Taxonomic revision of the genus *Cladosporium* s. lat. 5. Validations and descriptions of new species

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Abstract: SCHUBERT, K., BRAUN, U. & MUŁENKO, W. (2006): Taxonomic revision of the genus *Cladosporium* s. lat. 5. Validations and descriptions of new species. Schlechtendalia **14**: 55–83.

The new species *Cladosporium alneum, C. foliorum, C. fraxinicola, C. liriodendri, C. oreodaphnes, C. populicola, C. smilacicola* and *C. syringicola* are described, illustrated and discussed, and the new combinations *Cladosporium bosciae* and *C. chamaeropis* are introduced. *Cladosporium acutum* and *C. phoenicis* are reduced to synonymy with *C. herbarum*.

Zusammenfassung: SCHUBERT, K., BRAUN, U. & MUŁENKO, W. (2006): Taxonomische Revision der Gattung *Cladosporium* s. lat. 5. Validierungen und Beschreibungen neuer Arten. Schlechtendalia **14**: 55–83.

Die neuen Arten *Cladosporium alneum, C. foliorum, C. fraxinicola, C. liriodendri, C. oreodaphnes, C. populicola, C. smilacicola* und *C. syringicola* werden beschrieben, illustriert und diskutiert. Weiterhin werden die Neukombinationen *Cladosporium bosciae* und *C. chamaeropis* eingeführt. *Cladosporium acutum* und *C. phoenicis* werden zu Synonymen von *C. herbarum* reduziert.

Key words: Anamorphic fungi, taxonomy, *Cladosporium*, new species, new combinations.

Introduction

The genus *Cladosporium* Link, which comprises more than 770 names (DUGAN et al. 2004), is morphologically well characterised by its uniform scar type. The conidiogenous loci and conidial hila are protuberant, thickened, refractive or somewhat darkened, consisting of a central convex dome, surrounded by a raised periclinal rim, for which DAVID (1997) introduced the term coronate. On the basis of this unique feature, species of the latter genus are easily recognisable. Molecular examinations of cladosporioid fungi confirmed David's (1997) approach restricting this genus to species with coronate conidiogenous loci. Based on ITS sequence analyses BRAUN et al. (2003) could demonstrate that species with anamorphs belonging in the genus *Cladosporium* s. str. represent a monophyletic sister group to *Mycosphaerella* Johanson s. str. with cercosporoid anamorphs. The ascomycetous genus *Davidiella* Crous & U. Braun was proposed to accommodate the teleomorphs formerly placed in *Mycosphaerella* s. lat. Since no overall monograph has been attempted, a comprehensive revision of the numerous described taxa, including re-examinations of type material, has been initiated. Reassessments, redescriptions, illustrations and commentaries on several species, which proved to be non-congeneric with *Cladosporium* s. str., have already been provided (CROUS et al. 2006; SCHUBERT 2005a; SCHUBERT

& BRAUN 2004, 2005a, b). Furthermore, all *Cladosporium* species classified in literature to be fungicolous have recently been treated by means of light and scanning electron microscopy (HEUCHERT et al. 2005). Foliicolous *Cladosporium* species occurring on living or fading leaves have been the subject of a thesis (SCHUBERT 2005b) carried out at the Martin-Luther-University Halle-Wittenberg, Germany. Since a thesis is not a valid publication, newly described species and new combinations introduced in the latter work are validly published within this paper. They are comprehensively described, illustrated and discussed comparing them with morphologically similar species.

Materials and methods

Herbarium specimens and fresh collections have been examined by standard light microscopy (Olympus BX 50, Hamburg, Germany). Measurements have been carried out in distilled water using oil immersion. Stains were not used as the fungal hyphae, conidiophores and conidia are pigmented and thus clearly visible. Drawings were done free hand. Digital photographs were taken using a ZEISS AxioCam HR attached to a ZEISS Axioskop 2 and occasionally optimised with the software ZEISS AxioVision. SEM micrographs have been prepared at the Institute of Zoology, Martin-Luther-University, Halle. Specimens were coated with a thin layer of gold, using a sputter coater SCD 004 (200 seconds in an argon atmosphere of 20 mA, 30 mm distant from the electrode) and examined by a HITACHI S-2400 scanning electron microscope with integrated camera (ILFORD PLUS 125). The collections examined are deposited at the herbaria B, BPI, HAL, DAOM, LBL, M, MA, NY, PAD and PH (abbreviations according to HOLMGREN et al. 1990).

Descriptions of the new species

1. *Cladosporium alneum* Pass. ex K. Schub., **sp. nov.** (MB 500531) **Fig. 1; Pl. 1, Fig. A**

≡ *Cladosporium alneum* Pass., in herb.

Differt a *C. cladosporioides* locis conidiogenis aggregatos, conidiis 0–3-septatis; a *C. rivinae* conidiis levibus, conidiophoris ad basim saepe non inflatis; a *C. populicola* conidiis longioribus, 3–23 µm, 0–3-septatis.

Holotype: on living leaves of *Alnus glutinosa* (Betulaceae), Italy, Emilia Romagna, Parma, 1879, G. Passerini (B 70-6156).

Leaf spots amphigenous, subcircular, oval to somewhat irregular in outline, scattered over the whole leaf surface, extending and often confluent, becoming oblong-irregular, 1–30 mm long, 1–13 mm wide, pale brownish, ochraceous or clay-coloured, becoming grey-brown or olivaceous-brown by dense fructification, mostly without margin, occasionally with a narrow, irregular, pale to medium reddish brown margin, affected areas turning fragile and finally forming shot hole symptoms. *Colonies* amphigenous, scattered to subeffuse, loosely caespitose, brown, villose. *Mycelium* internal, subcuticular to intraepidermal, sometimes also external, growing superficially; hyphae unbranched or sparingly branched, 3–9 µm wide, septate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown or medium brown, smooth,

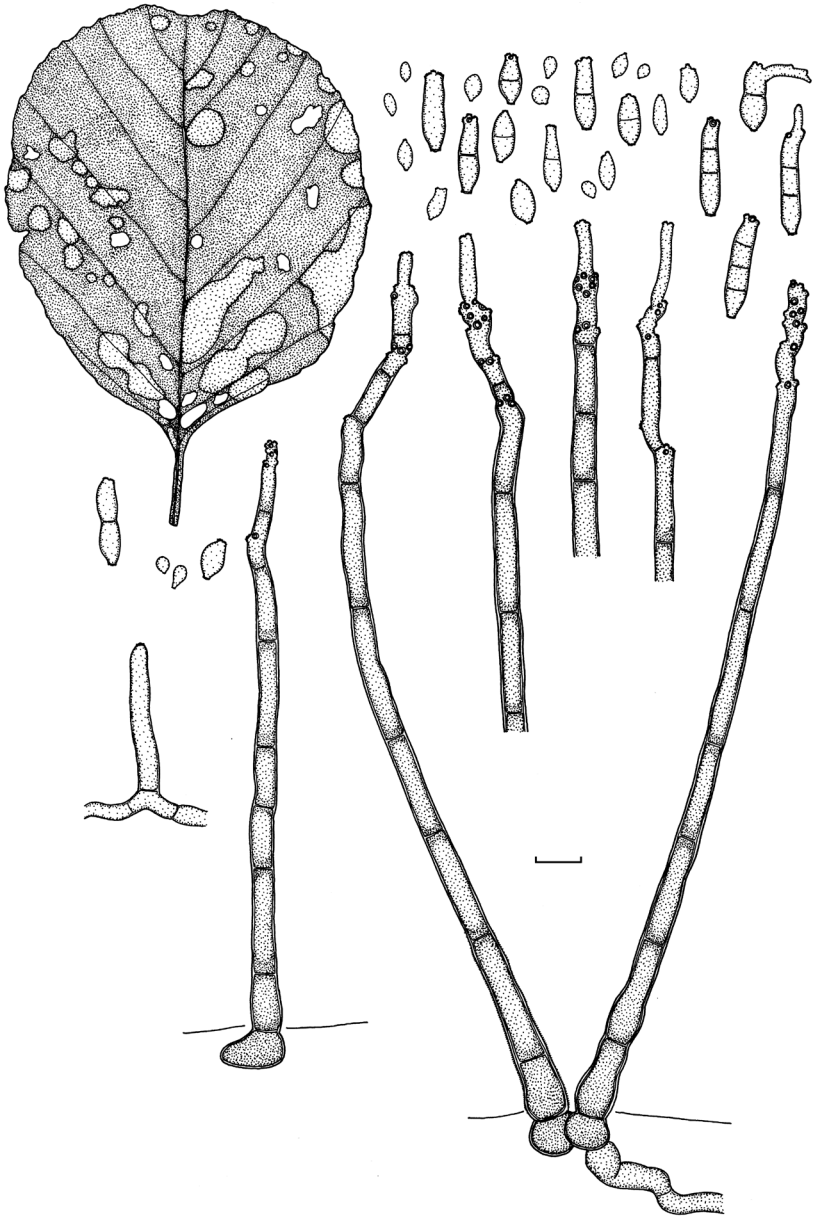


Fig. 1: *Cladosporium alneum* (from the holotype). Symptoms, conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

walls somewhat thickened, forming swollen hyphal cells, subglobose, 7–13 µm wide, medium brown or medium olivaceous-brown, smooth, thick-walled. *Stromata* usually absent, sometimes developed, small, up to 30 µm diam., composed of swollen hyphal cells. *Conidiophores* solitary, in pairs of two or sometimes in loose groups, arising from swollen hyphal cells, erumpent, sometimes arising from internal and external hyphae, lateral and terminal, erect, straight to somewhat flexuous, sometimes slightly geniculate-sinuous and subnodulose towards the apex, unbranched, 25–260 × (2–)3–7(–8.5) µm, pluriseptate, pale to usually pale medium brown or medium brown, paler towards the apex, sometimes subhyaline, smooth to somewhat asperulate, especially near the base, walls thickened, one-layered or two-layered, inner wall not very conspicuous, 0.5–1 µm wide, usually attenuated towards the apex, sometimes slightly swollen at the base, up to 10 µm wide, protoplasm of the cells somewhat aggregated at the septa, thus appearing to be thickened, similar to distoseptation. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical-oblong, 9–46 µm long, proliferation sympodial, with several or even numerous conidiogenous loci, sometimes situated on small lateral shoulders or crowded at small multilateral swellings but not confined to them, protuberant, short cylindrical, subdenticulate, (0.5–)1–2(–2.5) µm diam., thickened, refractive to somewhat darkened. *Conidia* catenate, usually in branched chains, subglobose, ovoid, ellipsoid-ovoid, subcylindrical to cylindrical, 3–23 × 2.5–6 µm, 0–3-septate, sometimes slightly constricted at the septa, pale brown or pale olivaceous, sometimes almost subhyaline, smooth, walls somewhat thickened, apex rounded or with a single or several hila, slightly attenuated towards the base, hila protuberant, 0.5–2(–2.5) µm diam., obconically truncate, thickened, refractive to somewhat darkened; microcyclic conidiogenesis occurring.

In the type collection some verruculose conidia of *C. herbarum* (Pers.: Fr.) Link are intermixed. *Cladosporium alnicola* Bubák & Vleugel and *C. alnicola* Corda, recorded on *Alnus* spp., proved to be synonymous with *C. herbarum*. *Cladosporium bacilligerum* Mont. & Fr. described from France on *Alnus glutinosa* is excluded from *Cladosporium* s. str. and belongs in the genus *Passalora* Fr. *Passalora bacilligera* (Mont. & Fr.) Mont. & Fr. is the type species of the latter genus. All Cladosporia described from the host genus *Betula* have been excluded and referred to the hyphomycetous genus *Fusicladium* Bonord. (SCHUBERT et al. 2003; SCHUBERT 2005a).

Cladosporium alneum is morphologically comparable with *C. cladosporioides* (Fresen.) G.A. de Vries, *C. rivinae* Speg. and *C. populicola* K. Schub. & U. Braun sp. nov. (see below). However, *C. cladosporioides* differs in having usually aseptate conidia and somewhat narrower conidiophores with only few, non-crowded conidiogenous loci; in *C. rivinae* the conidiophores are always distinctly swollen at the base, up to 16 µm wide, and the conidia are usually minutely verruculose; and *C. populicola* possesses 0–1(–2)-septate, shorter conidia, 4–14 × 3–5(–5.5) µm, with distinct lumen.

2. *Cladosporium bosciae* (Sacc.) K. Schub., **comb. et stat. nov.** (MB 500552)

Fig. 2; Pl. 2, Figs B–C

≡ *Cladosporium compactum* [Berk. & M.A. Curtis] f. *bosciae* Sacc., Ann. Mycol. 8: 340 (1910).

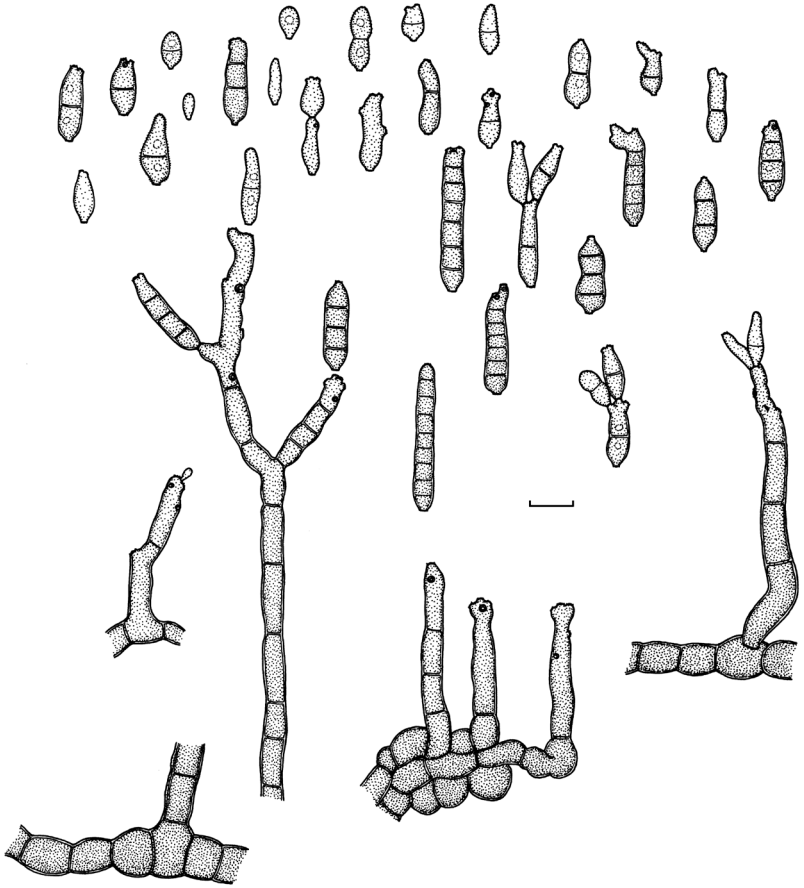


Fig. 2: *Cladosporium bosciae* (from the holotype). Conidiophores and conidia. Bar = 10 μm.

≡ *Cladosporium compactum* [Berk. & M.A. Curtis] var. *bosciae* (Sacc.) Sacc., Syll. Fung. 22: 1367 (1913).

Holotype: on *Boscia senegalensis* (Capparidaceae), Eritrea, Barca, Agordat, alt. 640 m, 23 Feb. 1909, A. Fiori (PAD).

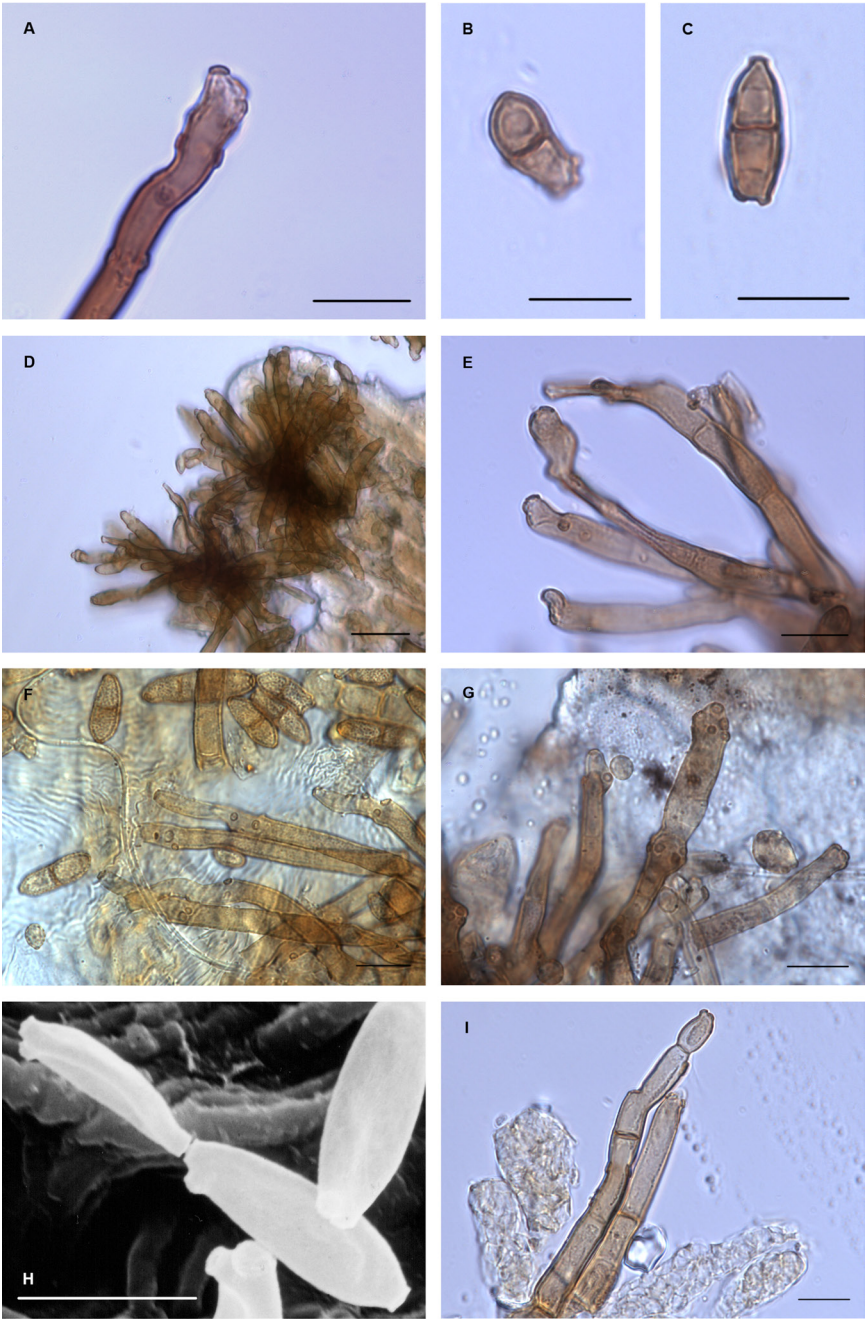
Leaf spots amphigenous, numerous, punctiform, up to 2 mm wide, often somewhat irregular and limited by larger leaf veins, grey-brown to dark brown or almost blackish, later confluent, then leaves with a somewhat spotted appearance, spots surrounded by a narrow, reddish or pale reddish brown, irregular margin, cuticle of the diseased leaves seemingly destroyed or dislodged, looking like the damage caused by insects, yellowish ochraceous. *Colonies* usually hypophyllous, on the upper leaf surface sparingly developed, scattered, dense, caespitose, red-brown to dark brown, velvety. *Mycelium*

internal, immersed; hyphae branched, 3.5–4.5 µm wide, septate, sometimes slightly constricted at the septa, pale olivaceous to olivaceous-brown, smooth, walls somewhat thickened, often somewhat wider and darker at the base of conidiophores. *Stromata* intraepidermal composed of subglobose to somewhat angular, thick-walled cells, 5–12 µm wide, olivaceous-brown, smooth. *Conidiophores* solitary or in loose groups, arising from stromata or from swollen hyphal ropes, erect, more or less straight, cylindrical-oblong, unbranched, rarely branched, 35–130 × 4.5–7(–9) µm, septate, sometimes slightly constricted at the septa, olivaceous-brown, smooth or sometimes faintly asperulate, walls thickened, sometimes even distinctly two-layered, mostly somewhat paler and attenuated towards the apex. *Conidiogenous cells* integrated, at first terminal, later intercalary, cylindrical, 10–35 µm long, proliferation sympodial, with one or only few conidiogenous loci, subdenticulate, truncate to slightly convex, 1.5–2.5 µm diam., thickened, more or less darkened-refractive. *Conidia* in branched chains, polymorphous, small conidia subglobose, ovoid, obovoid, ellipsoid, subcylindrical, 4–11 × 2.5–5(–6) µm, 0–1-septate, larger conidia ellipsoid, fusiform, cylindrical 10–20 × 3.5–6(–7) µm, (0–)1–3-septate, ramoconidia s. lat. and s. str. oblong, ellipsoid-cylindrical, 18–40 × 4.5–8 µm, 1–6(–8)-septate, not to slightly constricted at the septa, pale olivaceous, olivaceous-brown to brown, smooth or almost so, sometimes faintly rough-walled, walls slightly to distinctly thickened, cell structure sometimes unusual, paler and apparently hollow in the centre of the cells, surrounded by the somewhat darker protoplasm, similar to distoseptation, apex rounded to attenuated, hila truncate to slightly convex, 1–2.5 µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis not observed.

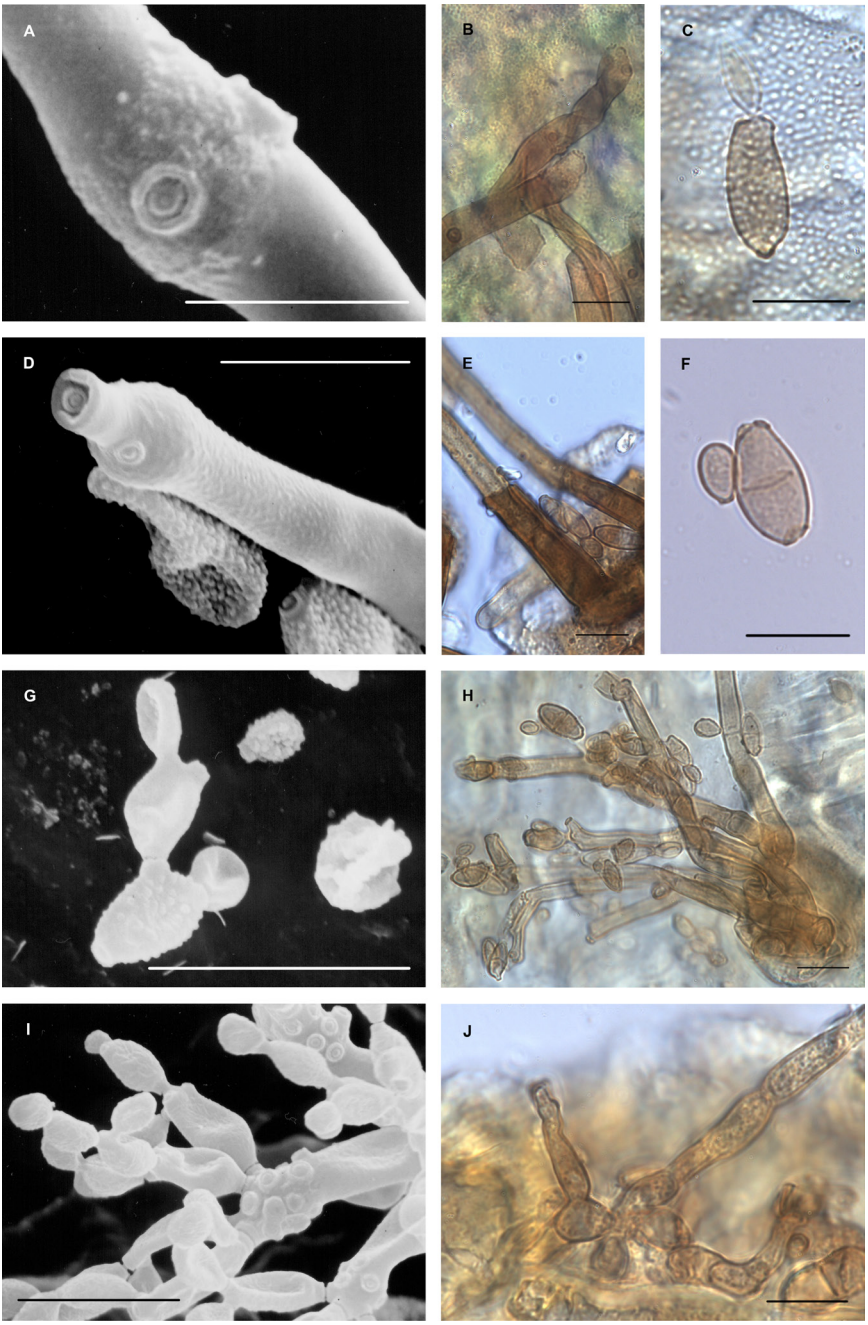
This species was introduced by SACCARDO (1910) as forma of *C. compactum* Sacc. (‘*Cladosporium compactum* Sacc. – Syll. IV, 364 – fm. *Bosciae* Sacc.’). Page 364 of Saccardo’s Sylloge fungorum (1886) refers, however, to *C. compactum* Berk. & M.A. Curtis. This must be considered a bibliographic error in SACCARDO (1910). In 1913, SACCARDO recognised and corrected it and treated *bosciae* as variety of the latter species, which has to be regarded as new combination.

Colonies were described to be hypophyllous on areoles between leaf veins, hollowed out by insects and almost completely occupied (SACCARDO 1910). The biology of *C. bosciae* is quite unclear, either it is a saprobic species or a taxon restricted to *Boscia*. Further collections are necessary to prove the ecology of this species. The common saprobic species *C. herbarum*, *C. oxysporum* Berk. & M.A. Curtis and *C. cladosporioides* are quite distinct from *C. bosciae* in having aseptate or only sparingly septate conidia [0–1(–2)-septate in *C. cladosporioides*; 0–3-septate in *C. herbarum*; 0–1(–2)-

Pl. 1, Figs A–I (p. 61):
A: *Cladosporium alneum*, tip of a conidiophore with several somewhat darkened conidiogenous loci (bar = 10 µm). **B–C**: *Cladosporium bosciae*, conidia showing cell structure, with paler cavity in the centre of the cells (bar = 10 µm). **D–E**: *Cladosporium chamaeropis*: **D** – overview (bar = 20 µm), **E** – conidiophores (bar = 10 µm). **F**: *Cladosporium foliorum*, conidiophores and conidia (bar = 10 µm). **G**: *Cladosporium oreodaphnes*, conidiophores with numerous, conspicuous, somewhat crowded conidiogenous loci (bar = 10 µm). **H–I**: *Cladosporium fraxinicola*: **H** – conidial chain with conidia just separating but still attached at the central domes (bar = 10 µm), **I** – conidiophores (bar = 10 µm).



Pl. 1, Figs A–I (text on page 60).



Pl. 2, Figs A–J (text on page 63).

septate in *C. oxysporum*], narrower (2–5 µm in *C. cladosporioides*) and, above all, verruculose conidia (in *C. herbarum*). Furthermore, the conidiophores of *C. herbarum* and *C. oxysporum* are usually subnodulose, nodulose or even nodose with conidiogenous loci confined to these multilateral swellings.

3. *Cladosporium chamaeropis* (Unamuno) K. Schub., **comb. nov.** (MB 500553)
Fig. 3; Pl. 1, Figs D–E

≡ *Cladosporium fasciculare* f. *chamaeropis* Unamuno, Trab. Secc. Cienc. Nat. Congr. Assoc. Progr. Cienc. Oporto 1921: 60 (1922).

Holotype: on leaves of *Chamaerops humilis* (Arecaceae), Spain, near Oriedo, May 1921, P. Unamuno (MA 06416).

Leaf spots amphigenous, at first small, subcircular-oval to somewhat oblong, later extending and confluent, oblong-irregular, covering large areas of the leaf surface, mainly at the tips of leaves, pale brown or fading, turning pale clay-coloured in the centre, surrounded by a narrow to wide irregular margin, dark brown or almost blackish, surrounding leaf tissue discoloured, brownish. *Colonies* amphigenous, scattered to subeffuse in the pale centre, loosely caespitose, in tufts, brown. *Mycelium* internal, intraepidermal; hyphae sparingly branched, 2–4 µm wide, septate, subhyaline to pale brown, smooth, walls not or only slightly thickened. *Stromata* usually well-developed, compact, substomatal to intraepidermal, 10–30 µm diam., several layers deep, composed of somewhat angular swollen hyphal cells, 4–10 µm wide, brown to olivaceous-brown, smooth, thick-walled. *Conidiophores* mostly in loose to somewhat denser fascicles, few to numerous, arising from stromata, rarely solitary, arising from swollen hyphal cells, mostly emerging through stomata or erumpent through the cuticle, erect, straight to somewhat flexuous, cylindrical-oblong, sometimes slightly geniculate-sinuous towards the apex, usually without swellings, unbranched or rarely once branched, 20–125 × 4–6.5 µm, septate, not constricted at the septa, pale to medium olivaceous-brown or brown, sometimes paler towards the apex, smooth or almost so, walls thickened, often distinctly two-layered, up to 1 µm wide. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, (6–)11–35 µm long, proliferation sympodial, with few or often numerous conidiogenous loci, often on small lateral shoulders, protuberant, more or less subdenticulate, short cylindrical, 1–2(–2.5) µm diam., thickened, refractive to somewhat darkened. *Ramoconidia* s. str. not observed.

Pl. 2, Figs A–J (p. 62):
A–C: *Cladosporium liriodendri*: **A** – conidiophore with coronate scars (bar = 5 µm), **B** – tips of conidiophores with several conspicuous, somewhat darkened conidiogenous loci (bar = 10 µm), **C** – conidia (bar = 10 µm). **D–F**: *Cladosporium populicola*: **D** – conidiophore and conidia with coronate scars (bar = 10 µm), **E** – conidiophore with percurrent, enteroblastic proliferations visible as a discontinuity in pigmentation and the thickness of the wall (bar = 10 µm), **F** – conidia (bar = 10 µm). **G–H**: *Cladosporium smilacicola*: **G** – conidia showing surface ornamentation (bar = 10 µm), **H** – fascicle of conidiophores (bar = 10 µm). **I–J**: *Cladosporium syringicola*: **I** – tip of a conidiophore with numerous, conspicuous, crowded, coronate conidiogenous loci and conidia still attached (bar = 10 µm), **J** – dimorphic conidiophores, second type of conidiophores arising from external, creeping hyphae (bar = 10 µm).

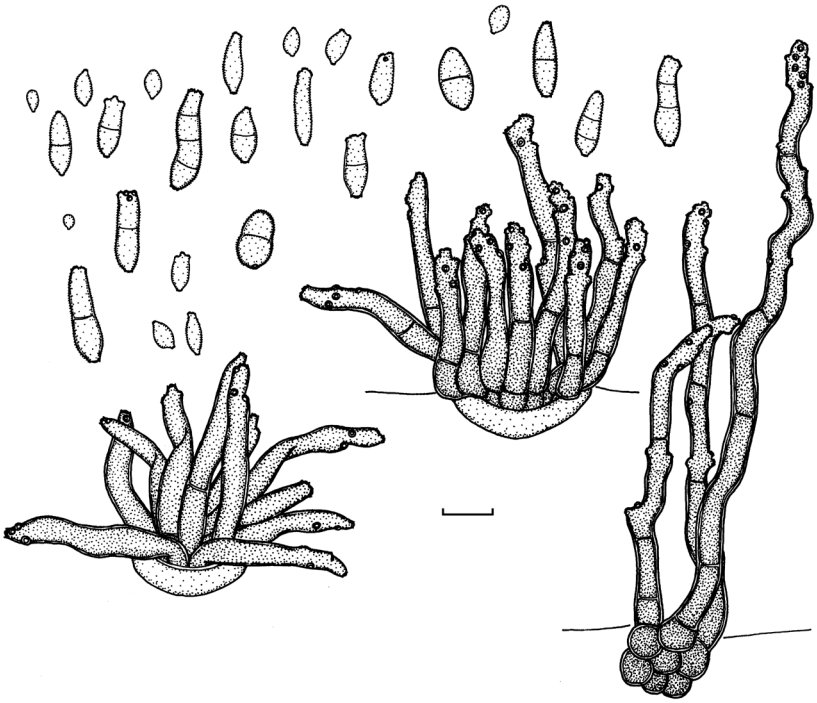


Fig. 3: *Cladosporium chamaeropis* (from the holotype). Fascicles of conidiophores emerging through stomata or erumpent through the cuticle and conidia. Bar = 10 µm.

Conidia catenate, mostly in branched chains, ovoid, obovoid, limoniform, ellipsoid to cylindrical, 3–20 × 2–5(–6.5) µm, 0–1(–3)-septate, septa sometimes not very conspicuous, sometimes slightly constricted at the septa, pale brown or olivaceous-brown, smooth or almost so to mostly minutely verruculose, walls only slightly thickened, apex rounded, somewhat attenuated or with a single or several hila, protuberant, short cylindrical, truncate to slightly convex, (0.5–)1–2(–2.5) µm diam., thickened, refractive to somewhat darkened; microcyclic conidiogenesis not observed.

This is the only leaf-spotting *Cladosporium* species occurring on a host of the genus *Chamaerops*. *Cladosporium borassi* Hasija, described on leaves of *Borassus flabellifer* from India, is easily distinguishable from *C. chamaeropis* by its subnodulose or nodulose conidiophores, 0–1-septate, smooth and, above all, shorter conidia and narrower conidiogenous loci and hila. *Cladosporium coryphae* (Syd. & P. Syd.) J.C. David, known from the Philippines on leaves of *Corypha elata*, a host also belonging to the Arecaceae, is quite distinct in having longer conidiophores, somewhat wider conidiogenous loci and hila and 0–4(–5)-septate, larger and above all wider conidia, 9–32(–44) × 5–14(–17) µm, which are distinctly thick-walled with two or more layers

giving them a zonate appearance, for which DAVID (1997) introduced the new subgenus *Bistratosporium*. *Cladosporium phoenicis* Roum., described on dry, dead leaves of *Phoenix tenuis* from France, forms large, extended internal and external hyphal aggregations giving raise to often somewhat geniculate-sinuous or subnodulose conidiophores and 0–4-septate, almost smooth to verruculose conidia. This species has to be reduced to synonymy with *C. herbarum*.

Morphologically similar species with short, usually fasciculate conidiophores are distinguished from *C. chamaeropis* by having wider conidia [4–8 µm wide in *C. praecox* (Niessl) U. Braun], conidia with different surface ornamentations (always smooth in *C. maracuja* Viégas and *C. myrtacearum* K. Schub., U. Braun & R.G. Shivas; faintly to conspicuously verruculose-echinulate in *C. praecox*) and differ in the degree of ramification of the conidiophores [often once or several times branched in *C. myrtacearum*] (BRAUN 2000, BRAUN et al. 2005, SCHUBERT 2005b).

4. ***Cladosporium foliorum*** Ellis & Everh. ex K. Schub., **sp. nov.** (MB 500532)
Fig. 4; Pl. 1, Fig. F

≡ *Cladosporium foliorum* Ellis & Everh., in herb.

Differt a *C. cladosporioides* conidiophoris fasciculatis, geniculatis, conidiis semper verruculosis; a *C. orchidearum* conidiis 0–1(–2)-septatis; et a *C. dracaenatum* conidiis 0–1(–2)-septatis, conidiophoris 1–4-septatis.

Holotype: on living leaves of *Angelica breweri* (Apiaceae), USA, California, Amador Co., Pine Grove, ca. 2200 m alt., Aug. 1896, G. Hansen, No. 1362 (BPI 426581).

Isotype: BPI 426580.

Leaf spots amphigenous, formed as extended pale ochraceous to yellowish orange discolorations, often limited by leaf veins, appearing somewhat angular-irregular, at first at leaf margins, later spreading towards the midrib, covering large areas of the leaf surface, later becoming somewhat darker, small segments orange-brown or pale to medium brown and somewhat shiny, without margin, rarely with a narrow brownish margin. *Colonies* amphigenous, sparingly fruiting and not very conspicuous, often at the tips of the leaves, loosely caespitose, pale brown to brown. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 2–8 µm wide, septate, sometimes with small swellings and constrictions, subhyaline to pale olivaceous-green, smooth or almost so, walls slightly to distinctly thickened, radiating, forming loose to dense stromatic hyphal plates (fusicladium-like growth), interconnecting stromata, hyphal cells angular, cylindrical-oblong, polygonal, 5–10(–15) µm long, sometimes irregularly lobed, pale yellowish to pale yellowish brown. *Stromata* compact, 15–50 µm diam., usually substomatal, composed of swollen hyphal cells, 3–10 µm wide, medium brown to somewhat reddish brown, smooth or almost so, thick-walled. *Conidiophores* fasciculate, in small to moderately large fascicles, arising from stromata, emerging through stomata, rarely solitary, arising from hyphae, erect, substraight to somewhat flexuous, narrowly cylindrical-oblong to filiform, often apically slightly geniculate-sinuous, non-nodulose, unbranched or once branched, 25–120 × 3–5 µm, 1–4-septate,

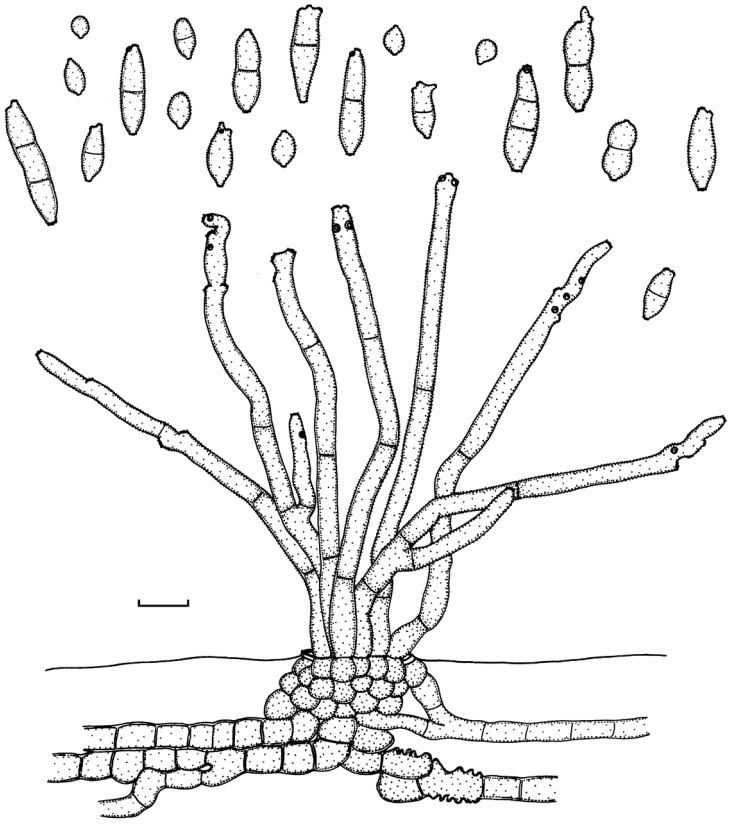


Fig. 4: *Cladosporium foliorum* (from the holotype). Fascicle of conidiophores and conidia. Bar = 10 µm.

septa not very conspicuous, subhyaline to pale brown, almost smooth to minutely verruculose throughout, walls one-layered, somewhat thickened, sometimes slightly swollen at the base, up to 7 µm wide, protoplasm of the cells somewhat aggregated at the septa, but not very conspicuous. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical-oblong, often slightly geniculate, 13–51 µm long, proliferation sympodial, with few conidiogenous loci situated on small lateral shoulders, protuberant, well differentiated in a raised dome and a periclinal rim, 1–2 µm diam., thickened, somewhat darkened-refractive. *Conidia* catenate, in branched chains, straight to slightly curved, subglobose, obovoid, ellipsoid to cylindrical, 4–26 × (2.5–)3.5–6 µm, 0–1(–2)-septate, sometimes slightly constricted at the septa, pale brown, verruculose, walls slightly thickened, apex and base rounded or somewhat attenuated, hila protuberant, (0.5–)1–2 µm wide, thickened, somewhat darkened-refractive; microcyclic conidiogenesis occurring.

With its radiating hyphal plates *C. foliorum* resembles species of the genus *Fusicladium*, but it is quite distinct from the latter genus in having cladosporioid conidiogenous loci and hila with a central convex dome and a raised periclinal rim. The new species is similar to *C. cladosporioides*, which differs, however, in having usually smooth and somewhat narrower conidia and non-geniculate conidiophores not arranged in fascicles. *Cladosporium dracaenatum* Thüm. is also morphologically close to *C. foliorum* but clearly separated by longer, pluriseptate conidiophores and 0–3-septate conidia. With age the conidia become more frequently septate (up to 7), longer and above all wider, giving rise to secondarily formed conidiophores (SCHUBERT 2005b). Other *Cladosporium* species described on hosts belonging to the Apiaceae were excluded from this genus and reallocated to *Passalora* [e.g. *C. depressum* Berk. & Broome ≡ *Passalora depressa* (Berk. & Broome) Sacc.] or *Pseudocercospora* Speg. [*C. punctiforme* Fuckel = *Pseudocercospora saniculae-europaeae* (E. Müll. & Arx) U. Braun & Crous]. *Cladosporium macrocarpum* Preuss (neotype material selected by DE VRIES, 1952, on dead leaves of *Eryngium pandanifolium*), now considered a variety of *C. herbarum*, is easily distinguishable from *C. foliorum* by having 0–3-septate, wider conidia and subnodulose to nodulose, somewhat wider conidiophores.

5. *Cladosporium fraxinicola* K. Schub. & Mułenko, **sp. nov.** (MB 500533)

Figs 5–7; Pl. 1, Figs H–I

Differt a *C. myrtacearum* locis et hilis latioribus, ad 3 µm, conidiis longioribus, ad 31 µm, ad 3-septatis, saepe non constrictis et a *C. psoraleae* conidiophoris latioribus, saepe 4–9 µm, crassitunicatis, interdum bistratis et conidiis 0–2(–3)-septatis.

Holotype: on *Fraxinus excelsior* (Oleaceae), Germany, Sachsen-Anhalt, Halle (Saale), Neuwerk/Jägerplatz, kindergarten, 23 Jun. 2004, K. Schubert (HAL 1829 F).

Paratypes: on *Fraxinus excelsior*, Germany, Sachsen-Anhalt, Halle (Saale), Neuwerk/Jägerplatz, kindergarten, 2 Aug. 2004, K. Schubert (HAL 1830 F) and U. Braun, Fungi selecti exsiccati 47; Poland, Lublin, street margin, 10 Aug. 2004, W. Mułenko (HAL 1831 F; LBLM 8576, 8577) and U. Braun, Fungi selecti exsiccati 48.

On living leaves, causing leaf spots, amphigenous, variable in shape and size, subcircular to oval-elliptical or irregular in outline, 3–8 mm wide, effuse, then usually irregular in shape, up to 45 mm long or even longer, confluent, covering large areas of the leaf surface, pale to medium brown or even dark brown, somewhat darker in the centre, somewhat zonate, surrounded by a narrow, irregular, dark brown or even reddish brown margin, on the lower leaf surface spots paler. *Colonies* epiphyllous or hypophyllous, scattered, punctiform, caespitose, loose to somewhat denser, pale to dark brown or blackish. *Mycelium* internal and external, hyphae sometimes emerging through stomata and growing superficially; hyphae sparingly branched, 3.5–6(–8) µm wide, septate, subhyaline to very pale olivaceous, smooth, walls only slightly thickened, often swollen, swollen hyphal cells subglobose to somewhat angular, 7–14 µm wide, pale to medium olivaceous-brown. *Stromata* absent. *Conidiophores* solitary or in small loose groups, arising from internal and external hyphae or swollen hyphal cells, erumpent through the cuticle, emerging through stomata or growing super-

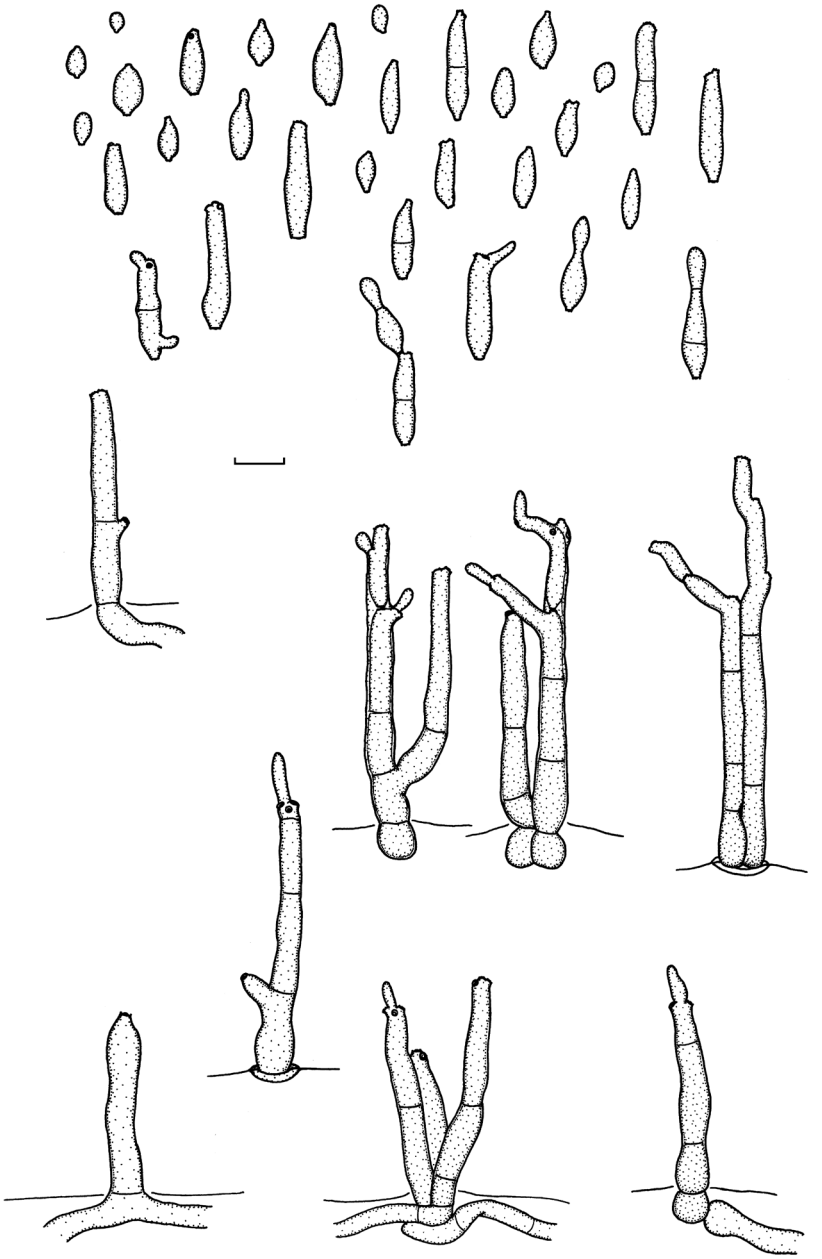


Fig. 5: *Cladosporium fraxinicola* (from the holotype). Conidiophores and conidia. Bar = 10 µm.

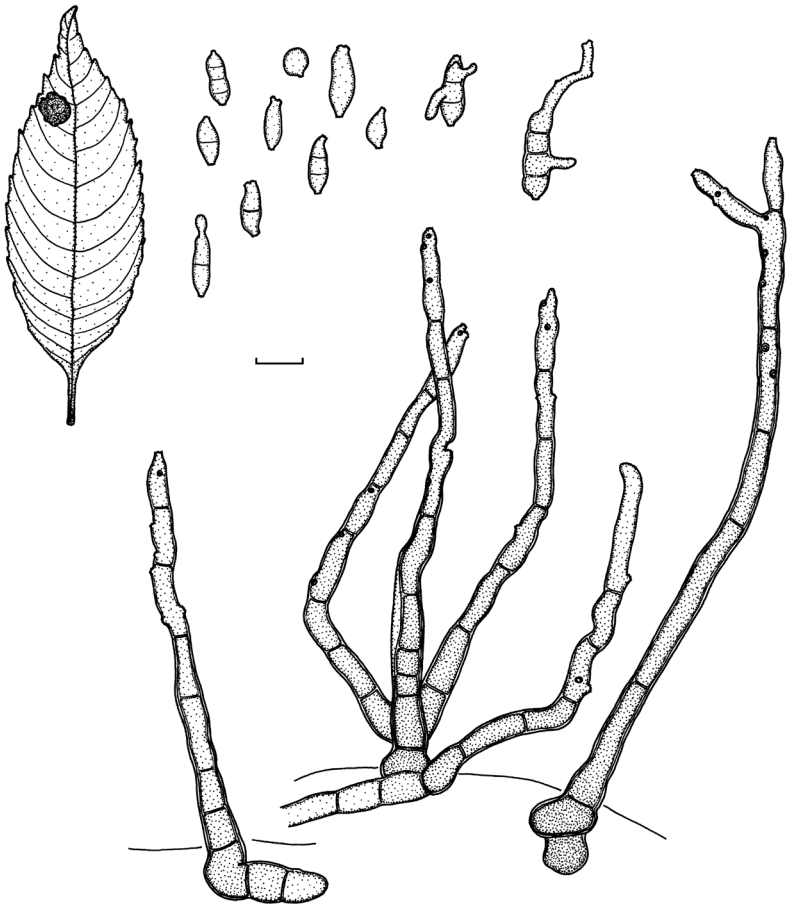


Fig. 6: *Cladosporium fraxinicola* (from paratype HAL 1830 F). Symptoms, conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

ficially, erect, straight to slightly flexuous, often geniculate-sinuous, subnodulose, unbranched or branched, 12–265 × (2.5–)4–9 µm, septate, pale olivaceous to olivaceous-brown, smooth, walls slightly to distinctly thickened, sometimes even two-layered, slightly attenuated towards the apex. *Conidiogenous cells* integrated, terminal or intercalary, or conidiophores reduced to conidiogenous cells, 10–52 µm long, proliferation sympodial, with a single to several protuberant conidiogenous loci, 1–3 µm wide, thickened, darkened-refractive. *Conidia* catenate, in branched chains, straight, small conidia (without apical hila) subglobose, ovoid, obovoid to ellipsoid, 2.5–10 × 2–4.5 µm, larger conidia (ramoconidia s. lat.) limoniform, ellipsoid, fusiform to cylin-

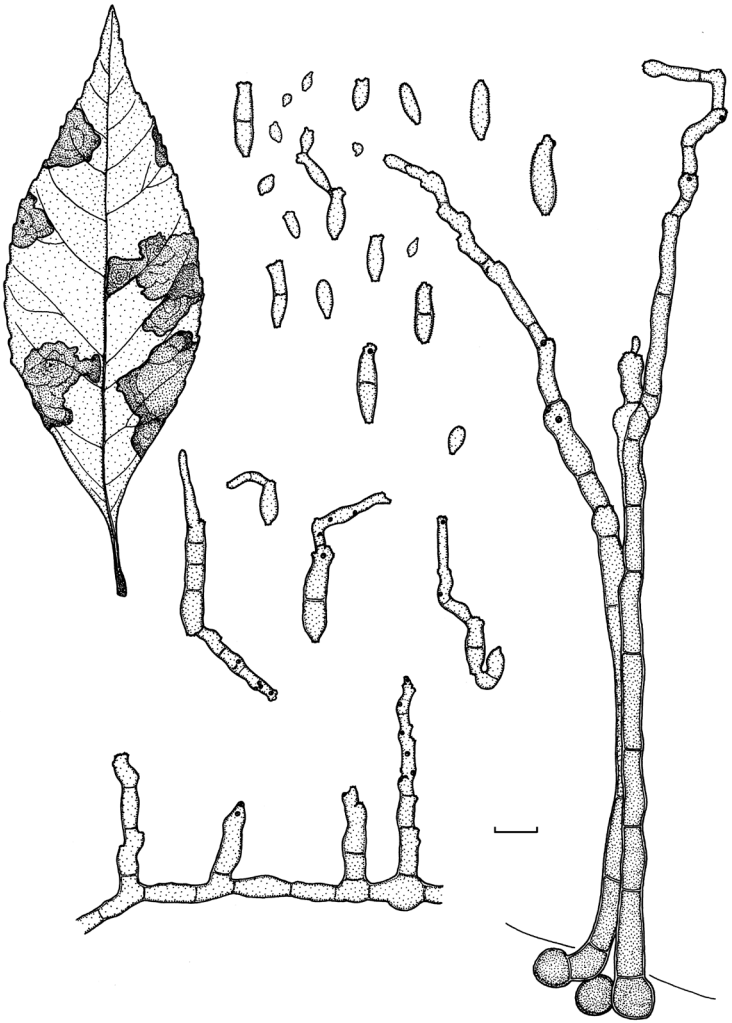


Fig. 7: *Cladosporium fraxinicola* (from paratype HAL 1831 F). Symptoms, conidiophores, conidia and microcyclic conidiogenesis. Bar (conidiophores and conidia) = 10 µm.

drical, 6.5–31 × 3.5–6 µm, 0–2(–3)-septate, not or rarely somewhat constricted at the septa, pale olivaceous, smooth to minutely verruculose, walls only slightly thickened, apex rounded or truncate, somewhat attenuated towards apex and base, base truncate to slightly convex, hila (0.5–)1–3 µm wide, thickened, darkened-refractive; microcyclic conidiogenesis occurring.

Several *Cladosporium* taxa have been described from *Fraxinus* spp. *Cladosporium acutum* Ellis & Dearn., described on *Fraxinus* sp. from Canada (type: DAOM 2441, NYS, examined), is conspecific with *C. herbarum*. *Cladosporium desmotrichum* Desm. (DESMAZIÈRES 1851), on dry leaves of *F. ornus* without any lesions, was described to have fasciculate conidiophores with hyaline tips and 0–1-septate, colourless conidia. Type material of this species could not be traced at PC. Original material of *C. fumago* f. *fraxini* Thüm. (nom. nud., on *F. excelsior*, Thümen, Herbarium mycologicum oeconomicum No. 375, B 70-6422, examined) consists of green leaves infected with several hyphomycetes, including a trimmatostroma-like hyphomycete and *C. herbarum*. The taxonomic status of *C. simplex* Schwein., described on dead, necrotic leaves of *Fraxinus* sp. from the USA (holotype: Pennsylvania, Bethlehem, Syn. Fung. No. 2606, PH 1020415, examined), is quite unclear since the type material is too meagre for a final conclusion. It was not possible to find sufficient fructification for a re-evaluation of this species. The original description (SCHWEINITZ 1832) is too brief and non-informative for any conclusions about the status of this fungus.

Among leaf-spotting *Cladosporium* species on hosts of other plant families, *Cladosporium fraxinicola* is comparable with *C. myrtacearum* (BRAUN et al. 2005), described on *Corymbia polycarpa* from Australia, and *C. psoraleae* M.B. Ellis, known from Myanmar (Burma) on *Psoralea corylifolia* (ELLIS 1976). The latter species differs from *C. fraxinicola* in having narrower conidiophores, 3–6 µm wide, with unthickened, consistently one-layered and usually 0–1-septate conidia. The conidia of *C. myrtacearum* are shorter, 3–22 µm long, usually 0–1-septate, often constricted at the septa, and the conidiogenous loci and hila are only 1–2 µm wide. Subnodulose conidiophores may be confused with the common cosmopolitan saprobic species *C. herbarum*, which is, however, clearly distinguished from *C. fraxinicola* by having regularly nodulose conidiophores with conidiogenous loci confined to swellings and distinctly verruculose to verrucose conidia.

6. *Cladosporium liriodendri* K. Schub. & U. Braun, **sp. nov.** (MB 500534)

Fig. 8; Pl. 2, Figs A–C

Differt a *C. cladosporioides* conidiophoris 4–7(–8) µm latis, crassitunicatis, interdum bistratos, conidiis brevioribus et leniter latioribus, 5–15(–20) × (2.5–)3.5–6(–7) µm, et a *C. galii* conidiis brevioribus, levibus.

Holotype: on *Liriodendron tulipifera* (Magnoliaceae), USA, New York, Tomkins Co., Six Mile Ravine, 11 Sept. 1949, C.T. Rogerson, as '*Cercospora* or *Cladosporium*' (NY).

On living leaves, leaf spots amphigenous, subcircular to more or less irregular in outline, 2–10 mm wide, sometimes somewhat extended, up to 14 mm long, medium to dark brown or yellowish brown, ochraceous, sometimes greyish brown in the centre, surrounded by a narrow, medium to dark brown, irregular margin, on the lower leaf surface somewhat paler, affected areas finally dropping out, forming shot holes symptoms. *Colonies* amphigenous, loosely scattered, villose, not caespitose, brown. *Mycelium* internal, subcuticular to intraepidermal; hyphae sparingly branched, 4.5–6

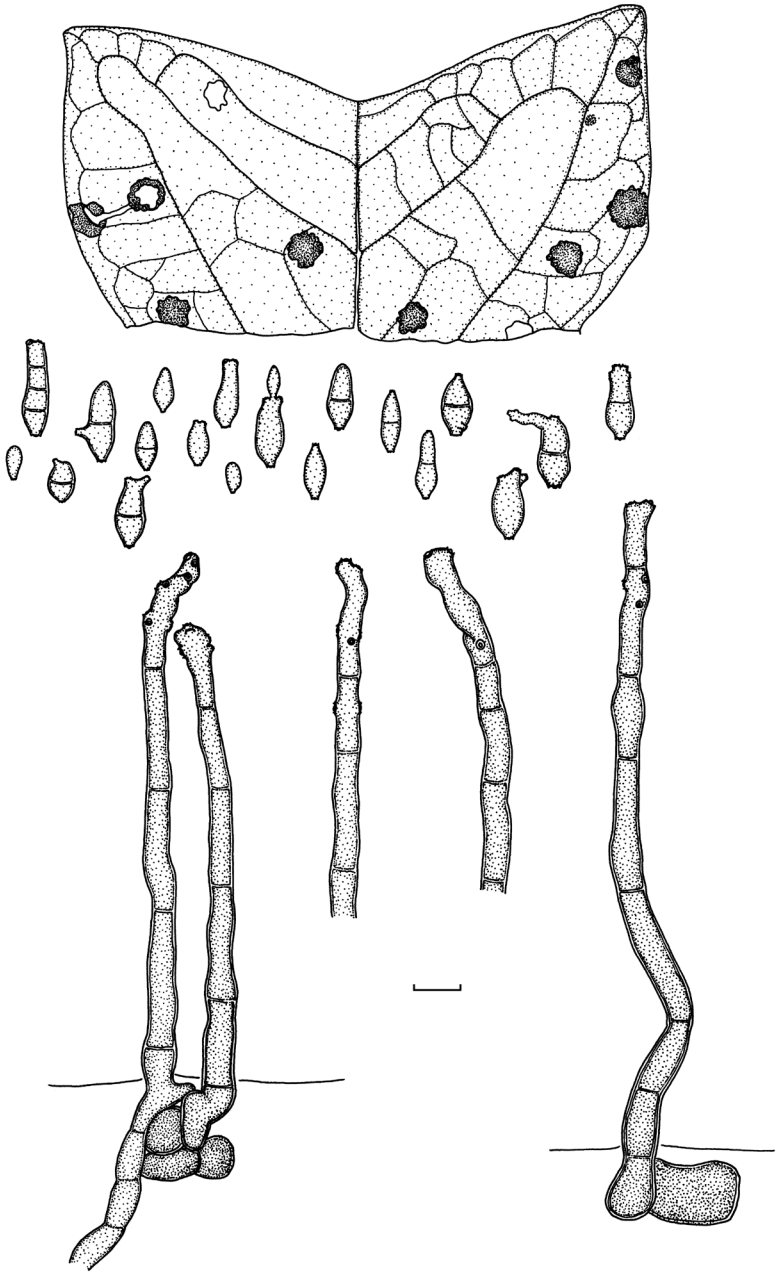


Fig. 8: *Cladosporium liriodendri* (from the holotype). Symptoms, conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

µm wide, septate, pale to mostly medium brown, smooth, walls slightly thickened, often swollen. *Stromata* or stromatic hyphal aggregations usually small, subglobose to somewhat oval, 15–40 µm diam., sometimes larger, composed of large, swollen hyphal cells, subglobose to angular-oblong, 8–13(–20) µm wide, dark brown, thick-walled. *Conidiophores* solitary or in small loose groups, mostly in pairs or up to three, arising from swollen hyphal cells or stromatic hyphal aggregations, erumpent through the cuticle, erect, straight to slightly flexuous, not to only somewhat geniculate-sinuous, unbranched, rarely branched, 45–200 × 4–7(–8) µm, pluriseptate, medium to dark brown, smooth, walls distinctly thickened, sometimes two-layered, up to 1 µm wide, often swollen at the base and somewhat attenuated towards the apex, sporadically subnodulose, swellings sometimes with conidiogenous loci, but loci not restricted to them. *Conidiogenous cells* integrated, terminal and intercalary, 8–39 µm long, proliferation sympodial, with few protuberant conidiogenous loci, 1–2.5(–3) µm diam., conspicuously differentiated in a central dome and a raised periclinal rim, thickened, only somewhat darkened-refractive. *Conidia* in unbranched or branched chains, straight, obovoid, ellipsoid to subcylindrical, 5–15(–20) × (2.5–)3.5–6(–7) µm, 0–1(–3)-septate, not constricted at the septa, in 1-septate conidia the septum more or less median, pale to medium brown, smooth, walls more or less thickened, apex rounded, slightly attenuated or truncate, hila protuberant, 1–2.5 µm diam., thickened, only somewhat darkened-refractive; occasionally microcyclic conidiogenesis occurring.

Specific *Cladosporium* species on *Liriodendron* spp. have not yet been described. The new species is similar to *C. cladosporioides*, which differs, however, in having narrower conidiophores, 2.5–5 µm wide, with usually one-layered walls and longer, somewhat narrower conidia, 5–30 × 3–4(–5) µm (ELLIS 1971). *Cladosporium galii* Mułenko, K. Schub. & M. Kozłowska is also morphologically close to *C. liriodendri*, but the conidia are longer, 6–30(–40) µm, and, above all, minutely verruculose (MUŁENKO et al. 2004). FARR et al. (1989) recorded *C. cladosporioides* on *Liriodendron* in the USA, which possibly refers to the new species described herein.

7. *Cladosporium oreodaphnes* Allesch. ex K. Schub., **sp. nov.** (MB 500535)

Fig. 9; Pl. 1, Fig. G

≡ *Cladosporium oreodaphnes* Allesch., in herb.

Differt a *C. fusicladiiformis* conidiophoris non dimorphis, conidiis leniter longioribus et latioribus, 2.5–19(–24) × 2–7(–8) µm, a *C. apicale* conidiophoris brevioribus, ad apicem non attenuatis, parietibus ad 1 µm latis, et a *C. dracaenatum* conidiophoris et conidiis latioribus.

Holotype: on a leaf of *Oreodaphne foetens* (= *Ocotea foetens*) (Lauraceae), Germany, Berlin, botanical garden, Apr. 1894, P. Hennings (M-57756).

Leaf spots amphigenous, effuse, covering large areas of the leaf surface, faded, turning pale brownish grey or somewhat ochraceous, membranous, caused by the detaching cuticle, margin or marginal line mostly small, irregular, dark brown or olivaceous-brown, sometimes with a small olivaceous-greyish halo. *Colonies* amphigenous, scattered, punctiform, dense, in tufts, greyish brown to somewhat blackish, appearing

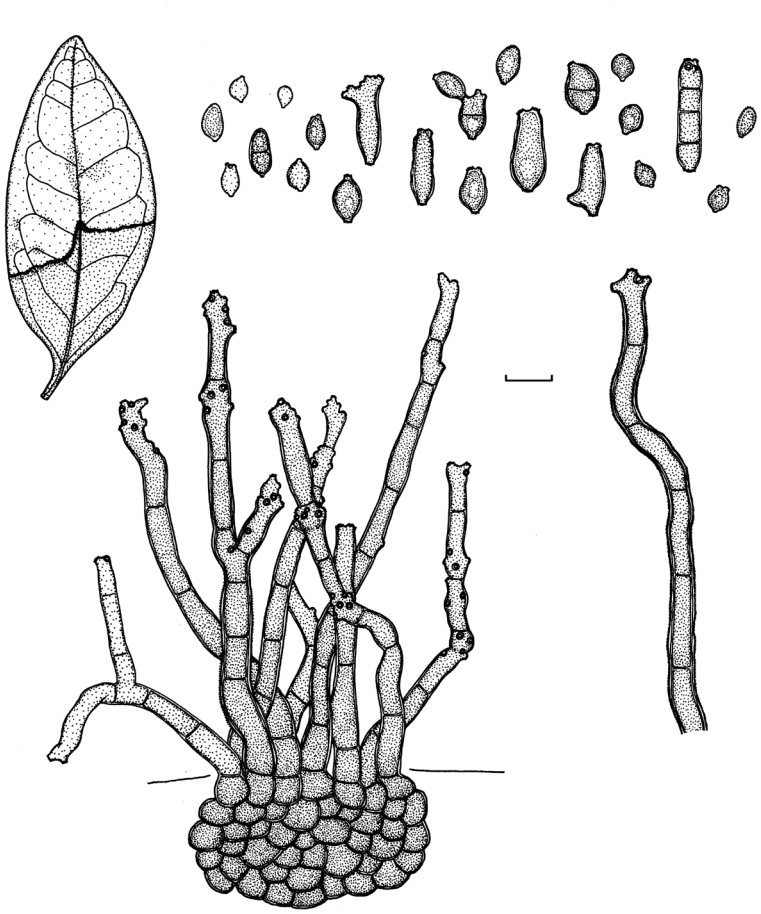


Fig. 9: *Cladosporium oreodaphnes* (from the holotype). Symptoms, fascicle of conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

darker on the upper leaf surface, somewhat floccose or sometimes villose. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 2–5 µm wide, septate, sometimes with swellings and constrictions, very pale, subhyaline to pale olivaceous, smooth or almost so, walls only slightly thickened. *Stromata* small to moderately large, 25–65 µm wide, sometimes wider, up to 110 µm, several layers deep, composed of swollen hyphal cells, subglobose to somewhat angular, polygonal, 5–11 µm wide, medium to dark olivaceous-brown or brown, smooth, thick-walled. *Conidiophores* in small to moderately large loose fascicles, arising from stromata, erumpent through the cuticle, more or less erect, straight to more or less flexuous, cylindrical-oblong to filiform, sometimes mildly geniculate-sinuous, often subnodulose to nodulose,

intercalar swellings up to 7 µm diam., unbranched to often branched, usually once branched, sometimes several times branched, 40–230 × 3.5–7 µm, pluriseptate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown, smooth or almost so to faintly asperulate or irregularly rough-walled with age, walls somewhat thickened, up to 1 µm thick, sometimes even two-layered, occasionally swollen at the base, up to 8 µm wide, protoplasm of the cells sometimes aggregated at the septa, then appearing to be thickened, similar to distoseptation. *Conidiogenous cells* integrated, terminal and intercalary, 10–21 µm long, proliferation sympodial, occasionally mildly geniculate-sinuous, often subnodulose or nodulose, usually with numerous, crowded conidiogenous loci at the swellings, but loci not confined to them, protuberant, subdenticulate, 1–2.5 µm diam., thickened and darkened-refractive. *Conidia* catenate, in branched chains, more or less straight, almost globose to subglobose, obovoid, limoniform, somewhat fusiform, ellipsoid to subcylindrical, 2.5–19(–24) × 2–7(–8) µm, 0–1(–3)-septate, pale to medium olivaceous-brown, almost smooth to minutely asperulate or irregularly rough-walled, walls more or less thickened, sometimes even two-layered, up to 1 µm wide, with an unusual cell structure, forming a paler cavity in the centre of the cells, surrounded by the somewhat darker protoplasm, apex and base somewhat rounded or attenuated, hila protuberant, truncate to obconically truncate, short cylindrical, 0.5–2(–2.5) µm diam., thickened, darkened-refractive; microcyclic conidiogenesis occurring.

Several *Cladosporium* species have been described from hosts belonging to the Lauraceae, but almost all of them have to be excluded from the genus. *Cladosporium cinnamomi* (Racib.) Höhn., as '*cinnamomeum*' (≡ *Scolecotrichum cinnamomi* Racib.) was assigned to *Stenella* Syd. (BRAUN 2002). *Cladosporium congestum* Berk. & Broome proved to be conspecific with *Spiropes scopiformis* (Berk.) M.B. Ellis (ELLIS 1968). *Cladosporium ferrugineum* R.F. Castañeda, known from Cuba on *Nectandra coriacea*, *C. machili* Sawada (nom. inval.), described from Taiwan on *Machilus* (= *Persea*) *thunbergii*, and *C. superficiale* Petch on *Cinnamomum ovalifolium* from India have to be excluded from *Cladosporium* s. str., since the conidiogenous loci and hila are not cladosporioid, but their taxonomic affinities are not yet clear. *Cladosporium lauri* Raybaud was described to form spots on leaves of *Laurus nobilis* which were damaged by insects. Type material of the latter species could not be traced, but RAYBAUD (1923) stated that the conidia are similar to those of the genus *Torula* Pers. with the central cells swollen and voluminous.

Among leaf-spotting *Cladosporium* species on hosts of other plant families, *Cladosporium oreodaphnes* is morphologically comparable with *C. apicale* Berk. & Broome, *C. dracaenatum* and *C. fusicladiiformis* Gonz. Frag. However, the latter species is easily distinguishable by its dimorphic conidiophores and somewhat shorter and narrower conidia, which are usually smooth or almost so. *Cladosporium apicale* possesses much longer and distinctly attenuated conidiophores with thicker walls, 0.75–3 µm wide, and in *C. dracaenatum* the conidiophores and conidia are narrower, intercalar swellings with crowded conidiogenous loci are lacking and, above all, the conidia become longer, wider, more frequently septate and more thick-walled with age.

8. *Cladosporium populicola* K. Schub. & U. Braun, **sp. nov.** (MB 500536)
Fig. 10; Pl. 2, Figs D–F

Differt a *C. cladosporioides* conidiophoris latioribus, (4–)5–8(–11) µm, crassitunicatis, saepe bistratos, conidiis brevioribus, 4–14 µm.

Holotype: on *Populus tremula* (Salicaceae), Germany, Schleswig-Holstein, Missunde, Schlei ferry, river bank, 30 Aug. 2004, U. Braun (HAL 1833 F).

Leaf spots amphigenous, at first small, subcircular to irregular, later extending, becoming oblong or often irregular, greyish white, surrounded by a distinct, narrow, irregular, dark brown to almost blackish margin, finally confluent, covering large areas of the leaves. *Colonies* amphigenous, loosely scattered, dark brown, sometimes visible as greyish to blackish dots on the whitish spots. *Mycelium* internal, subcuticular to intraepidermal; hyphae sparingly branched, (2–)3–4.5 µm wide, septate, pale olivaceous-brown, near the base of the conidiophores somewhat wider and darker, with swellings and constrictions, smooth, with slightly to distinctly thickened walls, occasionally even distinctly two-layered. *Stromata* or stromatic hyphal aggregations absent to well-developed, mostly small, 15–35(–45) µm diam., composed of swollen, subglobose to somewhat angular-oblong cells, 6–11(–15) µm wide, medium to dark olivaceous-brown, smooth, thick-walled. *Conidiophores* solitary, in pairs or small loose groups, arising from swollen hyphal cells or from stromata, erumpent through the cuticle, erect, straight to slightly flexuous, subcylindrical or cylindrical-oblong, unbranched to apically branched, not to sporadically somewhat geniculate-sinuous, 50–175 × (4–)5–8(–11) µm, pluriseptate, not constricted at the septa, medium to dark olivaceous-brown, somewhat paler and attenuated towards the apex, smooth to occasionally minutely verruculose, thick-walled, often distinctly two-layered, (0.5–)1–2 µm wide, cells often with a distinct small inner lumen clearly separated from the inner wall of the conidiophore, often enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, 6–24 µm long, proliferation sympodial, with a single to several conidiogenous loci, sometimes located on small lateral shoulders, protuberant, 1–2 µm diam., slightly darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight, obovoid, ellipsoid to rarely subcylindrical, 4–14 × 3–5(–5.5) µm, 0–1(–2)-septate, not constricted at the septa, pale olivaceous to pale olivaceous-brown, smooth or almost so to slightly verruculose (light microscopy), but most conidia minutely verruculose when viewed by SEM, walls more or less thickened, cells occasionally with a distinct inner lumen clearly separated from the thick wall, apex rounded or slightly attenuated, with up to three apical hila, protuberant, 1–2 µm diam., somewhat darkened-refractive; microcyclic conidiogenesis not observed.

Several species of *Cladosporium* s. lat. have been described on *Populus* spp. [*C. asteroma* Fuckel, *C. lethiferum* Peck, *C. maculicola* (Romell & Sacc.) M. Morelet, *C. martianoffianum* Thüm., *C. ramulosum* Roberge ex Desm., *C. subsessile* Ellis & Barthol.], but all of them have to be excluded from *Cladosporium* s. str. and belong in *Fusicladium* (SCHUBERT et al. 2003). Type material of *C. brunneum* Corda, described on dead leaves of *Populus* sp., could not be traced at PRM and is probably not preserved.

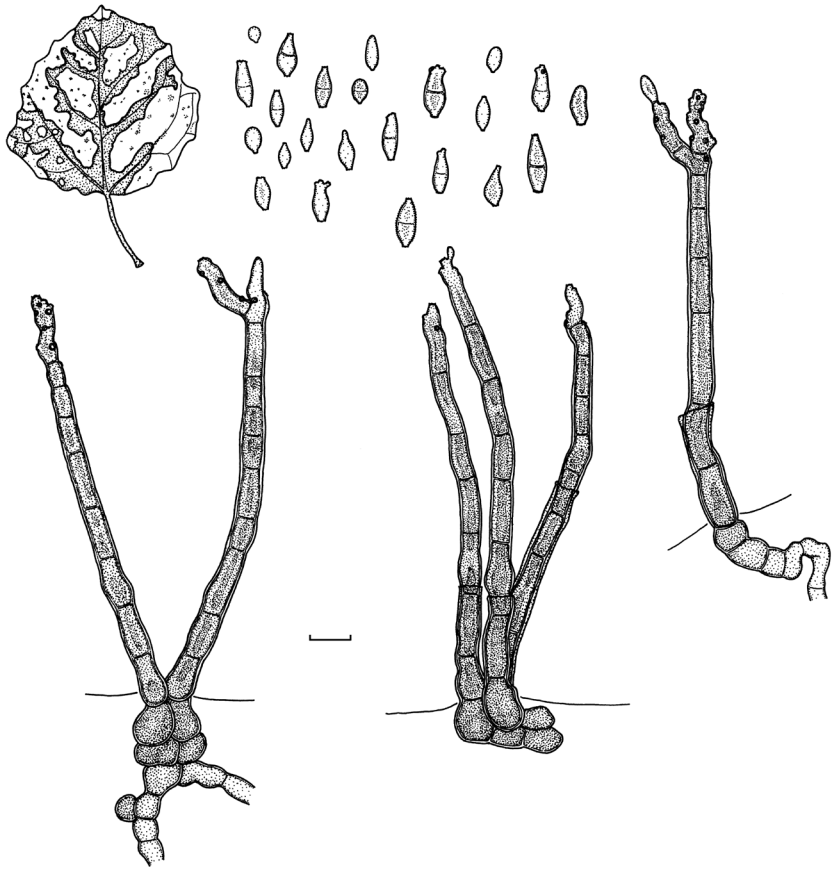


Fig. 10: *Cladosporium populicola* (from the holotype). Symptoms, conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

Cladosporium populicola is morphologically similar to *C. cladosporioides*, which differs, however, in having narrower conidiophores, 2.5–5 µm wide, with thinner and usually one-layered, not two-layered walls, without enteroblastic proliferations, as well as longer conidia, 5–30 µm.

9. *Cladosporium smilacicola* K. Schub., **sp. nov.** (MB 500537) **Fig. 11; Pl. 2, Figs G–H**

Differt a *C. foliorum* conidiophoris saepe ramosis, conidiis leniter brevioribus, 0–3(–4)-septatis, et a *C. oreodaphnes* conidiophoris non-nodulosis, 2.5–5 µm latis, conidiis 1.5–5(–6) µm latis, 0–3(–4)-septatis, non crassitunicatis.

Holotype: on *Smilax grandifolia* (Smilacaceae), Germany, München, botanical garden, cold house, Mar. 1895, Allescher [M-57718, as '*C. smilacis* (Schwein.) Fr.'].

On living leaves, large areas of the leaf surface becoming necrotic, at first at leaf margins, later extending, on the upper leaf surface pale greyish brown to whitish, faded, below dingy olivaceous-brown to pale greyish brown, partly limited by a narrow, brown or somewhat reddish brown margin and a paler halo. *Colonies* mainly hypophyllous, sometimes sparsely fruiting on the upper leaf surface, effuse, loosely to densely caespitose, dingy greyish brown to brown, somewhat floccose when dense (visible by means of a stereomicroscope), velvety. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 2–6 µm wide, septate, with swellings and constrictions, subhyaline to very pale olivaceous-green, smooth, thin-walled or almost so, forming a loose network or hyphal plates. *Stromata* intraepidermal and substomatal, at first small, subglobose, later extending and flattened, compact, 15–85 µm wide or confluent and even larger, several layers deep, composed of swollen hyphal cells, subglobose to somewhat angular-oblong, 5–10 µm diam., pale to medium brown, smooth, walls somewhat thickened. *Conidiophores* in small to somewhat larger, loose fascicles, arising from stromata, emerging through stomata or erumpent through the cuticle, erect, straight to slightly flexuous, cylindrical-oblong, often slightly geniculate-sinuous near the apex, unbranched or usually branched, once or several times and often near the base, 20–150 × 2.5–5 µm, septate, pale brown to pale olivaceous-brown, somewhat darker near the base, smooth to somewhat irregularly rough-walled, sometimes minutely verruculose near the apex, walls somewhat thickened, sometimes even two-layered near the base, occasionally slightly swollen near the base, sporadically enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical-oblong, slightly geniculate, 14–48 µm long, with a single or several conidiogenous loci, often situated on small lateral shoulders, protuberant, subdenticulate, 1–2 µm diam., dome not or only slightly higher than the surrounding rim, thickened, darkened-refractive. *Ramoconidia* s. str. sporadically occurring, broadly cylindrical-oblong, up to 26 µm long, 0(–1)-septate, with a broadly truncate, unthickened base, 3 µm wide. *Conidia* in branched chains, straight, numerous and variable in shape, subglobose, obovoid, ellipsoid, fusiform, subcylindrical to cylindrical-oblong, 2–18(–21) × 1.5–5(–6) µm, 0–3(–4)-septate, usually not constricted at the septa, pale brown to pale olivaceous-brown, almost smooth to often verruculose or irregularly rough-walled, walls somewhat thickened, apex rounded or slightly attenuated towards the apex and base, hila protuberant, short cylindrical, truncate to slightly convex, (0.5–)1–2 µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis occurring.

Type material of *Cladosporium smilacis* (Schwein.) Fr., briefly described by SCHWEINITZ (1822) as *Dematium smilacis* Schwein. on twigs of *Smilax* sp. from North America, is in very poor condition. No *Cladosporium* has been found, only few dark brown, 2–3-septate conidia without cladosporioid hila have been observed so that this species has to be excluded from *Cladosporium* s. str., but its taxonomic status remains unclear. ZHANG et al. (2003) described and illustrated a Chinese collection on *Smilax china* determinated as *C. smilacis*, which could not be checked.

Cladosporium smilacicola is morphologically comparable with the new species *C. foliorum* and *C. oreodaphnes*, but the latter species is quite distinct in having wider,

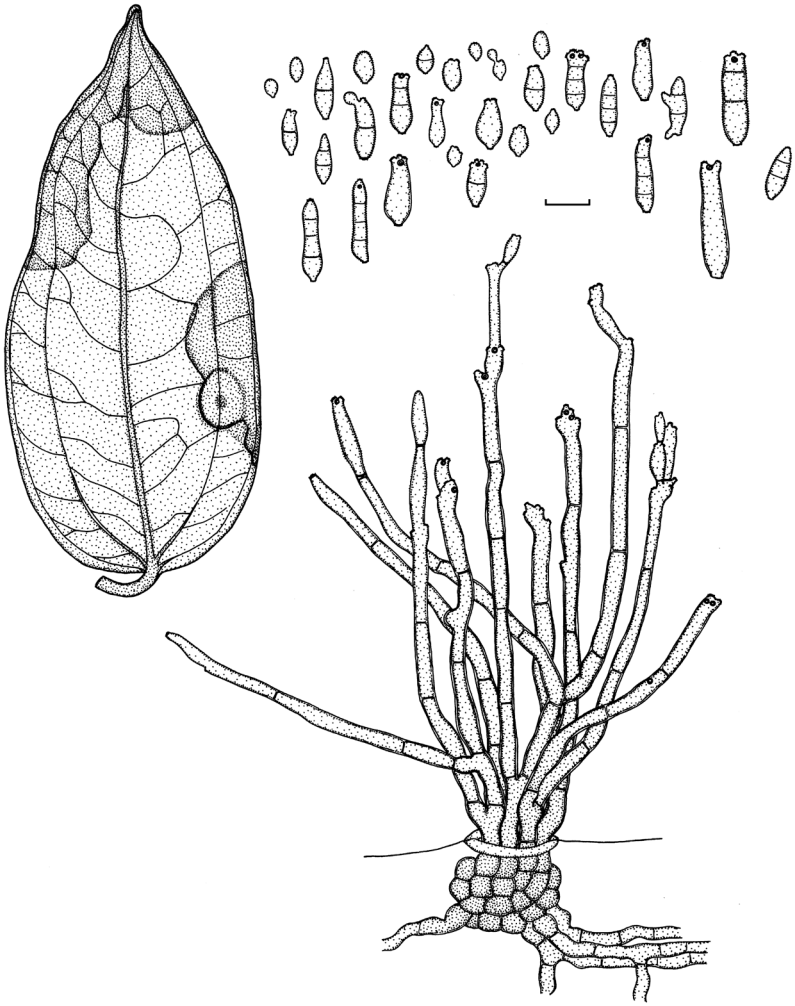


Fig. 11: *Cladosporium smilacicola* (from the holotype). Symptoms, fascicle of conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

often subnodulose to nodulose conidiophores, wider, 0–1(–3)-septate conidia with more or less thickened, sometimes even two-layered walls and a somewhat unusual cell structure (protoplasm aggregated so that the septa and walls appear to be thickened, with a paler cavity in the centre of the cells giving them a somewhat zonate appearance). *Cladosporium foliorum* deviates in forming dense, fusicladium-like stromatic hyphal aggregations with sometimes irregularly lobed cells, usually unbranched conidiophores and somewhat longer, 0–1(–2)-septate conidia.

10. *Cladosporium syringicola* K. Schub. & U. Braun, **sp. nov**. (MB 500538)

Fig. 12; Pl. 2, Figs I–J

Differt a *C. gallii* conidiophoris dimorphis, locis conidiogenis 0.5–2 µm latis, conidiis 2.5–18 × 2–5(–6.5) µm, 0–2(–3)-septatis.

Holotype: on *Syringa* ×*chinensis* (Oleaceae), Germany, Sachsen-Anhalt, Halle (Saale), Botanical Garden, 2 Aug. 2004, K. Schubert, mixed infection with *Erysiphe syringae-japonicae* (U. Braun) U. Braun & S. Takam. (HAL 1835 F).

Isotypes: U. Braun, Fungi selecti exsiccati 52.

On living leaves, leaf spots amphigenous, distinct, at first punctiform, later extending, usually irregular in shape, 1–25 mm wide, pale to medium brown, occasionally somewhat zonate, surrounded by a narrow, dark brown margin, sometimes with a pale greenish halo, on the lower leaf surface somewhat paler, confluent. *Colonies* amphigenous, loosely scattered, in small tufts, dark brown to blackish, tips of sporulating conidiophores pale olivaceous. *Mycelium* internal and external, hyphae emerging through stomata and then growing superficially; hyphae loosely branched, 2–5 µm wide, septate, sometimes constricted at the septa, often with small swellings, subhyaline to pale olivaceous, smooth, walls thickened, cells occasionally with distinct, clearly delineated, somewhat granular lumen, forming stromatic hyphal aggregations. Stromatic hyphal aggregations absent to well-developed, composed of swollen hyphal cells, subcircular to somewhat angular, 6–15 µm wide, medium to dark olivaceous-brown, smooth, thick-walled. *Conidiophores* dimorphic, solitary or in small fascicles, usually emerging through stomata or erumpent through the cuticle, arising from swollen hyphal cells or stromatic hyphal aggregations, erect, straight to flexuous, unbranched or often branched, not to somewhat geniculate-sinuous, sometimes subnodulose, subcylindrical, attenuated towards the apex, 25–140 × 4–8 µm, pluriseptate, occasionally constricted at the septa, medium to dark olivaceous-brown or brown, smooth, walls thickened, often distinctly two-layered, up to 1(–1.25) µm thick, cells often with distinct, clearly delineated lumen, often swollen at the base, up to 14 µm wide; conidiophores of the second type shorter, narrower and paler, solitary, arising from superficial hyphae, erect, more or less straight, somewhat geniculate, unbranched, 9–35 × 2–4 µm, septate, not constricted at the septa, pale olivaceous, smooth, walls thickened, not distinctly two-layered, but sometimes with distinct, delineated lumen, slightly attenuated towards the apex, often somewhat swollen at the base. *Conidiogenous cells* integrated, terminal or intercalary, 7–25 µm long, proliferating sympodially, with numerous, subdenticulate conidiogenous loci, often crowded, apex appearing somewhat rugose (periconiella-like), 0.5–2 µm diam., somewhat thickened and darkened-refractive. *Ramoconidia* s. str. rarely occurring. *Conidia* catenate, in branched chains, straight to slightly curved, subglobose, obovoid, ellipsoid, subcylindrical to irregular, 2.5–18 × 2–5(–6.5) µm, 0–2(–3)-septate, not constricted at the septa, subhyaline, pale olivaceous to pale olivaceous-brown, smooth to minutely verruculose, walls thickened, often with distinct, clearly delineated lumen, apex rounded to somewhat attenuated, with numerous hila, 0.5–2 µm diam., somewhat thickened and darkened-refractive; microcyclic conidiogenesis often occurring.

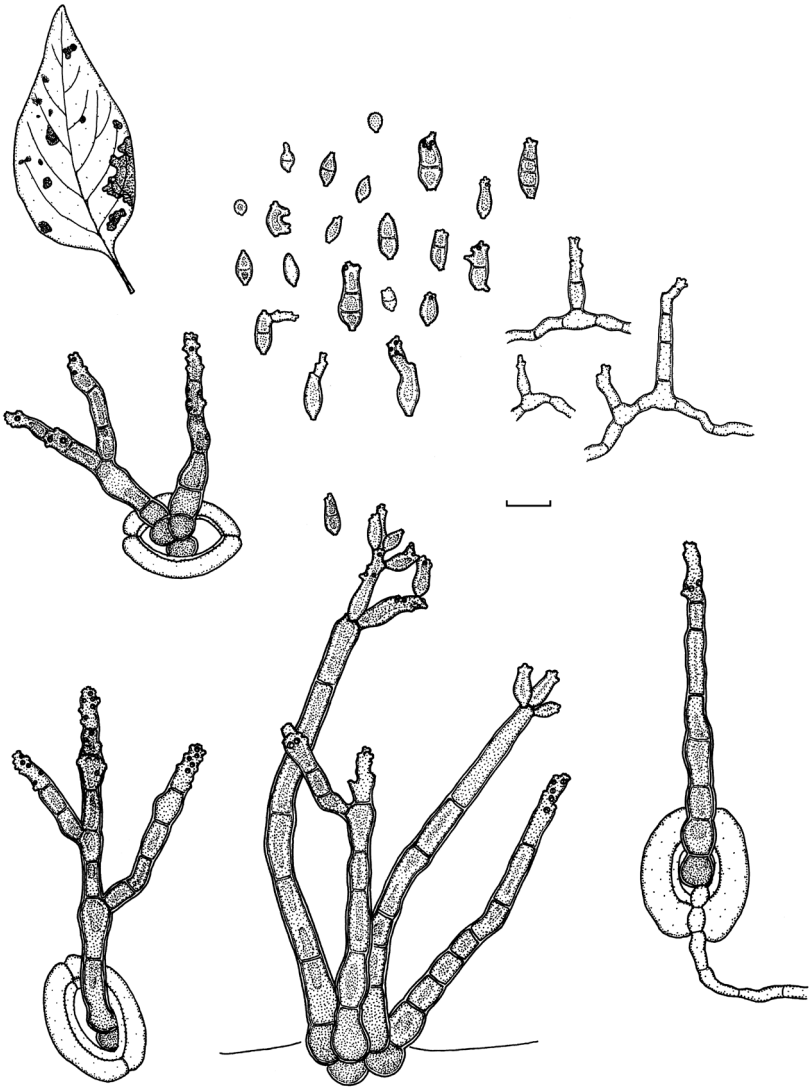


Fig. 12: *Cladosporium syringicola* (from the holotype). Symptoms, dimorphic conidiophores and conidia. Bar (conidiophores and conidia) = 10 µm.

Based on frequently branched conidiophores and conidiogenous cells with numerous crowded conidiogenous loci, *Cladosporium syringicola* is morphologically close to and comparable with *C. gallicola* B. Sutton, but the latter species differs in having uniform, non-dimorphic conidiophores, somewhat wider conidiogenous loci (1–3

µm), and somewhat longer and wider conidia, 3–29 × 2–8 µm, with 0–3(–4) septa (HEUCHERT et al. 2005). Dimorphic conidiophores are also formed in *C. fusicladiiformis*, a leaf-spotting species known from Spain on *Eriobotrya japonica*, but the latter species is quite distinct in having much longer conidiophores, up to 300 µm, and usually 0–1-septate conidia without a distinct, clearly delineated lumen.

Cladosporium fumago var. *maculaeforme* Thüm. (type: on *Syringa vulgaris*, Thümen, Mycotheca universalis No. 673, M-57646, examined) does not belong in *Cladosporium* s. str., since the conidiogenous loci and hila are non-cladosporioid; the generic affinity is not yet clear. *Cladosporium fumago* f. *syringae-vulgaris* Thüm. (type: on *Syringa vulgaris*, Thümen, Herbarium mycologicum oeconomicum No. 393, M-57668, examined) is a trimmatostroma-like hyphomycete, which has to be excluded from *Cladosporium* s. str. *Cladosporium syringae* Montem. (type material not traced) was described to have fasciculate, unbranched conidiophores, 3–4 µm wide, and cylindrical conidia, 15–20 µm long (SACCARDO 1931).

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