* **25**: 43–51.
- Boedijn KB (1961) The genus *Cercospora* in Indonesia. *Nova Hedwigia* **3**: 411–436.
- Braun U (1992) Taxonomic notes on some species of the *Cercospora* complex. *Nova Hedwigia* **55**: 211–221.
- Braun U (1993) Taxonomic notes on some species of the *Cercospora* complex (III). *Mycotaxon* **48**: 275–298.
- Braun U (1995) *A monograph of Cercospora, Ramularia and allied genera (phytopathogenic hyphomycetes)*. Vol. 1. Eching: IHW-Verlag.
- Braun U (1998) *A monograph of Cercospora, Ramularia and allied genera (phytopathogenic hyphomycetes)*. Vol. 2. Eching: IHW-Verlag.
- Braun, U. (1999) Taxonomic notes on some species of the *Cercospora* complex (V). *Schlechtendalia* **2**: 1–28.
- Braun U (2000a) Miscellaneous notes on some micromycetes. *Schlechtendalia* **5**: 31–56.
- Braun U (2000b) Annotated list of *Cercospora* spp. described by C. Spegazzini. *Schlechtendalia* **5**: 57–79.
- Braun U (2001) Taxonomic notes on some species of the *Cercospora* complex (VII). *Fungal Diversity* **8**: 41–71.
- Braun U, Castañeda Ruiz RF (1991) *Cercospora* and allied genera of Cuba (II). *Cryptogamic Botany* **2–3**: 289–297.
- Braun U, Crous PW (2005) Additions and corrections to names published in *Cercospora* and *Passalora*. *Mycotaxon* **92**: 395–416.
- Braun U, Freire FCO (2004) Some cercosporoid hyphomycetes from Brazil – III. *Cryptogamic Mycologie* **25**: 221–244.
- Braun U, Freire FCO (2006) Some cercosporoid hyphomycetes from Brazil – IV. *Cryptogamic Mycologie* **27**: 231–248.
- Braun U, Hill CF (2002) Some new micromycetes from New Zealand. *Mycological Progress* **1**: 19–30.
- Braun U, Mel'nik VA (1997) Cercosporoid fungi from Russia and adjacent countries. *Trudy Botanicheskogo Instituta Imeni V.L. Komarova, Rossijskaya Akademiya Nauk St. Petersburg* **20**: 1–130.
- Braun U, Sivapalan A (1999) Cercosporoid hyphomycetes from

- Brunei. *Fungal Diversity* **3**: 1–27.
- Braun U, Urtiaga R (2008) New species and new records of cercosporoid hyphomycetes from Venezuela. *Feddes Repertorium* **119**: 484–506.
- Braun U, Urtiaga R (2013) New species and new records of cercosporoid hyphomycetes from Cuba and Venezuela (Part 2). *Mycosphere* **4**: 165–205.
- Braun U, Bagyanarayana G, Jagadeeswar P (1992) Notes on Indian *Cercosporae* and allied genera (II). *International Journal of Mycology and Lichenology* **4**: 361–374.
- Braun U, Crous PW, Nakashima C (2014) Cercosporoid fungi (*Mycosphaerellaceae*) 2. Species on monocots (*Acoraceae* to *Xyridaceae*, excluding *Poaceae*). *IMA Fungus* **5**: 203–390.
- Braun U, Crous PW, Nakashima C (2015) Cercosporoid fungi (*Mycosphaerellaceae*) 3. Species on monocots (*Poaceae*, true grasses). *IMA Fungus* **6**: 25–97.
- Braun U, Crous PW, Pons N (2002) Annotated list of *Cercospora* species (epithets a–b) described by C. Chupp. *Feddes Repertorium* **113**: 112–127.
- Braun U, Delhey R, Kiehr M (2001) Notes on some cercosporoid hyphomycetes from Argentina. *Fungal Diversity* **6**: 18–33.
- Braun U, Nakashima C, Crous PW (2013) Cercosporoid fungi (*Mycosphaerellaceae*) 1. Species on other fungi, *Pteridophyta* and *Gymnospermae*. *IMA Fungus* **4**: 265–345.
- Bridson GDR (2004a) *BPH–2, Periodicals with botanical content, constituting a second edition of Botanico-Periodicum-Huntianum*. Vol. 1, A–M. Pittsburgh: Hunt Institute for Botanical Documentation.
- Bridson GDR (2004b) *BPH–2, Periodicals with botanical content, constituting a second edition of Botanico-Periodicum-Huntianum*. Vol. 2, N–Z. Pittsburgh: Hunt Institute for Botanical Documentation.
- Brummitt RK, Powell CE (1992) *Authors of Plant Names*. Kew: Royal Botanic Gardens.
- Castañeda Ruiz RF, Braun U (1989) *Cercospora* and allied genera of Cuba (I). *Cryptogamic Botany* **1**: 42–55.
- Chaudhary RK, Narayan S, Uphadhyay UC, Rao GP (1995) New species of *Cercospora* causing foliar diseases in weed flora of sugarcane crop in North-Eastern, U.P. *Journal of Living World* **2**(2): 38–45.
- Chi PK (1994) *Fungal Diseases of Cultivated Medicinal Plants in Guangdong Province*. Guangzhou: Guangdong Academic Press.
- Chiddarwar PP (1959) [“1960”] Contributions to our knowledge of the *Cercosporae* of Bombay State – I. *Sydowia* **13**: 152–163.
- Chiddarwar PP (1962) Contributions to our knowledge of the *Cercosporae* of Bombay State – III. *Mycopathologia et Mycologia Applicata* **17**: 71–81.
- Chowdhury S (1956) [“1955”] Notes on fungi of Assam, I. *Lloydia* **18**: 82–87.
- Chupp C (1954) *A Monograph of the fungus genus Cercospora*. Ithaca, NY: C. Chupp.
- Clement W, Arikake M, Sweeney P, Edwards EJ, Donoghue MJ (2014) A chloroplast tree for *Viburnum* (*Adoxaceae*) and its implication for phylogenetic classification and character evolution. *American Journal of Botany* **101**: 1029–1049.
- Crous PW, Braun U (1996). Cercosporoid fungi from South Africa. *Mycotaxon* **57**: 233–321.
- Crous PW, Braun U (2001) A reassessment of the *Cercospora* species described by C. Chupp: specimens deposited at BPI, Maryland, U.S.A. *Mycotaxon* **78**: 327–343.
- Crous PW, Braun U (2003) *Mycosphaerella and its Anamorphs: 1. Names published in Cercospora and Passalora*. [CBS Biodiversity Series no. 1]. Utrecht: Centraalbureau voor Schimmelcultures.
- Crous PW, Braun U, Hunter GC, Wingfield MJ, Verkley GJM, et al. (2013) Phylogenetic lineages in *Pseudocercospora*. *Studies in Mycology* **75**: 37–114.
- Deighton FC (1974) Studies on *Cercospora* and allied genera. V. *Mycovellosiella* Rangel, and a new species of *Ramulariopsis*. *Mycological Papers* **137**: 1–75.
- Deighton FC (1976) Studies on *Cercospora* and allied genera. VI. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. *Mycological Papers* **140**: 1–168.
- Deighton FC (1979) Studies on *Cercospora* and allied genera. VII. New species and redispersions. *Mycological Papers* **144**: 1–56.
- Deighton FC (1987) New species of *Pseudocercospora* and *Mycovellosiella*, and new combinations into *Pseudocercospora* and *Phaeoramularia*. *Transactions of the British Mycological Society* **88**: 365–391.
- Dubey RK, Rai AN, Verma NK, Thakur RS (2011) Three novel additions to fungal genus *Cercospora* Fres. from Central India. *Journal of Mycology and Plant Pathology* **41**: 512–517.
- Egorova LN (2007) Additions to the biota of anamorphic fungi of the Zeysky Reserve (Amur region, Russia). *Mikologiya i Fitopatologiya* **41**: 202–207.
- Ellis MB (1971) *Dematiaceous Hyphomycetes*. Kew: Commonwealth Mycological Institute.
- Ellis MB (1976) *More Dematiaceous Hyphomycetes*. Kew: Commonwealth Mycological Institute.
- Ferraris T (1910) *Flora italica cryptogama*. Pars I. *Fungi, Hyphales*. Rocca S. Casciano: Stabilimento tipografico Cappalli.
- Fuckel KWGL (1863) *Fungi rhenani exsiccati a L. Fuckel collecti*. Fasc. I–IV. 1863. *Hedwigia* **2**: 132–136.
- Fuckel KWGL (1870) [“1869”] *Symbolae mycologicae: Beitrag zur Kenntnis der rheinischen Pilze. Jahrbücher des Nassauischen Vereins für Naturkunde* **23–24**: 1–459.
- Gola G (1930) *L'Erbario Micologico di P. A. Saccardo. Catalogo*. Padova: Tipografia Editrice Antoniana.
- González Fragoso DR (1927) Estudio sistemático de los hifales de la flora Española conocidos hasta esta fecha. *Memorias de la Real Academia de Ciencias Exactas, Físicas y Naturales de Madrid, 2 Serie*, **6**: 1–377.
- Govindu HC, Thirumalachar MJ (1954) Notes on some Indian *Cercosporae*. IV. *Sydowia* **8**: 221–230.
- Govindu HC, Thirumalachar MJ (1955) Notes on some Indian *Cercosporae*. VI. *Sydowia* **9**: 221–228.
- Govindu HC, Thirumalachar MJ (1957) Notes on some Indian *Cercosporae*. VIII. *Sydowia* **10**: 271–277.
- Groenewald JZ, Nakashima C, Nishikawa J, Shin, HD, Park JH, et al. (2013) Species concepts in *Cercospora*: spotting the weeds among the roses. *Studies in Mycology* **75**: 115–170.
- Guo YL (1995) [“1994”] Four new species of *Pseudocercospora*. *Mycosystema* **7**: 119–127.
- Guo YL (1996) [“1995–1996”] *Cercospora* and allied genera and species recorded from the Qinling Mountains. *Mycosystema* **8–9**: 89–102.
- Guo YL (2001) New species and new records of fungi from tropical China: Hyphomycetes. *Mycotaxon* **77**: 343–348.
- Guo YL (2012) Studies on *Cercospora* and allied genera in China XV. *Mycosystema* **31**: 159–164.
- Guo YL, Hsieh WH (1995) The genus *Pseudocercospora* in China.

- Mycosystema Monographicum Series 2*: 1–388.
- Guo YL, Jiang Y (2000) Studies on *Cercospora* and allied genera in China I. *Mycotaxon* **74**: 257–266.
- Guo YL, Liu XJ (1992) Studies on the genus *Pseudocercospora* in China VI. *Mycosystema* **5**: 99–108.
- Guo YL, Liu XJ, Hsieh WH (1998) *Pseudocercospora*. [Flora Fungorum Sinicorum vol. 9.] Beijing: Science Press.
- Guo YL, Liu XJ, Hsieh WH (2003) *Mycovellosiella*, *Passalora*, *Phaeoramularia*. [Flora Fungorum Sinicorum vol. 20.] Beijing: Science Press.
- Guo YL, Liu XJ, Hsieh WH (2005) *Cercospora*. [Flora Fungorum Sinicorum vol. 24.] Beijing: Science Press.
- Gupta BK, Kamal (1987) Some new species of *Pseudocercospora* from India. In *Perspectives in Mycological Research – I. Prof. G.P. Agarwal Festschrift Volume* (Hasija SK, Rayak RC, Singh SM eds): 19–33. New Delhi: Today & Tomorrow's Printers and Publishers.
- Gupta C, Abbasi P, Kamal (1987) Some new foliicolous hyphomycetes from North-Eastern U.P. In *Perspectives in Mycological Research – I. Prof. G.P. Agarwal Festschrift Volume* (Hasija SK, Rayak RC, Singh SM eds): 7–17. New Delhi: Today & Tomorrow's Printers and Publishers.
- Hesami S, Khodaparast SA, Zare R (2011) New reports on *Cercospora* and *Cercospora*-like fungi from Guilan Province, Iran. *Iranian Journal of Plant Pathology* **47**: 131–132.
- Hsieh WH, Goh TK (1990) *Cercospora and similar Fungi from Taiwan*. Taipei: Maw Chang Book Company.
- Ibrahim FM, El Nur Elamin (1974) A quantitative morphological classification of thirty species of *Cercospora*. *Mycopathologia et Mycologia Applicata* **52**: 141–146.
- Jaganathan T, Palaniswami A, Narayanaswami P (1972) A new leaf spot disease of *Crossandra*. *The Madras Agricultural Journal* **59**: 671–672.
- Jage H, Braun U (2004) Neufunde pflanzenbewohnender Mikromyceten aus der Bundesrepublik Deutschland. *Feddes Repertorium* **115**: 56–61.
- Kamal (2010) *Cercosporoid Fungi of India*. Dehra Dun: Bishen Singh Mahendra Pal Singh.
- Kar AK, Mandal M (1969) New *Cercospora* spp. from West Bengal. *Transactions of the British Mycological Society* **53**: 337–360.
- Kar AK, Mandal M (1970) New *Cercospora* spp. from West Bengal. II. *Transactions of the British Mycological Society* **54**: 423–433.
- Karan D, Manoharachary C (1978) [“1976”] Notes on microfungi from Andhra Pradesh – VII Some phytopathogenic fungi from Hyderabad. *The Botanique* (Nagpur) **7**: 157–162.
- Katsuki S (1965) *Cercosporae* of Japan. *Transactions of the Mycological Society of Japan*, Extra Issue **1**: 1–100.
- Keissler K, Lohwag H (1937) Fungi. In Handel-Mazzetti H. (ed.): *Symbolae sinicae* **2**: 1–79. Vienna: J. Springer.
- Kim JD, Shin HD (1999) Taxonomic studies on *Cercospora* and allied genera in Korea (X). *Korean Journal of Mycology* **27**: 220–230.
- Kirk PM (1999) *Stigminta tinea*. *CMI Descriptions of Pathogenic Fungi and Bacteria* **1400**: 1–2.
- Kobayashi T (2007) *Index of fungi inhabiting woody plants in Japan – Host, Distribution and Literature*. Japan. Zenkoku-Noson-Kyoiku Kyokai, Publishing.
- Kobayashi T, Nakashima C, Nishijima T (2002) Addition and re-examination of Japanese species belonging to the genus *Cercospora* and allied genera. V. Collections from the Nansei Islands (2). *Mycoscience* **43**: 219–227.
- Lindau G (1910) *Fungi imperfecti: Hyphomycetes (zweite Hälfte), Dematiaceae (Phaeophragmiae bis Phaeostauroporae, Stilbaceae, Tuberculariaceae, sowie Nachträge, Nährpflanzen-verzeichnis und Register*. [Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz **1** (9).] Leipzig: Verlag von E. Kummer.
- Liu XJ, Guo YL (1982) Studies on some species of the genus *Phaeoramularia* in China. *Acta Phytopathologica Sinica* **12**(4): 1–15.
- Liu XJ, Guo YL (1987) [“1986”] Three hyphomycete species parasitic on *Actinidia* plants in China. *Acta Mycologica Sinica, Supplement* **1**: 353–358.
- Meeboon J, Hidayat I, To-anun C (2007a) Cercosporoid fungi from Thailand 3. Two new species of *Passalora* and six new records of *Cercospora* species. *Mycotaxon* **102**: 139–145.
- Meeboon J, Hidayat I, To-anun C (2007b) An annotated list of cercosporoid fungi in Northern Thailand. *Journal of Agricultural Technology* **3**: 51–63.
- Mendes MAS, da Silva VL, Dianese JC, Ferreira MASV, dos Santos CEN, et al. (1998) *Fungos em Plantas no Brasil*. Brasília, DF: Serviço de Informação – SPI.
- Minter DW, Rodríguez Hernández M, Mena Portales J (2001) *Fungi of the Caribbean: an annotated checklist*. Isleworth: PDMS Publishing.
- Muntañola M (1960) Algunos Hyphomycetes criticos. Notas y descripciones. *Lilloa* **30**: 165–232.
- Nakashima C, Oetari A, Kanti A, Saraswati R, Widyastuti Y, Ando K (2010) New species and newly recorded species of *Cercospora* and allied genera from Indonesia. *Mycosphere* **1**: 315–323.
- Nakashima C, Tanda S, Kobayashi T (2002) Addition and re-examination of Japanese species belonging to the genus *Cercospora* and allied genera. IV. Newly recorded species from Japan (1). *Mycoscience* **43**: 95–102.
- Nguanhom J, Cheewangkoon R, Groenewald JZ, Braun U, To-Anun C, Crous PW (2015) Taxonomy and phylogeny of *Cercospora* spp. from Northern Thailand. *Phytotaxa* **233**(1): 027–048.
- Patil MS (1975) Some *Cercospora* species from Kolhapur – II. *Botanique* **6**: 219–226.
- Patil MS (1978) Some *Cercospora* species from Kolhapur – IV. *Botanique* **8**: 69–74.
- Patwardhan PG, Pande AK (1970) [“1969”] Some Fungi-Imperfecti from Maharashtra. *Sydowia* **23**: 95–101.
- Pavgi MS, Singh RA (1964) Parasitic fungi from North India. *Mycopathologia et Mycologia Applicata* **23**: 188–196.
- Pavgi MS, Singh RA (1965) Parasitic fungi from North India – V. *Mycopathologia et Mycologia Applicata* **27**: 89–96.
- Phengsintham P, Braun U, McKenzie EHC, Chukeatiroe E, Cai L, Hyde KD (2013) Monograph of cercosporoid fungi from Thailand. *Plant Pathology & Quarantine* **3**: 19–90.
- Pirmia M, Zare R, Zamanizadeh HR, Khodaparast A (2010) Contribution to the identification of *Cercospora* species in Iran. *Rostaniha* **11**: 183–189.
- Ponnappa KM (1968) Some interesting fungi-II. *Cercospora hygrophilae* sp. nov. and *Stenella plectroniae* sp. nov. *Proceedings of the Indian Academy of Sciences, sect. B*, **67**: 31–34.
- Pons N, Sutton BC (1988) *Cercospora* and similar fungi on yams (*Dioscorea* spp.). *Mycological Papers* **160**: 1–78.
- Raghu Ram M, Mallaiah KV (1996) New species of *Mycovellosiella* and *Cercospora* from India. *Mycological Research* **100**: 295–296.

- Rai AN, Kamal (1987) New *Cercospora* species from India. *Transactions of the British Mycological Society* **89**: 124–126.
- Rao GP, Filho AB, Magarey RC, Autrey LJC (1999) *Sugarcane Pathology. Volume I: Fungal Diseases*. Enfield, NH: Science Publisher Inc.
- Ray WW (1941) Notes on Oklahoma *Cercosporae*. *Mycologia* **33**: 174–177.
- Saccardo PA (1886) *Sylloge Fungorum omnium hucusque cognitum*. Vol. 4. Padova: P.A. Saccardo.
- Saccardo PA (1892) *Sylloge Fungorum omnium hucusque cognitum*. Vol. 10. Padova: P.A. Saccardo.
- Saccardo PA (1895) *Sylloge Fungorum omnium hucusque cognitum*. Vol. 11. Padova: P.A. Saccardo.
- Saccardo PA (1906) *Sylloge Fungorum omnium hucusque cognitum*, Vol. 18. *Supplementum Universal Pars VII*. [Saccardo PA, Saccardo D, eds]. Padova: P.A. Saccardo.
- Saccardo PA (1913) *Sylloge Fungorum omnium hucusque cognitum*, Vol. 22. [Saccardo PA, Trotter A, eds]. Padova: P.A. Saccardo.
- Saccardo PA (1972) *Sylloge Fungorum omnium hucusque cognitum*, Vol. 26 [Trotter A, Cash K, eds]. New York: Johnson.
- Shin HD, Kim JD (2001) *Cercospora* and allied genera from Korea. *Plant Pathogens of Korea* **7**: 1–303.
- Shivas RG, Suyoko S, Raga N, Hyde KD (1996) Some disease-associated microorganisms on plants in Irian Jaya, Indonesia. *Australasian Plant Pathology* **25**: 36–49.
- Simmons EG (1995) *Alternaria* themes and variations (112–144). *Mycotaxon* **55**: 55–163.
- Singh SM (1976) Some *Deuteromycetes* from Balaghat, Madhya Pradesh. *Indian Phytopathology* **29**: 17–19.
- Singh PN, Singh SK, Tripathi SC (1996) New species of *Pseudocercospora* causing leaf spots of forest plants of Nepal. *Mycological Research* **100**: 1129–1132.
- Solheim WG, Stevens F (1931) *Cercospora* studies: II. Some tropical *Cercosporae*. *Mycologia* **23**: 365–405.
- Srivastava RK, Narayan S, Kumari N (2001) New *Cercospora* spp. from north-eastern Uttar Pradesh. *Indian Phytopathology* **54**: 102–107.
- Srivastava RK, Srivastava AK, Kamal (1995) [“1992–1993”] An appraisal of Indian species of *Cercospora* Fres. sensu stricto: some new species and new records. *Kavaka* **20/21**: 37–47.
- Stevenson JA (1975) Fungi of Puerto Rico and the American Virgin Islands. *Contributions from the Reed Herbarium* **23**: 1–742.
- Sutton BC, Pons N (1980) Notes on the original species of *Cercosporina*. *Mycotaxon* **12**: 201–218.
- Świdarska-Burek U, Mullen W (2014) New records of cercosporoid fungi from Poland. *Mycotaxon* **128**: 55–62.
- Sydow H, Mitter JH, Tandon RN (1937) Fungi indici – III. *Annales Mycologici* **35**: 222–243.
- Tai FL (1948) *Cercosporae* of China II. *Lloydia* **11**: 36–56.
- Tai FL (1979) *Sylloge Fungorum Sinicorum*. Beijing: Academia Sinica, Science Press.
- Thaung MM (1984) Some fungi of *Cercospora* from Burma. *Mycotaxon* **19**: 425–452.
- Thirumalachar MJ, Chupp C (1948): Notes on some *Cercosporae* from India. *Mycologia* **40**: 352–362.
- Thirumalachar MJ, Govindu HC (1953) Notes on some *Cercosporae* of India – II. *Sydowia* **7**: 45–49.
- To-anun C, Hidayat I, Meeboon J (2011) Genus *Cercospora* in Thailand: taxonomy and phylogeny (with a dichotomous key to species). *Plant Pathology & Quarantine* **1**: 11–87.
- Vassiljevsky NI, Karakulin BP (1937) *Parazitnye nesovershennye griby*. Vol. 1. *Gifomicety*. Moscow, Leningrad: Izdatek'ltvo Akademii Nauk SSSR.
- Vasudeva RS (1963) *Indian Cercosporae*. New Delhi: Indian Council of Agricultural Research.
- Verma RK, Kamal (1991) Some new species of *Pseudocercospora*. *Indian Phytopathology* **44**: 440–447.
- Winkworth RC, Donoghue MJ (2005) *Viburnum* phylogeny based on combined molecular data: implications for taxonomy and biogeography. *American Journal of Botany* **92**: 653–666.
- Yen JM (1964) Étude sur les champignons parasites du Sud-Est Asiatique. I : Première note sur quelques nouvelles espèces de *Cercospora* de Singapour. *Revue de Mycologie* **29**: 209–240.
- Yen JM (1965) Étude sur les champignons parasites du Sud-Est Asiatique. III : Deuxième notes sur les nouvelles espèces de *Cercospora* de Singapour. *Revue de Mycologie* **30**: 166–204
- Yen JM (1967) Étude sur les champignons parasites du Sud-Est Asiatique. VII. Quatrième note sur quelques *Cercospora* et *Stenella* de Singapour (Malaisie). *Revue de Mycologie* **32**: 177–202.
- Yen JM (1977) Étude sur les champignons parasites du Sud-Est Asiatique. XXVI. Les *Cercospora* de Formose II. *Bulletin Trimestriel de la Société Mycologique de France* **93**: 145–164.
- Yen JM (1978) Étude sur les champignons parasites du Sud-Est Asiatique. XXX. Les *Cercospora* de Formose III. *Bulletin Trimestriel de la Société Mycologique de France* **94**: 49–59.
- Yen JM (1983) Studies on parasitic fungi from South East Asia, 49. Parasitic fungi from Malaysia, 25. *Semipseudocercospora* gen. nov. *Mycotaxon* **17**: 361–363.
- Yen JM, Lim G (1973) Étude sur les champignons de Sud-Est asiatique. XX. Dixième note sur les *Cercospora* de Malaisie. *Cahiers du Pacifique* **17**: 95–144.
- Yen JM, Lim G (1980) *Cercospora* and allied genera of Singapore and the Malay Peninsula. *Gardens' Bulletin, Singapore* **33**: 151–263.
- Yen JM, Kar AK, Das BK (1982) Studies on hyphomycetes from West Bengal, India, I. *Cercospora* and allied genera of West Bengal, 1. *Mycotaxon* **16**: 35–57.