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Taxonomic notes on some species of the Cercospora complex (V)

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Abstract: BRAUN, U. 1999: Taxonomic notes on some species of the *Cercospora* complex (V). Schlechtendalia **2**: 1-28.
32 species of the genus *Cercospora* s.lat. have been re-examined, reassessed, and placed in *Mycovellosiella, Passalora, Phaeoramularia,* and *Pseudocercospora*. The species concerned are described, illustrated, and the nomenclature of some of these taxa is discussed. Furthermore, a second collection of *Pseudocercospora lippiae-albae* on a new host species is recorded.

Zusammenfassung: BRAUN, U. 1999: Taxonomic notes on some species of the *Cercospora* complex (V). Schlechtendalia **2**: 1-28.
32 Arten der Gattung *Cercospora* s.lat. sind untersucht, neu bewertet und in die Gattungen *Mycovellosiella, Passalora, Phaeoramularia* und *Pseudocercospora* überführt worden. Diese Arten werden beschrieben und abgebildet, und die Nomenklatur einiger Taxa wird diskutiert. Weiterhin wird über eine zweite Kollektion von *Pseudocercospora lippiae-albae* auf einer neuen Wirtsart berichtet.

In the present paper, a series dealing with the taxonomy and nomenclature of species belonging to the *Cercospora* complex is continued (BRAUN 1992, 1993a, 1993b, 1996). BRAUN (1995a) and BRAUN and MELNIK (1997) published comprehensive descriptions, discussions, and keys to the genera concerned, which are the basis for the generic concept used in this paper.

1. *Mycovellosiella flexuosa* (Tracy & Earle) U. Braun **comb. nov.** Fig. 1

Bas.: *Cercospora flexuosa* Tracy & Earle, Bull. Torrey Bot. Club 22: 178 (1895).
= *Cercospora diospyri* var. *ferruginosa* G.F. Atk., J. Elisha Mitchell Sci. Soc. 8: 63 (1892).
Ref.: CHUPP (1954: 202).

Leaf spots indefinite. Colonies hypophyllous, effuse, olivaceous to sooty patches. Primary mycelium internal; hyphae septate, branched, 1.5-4 µm wide, pale, forming small substomatal stromata, 10-30 µm diam., brown, composed of swollen hyphal cells, 2-6 µm wide; secondary mycelium external; hyphae superficial, creeping, arising from stromata, similar to conidiophores. Conidiophores in small to moderately large fascicles, loose to dense, arising from stromata, emerging through stomata, erect to decumbent (decumbent threads often developing to creeping secondary hyphae with solitary lateral or terminal conidiophores or conidiogenous cells), simple or frequently branched, straight, subcylindric to flexuous, geniculate-sinuous, (10-)20-200 x 2.5-6 µm, pluriseptate, wall thin or somewhat thickened, olivaceous, yellowish to medium dark brown throughout or tips paler, smooth, conidiogenous cells integrated, terminal, intercalary as well as pleurogenous, (5-)10-20(-30) µm long, sympodial, rarely percurrent, conidial scars conspicuous, somewhat thickened and darkened, 1-1.5 µm diam. Conidia solitary, obclavate-cylindrical, 20-75 x 4-6 µm, (1-)3-8(-12)-septate, pale olivaceous to medium dark brown, wall thin or somewhat thickened, smooth, apex obtuse, base rounded to short obconically truncate, hila slightly thickened and darkened, 1-2 µm wide.

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On *Diospyros virginiana*, USA, Starkville, Miss., 27 Sept. 1895, S.M. TRACY (HBG), authentic material.

The type collection of this species has not been examined, but authentic material, collected and identified by TRACY. *Cercospora flexuosa* is a typical member of *Mycovellosiella* with conspicuous conidial scars, creeping secondary hyphae, and solitary secondary conidiophores.

2. ***Mycovellosiella helianthi*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 2

Bas.: *Cercospora helianthi* Ellis & Everh., J. Mycol. 3: 20 (1887).
Ref.: CHUPP (1954: 141).

Leaf spots lacking, indistinct, later with diffuse, irregular, epiphyllous discolorations, yellowish to brownish. Colonies hypophyllous, in scattered to confluent patches, punctiform to effuse, dark brown, often resembling uredosori of rust fungi. Primary mycelium internal; secondary mycelium external, superficial; hyphae creeping, emerging through stomata, simple or sparingly branched, 1.5-5 µm diam., subhyaline to olivaceous brown, septate, smooth. Conidiophores in small to usually large fascicles, erect to decumbent, emerging through stomata, loose, simple or branched, flexuous, geniculate-sinuous, often strongly so, tortuous-nodulose, with irregular swellings and constrictions, apex often wider, subclavate, erect conidiophores 10-100 x 4-8 µm, decumbent threads up to 250 µm long, developing to creeping secondary hyphae, pluriseptate, olivaceous brown to medium dark brown, thin-walled, smooth, conidiogenous cells integrated, terminal, intercalary, occasionally pleurogenous, 10-30(-50) µm long, conidial scars conspicuous, on small shoulders caused by sympodial proliferation, or hardly raised above the surface of the conidiogenous cells, somewhat thickened and darkened, 1.5-2 µm diam. Conidia solitary, obclavate(-subcylindric), straight or somewhat curved, small conidia often obovoid, ellipsoid-fusoid, 15-125 x 4-8 µm, 0-12-septate, occasionally constricted at the septa, pale olivaceous to olivaceous brown, smooth, thin-walled, tips obtuse to subacute, base long obconically truncate, hila somewhat thickened and darkened, 2 µm wide.

Holotype: on *Helianthus* sp., USA, Columbia, Miss., Oct. 1886, S.M. Tracy 208 (NY).

Numerous additional collections of this species have been examined, including Ellis & Everh., Fungi Columb. 1167, Barthol., Fungi Columb. 2914, Kabát & Bubák, Fungi imp. exs. 243, and Kellerm., Ohio Fungi 162 (HBG). On account of thickened and darkened conidial scars and hila and well-developed secondary mycelium with solitary conidiophores, this species has to be placed in *Mycovellosiella*.

3. ***Mycovellosiella poasensis*** (Syd.) U. Braun **comb. nov.** Fig. 3

Bas.: *Cercospora poasensis* Syd., Ann. Mycol. 23: 426 (1925).
Ref.: CHUPP (1954: 469).

Leaf spots amphigenous, at first small, 0.5-3 mm diam., brown to blackish, later enlarging or

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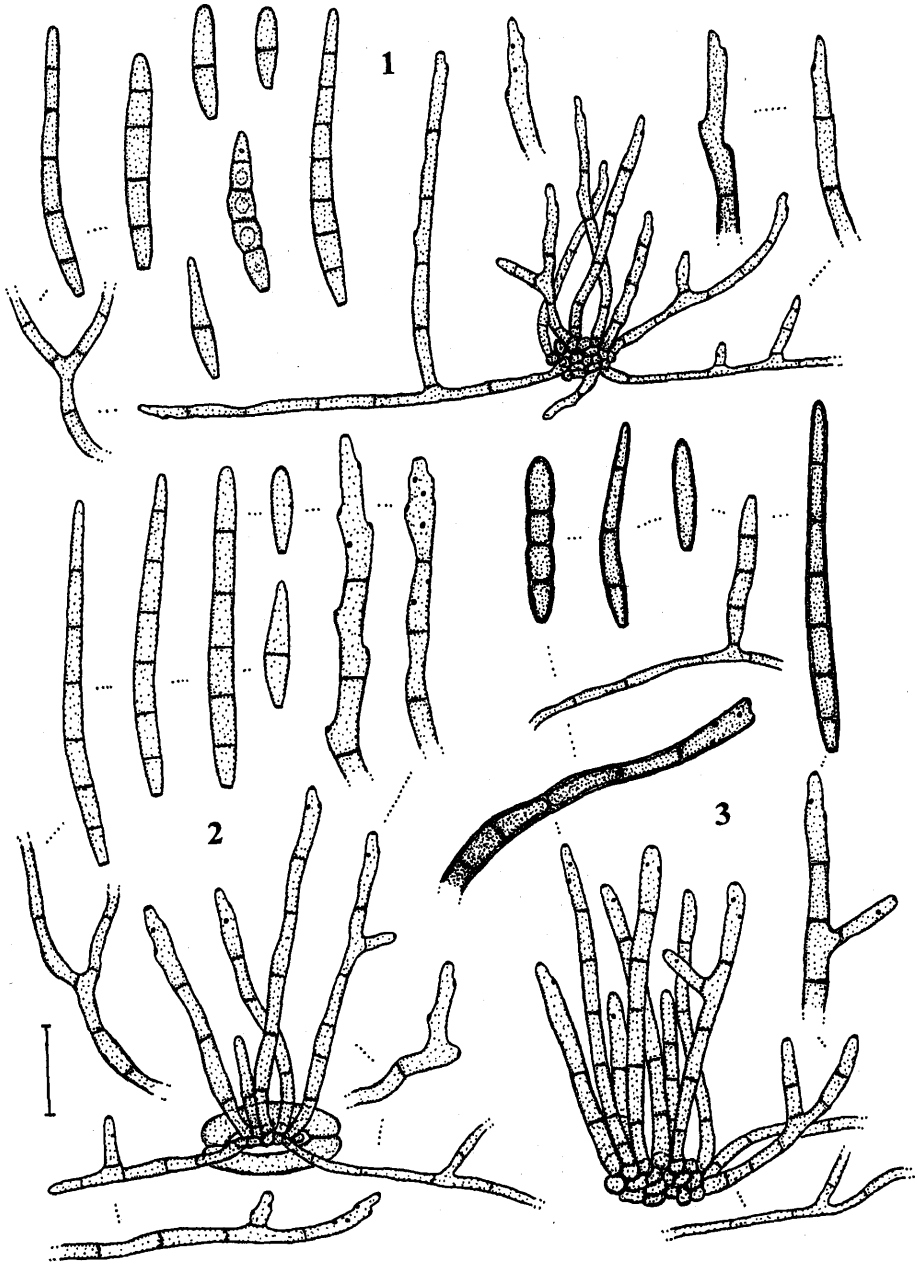

Fig. 1-3: 1 - *Mycovellosiella flexuosa*; 2 - *M. helianthi*; 3 - *M. poasensis*; fascicles of conidiophores, conidiophores, conidia, secondary hyphae; scale = 20 µm; U. Braun del.

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confluent, margin indefinite. Caespituli hypophyllous, punctiform, dark. Primary mycelium internal; secondary mycelium external, superficial; hyphae creeping, branched, septate, 1.5-4 µm wide, subhyaline to pale olivaceous, smooth. Stromata lacking to well-developed, immersed to somewhat erumpent, 20-70 µm diam., dark brown to blackish. Conidiophores solitary or in small to large fascicles, loose to very dense, arising from internal hyphae or stromata, erect to decumbent, occasionally solitary, arising from creeping hyphae as lateral branchlets, (30-)40-200(-250) x 3-5 µm, simple or frequently branched, straight, subcylindric to flexuous, geniculate-sinuous in the upper half, apex often somewhat swollen, subclavate, pluriseptate throughout, pale to dark brown or reddish brown, tips often paler, wall somewhat thickened, smooth or almost so, conidiogenous cells integrated, terminal, intercalary or pleurogenous, 10-30 µm long, conidial scars somewhat thickened and darkened, 1.5-2 µm wide. Conidia solitary, obclavate-subcylindric, (15-)30-120(-160) x 4-6.5 µm, (0-)3-10(-14)-septate, occasionally constricted at the septa, pale olivaceous to medium dark brown, smooth, wall somewhat thickened, apex obtuse, base rounded or short to long obconically truncate, hila slightly thickened and darkened, 2 µm wide.

Lectotype (selected here): on *Rhamnus discolor*, Costa Rica, Poas Mt., near Grecia, 15 Jan. 1925, H. Sydow, Fungi exot. exs. 712 (HBG). Isolectotypes: Syd., Fungi exot. exs. 712.

This species is a typical member of the genus *Mycovellosiella* with thickened, darkened conidial scars and hila, frequently branched conidiophores, and secondary mycelium.

4. ***Passalora caulophylli*** (Peck) U. Braun **comb. nov.** Fig. 4

Bas.: *Cercospora caulophylli* Peck, Ann. Rep. N.Y. State Mus. 33: 30 (1880).
Ref.: Chupp (1954: 79).

Leaf spots amphigenous, subcircular to angular-irregular, 2-6 mm diam., brown, with a dark border, dark brown or purplish. Caespituli hypophyllous, punctiform, scattered to gregarious, pale to medium brown. Mycelium internal. Stromata absent or small, substomatal, occasionally intraepidermal, 10-40 µm diam., yellowish, yellowish brown to olivaceous brown. Conidiophores in small fascicles, loose, arising from internal hyphae or from stromata, through stomata or erumpent, erect to decumbent, filiform, flexuous to somewhat geniculate-sinuous in the upper half, simple, 10-130 x 2.5-5 µm, short conidiophores continuous, longer ones pluriseptate throughout, subhyaline, yellowish, pale olivaceous to olivaceous brown, smooth, wall thin to slightly thickened, conidiogenous cells integrated, terminal, occasionally intercalary, or conidiophores reduced to conidiogenous cells, 10-40 µm long, sympodial, conidial scars somewhat thickened and darkened, 2-3 µm diam. Conidia solitary, short cylindrical, obclavate, ellipsoid-fusoid, obovoid, 10-45 x 3-8 µm, 0-4(-5)-septate, hyaline, subhyaline to very pale yellowish green or olivaceous, smooth, thin-walled, apex obtuse, often broadly rounded, base rounded to short obconically truncate, hila slightly thickened and darkened, 2-2.5 µm wide.

Holotype: on *Caulophyllum* sp., USA, Hederberg Mt., N.Y., July 1879, C.H. Peck (NYS).

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Various North American collections on *Caulophyllum thalictroides* have been examined, e.g. Kellerm., Ohio Fungi 141 and Ellis & Everh., Fungi Columb. 167, 457 (HBG). On account of thickened and darkened conidial scars and hila and the shape, size, and pigmentation of the conidia, this species has to be reallocated to *Passalora*.

5. ***Passalora desmanthi*** (Ellis & Kellerm.) U. Braun **comb. nov.** Fig. 5

Bas.: *Cercospora condensata* [Ellis & Kellerm.] var. *desmanthi* Ellis & Kellerm., J. Mycol. 1: 2 (1885).
≡ *Cercospora desmanthi* (Ellis & Kellerm.) Ellis & Everh., J. Mycol. 3: 14 (1887).
≡ *Camptomeris desmanthi* (Ellis & Kellerm.) Petr., Ann. Mycol. 32: 334 (1934), comb. illeg., non *Camptomeris desmanthi* Cif., 1933.
≡ *Cercosporidium desmanthi* (Ellis & Kellerm.) Dearn., Mycologia 33: 365 (1941).
≡ *Phaeoisariopsis desmanthi* (Ellis & Kellerm.) Arx, Proc. K. Ned. Akad. Wet., C 86: 43 (1983).
≡ *Passalora desmanthi* (Ellis & Kellerm.) Poonam Srivast., J. Living World 1: 114 (1994), comb. inval. (ICBN, Art. 33.2).
Holotype: on *Desmanthus brachylobus*, USA, Great Bend, Kansas, 1884, W.A. Kellerman (NY).

DEIGHTON (1967: 64-66) described and illustrated this species in detail and placed it in *Cercosporidium*, but the latter genus has been reduced to synonymy with *Passalora* (Arx 1983, Deighton 1990, Braun 1995b). The conidiophores are formed in very large, dense, but non-synnematous fascicles. Hence, Arx's (1983) treatment of this species under *Phaeoisariopsis* is not tenable.

6. ***Passalora granuliformis*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 6

Bas.: *Cercospora granuliformis* Ellis & Everh., J. Mycol. 1: 6 (1885).
Ref.: CHUPP (1954: 298).

Leaf spots amphigenous, subcircular to irregular, usually large, 1-20 mm diam., or even larger, yellowish, ochraceous to brownish, finally sometimes greyish brown or dingy dark grey, margin indefinite. Caespituli amphigenous, punctiform, blackish. Mycelium internal. Stromata substomatal, 20-50 µm diam., subglobose, yellowish to medium dark brown, cells 2-7 µm diam. Conidiophores in small to fairly large fascicles, loose to usually dense or very dense, arising from stromata, through stomata, erect, straight, subcylindric to geniculate-sinuous, simple, 5-30(-40) x 2.5-5(-6) µm, 0-1(-2)-septate, pale olivaceous to medium brown, smooth, wall thin or slightly thickened, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5-25 µm long, conidial scars somewhat thickened and darkened, 1 µm wide. Conidia solitary, cylindrical, obclavate-fusoid (-subclavate, obovoid), 10-50(-60) x 2.5-4 µm, 0-4(-6)-septate, subhyaline to pale greenish or very pale olivaceous, smooth, thin-walled, apex obtuse or subacute, base short obconically truncate, hila slightly thickened and darkened, 1 µm wide.

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Holotype: on *Viola cucullata*, USA, Decorah, Iowa, Aug. 1884, E.W.D. HOLWAY (NY).

Numerous collections of this fungus have been examined, including Barthol., Fungi Columb. 3607, 3608, Ellis & Everh., Fungi Columb. 455, Griff., West Am. Fungi 343, Seym. & Earle, Econ. Fungi 459, and Rabenh., Fungi eur. 3683 (HAL, HBG). The conidial scars and hila are thickened and darkened and the conidia are pigmented, so that this species can be referred to *Passalora*.

7. ***Passalora iochromatis*** (Pat.) U. Braun **comb. nov.** Fig. 7

Bas.: *Cercospora iochromatis* Pat. („*jochromatis*"), Bull. Soc. Mycol. Fr. 11: 233 (1895).
Ref.: CHUPP (1954: 542).

Leaf spots amphigenous, subcircular to somewhat irregular, 2-20 mm diam., yellowish-ochraceous to brown, later greyish, often somewhat zonate, margin indefinite or with a narrow to moderately wide dark brown to black border, often irregular, sometimes confluent. Caespituli hypophyllous, punctiform, subdiffuse, scattered to dense, dull olivaceous brown to medium dark brown. Mycelium internal. Stromata almost lacking to well-developed, substomatal, 10-70 µm diam., yellowish to brown. Conidiophores in small to moderately large fascicles, usually dense, emerging through stomata, from stromata, erect, straight, subcylindric to usually somewhat clavate, gradually attenuated towards the base, 10-60 x 4-8 µm, densely appressed at the very base between the cells of the stomatal opening, and only 1.5-2.5 µm wide, unbranched, hardly geniculate-sinuous, aseptate or with few septa at the very base, pale olivaceous to olivaceous brown throughout, smooth, thin-walled, conidiophores usually reduced to conidiogenous cells, conidial scars conspicuous, somewhat thickened and darkened, 1.5-2 µm wide, usually hardly raised above the surface of the conidiogenous cells. Conidia solitary, subcylindric, occasionally branched, (10-)30-140(-170) x 4.5-10 µm, (0-)3-13-septate, occasionally somewhat constricted at the septa, pale olivaceous to olivaceous brown, smooth, thin-walled, apex obtuse, broadly rounded, base short obconically truncate, hila slightly thickened and darkened, 1.5-2.5 µm wide.

Holotype: on *Iochroma* sp., Ecuador, Entre Quito et Seminario major, Feb. 1892, G. Lagerheim (FH 7832).

On *Iochroma macrocalyx,* Ecuador, Hacienda San Antonio, Prov. Tungurahua, 6 Dec. 1937, H. Sydow, Fungi exot. exs. 1239 (HBG).

The conidial scars and hila are thickened and darkened and the conidia are pigmented, so that this species can be reallocated to *Passalora*.

8. ***Passalora melanochaeta*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 8

Bas.: *Cercospora melanochaeta* Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 46: 380 (1894).

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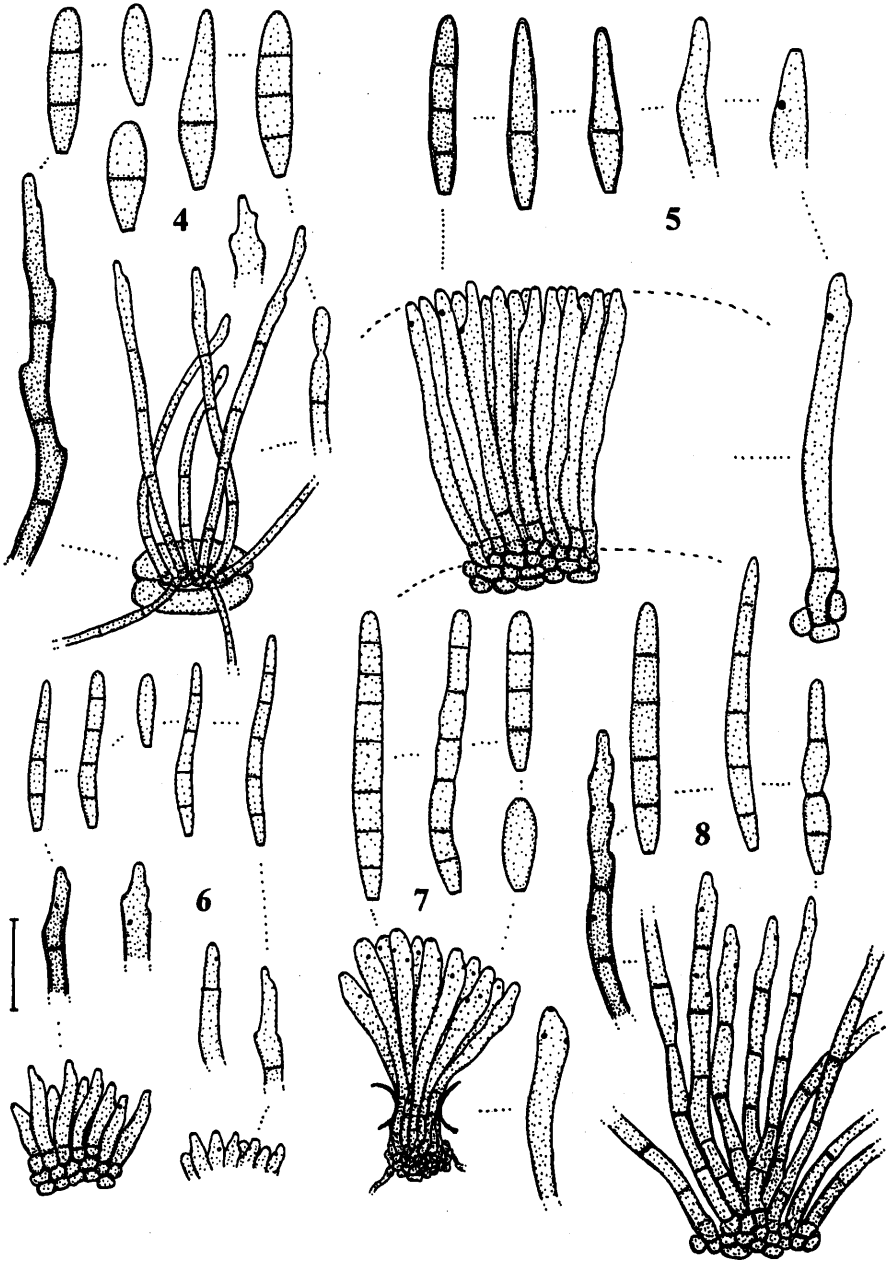

Fig. 4-8: 4 - *Passalora caulophylli*; 5 - *P. desmanthi*; 6 - *P. granuliformis*; 7 - *P. iochromatis*; 8 - *P. melanochaeta*; fascicles of conidiophores, conidiophores, conidia; scale = 20 µm; U. Braun del.

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≡ *Phaeoisariopsis melanochaeta* (Ellis & Everh.) Deighton, in Ellis, More Dematiaceous Hyphomycetes: 230, Kew 1976.
Ref.: Chupp (1954: 109).
Holotype: on *Celastrus scandens*, USA, Louisville, Kansas, 16 Oct. 1893, E. Bartholomew 1210 (NY).

Numerous North American collections on *Celastrus scandens* have been examined, including Barthol., Fungi Columb. 3006, Ellis & Everh., Fungi Columb. 1168, and North Am. Fungi 1168, 3595 (HBG). Deighton, in Ellis (1976), reassessed this species and placed it in *Phaeoisariopsis*. The conidiophores are, however, formed in small to moderately large, loose to very dense, but non-synnematous fascicles. In some fascicles, a few conidiophores may be even decumbent. Hence, this species has to be placed in *Passalora* rather than in *Phaeoisariopsis*.

9. ***Passalora merrowii*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 9

Bas.: *Cercospora merrowii* Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 46: 380 (1894).
Ref.: Chupp (1954: 463).

Leaf spots at first indistinct, later with irregular-diffuse discolorations, darker, sometimes bluish. Colonies hypophyllous, effuse, olivaceous. Mycelium internal. Stromata lacking. Conidiophores solitary or in small, loose groups, arising from internal hyphae or small subcuticular-intraepidermal, occasionally substomatal aggregations of swollen hyphal cells, 3-7 µm diam., yellowish to yellowish brown, erumpent, erect, straight, subcylindric to geniculate, simple, 10-60 x 4-7 µm, 0-1-septate, olivaceous to yellowish brown, smooth, thin-walled, conidiophores usually reduced to conidiogenous cells, conidial scars somewhat thickened and darkened, 1.5-3 µm diam. Conidia solitary, cylindrical-obclavate, short conidia sometimes obovoid or ellipsoid-fusoid, 20-60 x 4-7 µm, (0-)1-4(-6)-septate, subhyaline to pale olivaceous or brown, smooth, thin-walled, apex obtuse, base subtruncate or short obconically truncate, hila somewhat thickened and darkened, 2-3 µm wide.

Holotype: on *Isopyrum biternatum*, USA, Ann Arbor, Mich., 30 Oct. 1893, H.L. Merrow (NY).

On *Isopyrum biternatum*, USA, Ann Arbor, Mich., May 1894, H.L. Merrow, Ellis & Everh., North Am. Fungi 3195 (HBG), topotype material.

Based on thickened and darkened conidial scars and hila and pigmented, solitary conidia, this species has to be placed in *Passalora*. Chupp (l.c.) noted that the conidia in this species are occasionally catenate, but in the course of the present study, based on type material, no trace of catenation have been observed.

10. ***Passalora oxybaphi*** (Ellis & Halst.) U. Braun **comb. nov.** Fig. 10

Bas.: *Cercospora oxybaphi* Ellis & Halst., J. Mycol. 4: 8 (1888).
Ref.: Chupp (1954: 410).

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Leaf spots indistinct or with slight darkenings on both leaf surfaces, 2-5 mm diam. Caespituli amphigenous, effuse, dark olivaceous brown. Mycelium internal. Stromata absent or small, 10-30 µm diam., dark brown, substomatal to intraepidermal. Conidiophores in small to moderately large fascicles, loose to dense, arising from internal hyphae or stromata, through stomata or erumpent, erect, straight, subcylindric to geniculate-sinuous, simple, occasionally branched, 10-40 x 3-7 µm, 0-2(-3)-septate, olivaceous, olivaceous brown or yellowish, medium brown in mass, smooth to verruculose, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidial scars somewhat thickened and darkened, 1-2 µm diam. Conidia solitary, narrowly obclavte-subcylindric, 30-130 x (2.5-)3-5(-5.5) µm, 2-10-septate, subhyaline, pale olivaceous to olivaceous brown, smooth, thin-walled, apex subobtuse to subacute, base short to long obconically truncate, hila unthickened, not darkened, 1-2 µm wide.

Holotype: on *Oxybaphus nyctagineus*, USA, Iowa City, Iowa, June 1887, A.S. Hitchcock (NY).

On *Oxybaphus angustifolius*, USA, Rockport, Kansas, Aug. 1893, E. Bartholomew, Ellis & Everh., Fungi Columb. 393 (HBG). On *O. nyctagineus*, USA, Red Cloud, Nebr., 12 Sept. 1911, J.M. Bates, Barthol., Fungi Columb. 3609 (HBG).

Thickened and darkened conidial scars and pigmented conidia place this species in *Passalora*.

11. ***Passalora pachypus*** (Ellis & Kellerm.) U. Braun **comb. nov.** Fig. 11

Bas.: *Cercospora pachypus* Ellis & Kellerm., J. Mycol. 3: 104 (1887).
Ref.: CHUPP (1954: 151).

Leaf spots absent or diffuse to angular-irregular, 1-5 mm diam., yellowish, later olivaceous to olivaceous brown caused by dense fungal fructification. Caespituli amphigenous, subeffuse, olivaceous to olivaceous brown, loose to dense. Stromata absent or small, composed of a few swollen hyphal cells, brown, substomatal to intraepidermal. Conidiophores in small to moderately large fascicles, loose to dense, arising from internal hyphae or hyphal aggregations, emerging through stomata or erumpent, occasionally solitary, erect, straight, subcylindric or attenuated towards the apex, geniculate-sinuous, simple, 5-45 x 5-10 µm, 0-1-septate, medium to medium dark brown, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidial scars somewhat thickened and darkened, 1.5-3 µm wide. Conidia solitary, ellipsoid-ovoid, cylindrical-obclavate, 15-75 x 5-8 µm, 0-3-septate, pale olivaceous to olivaceous brown or light brown, smooth, thin-walled, apex obtuse, base subtruncate to short obconically truncate, hila slightly thickened and darkened, 2-3 µm wide.

Holotype: on *Helianthus annuus*, USA, Manhattan, Kansas, 20 Aug. 1887 („1888"), W.T. Swingle (NY).

On *Helianthus annuus*, USA, Rooks Co., Kansas, 16 Sept. 1901, E. Bartholomew, Ellis & Everh., Fungi Columb. 1518 (HBG).

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This species is a typical member of the genus *Passalora* with conspicuous conidial scars and pigmented conidia.

12. ***Passalora pteleae*** (G. Winter) U. Braun **comb. nov.** Fig. 12

Bas.: *Cercospora pteleae* G. Winter, Hedwigia 24: 205 (1885).
Ref.: Chupp (1954: 505).

Leaf spots amphigenous, subcircular to angular-irregular, 1-5 mm diam., yellowish, yellowish brown, later often with a dingy grey centre. Caespituli amphigenous, punctiform to subeffuse. Mycelium immersed; hyphae septate, branched, pale, 1.5-2.5 µm, forming small to well-developed stromata, 10-60 µm diam., dark brown, substomatal to intraepidermal. Conidiophores in small to fairly large fascicles, loose to usually dense, occasionally very dense, subsynnematous, arising from stromata, through stomata or erumpent, erect, 30-160 x 3-5 µm, simple, rarely branched, straight, subcylindric to flexuous, somewhat geniculate-sinuous, sparsely to pluriseptate throughout, uniformly pale olivaceous brown, smooth, thin-walled, conidiogenous cells integrated, terminal, 10-40 µm long, conidial scars hardly or slightly thickened, but somewhat darkened, 1-2 µm wide. Conidia solitary, obclavate-subcylindric, 20-70 x 4-6 µm, 1-5-septate, occasionally constricted at the septa, pale olivaceous to olivaceous brown, smooth, thin-walled, apex obtuse, base short obconically truncate, hila hardly thickened, but somewhat darkened, refractive, 1.5-2 µm wide.

Lectotype (selected here): on *Ptelea trifoliata*, USA, Perryville, Mo., June 1885, C.H. Demetrio, Rabenh.-Winter, Fungi eur. 4096 (HBG). Isolectotypes: Rabenh.-Winter, Fungi eur. 4096 (e.g. B, HAL).

The conidial scars and hila are hardly thickened, but somewhat darkened and refractive. In surface view, they are visible as minute, somewhat darkened circles. The conidiophores are fasciculate, erect, secondary mycelium is absent, and the conidia are pigmented. Based on these features, this species has to be placed in *Passalora*. Winter (l.c.) described simultaneously *Cercospora pteleae* and *C. afflata* on *Ptelea trifoliata* from Perryville, Mo., USA. Chupp (l.c.) reduced the latter species to synonym with *C. pteleae*. The synonymy of these species is, however, not yet clear. Type material of *C. afflata* could not be traced.

13. ***Passalora umbrata*** (Ellis & Holw.) U. Braun **comb. nov.** Fig. 13

Bas.: *Cercospora umbrata* Ellis & Holw., J. Mycol. 2: 2 (1886).
Ref.: Chupp (1954: 164).

Leaf spots usually indefinite, occasionally formed as small brown spots, 4-5 mm diam. Caespituli usually hypophyllous, subeffuse, olivaceous to almost black. Mycelium internal. Stromata absent. Conidiophores in small, loose fascicles of 2-15 threads, occasionally solitary, arising from internal hyphae, emerging through stomata, erect, subcylindric-setiform, straight, apical part

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geniculate-sinuous, simple, 40-200 x 3-5 µm, occasionally swollen at the very base, pluriseptate throughout, light to dark medium brown, almost throughout or tips often paler, smooth, wall somewhat thickened, conidiogenous cells integrated, 10-40 µm long, terminal or intercalary, conidial scars somewhat thickened and darkened, 1-1.5 µm diam. Conidia solitary, subcylindric-obclavate, 20-60(-80) x 3-5 µm, 1-4(-5)-septate, subhyaline to pale olivaceous, smooth, thin-walled, apex subobtuse, base short obconically truncate, hila slightly thickened and darkened, 1-1.5 µm wide.

Holotype: on *Bidens* sp., USA, Decorah, Iowa, Aug. 1885, E.W.D. Holway (NY).

Additional North American material on *Bidens cernua*, Barthol., Fungi Columb. 3213 (HBG), and *B. frondosa*, Ellis & Everh., Fungi Columb. 1088 (HBG), has been examined. Since this species is characterized by having thickened and darkened conidial scars and hila as well as pigmented conidia, it must be placed in *Passalora*.

14. ***Phaeoramularia gilbertii*** (Speg.) U. Braun **comb. nov.** Fig. 14

Bas.: *Cercospora gilbertii* Speg., Anal. Soc. Cient. Argent. 10: 38 (1880).
Ref.: CHUPP (1954: 33).

Leaf spots amphigenous, subcircular to irregular, 1-10 mm diam., oblong patches up to 20 mm in length, brown to dingy grey, zonate, sometimes with a narrow, brown margin. Caespituli amphigenous, punctiform, dark. Mycelium internal. Stromata well-developed, 20-60 µm diam., subglobose, brown. Conidiophores numerous, in loose to very dense fascicles, erect, filiform, flexuous, somewhat geniculate-sinuous, simple, 20-60 x 1.5-5 µm, continuous to pluriseptate throughout, subhyaline to pale olivaceous, olivaceous brown in mass, tips often paler, subhyaline, smooth, thin-walled, conidiogenous cells integrated, terminal, 10-30 µm long, conidial scars minute, 0.75-1.5 µm diam., subconspicuous, hardly or only very slightly thickened, slightly darkened-refractive. Conidia solitary and in chains, subcylindric (- narrowly obclavate, fusoid), 20-60 x 2-5 µm, (0-)1-4-septate, hyaline or subhyaline, apex obtuse, subacute or truncate, base short to long obconically truncate, hila hardly thickened, colourless or slightly darkened-refractive, 1 µm wide.

On *Iresine diffusa*, Ecuador, Pichincha, Quito, 20 Sept. 1937, H. Sydow, Fungi exot. exs. 1047 (HBG).

Type material of this species was not available, but the present collection from Ecuador agrees perfectly with the original diagnosis and CHUPP's (l.c.) description. Based on catenate conidia and conidial scars which are not quite inconspicuous, *Cercospora gilbertii* can be referred to *Phaeoramularia*, although the subconspicuous conidial scars and colorless conidia are rather unusual for this genus.

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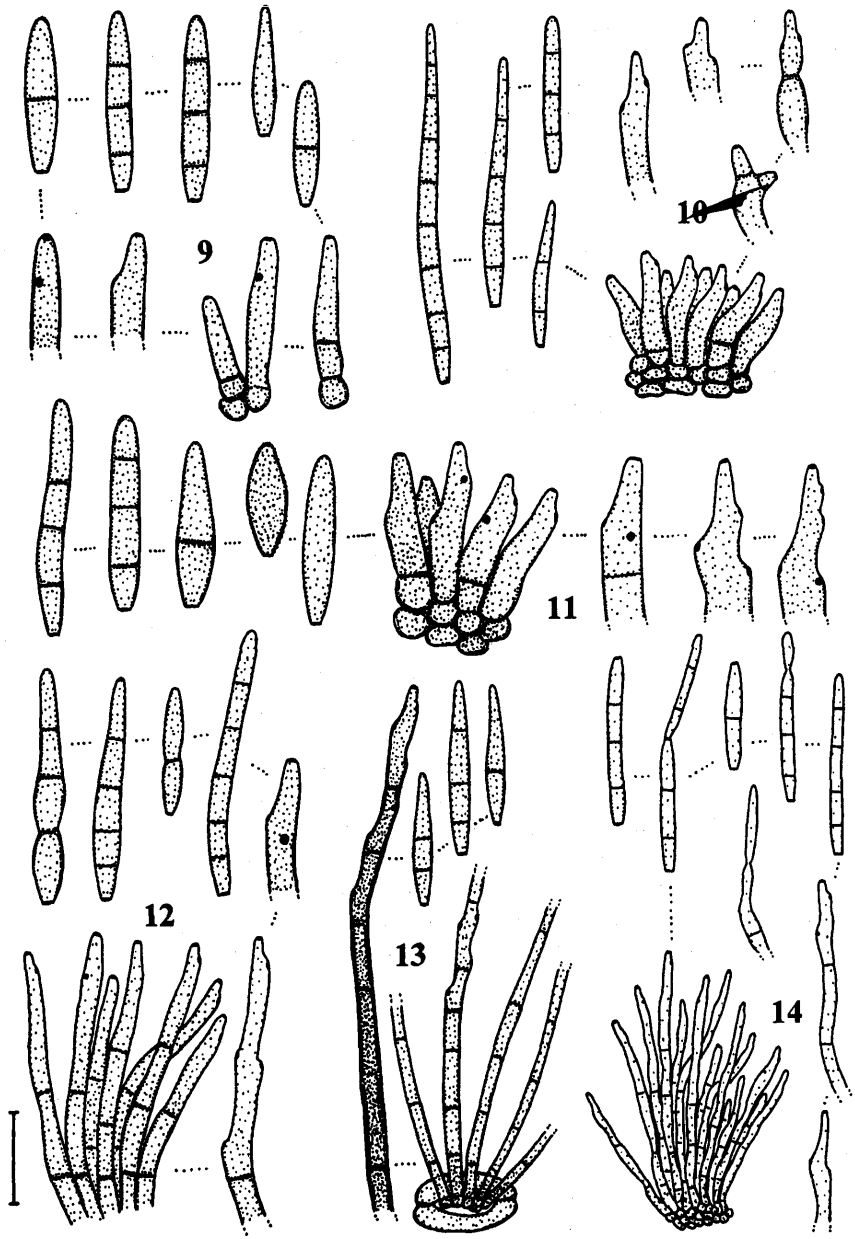

Fig. 9-14: 9 - *Passalora merrowii*; 10 - *P. oxybaphi*; 11 - *P. pachypus*; 12 - *P. pteleae*; 13 - *P. umbrata*; 14 - *Phaeoramularia gilbertii*; fascicles of conidiophores, conidiophores, conidia; scale = 20 µm; U. Braun del.

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15. ***Phaeoramularia oculta*** (Ellis & Kellerm.) U. Braun **comb. nov.** Fig. 15

Bas.: *Cercospora oculta* Ellis & Kellerm., Bull. Torrey Bot. Club 11: 116 (1884).
Ref.: CHUPP (1954: 149).

Leaf spots amphigenous, subcircular to irregular, 1-8 mm diam. or confluent and larger, greenish, greyish green to brownish, occasionally zonate, with a narrow darker margin or marginal line, often somewhat raised, occasionally with a purplish halo. Caespituli amphigenous, punctiform to subeffuse, dark. Mycelium immersed. Stromata substomatal to intraepidermal, 10-40 µm diam., or confluent and larger, forming subeffuse layers, medium brown, cells 2-6 µm wide. Conidiophores in small to large, loose to dense fascicles, arising from stromata, through stomata or erumpent, erect, straight, subcylindric to flexuous, geniculate-sinuous, simple, 10-45(-65) x 3-5 µm, 0-1(-2)-septate, pale olivaceous to olivaceous brown, dark in mass, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10-30 µm long, conidial scars hardly or only very slightly thickened, somewhat darkened, in surface view visible as minute, somewhat darkened circles, 1-2 µm wide. Conidia solitary and catenate, cylindrical-obclavate, 15-75 x 3-5 µm, 0-5-septate, pale olivaceous, smooth, thin-walled, apex rounded to truncate, base short to long obconically truncate, hila hardly thickened, but somewhat darkened, 1.5-2 µm wide.

Holotype: on *Vernonia baldwinii*, USA, Manhattan, Kansas, 12 July 1884, W.A. Kellerman 574 (NY).

On *V. baldwinii*, USA, Rockport, Kansas, July 1894, E. Bartholomew, Ellis & Everh., Fungi Columb. 598 (HBG).

Since this species is characterized by having catenate conidia and conspicuous conidial scars, it must be placed in *Phaeoramularia*.

16. ***Pseudocercospora clavicarpa*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 16

Bas.: *Cercospora clavicarpa* Ellis & Everh., Erythea 2: 26 (1894).
Ref.: CHUPP (1954: 130).

Leaf spots amphigenous, subcircular, subelliptical to somewhat irregular, 5-20 mm diam., dull brown, margin indefinite or with a narrow, yellowish halo. Caespituli amphigenous, punctiform, scattered, dark brown. Mycelium internal. Stromata substomatal, 10-50 µm diam., yellowish to medium brown. Conidiophores in small to moderately large fascicles, usually dense, arising from stromata, through stomata, erect, straight, subcylindric to conic, slightly geniculate-sinuous, simple, 5-30 x 3-9 µm, continuous, occasionally with a single basal septum, pale to dark olivaceous brown, smooth to faintly rough-walled, thin-walled, conidiophores usually reduced to conidiogenous cells, proliferation sympodial, rarely percurrent, conidial scars inconspicuous, occasionally subconspicuous, i.e. scars in surface view visible as minute circles, but only with

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conspicuous rim, wall between rim and central porus neither thickened nor darkened. Conidia solitary, cylindrical or subcylindric-obclavate, 20-105 x 4-8 µm, 0-5-septate, occasionally constricted at the septa, pale olivaceous to olivaceous brown, smooth to faintly rough-walled, apex obtuse, often broadly rounded, base rounded to short obconically truncate, hila unthickened, not darkened, occasionally somewhat refractive, 1.5-3 µm wide.

Holotype: on *Stephanomeria virgata*, USA, Pasadena, Calif., 8 Sept. 1893, A.J. McClatchie 388 (NY).

On *S. virgata*, USA, Pasadena, Calif., July 1894, A.J. McClatchie, Ellis & Everh., Fungi Columb. 797 (HBG), topotype material.

This species is characterized by having inconspicuous conidial scars and unthickened, not darkened hila and belongs in *Pseudocercospora*.

17. ***Pseudocercospora cupheae*** (Syd.) U. Braun **comb. nov.** Fig. 17

Bas.: *Cercospora cupheae* Syd., Ann. Mycol. 37: 428 (1939).
Ref.: Chupp (1954: 361).

Leaf spots amphigenous, 1-10 mm diam., angular-irregular, yellowish, greyish brown to dingy grey on the upper leaf surface, margin indefinite or somewhat darker, greyish olivaceous below. Caespituli amphigenous, punctiform, pale brown, greyish brown, scattered to dense. Mycelium internal. Stromata well-developed, substomatal to intraepidermal, 20-90 µm diam., olivaceous to medium dark brown, cells 1.5-5 µm diam. Conidiophores in small to very large fascicles, loose to dense, often almost sporodochial, arising from stromata, through stomata or erumpent, erect, straight, subcylindric to slightly geniculate-sinuous, simple, 5-15 x 2-3 µm, aseptate, subhyaline to pale yellowish green or olivaceous, smooth, thin-walled, conidiophores reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, cylindrical-filiform, occasionally subacicular or slightly narrowly obclavate, 40-130 x 1.5-4 µm, 4-13-septate, subyhaline, pale greenish or olivaceous, light olivaceous brown in mass, smooth, thin-walled, apex subacute or subobtuse, base truncate to obconically truncate, hila unthickened, not darkened, 1.5-3 µm wide.

Lectotype (selected here): on *Cuphea strigosa*, Ecuador, Hacienda San Antonio, near Baños, Prov. Tungurahua, 21 Dec. 1937, H. Sydow, Fungi exot. exs. 1241 (HBG). Isolectotypes: Syd., Fungi exot. exs. 1241.

This species is a typical member of *Pseudocercospora* with unthickened, not darkened conidial scars and hila.

18. ***Pseudocercospora erythrogena*** (G.F. Atk.) U. Braun **comb. nov.** Fig. 18

Bas.: *Cercospora erythrogena* G.F. Atk., J. Elisha Mitchell Sci. Soc. 8: 65 (1892).
Ref.: Chupp (1954: 379).

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Leaf spots absent or with irregular brown areas of variable size. Colonies amphigenous, effuse, dingy greyish olivaceous. Primary mycelium immersed; secondary mycelium external, superficial; secondary hyphae creeping, sparingly branched, septate, 1-3.5 µm wide, subhyaline to pale brown, smooth. Stromata absent or small, substomatal to intraepidermal, brown. Conidiophores in small to moderately large fascicles, loose to dense, arising from internal hyphae or stromata, through stomata or erumpent, or conidiophores solitary, arising from creeping secondary hyphae, lateral, occasionally terminal, erect, straight, subcylindric to geniculate-sinuous, simple, 10-70 x 2-4.5 µm, 0-4-septate, pale to medium dark brown, smooth, wall somewhat thickened, tips paler and thin-walled, conidiogenous cells integrated, terminal, 10-30 µm long, conidial scars inconspicuous. Conidia solitary, subcylindric-filiform, narrowly obclavate, 20-100 x 2-4 µm, 3-8-septate, subyhaline to pale olivaceous, smooth, thin-walled, apex subacute or subobtuse, base subtruncate to short obconically truncate, hila unthickened, not darkened, 1-2 µm wide.

Lectotypus (selected here): on *Rhexia mariana*, USA, Auburn, Ala., 22 July 1890, G.F. Atkinson 1541 (CUP).

On *Rhexia mariana*, USA, Tuskegee, Ala., 18 Sept. 1906, G.W. Carver, Barthol., Fungi Columb. 2310 (HBG).

This species possesses inconspicuous conidial scars and conidia with unthickened, not darkened hila, so that it has to be placed in *Pseudocercospora*. Since ATKINSON (l.c.) cited various original collections, a lectotypification is necessary.

19. ***Pseudocercospora eustomatis*** (Peck) U. Braun **comb. nov.** Fig. 19

Bas.: *Cercospora eustomatis* („*eustomae*") Peck, N.Y. State Mus. Bull. 157: 45, 107 (1912).
= *Cercospora nepheloides* Ellis & Holw. ex Heald & F.A. Wolf, U.S.D.A. Bur. Pl. Ind. Bull. 226: 87 (1912).
Ref.: CHUPP (1954: 237).

Leaf spots indistinct or with brown areas, 2-10 mm diam. Caespituli amphigenous, punctiform, pustulate, loose to dense, olivaceous brown. Mycelium internal. Stromata large, 20-80 µm diam., subglobose, sometimes oblong, origin substomatal, but soon widening and rupturing the stomata, becoming intraepidermal, dark brown to blackish. Conidiophores numerous to very numerous, densely fasciculate, arising from stromata, forming large sporodochial conidiomata, erect, straight, subcylindric, conic to flexuous, geniculate-sinuous, simple, rarely branched, 5-40 x 3-7 µm, 0-1(-2)-septate, olivaceous to medium olivaceous brown, dark olivaceous brown in mass, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, subcylindric-obclavate (- subclavate, ellipsoid-ovoid), (12-)20-60(-80) x 3-6 µm, (0-)1-6-septate, occasionally somewhat constricted at the septa, pale olivaceous to olivaceous brown, smooth, thin-walled, apex obtuse, base short obconically truncate, hila unthickened, not darkened, 1-2 µm wide.

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Syntype: on *Eustoma andrewsii*, USA, Denver, Colo., 29 Sept. 1909, E. Bethel, Barthol., Fungi Columb. 3804 (HBG).

The examination of syntype material and a collection on *Eustoma russellianum* (Barthol., Fungi Columb. 4007, HBG) showed that this species belongs in *Pseudocercospora*, since the conidial scars and hila are neither thickened nor darkened.

20. ***Pseudocercospora gangetici*** (Bharadwaj) U. Braun **comb. nov.** Fig. 20

Bas.: *Cercospora gangetici* („*gangeticae*") Bharadwaj, J. Indian Bot. Soc. 49: 120 (1970).
= *Pseudocercospora bhopalensis* Deighton, Mycol. Pap. 140: 58 (1976).
= *P. ghanensis* Deighton, l.c.: 61.
= *P. mulleri* Deighton, l.c.: 61.

Leaf spots amphigenous, subcircular to angular-irregular, often vein-limited, 0.5-2 mm diam., sometimes confluent, forming larger blotches, yellowish, later pale to dark greyish or dingy brown, margin indefinite. Colonies amphigenous, effuse, loose to dense, dingy olivaceous. Primary mycelium internal; secondary mycelium absent to sparingly developed (decumbent conidiophores sometimes developing to creeping secondary hyphae). Stromata absent or 10-60 µm diam., well-developed stromata usually epiphyllous, dark brown, substomatal to intraepidermal. Conidiophores in small to moderately large fascicles, arising from internal hyphae or stromata, emerging through stomata, occasionally erumpent when arising from stromata, erect to decumbent, occasionally solitary, arising from creeping threads, lateral, simple or frequently branched, sometimes strongly branched, flexuous, geniculate-sinuous, 20-200 x 3-7(-8) µm, pluriseptate throughout, olivaceous, pale to medium brown, smooth, thin-walled, conidiogenous cells integrated, terminal or intercalary, 10-30 µm long, conidial scars inconspicuous or conidiogenous cells subdenticulate, but wall of the loci neither thickened nor darkened. Conidia solitary, subcylindric-obclavate, 30-90 x 3-8 µm, 3-7-septate, subhyaline to pale olivaceous, smooth, old conidia sometimes faintly rough-walled, thin-walled, apex obtuse or subobtuse, often broadly rounded, base short obconically truncate, hila unthickend, not darkened, 1.5-3 µm wide.

On *Desmodium gangeticum*, India, Gorakhpur (U.P.), 6 May 1978, P.K. Singhania 195 (IMI 228139).

Type material of this species is deposited at HCIO, but was not available for a re-eamination in the course of this study. However, the present collection on *Desmodium gangeticum* from IMI agrees very well with Bharadwaj's (1970) description and illustration. On account of unthickened, not darkened conidial scars and hila, this species must be placed in *Pseudocercospora*. Deighton (1976) described *Pseudocercospora bhopalensis* (on *Desmodium gangeticum* from India), *P. ghanensis* (on *Desmodium triflorum* from Ghana), and *P. mulleri* (on *Desmodium* sp. from Venezuela), but emphasized that these species are very similar to each other, and that further collections may show that these three species are better regarded as varieties of a single species. Deighton (l.c.) failed to compare his new species, above all

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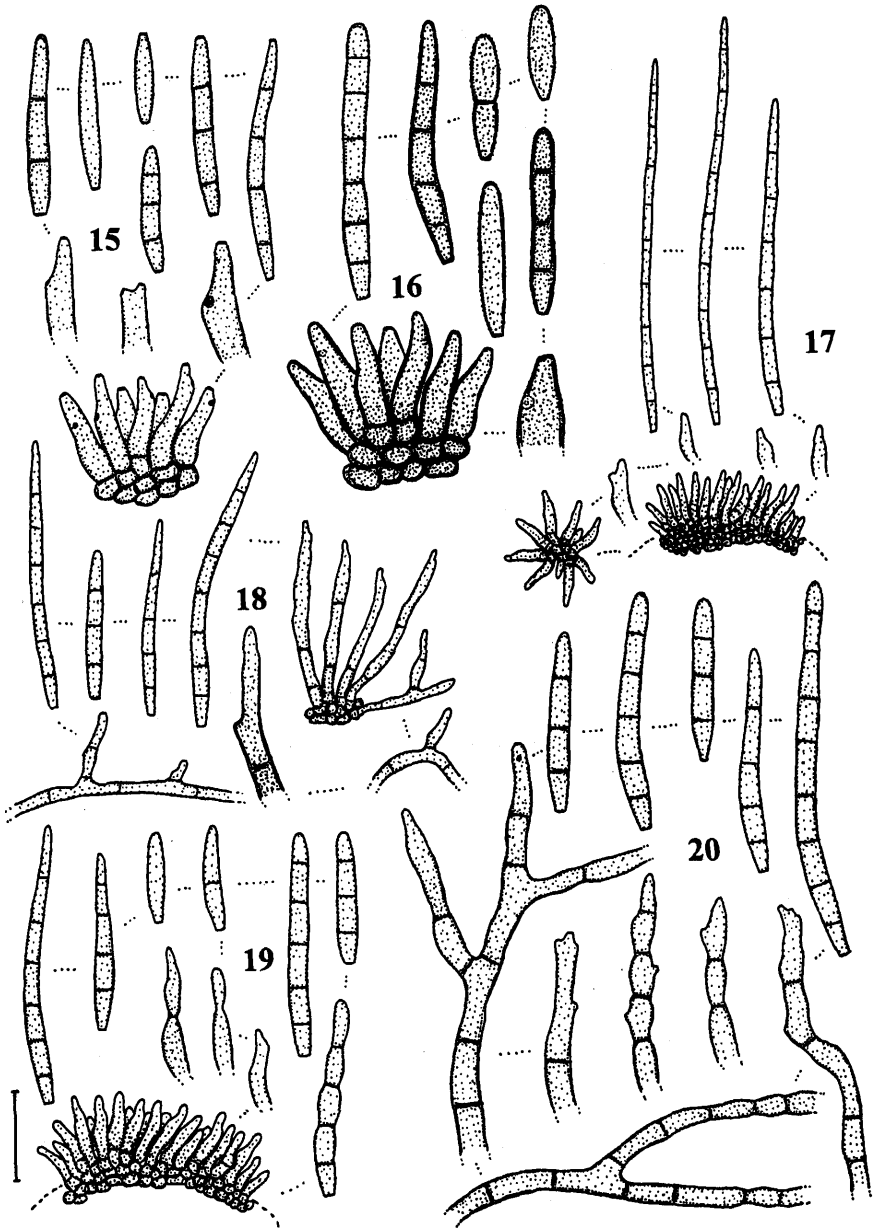

Fig. 15-20: 15 - *Phaeoramularia oculta*; 16 - *Pseudocercospora clavicarpa*; 17 - *P. cupheae*; 18 - *P. erythrogena*; 19 - *P. eustomatis*; 20 - *P. gangetici*; fascicles of conidiophores, conidiophores, conidia, secondary hyphae (in 18 and 20); scale = 20 µm; U. Braun del.

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Pseudocercospora bhopalensis on *Desmodium gangeticum*, with *Cercospora gangetici*, which is undoubtedly conspecific. According to DEIGHTON (l.c.), *Pseudocercospora bhopalensis* has finely rough-walled conidia which are more often subcylindric rather than obclavate-cylindric, *P. ghanensis* differs in having often longer and more septate conidia, and *P. mulleri* possesses longer conidiophores. These „differences" are only gradual and not sufficient for a separation of species. Furthermore, the present collection from Gorakhpur is completely intermediate between DEIGHTON's (l.c.) taxa. Therefore, it is undoubtedly justified to reduce these species to synonymy with *Pseudocercospora gangetici*. The introduction of varieties would not be tenable, since clear morphological delimitations are hardly possible.

21. ***Pseudocercospora grisea*** (Cooke & Ellis) U. Braun **comb. nov.** Fig. 21

Bas.: *Cercospora grisea* Cooke & Ellis, Grevillea 5: 49 (1876).
= *Cercospora polygalae* Henn., Hedwigia 43: 95 (1904).
Ref.: CHUPP (1954: 445).

Complete leaflets discoloured, brown, greyish brown to dingy grey. Caespituli amphigenous, effuse as well as punctiform, pustulate, dingy brown, greyish brown to dull black. Primary mycelium internal; secondary mycelium almost absent to sparingly developed, external; hyphae creeping, septate, sparingly branched, 1.5-4 µm wide, subhyaline to pale olivaceous. Stromata substomatal, small or up to 50 µm diam., subglobose, yellowish brown, medium to dark brown, cells 2-8 µm diam. Conidiophores in small to moderately large fascicles, arising from stromata, through stomata, or solitary, arising from creeping hyphae, lateral, erect, straight, subcylindric to flexuous, somewhat geniculate-sinuous, simple, occasionally subdenticulate, 5-80 x 3-5 µm, continuous to septate throughout, pale olivaceous to olivaceous brown, tips often paler, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, narrowly obclavate-subcylindric, filiform, 20-100 x 2-4.5 µm, 3-8-septate, subhyaline to pale olivaceous or olivaceous brown, smooth, thin-walled, apex subacute, base long obconically truncate, hila unthickened, not darkened, 1-1.5 µm wide.

On *Polygala cruciata,* USA, Newfield, N.J., Sept. 1895, Ellis & Everh., Fungi Columb. 889 (HBG), authentic material, collected at the type locality, and determined by ELLIS and EVERHART.

This fungus is a typical member of *Pseudocercospora* with inconspicuous conidial scars and conidia with unthickened, not darkened hila. Type material of *Cercospora polygalae* has recently been lost, but it was examined by CHUPP (l.c.) who reduced this name to synonymy with *C. grisea*.

22. ***Pseudocercospora leandrae*** (Syd.) U. Braun **comb. nov.** Fig. 22

Bas.: *Cercospora leandrae* Syd., Ann. Mycol. 37: 430 (1939).
Ref.: CHUPP (1954: 380).

Leaf spots amphigenous, subcircular to angular-irregular, 2-10 mm diam., brown, later greyish,

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with a narrow dark margin or marginal line, dark brown to dull violet. Caespituli hypophyllous, punctiform, scattered, dark brown. Mycelium internal. Stromata usually substomatal, 20-70 µm diam., subglobose, dark olivaceous brown. Conidiophores in small to moderately large fascicles, loose to moderately dense, arising from stromata, through stomata, erect, straight, subcylindric to flexuous, sinuous to slightly geniculate, simple, 20-80 x 3-5 µm, 0-3-septate, pale to medium olivaceous brown, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10-40 µm long, conidial scars inconspicuous. Conidia solitary, obclavate-subcylindric, 40-140 x 3-5 µm, 3-10-septate, occasionally with constrictions at the septa, subhyaline or very pale olivaceous, smooth, thin-walled, apex obtuse to subacute, base subtruncate to short obconically truncate, hila unthickened, not darkened, 2-3 µm wide.

Lectotype (selected here): on *Leandra subseriata*, Ecuador, Guapulo, Prov. Pichincha, 9 Sept. 1937, H. Sydow, Fungi exot. exs. 1243 (HBG). Isolectotypes: Syd., Fungi exot. exs. 1243.

Since the conidial scars and the hila of the conidia are neither thickened nor darkened, this species belongs in *Pseudocercospora*.

23. ***Pseudocercospora lippiae-albae*** U. Braun & R.F. Castañeda, Cryptog. Bot. 1: 52 (1989) Fig. 23

On *Lippia geminata*, Uruguay, M. Video, Atahualpa, Sept. 1930, Herter, Pl. Uruguayenses Exs. 1483 (HBG).

BRAUN and CASTAÑEDA (1989) described this species from Cuba on *Lippia alba*. The present collection from Uruguay agrees very well with this species, is conspecific, and represents the second record on a new host species.

24. ***Pseudocercospora melanotes*** (Syd.) U. Braun **comb. nov.** Fig. 24

Bas.: *Cercospora melanotes* Syd., Ann. Mycol. 28: 215 (1930).
Ref.: CHUPP (1954: 556).

Leaf spots absent or with diffuse yellowish areas on the upper leaf surface. Colonies hypophyllous, effuse, loose to dense, olivaceous. Primary mycelium internal; secondary mycelium external, superficial; hyphae emerging through stomata, decumbent, creeping to ascendent, often intertwined, sometimes climbing leaf hairs, sparingly branched, septate, 1-6 µm wide, olivaceous, olivaceous brown, pale brown, smooth. Stromata lacking. Conidiophores solitary, arising from superficial hyphae, lateral or terminal, occasionally formed as erect, intertwined threads, 10-150 x 3-6 µm, straight, subcylindric to geniculate-sinuous, tortuous, with swellings and constrictions, continuous to pluriseptate throughout, olivaceous to medium olivaceous brown throughout, smooth, thin-walled, conidiogenous cells integrated, terminal, sometimes conidiophores reduced to conidiogenous cells, 10-40 µm long, occasionally

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subdenticulate, conidial scars neither thickened nor darkened. Conidia solitary, cylindrical (-obclavate), 25-60 x 3.5-6 µm, (1-)3-8-septate, occasionally constricted at the septa, pale olivaceous to medium olivaceous brown, smooth, thin-walled, apex obtuse, base obconically truncate, hila neither thickened nor darkened, 1.5-2.5 µm wide.

Lectotype (selected here): on *Melochia tomentosa*, Venezuela, Macuto, La Guaira, 21 Dec. 1927, H. Sydow, Fungi exot. exs. 888 (HBG). Isolectotypes: Syd., Fungi exot. exs. 888.

This is a typical member of the genus *Pseudocercospora* with unthickened, not darkened conidial scars and hila.

25. ***Pseudocercospora nesaeae*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 25

Bas.: *Cercospora nesaeae* Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 45: 170 (1893).
Ref.: Chupp (1954: 363).

Leaf spots amphigenous, subcircular to angular-irregular, 1-4 mm diam., brown, reddish brown, with narrow dark brown border. Caespituli epiphyllous, punctiform, dark. Mycelium internal. Stromata immersed, subglobose, 10-40 µm diam., dark olivaceous brown. Caespituli in small to moderately large fascicles, loose to fairly dense, arising from stromata, erumpent, erect, straight, subcylindric to flexuous, geniculate-sinuous, occasionally apically subdenticulate, simple, 10-50 x 3-5 µm, rarely longer, 0-2-septate, pale olivaceous to olivaceous brown, medium to dark olivaceous brown in mass, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10-30 µm long, conidial scars inconspicuous. Conidia solitary, narrowly obclavate, subcylindric-fusiform, 20-110 x (2-)3-4(-5) µm, (1-)3-8 (-10)-septate, subhyaline, pale greenish-olivaceous, smooth, thin-walled, apex obtuse to subacute, base short to long obconically truncate, hila unthickened, not darkened, 1-1.5 µm wide.

Holotype: on *Nesaea verticillata*, USA, Milford, Del., 1 Sept. 1892, A. Commons 1984 (NY).

On *Nesaea verticillata*, USA, Newfield, N.J., without date and collector, Ellis & Everh., Fungi Columb. 886 (HBG).

Because of inconspicuous conidial scars and conidia with unthickened, not darkened hila, this species must be referred to *Pseudocercospora*.

26. ***Pseudocercospora oxydendri*** (Tracy & Earle) U. Braun **comb. nov.** Fig. 26

Bas.: *Cercospora oxydendri* Tracy & Earle, Bull. Torrey Bot. Club 26: 495 (1899).
= *Cercospora oxydendri* Ellis & Everh., J. Mycol. 8: 71 (1902), homonym.
Ref.: Chupp (1954: 209).

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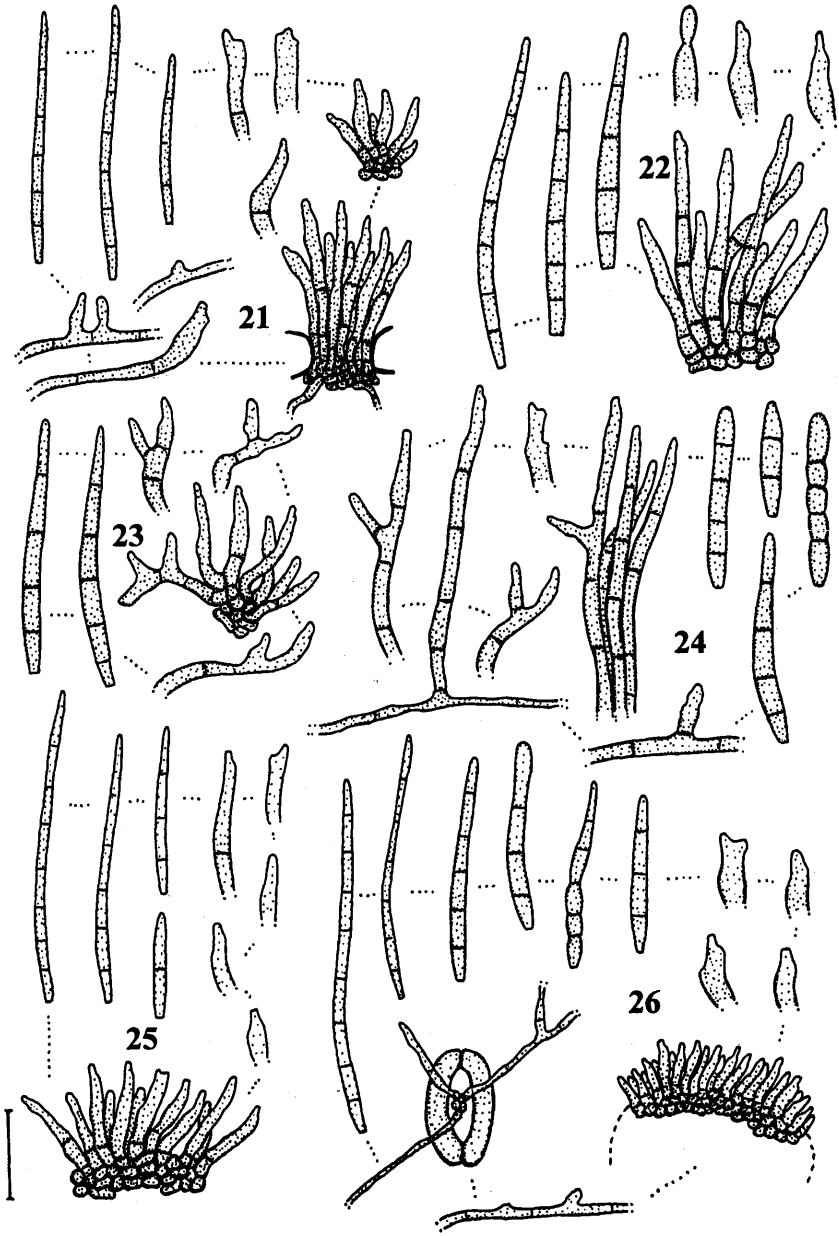

Fig. 21-26: 21 - *Pseudocercospora grisea*; 22 - *P. leandrae*; 23 - *P. lippiae-albae* (from *Lippia geminata*); 24 - *P. melanotes*; 25 - *P. nesaeae*; 26 - *P. oxydendri*; fascicles of conidiophores, conidiophores, conidia, secondary hyphae (in 21, 23, 24, and 26); scale = 20 µm; U. Braun del.

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Leaf spots amphigenous, angular-irregular, 2-15 mm diam. or confluent and larger, ochraceous, brownish, reddish brown, margin indefinite or with a narrow reddish to reddish brown border. Caespituli amphigenous, on the upper leaf surface punctiform, dark, more or less inconspicuous below. Primary mycelium internal; secondary mycelium mainly hypophyllous, external, superficial; hyphae creeping, emerging through stomata, sparingly branched, septate, 1-3 µm diam., subhyaline, pale olivaceous to brownish, smooth. On the upper leaf surface with numerous to very numerous conidiophores in dense fascicles, arising from stromata, erumpent; on the lower leaf surface in small, loose fascicles, emerging through stomata, or solitary, arising from creeping hyphae as lateral branchlets; erect, straight, subcylindric to geniculate-sinuous, simple, 5-45 x 2-5 µm, 0(-1)-septate, pale olivaceous to olivaceous brown, dark olivaceous brown in mass, smooth, thin-walled, conidiophores usually reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, 25-85(-115) x 2.5-4.5 µm, 2-8-septate, subhyaline to pale olivaceous or olivaceous brown, smooth, thin-walled, apex obtuse (- subacute), base short or occasionally long obconically truncate, hila unthickened and not darkened, about 1 µm wide.

On *Oxydendron arboreum*, USA, Tuskegee, Ala., Sept. 1900, G.W. Carver, Ellis & Everh., Fungi Columb. 1610 (HBG), syntype material of *C. oxydendri* Ellis & Everh.

On account of unthickened, not darkened conidial scars and hila, this species belongs in *Pseudocercospora*. The more or less inconspicuous hypophyllous fructification of this species has not been described by CHUPP (l.c.).

27. ***Pseudocercospora penstemonis*** (Ellis & Kellerm.) U. Braun **comb. nov.** Fig. 27

Bas.: *Cercospora penstemonis* Ellis & Kellerm. („*pentstemonis*"), Bull. Torrey Bot. Club 11: 121 (1884).
Ref.: CHUPP (1954: 524).

Leaf spots amphigenous, subcircular, 1-5 mm diam., yellowish-ochraceous to brownish, later dingy grey, margin narrow, dark brown to blackish or dark reddish to purplish violet. Caespituli amphigenous, punctiform, loose to dense, dark. Mycelium internal. Stromata intraepidermal as well as substomatal, 10-60 µm diam., subglobose, brown to blackish, cells 2-6 µm diam. Conidiophores in small to large fascicles, usually dense, arising from stromata, through stomata or erumpent, erect, almost straight and subcylindric to strongly geniculate-sinuous, apically often subdenticulate, simple, occasionally branched, 5-35 x 2-5 µm, up to 7 µm at the very base, 0-2-septate, pale to medium dark brown or reddish brown, smooth to irregularly verruculose-rugose, thin-walled, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 10-30 µm long, conidial scars unthickened, not darkened, inconspicuous or occasionally subconspicuous, with slightly refractive thickening confined to a very narrow rim around the scar (*Paracercospora*-like). Conidia solitary, obclavate-subcylindric, 25-55 (-75) x (1.5-)2-4 µm, (0-)1-4(-6)-septate, greenish-olivaceous to pale brownish, smooth or almost so, thin-walled, apex subacute or subobtuse, base truncate to short obconically truncate, hila unthickened, not darkened, at most slightly refractive, about 1µm wide.

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Holotype: on *Penstemon grandiflorus*, USA, Manhattan, Kansas, June 1884, W.A. Kellerman 566 (NY).

Numerous collections of this species on *Penstemon grandiflorus* have been examined, e.g. Ellis & Everh., Fungi Columb. 1812, Barthol., Fungi Columb. 3805, and Griff., West Am. Fungi 77 (HBG). The conidial scars and hila are unthickened and not darkened, so that this species can be placed in *Pseudocercospora*.

28. ***Pseudocercospora rapaneae*** (Syd.) U. Braun **comb. nov.** Fig. 28

Bas.: *Cercospora rapaneae* Syd., Ann. Mycol. 37: 432 (1939).
Ref.: CHUPP (1954: 404).

Leaf spots amphigenous, subcircular to angular-irregular, occasionally zonate, 1-5 mm diam., occasionally confluent, brown with narrow dark brown margin or marginal line, sometimes margin indefinite. Caespituli amphigenous, on the upper leaf surface punctiform, dark brown to black, but effuse below, dark olivaceous. Stromata mainly epiphyllous, immersed, subglobose to oblong, 50-200 µm diam., blackish. Primary mycelium internal; secondary mycelium mainly hypophyllous, external, superficial, well-developed; hyphae creeping, branched, septate, 1.5-3.5 µm wide, subhyaline, pale olivaceous to olivaceous brown. On the upper leaf surface with conidiophores in large fascicles, loose to dense, arising from stromata; on the lower leaf surface with conidiophores in small fascicles, loose, emerging through stomata, or solitary, arising from secondary hyphae, lateral; erect, straight, subcylindric-filiform to geniculate-sinuous, simple, 40-200 x 4-7 µm, 2-10-septate throughout, pale to dark brown or olivaceous brown, tips often paler, smooth, wall somewhat thickened, conidiogenous cells integrated, terminal, 10-40 µm long, conidial scars inconspicuous. Conidia solitary, obclavate, subcylindric, subacicular, 30-60 x 3-6 µm, (0-)2-4-septate, subhyaline, pale olivaceous to olivaceous brown, smooth, thin-walled, apex obtuse, occasionally subacute, base rounded, subtruncate to short obconically truncate, hila unthickened, not darkened, 2-3 µm wide.

Lectotype (selected here): on *Rapanea jelskii*, Ecuador, Hacienda San Antonio, near Baños, Prov. Tungurahua, 6 Jan. 1938, H. Sydow, Fungi exot. exs. 1244 (HBG). Isolectotypes: Syd., Fungi exot. exs. 1244.

Since the conidial scars and hila are unthickend and not darkened, this species belongs in *Pseudocercospora*.

29. ***Pseudocercospora sapiicola*** (Speg.) U. Braun **comb. nov.** Fig. 29

Bas.: *Cercospora sapiicola* Speg., Anal. Mus. Nac. B. Aires 20: 442 (1910).
Ref.: CHUPP (1954: 229).

Leaf spots amphigenous, subcircular to angular-irregular, 2-20 mm diam., sometimes confluent

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and larger, pale to medium dark brown, margin mostly indistinct, occasionally pale spots with darker border or with a diffuse ochraceous-brownish halo. Caespituli amphigenous, mostly hypophyllous, punctiform, dingy grey to dark brown, often dense. Mycelium internal. Stromata substomatal to intraepidermal, variable, subglobose to oblong, 10-80 µm diam., rarely larger, yellowish or olivaceous brown to dark brown, cells 2-8 µm diam. Conidiophores in small to fairly large fascicles, loose to dense, arising from stromata, through stomata or erumpent, erect, straight, subcylindric or somewhat narrowed towards the apex, or subclavate, apex slightly enlarged, somewhat sinuous or curved, but hardly geniculate, simple, 5-40 x 2.5-8 µm, rarely longer, 0-2-septate, pale olivaceous to olivaceous brown, smooth, wall thin or somewhat thickened, conidiogenous cells integrated, terminal or conidiophores reduced to conidiogenous cells, 5-30 µm long, conidial scars inconspicuous. Conidia solitary, obclavate-subcylindric, 30-70 x 4-7 µm, (1-)2-3(-4)-septate, pale olivaceous, smooth, thin-walled, apex obtuse, base short obconically truncate, hila unthickened, not darkened, 2.5-3 µm wide.

On *Sapium verum*, Costa Rica, La Caja, near San José, 19 Feb. 1925, H. Sydow, Fungi exot. exs. 713 (HBG).

Type material of this species has not been re-examined, but the present collection from Costa Rica agrees perfectly with the original diagnosis and CHUPP's (l.c.) description. The conidial scars and hila are unthickened and not darkened, so that *C. sapiicola* can be referred to *Pseudocercospora*.

30. ***Pseudocercospora scutellariae*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 30

Bas.: *Cercospora scutellariae* Ellis & Everh., J. Mycol. 4: 54 (1888).
Ref.: CHUPP (1954: 272).

Leaf spots amphigenous, angular-irregular, 1-6 mm diam., olivaceous to dark brown, margin indefinite or with a narrow purplish-violet to dark brown border or halo. Caespituli amphigenous, punctiform and dark on the upper leaf surface, less conspicuous below. Mycelium internal, rarely with some superficial, creeping hyphae. Stromata mainly epiphyllous, intraepidermal, subglobose, 10-50 µm diam., medium to dark brown, cells 2-8 µm diam., walls somewhat thickened. Conidiophores in small to fairly large fascicles, loose to dense, arising from stromata, erumpent, erect, subcylindric to flexuous, somewhat geniculate-sinuous, slightly narrowed towards the apex, simple, 5-25(-30) x (2-)3-5(-6) µm, 0-1-septate, pale olivaceous to medium brown, smooth, thin-walled, conidiophores often reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, narrowly obclavate(-subcylindric), (15-)30-80(-125) x 2-4 µm, 1-10-septate, subhyaline to pale olivaceous, smooth, thin-walled, apex acute to subobtuse, base obconically truncate, hila unthickened, not darkened, 1-2 µm wide.

Holotype: on *Scutellaria versicolor*, USA, Concordia, Mo., Oct. 1886, C.H. Demetrio 88 (NY).

On *Scutellaria versicolor*, USA, Perryville, Mo., C.H. Demetrio, Kabát & Bubák, Fungi imp. exs. 799 (HBG).

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Based on unthickened and not darkened conidial scars and hila, this species has to be reallocated to *Pseudocercospora*.

31. ***Pseudocercospora silphii*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 31

Bas.: *Cercospora silphii* Ellis & Everh., J. Mycol. 4: 3 (1888).
= *Cercospora silphii* var. *laciniati* Tehon & Daniels, Mycologia 19: 128 (1927).
Ref.: CHUPP (1954: 158).

Leaf spots amphigenous, angular, 0.5-8 mm diam., pale to dark brown, occasionally blackish, margin indefinite. Caespituli amphigenous, punctiform to subeffuse, dark. Mycelium internal. On the upper leaf surface with well-developed stromata, up to 50 µm diam., substomatal to intraepidermal, on the lower leaf surface with small substomatal stromata, 10-25 µm diam., olivaceous, or stromata even lacking. Conidiophores in small to large fascicles, arising from stromata, through stomata or erumpent, erect, straight, subcylindric to flexuous, slightly to strongly geniculate-sinuous, simple, rarely branched, often subdenticulate in the upper half, 5-55 x 2-7 µm, 0-1(-2)-septate, pale olivaceous to olivaceous brown throughout, smooth, thin-walled, conidiogenous cells integrated, terminal or conidiophores often reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, obclavate-cylindrical, (20-)40-80(-100) x 2.5-5.5 µm, usually 3-6-septate, subhyaline to pale olivaceous, smooth, thin-walled, apex obtuse to subacute, base short to long obconically truncate, hila unthickened, not darkened, 1.5-3 µm wide.

Holotype: on *Silphium integrifolium*, USA, Manhattan, Kansas, July 1887, W.T. Swingle 1035 (NY).

Some North American collections on *Silphium integrifolium* have been examined, e.g. Barthol., Fungi Columb. 3513 and Ellis & Everh., Fungi Columb. 456 (HBG). Since the conidial scars and hila are neither thickened nor darkened, *Cercospora silphii* belongs in *Pseudocercospora*.

32. ***Pseudocercospora sydowiana*** (Chupp) U. Braun & Crous **comb. nov.**

Bas.: *Cercospora sydowiana* Chupp, A Monograph of the Fungus Genus *Cercospora*: 363, Ithaca, New York 1954.
≡ *Cercospora woodfordiae* Syd., Ann. Crypt. Exot. 2: 271 (1929), non *C. woodfordiae* Petch, 1922. ≡ *Pseudocercospora woodfordiae* X.-J. Liu & Y.-L. Guo, Acta Mycol. Sinica 11: 32 (1993), as „*P. woodfordiae* (Syd.) X.-J. Liu & Y.-L. Guo".

Cercospora woodfordiae Syd. is an illegitimate name (younger homonym of *C. woodfordiae* Petch), replaced by *C. sydowiana* in CHUPP (l.c.). LIU and GUO (l.c.) did not adopt this valid name, but transferred *C. woodfordiae* Syd. to *Pseudocercospora*. In doing so, they introduced a new name in *Pseudocercospora* which is to be ascribed to the Chinese authors alone (ICBN, Art. 72).

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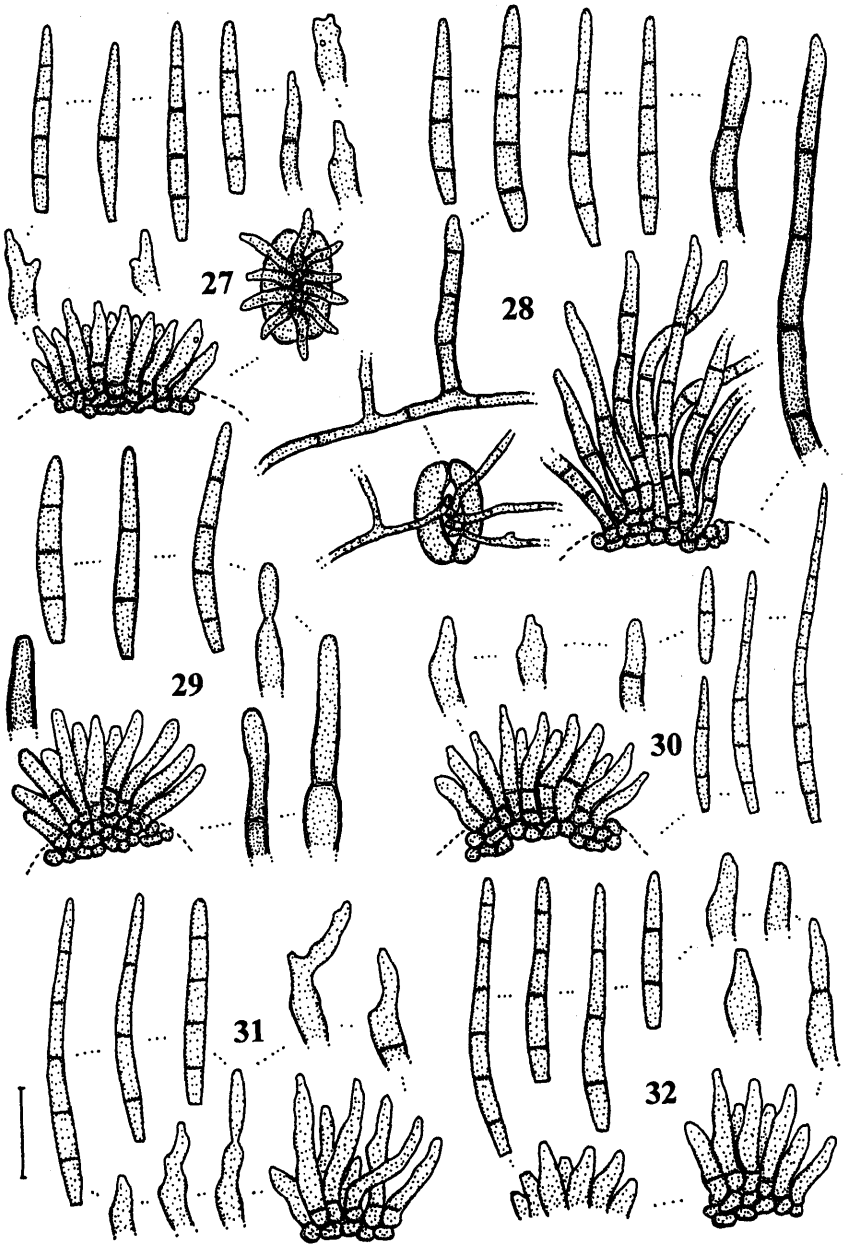

Fig. 27-32: 27 - *Pseudocercospora penstemonis*; 28 - *P. rapaneae*; 29 - *P. sapiicola*; 30 - *P. scutellariae*; 31 - *P. silphii*; 32 - *P. tuberculans*; fascicles of conidiophores, conidiophores, conidia, secondary hyphae (in 28); scale = 20 µm; U. Braun del.

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33. ***Pseudocercospora tuberculans*** (Ellis & Everh.) U. Braun **comb. nov.** Fig. 32

Bas.: *Cercospora tuberculans* Ellis & Everh., J. Mycol. 4: 115 (1888).
Ref.: CHUPP (1954: 259).

Leaf spots absent or almost so, sometimes with slight discolorations on the upper leaf surface. Caespituli hypophyllous, punctiform, formed on small, brown, tubercle-like swellings, 0.5-1 mm diam., sometimes effuse between tubercles. Mycelium internal. Stromata absent to well-developed, 10-80 µm diam., dark brown to blackish, substomatal to deeply immersed, cells 3-8 µm diam. Conidiophores in small to large fascicles, loose to usually dense, occasionally solitary, arising from stromata, through stomata or erumpent, erect, straight, subcylindric, hardly geniculate-sinuous, simple, 10-35 x 3-7 µm, rarely longer, 0-1-septate, pale olivaceous to olivaceous brown, smooth, thin-walled, conidiogenous cells integrated, terminal, but conidiophores mostly reduced to conidiogenous cells, conidial scars inconspicuous. Conidia solitary, cylindrical (-obclavate), 20-80 x 4-6.5 µm, 1-6-septate, pale olivaceous to brownish, smooth, thin-walled, apex obtuse, base subtruncate, short to long obconically truncate, hila unthickened, not darkened, 2-3 µm wide.

Holotype: on *Liquidambar styraciflua*, USA, Starkville, Miss., June 1888, S.M. Tracy (NY).

On *Liquidambar styraciflua*, USA, Starkville, Miss., June 1892, S.M. Tracy, Ellis & Everh., Fungi Columb. 168 (HBG), topotype material.

Since the conidial scars and hila are neither thickened nor darkened, this species belongs in *Pseudocercospora*.

Acknowledgments:
I wish to convey my thanks to the heads and curators of the herbaria cited in the paper for allowing me to examine type material and other collections in their keeping.

Literature:

ARX, v. J.A. 1983: *Mycosphaerella* and its anamorphs. Proceedings Koninklije Nederlandse Akademie van Wettenschappen, Ser. C, **86**: 15-54.

BHARADWAJ, S.D. 1970: A note on two species of *Cercospora*. The Journal of the Indian Botanical Society **49**(1-4): 119-121.

BRAUN, U. 1992: Taxonomic notes on some species of the *Cercospora* complex. Nova Hedwigia **55**: 211-221.

BRAUN, U. 1993a: Taxonomic notes on some species of the *Cercospora* complex (II). Cryptogamic Botany **3**: 235-244.

BRAUN, U. 1993b: Taxonomic notes on some species of the *Cercospora* complex (III). Mycotaxon **48**: 275-298.

BRAUN, U. 1995a: A monograph of *Cercosporella, Ramularia* and allied genera (phytopathogenic hyphomycetes). Vol. 1. Eching.

Institut für Biologie, Institutsbereich Geobotanik und Botanischer Garten der Martin-Luther-Universität Halle-Wittenberg

BRAUN, U. 1995b: Miscellaneous notes on phytopathogenic hyphomycetes (II). Mycotaxon **55**: 223-241.

BRAUN, U. 1996: Taxonomic notes on some species of the *Cercospora* complex (IV). Sydowia **48**(2): 205-217.

BRAUN, U. & CASTAÑEDA RUIZ, R.F. 1989: *Cercospora* and allied genera of Cuba (I). Cryptogamic Botany **1**: 42-55.

BRAUN, U. & MELNIK, V.A. 1997: Cercosporoid fungi from Russia and adjacent countries. Proceedings of the Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg, **20**: 1-130.

CHUPP, C. 1954: A monograph of the fungus genus *Cercospora*. Ithaca, New York.

DEIGHTON, F.C. 1967: Studies on *Cercospora* and allied genera. II. *Passalora, Cercosporidium* and some species of *Fusicladium* on *Euphorbia*. Mycological Papers **112**: 1-80.

DEIGHTON, F.C. 1976: Studies on *Cercospora* and allied genera. VI. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. Mycological Papers **140**: 1-168.

DEIGHTON, F.C. 1990: Observations on *Phaeoisariopsis*. Mycological Research **94**: 1096-1102.

ELLIS, M.B. 1976: More Dematiaceous Hyphomycetes. CMI, Kew.

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Jahr/Year: 1999

Band/Volume: 2

Autor(en)/Author(s): Braun Uwe

Artikel/Article: Taxonomic notes on some species of the Cercospora complex (V) 1-28