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Morphotaxonomic revision of foliicolous *Cladosporium* species (hyphomycetes)

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1. Introduction

The genus *Cladosporium* Link is one of the largest genera of hyphomycetes. Species of this genus are among the most common fungi to be isolated from the environment almost anywhere in the world. The small conidia, usually formed in branched chains, are well adapted to be spread easily in large numbers over long distances. They form the most common component of spores in air (FARR et al. 1989; MULLINS 2001; FLANNIGEN 2001). Many species are known to be plant pathogens, while others are regularly encountered as contaminants and spoilage agents in food or industrial products, as well as being frequently associated with asthmatic complaints. Common, widespread saprobic species, like *C. herbarum* (Pers.: Fr.) Link and *C. cladosporioides* (Fresen.) G.A. de Vries, abundantly occur on fading or dead leaves of herbaceous and woody plants, as secondary invaders on necrotic leaf lesions caused by other fungi, have frequently been isolated from air, soil, foodstuffs, paints, textiles and numerous other matters, and are also known to be common endophytes (RIESEN & SIEBER 1985; BROWN et al. 1998; EL-MORSY 2000).
Previous circumscriptions and delimitations from other genera were rather vague and imprecise, which made *Cladosporium* to one of the most heterogeneous anamorph genera. All kinds of superficially similar cladosporioid dematiaceous hyphomycetes with amero- to phragmosporous conidia formed in acropetal chains were assigned to *Cladosporium* s. lat. Therefore, the genus was considered the most urgently in need of critical revision by the International Commission on the Taxonomy of Fungi (HAWKSWORTH 1986). Various authors discussed the heterogeneity of *Cladosporium* s. lat. and proposed new, more natural circumscriptions of this genus (ARX 1983; MORGAN-JONES & JACOBSEN 1988; MCKEMY & MORGAN-JONES 1990; MORGAN-JONES & MCKEMY 1990; DAVID 1997; PARTRIDGE & MORGAN-JONES 2002, 2003). Based on re-assessments of morphological features and molecular data, various groups of cladosporioid anamorphs could be excluded from *Cladosporium* s. str., e.g., human pathogenic species (Herpotrichiellaceae) (DE HOOG et al. 1995; MASCLAUX et al. 1995), *Venturia* Sacc. anamorphs (Venturiaceae) (SCHUBERT et al. 2003; BECK et al. 2005) and heat-resistant fungi (Mycosphaerellaceae) (SEIFERT et al. 2004). DAVID (1997), who carried out detailed SEM examinations of conidiogenous loci and conidial hila, demonstrated that true *Cladosporium* species (incl. *Heterosporium* Klotzsch ex Cooke) are clearly characterised by a uniform scar type. These coronate conidiogenous loci and hila are protuberant, thickened, refractive or somewhat darkened consisting of a central convex dome, surrounded by a raised periclinal rim. 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. BRAUN et al. (2003) provided results of comprehensive ITS sequence analyses and discussed phylograms of cladosporium-like fungi in detail. Within a big clade formed by members of the Mycosphaerellaceae, species with anamorphs belonging to the genus *Cladosporium* s. str. were shown to 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.
The results of these examinations led to a more natural, phylogenetic classification and circumscriptions of *Cladosporium* s. str. Since no overall monograph has been attempted, there is now the big challenge of ascertaining the true generic affinity of hundreds of names assigned to *Cladosporium*. A recently published checklist (DUGAN et al. 2004) contains a total number of 772 names. A comprehensive revision of the numerous described taxa, including re-examinations of type collections, is essential and indispensable and will entail detailed morphological analyses, redescriptions and molecular studies.

Therefore, monographic studies within this genus have been initiated. Reassessments, re-description, illustrations and commentaries on several species, which proved to be non-congeneric with *Cladosporium* s. str., have already been provided (SCHUBERT & BRAUN 2004; SCHUBERT 2005; SCHUBERT & BRAUN 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).

The present work, treating all taxa described to occur on living or fading leaves, is an additional contribution to a morphotaxonomic revision of *Cladosporium* species. Based on re-examinations of type material, if available, and additional collections from herbaria as well as new collections made during the course of the present studies, the generic affinity of these foliicolous taxa has been proven and detailed descriptions and illustrations have been provided. Furthermore, the revision of biotrophic *Cladosporium* species is also an important step towards an intended comprehensive monograph of *Cladosporium* s. lat.

2. Historical survey

A comprehensive review of the history of *Cladosporium* has been given in DAVID (1997) and HEUCHERT et al. (2005) and is summarized within this work. The genus *Cladosporium* was established in 1816 by Link, who described it as follows: 'Thallus e floccis caespitosis, erectis simplicibus aut subramosis, apicibus in sporidia secedentibus. A Sporothricho et Oidio differt floccis non intricatis, ab Acladio, sporidiis apici primum innatis, dein delabentibus'. LINK (1816) included *C. herbarum*, introduced by PERSOON (1794) as *Dematium herbarum* Pers. and later reclassified by LINK (1809) as *Acladium herbarum* (Pers.) Link; *C. abietinum* (Pers.) Link [= *Trentepohlia abietina* (Flot.) Hansg., fide HUGHES 1958]; *C. atrum* (= sterile fungus, fide HUGHES 1958) and *C. aureum* Link [= ?*Trentepohlia aurea* (L.) Mart., lectotype of *Trentepohlia* Mart.]. CLEMENTS & SHEAR (1931) proposed *C. herbarum* as lectotype species, a decision followed by DE VRIES (1952) and HUGHES (1958). *Cladosporium* became rapidly established in the literature, being used by MARTIUS (1817), NEES (1817) and in Fries' 'Systema mycologicum' (1821, 1832), and encompassed a steadily growing number of species. LINK (1824) described seven species, CORDA (1837) listed 15 species and RABENHORST (1844) 23 species. This number grew to 110 in SACCARDO (1886), who already classified this genus to be problematic. This steady increase continued so that by 1931 270 species had been described in the genus and listed in the various volumes of Saccardo's Sylloge fungorum'. Most of the original diagnoses of the species concerned are very brief and imprecise. Although available information of many of the older taxa has been rather meagre, description of new species has continued unabatedly. Since 1950, more than 130 new species have been added (MORGAN-JONES & MCKEMY 1990). PRASIL & DE HOOG (1988) estimated the number of *Cladosporium* to be around 540 species. A recently published checklist contains data for 772 *Cladosporium* names, i.e., valid, invalid, legitimate and illegitimate species, varieties and formae as well as herbarium names (DUGAN et al. 2004). Reasons for this vast number of taxa probably reside in the imprecise, wide circumscription of this genus in the previous literature, the strong morphological variability of most species and the occurrence of some species on a wide range of substrates.

DE VRIES (1952) examined *Cladosporium* in vitro and provided descriptions of nine species with a further 13 species as an appendix. ELLIS (1971, 1976), who followed a very wide generic concept, surveyed 43 species. Morgan-Jones and McKemy initiated a series 'Studies in the genus *Cladosporium* sensu lato', in which they dealt with selected species giving comprehensive descriptions of their features in vivo and in vitro (MORGAN-JONES & MCKEMY 1990; MCKEMY & MORGAN-JONES 1990, 1991a, b, c). Descriptions and an expanded key to the *Cladosporium* species available in culture have been provided by HO et al. (1999), but the authors followed a rather wide taxonomic concept including species, which belong in other genera. ZHANG et al. (2003) published a monograph of the genera *Cladosporium*, *Fusicladium* Bonord. and *Pyricularia* Sacc. from China, including numerous previously published, newly described species of *Cladosporium*. Furthermore, they reported numerous old species introduced in the nineteenth or early twenties century to occur in China, but without having seen any type material of these taxa, so that these names have probably often been misapplied. Unfortunately, type material and additional collections cited in this work were not available from MHYAU and could therefore not be re-examined. A morphotaxonomic revision of fungicolous *Cladosporium* species has recently been carried out by HEUCHERT et al. (2005).

The status of the genus *Heterosporium* has been controversially discussed. Based on characteristically large, mostly pluriseptate conidia, usually formed singly, and mostly rather coarse, fasciculate conidiophores often emerging through stomata, several authors

considered *Heterosporium* a genus distinct from *Cladosporium* (e.g., ARX 1983; MCKEMY & MORGAN-JONES 1990). DE VRIES (1952) concluded that a separation of the two genera based on the formation and septation of conidia is impracticable and not tenable, since all kinds of transitions occur, and reduced *Heterosporium* to synonymy with the latter genus, a treatment supported by HUGHES (1958). ELLIS (1971, 1976) followed this arrangement and transferred the names of the remaining accepted species of *Heterosporium* to *Cladosporium*. ARX (1981) reinstated the use of *Heterosporium* and considered that the recognition of *Heterosporium* was a first step towards delineating homogenous genera in the *Cladosporium* complex. During the course of monographic studies in the genus *Heterosporium*, DAVID (1997) examined *Cladosporium* and *Heterosporium* by means of SEM and clearly demonstrated that the conidiogenous loci and conidial hila in the two genera are very similar, i.e., they are coronate with a central convex dome and a raised periclinal rim. Based on these results, he placed *Heterosporium* in *Cladosporium* and proposed the combination *Cladosporium* subgen. *Heterosporium* (Klotzsch ex Cooke) J.C. David. BRAUN et al. (2003) confirmed this treatment by molecular data.

3. Generic and subgeneric concept

Due to the very brief, imprecise circumscription of the genus *Cladosporium* in the past, numerous superficially similar pigmented hyphomycetes with amero- to phragmosporous conidia formed in acropetal chains have been placed in *Cladosporium* s. lat., which made this genus very heterogeneous and polyphyletic. This heterogeneity has been recognised and discussed by several authors (ARX 1981; MCKEMY & MORGAN-JONES 1990; DAVID 1997). Based on re-assessments of morphological features and molecular data, various groups of cladosporioid anamorphs could be excluded from *Cladosporium* s. str., e.g., human pathogenic species and *Venturia* anamorphs. Human pathogenic species, now known to be species of *Cladophialophora* Borelli (teleomorph: *Capronia* Sacc., Herpotrichellaceae) differ in their morphology (conidiophores lacking or semi-macronematous, hila not coronate, less pigmented) and physiology (inability to liquefy gelatine), which could be confirmed by molecular data (DE HOOG et al. 1995; UNTEREINER 1997; UNTEREINER et al. 1999; DE HOOG et al. 2000). *Fusicladium* species with catenate conidia have often been assigned to *Cladosporium*. The revision of the genus *Fusicladium* (teleomorph: *Venturia*, Venturiaceae) showed these species to be genuine member of the latter genus (SCHUBERT et al. 2003), a conclusion confirmed by molecular data (BECK et al. 2005). The structure of the conidiogenous loci and hila of the genus *Fusicladium* is quite distinct from those of *Cladosporium* in being more or less denticle-like, truncate to slightly convex (but non-coronate), unthickened, not darkened or somewhat darkened-refractive.
Other species, originally placed in *Cladosporium*, proved to be *Mycosphaerella* anamorphs belonging in *Passalora* Fr., *Pseudocercospora* Speg. and *Stenella* Syd. (CROUS & BRAUN 2003; SCHUBERT & BRAUN 2005a, b). Species of the genus *Passalora* possess conspicuous, more or less truncate, somewhat thickened and darkened-refractive conidiogenous loci and hila; the genus *Stenella* is well-characterised by having superficially growing verruculose hyphae, usually verruculose conidia and conspicuous, somewhat thickened and darkened, pileate to planate conidiogenous loci and hila; and *Pseudocercospora* is easily distinguishable by its inconspicuous, unthickened and usually not darkened conidiogenous loci. On account of morphological, molecular and ecological features, SEIFERT et al. (2004) recently separated *Cladosporium staurophorum* (W.B. Kendr.) M.B. Ellis from *Cladosporium* s. str. and introduced the new hyphomycete genus *Devriesia* Seifert & N.L. Nickerson (Mycosphaerellaceae) to accommodate a group of five heat-resistant species that is also cladosporium-like in its general morphology. During the course of the morphotaxonomic revision of fungicolous *Cladosporium* species (HEUCHERT et al. 2005) two additional genera have been published, viz. *Digitopodium* U. Braun, Heuchert & K. Schub. with *Digitopodium hemileiae* (Steyaert) U. Braun, Heuchert & K. Schub. (basionym: *Cladosporium hemileiae* Steyaert) as type species and *Parapericoniella* U. Braun, Heuchert & K. Schub. with the new combination *Parapericoniella asterinae* (Deighton) U. Braun, Heuchert & K. Schub.
Cladosporium musae E.W. Mason, a leaf-spotting fungus on banana leaves, has recently been assigned to the new genus *Metulocladosporiella* Crous, Schroers, Groenewald, U. Braun & K. Schub. (Chaetothyriales), an additional segregate of *Cladosporium* s. lat., which differs from morphologically allied genera in having frequently branched, pigmented conidiophores with much paler tips and paler, often subhyaline conidia. The conidiogenous loci are subconspicuous to conspicuous, i.e., unthickened or almost so, but somewhat darkened-refractive (CROUS et al. 2005). Morphological reassessments based on light microscopy and SEM examinations as well as molecular studies within the *Cladosporium* complex supported the separate position of this genus, well-delimited from

all superficially similar genera by its unique scar type as described above, and confirmed its monophyletic position (BRAUN et al. 2003).

3.1. *Generic concept*

Cladosporium Link, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 7: 37 (1816): Fr., Syst. mycol. 3(2): 368 (1832).

≡ *Sporocladium* Chev., Fl. gén. env. Paris 1 (1826).
= *Heterosporium* Klotzsch, Herb. viv. myc., Cent. I, No. 69 (1832), nom. inval., ICBN Art. 32.1(c).
≡ *Heterosporium* Klotzsch ex Cooke, Grevillea 5: 122 (1877).
= *Myxocladium* Corda, Icon. fung. 1: 12 (1837).
= *Didymotrichum* Bonord., Handb. Mykol.: 89 (1851).

Type species: *C. herbarum* (Pers.: Fr.) Link (CLEMENTS & SHEAR 1931: 395, L 910.225-733: lectotype).
Teleomorph: *Davidiella* Crous & U. Braun, in Braun, Crous, Dugan, Groenewald & de Hoog, Mycol. Progr. 2(1): 8 (2003).
Lit.: DE VRIES (1952), HUGHES (1958), ELLIS (1971), DOMSCH et al. (1980), DAVID (1997), SAMSON et al. (2000).

Colonies punctiform to effuse, mostly olivaceous-brown to blackish brown or with a grey-olivaceous appearance, velvety, floccose or villose. *Mycelium* internal or external, superficial; hyphae branched, septate, subhyaline to usually pigmented, smooth, sometimes slightly rough-walled to verruculose. *Stromata* absent to sometimes well-developed. *Conidiophores* mononematous, usually macronematous, solitary, fasciculate, in small to large fascicles, loosely to densely caespitose, usually erect, occasionally subdecumbent, decumbent or repent, straight to flexuous, unbranched or branched, septate, pigmented, proliferation holoblastic, occasionally enteroblastic (after a period when growth has stopped and then resumed), usually sympodial, rarely monopodial (sometimes leaving coarse annellations from repeated enteroblastic proliferation). *Conidiogenous cells* integrated, terminal or intercalary, monoblastic or usually polyblastic, mostly sympodially proliferating, more or less cylindrical, conidiogenous loci usually conspicuous, protuberant, composed of a central convex dome surrounded by a more or less raised periclinal rim (coronate), thickened, refractive to darkened; conidial formation holoblastic. *Conidia* solitary or catenate, in unbranched or branched acropetal chains (species with solitary conidia are capable to form conidial chains in culture), shape and septation variable, usually subglobose, ovoid, obovoid, ellipsoid, fusiform to cylindrical, aseptate or with several transverse eusepta, rarely with a single longitudinal septum, subhyaline to usually pigmented, smooth to verrucose-echinulate, hila protuberant, coronate, with a central convex dome and raised periclinal rim, thickened, refractive to darkened; microcyclic conidiogenesis often occurring.

Notes: According to LINDAU (1907), *Mydonosporium* Corda is synonymous with *Cladosporium*, a conclusion supported by DE VRIES (1952). ARX (1983) considered *Acroconidiella* J.C. Lindq. & Alippi as synonym of *Heterosporium* and reduced *Stenella* to synonymy with *Cladosporium*. However, *Acroconidiella* possesses tretic conidiogenous cells and the structure of the conidiogenous loci and hila within the genus *Stenella* is quite distinct from those of *Cladosporium* by being pileate, without dome and raised rim. Hence, the two genera should be retained as separate genera (CROUS & BRAUN 2003).

3.2. *Subgeneric concepts*

Attempts to divide *Cladosporium* into subgeneric units are complicated due to the high degree of variability in the conidial size, shape, septation, pigmentation, surface ornamentation as well as in the conidiophore morphology and size of the particular species. The habit of *Cladosporium* species is often significantly effected by external impacts, e.g., substrate differences, climatic conditions, diverse geographic influences, etc. Colonies grown in vitro or in moisture chambers are often strongly deviating from those found on natural substrates.

Historical proposals to divide *Cladosporium* into smaller subunits are unsatisfactory and have been less practicable (DAVID 1997). SACCARDO (1886) introduced a system based on host preferences. On the basis of ecological and morphological characteristics and differences in vitro, KRANGAUZ (1970) divided *Cladosporium* in three subgenera ('*Parasiticum*', '*Eucladosporium*' and '*Saprophyticum*'), which were however not validly published. ARX (1983) proposed four informal sections (excl. *Heterosporium*), again based on ecological preferences. DAVID (1997) introduced a subgeneric classification on account of morphological differences, recognizing the subgenera *Heterosporium* (conidia solitary or in short unbranched chains, without ramoconidia, conidia rather uniform), *Bistratosporium* J.C. David (conidia in branched chains, ramoconidia present, walls of the conidia distinctly two-layered) and *Cladosporium* (conidia in branched chains, ramoconidia present, conidia polymorphous, walls always one-layered). The latter subgenus was separated into the sections *Cladosporium* (conidiophores proliferating) and *Hormodendropsis* J.C. David (conidiophores determinate, not proliferating). These two types of conidiophore proliferation have previously been recognized by DE VRIES (1952) and MCKEMY & MORGAN-JONES (1991c). However, SAMSON et al. (2000) mentioned that the two types cannot always be sharply defined.

The phenomenon of two-layered, thickened conidial walls, giving conidia a somewhat zonate appearance, was at first described in *C. coryphae* (Syd. & P. Syd.) J.C. David, for which DAVID (1997) introduced the subgenus *Bistratosporium*. A re-examination of type material revealed that the walls of the conidiophores are also often distinctly two-layered, which was not described and illustrated by DAVID (1997). During the course of morphotaxonomic studies of fungicolous and foliicolous *Cladosporium* species several other species have been re-described, which possess conidia and conidiophores with two-layered walls, e.g., *C. episclerotiale* Bubák (HEUCHERT et al. 2005), *C. ushuwaiense* Speg. and *C. oreodaphnes* Allesch. ex K. Schub. (see chapter 8.2.). Since the conidia of these species are much smaller, it is not as conspicuous as in *C. coryphae* but nevertheless two distinct wall layers are visible. In several collections of *C. herbarum* conidiophores and few conidia with thickened, two-layered walls have also been observed, i.e., conidiophores and conidia with one- and two-layered walls are often mixed in particular species or even single collections of a species. Hence, *Bistratosporium* is undoubtedly not tenable at subgeneric rank.

In previously published molecular studies of *Cladosporium* s. lat. (WIRSEL et al. 2002; BRAUN et al. 2003) as well as in the cladogram presented below (Fig. 2), *C. sphaerospermum* Penz. usually forms a well supported subclade. For the latter species, which is well-characterised by having globose or subglobose, mid to dark brown, verrucose terminal conidia and 0–3-septate, smooth or verruculose ramoconidia (ELLIS 1971), the introduction of a separate subgenus is probably warranted. However, final conclusions about a subgeneric classification of *Cladosporium* are not yet possible since they have to be based on a complete monograph of the genus, including saprobic taxa, and additional molecular examinations, using other genes.

4. Morphotaxonomy of the species examined

4.1. *Morphology*

4.1.1. *Mycelium*

The mycelium of foliicolous *Cladosporium* species is often internal, but can also be both internal and external or exclusively external. The hyphae are consistently septate, mostly branched, smooth and lightly pigmented. Some species are characterised by having very wide hyphae, e.g., *C. gentianae* Lobik, while others sometimes possess somewhat lobed hyphae, e.g., *C. grech-delicatae* Sacc. and *C. foliorum* Ellis & Everh. ex K. Schub., but these features are of little value for the delimitation of species. Particular hyphal cells are often somewhat swollen and form loose aggregations or dense stromata. However, the ability to form stromata is often not diagnostic.

4.1.2. *Conidiophores*

The conidiophores in species of the genus *Cladosporium* are mostly cylindrical, subcylindrical or filiform, but further differentiations are often due to sympodial proliferations causing geniculations with conidiogenous loci often situated on small lateral shoulders or intercalary swellings. Several species are well-characterised by having mildly to distinctly geniculate-sinuous conidiophores, e.g., *C. hypophyllum* Fuckel, *C. minusculum* Sacc. and *C. phyllogenum* K. Schub. Different degrees of intercalar and apical swellings are possible, ranging from subnodulose to nodose. The term subnodulose is used when lateral shoulders become slightly swollen. Nodulose conidiophores, as in *C. herbarum* and *C. trillii* Ellis & Everh., possess multilateral swellings round about the stalks, which are usually formed in quick succession giving conidiophores a somewhat gnarled or knotty appearance. Nodose conidiophores with distinct, regular, more pronounced swellings, clearly separated and distant from each other, are formed in *C. colocasiae* Sawada and *C. oxysporum* Berk. & M.A. Curtis. The process of conidiogenesis within the latter two species has been described in detail by MCKEMY & MORGAN-JONES (1991b). Conidiophores become temporarily determinate, linear apical growth ceases. The conidiophores swell appreciably at the extreme apex and a few conidia are formed in close proximity to one another at the surface of the inflated portion. Following such conidiation, apical meristematic terminal growth resumes giving rise initially to a narrow, hypha-like extension above the fertile node. This grows to varying lengths, depending upon growing conditions. The extended distal portion usually becomes separated from the node below by a transverse septum and then ceases growth. Terminal swellings and conidiation then ensue at the higher level and the sequence of events is repeated a number of times to give rise to the characteristic nodose morphology. Whether the conidiogenous loci are confined to swellings or not, is also an important feature for the discrimination of species. Within a species the shape of the conidiophores is usually uniform, but in a few cases, e.g., *C. fusicladiiformis* Gonz. Frag. and *C. chrysophylli* Thaung, they are dimorphic. Two different types of conidiophores are formed, which morphologically vary in their length, width, septation, pigmentation and sometimes in the thickness of the walls.

Peculiarities of the arrangement of conidiophores are diagnostic in combination with other characteristics. The number of conidiophores per fascicle is often variable, but general circumscriptions, e.g. ‘conidiophores solitary or in small loose groups’ or ‘conidiophores numerous, in dense fascicles’, are workable and useful. A few species within the genus *Cladosporium* form conspicuous fascicles of conidiophores, e.g., *C. soldanellae* Jaap and *C. oreodaphnes*.

Branched conidiophores occur in a number of species such as *C. diaphanum* Thüm., *C. rectangulare* K. Schub. & U. Braun and *C. smilacicola* K. Schub. The ramification of the

conidiophores (presence, degree, topology) is an additional useful feature, but can be affected by age and environmental conditions. The length of the conidiophores is usually variable, often strongly influenced by external conditions, and must be applied with caution. Some species are well-distinguished by having mostly constantly short, fasciculate conidiophores, usually not longer than 60 µm, as in *C. lupiniphilum* U. Braun, *C. praecox* (Niessl) U. Braun and *C. rutae* (Achundov) U. Braun. However, it has been reported by several authors (e.g., ELLIS 1971; MORGAN-JONES & MCKEMY 1990) that the length of the conidiophores can extremely vary (sometimes twice as long as under field conditions) when incubated in a moisture chamber or when grown in vitro. The width of the conidiophores is usually less variable. The occurrence and number of septa often depend on conidiophore length.

Under light microscopy the walls of the conidiophores can either be recognised as a single wall layer or when distinctly thickened, two layers can be observed, e.g., in *C. apicale* Berk. & Broome and *C. ushuwaiense* (Figs 7, 71). The outer wall, which can be ornamented, is often somewhat wider and paler than the inner wall layer. In combination with other characteristics the width of the conidiophore walls can be used as an additional feature to discriminate species. During periods of unfavourable conditions, in some cases the conidiophores of *Cladosporium* can stop growing and the walls become rigid. When these conditions are over, the conidiophores may resume growth to produce new conidiogenous cells. The apical conidiophore wall ruptures through the enteroblastic proliferation of an internal layer of the wall, visible as discontinuity in pigmentation and in thickness of the wall. DAVID (1997), who described this phenomenon in detail, used the term enterogenous, but the term enteroblastic, expanded and applied by MINTER et al. (1982) to mechanisms of budding in general, covering proliferations of conidiophores, conidiogenous cells and conidia, should be preferred. Enteroblastic proliferations are evident in *C. orchidiphilum* K. Schub. & U. Braun and *C. populicola* K. Schub. & U. Braun.

In several species, the protoplasm of the conidiophore cells appears to be somewhat aggregated at the septa (similar to distoseptation), giving septa and above all walls a somewhat thickened appearance, e.g., in *C. fusicladiiformis* (Fig. 29). This phenomenon could also be observed in few species of the genera *Fusicladium* and *Passalora*, but its taxonomic significance is not yet clear.

4.1.3. *Conidiogenous cells*

The conidiogenous cells are integrated, terminal or intercalary, or sometimes conidiophores are reduced to conidiogenous cells. DE VRIES (1952) recognised two types of conidial heads. The sympodial growth with regular prolongations of the conidiophores giving rise to new conidiogenous loci as in *C. herbarum* was referred to as the '*Cladosporium* type' and is common within the genus. In a few species, such as *C. tenuissimum* Cooke and *C. cladosporioides*, there is comparatively little, if any, sympodial conidiophore growth, no prolongations and thus a limited number of conidiogenous loci occur. A large diversity of conidia is formed as a result of the formation of primary, secondary and tertiary conidia. This second type was called the '*Hormodendrum* type'. Recognition of these types and variation among them can be useful in better defining species concepts and in identification (MCKEMY & MORGAN-JONES 1991c). DE VRIES (1952) considered these two types to occur commonly in any species of *Cladosporium* in culture. However, in some species conidiophores do not proliferate sympodially, so that the '*Hormodendrum* type' is full expression of the potential of the species concerned (DAVID 1997). DAVID (1997) considered the distinction between proliferating and non-proliferating conidiophores to be more important than recognised by DE VRIES (1952) and introduced a sectional division of subgenus *Cladosporium* on the base of types of

conidiophore growth patterns. Section *Hormodendropsis* comprises *Cladosporium* species with determinate conidiophores and section *Cladosporium* is characterised by having indeterminate, sympodially proliferating conidiophores. SAMSON et al. (2000) mentioned that these two types cannot always be sharply defined. In culture, HENNEBERT & SUTTON (1994) recognised the phenomenon that some species may initially produce '*Hormodendrum* type' conidial heads but subsequently proliferate and thus become '*Cladosporium* type'. The latter observations could be confirmed during the course of the present monographic studies. Differences in the proliferation of conidiogenous cells are, indeed, not clearly defined and discriminated, intermediate types occur. Hence, these features should not be used for the separation of *Cladosporium* into smaller units.

The structure of the conidiogenous loci and conidial hila is more or less uniform within the genus *Cladosporium*; differences noted between species are only minimal and gradual. This character is above all significant on the generic level as stated above. ROQUEBERT (1981) carried out first detailed SEM examinations of the scar structure. DAVID (1997) followed the terminology introduced in the latter paper and published the first comprehensive circumscription of the conidiogenous loci and hila. They are protuberant, thickened, refractive to somewhat darkened and consist of a central convex dome, which is the slightly bulging half of the original septum, delimiting the conidium and the conidiogenous cell, after being cleft, and a raised periclinal rim, where the walls were joined prior to secession (coronate or '*Cladosporium* type' of scars according to BRAUN et al. 2003). The main source of variation is in the degree of thickening of the rim, size and protuberance can vary with age. The size of these structures is often not very variable between *Cladosporium* species (mostly 1–2 µm diam.) and therefore of limited value for the discrimination of species.

Conidial secession in *Cladosporium* is schizolytic (DAVID 1997), i.e., the basal separating septum splits at the middle layer by cleavage. However, there are some peculiarities that distinguish this process and the resulting scar structure from other hyphomycete genera. The conidiogenous loci are distinctly protuberant and split in the middle, leaving a conspicuous fringe (raised periclinal rim). Mature conidia separate at the outer rim, but remain attached at the central dome, which secedes later. This process results in a conspicuous central papilla-like structure or dome (DAVID 1997: 15, Fig. 2A).

4.1.4. *Conidia*

All *Cladosporium* species have the potential to produce conidia in true chains. Species with solitary conidia on the host usually have the capacity to produce conidia in chains in culture. The formation of the conidia in chains or solitary is a useful feature to differentiate particular species, but it is not tenable on generic level. Conidial chains within the genus *Cladosporium* are acropetal, sympodial and often profusely branched. The term ramo-conidia has been used by several authors (e.g., ELLIS 1971, 1976; DAVID 1997; MCKEMY & MORGAN-JONES 1991c) for those conidia at the base of branches having more than one distal scar. KIRK et al. (2001) provided a definition of the term ramoconidium describing it as a branch of a conidiophore, which secedes and functions as a conidium, which means that it represents a detached conidiogenous cell. These true ramoconidia, referred to as 'ramoconidia s. str.', are characterised by having a truncate or slightly convex, unthickened base, without any dome or raised rim, which could be confirmed by light and scanning electron microscopy (see Pl. 24, Fig. E). Ramoconidia s. lat. always have a basal coronate hilum and more than one distal scar and can occur at the base or within the chains. Due to the structure of the conidial base, both types are easily separable. The presence of ramoconidia s. str. is a feature of limited value for the characterisation of *Cladosporium* species, since these structures are often rarely formed or lacking. If ramoconidia s. str. are

present, a combination of length, width and septation of these structures may be useful for the discrimination of particular groups of species or distinct species.
The shape of the conidia is highly variable and only little differentiated between the biotrophic species examined, ranging from subglobose, ovoid, ellipsoid, fusiform to subcylindrical or cylindrical. Conidial length and degree of septation are also often variable and depend on external conditions so that these characters can only be used in combination with other taxonomic features. The width of the conidia is, however, less variable and rather suitable for the delimitation of allied taxa. Peculiarities of conidial surface ornamentation provide useful criteria for the separation of species, but must be judged with caution. A general grouping, e.g., 'conidia smooth or almost so', or 'conidia verruculose or verrucose' is, however, workable. Species with verruculose or conspicuously verrucose-echinulate conidia, as in *C. praecox* and *C. agoseridis* U. Braun & Rogerson, are easily distinguishable from those with conidia which are smooth or almost so (e.g., *C. alneum* Pass. ex K. Schub. and *C. maracuja* Viégas). However, in several species some variation in surface ornamentation can occur, e.g., in *C. herbarum*. Conidia of the latter species are mainly verruculose, but sometimes few smooth conidia may be intermixed. Older conidia of species with usually smooth conidia sometimes become somewhat rough-walled, e.g., in *C. fusicladiiformis*, *C. lineolatum* Sacc. and in *C. oncobae* K. Schub. & C.F. Hill.
Since there are only few taxonomically relevant features within the genus *Cladosporium* and in hyphomycetes in general, attention has been paid to characteristic cell structures, hitherto barely used for taxonomic purposes. In several species, as in *C. arthrinioides* Thüm. & Beltr., *C. heliotropii* Erikss. and in *C. minusculum*, the protoplasm of the conidial cells sometimes appears to have a paler, more or less irregular cavity in the centre (see Figs 8, 33, 34, 45). This structure has been observed both in type material of *C. heliotropii*, described from Sweden, and in additional collections of this species collected in Alaska so that it may be used as distinctive feature. In some cases, the lumen of the conidial and also conidiophore cells often appears to be distinct, clearly separated from the inner wall (e.g., in *C. syringicola* K. Schub. and *C. populicola*). Peculiarities of the cell structure are, however, little examined and probably of limited value on the species level.

4.2. *Species concept*

The circumscriptions and delimitations of the species concerned are mainly based on quantitative as well as qualitative morphological features. Host range and specialisation as well as geographical distribution are also taken into consideration. Newly described species are comprehensively compared with morphologically similar species as well as species which occur on host plants of the same plant family.

The following features proved to be diagnostic for the differentiation at species rank:

- Shape of the conidiophores (geniculate-sinuous, nodulose, location of the conidiogenous loci, dimorphic).
- Ramification of the conidiophores (presence, topology, degree).
- Width of the conidiophores.
- Formation of conidia (solitary or catenate, unbranched or branched chains).
- Conidial surface ornamentation.
- Symptoms, lesions, host specifity.

The following features are only diagnostic in combination with other features:

- Mycelium (internal, external, both internal and external).
- Arrangement of the conidiophores (solitary, fasciculate).
- Length, septation and thickness of the wall of the conidiophores.

- Conidiogenous cells (terminal, intercalar, conidiophores reduced to conidiogenous cells; proliferation sympodial, enteroblastic; number and width of conidiogenous loci).
- Ramoconidia s. str. (presence, length, width, septation).
- Conidia (length, width, septation, shape, cell structure).

The following features are either more or less uniform or very variable and thus less appropriate for the discrimination of species:

- Structure of the mycelium.
- Formation of stromata.
- Formation of conidiophores (arising from stromata or hyphae).
- Structure of the conidiogenous loci and hila (generic feature).
- Degree of pigmentation of conidiophores and conidia.

4.3. *Biology, ecology and distribution*

Cladosporium species have an extremely wide ecological range, occurring on all kinds of substrates, and on a wide range of hosts, either biotrophically or on dead or dying tissue. Against previous assumptions, only few species are plurivorous, widely distributed saprobic species, e.g., *C. herbarum*, *C. cladosporioides* and *C. oxysporum*, which do not appear to have any strong environmental preferences. Some species are fungicolous using other fungi as substrate (HEUCHERT et al. 2005), but most species are host-specific, causing typical leaf spots, discolorations, necrosis or shot hole symptoms on living or fading leaves. Some of them may develop almost without visible symptoms (e.g., *C. obtectum* Rabenh. ex Cooke) or attack stems (e.g., *C. grech-delicatae*). For these biologically specialised taxa the host range is an important feature. They usually follow the distribution of their hosts. Cultivated hosts are usually colonised wherever grown. The host ranges are usually more or less narrow, not exceeding the limits of a single host family, mostly even narrower, often only covering few species of a single genus. However, there are some exceptions, e.g., *C. allii* (Ellis & G. Martin) P.M. Kirk & J.G. Crompton, *C. allii-cepae* (Ranoj.) M.B. Ellis and *C. victorialis* (Thüm.) U. Braun & H.D. Shin on species of *Allium*. While *C. allii-cepae* is known to be confined to *Allium cepa* (KIRK & CROMPTON 1984), *C. allii* is reported to have a wider host range. DAVID (1997) concluded that this may indicate that *C. allii-cepae* has evolved with its host to become distinct, whereas *C. allii* is the original form, known to occur on non-cultivated members of the genus *Allium*. *C. victorialis*, recorded from Korea and Russia, is morphologically quite distinct from the latter two species, so it could be assumed that *Allium* has been settled twice.

5. Material and methods

Microscopic examinations were carried out based on collections from numerous herbaria and some fresh specimens. The collections examined are deposited at the following herbaria: B, BPI, BRIP, CUP, DAOM, FH, HAL, HBG, IACM, ILL, IMI, INIFAT, K, KR, LBLM, LE, LEP, LPS, M, MA, NY, NYS, PAD, PC, PDD, PH, PPMH, PRM, S, SIENA, VPRI, W, WIS (abbreviations according to HOLMGREN et al. 1990).

5.1. *Microscopic standard methods*

Collections were examined using a stereomicroscope to detect the areas where the fungus was growing. Small amounts of colonies were excised and mounted in distilled water on a slide. Stains were not used, as the fungal hyphae, conidiophores and conidia are pigmented and thus clearly visible. Permanent slides were prepared by sealing the cover-glasses with Canada balm (SERVA, Heidelberg) and by putting them into a desiccator for 24 hours. Morphological descriptions are based on observations with standard light microscopy under oil immersion using an Olympus BX 50 microscope. Where possible, twenty conidiophores, conidiogenous cells, conidia and conidiogenous loci and hila were measured in each collection, and a representative range was depicted. Drawings were done free hand. Occasionally, material was so sparse that only a minimal number of measurements could be made. In most cases the number of septa and the number of conidial hila present in/on the conidia were registered.
Digital photographs were taken using a ZEISS AxioCam HR attached to a ZEISS Axioskop 2 and occasionally optimised with the software ZEISS AxioVision.

5.2. *Scanning electron microscopy*

SEM examinations, conducted at the Institute of Zoology of the Martin-Luther-University, were carried out to determine details of scar morphology and conidial surface ornamentation. Specimens were excised from the host, attached to aluminium pin stubs and then 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). Observations and micrographs were made with a HITACHI S-2400 scanning electron microscope with integrated camera (film: ILFORD PLUS 125).

5.3. *Molecular examinations*

Molecular studies have been carried out at the Centraalbureau voor Schimmelcultures, Fungal Biodiversity Centre (CBS, Utrecht, The Netherlands) by Prof. Dr. Pedro Crous, Dr. Ewald Groenewald and co-workers, which is very gratefully acknowledged. Methods are therefore only briefly summarised. Fresh specimens collected at Halle (especially in the botanical garden) and surroundings during the last two years were sent to the CBS, isolated in pure culture and included in the molecular examinations. General methods used for DNA isolation, amplification, and sequencing, as well as for phylogenetic analyses are those used by HALLEEN et al. (2004). Amplification of the ribosomal DNA was performed using the primers ITS 1 / ITS 4 (WHITE et al. 1990). The amplicons were sequenced with the BigDye terminator cycle (Applied Biosystems, Foster City, California) or DYEnamicET dye terminator (Amersham Biosciences) sequencing kits and analyzed on an ABI Prism 3700 (Applied Biosystems) by using the standard conditions recommended by the vendor. A sequence of *Phomopsis vaccinii* was used as outgroup for the ITS tree. Tree topologies were obtained from the aligned sequences by the neighbour-joining criteria as implemented in PAUP 4.0b10 (SWOFFORD 2003) using the F84 substitution model.

6. Molecular studies and phylogeny

Previous molecular studies employing rDNA ITS sequence data (CROUS et al. 2001) have shown cladosporium-like taxa to cluster adjacent to the main monophyletic *Mycosphaerella* clade, suggesting a position apart of the latter genus. Comprehensive ITS (ITS-1, 5.8S, ITS-2) and 18S rRNA sequence analyses carried out by BRAUN et al. (2003) provided further evidence for the separation of *Cladosporium* s. str. In the latter paper, results of molecular examinations published by other authors were summarised and phylograms of cladosporium-like fungi were discussed in detail. Human-pathogenic cladophialophora-like hyphomycetes (Herpotrichiellaceae), *Sorocybe resinae* (Fr.) Fr. (*Amorphotheca resinae* Parbery) (Amorphothecaceae), *Alternaria malorum* (Rühle) U. Braun, Crous & Dugan (*Cladosporium malorum* Rühle) (Pleosporaceae) and cladosporioid *Venturia* anamorphs (*Fusicladium*) (Venturiaceae) formed separate monophyletic clades and could be excluded from *Cladosporium* s. str. Within a big clade formed by members of the Mycosphaerellaceae, true *Cladosporium* species were shown to represent a sister clade to *Mycosphaerella* with cercosporoid anamorphs. The new teleomorph genus *Davidiella* was proposed to accommodate the teleomorphs of *Cladosporium* formerly placed in *Mycosphaerella* s. lat. It could be demonstrated that relatively minor differences in the conidiogenous loci and conidial hila support the different phylogenetic affinities.

SEIFERT et al. (2004) used morphological characters, ecological features and DNA sequence data to characterise *Cladosporium staurophorum* taxonomically and phylogenetically and assigned it to the new genus *Devriesia*. Together with three additional heat-resistant species, *C. staurophorum* formed a monophyletic group, with marginal position in the Mycosphaerellaceae, but clearly distinct from *Cladosporium* s. str. The new hyphomycetous genus *Metulocladosporiella*, an additional segregate of *Cladosporium* s. lat., has recently been introduced to accommodate *Cladosporium musae*, the causal agent of *Cladosporium* speckle disease of banana (CROUS et al. 2005). DNA sequence data derived from the ITS and LSU gene regions of *C. musae* isolates showed that this species is part of a large group of hyphomycetes in the *Chaetothyriales* with dematiaceous blastoconidia in acropetal chains. *Cladosporium adianticola* R.F. Castañeda, a foliicolous hyphomycete known from leaf litter in Cuba, proved to be also a member of this clade and closely related to *C. musae*.

WIRSEL et al. (2002) and PARK et al. (2004) carried out phylogenetic studies within *Cladosporium* s. str. WIRSEL et al. (2002) analysed ITS data of strains isolated from common reed in Germany, compared them with sequences from GenBank and cultures from the CBS (Utrecht, the Netherlands), and distinguished three species, viz., *Cladosporium herbarum*, *C. oxysporum* and *Cladosporium* sp. Beside ITS sequences, they generated two additional phylogenies, viz., analyses based on the differentiation of the fungi by their capacity to metabolize different carbon sources and a second approach, using actin gene sequences, in which they discovered a highly variable intron sequence. Species phylogenies based on this protein-encoding gene exhibited higher resolution compared with the ITS tree leading to further differentiation in terminal branches. Furthermore, it could be shown that all strains with smooth conidial surfaces clustered together, as did all isolates with rough-walled conidia, thus reflecting a possible division among plant-associated Cladosporia based on conidial ornamentation. However, due to the limited dataset, including only few *Cladosporium* species, a final conclusion could not be drawn. In the study carried out by PARK et al. (2004), the sequences of the D1/D2 regions of the LSU rDNA genes and the ITS regions of the rDNA were employed in order to establish molecular standards for the demarcation of the common airborne species *C. herbarum*, *C. cladosporioides* and *C. sphaerospermum*.

The two neighbour-joining analyses of ITS datasets of the *Cladosporium* s. lat. complex presented within this work have been carried out at the CBS and kindly provided by Ewald Groenewald. The first phylogram (Fig. 1) contains isolates from five main groups [Pleosporaceae, Herpotrichiellaceae, Mycosphaerellaceae, Venturiaceae and the species complex of *Cladosporium paeoniae* Pass. / *C. chlorocephalum* (Fresen.) E.W. Mason & M.B. Ellis]. The Pleosporaceae form a well-supported clade (100 % bootstrap support) containing isolates of species of the genera *Alternaria* Nees and *Lewia* M.E. Barr & E.G. Simmons. The Herpotrichiellaceae are separated into two groups, the first consists of a clade supported by a bootstrap support value of 100 % comprising species of *Cladophialophora* and *Phialophora* Medlar, and the second well-supported clade contains strains of *Cladosporium adianticola* (99 % bootstrap support), *Metulocladosporiella musicola* Crous, Schroers & Groenewald (91 % bootstrap support) and *Metulocladosporiella musae* (E.W. Mason) Crous, Schroers, Groenewald, U. Braun & K. Schub. (99 % bootstrap support). Within the Mycosphaerellaceae cluster, a strongly supported *Davidiella* clade (100 %) containing *Cladosporium* anamorphs is formed. A clade for the Venturiaceae is also well supported containing species of *Venturia* as well as isolates of *Fusicladium* and *Pseudocladosporium hachijoensis* (Matsush.) U. Braun. *Cladosporium paeoniae* and *C. chlorocephalum* cluster closely together with a bootstrap support value of 100 %, but grouped outside of the *Davidiella*/*Cladosporium* clade (100 % bootstrap support). ITS sequences similar to those of the latter species could not be obtained by BLAST-searches (www.ncbi.nlm.nih.gov/BLAST/) (pers. comm. with Ewald Groenewald), so the grouping with '*Trimmatostroma salinum*' is only due to the limited dataset selected here. The second neighbour-joining tree contains isolates of the Mycosphaerellaceae and Amorphothecaceae. The Amorphothecaceae clade is well-supported with a bootstrap support value of 100 % and consists of *Amorphotheca resinae* and '*Cladosporium*' *breviramosum*. The Mycosphaerellaceae clade consists of isolates of *Mycosphaerella*, a strongly supported clade (100 %) of *Devriesia* containing *Cladosporium staurophorum* and a big monophyletic clade of *Davidiella* comprising numerous *Cladosporium* species.

The phylograms derived in the present study reflect and support the results of previous phylogenic studies published by BRAUN et al. (2003), SEIFERT et al. (2004) and CROUS et al. (2005) in which several clades (genera, families) with cladosporium-like taxa are clearly delineated from *Cladosporium* s. str. Furthermore, it could be demonstrated that *C. paeoniae* and *C. chlorocephalum* form a well-supported group outside of the *Davidiella* / *Cladosporium* clade. This separate position could be confirmed by means of light and scanning electron microscopy showing the conidiogenous loci and hila to be different from those of *Cladosporium* s. str. in being non-coronate (see Fig. 113 and Pl. 34, Figs B, C, E, F). Although both species are morphologically and ecologically quite distinct, ITS sequence data of both species proved to be completely identical, which led to the conclusion that the latter species represent two stages of the same fungus (synanamorphs). However, the taxonomic affinity of both species is not yet clear. Further critical studies are required, in which additional isolates and other genes are included.

The independent and separate phylogenetic position of the genus *Cladosporium* in relation to *Mycosphaerella*, confirmed by morphotaxonomic and molecular studies, has been well established in literature. Isolates of *Davidiella* and *Cladosporium* s. str. consistently cluster together in ITS and LSU analyses, providing support for the monophyly of the anamorphic genus *Cladosporium* and the teleomorphic genus *Davidiella* (BRAUN et al. 2003). Within the big *Davidiella*/*Cladosporium* clade presented here (Fig. 2) three small subclades can be recognised, the first consisting of isolates of *Davidiella tassiana* (De Not.) Crous & U. Braun and its anamorph *Cladosporium herbarum* [incl. var. *macrocarpum* (Preuss) M.H.M. Ho & Dugan], the second containing two isolates of *C. cladosporioides*, and the

third comprising isolates of *C. sphaerospermum*. Isolates derived from new collections of several species made during the course of the present studies, e.g., *C. phyllogenum* and *C. phyllophilum* McAlpine (= *C. exoasci* Lindau) cluster within this clade confirming their correct placement in *Cladosporium*. *C. oncobae* also belongs in *Cladosporium* s. str. Since the two cultures isolated by Frank Hill cluster at two different places within the monophyletic clade, these cultures have to be checked to clarify their identities since the inclusion of a contamination has to be taken into consideration. There are similar problems with several isolates of '*C. cladosporioides*'.

However, it must clearly be stated that ITS data are often not sufficient to assess phylogenetic relationships, above all on subgeneric and species level. UNTEREINER (2000) stated that the lack of resolution in phylogenies inferred from rDNA sequence data, particularly at the level of species and genus, argues strongly in favour of the use of combined data sets including sequences from other regions of the nuclear ribosomal repeat or sequences from multiple loci. Analyses based on a single locus are often not sufficient to differentiate phenotypically clearly distinct species, as recently demonstrated by SAMSON et al. (2004) for species of *Penicillium* Link subgen. *Penicillium* analysed on the base of ß-tubulin sequences. Sequence data from the internal transcribed spacers (ITS 1, ITS 2) within the genus *Cladosporium* are very uniform showing little variation resulting in a barely resolved clade, so that final conclusions at subgeneric and species rank are not yet possible. Multilocal analyses of the genome, based on a larger number of isolates from different geographical regions are necessary to redefine species borders within *Cladosporium* (WIRSEL et al. 2002).

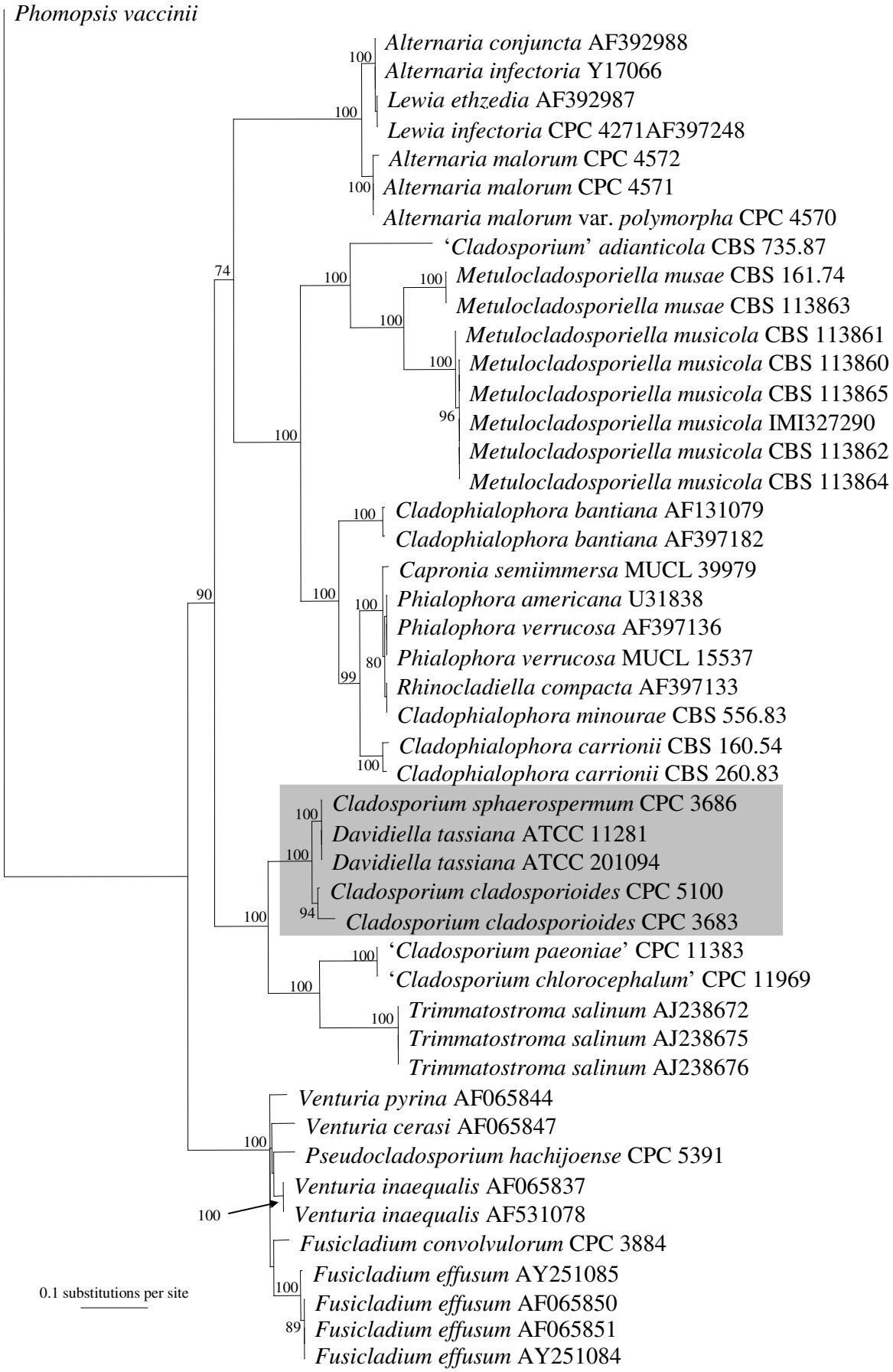

Fig. 1: Phylogram of neighbour joining tree obtained from ITS sequencing data using F84 substitution model. Bootstrap support values are shown at nodes. The GenBank sequence *Phomopsis vaccinii* AF317578 was used as outgroup. The subclade including species of *Davidiella* and *Cladosporium* is marked by coloration.

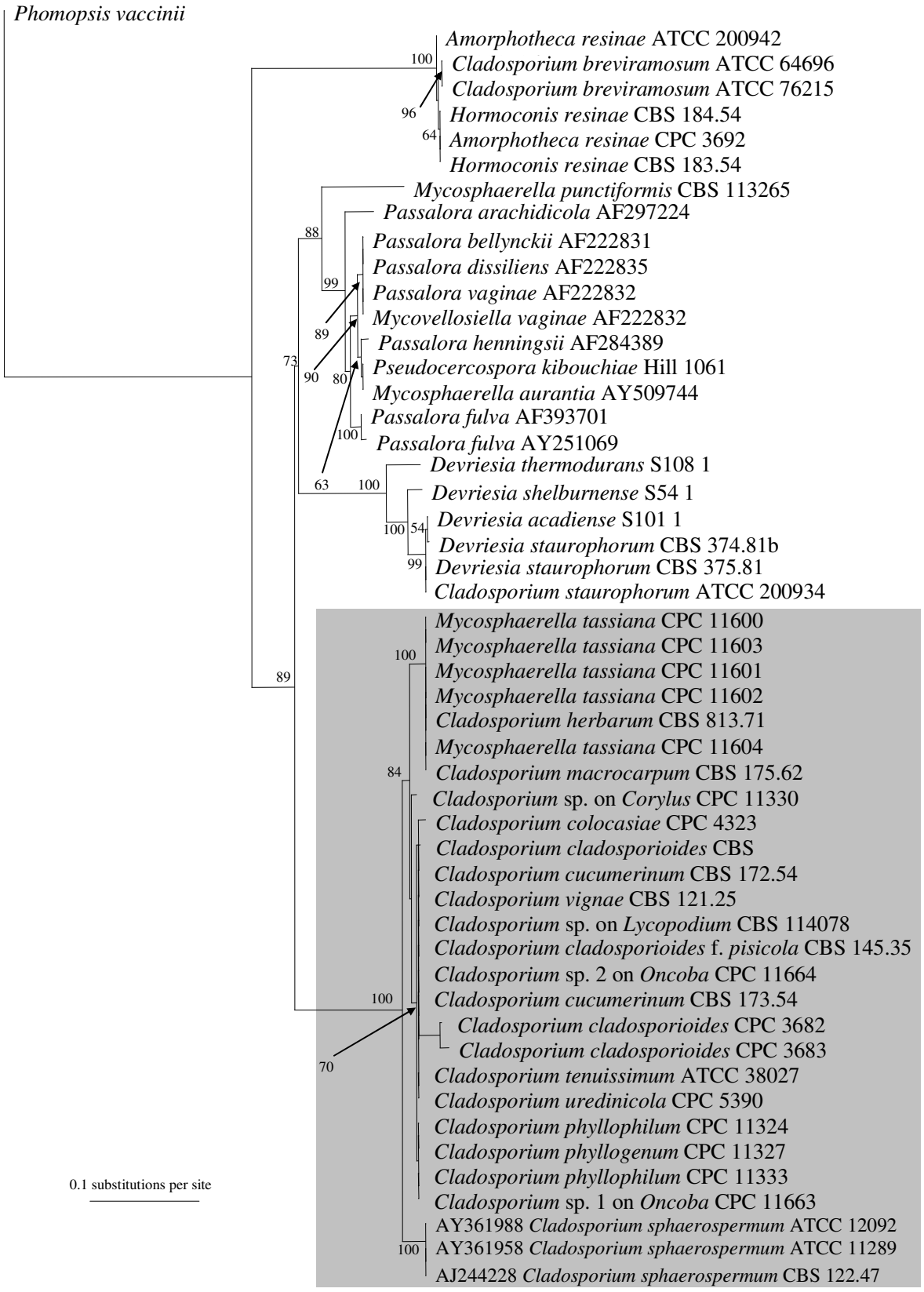

Fig. 2: Phylogram of neighbour joining tree obtained from ITS sequencing data using F84 substitution model. Bootstrap support values are shown at nodes. The GenBank sequence *Phomopsis vaccinii* AF317578 was used as outgroup. The subclade including species of *Davidiella* and *Cladosporium* is marked by coloration.

7. Keys

7.1. *Key to biotrophic Cladosporium species in vivo based on morphological features and ecology*

Beside the foliicolous *Cladosporium* species, this key contains some common, widespread saprobic species often occurring as secondary invaders on living or fading leaves. Descriptions of surface ornamentations, e.g. smooth, verruculose, etc., refer to light microscopy, if not otherwise stated

1 Conidia solitary, occasionally in short unbranched chains **2**
1* Conidia catenate, in unbranched or branched chains, rarely solitary **3**

2(1) Conidiophores 0–1-septate; conidiogenous loci and hila 3–5 µm diam.; conidia 20–40 µm long, 0–1-septate; on *Alopecurus* ..... (3) ***C. alopecuri***
2* Conidiophores 0–5-septate; conidiogenous loci and hila 1.5–2.5(–3.5) µm diam., conidia somewhat longer, (11–)20–60 µm, (0–)1–3(–5)-septate; on *Arthropodium* ..... (7) ***C. arthropodii***

3(1) Conidiophores dimorphic, forming two types different in shape, size, septation, pigmentation and sometimes thickness of the wall **4**
3* Conidiophores uniform, non-dimorphic **6**

4(3) Conidiophores up to 300 µm long, protoplasm of the conidiophore cells often conspicuously aggregated at the septa forming a paler cavity in the centre of the cells; conidia usually 0–1-septate; on *Eriobotrya* ..... (22) ***C. fusicladiiformis***
4* Conidiophores usually shorter, protoplasm of the cells not aggregated at the septa; conidia 0–2(–5)-septate **5**

5(4) Conidiophores with numerous crowded conidiogenous loci, apex of conidiogenous cells appearing somewhat rugose, periconiella-like, walls of the conidiophores thickened, up to 1(–1.25) µm wide, smooth, cells often with distinct clearly delineated lumen; ramoconidia s. str. occasionally occurring; on *Syringa* .....(66) ***C. syringicola***
5* Apex of conidiogenous cells not periconiella-like, walls of conidiophores up to 2 µm wide, with age outer wall seemingly detaching irregularly, cells without distinct lumen; no ramoconidia s. str.; on *Chrysophyllum* ..... (13) ***C. chrysophylli***

6(3) Conidiophores nodulose or nodose, conidiogenous loci usually confined to swellings **7**
6* Conidiophores non-nodulose or occasionally only subnodulose due to geniculate proliferations, but conidiogenous loci not confined to swellings **13**

7(6) Conidia usually smooth or almost so **8**
7* Conidia with different surface ornamentation, minutely to distinctly verruculose or verrucose, asperulate or irregularly rough-walled **10**

8(7) Conidiophores up to 250 µm long or even longer, occasionally up to 500 µm long, straight, nodose with distinct, regular swellings, clearly separated and distant from each other **9**
8* Conidiophores shorter, 40–105 µm long, nodulose, swellings not regular, neither clearly separated nor distant from each other, in quick succession; on *Borassus* ..... (8) ***C. borassi***

9(8) Conidia 0–1(–2)-septate, subglobose, ovoid, limoniform or ellipsoid, 3–6 µm wide; saprobic, on numerous substrates, also as a secondary invader on leaf spots caused by other fungi ..... ***C. oxysporum***

9* Conidia 0–3(–5)-septate, broadly ellipsoid-subcylindrical to cylindrical, wider, (5–)6–9(–10) µm; on *Colocasia* ..... (14) ***C. colocasiae***

10(7) Conidiophores unbranched to often branched; conidia almost smooth to minutely asperulate or irregularly rough-walled, walls sometimes even two-layered, with unusual cell structure (cells with a paler cavity in the centre of the cells); on *Ocotea* ..... (45) ***C. oreodaphnes***

10* Conidiophores mostly unbranched, rarely branched; conidia usually minutely to distinctly verruculose or verrucose, walls usually not two-layered, without unusual cell structure **11**

11(10) Conidiophores often with a single head-like, terminal swelling; conidia (2.5–)3–6.5 µm wide, 0–2(–3)-septate, usually minutely verruculose, occasionally smooth; on *Galium* ..... (23) ***C. galii***

11* Conidiophores with several or numerous intercalar and terminal swellings; conidia usually wider, up to 12 µm, with up to 5 septa, usually distinctly verruculose to verrucose **12**

12(11) Conidia (5–)11–36(–41) µm long, (0–)1–4(–5)-septate; on *Trillium* .. (61) ***C. trillii***

12* Conidia much shorter, mostly up to 25 µm long, 0–3-septate; saprobic, on numerous substrates, also as a secondary invader on leaf spots caused by other fungi ..... ***C. herbarum*** (incl. var. ***macrocarpum***)

13(6) Conidiophores usually in small to moderately large, loose to dense fascicles, usually arising from stromata, stromatic hyphal aggregations or swollen hyphal cells, emerging through stomata or erumpent through the cuticle, occasionally solitary **14**

13* Conidiophores solitary or occasionally in loose groups but not fasciculate, usually arising from hyphae or swollen hyphal cells **46**

14(13) Conidia smooth or almost so, rarely few conidia faintly rough-walled **15**

14* Conidia minutely to distinctly verruculose-echinulate, rarely few conidia smooth **30**

15(14) Conidiophores up to 100 µm long, but usually much shorter **16**

15* Conidiophores usually longer than 100 µm **27**

16(15) Conidia 10–45(–68) µm long, occasionally up to 180 µm in length, 0–4(–7)-septate; conidiogenous loci and hila (1–)1.5–3(–4) diam.; on *Allium* ..... (63) ***C. victorialis***

16* Conidia usually much shorter, with up to 3 septa; conidiogenous loci and hila usually narrower **17**

17(16) Conidia 0–1-septate, rarely with 2 septa **18**

17* Conidia 0–3(–4)-septate **22**

18(17) Conidia up to 25 µm long and up to 7 µm wide **19**

18* Conidia usually shorter, up to 18 µm long, and narrower, 2–5(–6) µm wide **20**

19(18) Conidiophores often branched, once or several times; conidia often distinctly constricted at the septa; on *Corymbia* ..... (38) ***C. myrtacearum***

19* Conidiophores usually unbranched, rarely once branched; conidia not or only very slightly constricted at the septa; on *Passiflora* ..... (35) ***C. maracuja***

20(18) Conidiogenous loci and hila 1.5–2.5 µm diam.; on *Ruta* ..... ***C. rutae***
20* Conidiogenous loci and hila narrower, 0.5–1.5(–2) µm diam. **21**

21(20) Conidiophores fasciculate as well as solitary, arising from internal and external hyphae, often with percurrent, enteroblastic proliferations; conidiogenous loci and hila very small, up to 1 µm diam.; ramoconidia s. str. sometimes occurring; conidia up to 11 µm long; on *Cassia* and *Chamaecrista* ..... (10) ***C. cassiae-surathensis***
21* Conidiophores usually fasciculate, arising from stromata or stromatic hyphal aggregations, mycelium not external, conidiophores without enteroblastic proliferations; conidiogenous loci and hila 0.5–1.5(–2) µm diam.; ramoconidia s. str. absent; conidia somewhat longer, 1.5–18 µm; on *Rhododendron* ..... (52) ***C. rhododendri***

22(17) Conidia (3–)4–18(–20) µm long **23**
22* Conidia longer, up to 30 µm **26**

23(22) Conidiophores fasciculate as well as solitary, arising from internal and external hyphae; ramoconidia s. str. occasionally occurring; conidia 2–14(–16) µm long; on *Capparis* ..... (32) ***C. lineolatum***
23* Conidiophores usually fasciculate; mycelium not external; ramoconidia s. str. absent; conidia somewhat longer **24**

24(23) Conidiophores erect to decumbent, unbranched or often branched; on *Manihot* ..... (40) ***C. nigrelloides***
24* Conidiophores always erect, not decumbent, usually unbranched, rarely branched **25**

25(24) Conidiophores 10–58 × 3.5–5 µm, often distinctly paler at the apex, almost hyaline; on *Jacaranda* ..... (31) ***C. jacarandicola***
25* Conidiophores 15–70 × 3–6 µm, not distinctly paler at the apex; on *Citrus* ..... (15) ***C. corrugatum***

26(22) Conidiophores erect to decumbent, fasciculate or solitary, arising from creeping hyphae, also on trichomes; conidia (8–)10–30(–35) × 2.5–6 µm; on *Gynoxys* ..... (30) ***C. inopinum***
26* Conidiophores always erect, arising from stromatic hyphal aggregations, not from creeping hyphae, not on trichomes; conidia somewhat wider, 6–28 × 4–8 µm; on *Lupinus* ..... (34) ***C. lupiniphilum***

27(15) Conidiophores 2.5–5 µm wide; conidia smooth to often minutely verruculose; on *Smilax* ..... (55) ***C. smilacicola***
27* Conidiophores usually much wider, (3–)4–11(–16) µm; conidia usually smooth under light microscopy **28**

28(27) Conidia (0–)1–6-septate, 9–45 × 4–8 µm; on *Photinia* ..... (17) ***C. diaphanum***
28* Conidia with up to three septa, up to 20 µm long, 3–5(–6) µm wide **29**

29(28) Conidiophores 50–175 × (4–)5–8(–11) µm, walls thickened, (0.5–)1–2 µm wide, cells often with a distinct small inner lumen clearly separated from the inner wall; conidia 4–14 µm long, 0–1(–2)-septate, smooth or almost so, but mostly minutely verruculose when viewed by SEM; on *Populus* ..... (48) ***C. populicola***
29* Conidiophores (23–)150–360 µm or even longer, 6–11(–16) µm wide at the base, distinctly attenuated towards the apex, (2–)3–5.5 µm wide, walls thickened, 0.75–3 µm wide, protoplasm of the cells somewhat aggregated at the septa; conidia 2–

22 µm long, 0–3-septate, smooth, with an unusual cell structure (with paler cavity in the centre of the cells); on *Cycas* ..... (5) ***C. apicale***

30(14) Conidiophores up to 100(–120) µm long, but usually much shorter **31**
30* Conidiophores usually longer than 100 µm **39**

31(30) Conidiophores 4–10(–13) µm wide; hyphae up to 13 µm wide **32**
31* Conidiophores narrower, up to 7 µm wide; hyphae much narrower **33**

32(31) Conidia (10–)12–40(–50) × (5–)6–13(–15) µm, 0–1(–3)-septate; conidiogenous loci and hila (1.5–)2–3.5(–4.5) µm diam.; on *Agoseris* ..... (1) ***C. agoseridis***
32* Conidia 3.5–23 × 3–6(–8) µm, 0–1(–2)-septate; conidiogenous loci and hila 1–2 µm diam.; on *Gentiana* ..... (24) ***C. gentianae***

33(31) Conidia up to 20 µm long **34**
33* Conidia usually longer, up to 30 µm long **37**

34(33) Conidiogenous loci and hila small, usually 0.5–1.5 µm diam. **35**
34* Conidiogenous loci and hila wider, 1–2(–2.5) µm wide **36**

35(34) Conidiophores strongly and frequently geniculate-sinuous, protoplasm of the cells often somewhat aggregated at the septa; conidia with an unusual cell structure (with paler cavity in the centre of the cells); on *Salix* ..... (37) ***C. minusculum***
35* Conidiophores only slightly geniculate-sinuous, protoplasm of the cells not aggregated at the septa; conidia without unusual cell structure; on *Rhododendron* ..... (52) ***C. rhododendri***

36(34) Conidiophores few to numerous, in small to moderately large, loose to dense fascicles; up to 125 µm long; conidia mostly minutely verruculose; on *Chamaerops* ..... (11) ***C. chamaeropis***
36* Conidiophores not numerous, only in small loose fascicles, up to 75 µm long; conidia usually distinctly verruculose; on *Oncidium* ..... (43) ***C. orchidearum***

37(33) Hyphae radiating, forming loose to dense stromatic hyphal plates (fusicladium-like growth), hyphal cells sometimes irregularly lobed; conidiophores unbranched or once branched; on *Angelica* ..... (19) ***C. foliorum***
37* Hyphae not radiating, without fusicladium-like growth, hyphal cells not irregularly lobed; conidiophores unbranched, only very rarely branched **38**

38(37) Conidiophores 8–54 × (2.5–)3.5–6(–7) µm, 0–1(–2)-septate; conidiogenous loci and hila (1–)1.5–2.5 µm diam.; conidia 4–7(–8) µm wide, 0–1(–3)-septate, faintly to conspicuously verruculose-echinulate; on *Tragopogon* ..... (49) ***C. praecox***
38* Conidiophores 40–100 × 3–5 µm, pluriseptate; conidiogenous loci and hila 1–1.5 µm diam.; conidia 2–5 µm wide, 0–1-septate, almost smooth to verruculose; on *Ilex* ..... (12) ***C. cheonis***

39(30) Conidiophores in large, dense fascicles, at the base of the conidiomata more or less parallel, synnema-like; stromata large, 40–150 µm wide, sometimes confluent and even larger, several layers deep; on *Soldanella* ..... (56) ***C. soldanellae***
39* Conidiophores in small to moderately large, loose to dense fascicles, but conidiomata not synnema-like; stromata smaller **40**

40(39) Conidiophores 2.5–5.5(–6) µm wide **41**
40* Conidiophores usually wider **44**

41(40) Conidiophores often with percurrent, enteroblastic proliferations; conidiogenous cells with numerous, often crowded conidiogenous loci, loci and hila small, 1–1.5

µm diam.; conidia 3–15(–19) µm long, with an unusual cell structure (with paler cavity in the centre of the cells); on *Cypripedium* ..... (44) ***C. orchidiphilum***

41* Conidiophores only sporadically with enteroblastic proliferations; conidiogenous cells with a single or several conidiogenous loci, neither numerous nor crowded, loci and hila usually somewhat wider, 1–2(–2.5) µm diam.; conidia usually longer, without unusual cell structure **42**

42(41) Conidiophores usually unbranched; conidiogenous loci arranged on about the same level, like a garland; conidia usually 0–4(–5)-septate; on *Stanhopea* ..... (58) ***C. stanhopeae***

42* Conidiophores unbranched or often branched, once or several times; conidiogenous loci not arranged like a garland; conidia usually 0–3-septate **43**

43(42) Conidia 3.5–26 × 3–7(–8) µm, with age becoming longer and wider, distinctly swollen, up to 36 µm long or even longer and up to 11 µm wide, with up to 7 septa, forming secondary conidiophores; without ramoconidia s. str. ; on *Dracaena* and *Cordyline* ..... (18) ***C. dracaenatum***

43* Conidia shorter and narrower, 2–18(–21) × 1.5–5(–6) µm, with age neither longer and wider nor swollen; ramoconidia s. str. occasionally occurring, up to 26 µm long, 0(–1)-septate; on *Smilax* ..... (55) ***C. smilacicola***

44(40) Conidiophores up to 310 µm long or even longer, 5–15 µm wide near the base, distinctly attenuated towards the apex, 3–5(–6) µm wide; conidia with unusual cell structure (with paler cavity in the centre of the cells); hyphae 2–4 µm wide; on *Berberis* ..... (62) ***C. ushuwaiense***

44* Conidiophores shorter, up to 180 µm long, not distinctly attenuated towards the apex, up to 10 µm wide; conidial cells without paler cavity in the centre, but lumen often distinct, clearly separated from the inner wall; hyphae up to 11 µm wide or even wider **45**

45(44) Conidia 3.5–23 × 3–6(–8) µm, almost smooth to often verruculose or irregularly rough-walled; on *Gentiana* ..... (24) ***C. gentianae***

45* Conidia 4–14 × 3–5(–5.5) µm, smooth or almost so to slightly verruculose (light microscopy), but most conidia minutely verruculose when viewed by SEM; on *Populus* ..... (48) ***C. populicola***

46(13) Conidiophores characteristically branched, right-angled; on *Epidendrum* ..... (51) ***C. rectangulare***

46* Conidiophores unbranched or branched, but not right-angled **47**

47(46) Conidiophores always with a conspicuously swollen bulbous base, up to 16 µm wide; on *Rivina* ..... ***C. rivinae***

47* Base of conidiophores not distinctly swollen, not bulbous **48**

48(47) Mycelium external; conidiophores usually arising from superficially growing hyphae **49**

48* Mycelium consistently usually internal, sometimes both internal and external; conidiophores usually arising from swollen hyphal cells or internal hyphae, occasionally also from external creeping hyphae **59**

49(48) Conidiophores usually 2–5 µm wide **50**

49* Conidiophores usually wider, 3–9(–11) µm **56**

50(49) Conidia usually 2–5 µm wide **51**

50* Conidia usually wider, up to 8 µm wide **55**

51(50) Conidiogenous loci and hila small, 0.5–1.5 µm diam. **52**

51* Conidiogenous loci and hila wider, up to 2.5 µm diam. **54**

52(51) Conidiophores erect to decumbent; conidia 3–23(–27) µm long, 0–3(–4)-septate; on *Heterophragma* ..... (27) ***C. heterophragmatis***

52* Conidiophores always erect; conidia usually shorter, usually 0–1-septate, only occasionally with up to 3 septa sometimes with an unusual cell structure **53**

53(52) Mycelium smooth to mostly more or less verruculose or irregularly rough-walled; conidia 4–17(–19) µm long, with age becoming distinctly enlarged, longer and wider, 5–7 µm wide, lumen often distinct, clearly separated from the inner wall; on *Ulmus* ..... (28) ***C. hypophyllum***

53* Mycelium smooth; conidia 4–14(–20) µm long, not distinctly enlarged with age, lumen of the cells not distinct; on *Styrax* ..... (29) ***C. inconspicuum***

54(51) Conidiophores 0–3-septate; conidia 0–2-septate; on *Mimulus* . (36) ***C. mimulicola***

54* Conidiophores pluriseptate, with up to 11 septa; conidia 0–4(–5)-septate; on *Nerium* ..... (39) ***C. neriicola***

55(50) Conidiophores 5–50 µm long, 0–3-septate; conidia 5–8 µm wide, 0–5-septate, often 3-septate; on *Artemisia* ..... (41) ***C. obtectum***

55* Conidiophores longer, 25–200 µm, pluriseptate; conidia 3–6.5 µm wide, usually 0–1(–2)-septate, with age becoming longer and more frequently septate, with up to 4 septa, with unusual cells structure (with paler cavity in the centre of the cells); on *Bougainvillea* ..... (6) ***C. arthrinioides***

56(49) Conidiophores 5–50 µm long, 3–5(–7) µm wide, 0–3-septate; on *Artemisia* ..... (41) ***C. obtectum***

56* Conidiophores much longer, pluriseptate **57**

57(56) Conidiophores often several times mildly to distinctly geniculate-sinuous, walls often distinctly two-layered; ramoconidia s. str. frequently formed, 17–60 × 4.5–8 µm, 0–3(–5)-septate; on *Ulmus* ..... (46) ***C. phyllogenum***

57* Conidiophores usually not geniculate-sinuous, walls more or less thickened, but not distinctly two-layered; ramoconidia s. str. absent **58**

58(57) Stromata (external) composed of more or less isodiametrical cells, forming a textura angularis; conidiophores 15–300 × 2.5–8 µm, arising solitarily from creeping hyphae or in loose groups from stromata; conidia 0–2(–5)-septate, walls unthickened or almost so; on *Piper* ..... (47) ***C. pipericola***

58* Stromata lacking; conidiophores 5–150(–210) × (2–)3–6 µm, solitary, often also formed secondarily (microcyclic conidiogenesis); conidia 0–1(–3)-septate, with age becoming distinctly swollen, longer and wider, up to 12 µm wide or even wider, pluriseptate, often constricted at the septa and thick-walled, sometimes even two-layered; hyphae, conidiophores and conidia sometimes with unusual cell structure (with paler cavity in the centre of the cells); on *Heliotropium* ..... (26) ***C. heliotropii***

59(48) Conidiophores usually 2–5 µm wide **60**

59* Conidiophores usually somewhat wider, (3–)4–8(–11) µm **64**

60(59) Conidia 0–4(–7)-septate, commonly 3-septate, septa usually thickened and distinctly darkened; on *Cenchrus* ..... (57) ***C. spongiosum***

60* Conidia with up to three septa, but septa neither conspicuously thickened nor darkened **61**

61(60) Conidiophores solitary, arising from internal and external hyphae or in small loose fascicles; ramoconidia s. str. occasionally occurring **62**

61* Conidiophores always solitary, non-fasciculate; ramoconidia s. str. absent **63**

62(61) Conidiophores unbranched or branched, sometimes furcate; conidiogenous loci and hila 0.5–1.5(–2) µm diam.; conidia 0–3-septate; on *Capparis* ..... (32) ***C. lineolatum***

62* Conidiophores unbranched, only very rarely branched, not furcate, often with percurrent, enteroblastic proliferations; conidiogenous loci and hila very small, up to 1 µm diam.; conidia 0–1-septate; on *Cassia* and *Chamaecrista* ..... (10) ***C. cassiae-surathensis***

63(61) Conidiophores 14–150 µm long, unbranched or once branched, arising from internal and external, creeping hyphae; without microcyclic conidiogenesis; conidia olivaceous-brown or medium brown; on *Quercus* .... (21) ***C. fumagineum***

63* Conidiophores longer, 25–275 µm, unbranched, arising from internal hyphae; microcyclic conidiogenesis often occurring; conidia paler, hyaline, subhyaline to very pale brown; on *Xyris* ..... (65) ***C. xyridis***

64(59) Conidia 0–6(–8)-septate, conidial cells sometimes with paler cavity in the centre; on *Boscia* ..... (9) ***C. bosciae***

64* Conidia 0–3(–4)-septate, conidial cells without paler cavity in the centre **65**

65(64) Ramoconidia s. str. often occurring, 15–23 × 5–7.5 µm, 0(–1)-septate; mycelium sometimes irregularly lobed; on *Ranunculus* ..... (25) ***C. grech-delicatae***

65* Ramoconidia s. str. absent or only very rarely formed; mycelium not irregularly lobed **66**

66(65) Conidia 3–15(–20) µm long **67**

66* Conidia up to 25 µm long or even longer **69**

67(66) Conidiophores (4–)5–8(–11) µm wide, often with percurrent, enteroblastic proliferations, walls (0.5–)1–2 µm wide, cells often with distinct, small inner lumen clearly separated from the inner wall; conidia smooth or almost so to somewhat verruculose (when viewed by SEM most conidia minutely verruculose), cells sometimes with distinct inner lumen; on *Populus* ..... (48) ***C. populicola***

67* Conidiophores (3.5–)4–7 µm wide, usually without enteroblastic proliferations, walls up to 1 µm wide, cells without distinct inner lumen, but protoplasm somewhat aggregated at the septa; conidia smooth, cells without distinct inner lumen **68**

68(67) Conidia (2.5–)3.5–6(–7) µm wide; on *Liriodendron* ..... (33) ***C. liriodendri***

68* Conidia (2–)3–4.5(–6) µm wide; on *Annona* ..... (4) ***C. annonae***

69(66) Immersed hyphae often with a slime coat; on Cucurbitaceae ..... (16) ***C. cucumerinum***

69* Hyphae without slime coat **70**

70(69) Conidiophores often subnodulose, with unilateral swellings, but conidiogenous loci not confined to swellings; conidia 4–8(–9) µm wide; all structures with oil droplets; on *Arabis* ..... (59) ***C. subsclerotioideum***

70* Conidiophores usually non-nodulose, somewhat cladosporioides-like; conidia usually somewhat narrower, 2.5–6(–7) µm; without oil droplets **71**

71(70) Conidia 3–23(–25) µm long **72**

71* Conidia longer, up to 30 µm long or even longer **73**

72(71) Walls of the conidiophores 0.5–1 µm wide; on *Alnus*, Europe ..... (2) ***C. alneum***

72* Walls of the conidiophores (0.5–)1–2 µm wide; on *Oncoba*, New Zealand ..... (42) ***C. oncobae***

73(71) Mycelium both internal and external; conidiophores with thickened walls, sometimes even two-layered; conidia 0–2(–3)-septate, smooth to minutely verruculose; on *Fraxinus* ..... (20) ***C. fraxinicola***

73* Mycelium only internal; walls of the conidiophores mostly only slightly thickened, not two-layered; conidia mostly 0–1-septate, very rarely with a second septum, usually smooth **74**

74(73) Conidiogenous cells usually terminal, rarely intercalary, with a single or few, scattered conidiogenous loci, not crowded; conidia usually 3–5 µm wide; saprobic on numerous substrates, some races also biotrophic, but usually not leaf-spotting ..... ***C. cladosporioides***

74* Conidiogenous cells terminal and intercalary, conidiogenous loci often numerous and somewhat crowded; conidia up to 7 µm wide; leaf-spotting **75**

75(74) Ramoconidia s. str. occasionally formed; conidiogenous loci and hila 0.5–2 µm diam.; on *Lespedeza* and *Vigna* ..... (64) ***C. vignae***

75* Ramoconidia absent; conidiogenous loci and hila 1–3 µm diam.; on *Psoralea* ..... (50) ***C. psoraleae***

7.2. *Key to the foliicolous Cladosporium species based on host genera*

(excluding species formerly referred to *Heterosporium*).

Alliaceae (Liliaceae s. lat.)

Allium ..... (63) ***C. victorialis***

Annonaceae

Annona ..... (4) ***C. annonae***

Anthericaceae (Liliaceae s. lat.)

Arthropodium ..... (7) ***C. arthropodii***

Apiaceae

Angelica ..... (19) ***C. foliorum***

Apocynaceae

Nerium ..... (39) ***C. neriicola***

Aquifoliaceae

Ilex ..... (12) ***C. cheonis***

Araceae

Colocasia ..... (14) ***C. colocasiae***

Arecaceae

1 Conidiophores nodulose, with conidiogenous loci often confined to swellings; conidia 3–10(–14) µm long, 0–1-septate, smooth; conidiogenous loci and hila small, 0.5–1(–1.5) µm diam.; on *Borassus* ..... (8) ***C. borassi***

1* Conidiophores non-nodulose, without swellings; conidia longer, up to 20 µm, 0–1(–3)-septate, usually minutely verruculose; conidiogenous loci and hila wider, (0.5–)1–2(–2.5) µm diam.; on *Chamaerops* ..... (11) ***C. chamaeropis***

Asteraceae

1 Mycelium internal; conidia loosely to densely verruculose or faintly to distinctly verrucose-echinulate **2**

1* Mycelium mainly external; conidia usually smooth, only occasionally some conidia verruculose or faintly rough-walled **3**

2 Conidiophores 20–90(–110) × (3–)4–10(–13) µm, 0–4-septate; conidia (10–)12–40(–50) × (5–)6–13(–15) µm; conidiogenous loci and hila (1.5–)2–3.5(–4.5) µm diam.; on *Agoseris* ..... (1) ***C. agoseridis***

2* Conidiophores shorter and narrower, 8–54 × (2.5–)3.5–6(–7) µm, 0–1(–2)-septate; conidia shorter and narrower, (6.5–)12–26(–31) × 4–7(–8) µm; conidiogenous loci and hila narrower, 1–2.5 µm diam.; on *Tragopogon* ..... (49) ***C. praecox***

3 Conidiophores solitary to often fasciculate, arising from small stromata or creeping hyphae, 10–120 µm long; conidia 2.5–6 µm wide; on *Gynoxys* ..... (30) ***C. inopinum***

3* Conidiophores solitary or in loose to dense groups, but non-fasciculate, arising from pluriseptate, external, creeping hyphae or stromatic hyphal aggregations, much shorter, 5–50 µm long; conidia wider, (3–)5–8 µm; on *Artemisia* ..... (41) ***C. obtectum***

Berberidaceae

Berberis ..... (62) ***C. ushuwaiense***

Betulaceae

Alnus ..... (2) ***C. alneum***

Bignoniaceae

1 Mycelium external; conidiophores solitary, arising from swollen hyphal cells or superficially growing creeping hyphae, 4–113(–190) µm long, often growing like and confusable with hyphae; conidia 3–23(–27) µm long; on *Heterophragma* ..... (27) ***C. heterophragmatis***

1* Mycelium internal, usually substomatal; conidiophores usually fasciculate, arising from stromata, emerging through stomata, shorter, 10–58 µm long, not growing like and not confusable with hyphae; conidia shorter, 4–18 µm long; on *Jacaranda* ..... (31) ***C. jacarandicola***

Boraginaceae

Heliotropium ..... (26) ***C. heliotropii***

Brassicaceae

Arabis ..... (59) ***C. subsclerotioideum***

Caesalpiniaceae

Cassia ..... (10) ***C. cassiae-surathensis***
Chamaecrista ..... (10) ***C. cassiae-surathensis***

Capparidaceae

1 Mycelium internal; stromata intraepidermal; conidiophores cylindrical-oblong, unbranched, rarely branched, 35–130 × 4.5–7(–9) µm; conidia polymorphous, 4–40 × 4.5–8 µm, 0–6(–8)-septate; conidiogenous loci and hila 1–2.5 µm diam.; on *Boscia* ..... (9) ***C. bosciae***

1* Mycelium at first internal, later also external; stromata lacking; conidiophores filiform, unbranched or branched, sometimes slightly furcate, shorter and narrower, 8–70(–90) × 2.5–5(–6) µm; conidia shorter and narrower, 2–14(–16) × 2–4.5 µm, 0–3-septate; conidiogenous loci and hila narrower, 0.5–1.5(–2) µm diam.; on *Capparis* ..... (32) ***C. lineolatum***

Cucurbitaceae

Citrullus ..... (16) ***C. cucumerinum***
Coccinia ..... (16) ***C. cucumerinum***
Cucumis ..... (16) ***C. cucumerinum***
Cucurbita ..... (16) ***C. cucumerinum***
Lagenaria ..... (16) ***C. cucumerinum***
Luffa ..... (16) ***C. cucumerinum***
Momordica ..... (16) ***C. cucumerinum***
Sechium ..... (16) ***C. cucumerinum***

Cycadaceae

Cycas ..... (5) ***C. apicale***

Dracaenaceae

Cordyline ..... (18) ***C. dracaenatum***
Dracaena ..... (18) ***C. dracaenatum***

Ericaceae

Rhododendron ..... (52) ***C. rhododendri***

Euphorbiaceae

Manihot ..... (40) ***C. nigrelloides***

Fabaceae

1 Conidiophores solitary or mostly loosely fasciculate, relatively short, 20–80 µm long; conidiogenous cells terminal, with only few conidiogenous loci; conidia 0–3-septate; on *Lupinus* ..... (34) ***C. lupiniphilum***

1* Conidiophores solitary or in small loose groups, but non-fasciculate, longer, up to 130 µm; conidiogenous cells terminal and intercalary, with often numerous conidiogenous loci; conidia 0–1(–2)-septate **2**

2 Conidiophores 3–7(–8) µm wide; conidiogenous loci and hila 0.5–2 µm diam., conidia 3–22(–29) × 2–6 µm, small conidia subglobose or obovoid; on *Vigna* ..... (64) ***C. vignae***

2* Conidiophores somewhat narrower, 3–6 µm wide; conidiogenous loci and hila somewhat wider, 1–3 µm diam.; conidia usually somewhat longer and wider, 5–30 × 3.5–7 µm; on *Psoralea* ..... (50) ***C. psoraleae***

Fagaceae

Quercus ..... (21) ***C. fumagineum***

Flacourtiaceae

Oncoba ..... (42) ***C. oncobae***

Gentianaceae

Gentiana ..... (24) ***C. gentianae***

Lauraceae

Ocotea ..... (45) ***C. oreodaphnes***

Magnoliaceae

Liriodendron ..... (33) ***C. liriodendri***

Myrtaceae

Corymbia ..... (38) ***C. myrtacearum***

Nyctaginaceae

Bougainvillea ..... (6) ***C. arthrinioides***

Oleaceae

1 Conidiophores dimorphic; conidiogenous cells with numerous subdenticulate, often crowded conidiogenous loci, apex appearing somewhat rugose (periconiella-like); conidia 2.5–18 × 2–5(–6.5) µm; on *Syringa* ..... (60) ***C. syringicola***

1* Conidiophores non-dimorphic; conidiogenous cells with a single to several conidiogenous loci, not crowded, apex not periconiella-like; conidia longer, 2.5–31 × 2–6 µm; on *Fraxinus* ..... (20) ***C. fraxinicola***

Orchidaceae

1 Conidiophores characteristically branched, right-angled; on *Epidendrum* ..... (51) ***C. rectangulare***

1* Conidiophores unbranched, rarely sparingly branched, but not right-angled **2**

2 Conidiophores loosely to densely fasciculate, rarely solitary, usually emerging through stomata **3**

2* Conidiophores solitary, rarely in small groups, not emerging through stomata; on *Stanhopea* ..... (58) ***C. stanhopeae***

3 Conidiophores 50–175 µm long, pluriseptate, often enteroblastically proliferating, often nodulose with small intercalary swellings; conidiogenous cells terminal and intercalary, with numerous, crowded conidiogenous loci; conidia subglobose, broadly ovoid, ellipsoid to somewhat irregular, smooth to minutely verruculose, loci and hila 0.5–1.5 µm wide; on *Cypripedium* ..... (44) ***C. orchidiphilum***

3* Conidiophores shorter, 20–75 µm long, 0–3-septate, not enteroblastically proliferating, without swellings; conidiogenous cells terminal, only few conidiogenous loci, not crowded; conidia obovoid, ellipsoid to subcylindrical, usually verruculose, loci and hila wider, (1–)1.5–2.5 µm diam.; on *Oncidium* ..... (43) ***C. orchidearum***

Passifloraceae

Passiflora ..... (35) ***C. maracuja***

Phytolaccaceae

Rivina ..... (53) ***C. rivinae***

Piperaceae

Piper ..... (47) ***C. pipericola***

Poaceae

1 Conidiophores in usually fairly large, dense fascicles, sometimes in palisade-like layers, arising from stromata, 40–120 × 5–9 µm; conidia solitary, 20–40 × 7–13(–15) µm, 0–1-septate, septa not distinctly darkened; conidiogenous loci and hila 3–5 µm diam.; on *Alopecurus* ..... (3) ***C. alopecuri***

1* Conidiophores solitary, non-fasciculate, arising from internal and external creeping hyphae, shorter and narrower, 5–90 × 3–5(–6) µm; conidia catenate, in unbranched or branched chains, narrower, 3–41(–60) × 3.5–5.5(–7) µm, 0–4(–7)-septate, septa often distinctly darkened; conidiogenous loci and hila narrower, 0.5–1.5(–2) µm diam.; on *Cenchrus* ..... (57) ***C. spongiosum***

Primulaceae

Soldanella ..... (56) ***C. soldanellae***

Ranunculaceae

Ranunculus ..... (25) ***C. grech-delicatae***

Rosaceae

1 Conidiophores dimorphic; conidia 3.5–14(–20) × 2.5–6 µm, 0–1(–2)-septate; conidiogenous loci and hila 0.5–2 µm diam.; on *Eriobotrya* ..... (22) ***C. fusicladiiformis***

1* Conidiophores not dimorphic; conidia longer and somewhat wider, (2–)3–45 × 2–8 µm, more frequently septate, 0–6-septate; conidiogenous loci and hila somewhat wider, 1–2.5(–3) µm diam.; on *Photinia* ..... (17) ***C. diaphanum***

Rubiaceae

Galium ..... (23) ***C. galii***

Rutaceae

1 Conidiophores 10–40 µm long, 0–1(–2)-septate; conidiogenous cells terminal or conidiophores often reduced to conidiogenous cells; conidia 0–1-septate; conidiogenous loci and hila 1.5–2.5 µm diam.; on *Ruta* ..... (54) ***C. rutae***

1* Conidiophores longer, 15–70 µm long, 0–5-septate; conidiogenous cells terminal or intercalary; conidia 0–2(–3)-septate; conidiogenous loci and hila narrower, 0.5–1.5(–2) µm diam.; on *Citrus* ..... (15) ***C. corrugatum***

Salicaceae

1 Conidiophores unbranched or apically branched, not or only sporadically somewhat geniculate-sinuous, 50–175 × (4–)5–8(–11) µm; on *Populus* ..... (48) ***C. populicola***

1* Conidiophores mostly unbranched, strongly and frequently geniculate-sinuous, shorter and narrower, 15–100 × 2–5(–7) µm; on *Salix* ..... (37) ***C. minusculum***

Sapotaceae

Chrysophyllum ..... (13) ***C. chrysophylli***

Scrophulariaceae

Mimulus ..... (36) ***C. mimulicola***

Smilacaceae

Smilax ..... (55) ***C. smilacicola***

Styracaceae

Styrax ..... (29) ***C. inconspicuum***

Trilliaceae

Trillium ..... (61) ***C. trillii***

Ulmaceae

Ulmus

1 Conidiophores 58–325 × 3.5–9(–11) µm; ramoconidia s. str. up to 60 µm long, 0–3(–5)-septate; conidia polymorphous, 2–32 × 2–7 µm, 0–2-septate; conidiogenous loci and hila 0.5–3 µm diam.; on *U. laevis* ..... (46) ***C. phyllogenum***

1* Conidiophores much shorter and narrower, 10–80(–100) × (2–)2.5–4(–5) µm; ramoconidia s. str. absent; conidia shorter and narrower, 4–17(–19) × 2–5 µm, 0–1(–3)-septate; conidiogenous loci and hila narrower, 0.5–1.5 µm; on *U. minor* ... (28) ***C. hypophyllum***

Xyridaceae

Xyris ..... (65) ***C. xyridis***

8. List of species

The present work provides a comprehensive treatment of biotrophic, foliicolous species of the genus *Cladosporium*. *Cladosporium* species formerly referred to the genus *Heterosporium* have not been included since they have been described in detail by DAVID (1997). Furthermore, the species complex of *Cladosporium fumago* Link with its numerous varieties and formae has also not been included. These taxa usually do not induce distinct leaf spots, grow on the surface of green leaves and form black mould-like communities of several hyphomycetes. They will be treated elsewhere. Common saprobic species, which often occur as secondary invaders on necrotic leaf spots caused by other fungi, species of uncertain taxonomic position and excluded species are separately listed. Names are arranged in alphabetic order. All species are comprehensively described and illustrated. Drawings (1: 100) are, if not otherwise stated, based on type material or other authentic collections. The scale bars represent 10 µm. The treatments of the particular species contain the scientific names with bibliographic references, synonyms, type collections, literature references, published illustrations, exsiccatae, comprehensive descriptions, host range and geographic distribution, additional collections examined and notes. For newly described species, which are, however, not validly published within this work, Latin diagnoses are provided. Author abbreviations conform to those of BRUMMIT & POWELL (1992), while journal abbreviations follow LAWRENCE et al. (1968) and BRIDSON & SMITH (1991). Herbarium names have been abbreviated according to HOLMGREN et al. (1990). The host and distribution data indicate the known distributions and hosts obtained from checklists, herbarium specimens, databases and other sources compiled for different countries. Names of particular countries are not abbreviated, whereas the particular states of the USA and the provinces and territories of Canada are abbreviated and follow FARR et al. (1989) and GINNS (1986), respectively. Host names have been checked as far as possible and conform to 'Flora Europaea' and 'Kew index'. Under 'additional collections examined' all specimens seen are cited, arranged in alphabetical order. The recently published checklist (DUGAN et al. 2004) served as source for the compilation of the taxa treated in this monograph. All novelties, changes and new results from recently published papers dealing with the taxonomy of *Cladosporium* s. lat., unpublished data or those just introduced in this thesis, have been added to the manuscript of the checklist marked in colour and by underlining. A CD with the latest updated version is attached.

8.1. *Abbreviations*

General: art. = article, comb. nov. = new combination, diam. = diameter, f. = forma, fig. = figure, herb. = herbarium, ill. = illustration, incl. = inclusive, l.c. = locus citatus, lit. = literature, reference, nom. illeg. = nomen illegitimum (illegitimate name), nom. inval. = nomen invalidum (invalid name), nom. nov. = nomen novum (new name), nom. nud. = nomen nudum (name without any description or diagnosis), nom. superfl. = nomen superfluum (superfluous name), pl. = plate, s. lat. = sensu lato (in a wide sense), s. str. = sensu stricto (in a narrow sense), SEM = scanning electron microscopy, sp. nov. = species novum (new species), spp. = species, ssp. = subspecies, stat. nov. = new status, syn. nov. = new synonym, TEM = transmission electron microscopy, var. = variety.

USA: AL = Alabama, AK = Alaska, CA = California, CO = Colorado, CT = Connecticut, FL = Florida, GA = Georgia, IA = Iowa, ID = Idaho, IL = Illinois, IN = Indiana, KS = Kansas, LA = Louisiana, MA = Massachusetts, MD = Maryland, ME = Maine, MI = Michigan, MN = Minnesota, MO = Missouri, MS = Mississippi, MT = Montana, NC = North Carolina, NE = Nebraska, NH = New Hampshire, NJ = New Jersey, NY = New

York, OH = Ohio, OK = Oklahoma, OR = Oregon, PA = Pennsylvania, SC = South Carolina, SD = South Dakota, TX = Texas, UT = Utah, VT = Vermont, WA = Washington, WI = Wisconsin, WV = West Virginia, WY = Wyoming.

Canada: Alta. = Alberta, BC. = British Columbia, Labr. = Labrador, Man. = Manitoba, NB. = New Brunswick, Nfld. = Newfoundland, NS. = Nova Scotia, NWT. = Northwest Territories, Ont. = Ontario, PEI = Prince Edward Island, Que. = Quebec, Sask. = Saskatchewan.

India: M.P. = Madhya Pradesh, U.P. = Uttar Pradesh.

Exsiccata:
Barthol., F. columb. = Bartholomew, Fungi columbiani.
Braun, F. sel. exs. = U. Braun, Fungi selecti exsiccati.
Briosi & Cav., F. paras. = Briosi & Cavara, I funghi parassiti delle piante coltivate od utili, essicati, delineati e descritti.
Cav. & Poll., F. paras. = Cavara & Pollacci, I funghi parassiti delle piante coltivate od utili, essicati, delineati e descritti.
Cif., Mycofl. Domin. exs. = Ciferri, Mycoflora Domingensis exsiccata.
Cooke, F. brit. exs. = Cooke, Fungi britannici exsiccati.
Ellis or Ellis & Everh., N. Am. F. = Ellis or Ellis & Everhardt, North American Fungi.
Erb. Critt. Ital. = Erbario Crittogamico Italiano.
Erikss., F. paras. scand. = Eriksson, Fungi parasitici scandinavici exsiccati.
Fl. Ludov. = Flora Ludoviciana.
Fuckel, F. rhen. = Fuckel, Fungi rhenani.
Herb. Mycol. Rom. = Herbarium Mycologicum Romanicum.
Kab. & Bub., F. imp. exs. = Kabát & Bubák, Fungi imperfecti exsiccati.
Klotzsch, Herb. viv. myc. = Klotzsch, Herbarium vivum mycologicum.
Krieger, F. sax. = Krieger, Fungi saxonici.
Krypt. exs. = Kryptogamae exsiccatae.
Petr., Fl. Bohem. Morav. exs. = Petrak, Flora Bohemica et Moravica exsiccata.
Rabenh., F. eur. = Rabenhorst, Fungi europaei exsiccati (also Rabenhorst & Winter, F. eur. or Rabenhorst, Winter & Pazschke, Fungi eur. et extraeur.).
Rav., F. amer. exs. = Ravenel, Fungi americanici exsiccati.
Reliqu. Petrak. = Reliquiae Petrakianae.
Roum., F. sel. gall. exs. = Roumeguère, Fungi selecti gallici exsiccati.
Sacc., Mycoth. ital. = Saccardo, Mycotheca italica.
Sacc., Mycoth. Ven. = Saccardo, Mycotheca Veneta.
Smarods, F. latv. exs. = Smarods, Fungi latvici exsiccati.
Syd., F. exot. exs. = H. Sydow, Fungi exotici exsiccati.
Syd., Mycoth. germ. = H. Sydow & P. Sydow, Mycotheca germanica.
Syd., Mycoth. march. = P. Sydow, Mycotheca marchica.
Thüm., Herb. mycol. oec. = de Thümen, Herbarium mycologicum oeconomicum.
Thüm., Mycoth. univ. = de Thümen, Mycotheca universalis.
Unio itin. crypt. = Unio itineria cryptogamae.

8.2. *Annotated alphabetical list of the foliicolous Cladosporium species*

(1) *Cladosporium agoseridis* U. Braun & Rogerson

Fig. 3; Pl. 1, Figs A–G

Cladosporium agoseridis U. Braun & Rogerson, Sydowia 47(2): 142 (1995).

Holotype: on living leaves of *Agoseris glauca* (Asteraceae), USA, Utah, Washington Co., northwest side of Pine Valley Mountain, northeast of Diamond Valley, vicinity of Mud Spring, 7 Jun. 1994, C.T. Rogerson (NY).
Isotype: HAL 1556 F.
Ill.: BRAUN & ROGERSON (1995: 143, Fig. 1).

Leaf spots amphigenous, subcircular or somewhat irregular, 1–8 mm diam. or confluent and larger, greyish brown, often somewhat zonate, surrounded by a narrow, darker margin or marginal line, necrotic. *Colonies* amphigenous, punctiform to subeffuse, brown, somewhat velvety. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 3–13 µm wide, septate, often with swellings and constrictions, pale to medium olivaceous-brown, smooth, walls thickened, forming small to moderately large aggregations of inflated hyphal cells, 25–100 µm wide, flattened, only few layers deep, cells subglobose to cylindrical-oblong, 5–15 µm wide, medium olivaceous-brown, smooth, thick-walled. *Conidiophores* solitary, in small loose groups or often loosely fasciculate, arising from internal hyphae or hyphal aggregations, erumpent through the cuticle, straight and subcylindrical to somewhat flexuous, geniculate-sinuous, unbranched, occasionally once branched, 20–90(–110) × (3–)4–10(–13) µm, 0–4-septate, often somewhat constricted at the basal septum, often wider and somewhat swollen or inflated at the base, up to 15 µm wide, and attenuated towards the apex, pale yellowish, pale to medium olivaceous-brown or brown, smooth, walls somewhat thickened, cells sometimes with distinct, clearly delineated lumen. *Conidiogenous cells* integrated, terminal and sometimes intercalary, cylindrical, 14–55 µm long, often somewhat geniculate, usually with a single or up to three, rarely four conidiogenous loci, conspicuous, protuberant, obconically truncate to slightly convex, 2–3.5(–4.5) µm diam., dome and surrounding rim relatively flat, dome not higher than the surrounding rim, somewhat thickened, darkened-refractive. *Conidia* catenate, usually in unbranched chains, occasionally in branched chains, broadly subglobose, obovoid, ellipsoid-ovoid, subcylindrical or somewhat clavate, (10–)12–40 (–50) × (5–)6–13(–15) µm, 0–1(–3)-septate, pale yellowish, olivaceous to brown, loosely to densely verruculose or verrucose, sometimes almost smooth, walls somewhat thickened, lumen sometimes distinct, clearly separated from the inner wall, apex rounded or slightly attenuated, hila obconically truncate to slightly convex, conspicuous, (1.5–)2–3.5(–4.5) µm diam., somewhat thickened and darkened-refractive; conidia sometimes germinating but microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Agoseris* spp. (Asteraceae), North America – *Agoseris glauca* (USA, UT) (only known from the type collection).

Notes: This leaf-spotting fungus is well characterised by its often fasciculate, wide conidiophores, wide conidiogenous loci and hila and large, above all wide conidia. Conidia formed in branched chains as described by BRAUN & ROGERSON (1995) could not be observed. *Cladosporium praecox* and *C. inopinum* U. Braun, two other *Cladosporium* species occurring on hosts belonging to the Asteraceae, differ in forming indistinct leaf spots or only discolorations and in having narrower conidiophores [3–7 µm in *C. inopinum*; (2.5–)3.5–6(–7) µm in *C. praecox*], narrower conidia [2.5–6 µm in *C. inopinum*; 4–7(–8) µm in *C. praecox*] and narrower conidiogenous loci and hila [(1–)1.5–2.5 µm in *C. praecox*]. SHAW (1973) recorded *Cladosporium* sp. on *Agoseris glauca* from Washington, which probably refers to this species.

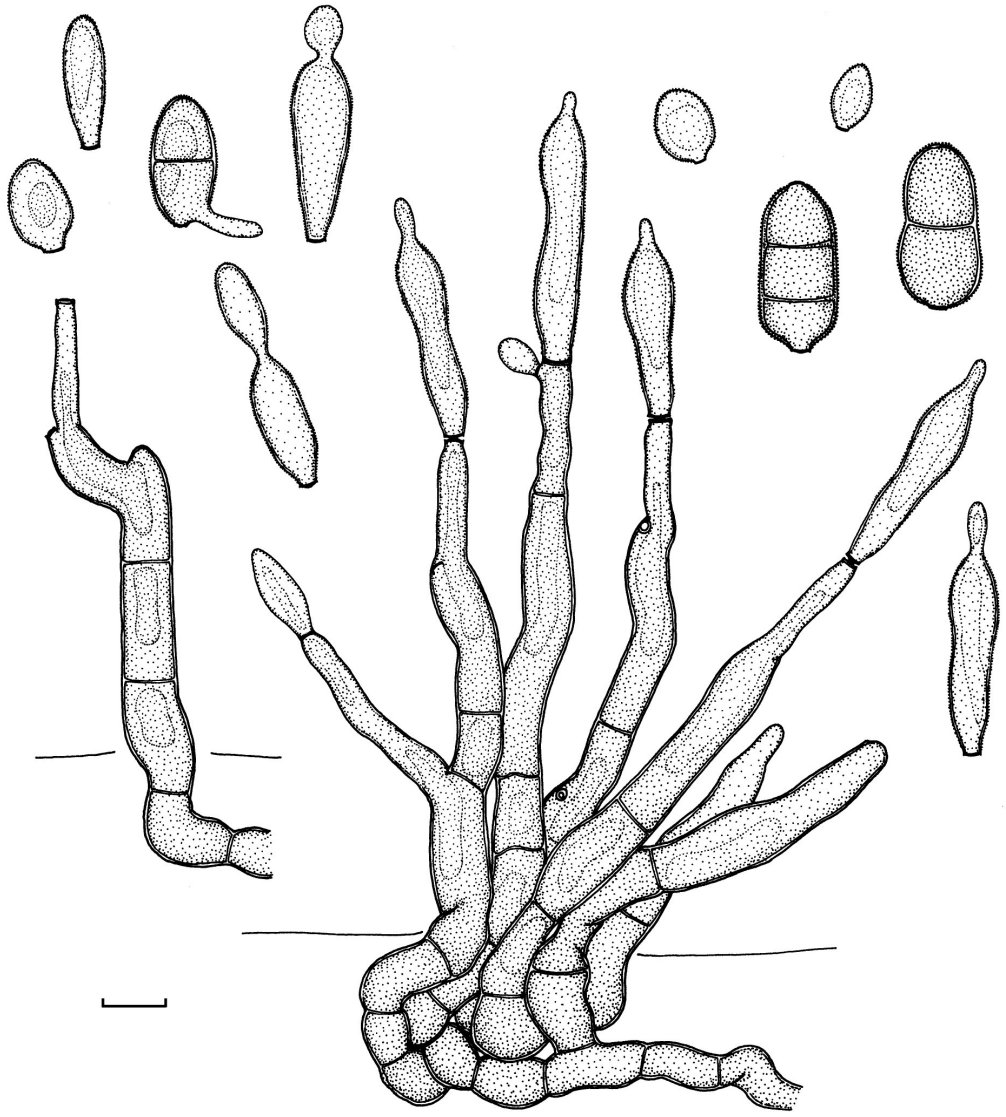

Fig. 3: *Cladosporium agoseridis*. Fascicle of conidiophores and conidia (from isotype HAL 1556 F). Bar = 10 µm.

(2) *Cladosporium alneum* Pass. ex K. Schub.

Fig. 4; Pl. 2, Figs A–C

Cladosporium alneum Pass. ex K. Schub., **sp. nov.**
≡ *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; et a *C. oncobae* conidiophoris crassitunicatis, parietibus 0.5–1 µm latis.

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 intra-epidermal, 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, 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, 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.

Host(s)/substrate(s) & distribution: on *Alnus* spp. (Betulaceae), Europe – *Alnus glutinosa* (Italy) (only known from the type collection).

Notes: In the type collection some verruculose conidia of *C. herbarum* are intermixed. *Cladosporium alnicola* Bubák & Vleugel and *C. alnicola* Corda recorded on *Alnus* spp. proved to be synonymous with *C. herbarum*. *C. bacilligerum* Mont. & Fr. described from France on *Alnus glutinosa* is excluded from *Cladosporium* s. str. and belongs to the genus *Passalora*. *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 *Fusicladium* (SCHUBERT et al. 2003; SCHUBERT 2005).
Cladosporium alneum is morphologically comparable with *C. cladosporioides*, *C. rivinae* Speg. and *C. populicola*. 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. *C. oncobae*, collected by Frank Hill on *Oncoba* leaves in New Zealand is also very close to *C. alneum* and morphologically barely distinguishable. Conidiophores and conidia of the latter species are very similar, but the symptoms and the thickness of the wall of the conidiophores deviate [(0.5–)1–2 µm wide in *C. oncobae* versus 0.5–1 µm wide in *C. alneum*]. Since both species form conspicuous leaf spots and since they are ecologically,

geographically and in some respects also morphologically distinct, they are treated as two separate species (see chapter 4.2. Species concept).

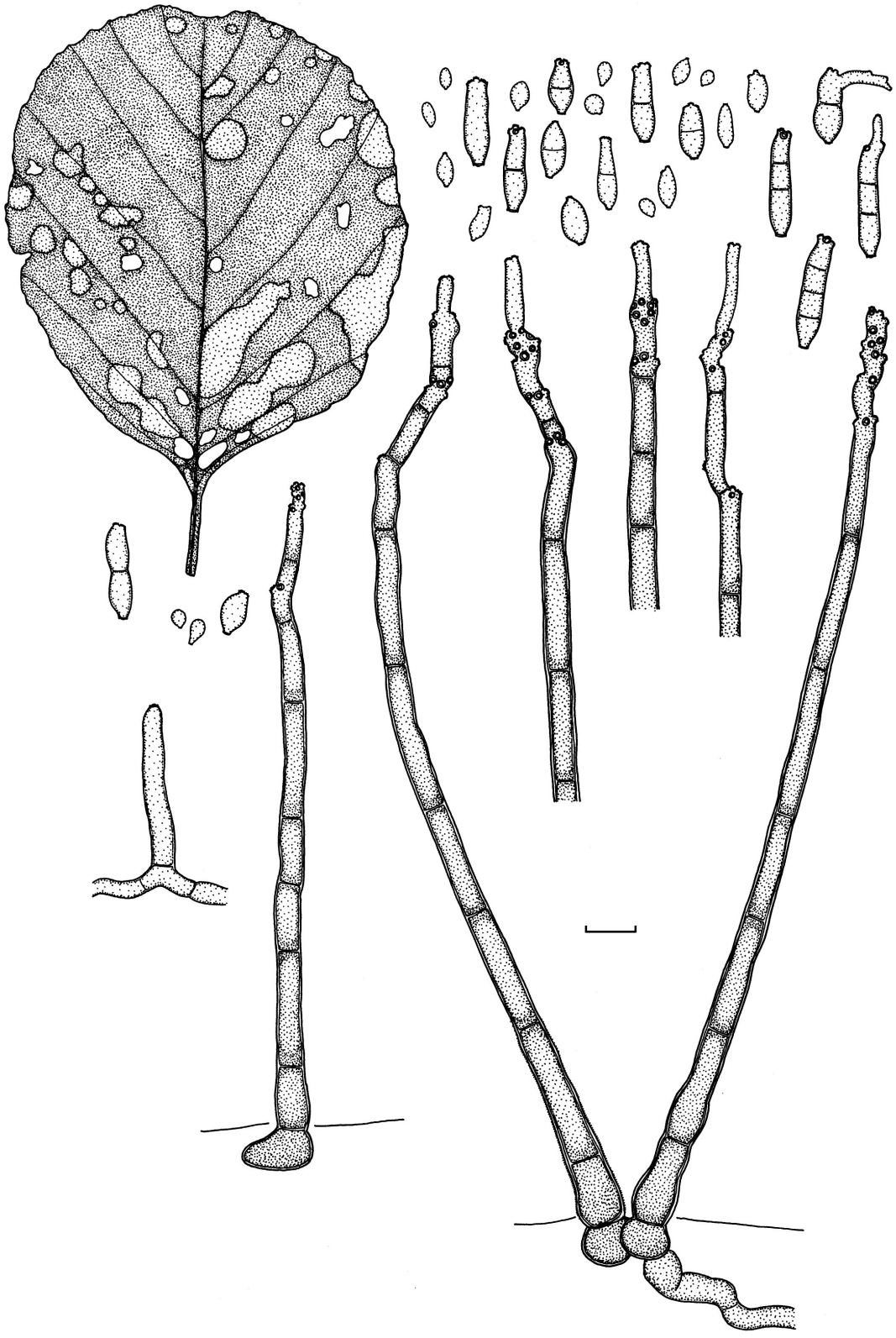

Fig. 4: *Cladosporium alneum*. Symptoms, conidiophores and conidia. Bar = 10 µm.

(3) *Cladosporium alopecuri* (Ellis & Everh.) U. Braun

Fig. 5

Cladosporium alopecuri (Ellis & Everh.) U. Braun, Schlechtendalia 5: 32 (2000).
≡ *Fusicladium alopecuri* Ellis & Everh., J. Mycol. 4: 53 (1888).

Holotype: on *Alopecurus geniculatus* (Poaceae), USA, Montana, Columbia Falls, 20 May 1887, B.T. Galloway (NY).
Ill.: BRAUN (2000: 33, Fig. 2).

On faded host plants, definite leaf spots lacking, but with yellowish-ochraceous to brownish, later greyish brown discolorations. *Colonies* amphigenous, punctiform, scattered to dense, brown to blackish brown, later dark greyish brown. *Mycelium* internal, immersed, forming moderately large stromata, olivaceous to olivaceous-brown, occasionally confluent. *Conidiophores* in well-developed, usually fairly large, dense fascicles, sometimes in palisade-like layers, arising from stromata, erumpent, erect, straight, subcylindrical to slightly geniculate-sinuous, unbranched, 40–120 × 5–9 µm, 0–1-septate, subhyaline, pale olivaceous to yellowish or olivaceous-brown, smooth, thin-walled, conidiophores usually reduced to conidiogenous cells, mostly with a single or only two conidiogenous loci, conspicuous, 3.5–5 µm diam., thickened, darkened. *Conidia* solitary, obovoid, ellipsoid-ovoid, short cylindrical, 20–40 × 7–13(–15) µm, 0–1-septate, subhyaline, pale olivaceous-yellowish to pale brown, densely finely asperulate-echinulate, apex obtuse, broadly rounded, base obconically truncate, hila protuberant, 3–5 µm diam., periclinal rim only slightly raised, often not very conspicuous, thickened, darkened.

Host(s)/substrate(s) & distribution: on *Alopecurus* spp. (Poaceae), North America – *Alopecurus geniculatus* (USA, MO) (only known from the type collection).

Notes: During the course of monographic studies within the genus *Fusicladium*, type material of *Fusicladium alopecuri* was re-examined by U. Braun, proved to be heterosporium-like with typical cladosporioid conidiogenous loci and hila, and was therefore assigned to *Cladosporium* s. str. (BRAUN 2000). It is distinguished from the closely allied *C. phlei* (C.T. Greg.) G.A. de Vries by forming densely fasciculate conidiophores, larger stromata, 0–1-septate conidia and wider conidiogenous loci and hila. ZHANG et al. (2003) recorded this species on *Alopecurus geniculatus*, *A. aequalis* and *Polypogon higegaweri* from China, and reduced *Fusicladium alopecuri* Sawada (nom. inval.), introduced without Latin diagnosis, to synonymy with *F. alopecuri* Ellis & Everh., which could not be confirmed since type material of *F. alopecuri* Sawada could not be traced and the Chinese collections were not available for a re-examination.

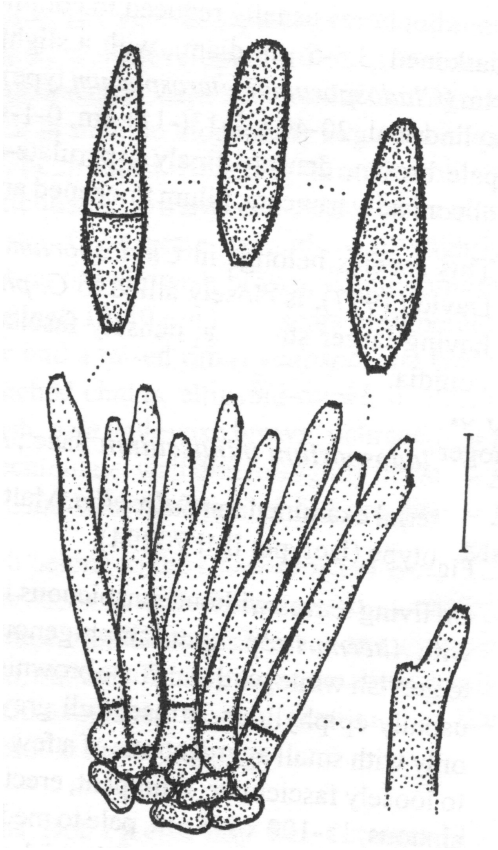

Fig. 5: *Cladosporium alopecuri*. Conidiophores and conidia (from BRAUN 2000). Bar = 20 µm.

(4) *Cladosporium annonae* Nann.

Fig. 6; Pl. 2, Figs D–F

Cladosporium annonae Nann. (‘*anonae*’), Atti Reale Accad. Fisiocrit. Siena, Ser. 10, 4(1–2): 91 (1929).

Holotype: on living leaves of *Annona* sp. (Annonaceae), Italy, Siena, botanical garden, Aug. 1928, mixed infection with *C. herbarum* as secondary invader (SIENA).
Lit.: SACCARDO (1972: 1336).

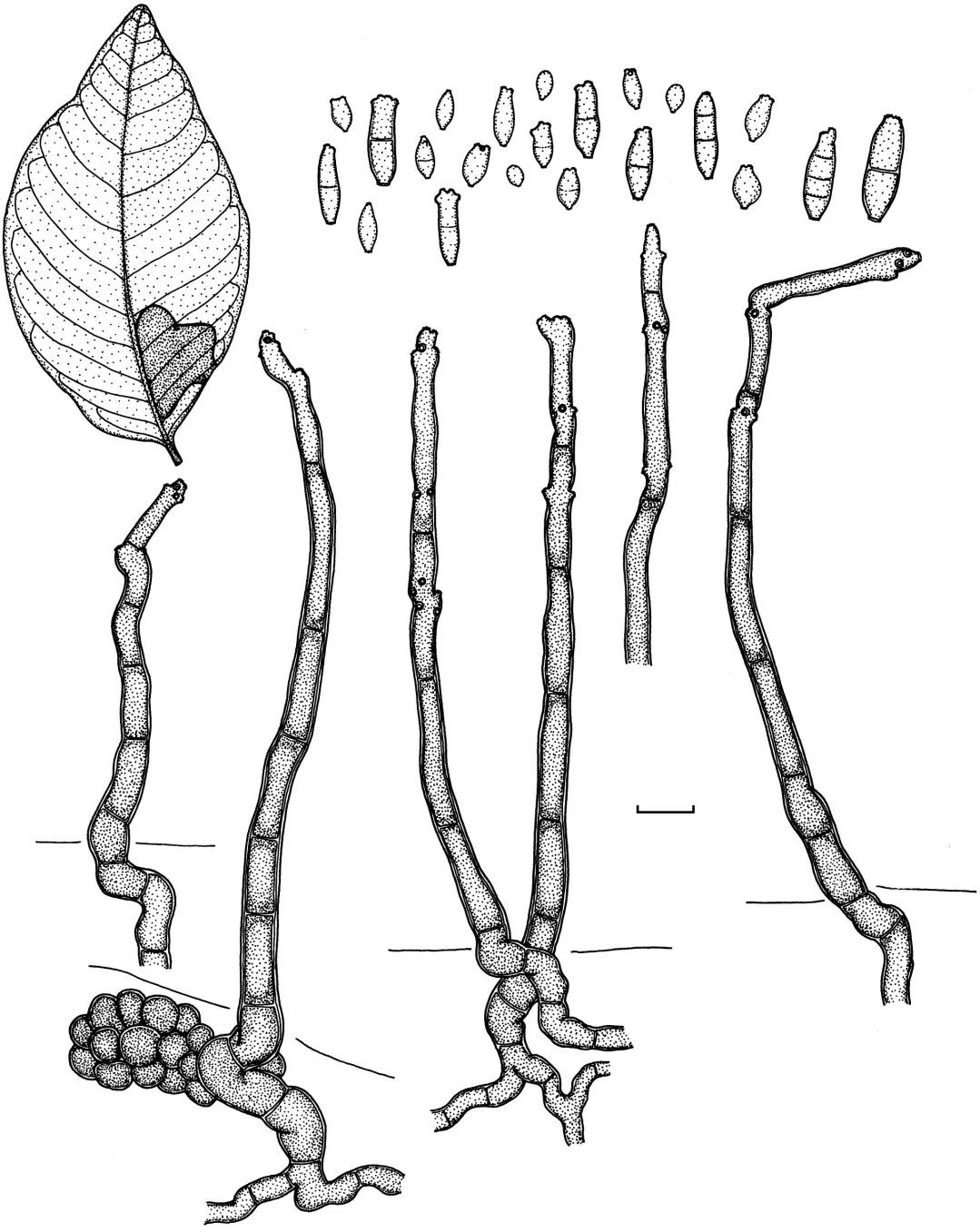

Fig. 6: *Cladosporium annonae*. Symptoms, conidiophores and conidia. Bar = 10 µm.

Leaf spots amphigenous, irregular in shape and size, often near to or limited by the midrib, pale to medium brown, mostly surrounded by a narrow, more or less irregular, medium to

dark brown margin, paler below, becoming fragile with age, surrounding leaf tissue often somewhat discoloured, yellowish to olivaceous. *Colonies* epiphyllous, loosely scattered, caespitose, brown. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 2.5–7 µm wide, septate, with swellings and constrictions, single hyphal cells up to 12 µm wide, pale to medium olivaceous-brown, smooth, walls thickened, forming a loose to somewhat denser hyphal network, sometimes aggregated. *Stromata* mostly absent, sometimes developed, 10–35 µm diam., composed of swollen hyphal cells, subglobose, 5–8 µm diam., medium dark olivaceous-brown to brown, smooth, thick-walled, walls up to 1 µm wide. *Conidiophores* mostly solitary or in small loose groups, arising from internal hyphae, swollen hyphal cells or stromata, erumpent through the cuticle, erect, straight to somewhat flexuous, cylindrical-oblong, usually without swellings, unbranched, 45–150 (–300) × (3.5–)4–7 µm, septate, not constricted at the septa, medium olivaceous-brown or brown, often somewhat paler at the apex, smooth, walls thickened, mostly distinctly two-layered, up to 1 µm wide, often wider or swollen at the base, 7–11 µm, protoplasm of the cells somewhat aggregated at the septa, so that the walls and septa appear to be thickened (as in distoseptation). *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, 7–43 µm long, proliferation sympodial, with several conidiogenous loci, sometimes situated on small shoulders, protuberant, almost flat to short cylindrical, 1–2(–2.5) µm diam., thickened, refractive, sometimes slightly darkened. *Conidia* mostly in branched chains, straight, subglobose, obovoid, ellipsoid, sometimes subcylindrical, 3–15(–19) × (2–)3–4.5(–6) µm, 0–1(–3)-septate, not constricted at the septa, at first subhyaline, later pale olivaceous-brown, smooth, walls somewhat thickened, apex rounded or attenuated towards the apex and base, hila protuberant, (0.5–)1–2(–2.5) µm diam., thickened, refractive to somewhat darkened; sporadically microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Annona* (Annonaceae), Europe – *Annona* sp. (Italy) (only known from the type collection).

Notes: NANNIZZI (1929) described much longer conidiophores (240–300 µm), which could not be observed during the course of the re-examination of the type material. *C. annonae* is the only *Cladosporium* species described on a host belonging to the Annonaceae (DUGAN et al. 2004). Among leaf-spotting *Cladosporium* species on hosts of other plant families, *C. annonae* is comparable with *C. populicola* and *C. alneum*. The latter species differs from *C. annonae* in having longer and usually somewhat wider conidia, 3–23 × 2.5–6 µm, and conidiophores arising from swollen hyphal cells as well as internal and external creeping hyphae. The conidiophores of *C. populicola*, often with a distinct lumen which is clearly separated from the inner wall, are sometimes apically branched, possess thicker walls, (0.5–)1–2 µm wide, and often proliferate enteroblastically. This phenomenon is visible as a discontinuity in pigmentation and in thickness of the wall.

(5) *Cladosporium apicale* Berk. & Broome

Fig. 7; Pl. 3, Figs A–H

Cladosporium apicale Berk. & Broome, J. Linn. Soc., Bot. 14: 99, 1873 (1875).

Type: on leaves of *Cycas circinalis* (Cycadaceae), Ceylon (Sri Lanka), Peradeniya, Jan. 1868, G.H.K. Thwaites (K 121544).
Lit.: SACCARDO (1886: 367), ELLIS (1976: 332).
Ill.: ELLIS (1976: 334, Fig. 252 A).

On leaves, hypophyllous as greyish to blackish patches or discolorations, irregular in shape, usually extended, covering large areas of the leaf surface, stretching halfway or right across the leaves. *Colonies* hypophyllous, scattered, in small tufts or very loosely caespitose, erect to decumbent, dark brown or almost blackish, villose. *Mycelium* internal,

later also external growing superficially, creeping; hyphae sparingly branched, 1.5–5 µm wide, septate, often slightly constricted at the septa, subhyaline to pale brown, smooth, walls slightly thickened. *Stromata* mostly substomatal, composed of more or less angular, polygonal cells, medium to dark brown, smooth, thick-walled. *Conidiophores* mostly loosely fasciculate, occasionally solitary, arising from stromata, emerging through stomata, more or less erect, straight or almost so, but somewhat flexuous towards the apex, cylindrical-oblong, subulate, somewhat geniculate-sinuous to subnodulose near the apex, unbranched or branched, at the base and, above all, at the apex, (23–)150–360 µm long or even longer, 6–11(–16) µm wide at the base, (2–)3–5.5 µm wide at the apex, pluriseptate, medium to usually dark brown or dark reddish brown, paler towards the apex, smooth or almost so to often obviously faintly asperulate, thick-walled, often distinctly two-layered, 0.75–3 µm wide, sometimes swollen at the base, protoplasm of the cells somewhat aggregated at the septa, so that the walls and, above all, septa appear to be thickened (as in distoseptation), occasionally enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, somewhat geniculate-sinuous and subnodulose, 6–23 µm long, proliferation sympodial, cicatrised, with numerous, small conidiogenous loci, conspicuously protuberant, subdenticulate, short cylindrical, often situated on small lateral shoulders or somewhat crowded, obconically truncate, 1–2 µm diam., dome often not higher than the surrounding rim, thickened, refractive to somewhat darkened. *Conidia* catenate, in branched chains, most of them very small, subglobose, obovoid, limoniform or ellipsoid, 2–11 × 2–4 µm, 0–1-septate, few conidia larger, ellipsoid, fusiform or subcylindrical, up to 22 µm long, 3–5(–6) µm wide, 1–3-septate, not constricted at the septa, pale olivaceous to pale or sometimes medium olivaceous-brown, smooth or almost so, walls somewhat thickened, with an unusual cell structure, in the centre of the cells paler, apparently hollow, surrounded by the somewhat darker protoplasm, apex rounded or with a single to numerous, small hila, slightly attenuated towards the base, base truncate or obconically truncate, hila protuberant, short cylindrical, 0.5–2 µm diam., dome and periclinal rim often not very conspicuous, thickened, refractive to somewhat darkened; occasionally microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Cycas* spp. (Cycadaceae), Asia – *Cycas circinalis* (Sri Lanka).

Notes: Under light microscopy, the cladosporioid structure of the conidiogenous loci and hila, differentiated in a distinct central dome and a periclinal rim, was not quite evident, but SEM examinations (Pl. 3, Fig. F) conclusively showed that *C. apicale* belongs to *Cladosporium* s. str. With its numerous, small, subglobose or obovoid conidia this species may be confused with the common cosmopolitan species *C. sphaerospermum* occurring on different substrates. However, the latter species is clearly distinguished from *C. apicale* by having mostly globose, but verrucose conidia, longer, smooth or verruculose ramoconidia and narrower conidiophores (ELLIS 1971). Type material of *Cladosporium cycadis* Marcolongo, reported from Italy on leaves of *Cycas revoluta* could not be traced, but the species was described to have narrower conidiophores, 4–5 µm wide, and aseptate, rarely 1-septate, smaller conidia, 7.8 × 2.4 µm (MARCOLONGO 1914).

DE & CHATTOPADHYAY (1994) recorded and illustrated *C. apicale* from West Bengal, India, on *Swietenia mahogoni* (Meliaceae) and ZHANG et al. (2003) listed *Allium fistulosum* and *Magnolia grandiflora* as hosts from China (Sichuan and Yunnan). The collections concerned were not available for a re-examination, but they seem to be very doubtful.

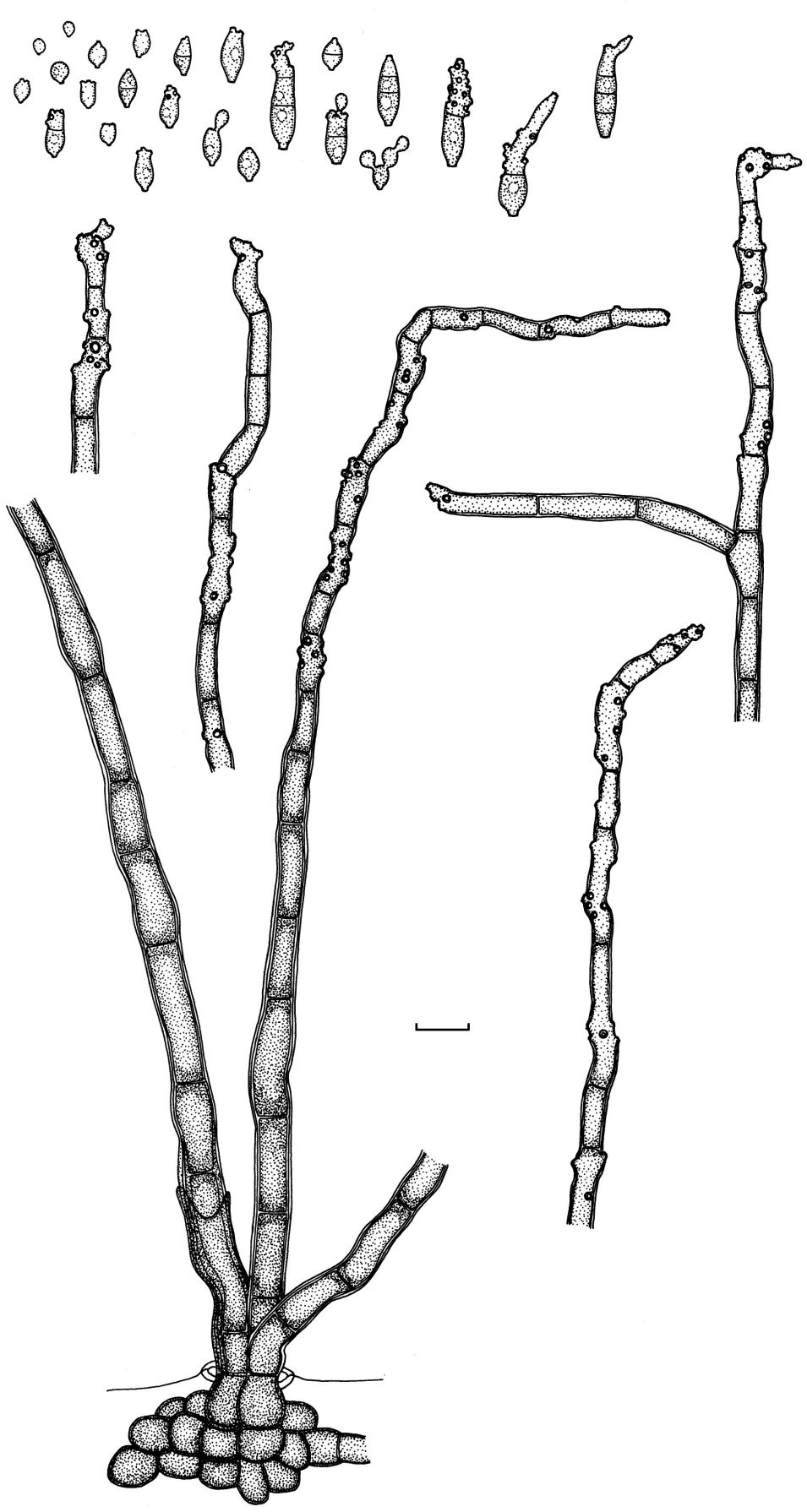

Fig. 7: *Cladosporium apicale*. Conidiophores and conidia. Bar = 10 µm.

(6) *Cladosporium arthrinioides* Thüm. & Beltr.

Fig. 8; Pl. 4, Figs A–E

Cladosporium arthrinioides Thüm. & Beltr., in Thümen, Nuovo Giorn. Bot. Ital. 8: 252 (1876).

Syntypes: on living and wilted leaves of *Bougainvillea spectabilis* (Nyctaginaceae), Italy, Sicily, Palermo, botanical garden, Mar. 1875, V. Beltrani-Pisani (M-57465), and Thüm., Mycoth. univ. 873 (BPI 426137; HAL; HBG; M-57466; MICH).
Lit.: SACCARDO (1886: 359), FERRARIS (1912).
Exs.: Thüm., Mycoth. univ. 873.

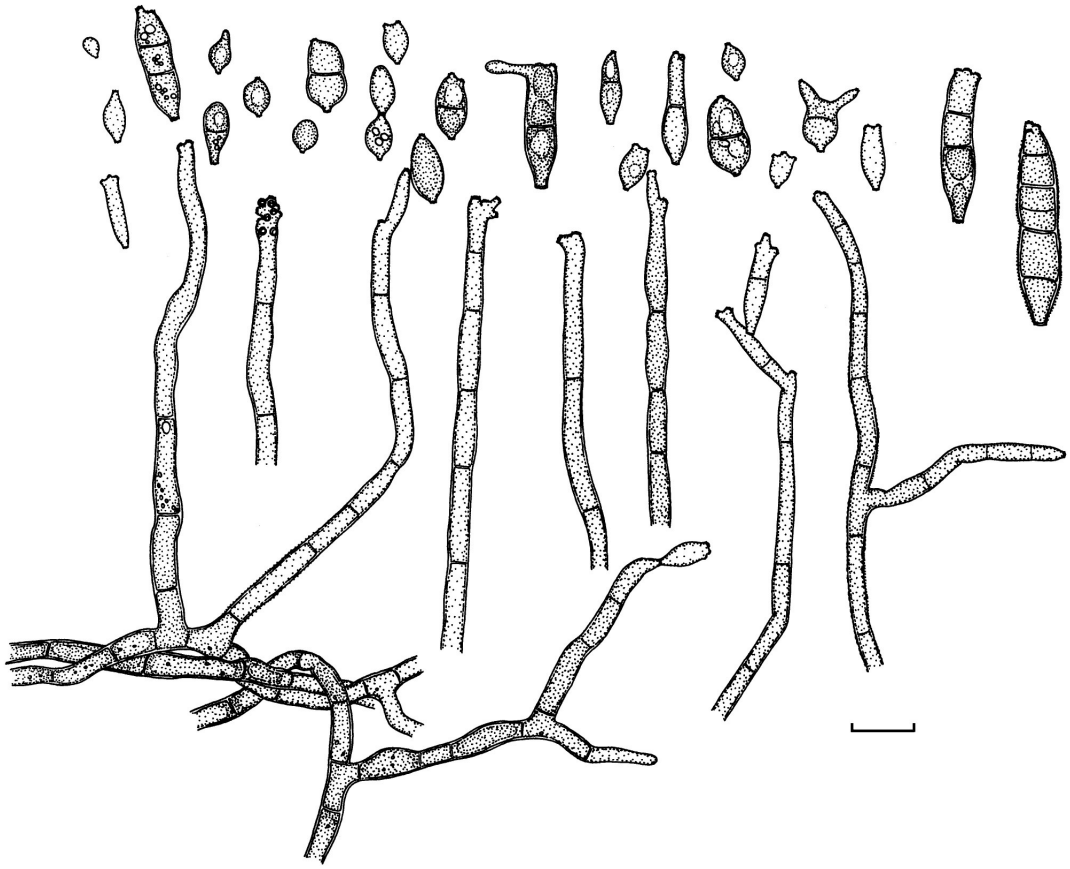

Fig. 8: *Cladosporium arthrinioides*. Conidiophores and conidia from syntype M-57466. Bar = 10 µm.

Leaf spots amphigenous, minute, at first punctiform, later subcircular, up to 3 mm diam., dark brown to almost blackish, often near or at leaf margin, without distinct margin, velvety, occasionally somewhat raised. *Colonies* amphigenous, scattered to subeffuse, loose to often dense, brown, villose or somewhat downy. *Mycelium* external, superficial; hyphae branched, 2–6 µm wide, septate, sometimes slightly constricted at the septa and somewhat swollen, up to 9 µm wide, subhyaline to pale or medium dirty olivaceous-brown, smooth or almost so to somewhat asperulate or irregularly rough-walled, walls thickened, protoplasm of the cells granular, sometimes distinct and clearly separated from the wall, with small oil droplets, sometimes aggregated at the septa, so that the walls and, above all, septa appear to be thickened (as in distoseptation), forming a more or less dense hyphal network. *Stromata* lacking. *Conidiophores* solitary, arising from superficially growing hyphae, terminal and lateral, often growing like and confusable with hyphae, erect, straight to flexuous, filiform, unbranched or once branched, non-nodulose, 25–200 ×

2–4 µm, pluriseptate, sometimes slightly attenuated at the septa, pale to medium dirty olivaceous-brown, smooth to somewhat asperulate or irregularly rough-walled, walls slightly thickened, sporadically with oil droplets. *Conidiogenous cells* integrated, mostly terminal, sometimes also intercalary, narrowly cylindrical, 5–43 µm long, proliferation sympodial, with a single to several conidiogenous loci, protuberant, subdenticulate to denticulate, obconically truncate, 0.5–2 µm diam., dome and periclinal rim often not very conspicuous, thickened and darkened-refractive. *Ramoconidia* s. str. occasionally formed, subcylindrical, up to 24 µm long, 4–5 µm wide, 1–2-septate, broadly truncate at the base, up to 2.5 µm wide. *Conidia* catenate, in unbranched or branched chains, small conidia globose, subglobose, ovoid, limoniform, ovoid-ellipsoid or somewhat irregular, 2–11 × 2–5 µm, 0–1-septate, larger conidia ellipsoid, narrowly obclavate to subcylindrical, 13–18 × 3–6.5 µm, 0–1(–2)-septate, occasionally distoseptate, with age larger and more frequently septate, up to 32 µm long, with up to 4 septa, subhyaline, pale to medium dirty olivaceous-brown, smooth or sometimes minutely verruculose, walls more or less thickened, cell structure unusual, paler and apparently hollow in the centre of the cells, surrounded by the protoplasm, sometimes also with somewhat refractive oil droplets, ends rounded or attenuated, hila protuberant, small, obconically truncate, 0.5–1.5(–2) µm diam., dome and rim often inconspicuous, thickened, refractive, sometimes darkened; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Bougainvillea* spp. (Nyctaginaceae), Europe – *Bougainvillaea spectabilis* (Italy) (only known from the type collection).

Notes: With its external, superficially growing mycelium and its sometimes rough-walled hyphae giving raise to solitary conidiophores, *Cladosporium arthrinioides* superficially resembles *Stenella* spp. SEM examinations demonstrated that the conidiogenous loci and hila are neither pileate nor planate as in species of the genus *Stenella*, but they proved to be cladosporioid (see Pl. 4, Fig. B). In one of the syntype collections (M-57466) a phialidic hyphomycete has been found. *Cladosporium heterophragmatis* S.A. Khan & Kamal, also with external mycelium and narrow conidiophores growing like and confusable with hyphae, deviates from *C. arthrinioides* in having erect to decumbent, creeping conidiophores with only few non-constricted septa, ramoconidia s. str. are lacking, and the conidia are never distoseptate. Furthermore, the unusual cell structures described above could not be observed.
In FARR et al. (1989), *C. arthrinioides* is recorded on leaves of *Bougainvillea* sp. from Texas, USA.

(7) *Cladosporium arthropodii* K. Schub. & C.F. Hill

Fig. 9; Pl. 5, Figs A–G

Cladosporium arthropodii K. Schub. & C.F. Hill, **sp. nov.**

Differt a *C. allii* conidiophoris semper fasciculatis, locis conidiogenis 1.5–2.5(–3.5) µm latis et 0.5–1 µm altis, conidiis (5–)7–12 µm latis.

Holotype: on *Arthropodium cirratum* (Anthericaceae, Liliaceae s. lat.), New Zealand, Auckland, Glen Funes, University of Auckland, Tamaki Campus, 1 Jul. 2004, C.F. Hill, No. 1054, mixed infection with *Alternaria* sp. (HAL 1828 F).
Paratypes: on *Arthropodium cirratum,* New Zealand, East Tamaki, Auckland University Campus, 4 Sept. 2003, E.H.C. McKenzie (PDD 78376) and Little Huia, 3 Dec. 1963, J.M. Dingley (PDD 23039).

Leaf spots amphigenous, oval to oblong-irregular, at first visible as small, whitish, shiny discolorations, later forming larger spots, up to 30 mm long, finally confluent, covering large areas of the leaves, on the upper leaf surface whitish, whitish grey to somewhat rose-

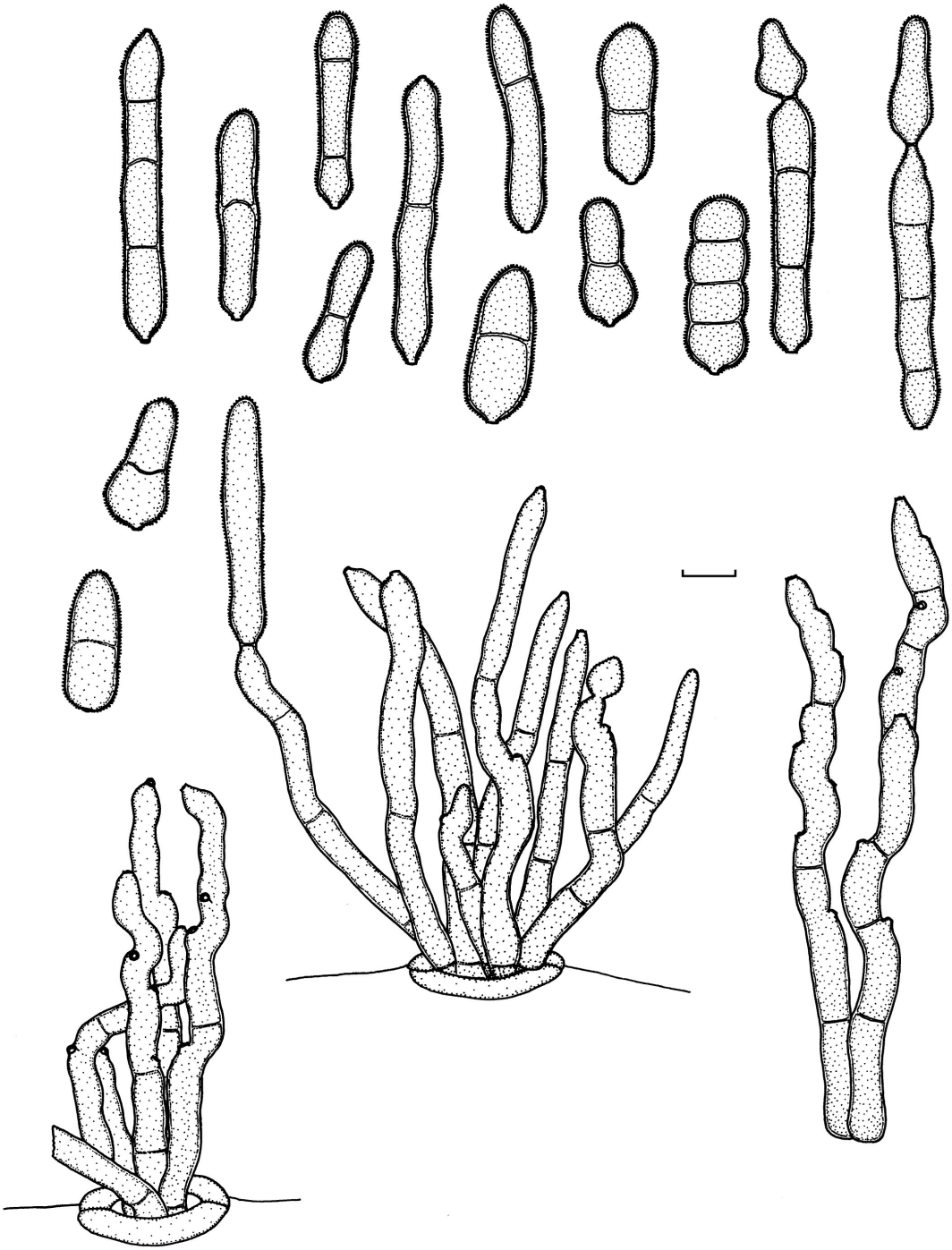

Fig. 9: *Cladosporium arthropodii*. Fascicles of conidiophores and conidia. Bar = 10 µm.

coloured, shiny, often with slightly rose- to purple-coloured, irregular discolorations in the centre of pale spots, somewhat zonate, surrounded by a narrow or broader, irregular margin or halo, yellowish brown to dark reddish brown, rarely purple or greenish, on the lower leaf surface darker, greyish to grey-green. *Colonies* hypophyllous, scattered, effuse, loose to dense, short caespitose, olivaceous-brown to brown or even blackish. *Mycelium* internal, subcuticular; hyphae branched, 3–5(–7.5) µm wide, septate, pale olivaceous to pale olivaceous-brown, smooth, walls unthickened or slightly thickened, sometimes with small swellings and constrictions, often aggregated. *Stromata* mostly substomatal, 20–50 µm diam., dense, compact, pale to medium olivaceous or olivaceous-brown. *Conidiophores*

loosely to densely fasciculate, arising from stromata, usually emerging through stomata, occasionally erumpent through the cuticle, erect, straight to flexuous, cylindrical-oblong, not to somewhat geniculate-sinuous, unbranched or rarely branched, non-nodulose to subnodulose, 30–130 × (3–)4.5–8(–10) µm, 0–5-septate, not constricted at the septa, very pale olivaceous to pale brown, smooth, sometimes somewhat verruculose near the apex, walls only slightly thickened, not or only slightly attenuated towards the apex. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, 10–47 µm long, proliferation sympodial, with a single to few conidiogenous loci, often on small lateral shoulders, more or less protuberant, 1.5–2.5(–3.5) µm wide, 0.5–1 µm high, periclinal rim not distinctly raised, thickened, somewhat darkened. *Conidia* solitary or in short unbranched chains, straight to slightly curved, cylindrical-oblong, (11–)20–60 × (5–)7–12 µm, (0–)1–3(–5)-septate, sometimes slightly constricted at the septa, septa not very conspicuous, pale to pale medium olivaceous-brown, echinulate (digitate under SEM), walls more or less thickened, apex usually rounded, base rounded or often somewhat attenuated, hila more or less protuberant, 1.5–2.5(–3.5) µm diam., somewhat darkened.

Host(s)/substrate(s) & distribution: on *Arthropodium* spp. (Anthericaceae), New Zealand – *Arthropodium cirratum* (New Zealand, Auckland).

Notes: This new species, which causes leaf spots on the endemic host species *Arthropodium cirratum*, is morphologically very close to *C. allii* but distinct by having conidiophores consistently formed in fascicles and narrower conidia [versus (8–)10–15 (–17) µm wide in *C. allii*] (DAVID 1997). Furthermore, the periclinal rim of the conidiogenous loci of *C. allii* is distinctly elongated (ca. 2 µm high) giving a peg-like appearance. Attempts to grow *C. arthropodii* in culture failed.
C. allii-cepae differs from the new species in having much longer conidia, (40–)60–120(–90) µm (DAVID 1997), and *C. victorialis* (BRAUN & MEL'NIK 1997) [= *C. alliicola* H.D. Shin & U. Braun] is quite distinct by its smooth conidia.

(8) *Cladosporium borassi* Hasija

Fig. 10; Pl. 4, Figs F–H

Cladosporium borassi Hasija, Indian Phytopathol. 19(1966): 373 (1967), as '*borassii*'.

Holotype: on living leaves of *Borassus flabellifer* (Arecaceae), India, Madhya Pradesh, Jabalpur, Howbagh, Coll. Garden, 7 Sept. 1964, S.K. Hasija (IMI 109416c).
Ill.: HASIJA (1967: 375, Fig. 2).

Leaf spots amphigenous, at first as brown pinhead spots on the upper region of the leaves, later extending, irregular in size, effuse, fading, turning yellowish to pale brown or pale reddish brown, surrounded by a narrow, reddish brown to medium brown margin. *Colonies* amphigenous, scattered, caespitose, loose to dense, dark brown to blackish. *Mycelium* internal, immersed, subcuticular to intraepidermal; hyphae branched, 2–4 µm wide, septate, often with small swellings, nodulose, subhyaline to pale olivaceous, walls slightly thickened. *Stromata* composed of subglobose, angular or somewhat irregular cells, 5–10 µm wide, pale to medium brown or yellowish brown, walls slightly thickened, sometimes forming extended stromatic layers. *Conidiophores* in loose to dense fascicles, arising from stromata, erumpent through the cuticle, erect, straight to flexuous, sometimes slightly geniculate-sinuous, subnodulose or nodulose, small swellings up to 6 µm wide, often connected with conidiogenesis, unbranched, 40–105(–150) × 4–5.5 µm, pluriseptate, olivaceous-brown to medium brown, somewhat paler towards the apex, smooth, walls thickened, sometimes distinctly two-layered, up to 1 µm wide, often swollen at the base, up to 8 µm wide. *Conidiogenous cells* integrated, terminal or intercalary, proliferation sympodial, with numerous conidiogenous loci, often situated on small multilateral

swellings, small, often not very conspicuous, truncate to slightly convex, 0.5–1(–1.5) µm diam. or smaller, slightly thickened, somewhat darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight, subglobose, ellipsoid, subcylindrical, 3–10(–14) × 2.5–6 µm, 0–1-septate, septum more or less median, sometimes slightly constricted at the septum, pale brown, smooth, walls slightly thickened, truncate at the base, hila very small, up to 1 µm wide, slightly thickened, somewhat darkened-refractive.

Host(s) & distribution: on *Borassus* spp. (Arecaceae), Asia – *Borassus flabellifer* (India).

Notes: The subnodulose or nodulose conidiophores of this species remind one of *Cladosporium herbarum*, but the latter species, which is a widespread saprobic species occurring on numerous substrates, is quite distinct in having usually verruculose, 0–3-septate, longer conidia and wider conidiogenous loci and hila.

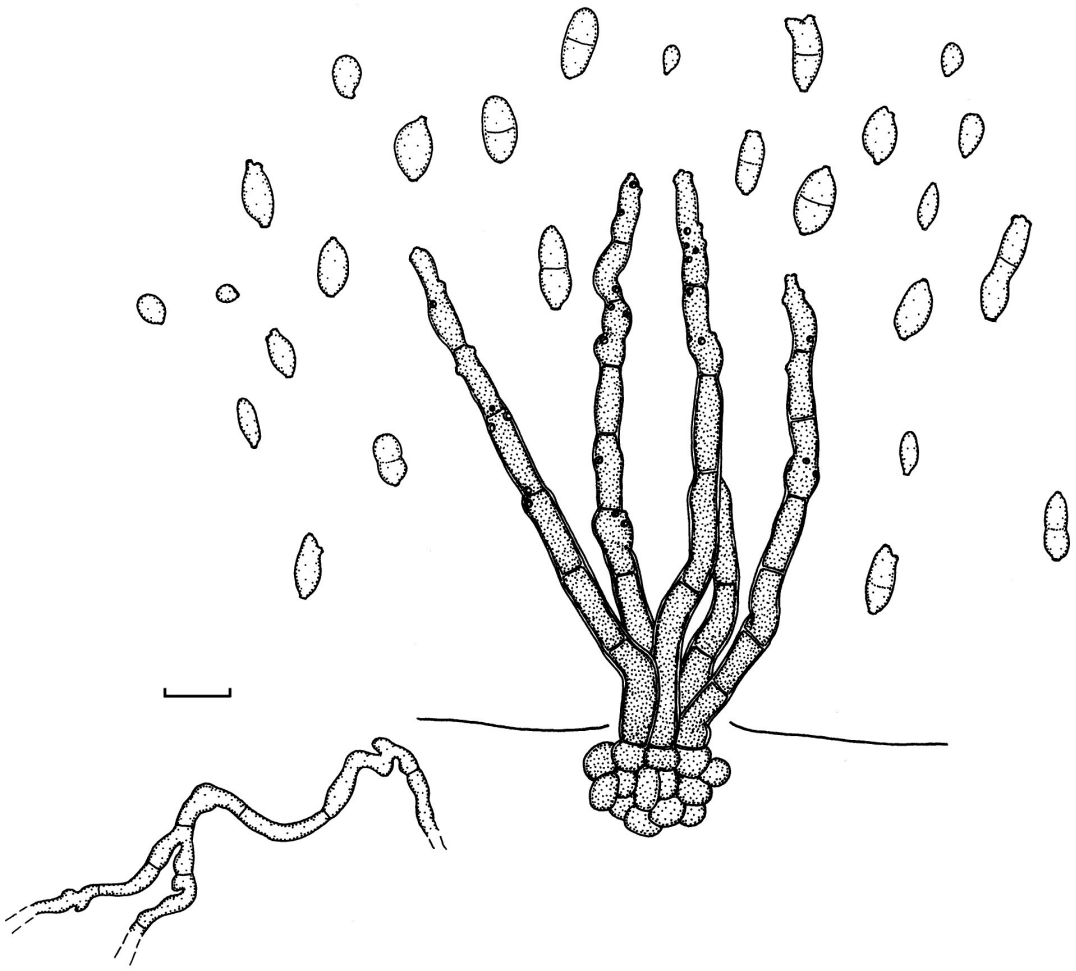

Fig. 10: *Cladosporium borassi*. Internal mycelium, fascicle of conidiophores and conidia. Bar = 10 µm.

(9) *Cladosporium bosciae* (Sacc.) K. Schub.

Fig. 11; Pl. 6, Figs A–E

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

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

≡ *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.

Host(s)/substrate(s) & distribution: on *Boscia* spp. (Capparidaceae), Africa – *Boscia senegalensis* (Eritrea) (only known from the type collection).

Notes: 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 could be regarded as new combination.
Colonies were described as occurring 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* and *C. cladosporioides* are quite distinct from *C. bosciae* in having aseptate or only few septate [0–1(–2)-septate in *C. cladosporioides*; 0–3-septate in *C. herbarum*; 0–1(–2)-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 the conidiogenous loci confined to these multilateral swellings.

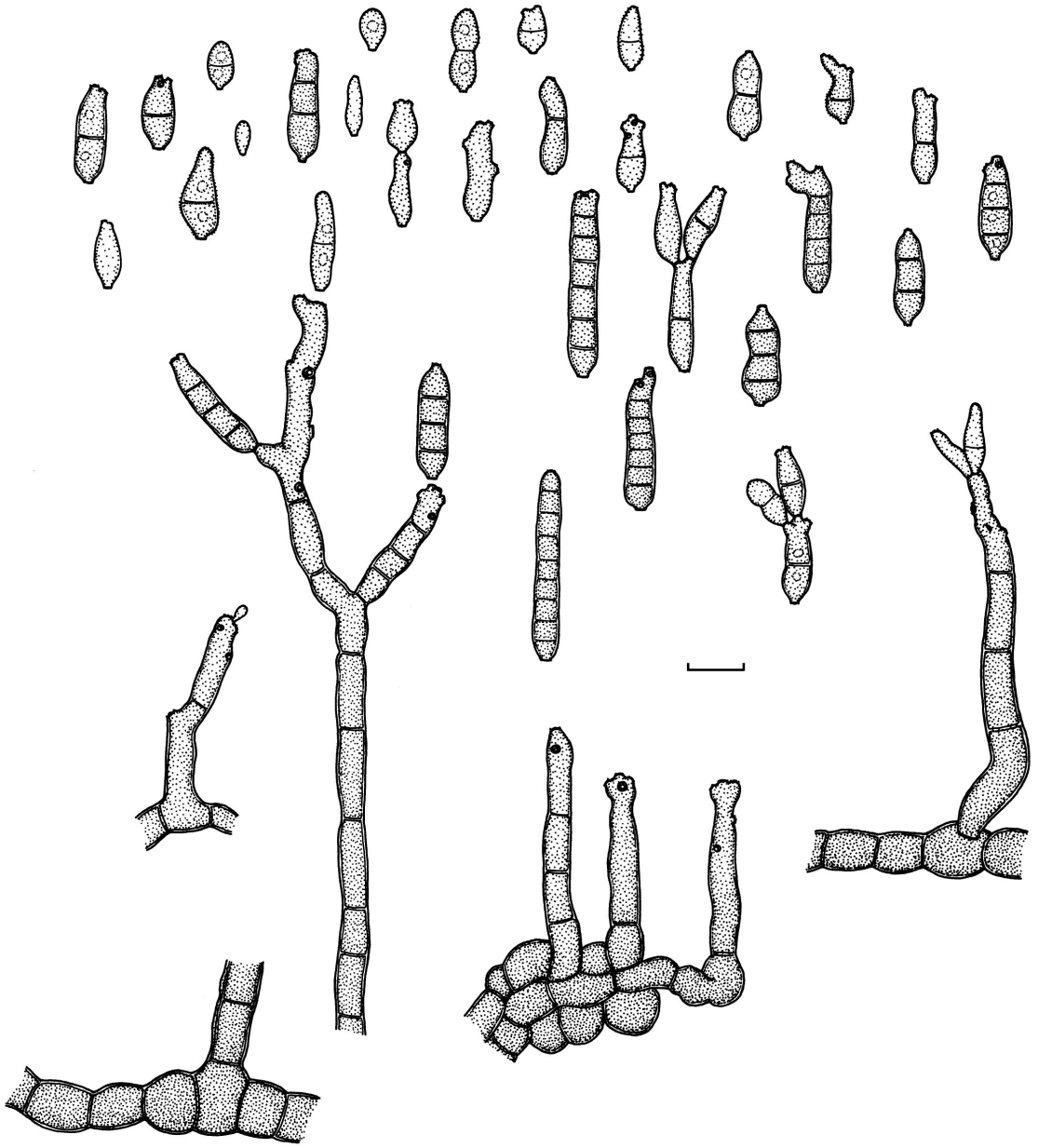

Fig. 11: *Cladosporium bosciae*. Conidiophores and conidia. Bar = 10 µm.

(10) *Cladosporium cassiae-surathensis* J.M. Yen

Figs 12–13; Pl. 7, Figs A–F

Cladosporium cassiae-surathensis J.M. Yen, Bull. Trimestriel Soc. Mycol. France 97(3): 130–131 (1981).

Holotype: on living leaves of *Cassia surathensis* (Caesalpiniaceae), Singapore, Bukit Timah, 29 Mar. 1970, G. Lim, No. 45 (LAM: Yen Herb., No. 10541).
Lit.: BRAUN & FREIRE (2004: 222).
Ill.: YEN (1981: 130, Fig. 1).

Leaf spots amphigenous, subcircular, oval-oblong to irregular, 1–8 mm wide, sometimes covering large areas of the leaf surface, small spots brown, larger ones with a pale brown centre, surrounded by a narrow, somewhat raised, dark brown, reddish brown to blackish margin, spots somewhat paler on the lower leaf surface. *Colonies* amphigenous, puncti-

form, scattered, loosely caespitose, brown, not velvety. *Mycelium* internal, subcuticular to intraepidermal, later also external, growing superficially; hyphae sparsely branched, 3–4 µm wide, septate, not constricted at the septa, pale brown or somewhat darker at the base of conidiophores, smooth, walls slightly thickened, often single cells swollen, up to 8 µm. *Stromata* subcuticular to intraepidermal, small, up to 25 µm wide, flat, only few layers deep, composed of swollen, subcircular to somewhat angular, thick-walled cells, 5–9 µm diam., pale brown to medium brown, sometimes even dark brown, smooth. *Conidiophores* solitary arising from internal and external hyphae or swollen hyphal cells, or in small, loose fascicles (up to 10) arising from stromata, erumpent through the cuticle, erect, straight to somewhat flexuous, cylindrical, unbranched, rarely branched, 20–100 × 3–5 µm, septate, not constricted at the septa, pale brown to mostly medium or even dark brown, somewhat paler towards the apex, smooth, sometimes slightly rough-walled, walls thickened, usually distinctly two-layered, up to 1 µm wide, often swollen at the base, up to 8 µm wide, often enteroblastically proliferating. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, 5–16 µm long, proliferation sympodial, cicatrised, with numerous small conidiogenous loci, often crowded near the apex, slightly convex, up to 1 µm diam., more or less thickened, not to slightly darkened-refractive. *Ramoconidia* s. str. ellipsoid to subcylindrical, 9–14 × 3–4.5 µm, mostly 1-septate, darker, concolorous with the tips of conidiophores, walls somewhat thicker as in conidia, with mostly several conidiogenous loci, base broadly truncate, 2 µm wide, unthickened. *Conidia* catenate, in unbranched or branched chains, straight to slightly curved, subglobose, ovoid, ellipsoid-ovoid, 3–11 × 2–4 µm, 0–1-septate, not constricted at the septa, very pale to pale brown, smooth, walls slightly thickened, ends more or less rounded, hila truncate to slightly convex, up to 1 µm diam., thickened, not to slightly darkened.

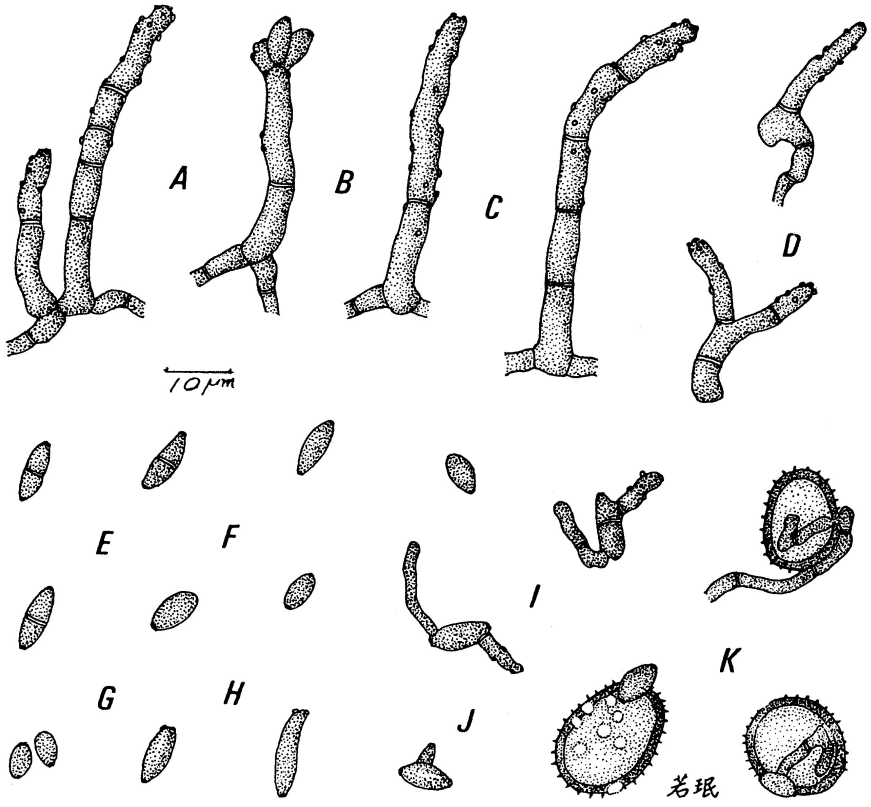

Fig. 12: *Cladosporium cassiae-surathensis*. Original drawing from YEN (1981). A–D: Conidiophores. E–H: Conidia. I–J: Germinating conidia. K: Uredospores parasitized by germ tubes of conidia.

Host(s)/substrate(s) & distribution: on *Cassia* and *Chamaecrista* (Caesalpiniaceae), Asia, South America – *Cassia surathensis* (Singapore), *Chamaecrista* sp. (Brazil).

Additional collection examined: on *Chamaecrista* sp., BRAZIL, State of Ceará, Cascavel Co., Preaoca district, 30 Aug. 2003, F. Freire (HAL).

Notes: Type material of *Cladosporium cassiae-surathensis* known from Singapore was not available. However, a single collection from Brazil on leaves of *Chamaecrista* sp. (*Cassia* s. lat.), identified as *C. cassiae-surathensis*, could be examined and agrees very well with the original description and illustration (see Fig. 12) of the latter species. The conidiophores are somewhat longer, formed singly as well as in small loose fascicles arising not only from external hyphae but also from internal hyphae, swollen hyphal cells and from small stromata. YEN (1981) observed germinating conidia and microcyclic conidiogenesis which could not be seen in the South American collection. In addition, he described the germinating conidia as occasionally penetrating germ pores of uredospores of *Uredo cassiae-surathensis* Yen which occurred on the same leaves.

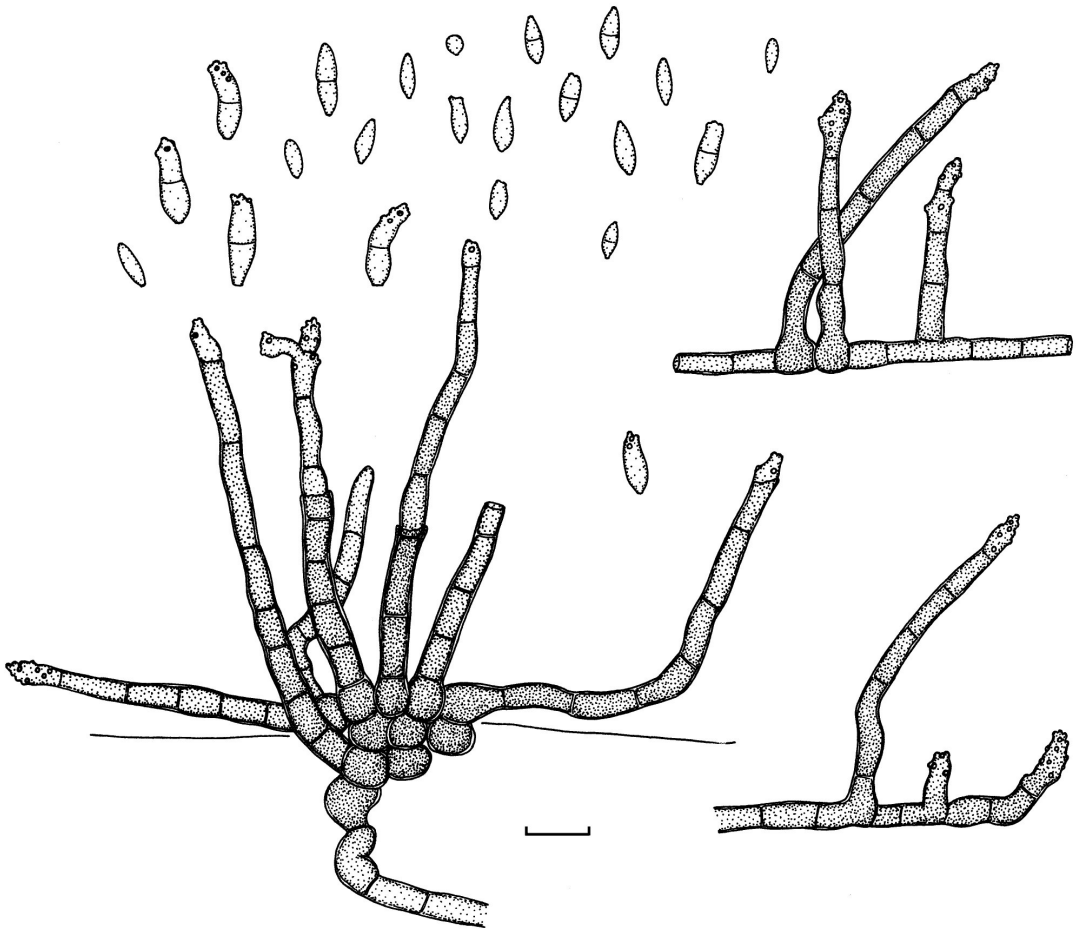

Fig. 13: *Cladosporium cassiae-surathensis*. Conidiophores and conidia from a single collection from HAL. Bar = 10 µm.

(11) *Cladosporium chamaeropis* (Unamuno) K. Schub.

Fig. 14; Pl. 6, Figs F–I

Cladosporium chamaeropis (Unamuno) K. Schub., **comb. nov.**

≡ *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 sub-effuse 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. *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 conidiogenous hila, 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.

Host(s)/substrate(s) & distribution: on *Chamaerops* spp. (Arecaceae), Europe – *Chamaerops humilis* (Spain) (only known from the type collection).

Notes: This is the only leaf-spotting *Cladosporium* species occurring on a host of the genus *Chamaerops*. *C. borassi*, 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. *C. coryphae*, 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*. *C. 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*), conidia with different surface ornamentations (always smooth in *C. maracuja* 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*).

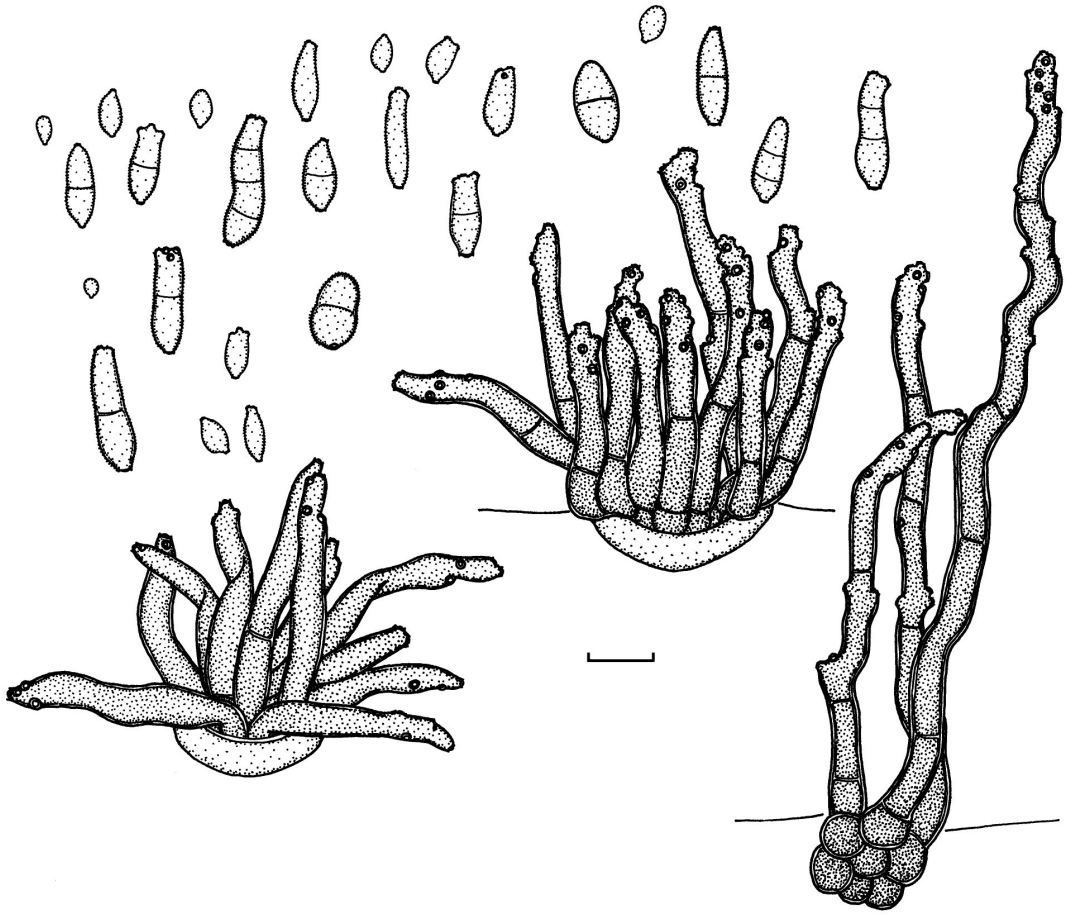

Fig. 14: *Cladosporium chamaeropis*. Fascicles of conidiophores emerging through stomata or erumpent through the cuticle and conidia. Bar = 10 µm.

(12) *Cladosporium cheonis* (Chupp & Linder) U. Braun

Fig. 15

Cladosporium cheonis (Chupp & Linder) U. Braun, Biblioth. Lichenol. 86: 85 (2003).
≡ *Cercospora cheonis* Chupp & Linder, Mycologia 29: 27 (1937).

Holotype: on leaves of *Ilex* sp. (Aquifoliaceae), China, Jiangsi Prov., Huang Yen Ssu, Hsing Tzu Hsien, 13 Sept. 1932, S.Y. Cheo, No. 922 (CUP 39400).
Lit.: CHUPP (1954: 52), CROUS & BRAUN (2003: 119).
Ill.: BRAUN (2003: 94, Fig. 8).

Leaf spots amphigenous, subcircular, 1–5 mm wide, brown, blackish, later pale, greyish, surrounded by a narrow, raised margin, pale to dark. *Colonies* punctiform to subeffuse, dark brown to blackish. *Mycelium* immersed. *Stromata* lacking or developed, 10–50 µm diam., substomatal, brown. *Conidiophores* in small to moderately large fascicles, loose to moderately dense, arising from internal hyphae or stromata, emerging through stomata, erect, straight, subcylindrical to somewhat geniculate-sinuous, non-nodulose, unbranched, 40–100 × 3–5 µm, pluriseptate throughout, pale olivaceous-brown to medium dark brown or somewhat reddish brown, wall thin to somewhat thickened, smooth. *Conidiogenous*

cells integrated, terminal or intercalary, 10–30 µm long, proliferation sympodial, with often numerous and crowded conidiogenous loci, conspicuous, 1–1.5 µm diam., thickened and darkened. *Conidia* catenate, occasionally in branched chains, ellipsoid-ovoid, subcylindrical-fusiform, 5–23(–30) × 2–5 µm, 0–1-septate (most conidia septate), olivaceous-brown, thin-walled, almost smooth to verruculose, ends rounded to obconically truncate, hila 1–1.5 µm diam., somewhat thickened and darkened.

Host(s)/substrate(s) & distribution: on *Ilex* spp. (Aquifoliaceae), Asia – *Ilex* sp. (China, Jiangsi) (only known from the type collection).

Notes: In the course of monographic studies of cercosporoid hyphomycetes type material of *Cercospora cheonis* was re-examined by BRAUN (2003). Due to the cladosporioid structure of the conidiogenous loci and hila he transferred this species to *Cladosporium* s. str. *C. cheonis* differs from all morphologically similar species with relatively short, fasciculate conidiophores in having usually 1-septate conidia (0–3-septate in *C. jacarandicola* K. Schub., U. Braun & C.F. Hill), narrower conidiophores [4–7 µm wide in *C. maracuja*; 5–9 µm wide in *C. alopecuri*; 4–10(–13) µm in *C. agoseridis*], narrower conidia [4–8 µm wide in *C. praecox*; 7–13(–15) µm wide in *C. alopecuri*] and narrower conidiogenous loci [1.5–2.5 µm diam. in *C. orchidearum* Cooke & Massee; (1.5–)2–3.5(–4.5) µm diam. in *C. agoseridis*].

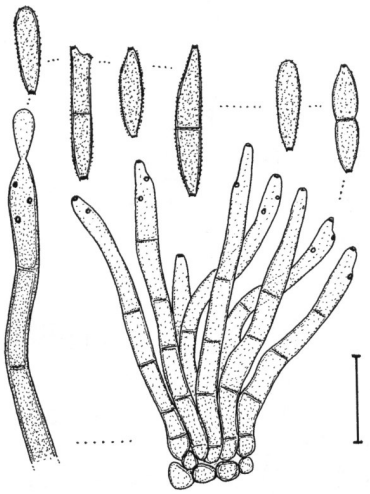

Fig. 15: *Cladosporium cheonis*. Conidiophores and conidia (from BRAUN 2003). Bar = 20 µm.

(13) *Cladosporium chrysophylli* Thaung

Fig. 16; Pl. 8, Figs A–F

Cladosporium chrysophylli Thaung, Trans. Brit. Mycol. Soc. 63(3): 620 (1974).

Holotype: on living leaves of *Chrysophyllum cainito* (Sapotaceae), Burma, Sintoung, east of Thazi, 24 May 1973, Mya Thaung (IMI 17741).
Ill.: THAUNG (1974: 620, Fig. 1).

Leaf spots amphigenous, irregular, varying in shape and size, on the upper leaf surface pale olivaceous, greyish green, surrounded by a narrow, dark brown margin, on the lower leaf surface pale greenish brown, margin pale olivaceous-brown and somewhat raised. *Colonies* hypophyllous, effuse, densely caespitose, dark olivaceous-brown or somewhat greyish, short villose or velvety. *Mycelium* both internal, mostly subcuticular or substomatal, and external, superficial; hyphae branched, 2.5–6 µm wide, septate, sometimes slightly constricted at the septa, subhyaline to pale olivaceous, smooth or sometimes distinctly roughened, walls slightly thickened, forming swollen hyphal cells, subglobose, 6–11 µm wide, sometimes aggregated forming hyphal ropes or stromatic hyphal aggregations. *Conidiophores* solitary or in small loose groups or fascicles, arising from swollen hyphal cells, internal and external hyphae or stromatic hyphal aggregations, emerging through stomata, erumpent through the cuticle or growing superficially, erect to sometimes subdecumbent, straight to slightly flexuous, variable in shape and size, somewhat dimorphic, at first short cylindrical, 18–70 µm long, later filiform, up to 225 µm long, often slightly geniculate-sinuous, unbranched, sometimes branched, once or several times, 3–7(–8) µm wide, septate, pale yellowish brown or pale to medium olivaceous-brown, paler towards the apex, walls often irregularly and distinctly roughened, rugose, outer wall

seemingly irregularly detaching, often refractive and somewhat shiny, thickened, often distinctly two-layered, up to 2 µm wide, mostly wider or somewhat swollen at the base, 8–12 µm wide. *Conidiogenous cells* integrated, terminal and intercalary, 7–35 µm long, sub-

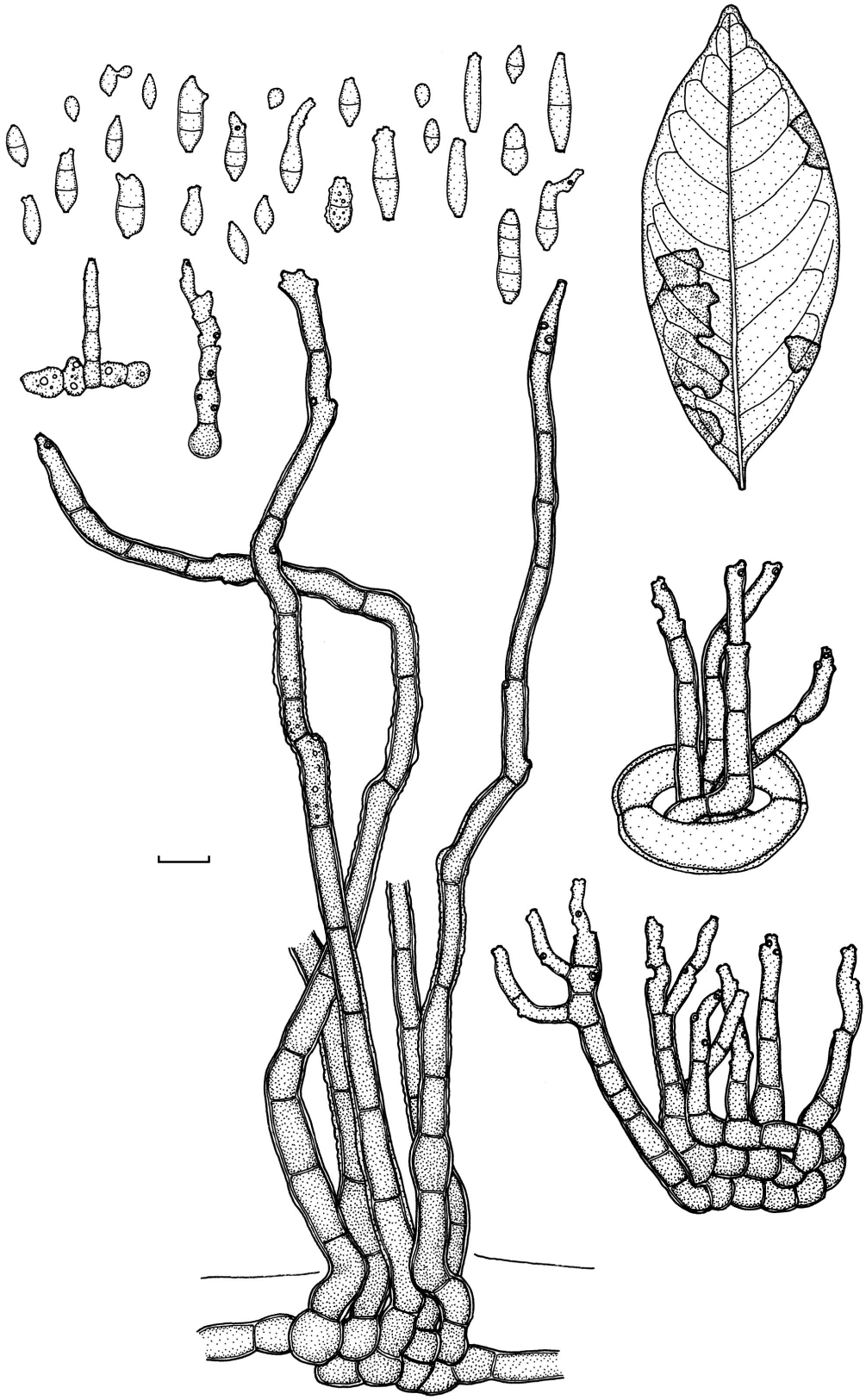

Fig. 16: *Cladosporium chrysophylli*. Symptoms, dimorphic conidiophores and conidia. Bar = 10 µm.

cylindrical-oblong, sometimes slightly geniculate or subnodulose, conidiogenous loci often situated on small lateral shoulders, protuberant, subdenticulate, obconically truncate, 0.5–2 µm diam., convex dome often not very distinct, somewhat thickened and darkened-refractive. *Conidia* catenate, mostly in branched chains, obovoid, ellipsoid, fusiform to subcylindrical, 3–19(–28) × 2–5(–6) µm, 0–2(–5)-septate, septa not very conspicuous, pale olivaceous-yellow to very pale brown, smooth or almost so, with age turning irregularly rough-walled, outer wall seemingly detach, only slightly thickened, hila more or less protuberant, obconically truncate, 0.5–2 µm diam., convex dome and periclinal rim often not very distinct, thickened, somewhat darkened-refractive; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Chrysophyllum* spp. (Sapotaceae), Asia – *Chrysophyllum cainito* (Burma) (only known from the type collection).

Notes: With its somewhat dimorphic conidiophores *C. chrysophylli* is a very variable but nevertheless well-characterised and unique species not comparable with any of the other foliicolous *Cladosporium* species. Conidia up to 28 µm long, as described by THAUNG (1974), could not be observed.

(14) *Cladosporium colocasiae* Sawada

Fig. 17; Pl. 9, Figs A–E

Cladosporium colocasiae Sawada, Trans. Nat. Hist. Soc. Taiwan 25: 125 (1916).
= *Cladosporium colocasiicola* Sawada, Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 195 (1959), nom. inval., **syn. nov.**

Holotype: on *Colocasia antiquorum* (= *C. esculenta*) (Araceae), Taiwan, 2 Jun. 1910, K. Sawada (PPMH).
Lit.: BUGNICOURT (1958), ELLIS (1971: 312), MATSUSHIMA (1975: 34), DAVID (1988a), HO et al. (1999: 123).
Ill.: BUGNICOURT (1958: 235, Fig. 1), ELLIS (1971: 313, Fig. 216 B), MATSUSHIMA (1975: Pl. 77), DAVID (1988a: Fig.), DE & CHATTOPADHYAY (1994: 228, Fig. 4), HO et al. (1999: 124, Figs 10–11).

Leaf spots amphigenous, subglobose, oval to somewhat irregular, at first punctiform, later extending, forming large patches, very variable in size, 1–10(–15) mm wide, sometimes confluent, covering large areas of the leaf surface, medium to dark brown, later yellow, most frequently on old leaves, giving them a spotted appearance, occasionally somewhat paler in the centre, on the lower leaf surface somewhat paler, grey-brown. *Colonies* amphigenous, effuse, mostly densely caespitose, brown, velvety to villose. *Mycelium* internal, subcuticular to intraepidermal, later also external, growing superficially; hyphae branched, 2.5–7.5 µm wide, septate, often with swellings and constrictions, at swellings up to 10 µm wide, pale brown to somewhat yellowish brown, smooth, thick-walled, forming hyphal aggregations, composed of swollen hyphal cells, subglobose to somewhat angular, 4–10 µm wide, pale to pale medium brown or somewhat yellowish brown, smooth, thick-walled. *Conidiophores* solitary or in small loose groups, arising from internal and external hyphae or from hyphal aggregations, conidiophores arising from internal hyphae erumpent through the cuticle, erect, straight or slightly flexuous, somewhat geniculate-sinuous, subnodulose to distinctly nodulose or even nodose, usually with multilateral, intercalar and terminal swellings, 5–8.5(–10) µm diam., unbranched, sometimes once branched, (25–)50–250(–450) µm long or even longer, 3.5–6(–7) µm wide, pluriseptate, not constricted at the septa, pale to pale medium brown, smooth, with age somewhat asperulate, walls thickened, usually one-layered, sometimes also two-layered, especially near the base, somewhat swollen at the base and attenuated towards the apex. *Conidiogenous cells* integrated,

terminal and intercalary, 6–30 µm long, with characteristic nodulose swellings, conidiogenous loci confined to them, situated on small shoulders or multilateral swellings, mostly 1–3 per node, protuberant, almost flat to short cylindrical, well differentiated in dome and raised rim, 1–2(–2.5) µm diam., thickened, somewhat refractive or slightly darkened. *Conidia* catenate, in unbranched or branched chains, broadly ellipsoid-sub-cylindrical to cylindrical, (8–)12–23(–32) × (5–)6–9(–10) µm, 0–3(–5)-septate, sometimes slightly constricted at the median septum, pale to pale medium brown, smooth, surface of older conidia sometimes appearing to be net-like, granular or punctate, walls more or less thickened, ends broadly rounded, hila protuberant, 1–2(–2.5) diam., thickened, refractive to somewhat darkened; sporadically microcyclic conidiogenesis occurring.

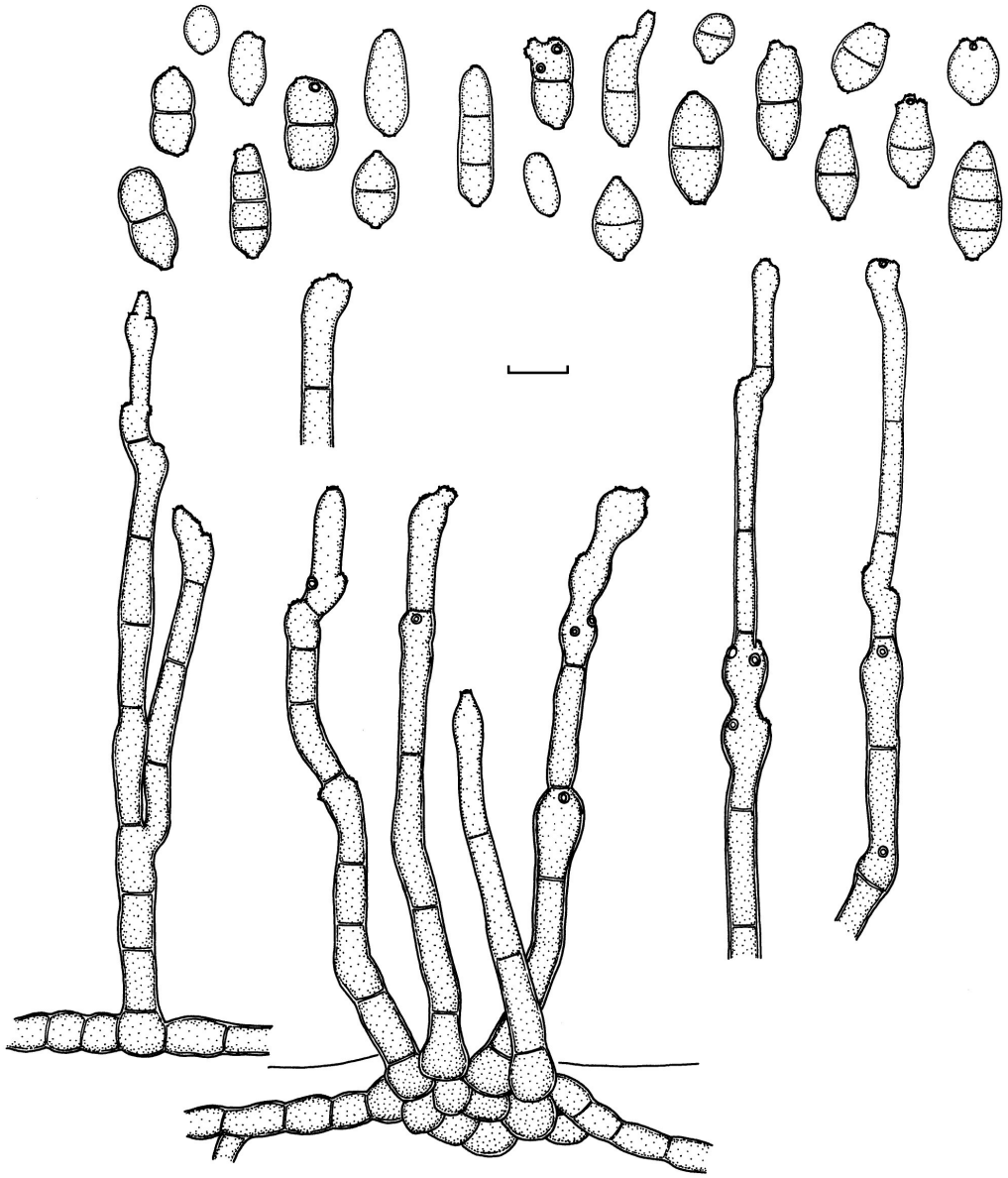

Fig. 17: *Cladosporium colocasiae*. Conidiophores and conidia (from BPI 426382). Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Colocasia* spp. (Araceae), Africa, Asia, Europe, North America, Australia, New Zealand – *Colocasia esculenta* (American Samoa;

Australia; Barbados; Brazil; Brunei; China, Beijing, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Liaoning, Shangdong, Sichuan, Yunnan; Cook Islands; Dominican Republic; Ethiopia; Federated States of Micronesia; Fiji; French Polynesia; Ghana; Guinea; Hong Kong; India, M.P., U.P.; Indonesia; Japan; Kiribati; Korea; Malaysia; Marshall Islands; Mauritius; Nepal; New Caledonia; New Zealand, Auckland, Coromandel; Nigeria; Niue; Pakistan; Palau; Papua New Guinea; Portugal, Azores; Puerto Rico; Sabah; Sarawak; Solomon Islands; Tahiti; Taiwan; Tonga; USA, Hawaii; Vanuatu; Western Samoa).

Additional collections examined: on *Colocasia antiquorum* (= *C. esculenta*), ex DOMINICAN REPUBLIC, intercepted at San Juan, 9 Jul. 1985, R. Barbosa (BPI 525147, as *C. colocasiicola*); ETHIOPIA, Kaffa Prov., Jimma, R.B. Stewart, 10 Nov. 1955 (BPI 426383, BPI 426385, NY); JAPAN, Kyoto, 2 Oct. 1924, K. Togashi (BPI 426382); Sendai, 25 Oct. 1918, A. Yasuda (BPI 426381); ex PUERTO RICO, intercepted at San Juan, 11 Mar. 1961, H.L. Rubin (BPI 426384).

Notes: Type material of this species is in very poor condition and was, therefore, not re-examined. *C. colocasiicola* Sawada, also recorded on leaves of *Colocasia esculenta*, is invalidly published, since the author failed to provide a Latin diagnosis. Although type material could not be traced and re-examined, this species is reduced to synonymy with *C. colocasiae* since the original diagnosis and illustration are very close to and almost identical with the latter species.
C. herbarum, *C. oxysporum* and *C. variabile* (Cooke) G.A. de Vries are morphologically close to *C. colocasiae* by also possessing nodulose to nodose conidiophores. However, the cosmopolitan *C. herbarum*, which occurs on numerous substrates, deviates in having verruculose conidia; the conidia of the saprobic *C. oxysporum* are subglobose, ovoid, limoniform or ellipsoid, narrower, 3–6 µm wide, and 0–1(–2)-septate; and the foliicolous *C. variabile* causing leaf spots on spinach differs in having verruculose to verrucose, wider and usually longer conidia, (6.5–)10–45(–55) × (5–)7–14(–17) µm, and wider conidiogenous loci and hila, (1–)2–3(–3.5) µm diam.
HO et al. (1999) examined *C. colocasiae* in culture and published a detailed description of its features in vitro recording the conidiophores as being much longer than on the natural substratum. In MATSUSHIMA (1980), *Eucalyptus* sp. and *Psidium guajava* are mentioned as additional hosts, but these records probably refer to one of the superficially similar, saprobic species discussed above. ZHANG et al. (2003) treat *C. colocasiicola* as a separate species and cite a record on *Nelumbo nucifera*, which is, however, very doubtful.

(15) *Cladosporium corrugatum* McAlpine

Fig. 18

Cladosporium corrugatum McAlpine, Fungus Dis. Citrus Trees Austral.: 88 (1899).

Holotype: on both surfaces of green orange leaves (*Citrus aurantium*, Rutaceae), Australia, Armadale near Melbourne, Jan. 1899 (VPRI 5924).
Lit.: SACCARDO (1913a: 1367).
Ill.: MCALPINE (1899: Fig. 57).

Leaf spots amphigenous, oval to irregular, 3–18 mm wide, pale to dark grey-brown, on the upper leaf surface with an irregular, narrow, dark reddish brown, somewhat raised margin, on the lower leaf surface margin wider, at first yellowish brown, later somewhat reddish, irregularly lobed in outline, surface of the spots more or less corrugated. *Colonies* amphigenous, punctiform to effuse, caespitose, forming dense tufts, dark brown to even blackish, confluent, velvety. *Mycelium* immersed, subcuticular to intraepidermal; hyphae sparingly branched, 3–4 µm wide, sometimes slightly swollen and up to 6 µm wide,

septate, not constricted or slightly constricted at the septa, subhyaline to pale olivaceous, smooth, walls not or barely thickened. *Stromata* mostly substomatal, composed of subglobose to somewhat angular, loosely to densely arranged, thick-walled cells, 5–9 µm wide, pale to dark olivaceous-brown, smooth. *Conidiophores* solitary or fasciculate, loose to dense, arising from stromata, emerging through stomata or erumpent through the cuticle, straight to often somewhat flexuous, somewhat geniculate-sinuous, unbranched, rarely branched, 15–70 × 3–6 µm, septate, medium to dark olivaceous, occasionally somewhat paler towards the apex, smooth, walls not or only slightly thickened, often somewhat swollen at the base. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, 5–25 µm long, proliferation sympodial, with a single to several conidiogenous loci, protuberant, subdenticulate, mostly truncate, 0.5–1.5(–2) µm diam., periclinal rim often not very conspicuous, slightly thickened, only somewhat darkened-refractive. *Conidia* catenate, in branched chains, more or less straight, obovoid, ellipsoid to sometimes subcylindrical, 3–20 × 2.5–7 µm, 0–2(–3)-septate, not constricted at the septa, pale olivaceous to olivaceous-brown, smooth, rarely minutely verruculose, walls not to slightly thickened, apex rounded or somewhat attenuated, with a single or few apical hila, hila truncate to slightly convex, 0.5–1.5(–2) µm diam., slightly thickened, somewhat darkened-refractive; microcyclic conidiogenesis occurring.

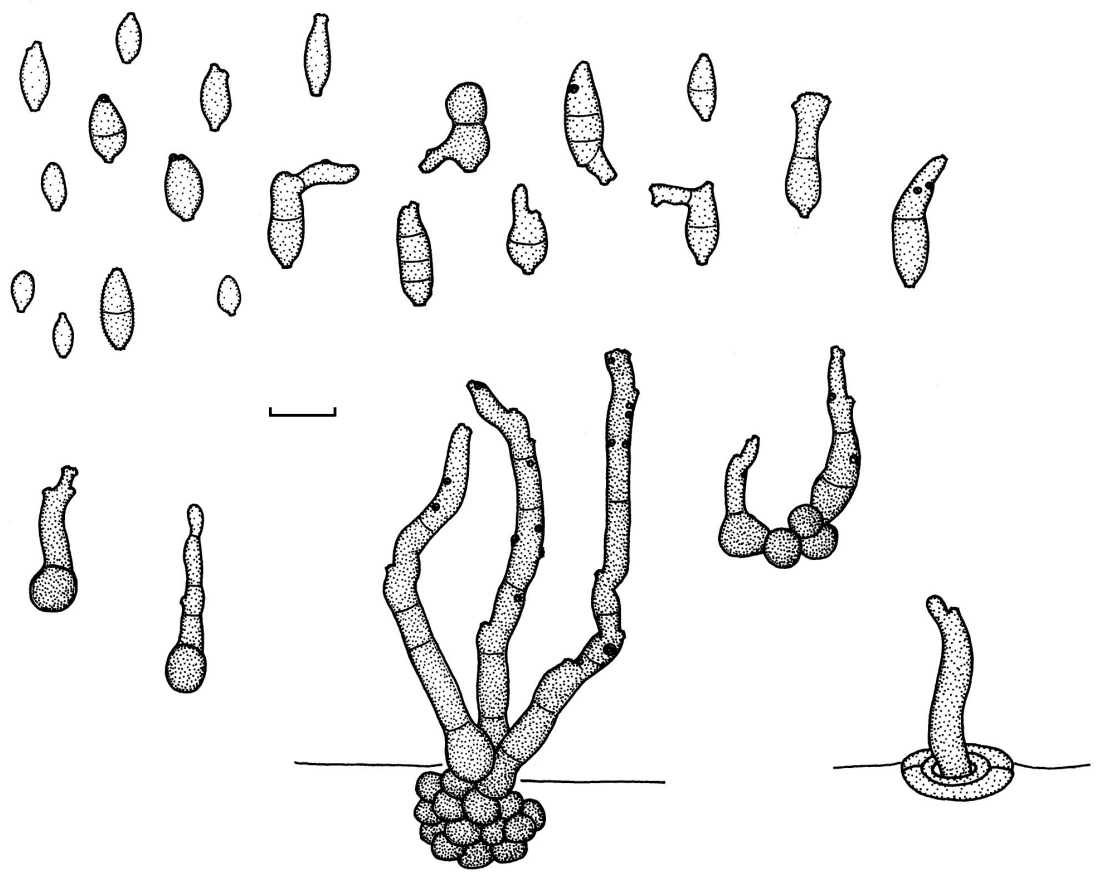

Fig. 18: *Cladosporium corrugatum*. Conidiophores and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Citrus* spp. (Rutaceae), Australia – *Citrus aurantium* (Australia) (only known from the type collection).

Notes: In his book 'Fungus diseases of *Citrus* trees in Australia' MCALPINE (1899) introduced three additional *Cladosporium* species. *C. brunneoatrum* McAlpine, causing

'False Melanose' on leaves and fruits of *Citrus aurantium*, is excluded from *Cladosporium* s. str. Its taxonomic status remains unknown since the type material is very sparse. Type material of *C. furfuraceum* McAlpine and *C. subfusoideum* McAlpine is not preserved. However, the conidiophores of *C. furfuraceum* were described as regularly or irregularly branched and the conidia as being ovate to pyriform, lemon-yellow, 0–1-septate and pretty constant in size, 15–17 × 8.5–9.5 µm. Type details of *C. subfusoideum* recorded on fruits of *Citrus medica* agree with *Diplodia citricola* McAlpine. Several other taxa have been described from *Citrus* spp. *C. elegans* Penz. recorded from Italy as causing leaf spots on living leaves of *Citrus* sp. proved to be synonymous with *C. herbarum*. *C. elegans* var. *singaporense* Sacc. is conspecific with *Spiropes guareicola* (SCHUBERT & BRAUN 2005a). SAWADA (1931) published *C. sclerotiophilum* Sawada, but only in Japanese. This taxon has to be excluded from *Cladosporium* s. str., its taxonomic affinity is not yet clear. Type material of *C. citri* Massee and *C. farnetianum* Sacc. (≡ *C. citri* Briosi & Farneti, nom. illeg.) could not be traced and is possibly not preserved. These species are discussed in detail in chapter 8.4.

C. sphaerospermum, originally described by PENZIG (1882) on faded leaves and branches of *Citrus* sp. from Italy, is quite distinct from *C. corrugatum* by having small globose, verrucose conidia, longer, smooth or verruculose ramoconidia and usually longer conidiophores.

(16) *Cladosporium cucumerinum* Ellis & Arthur

Fig. 19

Cladosporium cucumerinum Ellis & Arthur, Bull. Agric. Exp. Sta., Indiana 19: 9–10 (1889).

= *Scolecotrichum melophthorum* Prill. & Delacr., Bull. Soc. Mycol. France 7(1): 219 (1891).

≡ *Macrosporium melophthorum* (Prill. & Delacr.) Rostr., Gartn.-Tidende 24: 18 (1893).

= *Cladosporium cucumeris* A.B. Frank, Z. Pflanzenkrankh. 3: 31 (1893).

= *Cladosporium scabies* Cooke, Gard. Chron., Ser. 3, 34: 100 (1903).

= *Cladosporium cucumerinum* var. *europaeum* Bubák, in herb., **syn. nov.**

Holotype: on fruits of *Cucumis sativus* (Cucurbitaceae), USA, New York, Geneva, J.C. Arthur (NY).

Lit.: SACCARDO (1892: 601), LINDAU (1907: 830, 1910: 797), FERRARIS (1912: 349), GONZÁLES-FRAGOSO (1927: 206), CASH (1952: 68), DE VRIES (1952: 62), ELLIS (1971: 318), ELLIS & HOLLIDAY (1972), BRANDENBURGER (1985: 403), ELLIS & ELLIS (1985: 339), VON ARX (1987: 193), MCKEMY & MORGAN-JONES (1992), HO et al. (1999: 125), ZHANG et al. (2003: 80–82).

Ill.: DE VRIES (1952: 63, Fig. 12), ELLIS (1971: 318, Fig. 219 B), ELLIS & HOLLIDAY (1972: Fig.), VON ARX (1987: 194, Fig. 83b), MCKEMY & MORGAN-JONES (1992: 165, Fig. 1; 167, Pl. 1), HO et al. (1999: 124, Fig. 14).

Exs.: Herb. Mycol. Rom. 643; Petr., Fl. Bohem. Morav. exs. 2108; Reliqu. Petrak. 2342.

On living leaves, petioles, stems, fruits and young shoots, causing cucumber gummosis or scab and crown blight, on leaves forming necrotic, water-soaked spots, sometimes with a gummy exudate, sporulation mostly only sparse; on fruits forming pronounced, deeply sunken brownish lesions, up to 10 mm diam. or confluent, with a gummy exudate, older fruits with brown, cork-like scabs; young seedlings sometimes seriously damaged, dieback of apical shoots may occur. *Colonies* effuse, loosely to densely caespitose, pale to medium or almost dark greyish olive, velvety or somewhat felt-like with age. *Mycelium* partly immersed in the substratum, partly superficial; hyphae branched, 2–6 µm wide, septate, subhyaline to pale olivaceous or pale brown, smooth, walls somewhat thickened,

sometimes forming loose hyphal aggregations, composed of swollen, subglobose hyphal cells, pale medium brown, thick-walled, immersed hyphae often with a slime coat, sometimes becoming spirally twisted. *Conidiophores* solitary or in small groups, loose to somewhat dense, arising from internal and external hyphae, lateral or terminal, or from swollen hyphal cells or hyphal aggregations, erect, straight to somewhat flexuous, cylindrical to filiform, often somewhat geniculate-sinuous towards the apex, without multilateral swellings, unbranched, often with short, subapical, lateral projections, sometimes branched, once to several times, 10–300(–400) × 3–7(–8) µm, septate, sometimes constricted at the septa, pale to medium olivaceous-brown or pale to pale medium brown, somewhat paler towards the apex, smooth, walls somewhat thickened, often swollen and somewhat bulbous at the base, up to 8 µm wide. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical or somewhat geniculate, 18–65 µm long, proliferation sympodial, with a single to several conidiogenous loci, subdenticulate, often situated on small shoulders or short lateral projections, protuberant, often truncate and almost flat, 1–2.5 µm diam., central dome usually not higher than the surrounding rim, thickened, refractive to darkened-refractive. *Ramoconidia* s. str. occasionally occurring, cylindrical-oblong, up to 52 µm long, mostly aseptate, base 3–4 µm wide, unthickened, not darkened, sometimes slightly refractive. *Conidia* catenate, usually in branched chains, straight to slightly curved, terminal and intercalary conidia subglobose, obovoid, ellipsoid, fusiform or limoniform, 3–25 × 2–7(–9) µm, 0(–1)-septate, occasionally slightly constricted at the septum, ramoconidia s. lat. cylindrical to somewhat clavate or occasionally ampulliform to doliiform, up to 35 µm long, 3–7(–8) µm wide, 0–2(–3)-septate, with age slightly constricted at the septa, subhyaline, pale brown or pale olivaceous-brown, smooth, sometimes minutely verruculose, walls somewhat thickened, apex broadly rounded or with a single to several (up to 5) somewhat denticle-like hila, more or less truncate at the base, hila protuberant, 1–2.5 µm diam., thickened, refractive to somewhat darkened; microcyclic conidiogenesis sometimes observed.

Host(s)/substrate(s) & distribution: on Cucurbitaceae, cosmopolitan – *Citrullus lanatus* (Greece; Korea; Puerto Rico; Romania; USA, MD, NC, NE, TX), *C. vulgaris* (Canada; Puerto Rico; USA, MD, NE; Turkmenistan; Virgin Islands), *Coccinia grandis* (Kenya), *Cucumis melo* (Canada, NS, Ont.; France; Great Britain; Greece; India, Punjab; Korea; Mexico; Netherlands; Panama; Romania; South Africa; Turkmenistan; USA, CT, MA, MD, NC, SC, TX; Zimbabwe), *C. sativus* (Armenia; Austria; Brazil; Canada, BC., NB., NS., Ont., PEI, Que.; China, Guangdong, Jilin, Qinghai, Shaanxi, Shanxi; Czech Republic; Denmark; Estonia; Germany; Great Britain; Greece; Iran; Italy; Japan; Jordan; Kenya; Korea; Latvia; Mexico; Netherlands; Panama; Poland; Romania; South Africa; Suriname; Switzerland; USA, CA, FL, MI, MN, NC, NY, OK, OR, PA, VT, WA, WI; Zimbabwe), *Cucumis* spp. (Germany; Korea; Mexico), *Cucurbita maxima* (Canada, NS.; Chile; China, Shaanxi; USA, CT, MA, MD, NJ, NY, OR, WA), *C. pepo* (Barbados; New Zealand, Auckland; Pakistan; South Africa; USA, CT, MA, MD, NC, NY, PA; Zimbabwe), *Cucurbita* spp. (Canada, Man.; USA, CA, NC), *Lagenaria siceraria* (China, Henan; India, Punjab), *L. vulgaris* (Greece), *Luffa acutangula* (India, Rajastan), *L. aegyptiaca* (China, Hubei, Hunan, Shaanxi), *Momordica charantia* (China, Hunan), *Sechium edule* (Panama).

Additional collections examined: on *C. melo*, USA, Massachusetts, Dwight, 16 Aug. 1916, Massachusetts Fungi 2040 (NY). On *Cucumis sativus*, AUSTRIA, Kärnten, Poertschack at the Wörther See, Aug. 1902, E. Cerny (BPI 426422, original material of *Cladosporium cucumerinum* var. *europaeum*); CZECH REPULIC, Mähren-Weisskirchen, Aug. 1925, F. Petrak, Petrak, Fl. Bohem. Morav. exs. 2108 (M-57514); DANMARK, Kopenhagen, 20 Sept. 1907, J. Lind, Flora Danica (B 70-6220); 25 Sept. 1907, J. Lind, Lind, Flora Danica (B 70-6219; HBG); GERMANY, Bayern, Mögeldorf near Nürnberg,

16 Sept. 1906, P. Magnus (HBG); Brandenburg, Berlin, Aug. 1924, Noack (B70-6224); Versuchsfeld near Dahlem, 20 Sept. 1902, P. Magnus (HBG); Kreis Oder-Spree, Erkner near Berlin, 18 Jun. 1892 (B 70-6228, holotype of *Cladosporium cucumeris*); Mecklenburg-Vorpommern, Bramow near Rostock, 18 Aug. 1924, Fr. Malchow (B 70-6225); Sachsen-Anhalt, Harz, Quedlinburg, 30 Jul. 1934 (B 70-6221); POLAND, Oberschlesien, Proskau, 1 Sept. 1895 (B 70-6226); ROMANIA, Muntenia, District Ilfov-Bucureşti, 13 Jul. 1933, T. Săvulescu & C. Sandu, Herb. Mycol. Rom. 643 (M-57515, M-57516); SWITZERLAND, Graubünden, Plantahof, Landquart, 23 Sept. 1901, A. Volkart (HBG); USA, Massachusetts, Clinton, Oct. 1892, C.A. Chase, Massachusetts Fungi 828 (NY). On *Cucumis* sp., GERMANY, Sachsen, Dresden-Stetzsch, Jul. 1920, Laubert (B 70-6222). On *Cucurbita pepo*, PAKISTAN, Lahore, Dec. 1951, S. Ahmad, Reliqu. Petrak. 2342 (B 70-6227; M-57513).

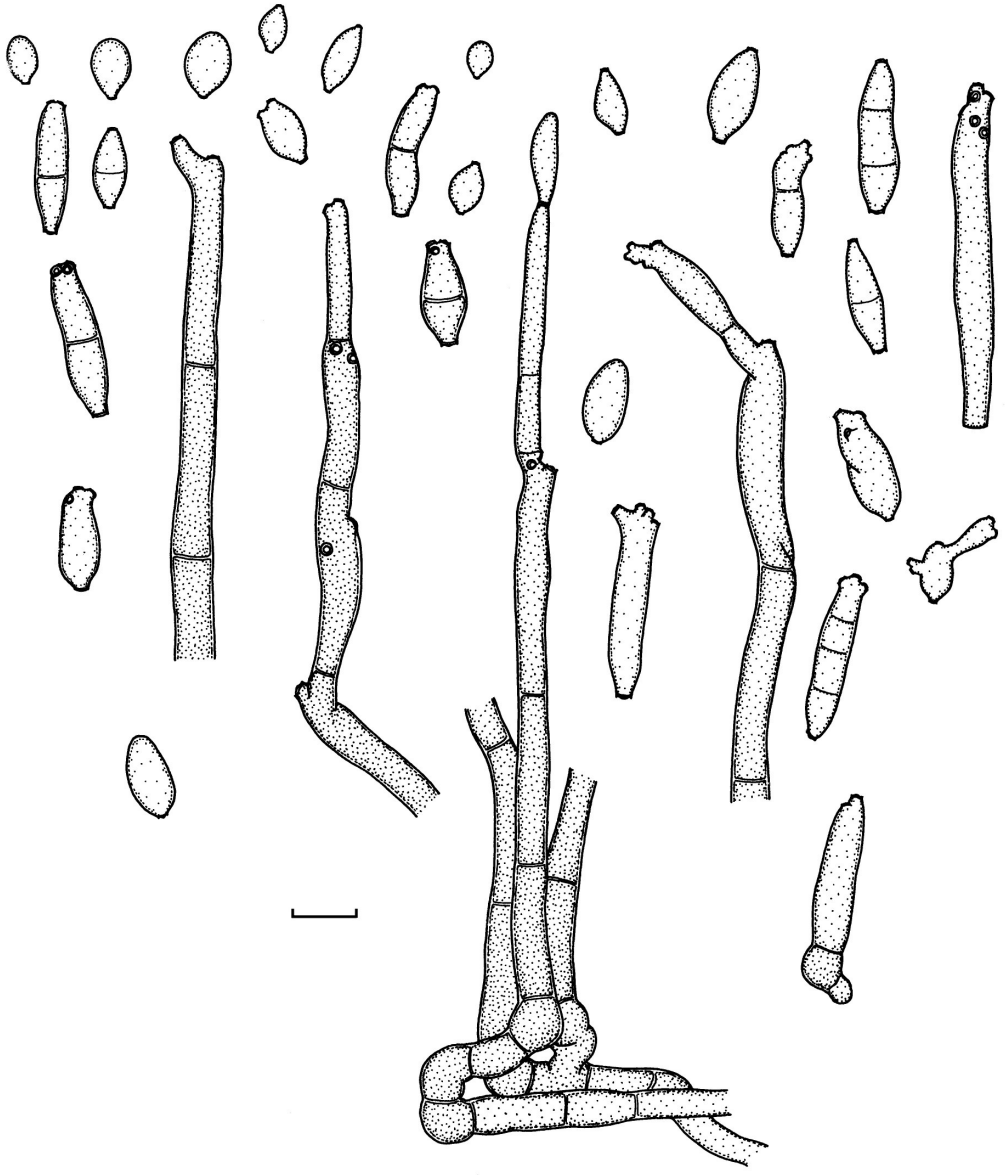

Fig. 19: *Cladosporium cucumerinum*. Conidiophores and conidia (from BPI 426422). Bar = 10 µm.

Notes: Original material of the herbarium name *C. cucumerinum* var. *europaeum* Bubák agrees very well with the species concept of *C. cucumerinum* and is therefore reduced to

synonymy with the latter species. In DE VRIES (1952) and MCKEMY & MORGAN-JONES (1992) '*Macrosporium cucumerinum* Ellis & Everh., Hedwigia 7: 49 (1896)' is cited as a synonym of *C. cucumerinum*, but in Hedwigia, vol. 7 (published in 1868, not in 1896) there is no reference to this name. On CABI page (Index fungorum) the original citation of *Macrosporium cucumerinum* is given as 'Proc. Acad. Nat. Sci. Philadelphia 1895: 440 (1895)' and '*Alternaria cucumerina* (Ellis & Everh.) A. Elliott, Amer. J. Bot. 4: 472 (1917)' is given as current name. DE VRIES (1952) listed *Chloridium polysporum* (Wallr.) Sacc. (≡ *Acladium polysporum* Wallr.) as an additional synonym and stressed that this name antedated *C. cucumerinum*. MCKEMY & MORGAN-JONES (1992) discussed this 'synonymy' and stated that the two species are not identical and do not even belong in the same genus. HUGHES (1958), who examined type material of Wallroth's species, reduced *A. polysporum* to synonymy with *Botrytis cinerea* Pers.

C. cucumerinum, belonging to a species complex with broadly similar conidiophore and conidium morphology, is close to *C. cladosporioides* and *C. vignae* M.W. Gardner. Besides very characteristic symptoms, its pathogenicity to several hosts of the Cucurbitaceae and its immersed hyphae often possessing a slime coat, *C. cucumerinum* is distinguished from *C. vignae* in having mostly longer conidiophores, ramoconidia s. str. and somewhat longer and wider ramoconidia s. lat.; and *C. cladosporioides*, which is considered to be saprobic and a secondary invader of diseased plant tissue, has usually narrower, non-geniculate conidiophores and somewhat narrower conidia. Furthermore, they are distinguished in vitro by colony appearance, particularly coloration, growth rates and degree of ramification of conidiophores. DE VRIES (1952), MCKEMY & MORGAN-JONES (1992) and HO et al. (1999) examined *C. cucumerinum* in culture and published detailed descriptions of its features in vitro recording the conidiophores as being narrower, not geniculate-sinuous and frequently branched, with branches often arising unilaterally, immediately below transverse septa, and conidia occasionally observed with up to 4 septa.

C. cucumerinum, the causal organism of crown blight and scab or gummosis disease is widespread and especially occurs on *Citrullus lanatus*, *Cucumis melo*, *C. sativus* and *Cucurbita pepo*. Records from other members of the Cucurbitaceae belong very probably to this species and are, therefore, listed under 'host(s)/substrate(s) & distribution'. ROBERTS et al. (1986) examined the internal mycoflora of achenes of *Helianthus annuus* (Asteraceae) and reported *C. cucumerinum* as isolated from developing sunflower seeds. Morphological data and illustrations have not been provided, and cultures could not be traced, so that a verification of the identity of the fungus concerned was not possible. HASIJA (1967) described this species from India on *Solanum tuberosum* (Solanaceae). In Korea, a *Cladosporium* species was isolated from leaves of *Solanum melongena* cultivated in greenhouses, and identified as *C. cucumerinum* by KWON et al. (1999). They carried out inoculation experiments to prove the identity and the pathogenic character of this fungus and reported it to successfully induce symptoms also in inoculated seedlings of watermelon, cucumber, oriental melon and pumpkins. One year later, KWON et al. (2000) reported *C. cucumerinum* to cause a black scab disease on sword bean, *Canavalia gladiata* (= *C. ensiformis*, Fabaceae) in greenhouses from Korea proved by inoculation experiments. MENDES et al. (1998) listed *Capsicum annuum* as a further host species. These records indicate that *C. cucumerinum* is possibly not confined to hosts of the family Cucurbitaceae. However, additional detailed inoculation experiments and especially molecular examinations are necessary to prove the host range of this species.

The original diagnosis of *Cladosporium dufourii* Brond. described on decaying fruits of cucurbits from France is very brief: 'Dense caespitosum, filamentis ramosis, geniculatis, septatis, olivaceis, e macula circulari atrocaerulea orientibus. Sporidiis rotundis vel oblongis, saepe didymis'. Since type material was not available, it remains unclear whether this species is similar or even identical with *C. cucumerinum*.

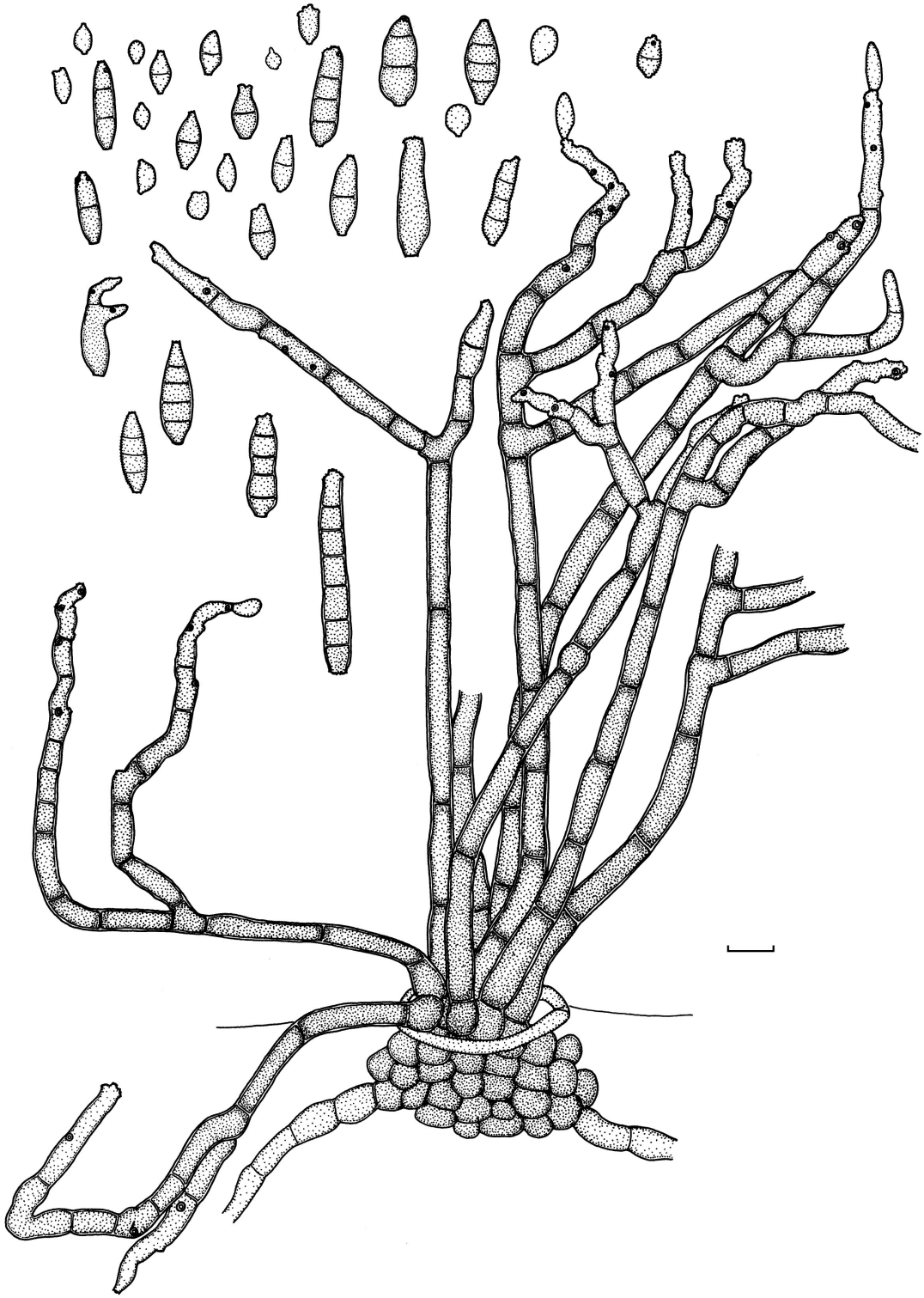

Fig. 20: *Cladosporium diaphanum*. Fascicle of conidiophores emerging through stomata and conidia (from isolectotype M-57507). Bar = 10 µm.

(17) *Cladosporium diaphanum* Thüm.

Figs 20–21; Pl. 10, Figs A–G

Cladosporium diaphanum Thüm., Mycoth. univ., Cent. XIX, No. 1868 (1881).

Lectotype: on dead leaves of *Photinia serrulata* (= *P. glabra*) (Rosaceae), France, Lyon, Jun. 1880, J. Therry, Thüm., Mycoth. univ. 1868 (HAL, selected by BRAUN 2001).

Isolectotypes: M-57506 and Thüm., Mycoth. univ. 1868 (e.g., B 70-6244; BPI 426451, BPI 426452; HBG; M-57507).
Topotypes: on *Photinia glabra*, France, Rhone-Alpes, Rhone, Lyon, Parc de la Tete-d'Or, J. Therry, Roum., F. sel. gall. exs. 5591 (e.g., B 70-6247).
Lit.: SACCARDO (1892: 603), ELLIS (1976: 342), BRAUN (2001: 56).
Ill.: ELLIS (1976: 341, Fig. 259 B), BRAUN (2001: 55, Fig. 2).
Exs.: Roum., F. sel. gall. exs. 5591; Thüm., Mycoth. univ. 1868.

On faded or dead leaves and petioles, without distinct leaf spots, causing whitish to pale greyish discolorations, membranous. *Colonies* usually hypophyllous, sparsely developed on the upper leaf surface, caespitose, punctiform to effuse, loose to dense, olivaceous-brown to brown or even blackish brown, velvety, often covering large areas or almost the entire leaf surface. *Mycelium* internal, mostly substomatal, subcuticular to intraepidermal; hyphae sparingly branched, 3–6 µm wide, septate, sometimes slightly constricted at the septa, subhyaline to pale brown, smooth, walls slightly thickened. *Stromata* or stromatic hyphal aggregations small to extended, mostly several layers deep, composed of subglobose to somewhat angular-oblong, polygonal cells, 5–9 µm wide, pale to medium or even dark brown, smooth, slightly thick-walled. *Conidiophores* solitary or often fasciculate, in loose to dense fascicles, arising from stromata or swollen hyphal cells, usually emerging through stomata, but also erumpent through the cuticle, erect to decumbent, straight to flexuous, filiform-setiform, not or somewhat geniculate-sinuous towards the apex, not or hardly nodulose, unbranched or often basely or apically branched, once to several times (mostly unilateral), 40–250(–300) × (3–)4–7(–8) µm, pluriseptate, sometimes slightly constricted at the septa, medium brown to medium dark golden brown, base often somewhat darker, paler towards the apex, smooth, occasionally faintly rough-walled, thick-walled, sometimes distinctly two-layered, often somewhat wider or swollen at the base, up to 11(–13) µm wide, attenuated towards the apex, protoplasm of the cells somewhat aggregated at the septa, which appear to be thickened, similar to distoseptation, pale and not very conspicuous. *Conidiogenous cells* integrated, terminal and intercalary, 7–40 µm long, proliferation sympodial, with one to several conidiogenous loci, more or less protuberant, 1–2.5(–3) µm diam., dome only somewhat higher than the surrounding rim, thickened, darkened-refractive. *Ramoconidia* s. str. occasionally observed. *Conidia* catenate, in unbranched or branched chains, mostly straight, dimorphic, small aseptate conidia subglobose, ovoid, limoniform, ellipsoid, fusiform, (2–)3–14 × 2–6 µm, pale, walls thin to only slightly thickened, smooth to faintly rough-walled, larger conidia obovoid, ellipsoid, fusiform to cylindrical, 9–45 × 4–8 µm, (0–)1–6-septate, sometimes slightly constricted at the septa, pale olivaceous to medium brown, smooth to minutely verruculose, walls slightly thickened, apex rounded or slightly attenuated towards the apex and base, hila protuberant, 1–2.5(–3) µm diam., thickened, darkened-refractive; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Photinia* spp. (Rosaceae), Europe – *Photinia glabra* (France) (only known from the type collection).

Notes: Conidiophores in the lectotype and isolectotype material are often once or several times branched, whereas those in the authentic material distributed as 'Roum., F. sel. gall. exs. 5591' are usually unbranched. *C. diaphanum* was collected in June on faded or dead leaves of *Photinia glabra*, but it remains unclear, whether this species caused the premature dying and leaf fall or whether it is a saprobic species. Additional collections are necessary to clarify the biology of this taxon.
Among the *Cladosporium* species occurring on leaves of various host genera and families some morphologically similar species with pluriseptate (more than 3 septa) conidia and non-nodulose conidiophores are easily distinguishable from *C. diaphanum* in having wider

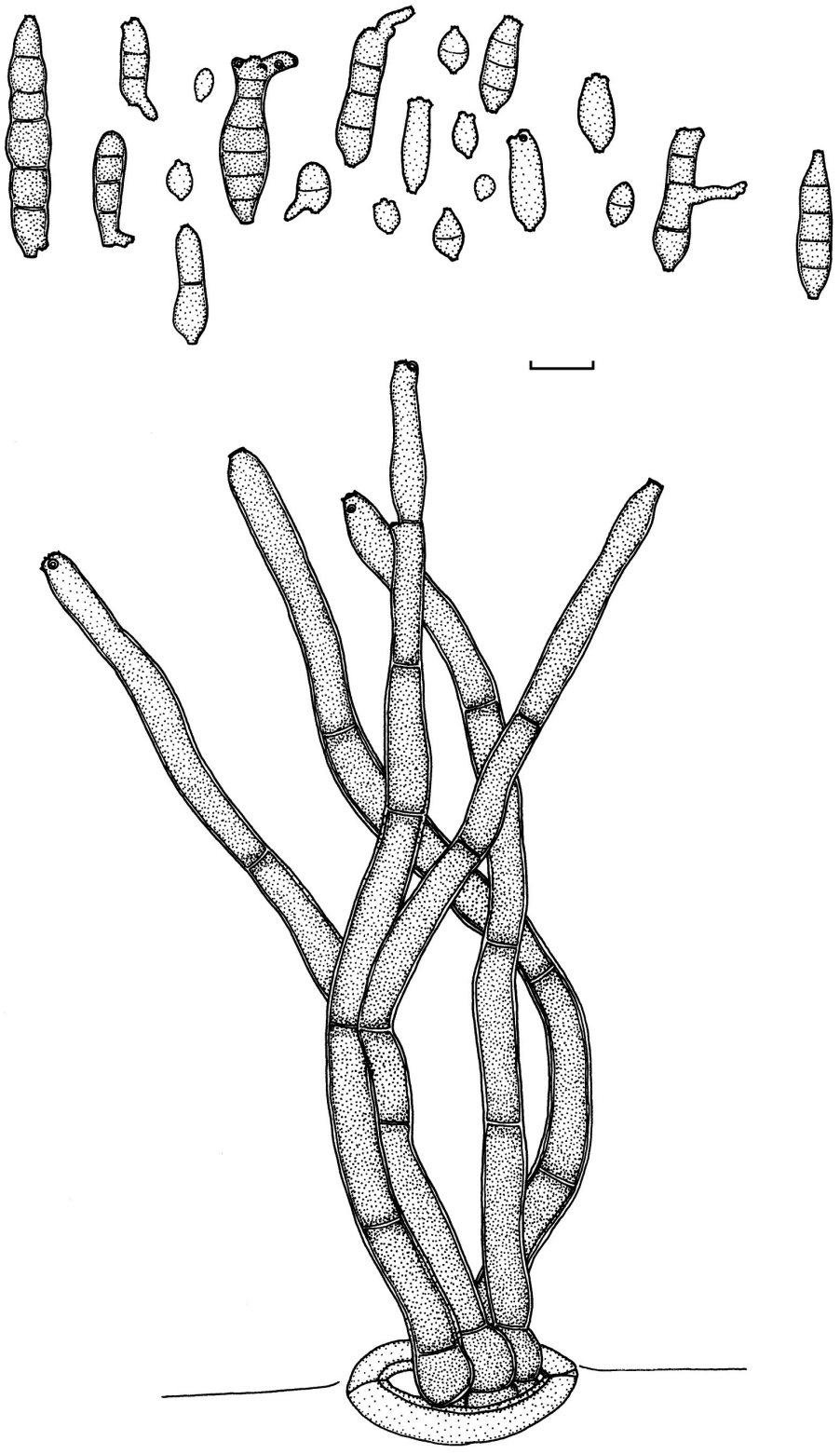

Fig. 21: *Cladosporium diaphanum*. Conidiophores and conidia (from topotype B 70-6247). Bar = 10 µm.

conidia [5–14(–17) µm wide in *C. coryphae*], shorter and partly narrower, usually unbranched conidiophores (35–130 µm long in *C. bosciae*; 5–90 × 3–5 µm in *C. spongiosum* Berk. & M.A. Curtis), narrower conidiogenous loci (usually 0.5–1.5 µm diam. in *C. spongiosum*) and differ in the formation and arrangement of conidiophores

(conidiophores solitary, arising as terminal or lateral branches of creeping hyphae in *C. spongiosum*; conidiophores arising from external mycelium in *C. coryphae*; conidiophores solitary or in loose groups arising from intraepidermal stromata or from swollen hyphal ropes in *C. bosciae*). The widespread saprobic *C. herbarum* is quite distinct in having verruculose to verrucose, 0–3-septate, shorter conidia and nodulose conidiophores with conidiogenous loci restricted to swellings.
In absence of a monograph of the genus *Cladosporium*, BRAUN (2001) assigned some collections on several basidiomycetes to *C. diaphanum*. During the course of a morphotaxonomic revision of fungicolous *Cladosporium* species these collections were re-examined and proved to be identical with *C. lycoperdinum* Cooke (HEUCHERT et al. 2005). The conidia of the latter species are shorter, (2–)6–28 µm long, 0–3-septate, narrow ramoconidia s. str. with up to 5 septa (21–32 × 4.5–5.5 µm) are occasionally formed and the walls of the conidiophores are only slightly thickened and not distinctly two-layered.
C. diaphanum has been recorded on *Laurocerasus officinalis* from Georgia, which could not be confirmed.

(18) *Cladosporium dracaenatum* Thüm.

Figs 22–23; Pl. 11, Figs A–G

Cladosporium dracaenatum Thüm., Mycoth. univ., Cent. XIX, No. 1869 (1881).

Syntypes: on living leaves of *Dracaena cooperi* (= *Cordyline terminalis*) (Dracaenaceae), USA, South Carolina, Aiken, 1876, H.W. Ravenel, Thüm., Mycoth. univ. 1869 (e.g., B 70-6248; BPI 426454, BPI 426455; BR-MYC 8172,86; HAL; HBG; M-57504).
Lit.: SACCARDO (1892: 605).
Exs.: Thüm., Mycoth. univ. 1869.

On living leaves, amphigenous, forming distinct patches, irregular in shape and size, pale to dark grey-brown or dark olivaceous-brown, without margin, sometimes confluent. *Colonies* amphigenous, scattered, in small tufts, caespitose, loose to dense, sometimes floccose, brown. *Mycelium* internal, intraepidermal, later also external, growing superficially; hyphae creeping, branched, 3–9 µm wide, septate, often constricted at the septa and then cells more or less irregularly swollen, subhyaline, pale olivaceous-green to pale brown, smooth, walls only slightly thickened, forming stromata and loose to dense hyphal aggregations. *Stromata* small to moderately large, usually well-developed, substomatal to intraepidermal, subglobose, 15–70 µm wide, few to several layers deep, composed of swollen hyphal cells, subglobose to somewhat angular or irregular, pale to medium brown, smooth, walls thickened. *Conidiophores* in small to moderately large fascicles, few to numerous, loosely arranged, arising from stromata, emerging through stomata or erumpent through the cuticle, or solitary arising from external hyphae or secondary conidia, erect, straight to more or less flexuous, often once to several times mildly to distinctly geniculate-sinuous, sometimes very slightly nodulose, unbranched or branched, once or twice, 20–240 × 3–5(–5.5) µm, pluriseptate, septa often not very conspicuous, pale brown, somewhat darker near the base, pale medium brown, smooth or minutely asperulate or somewhat irregularly rough-walled with age, sometimes minutely verruculose near the apex, walls slightly thickened, one-layered, often slightly swollen at the base. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical to often geniculate, 8–40 µm long, proliferation sympodial, with a single or few conidiogenous loci, often situated on small lateral shoulders or unilateral swellings, protuberant, often subdenticulate, short cylindrical, 1–2(–2.5) µm diam., dome often somewhat higher than the surrounding rim, thickened and somewhat darkened-refractive. *Conidia* catenate, in branched chains, straight, obovoid, ellipsoid to subcylindrical or cylindrical, 3.5–26 × 3–7(–8) µm, 0–3-septate, sometimes slightly constricted at the septa, pale brown, smooth or

almost so to minutely or distinctly verruculose, walls only slightly thickened, apex and base rounded, sometimes slightly attenuated, with age conidia becoming longer and wider, distinctly swollen, up to 36 µm long or even longer and up to 11 µm wide, with up to 7 septa, septa occasionally somewhat sinuous, darker, pale medium to medium brown or medium olivaceous-brown, thick-walled with a somewhat irregular surface ornamentation, sometimes with a single longitudinal septum, confusable with superficially growing swollen hyphae, hila protuberant, short cylindrical, truncate, 1–2(–2.5) µm diam., thickened and somewhat darkened-refractive; microcyclic conidiogenesis often occurring.

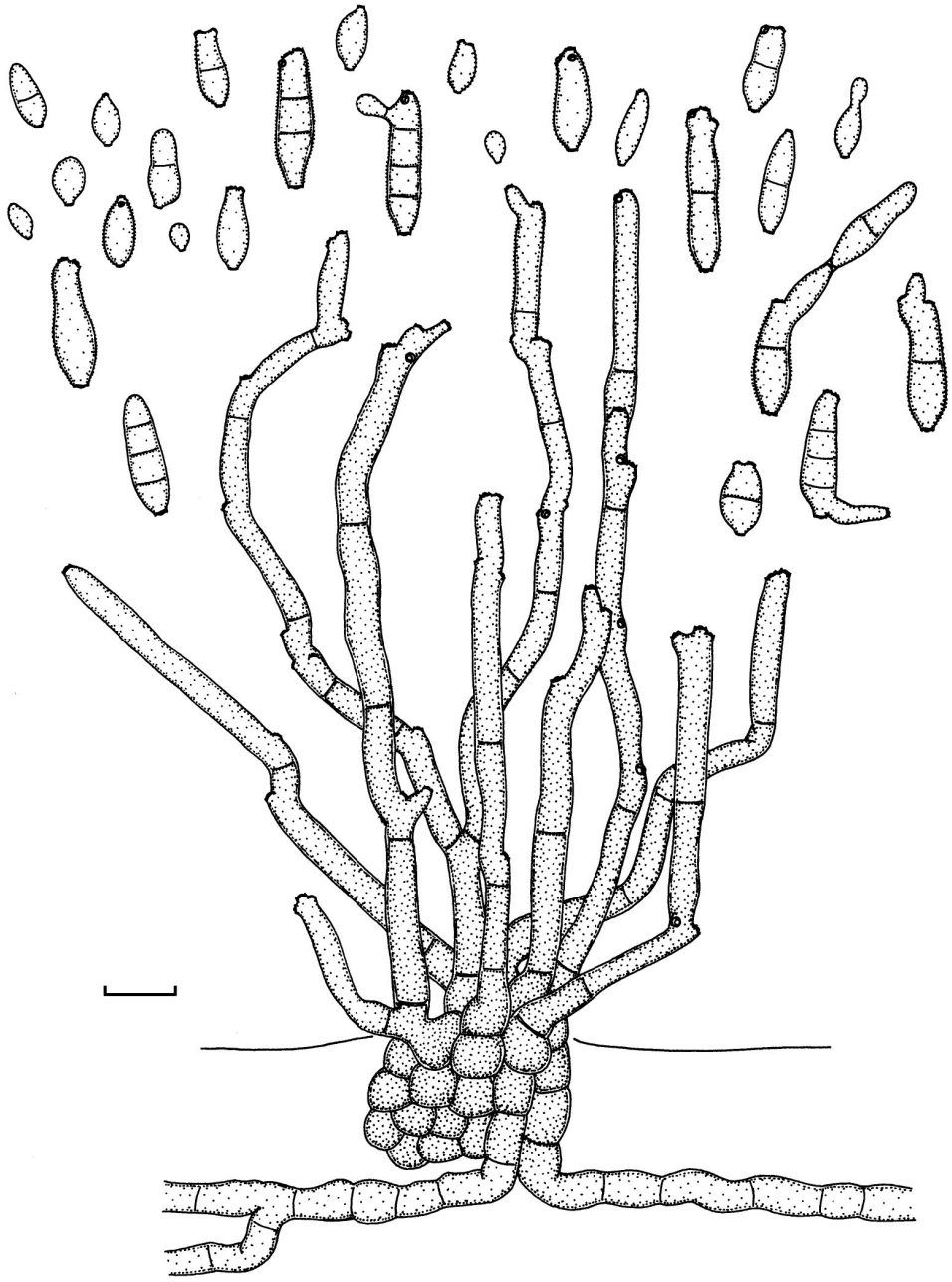

Fig. 22: *Cladosporium dracaenatum*. Fascicle of conidiophores and conidia (from syntype B 70-6248). Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Cordyline* and *Dracaena* spp. (Agavaceae), North America – *Cordyline indivisa* (USA, CA), *C. terminalis* (USA, SC), *Cordyline* sp. (USA, FL, SC), *Dracaena draco* (USA, SC), *Dracaena* sp. (USA, CA, OR, SC).

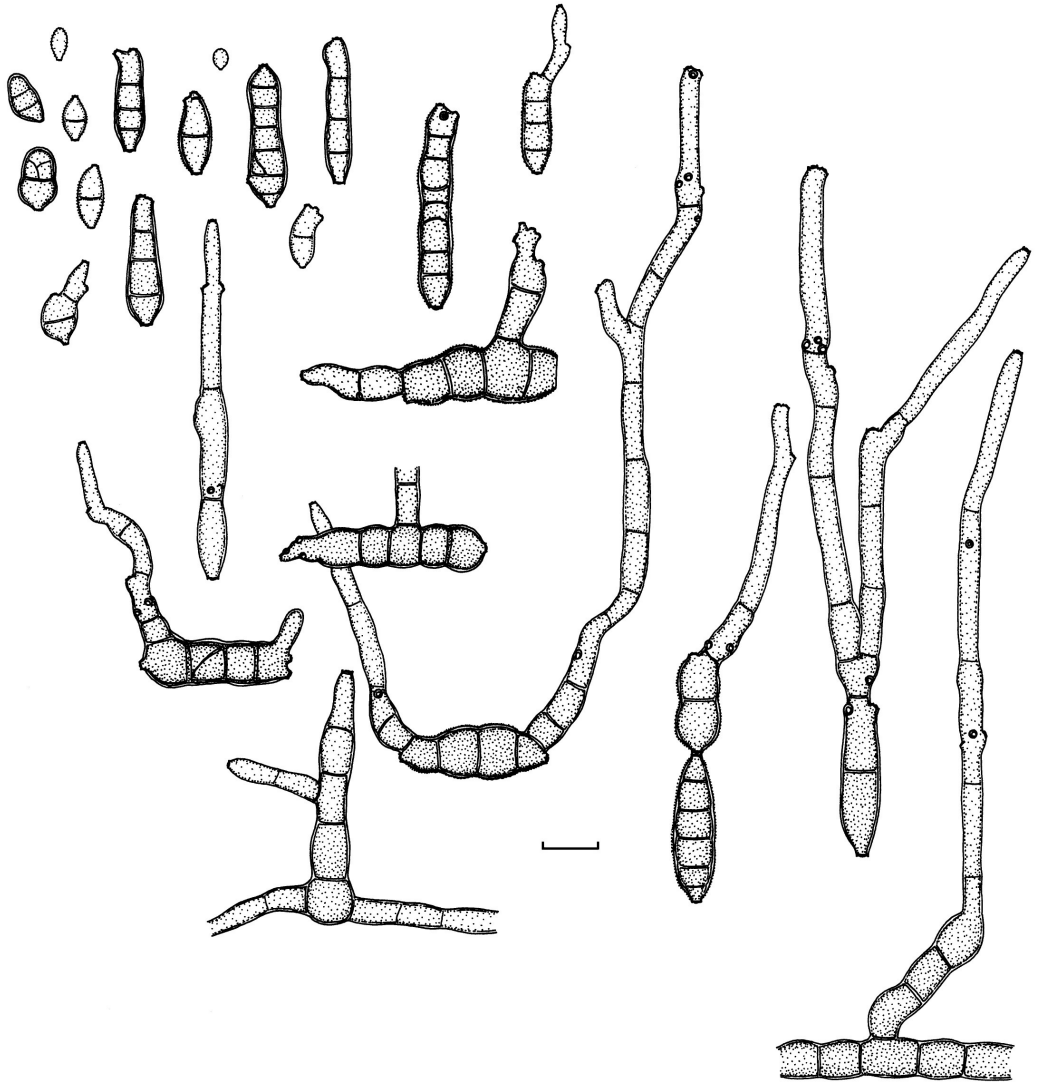

Fig. 23: *Cladosporium dracaenatum*. Conidiophores, old, swollen conidia and microcyclic conidiogenesis (from syntype M-57504). Bar = 10 µm.

Notes: FARR et al. (n.d.) reduced *C. dracaenatum* to synonymy with *C. elatum* (Harz) Nannf. However, the latter species is quite distinct and do not even belong in *Cladosporium* s. str. It is morphologically indistinguishable from the human-pathogenic species of *Cladophialophora*, but differs in being sensitive to cycloheximide (DE HOOG et al. 2000). The taxonomic position of *C. elatum* remains to be determined (HO et al. 1999). VANEV & TASEVA (1990) reported *C. dracaenatum* on *Dracaena draco* from Bulgaria. BAKA & KRZYWINSKI (1996) examined fungi associated with leaf spots of the endemic and now nearly extinct *Dracaena ombet* in Sudan and reported *C. dracaenatum* as one of the most common isolates and an important reason for the decline of this tree. They discussed the explosive spread of the disease either as pointing to an epidemic outbreak of a lethal pathogen influenced by external factors, or as a result of long-distance mass transport. Besides pathogenicity tests, SEM and TEM examination were carried out to detect and confirm the compatibility between *Dracaena* leaves and the pathogen. Remarkable

ultrastructural changes of cell organelles after infection were noticed indicating that the fungus examined was a true pathogen. BAKA & KRZYWINSKI (1996) did not provide a detailed description of its morphology, but described branched conidiophores emerging through stomata and producing new conidia, so it is possible that they actually dealt with *C. dracaenatum*. Probably, *C. dracaenatum* is not confined to North America and more common than indicated under host(s)/substrate(s) & distribution.

(19) *Cladosporium foliorum* Ellis & Everh. ex K. Schub.

Fig. 24; Pl. 9, Figs F–I

Cladosporium foliorum Ellis & Everh. ex K. Schub., **sp. nov.**
≡ *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, 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.

Host(s)/substrate(s) & distribution: on *Angelica* spp. (Apiaceae), North America – *Angelica breweri* (USA, CA) (only known from the type collection).

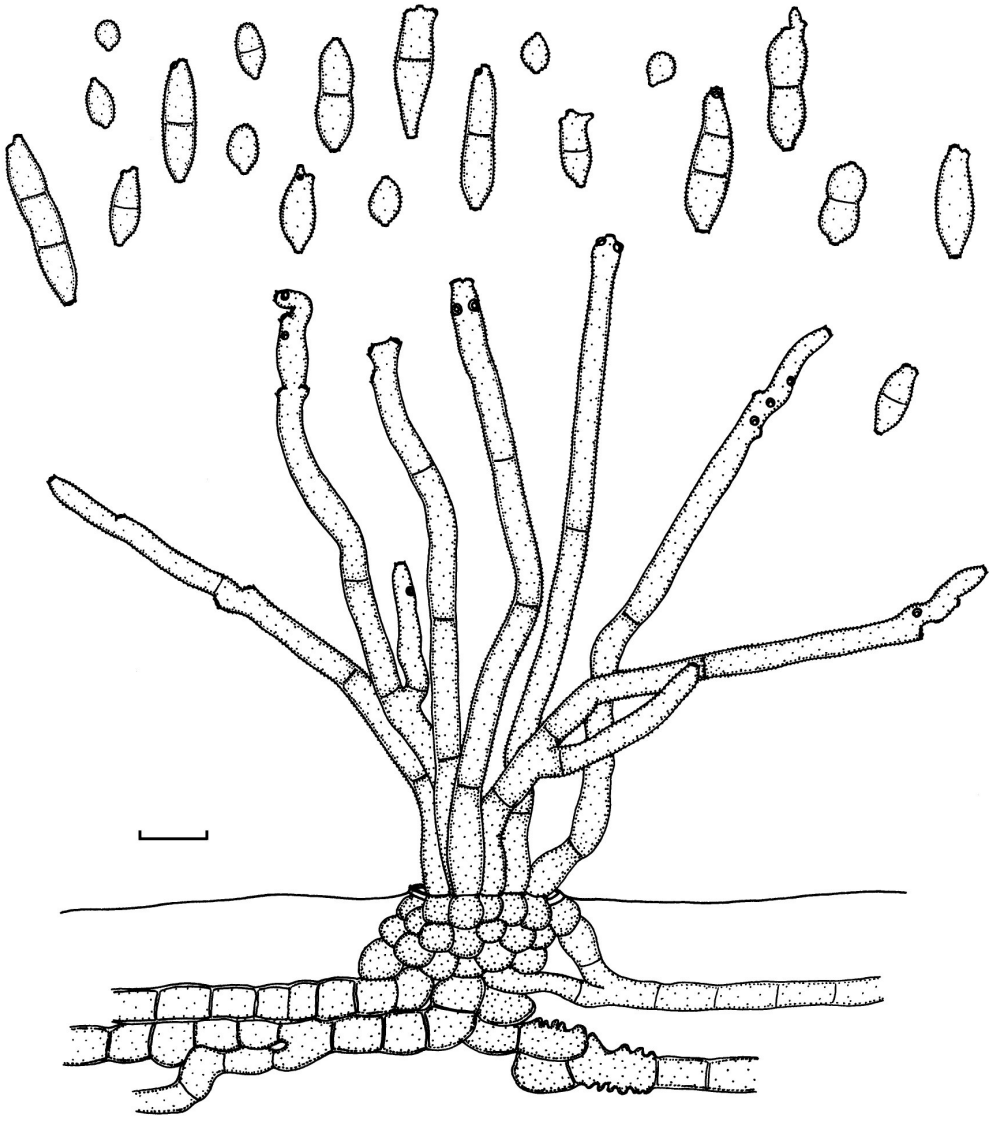

Fig. 24: *Cladosporium foliorum*. Fascicle of conidiophores and conidia. Bar = 10 µm.

Notes: 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. *C. dracaenatum* 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. Other *Cladosporium* species described on a host 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* [*C. punctiforme* Fuckel = *Pseudocercospora saniculae-europaeae* (E. Müll. & Arx) U. Braun & Crous]. *C. 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.

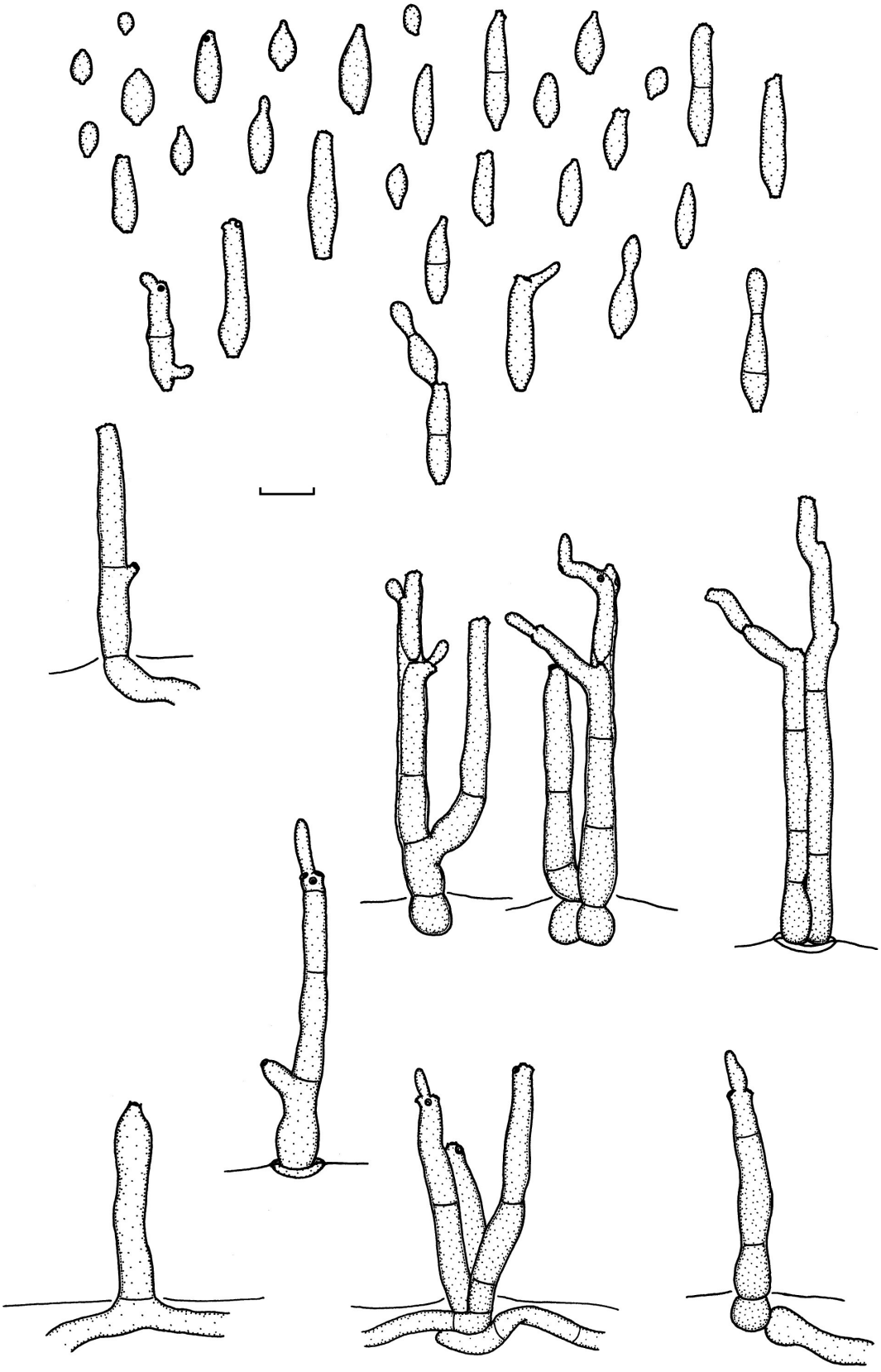

Fig. 25: *Cladosporium fraxinicola*. Conidiophores and conidia. Bar = 10 µm.

(20) *Cladosporium fraxinicola* K. Schub. & Mułenko

Figs 25–27; Pl. 12, Figs A–H

Cladosporium fraxinicola K. Schub. & Mułenko, **sp. nov.**

Differt a *C. myrtacearum* locis conidiophoris et hilis latioribus, ad 3 µm diam., conidiis longioribus, ad 31 µm, ad 3-septatis, saepe non constrictos; et a *C. psoraleae* conidiophoris latioribus, saepe 4–9 µm, crassitunicatis, interdum bistratos 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 Braun, F. sel. exs. 47; Poland, Lublin, street margin, 10 Aug. 2004, W. Mułenko (HAL 1831 F) and Braun, F. sel. exs. 48.
Exs.: Braun, F. sel. exs. 47, 48.

On living leaves, causing leaf spots, amphigenous, variable in shape and size, subcircular to oval-elliptical or irregularly 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, villose. *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 superficially, erect, straight to slightly flexuous, often geniculate-sinuous, somewhat 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, lumen sometimes granular. *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 diam., 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 cylindrical, 6.5–31 × 3.5–6 µm, 0–2(–3)-septate, rarely somewhat constricted at the septa, pale olivaceous, smooth to minutely verruculose, walls only slightly thickened, lumen sometimes appearing to be granular, apex rounded or truncate, somewhat attenuated towards the apex and base, base truncate to slightly convex, hila (0.5–)1–3 µm diam., thickened, darkened-refractive; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Fraxinus* spp. (Oleaceae), Europe – *Fraxinus excelsior* (Germany, Poland).

Notes: Several *Cladosporium* taxa have been described from *Fraxinus* spp. *C. acutum* Ellis & Dearn. described on *Fraxinus* sp. from Canada is conspecific with *C. herbarum*. *C. 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*, Thüm., Herb. mycol.

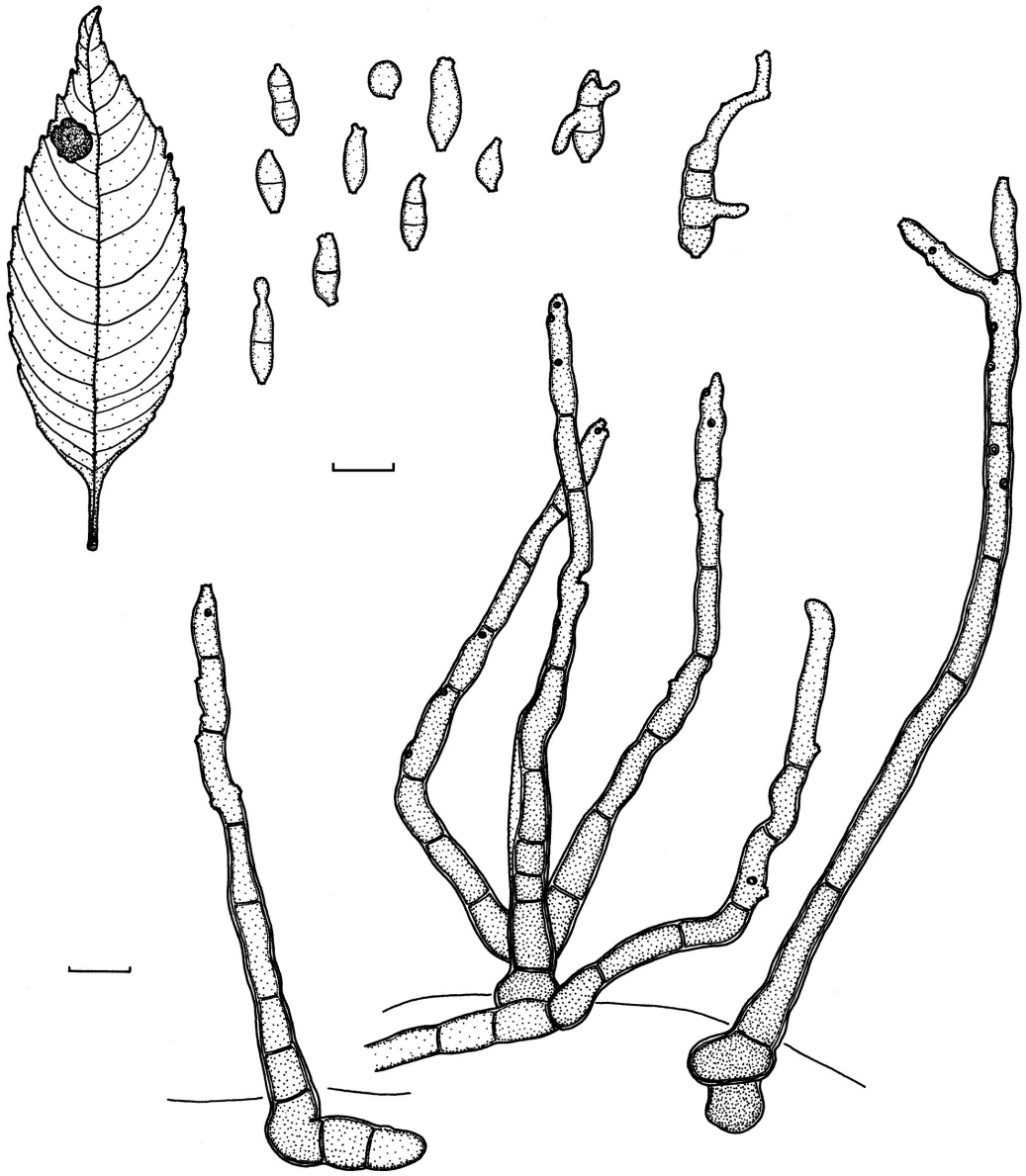

Fig. 26: *Cladosporium fraxinicola*. Symptoms, conidiophores and conidia (from paratype HAL 1830 F). Bar = 10 µm.

oec. 375, B 70-6422) 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, 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, *C. 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 and consistently one-layered walls, 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 narrower, only 1–2 µm diam. 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. Attempts to grow *C. fraxinicola* in culture failed.

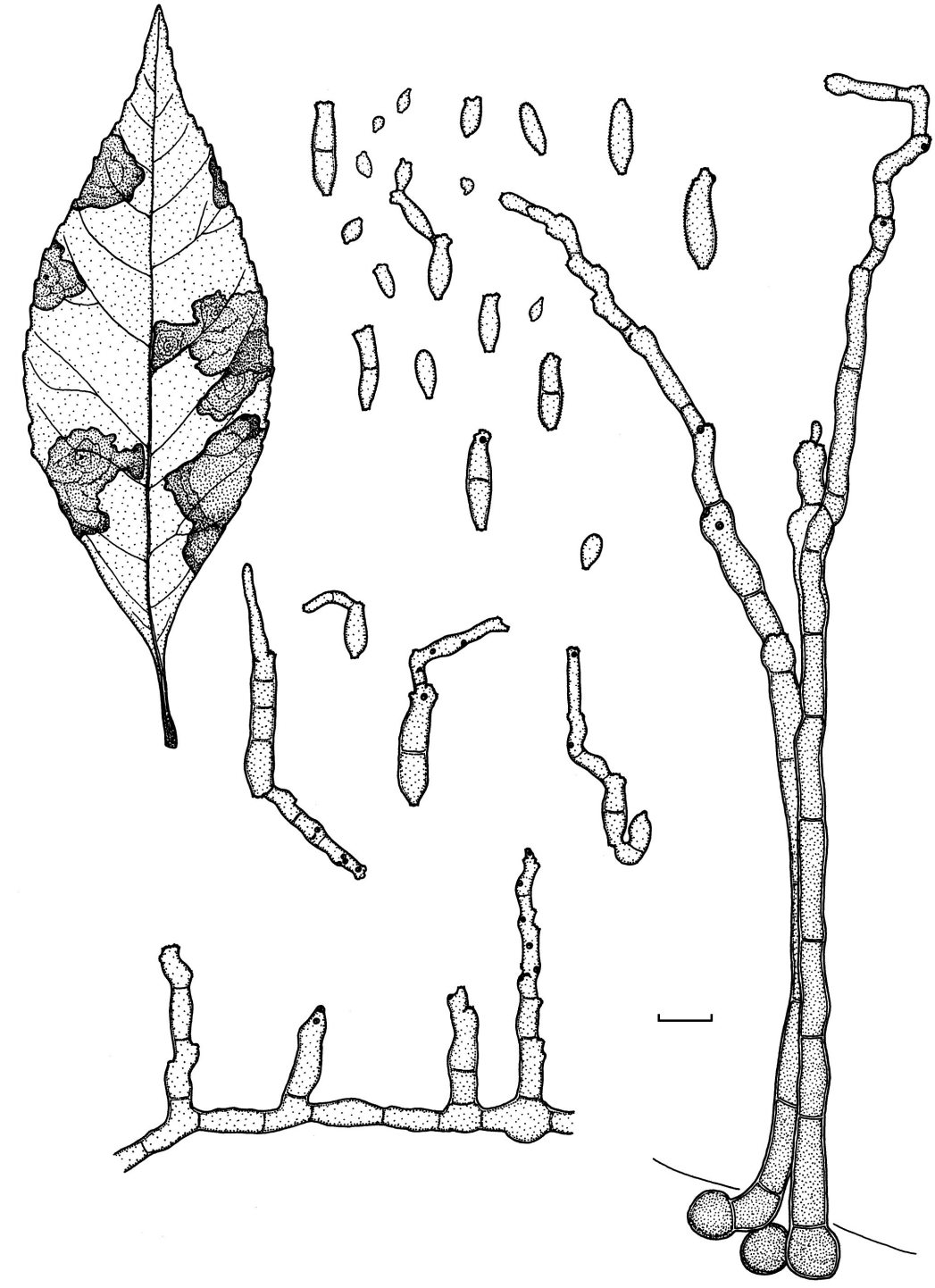

Fig. 27: *Cladosporium fraxinicola*. Symptoms, conidiophores, conidia and microcyclic conidiogenesis (from paratype HAL 1831 F). Bar = 10 µm.

(21) *Cladosporium fumagineum* Sacc.

Fig. 28; Pl. 13, Figs A–C

Cladosporium fumagineum Sacc., Nuovo Giorn. Bot. Ital., N.S., 27: 86 (1920).

Lectotype (designated here): on living leaves of *Quercus* sp. (Fagaceae), USA, Wyoming, Cook Co., Devils Tower, 28 Jul. 1918, J.R. Weir, No. 10025 (PAD).
Isolectotype: BPI 426763.
Lit.: SACCARDO (1931: 791).

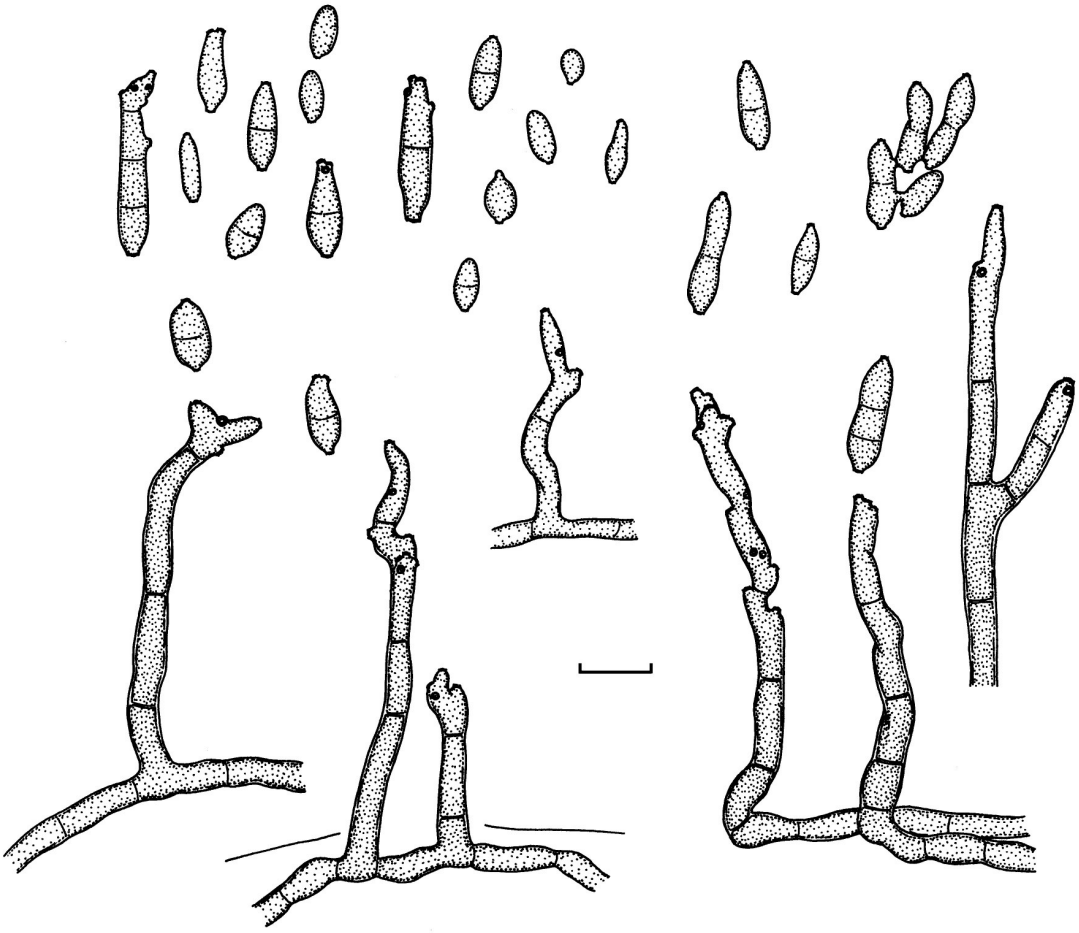

Fig. 28: *Cladosporium fumagineum*. Conidiophores and conidia. Bar = 10 µm.

Leaf spots amphigenous, oval to somewhat irregular, often confluent, epiphyllous spots pale greyish brown to pale reddish brown, margin indefinite or narrow and somewhat darker reddish brown, sometimes surrounded by a narrow whitish grey halo, hypophyllous olivaceous-brown to dark brown, surrounded by a narrow pale yellowish to pale reddish brown halo. *Colonies* hypophyllous, effuse, densely caespitose, dark brown, not vein-limited, velvety. *Mycelium* internal and external; hyphae branched, 2–5 µm wide, septate, often slightly constricted at the septa, pale olivaceous to olivaceous-brown, smooth, walls slightly thickened, often with small swellings, up to 7 µm wide, forming a loose hyphal network. *Conidiophores* solitary or in small loose groups of 2–3, arising from internal and external creeping hyphae, terminal and lateral, erect, straight to somewhat flexuous, slightly geniculate-sinuous towards the apex, unbranched or once branched, 14–150 × 3–5.5 µm, septate, olivaceous-brown, somewhat paler towards the apex, smooth, walls thickened. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, 7–25 µm

long, somewhat geniculate-sinuous, proliferation sympodial, with a single to several conidiogenous loci, subdenticulate, truncate to slightly convex, 1–2 µm diam., thickened, darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight to slightly curved, subglobose, ovoid, obovoid, ellipsoid, fusiform to subcylindrical, 2.5–25 × 2.5–5.5 µm, 0–2(–3)-septate, sometimes constricted at the septa, olivaceous to olivaceous-brown or medium brown, smooth, walls only slightly thickened, apex often rounded, hila protuberant, truncate to slightly convex, 0.5–2 µm diam., somewhat thickened and darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Quercus* spp. (Fagaceae), North America – *Quercus* sp. (USA, WY) (only known from the type collection).

Notes: This species is morphologically close to some collections of *C. uredinicola* Speg. on *Phyllactinia angulata* on leaves of *Quercus* sp. However, no powdery mildew fungi could be observed on the leaves of the lectotype material, and leaf spots are formed. Since *C. uredinicola* is a fairly variable, fungicolous species mainly occurring on uredospores of several rust fungi, which mostly produces much longer conidia (HEUCHERT et al. 2005), *C. fumagineum* is tentatively maintained as a separate species. Additional collections are needed to clarify the taxonomic status of this taxon.

(22) *Cladosporium fusicladiiformis* Gonz. Frag.

Fig. 29; Pl. 14, Figs A–G

Cladosporium fusicladiiformis Gonz. Frag., Trab. Mus. Nac. Ci. Nat., Ser. Bot. 10: 188 (1916).

Holotype: on living leaves of *Eriobotrya japonica* (Rosaceae), Spain, near Dos Hermanas, Sevilla, 22 Mar. 1915, Gonzáles-Fragoso (MA 06413).
Lit.: GONZÁLES-FRAGOSO (1927: 205), SACCARDO (1931: 795).

Leaf spots amphigenous, numerous, scattered, subcircular, rarely somewhat oblong, up to 8 mm diam., later confluent, pale greyish brown by the detached cuticle, surrounded by a narrow, dark brown margin. *Colonies* mostly hypophyllous, in small tufts, loosely scattered over leaf spots, non-caespitose, filiform, brown, villose. *Mycelium* internal, subcuticular to intraepidermal, sometimes also external, growing superficially, occasionally growing in leaf hairs; hyphae branched, (1–)2–5(–7) µm wide, septate, often with swellings and constrictions, subhyaline, pale to pale medium brown or somewhat yellowish brown, smooth, walls somewhat thickened. *Stromata* usually well-developed, substomatal, occasionally intraepidermal, 20–50 µm diam., few layers deep, composed of swollen hyphal cells, more or less subglobose, 5–11 µm diam., medium brown or somewhat yellowish brown, smooth, thick-walled. *Conidiophores* dimorphic, fasciculate, usually in small loose fascicles (up to 10), arising from stromata, mostly emerging through stomata, sometimes erumpent through the cuticle, erect, more or less flexuous, cylindrical-oblong to filiform, not geniculate, unbranched or branched, 50–300 × 3–6.5(–8) µm, sometimes nodulose, with small intercalar swellings, up to 7 µm diam., attenuated towards the apex and slightly swollen at the base, up to 10 µm wide, pluriseptate, sometimes slightly constricted at the septa, medium brown, paler towards the apex, sometimes subhyaline at the apex, smooth to somewhat asperulate, especially in the lower part, thick-walled, often distinctly two-layered, 0.5–1.5 µm wide, walls thinner towards the apex, occasionally enteroblastically proliferating, cell structure apparently distoseptate, with protoplasm aggregated near the septa and a paler cavity in the centre of the cells; second type of conidiophores shorter, narrower and paler, solitary, arising from superficially growing hyphae or swollen hyphal cells, erect, more or less straight, unbranched, 8–45 × 2–4 µm, septate, pale olivaceous, smooth, walls somewhat thickened, not distinctly two-layered

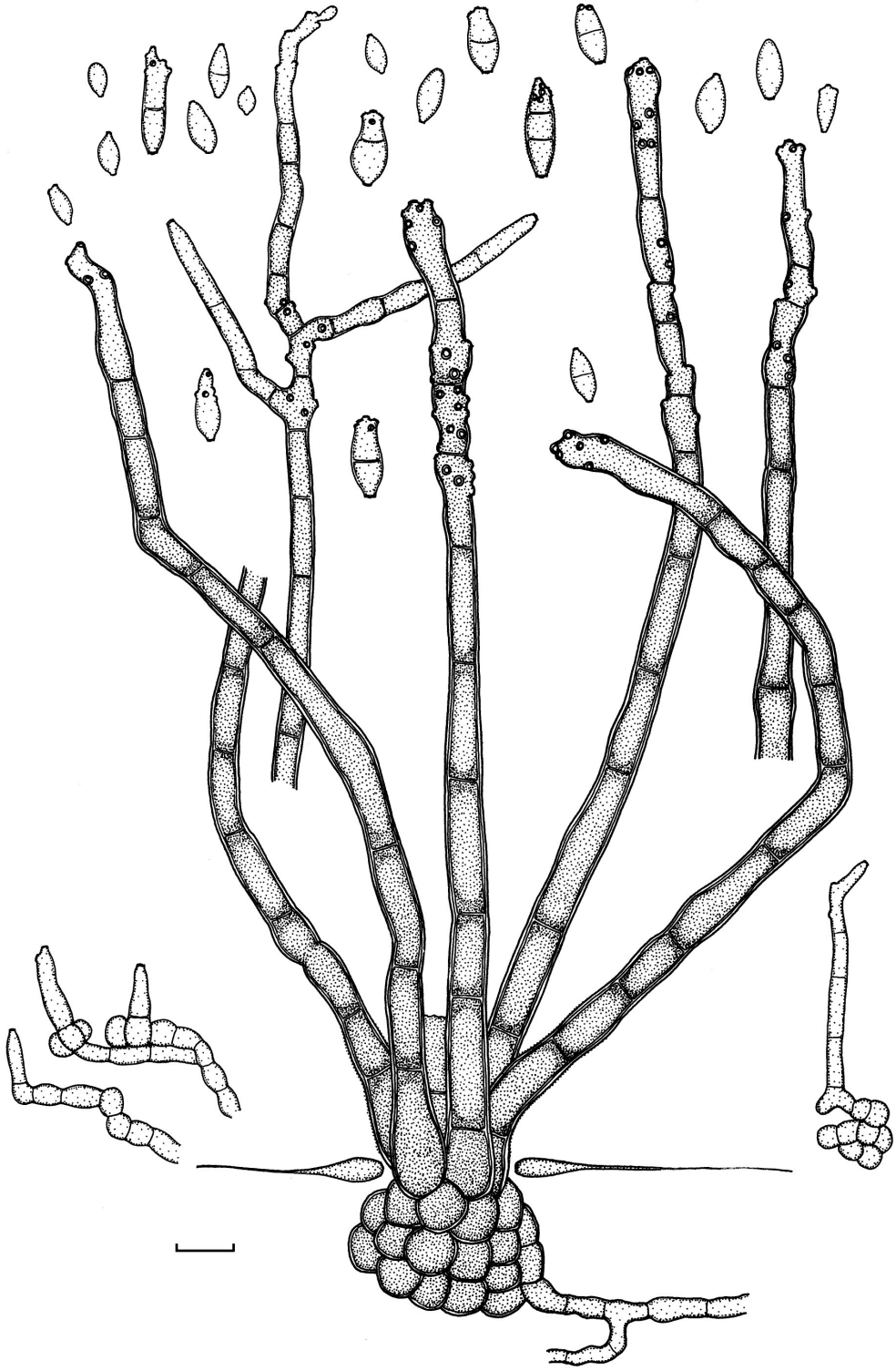

Fig. 29: *Cladosporium fusicladiiformis*. Dimorphic conidiophores and conidia. Bar = 10 µm.

Conidiogenous cells integrated, terminal and intercalary, cylindrical-oblong, 5–30 µm long, proliferation sympodial, with few to numerous, sometimes crowded conidiogenous loci, sometimes situated on small lateral shoulders or intercalar and terminal swellings, but not confined to them, somewhat protuberant, truncate and flat to slightly convex, 1–2 µm diam., thickened, often not darkened, but somewhat refractive. *Ramoconidia* s. str. not observed. *Conidia* catenate, in branched chains, obovoid, ellipsoid, fusiform, subcylin-

drical, 3.5–14(–20) × 2.5–6 µm, 0–1(–2)-septate, septa not very conspicuous, sometimes slightly constricted at the septa, very pale, subhyaline to very pale brown, smooth or almost so, occasionally minutely verruculose, walls somewhat thickened, sometimes apparently two-layered, ends rounded or slightly attenuated, hila more or less protuberant, slightly convex, 0.5–2 µm diam., thickened, refractive, sometimes slightly darkened; microcyclic conidiogenesis sometimes observed.

Host(s)/substrate(s) & distribution: on *Eriobotrya* spp. (Rosaceae), Europe – *Eriobotrya japonica* (Spain) (only known from the type collection).

Notes: In SACCARDO (1931), *C. fusicladiiformis* was discussed as being similar to *Fusicladium eriobotryae* (Cavara) Cavara, but the latter species, which proved to be a member of *Fusicladium* conspecific with *F. pomi* (Fr.) Lind (SCHUBERT et al. 2003), is quite distinct by having percurrently proliferating conidiogenous cells and non-coronate conidiogenous loci. Furthermore, SACCARDO (1931) stated that *C. eriobotryae* Pass. & Beltr. and *C. nervisequum* Mont., both described on leaves of *Eriobotrya japonica* and antedating *C. fusicladiiformis*, differ from the latter species. The conidia of *C. nervisequum* were described to be oblong, 1–3-septate, longer and wider, 10–25 × 5–10 µm (MONTAGNE 1857). The conidiophores of *C. eriobotryae* are caespitose, usually unbranched and short, and the conidia are 1–3-septate (PASSERINI & BELTRANI 1882). Type material of these taxa could not be traced and re-examined. Most of the other *Cladosporium* species described on hosts belonging to the Rosaceae have been excluded from the genus (SCHUBERT et al. 2003; SCHUBERT 2005; BRAUN et al. 2003) or proved to be synonyms of the widespread *C. herbarum* and *C. cladosporioides*. *C. diaphanum* on *Photinia glabra* is distinguished by having 0–6-septate, longer and wider conidia and somewhat wider conidiogenous loci and hila.
C. apicale on *Cycas circinalis* and *C. ushuwaiense* known from Argentina on *Berberis ilicifolia* are morphologically comparable with *C. fusicladiiformis* but do not possess dimorphic conidiophores. Furthermore, they deviate in having conidiophores with thicker walls [0.75–3 µm wide in *C. apicale*; 0.5–2(–3) µm wide in *C. ushuwaiense*], the conidia of *C. apicale* are 0–3-septate, and the conidia of *C. ushuwaiense* differ in being usually verruculose.

(23) *Cladosporium galii* Mułenko, K. Schub. & M. Kozlowska

Fig. 30; Pl. 13, Figs D–F

Cladosporium galii Mułenko, K. Schub. & M. Kozlowska, Mycotaxon 90(2): 272 (2004).

Holotype: on living leaves of *Galium odoratum* (Rubiaceae), Poland, Nizina Północnopodlaska, Białowieża Forest, Białowieża National Park, Forest Compartment 342, Permanent plot No 40 BSG UW, single collection in oak-linden-hornbeam forest (*Tilio-Carpinetum*), 26 Sept. 1992, W. Mułenko (LBLM–8459).
Isotype: HAL 1811 F.
Ill.: MUŁENKO et al. (2004: 273, Fig. 1).

On living leaves, distinct leaf spots lacking, but with pale olivaceous-brown to greyish discolorations. *Colonies* hypophyllous, rarely epiphyllous, punctiform, in small tufts, scattered, pale to dark brown, sometimes almost blackish. *Mycelium* internal, subcuticular to subepidermal, immersed; hyphae branched, (3–)4–8(–10) µm wide, septate, with swellings and constrictions, pale to medium brown, smooth, walls slightly thickened, forming loose to somewhat denser stromatic hyphal aggregations. *Stromata* 37.5–82.5 (–100) µm diam., composed of swollen, subcircular, ellipsoid to somewhat angular-irregular, thick-walled hyphal cells, (5–)7–16(–20) µm wide, olivaceous to dark brown, smooth. *Conidiophores* solitary, arising from hyphae or in loose to dense fascicles arising from

stromatic hyphal aggregations, erumpent through the cuticle or emerging through stomata, erect, straight or slightly flexuous, unbranched or rarely branched, 25–280 × (2.5–)4.5–8 (–10) µm, septate, but only few septa (up to 4), subhyaline, pale to medium olivaceous-brown, somewhat paler towards the apex, smooth, sometimes minutely verruculose at the apex, walls slightly thickened, more thick-walled near the base, sometimes even two-layered, usually swollen and somewhat darker at the base, up to 12 µm wide, often with small,

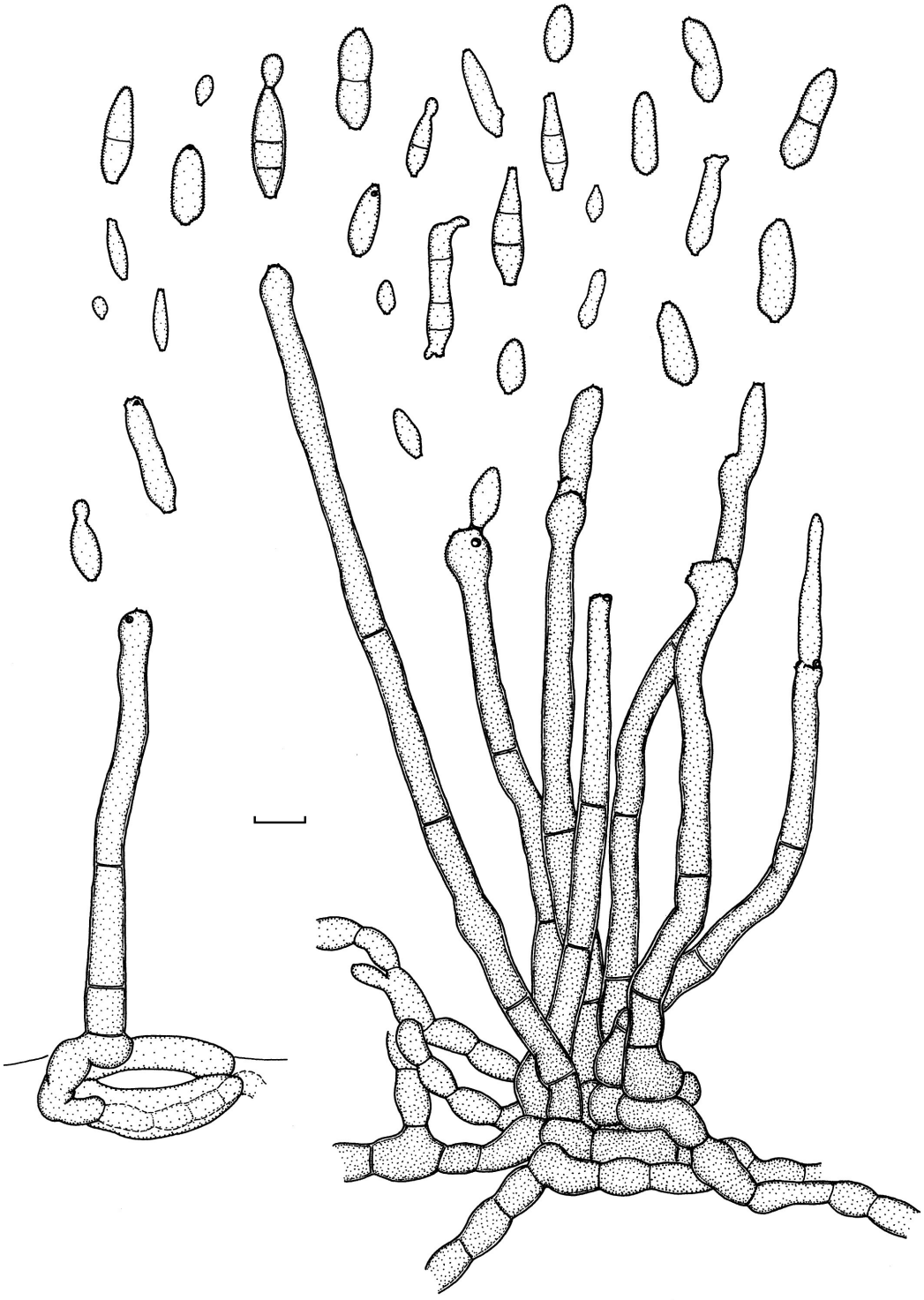

Fig. 30: *Cladosporium galii*. Conidiophores and conidia (from isotype HAL 1811 F). Bar = 10 µm.

head-like, terminal swellings, up to 8 µm wide, with a single or several distinct scars at the apex. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical or often with small swellings, 18–80 µm long, proliferation sympodial, with a single or few conidiogenous loci, often situated on swellings but not restricted to them, protuberant, mostly short cylindrical, (1–)1.5–2.5 µm diam., somewhat thickened and darkened–refractive. *Conidia* catenate, in simple or branched acropetal chains, sometimes solitary, straight to slightly curved, primary conidia small, obovoid, ellipsoid, 3–7 × 2–4 µm, smooth, secondary conidia ellipsoid, fusiform to cylindrical, 6–30(–40) × (2.5–)3–6.5 µm, mostly 0(–2)-, very rarely 3-septate, not constricted at the septa, subhyaline, very pale to medium pale brown, smooth to usually minutely verruculose, walls only slightly thickened, somewhat rounded or attenuated at the ends, with protuberant hila at one end or both ends, slightly convex, (0.5–)1–2.5 µm diam., well differentiated in a central convex dome, surrounded by a raised fine rim, thickened, somewhat darkened-refractive.

Host(s)/substrate(s) & distribution: on *Galium* spp. (Rubiaceae), Europe – *Galium odoratum* (Poland) (only known from the type collection).

Notes: *Cladosporium pilicola* Richon (SACCARDO 1892: 602) was described from France on dry stems of *Galium mollugo*. Type material of this species could not be traced, and other collections are unknown. However, based on the original description, *C. pilicola* is quite distinct from *C. galii* (probably saprobic; conidiophores branched; conidia cylindrical, 1–3-septate).
The common, widespread *Cladosporium cladosporioides* is usually a saprobic fungus or secondary invader on many different plants, but plant pathogenic races may also occur. It is morphologically close to *C. galii*, but differs in having narrower, cylindrical conidiophores, 2–5.5 µm wide, without swellings, usually formed singly, and usually smooth, narrower conidia, 2–5 µm wide. Nodulose conidiophores are known from some other *Cladosporium* species, e.g., *C. colocasiae*, *C. herbarum* s. lat. (incl. *C. macrocarpum*), *C. oxysporum* and *C. variabile*. The conidia of *C. herbarum* s. lat. and *C. variabile* are coarsely verruculose and wider. In addition, *C. variabile*, confined to *Spinacia oleracea*, is well-distinguished by forming tortuose, spirally twisted aerial hyphae. *C. colocasiae*, a common parasite of *Colocasia* species, has much wider, usually 6–9 µm broad, smooth conidia, and the widespread saprobic species *C. oxysporum* differs in having very long conidiophores, up to 500 µm long or even longer, and smooth conidia. Various species of *Cladosporium* subgen. *Heterosporium* tend also to be somewhat nodulose (DAVID 1997), but they are easily distinguishable by having much larger, above all wider, verrucose conidia, which are usually formed singly.

(24) *Cladosporium gentianae* Lobik

Fig. 31; Pl. 13, Figs G–J

Cladosporium gentianae Lobik, Bolezni Rast. 17(3–4): 189 (1928).

Holotype: on leaves of *Gentiana cruciata* (Gentianaceae), Russia, 15 Sept. 1927 (LE 40527).
Ill.: LOBIK (1928: Tab. 8, Fig. 87).

On living leaves, leaf sheaths and stems, leaf spots at leaf margins or starting at leaf margins and extending towards the mid, sometimes even covering the whole leaf surface, fading, turning yellowish brown, ochraceous, margin indefinite, somewhat raised at the border to the healthy leaf tissue, stems yellowish brownish discoloured, fading. *Colonies* amphigenous, solitary or in small tufts, effuse, scattered, loosely to moderately dense, caespitose, dark brown to blackish. *Mycelium* internal, subcuticular to intraepidermal; hyphae conspicuous, sparingly branched, 3.5–11 µm wide, septate, sometimes distinctly

constricted at the septa, subhyaline, pale olivaceous to medium olivaceous-brown, smooth or almost so to minutely verruculose, thick-walled, wall appearing yellowish, somewhat darker than the lumen and refractive, often with small to large, subglobose to somewhat irregular oil droplets, forming hyphal aggregations and stromata. *Stromata* substomatal to intraepidermal, small, subglobose, later somewhat flattened, 15–50 µm diam., only few layers deep, usually composed of only few but large swollen hyphal cells, up to 20 µm wide, subglobose to somewhat angular or irregular, medium to medium dark olivaceous-brown or brown, rarely pale olivaceous-brown, smooth to minutely verruculose, thick-walled. *Conidiophores* mostly loosely fasciculate, with 2–8 per fascicle, arising from stromata, sometimes solitary, arising from internal hyphae, emerging through stomata or erumpent through the cuticle, erect, rarely subdecumbent, more or less straight, cylindrical-oblong, robust, non-nodulose, usually not geniculate, unbranched, 26–120(–180) × (4–)5–10 µm, septate, not constricted at the septa, dark olivaceous-brown to brown, minutely verruculose or somewhat irregularly rough-walled, walls thickened, usually distinctly two-layered, 1–1.5 µm wide, slightly attenuated towards the apex, sometimes somewhat swollen at the base, protoplasm somewhat aggregated near the septa, which appear to be thickened, similar to distoseptation, occasionally enteroblastically proliferating. *Conidio-*

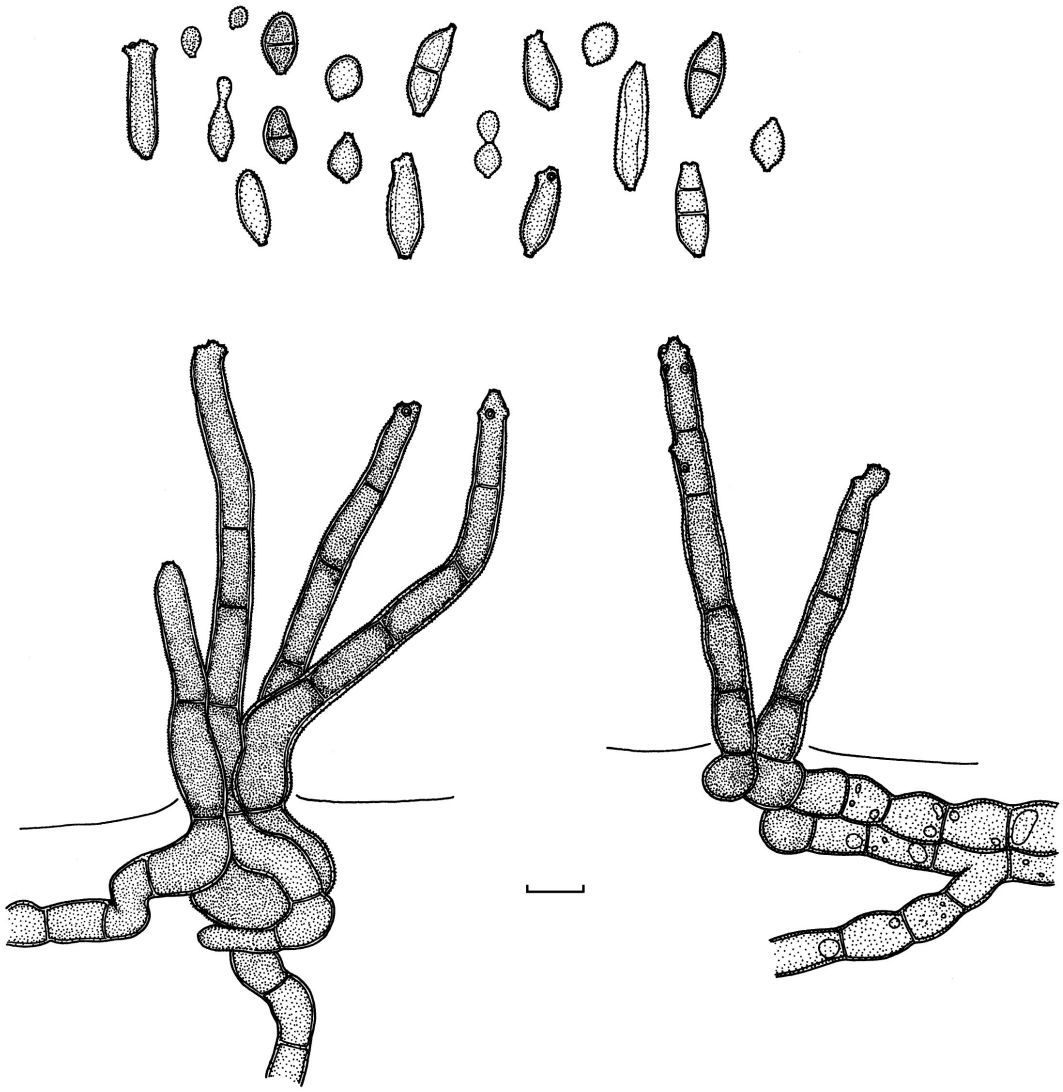

Fig. 31: *Cladosporium gentianae*. Conidiophores and conidia. Bar = 10 µm.

genous cells integrated, terminal, occasionally intercalary, 13–36 µm long, proliferation sympodial, with 1–8 conidiogenous loci, often crowded at the apex, protuberant, short cylindrical, subdenticulate, 1.5–2(–2.5) µm diam., thickened, somewhat darkened-refractive. *Conidia* catenate, usually in branched chains, straight, subglobose, obovoid, ovoid, narrowly to broadly ellipsoid to subcylindrical, 3.5–23 × 3–6(–8) µm, 0–1(–2)-septate, septum more or less median, not constricted at the septa, pale olivaceous-green to olivaceous-brown or brown, smooth or almost so to verruculose or irregularly rough-walled, walls thickened, up to 1 µm wide, rarely appearing two-layered, often with a distinct, clearly delineated lumen, apex rounded or with up to 4 hila, slightly attenuated towards the base, hila protuberant, short cylindrical, 1–2 µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Gentiana* spp. (Gentianaceae), Europe – *Gentiana cruciata* (Kazakhstan; Russia).

Notes: LOBIK (1928) described and illustrated up to 3-septate conidia, which could not be observed. *C. gentianae* is the only species in this genus known to attack a member of the Gentianaceae. The seta-like, non-nodulose, very dark conidiophores and the conspicuous, often wide hyphae chiefly characterise this species, defining and distinguishing it from morphologically allied taxa. *C. episclerotiale* known from galls of *Endocronartium harknessii* possesses longer conidiophores, (22–)97–295(322) µm, with frequently branched apices and 0–4-septate conidia (HEUCHERT et al. 2005); and *C. populicola* differs in having shorter, obovoid-ellipsoid conidia, 4–14 µm long, and narrower hyphae, (2–)3–4.5 µm wide.

(25) *Cladosporium grech-delicatae* Sacc.

Fig. 32; Pl. 15, Figs A–C

Cladosporium grech-delicatae Sacc., Ann. Mycol. 11: 564 (1913) and Nuovo Giorn. Bot. Ital., N.S. 21(1): 125 (1914).

Holotype: on still living stems of *Ranunculus aquatilis* (Ranunculaceae), Malta, Uied Bufula, Apr. 1913, Doct. Borg (PAD).
Lit.: SACCARDO (1931: 794).

On still living stems, forming small oblong patches, 1–3 mm long, 1 mm wide, dark, blackish, sometimes confluent. *Colonies* loose to dense, compact, pale to dark brown, villose to somewhat floccose when well fruiting. *Mycelium* internal, subcuticular to intraepidermal; hyphae sparsely branched, 3–8 µm wide, septate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown or somewhat darker at the base of conidiophores, sometimes subhyaline, smooth, walls slightly thickened, sometimes with small swellings, forming loose to somewhat denser stromatic hyphal aggregations or plates, occasionally with irregularly lobed cells. *Conidiophores* solitary or in small loose groups, but not fasciculate, arising from hyphae, swollen hyphal cells or from hyphal aggregations, erumpent through the cuticle, erect to rarely subdecumbent, straight or almost so to slightly flexuous, cylindrical-oblong to filiform, usually not geniculate, non-nodulose, unbranched, sometimes once branched, 40–235 µm long or even longer, 3.5–8 (–9) µm wide, pluriseptate, sometimes slightly constricted at the septa, medium to dark olivaceous-brown or brown, walls thickened, often distinctly two-layered, walls up to 1 µm wide, smooth to somewhat asperulate or irregularly rough-walled, slightly attenuated towards the apex, protoplasm of the cells sometimes aggregated near the septa, appearing to be somewhat thickened, similar to distoseptation. *Conidiogenous cells* integrated, terminal, rarely intercalary, cylindrical-oblong, 14–43 µm long, proliferation sympodial, at the apex with few subdenticulate conidiogenous loci, protuberant, truncate or obconically

truncate, 1.5–2(–2.5) µm diam., dome and surrounding rim sometimes not very conspicuous, somewhat thickened and darkened-refractive. *Ramoconidia* s. str. ellipsoid, subcylindrical to cylindrical, 15–23 × 5–7.5 µm, 0(–1)-septate, pale to medium brown or olivaceous-brown, with few apical hila, base truncate, 2–3 µm wide, without dome and raised rim, unthickened. *Conidia* catenate, usually in branched chains, subglobose, obovoid, narrowly to broadly ellipsoid or subcylindrical, (2.5–)5–17 × (2.5–)3.5–6 µm, 0–1-septate, not constricted at the septa, pale to medium brown or olivaceous-brown, smooth, walls somewhat thickened, lumen apparently somewhat distinct, apex often obtuse, rounded or with a single or few hila, hila truncate to slightly convex, slightly protuberant, 0.5–1.5(–2) µm diam., somewhat thickened and refractive.

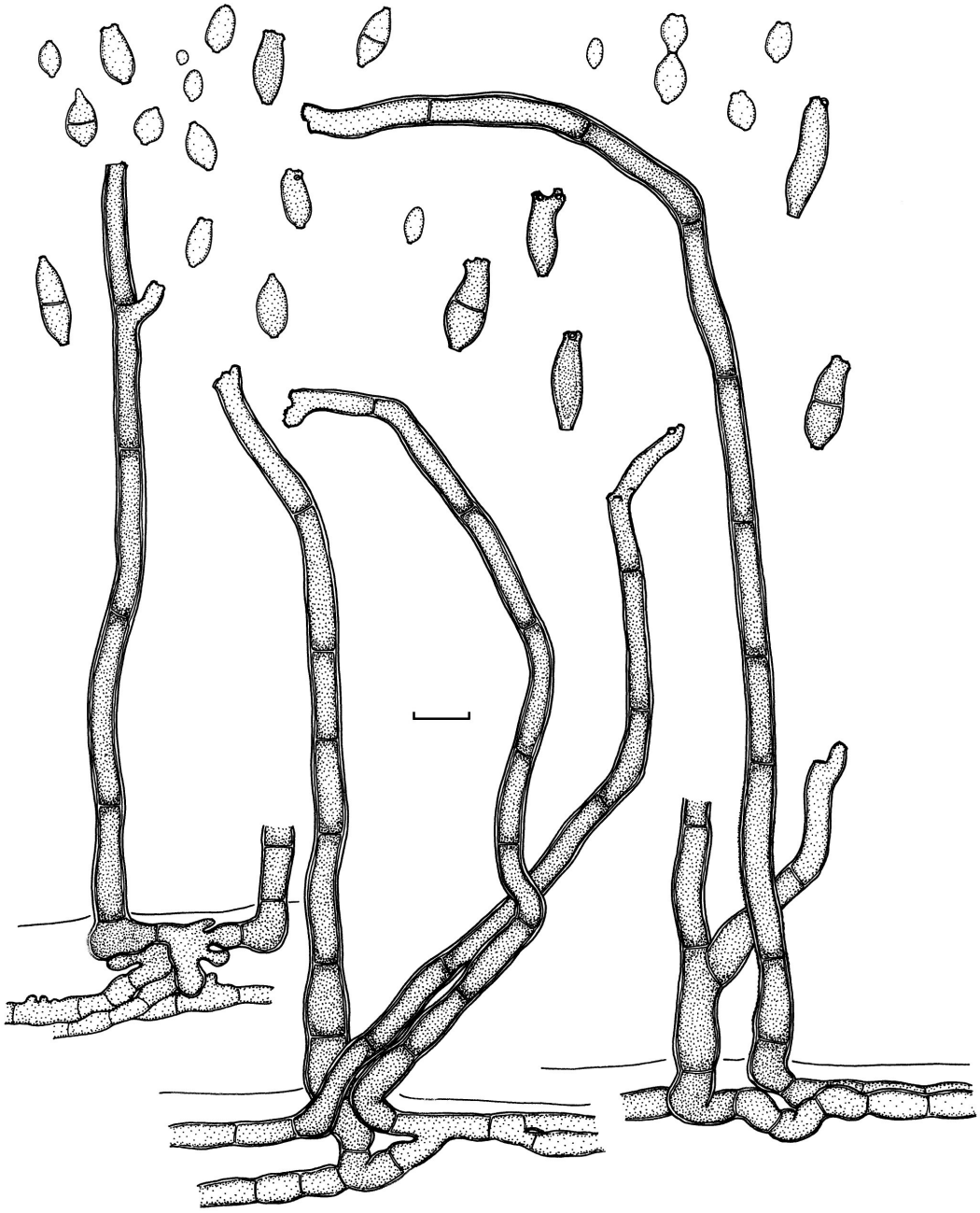

Fig. 32: *Cladosporium grech-delicatae*. Conidiophores, ramoconidia s. str. and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Ranunculus* spp. (Ranunculaceae), Europe – *Ranunculus aquatilis* (Malta) (only known from the type collection).

Notes: This species is comparable with *C. cladosporioides* but distinct in having shorter and wider conidia, ramoconidia s. str. with an unthickened, truncate base, wider, thick-walled, often distinctly two-layered conidiophores and sometimes irregularly lobed hyphae.

(26) *Cladosporium heliotropii* Erikss.

Figs 33–34; Pl. 16, Figs A–F

Cladosporium heliotropii Erikss., Bot. Centralbl. 47: 299 (1891) and F. paras. scand., Fasc. 8, No. 396 (1891), with description on the label.

Syntypes: on leaves of *Heliotropium peruvianum* (Boraginaceae), Sweden, Stockholm, Rosendal, 1882, J. Eriksson, Erikss., F. paras. scand. 396 (e.g., BPI 426853; HAL; HBG).
Lit.: SACCARDO (1892: 602), FERRARIS (1914: 884).
Exs.: Erikss., F. paras. scand. 396.

On living leaves, forming pale to dark brown, dense patches. *Colonies* epiphyllous, punctiform, scattered, caespitose, pale brown to olivaceous-brown, floccose-villose. *Mycelium* external, superficial; hyphae branched, septate, at first 3–6 µm wide, later distinctly swollen and often constricted at the septa, up to 10 µm wide or even wider, almost subhyaline or pale olivaceous, later pale olivaceous to medium brown or somewhat reddish brown, smooth or almost so to irregularly rough-walled, rugose, walls slightly to distinctly thickened, sometimes even two-layered, protoplasm of the cells often aggregated at the septa, olivaceous-yellowish, refractive and somewhat granular, surrounding walls much paler, sometimes almost hyaline, protoplasm sometimes appearing to have a paler, more or less irregular cavity in the centre, hyphae aggregated, forming loose to dense superficial, stromatic hyphal aggregations. *Stromata* lacking. *Conidiophores* solitary, arising from external, creeping hyphae, swollen hyphal cells or stromatic hyphal aggregations, lateral or terminal, often also formed secondarily (microcyclic conidiogenesis), arising from swollen conidia, erect, straight to flexuous, narrowly cylindrical-oblong or filiform, sometimes growing like and confusable with hyphae, usually not geniculate, sometimes subnodulose, unbranched or branched, 5–150(–210) × (2–)3–6 µm, septate, sometimes slightly constricted at the septa, almost hyaline, subhyaline to pale olivaceous-brown, smooth or almost so, sometimes asperulate, walls somewhat thickened, cell structure similar to hyphae, protoplasm distinct, clearly delineated from the inner wall, sometimes with a more or less irregular cavity in the centre, sometimes appearing to be distoseptate. *Conidiogenous cells* integrated, mostly terminal, occasionally intercalary, cylindrical, 8–32 µm long, proliferation sympodial, with 1–3 conidiogenous loci, often near the apex, sometimes situated on small lateral shoulders or unilateral swellings, protuberant, subdenticulate, 1–2 µm diam., thickened, refractive to somewhat darkened. *Conidia* catenate, in unbranched or branched chains, subglobose, obovoid, ellipsoid, fusiform to subcylindrical, occasionally cylindrical, 4–20(–25) × 3–7 µm wide, 0–1(–3)-septate, sometimes slightly constricted at the septa, pale olivaceous or pale olivaceous-brown, smooth or almost so to minutely verruculose, walls more or less thickened, with age becoming distinctly swollen, longer and wider, up to 12 µm or even wider, pluriseptate, often constricted at septa, sometimes with a single longitudinal septum or a single distoseptum, thick-walled, sometimes even two-layered, smooth to verruculose, sometimes confusable and only barely distinguishable from swollen hyphae, cell structure similar to hyphae and conidiophores, hila protuberant, 1–2 µm diam., thickened, refractive to somewhat darkened; microcyclic conidiogenesis often occurring.

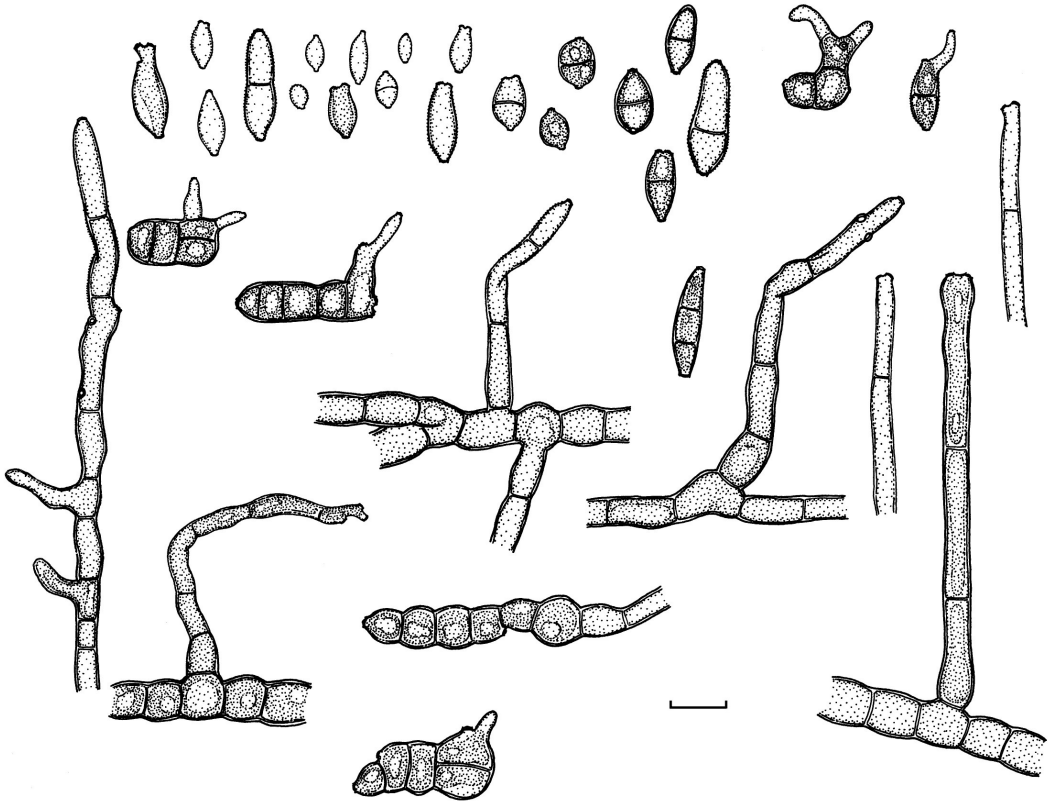

Fig. 33: *Cladosporium heliotropii*. Conidiophores and conidia (from syntype BPI 426853). Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Heliotropium* spp. (Boraginaceae), Europe, North America – *Heliotropium peruvianum* (Sweden; USA, AK), *Heliotropium* sp. (USA, AK).

Additional collections examined: on *Heliotropium* sp., USA, Alaska, Sitka, 1 Nov. 1914, J.P. Anderson, Alaska Fungi 144 (BPI 426850, BPI 426851) and Alaska Fungi 159 (BPI 426849, BPI 426852).

Notes: Some collections on *Heliotropium* sp. from Alaska housed at BPI could be examined and proved to be conspecific with *C. heliotropii*. They agree well with the latter species in forming an external mycelium giving raise to solitary conidiophores, having conidiophores and conidia with agreeing morphology and showing the same unusual cell structures as described above. They vary in having longer conidiophores (up to 210 µm long), longer and more frequently septate [0–3(–5) septa] conidia and occasionally somewhat wider conidiogenous loci and hila (up to 3 µm diam.). Old, swollen conidia could only occasionally be observed, whereas in the type material they were common. FERRARIS (1914) recorded and described a single collection from Italy (on leaves of *Heliotropium peruvianum*, Italy, near Turin, in a garden, P. Voglino) indicating that *C. heliotropii* is probably more common and widespread than given under host(s)/ substrate(s) & distribution. Furthermore, he stated that the conidia rapidly germinated in water, so that infections of leaves, above all, occurred under humid conditions. FRENCH (1989) reported this species from California, USA.

The phenomenon that conidia are become distinctly swollen, larger and wider, pluriseptate and thick-walled with age, giving raise to secondary conidiophores, is also known from *C. dracaenatum*, but this species differs from *C. heliotropii* in having fasciculate, mildly to

distinctly geniculate-sinuous conidiophores arising from true, substomatal to intra-epidermal stromata, and the unusual cell structure, described above, was not observed.

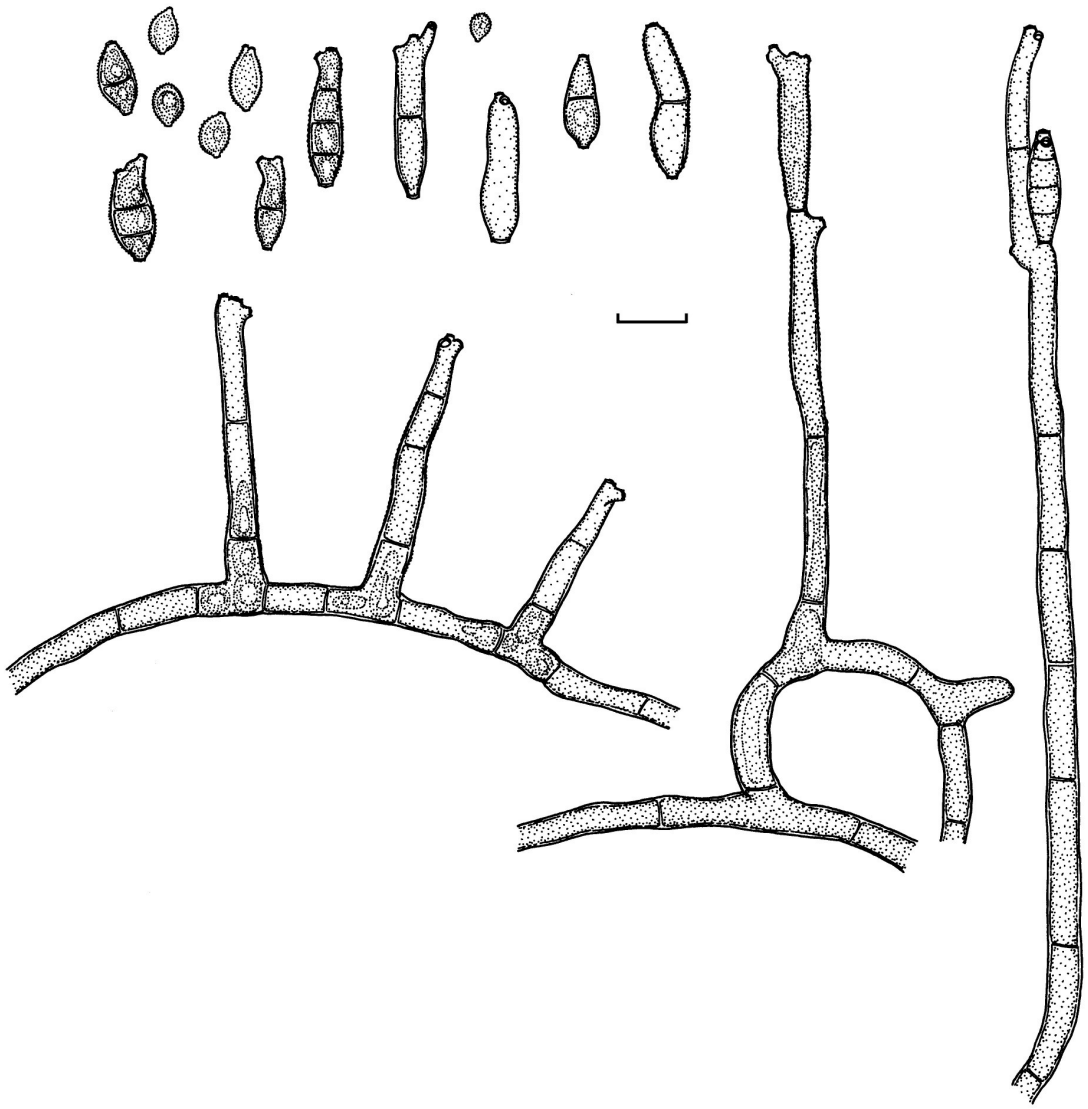

Fig. 34: *Cladosporium heliotropii*. Conidiophores and conidia (from BPI 426851). Bar = 10 µm.

(27) *Cladosporium heterophragmatis* S.A. Khan & Kamal

Fig. 35; Pl. 15, Figs D–H

Cladosporium heterophragmatis S.A. Khan & Kamal, Mycopathol. Mycol. Appl. 18(4): 246 (1962).

Holotype: on leaves of *Heterophragma adenophyllum* (Bignoniaceae), Pakistan, Tandoja, Campus A.R.I., 15 Nov. 1961, Shakil Ahmad Khan (IMI 90787).
Lit.: SCHUBERT & BRAUN (2004: 298–300).
Ill.: KHAN & KAMAL (1962: 247, Fig.), SCHUBERT & BRAUN (2004: 299, Fig. 1).

On living leaves, forming subcircular, oval–oblong to irregular discolorations on the upper leaf surface, confluent, yellowish brown or ochraceous. *Colonies* hypophyllous, caespitose, effuse, dense, grey-brown to dark brown, blackish, not vein-limited, velvety, confluent, covering large areas of the leaf surface. *Mycelium* external, superficial, hyphae branched,

2.5–6 µm wide, septate, sometimes slightly constricted at the septa, pale olivaceous to olivaceous-brown, smooth, rarely rough-walled to verruculose, walls thickened, hyphae often aggregated, forming horizontal threads, or with swollen hyphal cells, subcircular-ellipsoid, up to 13 µm diam. *Conidiophores* solitary, arising from swollen hyphal cells or creeping hyphae, lateral or terminal, erect or sometimes decumbent, straight to somewhat flexuous, unbranched or branched, 4–113(–190) × 2–5 µm, often slightly attenuated towards apex, continuous or with few septa, not constricted at the septa, pale olivaceous to

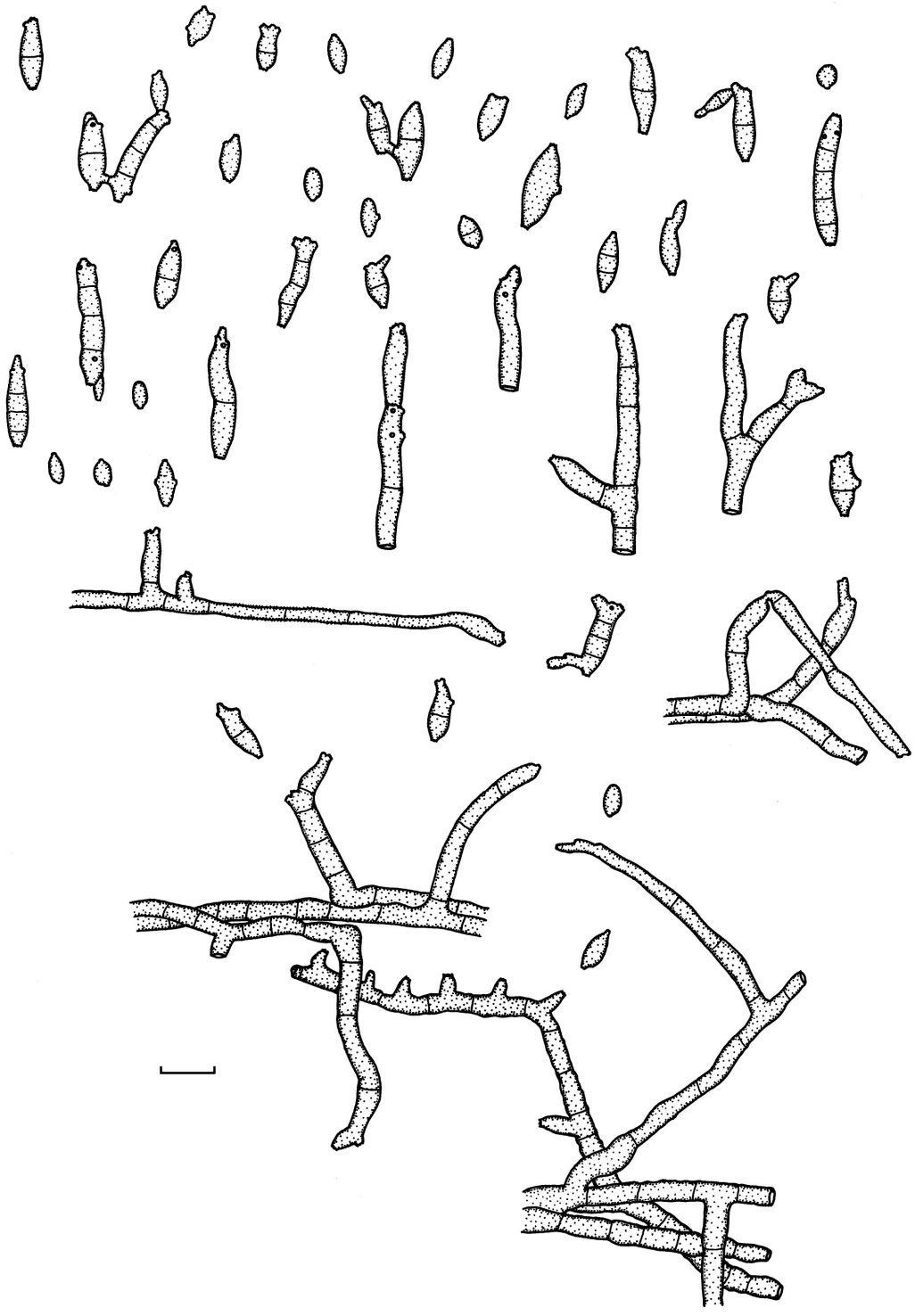

Fig. 35: *Cladosporium heterophragmatis*. Conidiophores and conidia. Bar = 10 µm.

olivaceous-brown, concolorous with the hyphae, often growing like, hardly distinguishable from and confusable with superficial hyphae, smooth, occasionally verruculose. *Conidiogenous cells* integrated, terminal, rarely intercalary, cylindrical to oblong, 3–14 µm long, proliferation sympodial, with a single to several conidiogenous loci, mostly crowded at the apex, scars protuberant, conspicuous, sometimes subdenticulate, slightly convex, 1–2 µm diam., thickened, more or less darkened-refractive. *Conidia* catenate, frequently in branched chains, straight to slightly curved, variable in shape, small conidia (apex without any hila or with a single apical hilum) subglobose, ellipsoid-ovoid, obovoid, fusiform, 3–14 × 2–4.5 µm, 0–1(–2)-septate, larger conidia with two to several apical hila (ramoconidia s. lat.) ellipsoid, fusiform, cylindrical to somewhat irregular, 5–23(–27) × 3–5(–6) µm, 0–3(–4)-septate, sometimes slightly constricted at the septa, pale olivaceous, pale brown to olivaceous-brown, smooth, rarely verruculose, walls unthickened or only slightly thickened, apex rounded or attenuated, hila conspicuous, subdenticulate, slightly convex, (0.5–)1–1.5 µm diam., thickened, darkened-refractive; microcyclic conidiogenesis occasionally occurring.

Host(s)/substrate(s) & distribution: on *Heterophragma* spp. (Bignoniaceae), Asia – *Heterophragma adenophyllum* (Pakistan) (only known from the type collection).

Notes: This species is morphologically close to the hyperparasitic species *Cladosporium phyllophilum*, but the latter species is easily distinguishable by having longer and somewhat wider, usually multibranched, pluriseptate conidiophores (20–250 × 3–7 µm) and wider, 0–5(–6)-septate conidia [small conidia 4–13 × 3–6 µm, large conidia 10–30(–35) × 4–10 µm] (BRAUN 2001; HEUCHERT et al. 2005). *Cladosporium bignoniae* Schwein., described on capsules of *Bignonia radicans* from North America, is tentatively considered a nomen dubium (SCHUBERT & BRAUN 2004), and *C. jacarandicola*, known from New Zealand on *Jacaranda mimosifolia*, differs in having usually fasciculate conidiophores arising from substomatal stromata.

(28) *Cladosporium hypophyllum* Fuckel

Fig. 36; Pl. 17, Figs A–E

Cladosporium hypophyllum Fuckel, Jahrb. Nassauischen Vereins Naturk. 23–24: 356 '1869' (1870).

= *Cladosporium microstictum* Sacc. & D. Sacc., in Saccardo, Ann. Mycol. 3: 169 (1905), **syn. nov.**

Syntypes: on the lower surface of living leaves of *Ulmus campestris* (= *U. minor*) (Ulmaceae), Germany, 'auf Grünau bei Hattenheim am Rheinufer', Fuckel, F. rhen. 1629 (e.g., BPI 427228, 427229, 427234; HAL; M-57614).
Lit.: SACCARDO (1886: 360), LINDAU (1907: 820).
Exs.: Fuckel, F. rhen. 1629; Sacc., Mycoth. ital. 589.

On living leaves, without distinct leaf spots, hypophyllous as greyish olivaceous coating. *Colonies* hypophyllous, effuse, loosely to densely caespitose, pale to medium olivaceous-brown or brown, sometimes even blackish, sometimes covering large areas of the leaf surface. *Mycelium* external, superficial; hyphae filiform, branched, 1–4 µm wide, septate, sometimes constricted at the septa, subhyaline to pale olivaceous-brown, later distinctly swollen, up to 7 µm wide, constricted at the septa, darker, pale medium to medium olivaceous-brown or brown, walls somewhat thicker, almost smooth or mostly more or less verruculose to irregularly rough-walled, protoplasm of the cells sometimes aggregated at the septa so that walls and, above all, septa appear to be thickened (as in distoseptation), with a somewhat irregular cavity in the centre of the cells, hyphae aggregated, forming loose to dense hyphal ropes or plates and stromatic hyphal aggregations composed of

subglobose swollen hyphal cells, brownish to somewhat reddish brown, walls thickened. *Conidiophores* solitary or in loose groups, not fasciculate, arising from external creeping hyphae, lateral or terminal, or from stromatic hyphal aggregations, erect, straight to flexuous, often mildly to distinctly geniculate-sinuous, sometimes subnodulose, unbranched or branched, 10–80(–100) × (2–)2.5–4(–5) µm, septate, pale olivaceous-brown, smooth to somewhat verruculose-asperulate, walls thickened, sometimes even two-layered, sometimes growing like and confusable with hyphae, protoplasm of the cells occasionally aggregated at the septa, appearing to be thickened (as in distoseptation). *Conidiogenous cells* integrated, terminal and intercalary, often geniculate to subnodulose, 8–25 µm long, proliferation sympodial, with several conidiogenous loci, often situated on small shoulders or unilateral swellings but not confined to them, subdenticulate, protuberant, obconically truncate or slightly convex, 0.5–1.5 µm diam., thickened, somewhat refractive, but mostly not darkened. *Conidia* catenate, in unbranched or branched chains, straight, ovoid, ellipsoid to fusiform, sometimes subcylindrical, 4–17(–19) × 2–5 µm, 0–1(–3)-septate, subhyaline to pale olivaceous, with age becoming distinctly swollen, longer and wider, 5–7 µm wide, usually constricted at the septa, darker, pale medium olivaceous-brown to somewhat reddish brown, with thicker walls, confusable with swollen hyphal cells of stromatic hyphal aggregations, smooth or almost so to more or less verruculose or irregularly rough-walled, protoplasm often somewhat distinct, clearly delineated from the inner wall and sometimes with an small irregular, paler cavity in the centre of the cells, giving conidia a somewhat zonate appearance, ends rounded or slightly attenuated, hila more or less protuberant, 0.5–1.5 µm diam., thickened, refractive but mostly not darkened; microcyclic conidiogenesis often occurring.

Host(s)/substrate(s) & distribution: on *Ulmus* spp. (Ulmaceae), Europe – *Ulmus minor* (Germany, Italy).

Additional collection examined: on leaves of *Ulmus campestris* (= *U. minor*), ITALY, Treviso, Vittorio, Oct. 1899, Sacc., Mycoth. ital. 589 (HBG, syntype of *Cladosporium microstictum*).

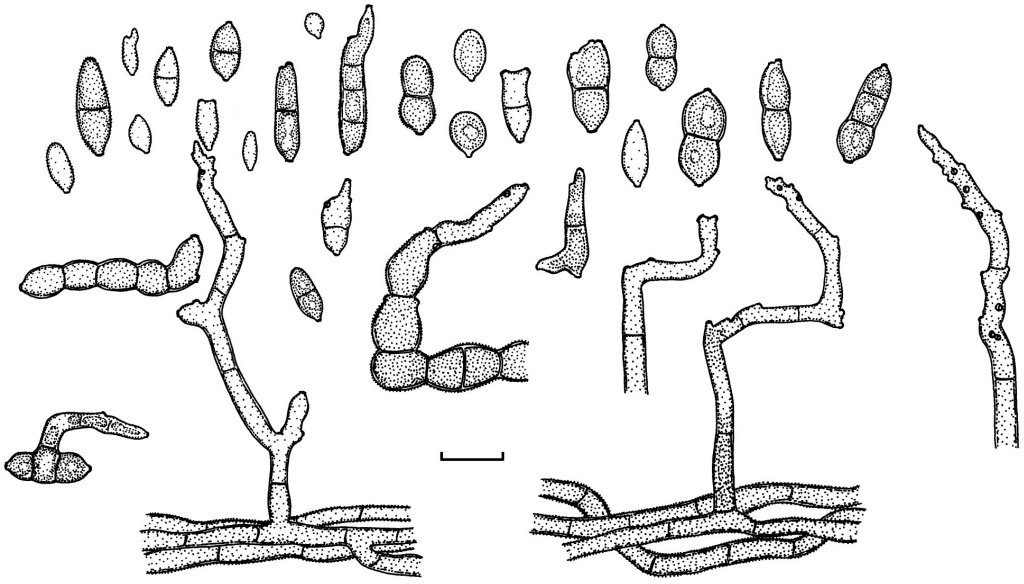

Fig. 36: *Cladosporium hypophyllum*. Conidiophores and conidia. Bar = 10 µm.

Notes: DE VRIES (1952) listed *C. hypophyllum* as a synonym of *Cladosporium cladosporioides*. A re-examination of the type material of *C. hypophyllum* revealed that the latter species is quite distinct in having usually geniculate conidiophores with several conidiogenous loci, shorter conidia and somewhat narrower, mostly not darkened conidiogenous loci and hila; the unusual cell structure as described above does not occur in *C. cladosporioides*. *C. heliotropii*, which has a similar growing type and cell structure, is easily distinguishable by having usually non-geniculate, somewhat wider conidiophores with only few conidiogenous loci and somewhat wider conidia. A single collection deposited at herb. M under *C. hypophyllum* (on still living leaves of *Ligustrum vulgare*, Germany, Bavaria, Fürstenfeldbrück, at the bank of the river Amper towards Schoengasing, 31 Aug. 1883, Allescher, M-57613) showed *C. herbarum* as secondary invader occurring on leaf spots caused by *Septoria ligustri* (Desm.) J. Kickx. f. [≡ *Mycosphaerella ligustri* (Desm.) Lindau].
Cladosporium microstictum, also described on leaves of '*Ulmus campestris*', was introduced in 1899 in Saccardo's 'Mycotheca italica' without any description. Later, in 1905, SACCARDO published a detailed Latin diagnosis. Type material of this species could be re-examined and proved to be synonymous with *C. hypophyllum*.

(29) *Cladosporium inconspicuum* Thüm.

Fig. 37; Pl. 16, Figs G–I

Cladosporium inconspicuum Thüm., Contributiones ad florum mycologicam lusitanicam, Ser. 2, No. 193 (1879) and Hedwigia 19: 133 (1880).

Type: on living leaves of *Styrax officinalis* (Styracaceae), Portugal, Coimbra, botanical garden, Oct. 1878, G.A. Moller (B 70-6557).
Lit.: SACCARDO (1886: 359), OUDEMANS (1923).

Leaf spots epiphyllous, small, subcircular to somewhat irregular, 1–5 mm wide, medium to dark brown or somewhat reddish brown, centre mostly paler, pale greyish brown or whitish grey, margin narrow, dark brown, sometimes surrounded by a somewhat reddish brown halo, spots turning fragile with age, on the lower leaf surface almost inconspicuous. *Colonies* hypophyllous, scattered, brownish, only sparingly fruiting. *Mycelium* internal and external, superficial; hyphae branched, (1–)3–6 µm wide, septate, with swellings and constrictions, then up to 9 µm wide, pale to medium smutty brown, rarely subhyaline, smooth, walls somewhat thickened, forming hyphal ropes and plates or loose to somewhat denser stromatic hyphal aggregations composed of swollen hyphal cells, somewhat darker than hyphae, medium dark brown, thick-walled. *Conidiophores* solitary, arising terminally or laterally from superficially growing, creeping hyphae or stromatic hyphal aggregations, erect, straight or somewhat flexuous, narrowly cylindrical, non-geniculate, non-nodulose, unbranched, 19–45 × 3–4 (–5) µm, septate, pale brown or yellowish brown, smooth, walls somewhat thickened. *Conidiogenous cells* integrated, usually terminal, 4–10 µm long, proliferation sympodial, with a single or few conidiogenous loci, subdenticulate, obconically truncate, 0.5–1.5(–2) µm diam., thickened, refractive to somewhat darkened. *Conidia* in unbranched or branched chains, obovoid, ovoid-ellipsoid to fusiform, 4–14(–20) × 2.5–5 µm, 0–1(–3)-septate, not constricted at the septa, pale brown, smooth or almost so (verruculose under SEM), walls somewhat thickened, often slightly attenuated towards the base, hila protuberant, obconically truncate, 0.5–1.5(–2) µm diam., central dome usually not higher than the surrounding rim and often not very conspicuous, thickened, refractive to somewhat darkened; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Styrax* spp. (Styracaceae), Europe – *Styrax officinalis* (Portugal) (only known from the type collection).

Notes: THÜMEN (1880) described long, sometimes branched and somewhat wider (5 µm) conidiophores which have not been seen during the course of the re-examination of the type material of *C. inconspicuum*. The type is in poor condition and only sparingly fruiting. Only few conidia and conidiophores have been observed. SEM examinations conclusively showed that *C. inconspicuum* belongs in *Cladosporium* s. str. (Pl. 16, Fig. G); but additional collections are needed to examine the variability of this taxon and its taxonomic status in detail. In URTIAGA (1986), this species has been recorded from Cuba on *Begonia nelumbifolia*, which could not be checked.

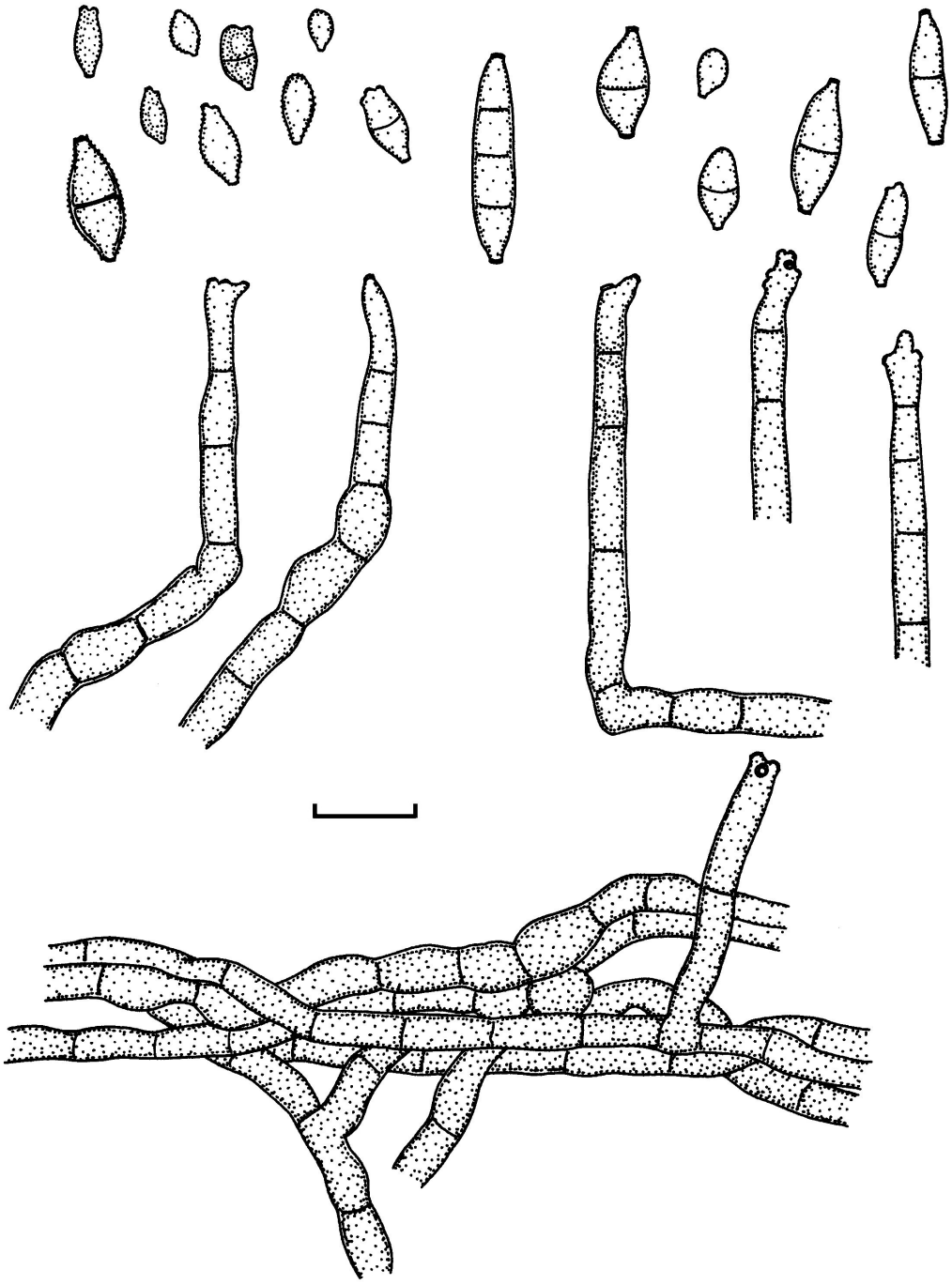

Fig. 37: *Cladosporium inconspicuum*. Conidiophores and conidia. Bar = 10 µm.

(30) *Cladosporium inopinum* (Petr.) U. Braun

Fig. 38

Cladosporium inopinum (Petr.) U. Braun, Mycotaxon 55: 224 (1995).
≡ *Cercospora inopina* Petr., Sydowia 4: 570 (1950).

Syntype: on leaves of *Gynoxys hallii* (Asteraceae), Ecuador, Pichincha, near Quito, 20 Sept. 1937, H. Sydow, Reliqu. Petrak. 1350 (GZU).
Lit.: CHUPP (1954: 142), CROUS & BRAUN (2003: 227).
Ill.: BRAUN (1995: 225, Fig. 2).
Exs.: Reliqu. Petrak. 1350.

Leaf spots indistinct. *Mycelium* mainly external, on trichomes; hyphae branched, 1–5 µm wide, septate, subhyaline-greenish, olivaceous to brown, smooth, rarely faintly rough-walled, forming small stromata. *Stromata* composed of brown swollen cells, 4–9 µm wide, fairly thick-walled. *Conidiophores* solitary to fasciculate, arising from small stromata or creeping hyphae, erect or horizontal, straight to geniculate-sinuous, subcylindrical, unbranched, occasionally branched, 10–120 × 3–7 µm, continuous or septate, sometimes with constrictions and swollen segments, olivaceous-brown, smooth, walls only slightly thickened. *Conidiogenous cells* integrated, terminal or conidiophores reduced to conidiogenous cells, cylindrical, often geniculate, with a single or few conidiogenous loci, somewhat protuberant, about 1–2 µm diam., thickened and darkened. *Conidia* catenate, occasionally in branched chains, ellipsoid-ovoid, subcylindrical, (8–)10–30(–35) × 2.5–6 µm, 0–3(–4)-septate, olivaceous to brown, smooth to faintly rough-walled, hila somewhat protuberant, about 1.5–2 µm diam., thickened and darkened.

Host(s)/substrate(s) & distribution: on *Gynoxys* spp. (Asteraceae), South America – *Gynoxys hallii* (Ecuador) (only known from the type collection).

Notes: Based on the cladosporioid structure of the conidiogenous loci and hila, *Cercospora inopina* was transferred to *Cladosporium* s. str. (BRAUN 1995). *Cladosporium gynoxidicola* Petr., also known from Ecuador on leaves of *Gynoxys* sp., has been excluded from the latter genus and re-allocated to *Passalora* (SCHUBERT & BRAUN 2005b).

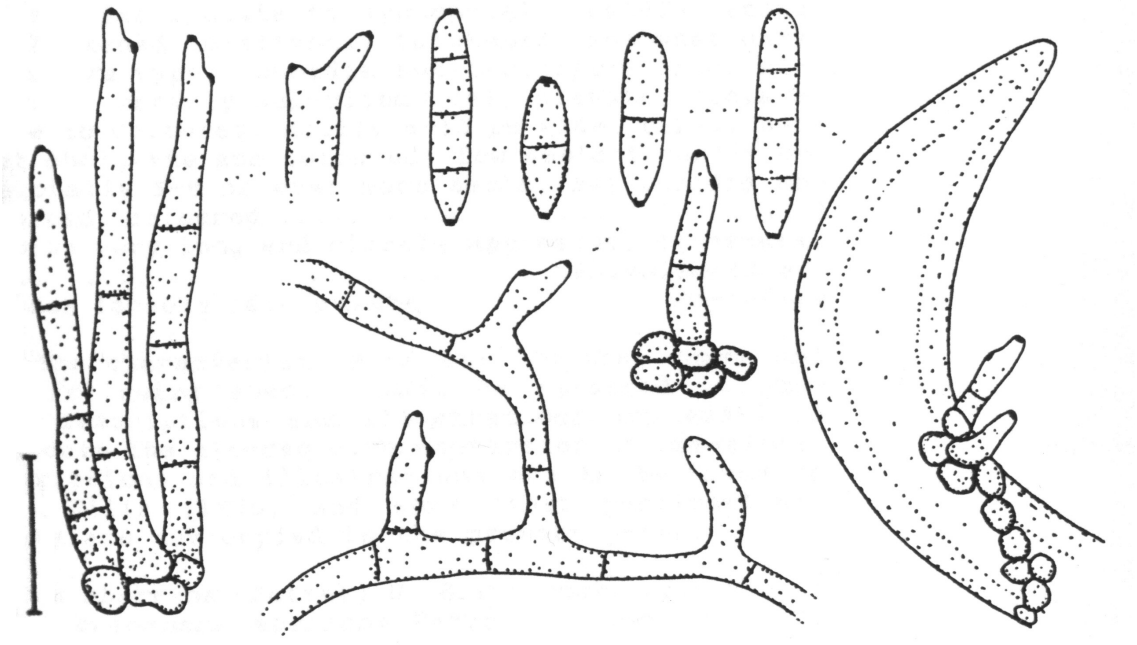

Fig. 38: *Cladosporium inopinum*. Conidiophores and conidia (from BRAUN 1995). Bar = 20 µm.

(31) *Cladosporium jacarandicola* K. Schub., U. Braun & C.F. Hill

Fig. 39; Pl. 17, Figs F–I

Cladosporium jacarandicola K. Schub., U. Braun & C.F. Hill, Sydowia 56(2): 300–301 (2004).

Holotype: on living leaves of *Jacaranda mimosifolia* (Bignoniaceae), New Zealand, Mt. Albert, Ruarangi Road, 6 Aug. 2002, C.F. Hill 693 (HAL 1812 F).
Ill.: SCHUBERT & BRAUN (2004: 300, Fig. 2).

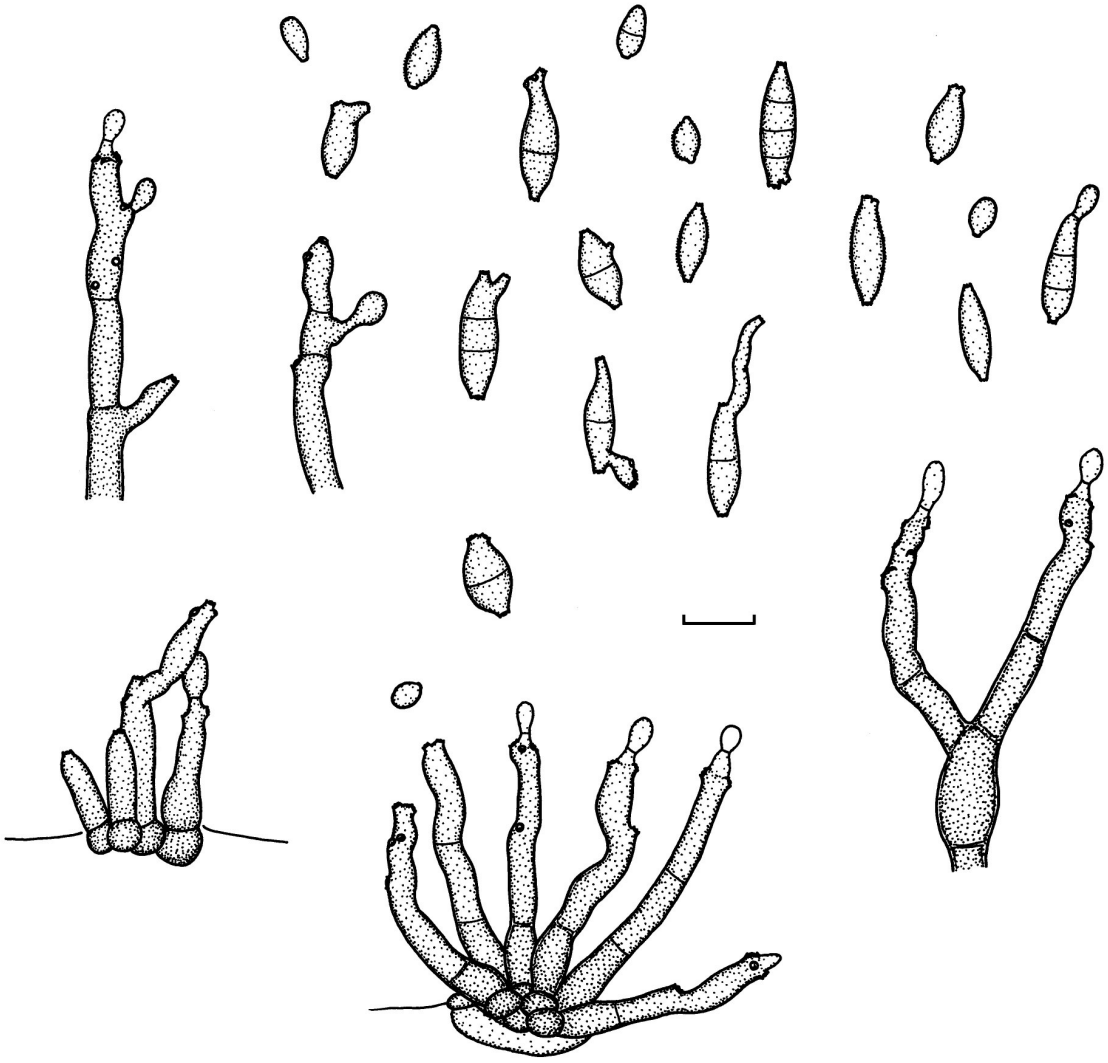

Fig. 39: *Cladosporium jacarandicola*. Conidiophores and conidia. Bar = 10 µm.

On living leaves, causing small, subcircular, brownish spots. *Colonies* punctiform, scattered, brownish. *Mycelium* internal; hyphae 3–4(–5) µm wide, septate, pale olivaceous. *Stromata* absent to well-developed, substomatal, composed of subglobose, more or less thick-walled cells, 5–7 µm wide, olivaceous to olivaceous-brown. *Conidiophores* solitary or in loose to dense fascicles, arising from stromata, emerging through stomata, erect, straight to somewhat flexuous, somewhat geniculate-sinuous, unbranched, occasionally branched, 10–58 × 3.5–5 µm, continuous to sparsely septate, olivaceous, olivaceous-brown, apex often paler, subhyaline, smooth, walls slightly thickened, somewhat swollen at the base. *Conidiogenous cells* integrated, terminal, rarely intercalary, cylindrical-oblong, 10–30 µm long, proliferation sympodial, with several conidiogenous loci, often crowded at

the apex, loci protuberant, 1–1.5(–2) µm diam., thickened, darkened-refractive. *Conidia* in unbranched or branched chains, subglobose, obovoid, fusiform, ellipsoid, 4–18 × 3–5(–6.5) µm, 0–3-septate, pale olivaceous, smooth to verruculose, walls not to slightly thickened, apex rounded, somewhat attenuated or truncate, base truncate to slightly convex, hila (0.5–)1–1.5(–2) µm diam., thickened, darkened-refractive; microcyclic conidiogenesis occasionally occurring.

Host(s)/substrate(s) & distribution: on *Jacaranda* spp. (Bignoniaceae), New Zealand – *Jacaranda mimosifolia* (New Zealand) (only known from the type collection).

Notes: There are some morphologically similar species with consistently short conidiophores, which are, however, quite distinct from *C. jacarandicola* in forming wider conidiophores [(3–)4–10(–13) wide in *C. agoseridis*; 3–8 µm in *C. lupiniphilum*], larger, above all wider conidia with different surface ornamentations [(6.5–)12–26(–31) × 4–8 µm, faintly to conspicuously verruculose-echinulate in *C. praecox*; (10–)12–40(–50) × (5–)6–13(–15), loosely to densely verruculose or verrucose in *C. agoseridis*; 6–28 × 4–8 µm, smooth or almost so in *C. lupiniphilum*] and wider loci, respectively [1.5–2.5 µm diam. in *C. orchidearum*; (1.5–)2–3.5(–4.5) µm diam. in *C. agoseridis*] (BRAUN & ROGERSON 1995; BRAUN 1998, 2000; ELLIS 1976). In addition to the new species of *Cladosporium*, this collection (no. 693) also contained rich fructification of *Cercospora apii* Fresen. s. lat.

(32) *Cladosporium lineolatum* Sacc.

Fig. 40; Pl. 18, Figs A–D

Cladosporium lineolatum Sacc., Ann. Mycol. 12: 313 (1914).

Lectotype (designated here): on leaves of *Capparis micracantha* (Capparidaceae), Philippines, Prov. Rizal, Alabang, Mar. 1912, P.W. Graff, No. 16748 (PAD).
Isolectotype: BPI 427242.
Lit.: SACCARDO (1931: 789).

On still living leaves, causing leaf spots or discolorations, amphigenous, minute, often short striate, blackish, under stereomicroscope visible as minute spots with pale centre and distinct, blackish brown margin. *Colonies* hypophyllous, scattered, subeffuse, dense, dark brown. *Mycelium* at first internal, subcuticular to intraepidermal, later also external, growing superficially; hyphae branched, 2–5 µm wide, sometimes swollen, then up to 8 µm wide, septate, often slightly constricted at the septa, subhyaline or almost hyaline to pale olivaceous-brown, smooth, walls slightly thickened. *Stromata* lacking. *Conidiophores* solitary or in small, loose fascicles, arising from internal hyphae, mostly emerging through stomata, sometimes erumpent through the cuticle, or in loose to somewhat denser groups, arising from superficial hyphae as lateral or terminal branches, confusable with hyphae, more or less erect to subdecumbent, more or less flexuous, filiform, often mildly geniculate-sinuous, unbranched or branched, sometimes slightly furcate, 8–70(–90) × 2.5–5(–6) µm, septate, often slightly constricted at the septa, then cells appearing to be somewhat swollen, pale to medium olivaceous-brown, somewhat paler towards the apex, smooth, with age somewhat asperulate, walls thickened, often two-layered, up to 1 µm wide, sometimes slightly swollen at the base. *Conidiogenous cells* integrated, terminal and intercalary, often somewhat geniculate, 6–15 µm long, proliferation sympodial, cicatrised, with numerous subdenticulate, protuberant conidiogenous loci, obconically truncate to slightly convex, 0.5–1.5(–2) µm, thickened, refractive to somewhat darkened. *Ramoconidia* s. str. sporadically occurring, base broadly truncate, unthickened and only very slightly attenuated. *Conidia* in branched chains, subglobose, ovoid, limoniform, ellipsoid to subcylindrical, 2–14(–16) × 2–4.5 µm, 0–3-septate, mostly not constricted at the septa, subhyaline to pale olivaceous-brown, smooth or almost so to somewhat

irregularly rough-walled, walls more or less thickened, occasionally apparently two-layered, apex and base rounded or attenuated, hila protuberant, obconically truncate to somewhat convex, 0.5–1.5(–2) µm diam., dome and rim often not very conspicuous, thickened, refractive to somewhat darkened; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Capparis* spp. (Capparidaceae), Asia – *Capparis micracantha* (Philippines) (only known from the type collection).

Notes: *Cladosporium lineolatum* is morphologically comparable with *C. myrtacearum*, *C. cassiae-surathensis* and *C. chamaeropis*. However, the latter species differs from *C. lineolatum* in having somewhat longer and wider conidia, 3–20 × 2–5(–6.5) µm, wider conidiophores, 4–6.5 µm, usually arranged in moderately large fascicles and somewhat wider conidiogenous loci and hila, (0.5–)1–2(–2.5) µm; in *C. myrtacearum* the conidiophores are wider, 3–7 µm, and the conidia are longer, above all wider, 3–22 × 2–7 µm, often constricted at the septa; and *C. cassiae-surathensis* possesses 0–1-septate conidia and non-geniculate conidiophores. *C. bosciae* described on leaves of *Boscia senegalensis*, a host belonging to the Capparidaceae, is quite distinct by forming much longer and wider, 0–6(–8)-septate conidia, wider conidiophores and wider conidiogenous loci and hila.

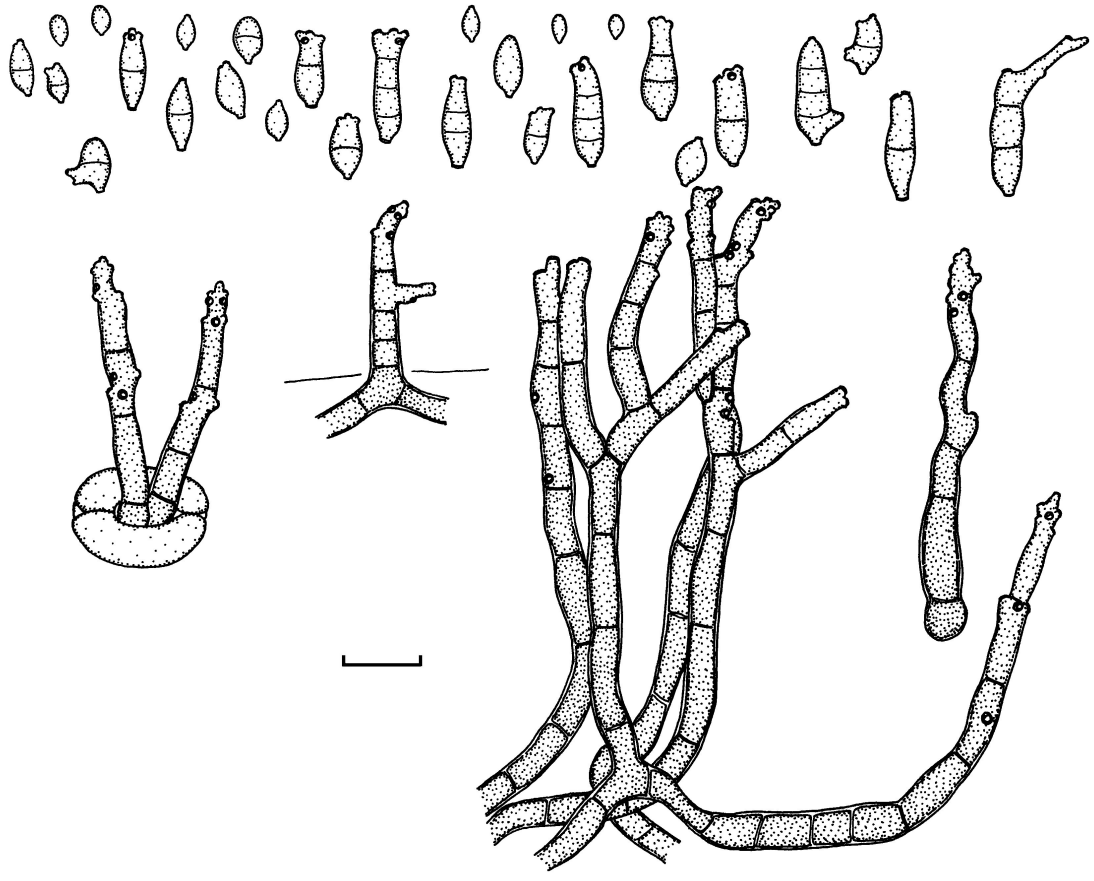

Fig. 40: *Cladosporium lineolatum*. Conidiophores and conidia. Bar = 10 µm.

(33) *Cladosporium liriodendri* K. Schub. & U. Braun

Fig. 41; Pl. 18, Figs E–I

Cladosporium liriodendri K. Schub. & U. Braun, **sp. nov.**

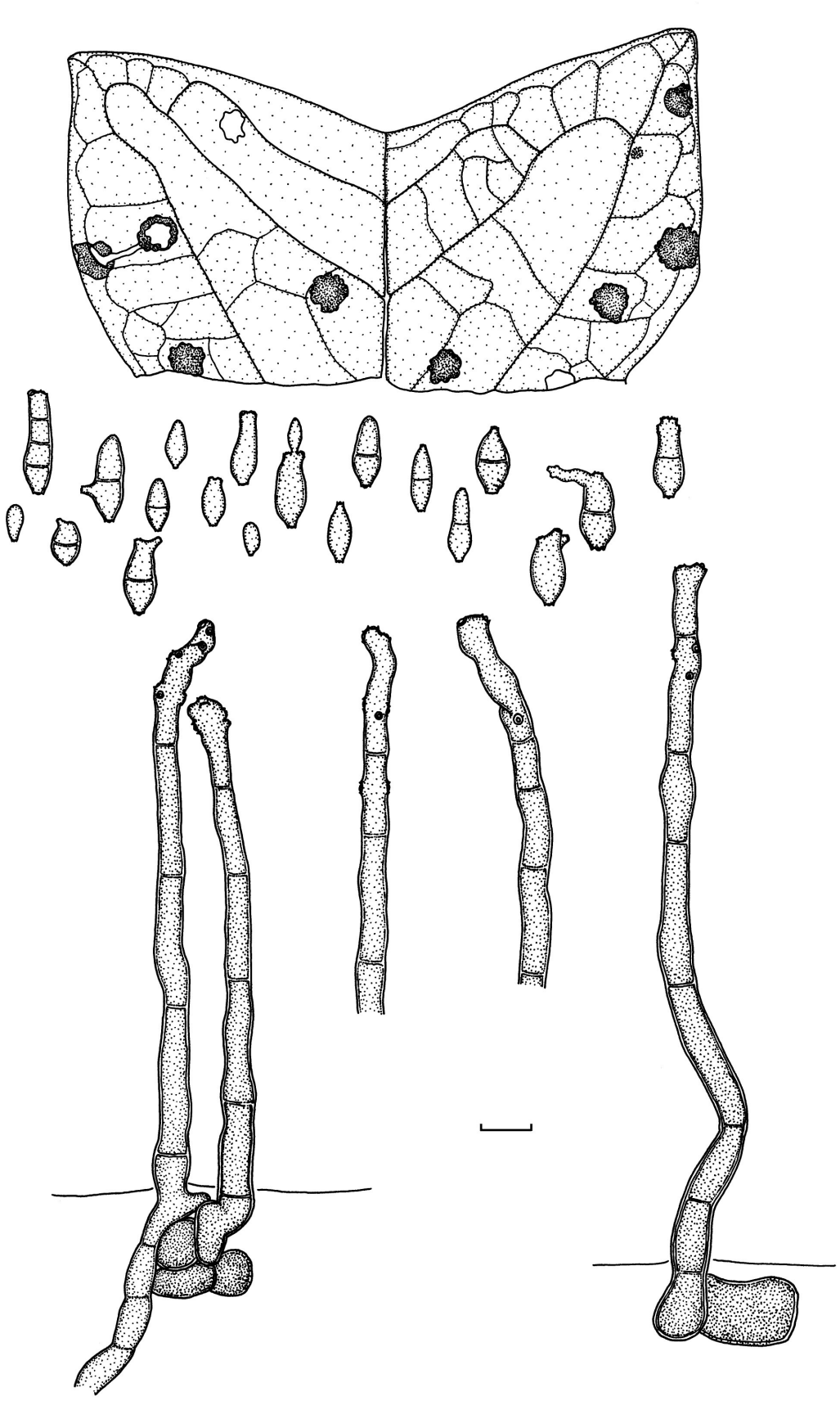

Fig. 41: *Cladosporium liriodendri*. Symptoms, conidiophores and conidia. Bar = 10 µm.

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, but 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 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.

Host(s)/substrate(s) & distribution: on *Liriodendron* spp. (Magnoliaceae), North America – *Liriodendron tulipifera* (USA, NY) (only known from the type collection).

Notes: 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). *C. galii* 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.

(34) *Cladosporium lupiniphilum* U. Braun

Fig. 42

Cladosporium lupiniphilum U. Braun, A monograph of *Cercosporella*, *Ramularia* and allied genera (Phytopathogenic Hyphomycetes) 2: 410 (1998).

Holotype: on *Lupinus luteus* (Fabaceae), Byelorussia, Minsk area, 1959, Čenaškskaja (?) (LEP, as '*Ramularia lupini*').
Ill.: BRAUN (1998: 411, Fig. 664).

Leaf spots amphigenous, subcircular to irregular, 1–3 mm wide, pale yellowish ochraceous to greyish white, margin indefinite or with a narrow darker marginal line. *Colonies* amphigenous, mostly hypophyllous, subeffuse, pale brownish. *Mycelium* internal; hyphae branched, 1.5–5 µm wide, septate, hyaline, subhyaline to pale yellowish olivaceous or olivaceous-brown, forming small stromatic hyphal aggregations, up to 10 µm wide, subglobose, subcuticular to intraepidermal, rarely substomatal, often confluent, sometimes almost crustose. *Conidiophores* solitary or in small, loose fascicles, arising from internal cells or stromatic hyphal aggregations, erumpent through the cuticle, rarely emerging through stomata, erect, subcylindrical, hardly geniculate-sinuous, non-nodulose, unbranched, 20–80 × 3–8 µm, continuous or sparsely septate, subhyaline, pale olivaceous to yellowish brown, smooth, walls only slightly thickened. *Conidiogenous cells* integrated, terminal, with few conidiogenous loci, prominent, 1–2 µm diam., thickened and darkened. *Conidia* catenate, usually in branched chains, ellipsoid-ovoid (-subglobose), subcylindrical-fusiform, 6–28 × 4–8 µm, 0–3-septate, subhyaline, pale olivaceous to yellowish brown, smooth or almost so, ends somewhat attenuated, hila prominent, 1.5–2.5 µm diam., thickened and darkened.

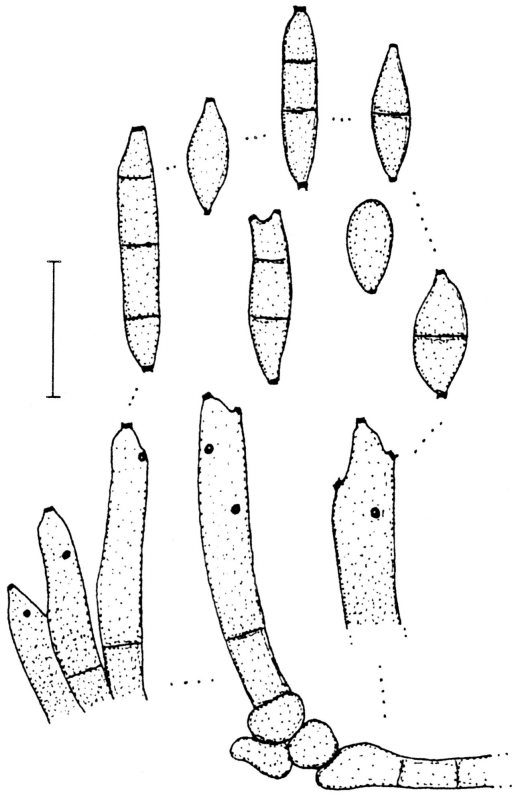

Fig. 42: *Cladosporium lupiniphilum*. Conidiophores and conidia (from BRAUN 1998). Bar = 20 µm.

Host(s)/substrate(s) & distribution: on *Lupinus* spp. (Fabaceae), Europe – *Lupinus luteus* (Byelorussia) (only known from the type collection).

Notes: *C. lupiniphilum* is easily distinguishable from morphologically allied *Cladosporium* species with relatively short, loosely fasciculate conidiophores by having smooth conidia (faintly to conspicuously verruculose-echinulate in *C. praecox*), wider 0–3-septate conidia [2–5 µm wide, 0–1-septate in *C. cheonis*; 2–5(6.5) µm wide, 0–1(–3)-septate in *C. chamaeropis*], and wider conidiogenous loci and hila (1–1.5 µm diam. in *C. cheonis*), respectively.

(35) *Cladosporium maracuja* Viégas

Fig. 43; Pl. 19, Figs A–C

Cladosporium maracuja Viégas, Bragantia 6: 367 (1947).

Holotype: on *Passiflora* sp. (Passifloraceae), Brazil, Prov. St. Pauli, Pindorama, Est. Exp. de Pindorama, 19 Jul. 1935, A.S. Costa (IACM).
Ill.: VIÉGAS (1947: 368, Fig. 5).

Leaf spots amphigenous, solitary, scattered, subcircular, 1–6 mm wide, paler in the centre, margin reddish brown, surrounded by a subcircular, yellowish halo. *Colonies* amphigenous. *Mycelium* immersed, intercellular, intraepidermal; hyphae sparingly branched, 4–5.5 µm wide, septate, not constricted at the septa, hyaline to subhyaline, smooth, walls slightly

thickened. *Stromata* small, substomatal to intraepidermal, 10–50 µm diam., composed of swollen hyphal cells, subglobose, 6–10(–14) µm diam., pale brown, smooth, thick-walled. *Conidiophores* solitary or in small groups, arising from swollen hyphal cells or from stromata, erumpent through the cuticle or emerging through stomata, erect, straight to somewhat flexuous, sometimes geniculate-sinuous, non-nodulose, unbranched, rarely branched, 25–85 × 4–7 µm, often slightly attenuated towards the apex, septate, occasionally somewhat constricted at the septa, pale brown, smooth, walls only slightly thickened, often swollen at the base, up to 10 µm wide, protoplasm of the cells sometimes aggregated at the septa appearing to be thickened, similar to distoseptation. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, 10–32 µm long, with a single to several conidiogenous loci, situated on small lateral shoulders, protuberant, truncate to slightly convex, 1–2(–2.5) µm diam., dome and raised rim conspicuous, thickened, darkened-refractive. *Conidia* catenate, in branched chains, straight, variable, obovoid, ellipsoid, fusiform to subcylindrical, 5–25 × (3–)4–6.5 µm, 0–1(–2)-septate, sometimes slightly constricted at the septum, subhyaline to pale brown, smooth, walls not to only slightly thickened, apex rounded or with a single to several apical hila, truncate to slightly convex at the base, hila conspicuous, 1–2 µm diam., thickened, darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Passiflora* spp. (Passifloraceae), South America – *Passiflora* sp. (Brazil) (only known from type collection).

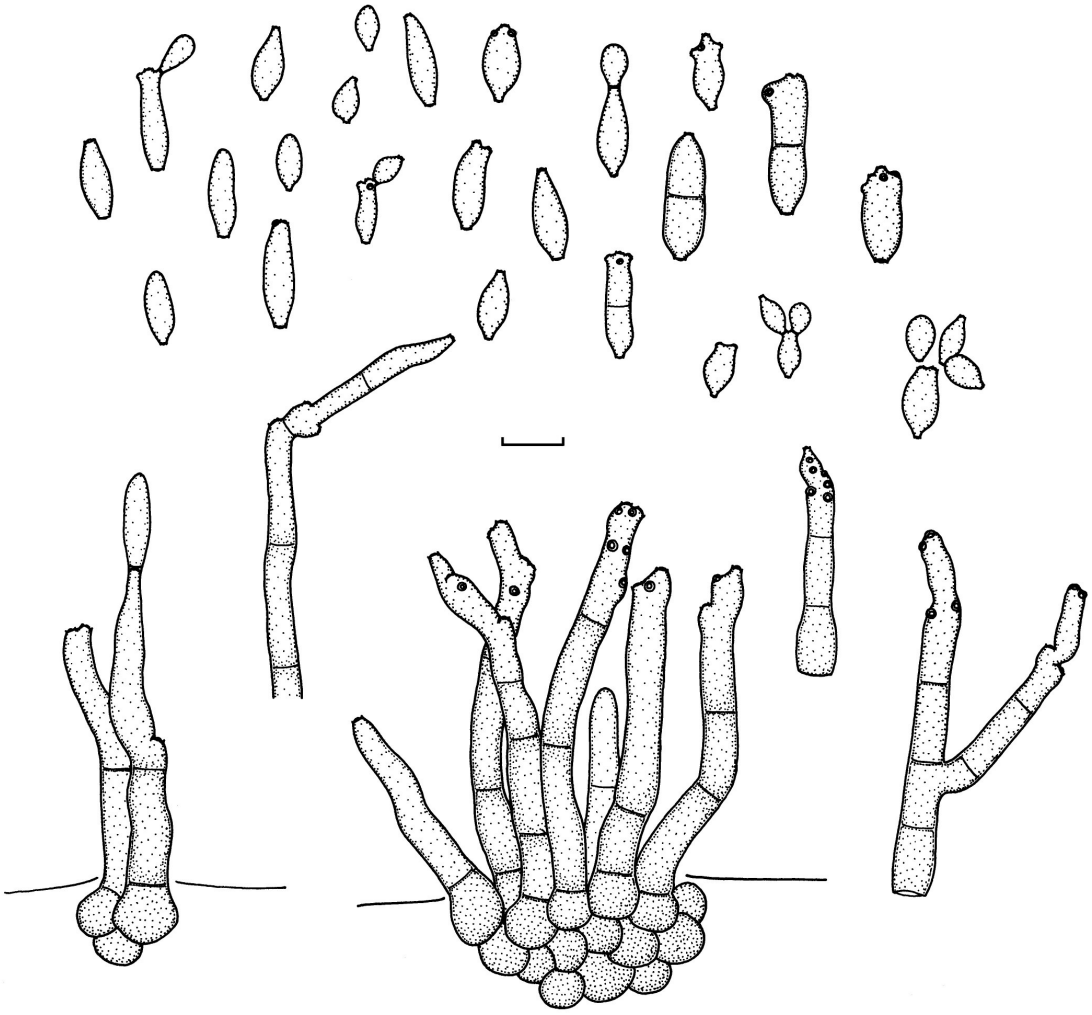

Fig. 43: *Cladosporium maracuja*. Conidiophores and conidia. Bar = 10 µm.

Notes: A stained preparation of the holotype of this species, which has been examined by F. Freire (Fortaleza, Brazil), showed several fascicles of conidiophores and numerous conidia with conspicuous cladosporioid conidiogenous loci and hila, well differentiated in a convex central dome and a raised periclinal rim. *C. maracuja* is the only species in this genus known to attack a member of the Passifloraceae. It is morphologically comparable with *C. praecox*, *C. orchidearum* and *C. gentianae*, but distinct in having smooth conidia (faintly to conspicuously verruculose-echinulate in *C. praecox*; smooth or almost so to verruculose or irregularly rough-walled in *C. gentianae*; verruculose in *C. orchidearum*), narrower conidiophores [(4–)5–10 µm wide in *C. gentianae*], and usually 0–1-septate conidia (0–3-septate in *C. orchidearum*).
C. oxysporum, originally described on dead leaves of *Passiflora edulis* from Cuba, is a common saprobic species and easily distinguishable from *C. maracuja* by having nodulose or even nodose, much longer conidiophores with conidiogenous loci confined to swellings.

(36) *Cladosporium mimulicola* U. Braun

Fig. 44

Cladosporium mimulicola U. Braun, Nova Hedwigia 58(1–2): 196 (1994).

Holotype: on *Mimulus* sp. (Scrophulariaceae), USA, California, 18 Jul. 1895, J.J. Davis (NY).
Ill.: BRAUN (1994: 193, Pl. 1, Fig. 7).

Leaf spots almost absent or diffuse, leaves with brownish discolorations. *Colonies* usually hypophyllous, diffuse, brownish. *Primary mycelium* internal, secondary mycelium external, superficial, branched, 2–5 µm wide, septate, brown, smooth, thin-walled. *Stromata* absent. *Conidiophores* solitary, arising from superficial hyphae, lateral and terminal, straight and subcylindrical to slightly geniculate-sinuous, unbranched, ca. 10–80 × 3–5 µm, 0–3-septate, brown, walls thin to slightly thickened. *Conidiogenous cells* integrated, terminal or conidiophores reduced to conidiogenous cell, proliferation sympodial, conidiogenous loci conspicuous, protuberant, (0.5–)1–2(–2.5) µm diam., thickened and darkened. *Conidia* catenate, often in branched chains, ellipsoid-ovoid, subcylindrical, 10–30 × (2.5–)3–5(–6.5) µm, 0–2-septate, brown, smooth, hila somewhat protuberant, 0.5–2.5 µm diam., thickened and darkened.

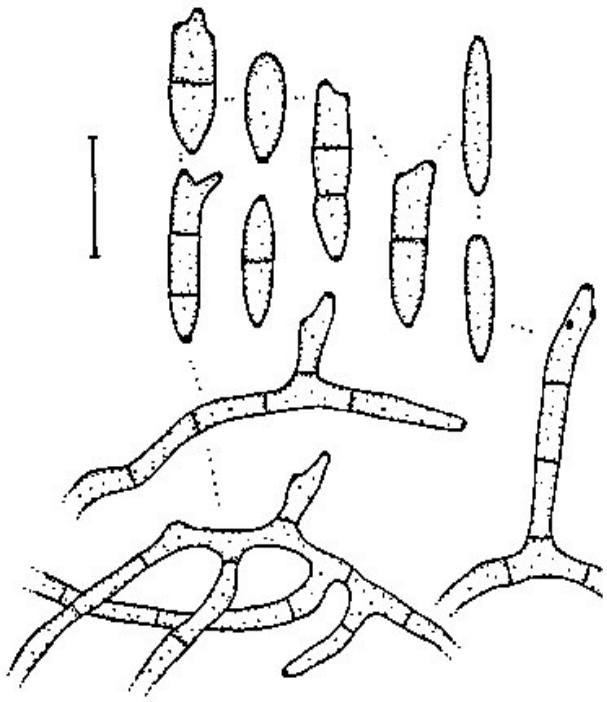

Fig. 44: *Cladosporium mimulicola*. Conidiophores and conidia (from BRAUN 1994). Bar = 20 µm.

Host(s)/substrate(s) & distribution: on *Mimulus* spp. (Scrophulariaceae), North America – *Mimulus* sp. (USA, CA) (only known from the type collection).

(37) *Cladosporium minusculum* Sacc.

Fig. 45; Pl. 19, Figs D–F

Cladosporium minusculum Sacc., Ann. Mycol. 11: 20 (1913).

Holotype: on living leaves of *Salix alba* (Salicaceae), Malta, Ghain el Gbira, Oct. 1911, Caruana Gatto (PAD).
Isotype: IMI 70294.
Lit.: FERRARIS (1914: 886), SACCARDO (1931: 798), BRAUN (2000: 34).
Ill.: BRAUN (2000: 37, Fig. 5).

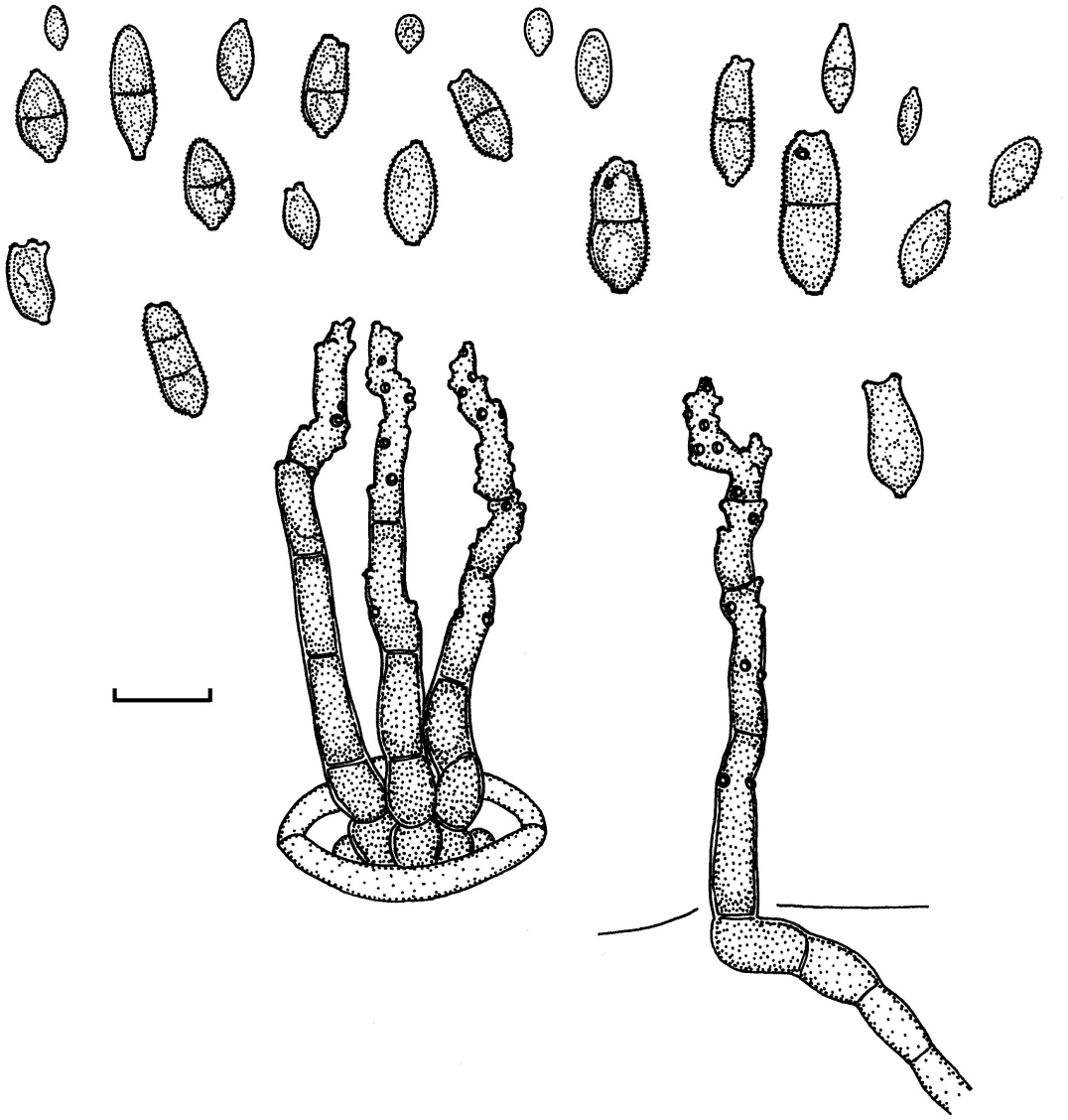

Fig. 45: *Cladosporium minusculum*. Conidiophores and conidia. Bar = 10 µm.

On living leaves without conspicuous lesions or associated with distinct leaf spots, together with *Alternaria* sp., spots amphigenous, subcircular to irregular, 1–3 mm wide, brownish to greyish white, with a diffuse brownish margin or marginal line. *Colonies* amphigenous, usually epiphyllous, scattered to subeffuse, dull greyish brown, not very conspicuous. *Mycelium* internal, mostly intraepidermal; hyphae sparingly branched, 3–6 µm wide, septate, later often swollen and slightly constricted at the septa, up to 10 µm wide, subhyaline to pale brown, smooth, walls somewhat thickened. *Stromata* absent or developed, small, usually substomatal, 10–20 mm diam., composed of only few swollen

hyphal cells, somewhat angular, 4–8 µm wide, pale to medium brown, thick-walled, smooth. *Conidiophores* solitary or in small loose fascicles, arising from swollen hyphal cells or stromata, often emerging through stomata, sometimes erumpent through the cuticle, erect, straight to often somewhat flexuous, strongly and frequently geniculate-sinuous, non-nodulose, mostly unbranched, 15–100 × 2–5(–7) µm, pluriseptate, not constricted at the septa, pale to medium dark brown throughout or tips paler, smooth, with age somewhat asperulate, walls somewhat thickened, sometimes two-layered, protoplasm of the cells somewhat aggregated at the septa appearing to be thickened (as in distoseptation). *Conidiogenous cells* integrated, terminal and intercalary, 7–35 µm long, proliferation sympodial, with numerous conidiogenous loci, often aggregated near the apex, protuberant, often situated on small lateral shoulders, subdenticulate, (0.5–)1–1.5 µm diam., thickened, refractive to somewhat darkened. *Conidia* catenate, in unbranched or branched chains, subglobose, ellipsoid-ovoid, fusiform to subcylindrical, 3–16 × (2–)3–5 (–6) µm, 0–1(–3)-septate, sometimes slightly constricted at the septa, subhyaline to pale yellowish, olivaceous or brownish, almost smooth or mostly faintly to distinctly verruculose, walls somewhat thickened, thicker with age, protoplasm of the cells mostly with a small, oval to somewhat irregular, paler cavity in the centre, ends rounded or slightly attenuated, hila protuberant, truncate to slightly convex, 0.5–1.5 µm diam., thickened, refractive to somewhat darkened; microcyclic conidiogenesis sporadically occurring.

Host(s)/substrate(s) & distribution: on *Salix* spp. (Salicaceae), Europe – *Salix alba* (Malta) (only known from the type collection).

Notes: In the original diagnosis, SACCARDO (1913b) described this species to occur on minute excrements of insects on the lower leaf surface of living leaves of *Salix alba*, which could not be observed neither by BRAUN (2000) nor during the course of the recent re-examination of the type material. *C. minusculum* is morphologically allied to *C. cladosporioides*, but differs in having strongly geniculate-sinuous conidiophores and consistently verruculose conidia (BRAUN 2000). *C. lineolatum*, which is also close to *C. minusculum*, deviates in having an internal mycelium as well as superficially growing hyphae giving raise to often branched conidiophores, usually smooth 0–3-septate conidia; occasionally ramoconidia s. str. are formed.

(38) *Cladosporium myrtacearum* K. Schub., U. Braun & R.G. Shivas

Fig. 46; Pl. 19, Figs G–I

Cladosporium myrtacearum K. Schub., U. Braun & R.G. Shivas, in Braun et al., Australas. Pl. Pathol. (2005), in press.

Holotype: on *Corymbia polycarpa* (Myrtaceae), Australia, Northern Territory, Millingimbi, Townsite, 17 Aug. 1999, A.A. Mitchel (BRIP 26527).
Isotype: DNAP 26527.
Ill.: BRAUN et al. (2005: Fig. 5).

Leaf spots amphigenous, subcircular to oval-oblong, 3–12 mm wide, medium to reddish brown, centre paler, occasionally with a small hole in the centre, margin irregular, inconspicuous or narrow, somewhat raised, occasionally with a narrow, brown or purplish halo, finally leaf spots dropping out, leaving shot-hole symptoms. *Colonies* amphigenous, mostly in the centre, densely caespitose, olivaceous-brown. *Mycelium* immersed, subcuticular to intraepidermal; hyphae sparingly branched, septate, subhyaline to pale olivaceous, smooth, thin-walled. *Stromata* lacking or only with small hyphal aggregations, composed of swollen hyphal cells, subglobose to somewhat angular, 5–10(–13) µm diam., pale olivaceous to medium brown. *Conidiophores* solitary or in small, loose to dense fascicles,

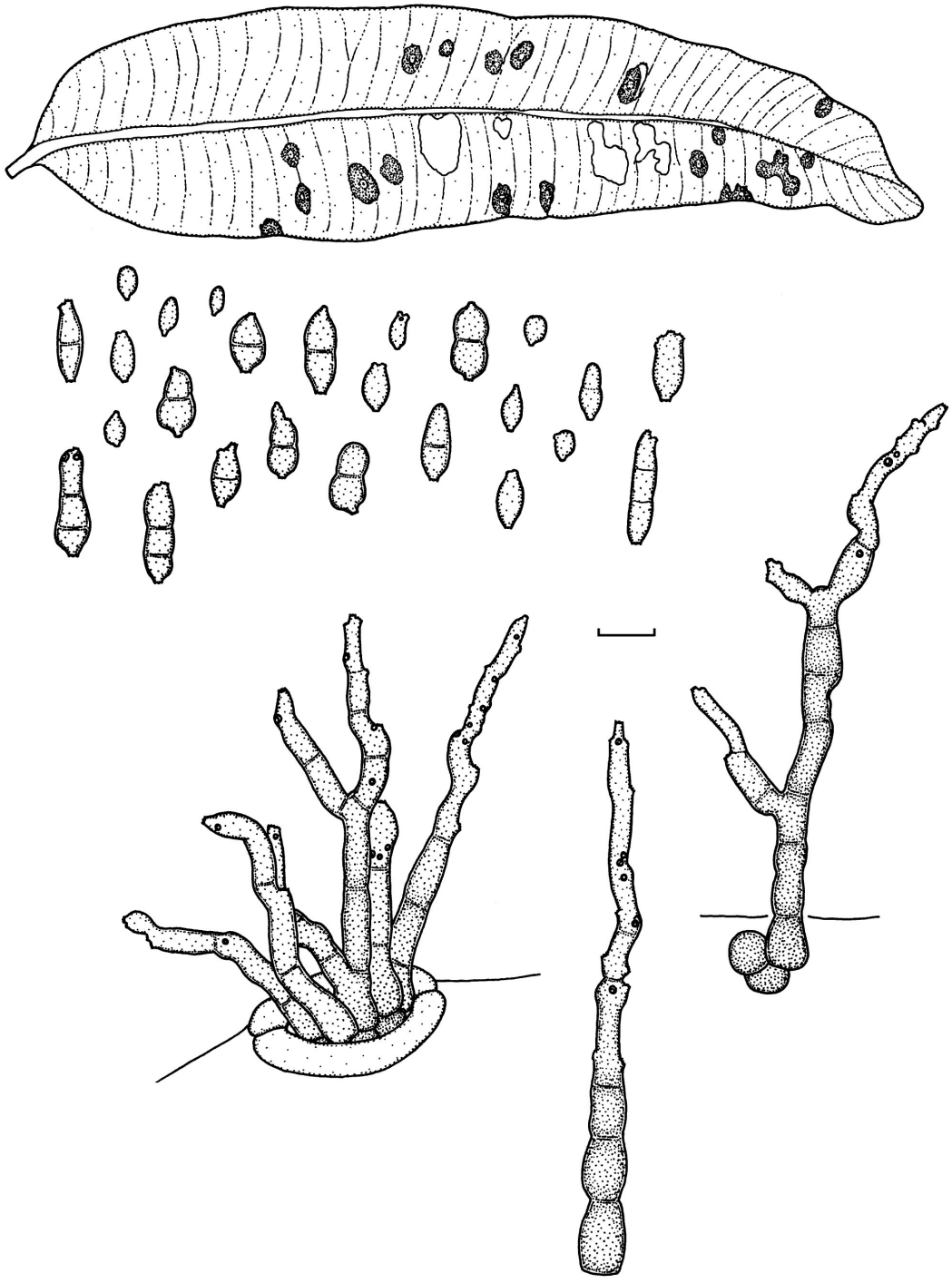

Fig. 46: *Cladosporium myrtacearum*. Symptoms, conidiophores and conidia. Bar = 10 µm.

arising from swollen hyphal cells, emerging through stomata or erumpent through the cuticle, straight to flexuous, unbranched or branched, geniculate-sinuous, subnodulose, often somewhat attenuated towards the apex and swollen at the base, 14–96 × 3–7(–9.5) µm, pluriseptate, often constricted at the septa, pale olivaceous to medium brown, somewhat paler towards the apex, walls somewhat thickened, protoplasm of the cells sometimes aggregated at the septa appearing to be thickened (as in distoseptation). *Conidiogenous cells* integrated, terminal and intercalary, cylindrical-oblong, 10–43 µm long, proliferation sympodial, with numerous, scattered conidiogenous loci, not confined to

swellings, somewhat protuberant, 1–2 µm diam., somewhat thickened and darkened-refractive. *Conidia* in unbranched or branched chains, straight, subglobose, ovoid, obovoid, broadly ellipsoid-fusiform, subcylindrical, 3–22 × 2–7 µm, 0–1(–2)-septate, not to distinctly constricted at the septa, pale olivaceous to olivaceous, smooth, wall unthickened to somewhat thickened, apex rounded or with 1–5 hila, base rounded to somewhat attenuated, hila somewhat protuberant, 1–2 µm diam., somewhat thickened and darkened-refractive; microcyclic conidiogenesis occasionally occurring.

Host(s)/substrate(s) & distribution: on *Corymbia* spp. (Myrtaceae), Australia – *Corymbia polycarpa* (Australia, Northern Territory) (only known from the type collection).

Notes: At first sight the subnodulose conidiophores of this fungus seemed to resemble those of *Cladosporium herbarum*. However, the conidiogenous loci of *C. myrtacearum* are not confined to swellings, the conidia are smooth and the new species is a leaf-spotting fungus. *C. herbarum* is characterised by having nodulose conidiophores with conidiogenous loci confined to these swellings, and the conidia are verruculose. *C. jacarandicola* (SCHUBERT & BRAUN 2004), recently described from New Zealand on *Jacaranda mimosifolia*, and *C. praecox* (BRAUN 2000) on *Tragopogon orientalis* in Europe are two broadly similar species, but they differ in having shorter and somewhat narrower, sparsely septate conidiophores and conidia with different surface ornamentations (smooth to verruculose in *C. jacarandicola* and faintly to conspicuously verruculose-echinulate in *C. praecox*).
C. amoenum R.F. Castañeda, nom. nud. (≡ *Anungitopsis amoena* R.F. Castañeda & F.M. Dugan), *C. myrticola* Bubák [≡ *Fusicladium myrticola* (Bubák) K. Schub. & U. Braun] and *C. myrticola* R.F. Castañeda & W.B. Kendr., nom. illeg. (generic affinity unclear), species occurring on other hosts of the family Myrtaceae, have been excluded from *Cladosporium* s. str. and belong to other genera (HO et al. 1999; SCHUBERT & BRAUN 2005b).

(39) *Cladosporium neriicola* S.A. Khan & M.A. Kamal

Fig. 47; Pl. 20, Figs A–D

Cladosporium neriicola S.A. Khan & M.A. Kamal, Mycopathol. Mycol. Appl. 52(1): 33 (1974).

Holotype: on leaves of *Nerium indicum* (Apocynaceae), Pakistan, Tando Mohd Khan, Faugi Sugarcane Farm, 11 Oct. 1966, S.A. Khan (IMI 123901).
Ill.: KHAN & KAMAL (1974: 34, Fig. 4).

On living leaves, tips and margins of the leaves, faded, turning pale greyish brown, delimited from green parts of the leaves by a small, 2 mm wide, medium to reddish brown margin, on the lower leaf surface somewhat darker. *Colonies* hypophyllous, punctiform, scattered, in small tufts, dark brown to blackish. *Primary mycelium* internal, immersed, subcuticular. *Stromata* dense, 15–50 µm diam., only few layers deep, composed of subcircular to somewhat angular cells, 3–6 µm diam., pale to reddish brown, smooth, walls slightly thickened. *Secondary mycelium* external, superficial; hyphae creeping, branched, 2.5–4 µm wide, septate, often constricted at the septa, pale olivaceous-brown, smooth to verruculose, walls slightly thickened. *Conidiophores* solitary, arising from external, creeping hyphae, lateral or terminal, or in loose groups arising from stromata, erect to subdecumbent, straight to slightly flexuous, one to several times mildly to distinctly geniculate-sinuous, unbranched, rarely branched, 13–100 × 2.5–4.5(–5) µm, 1–11-septate, pale to medium brown throughout or somewhat paler towards the apex, smooth or faintly to distinctly verruculose, especially at the apex, walls slightly thickened. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, 6–25 µm long, with a single or several subdenticulate conidiogenous loci, truncate to slightly convex, 1–2(–2.5) µm diam., dome

and rim often not very conspicuous, somewhat thickened, more or less darkened-refractive. *Conidia* catenate, in branched chains, straight to slightly curved, small conidia subglobose, obovoid, ellipsoid, 3.5–14 × 2.5–4.5(–5) µm, 0–1(–3)-septate, larger conidia cylindrical-oblong, 15–30 × 4–5(–6) µm, 1–4(–5)-septate, sometimes constricted at the septa, mostly at the median septum, subhyaline, pale to medium brown, smooth to faintly or distinctly verruculose, walls thickened, apex rounded or attenuated with a single to several apical hila, hila conspicuous, subdenticulate, truncate to slightly convex, 1–2(–2.5) µm diam., dome and rim often almost inconspicuous, somewhat thickened, darkened-refractive; microcyclic conidiogenesis not observed.

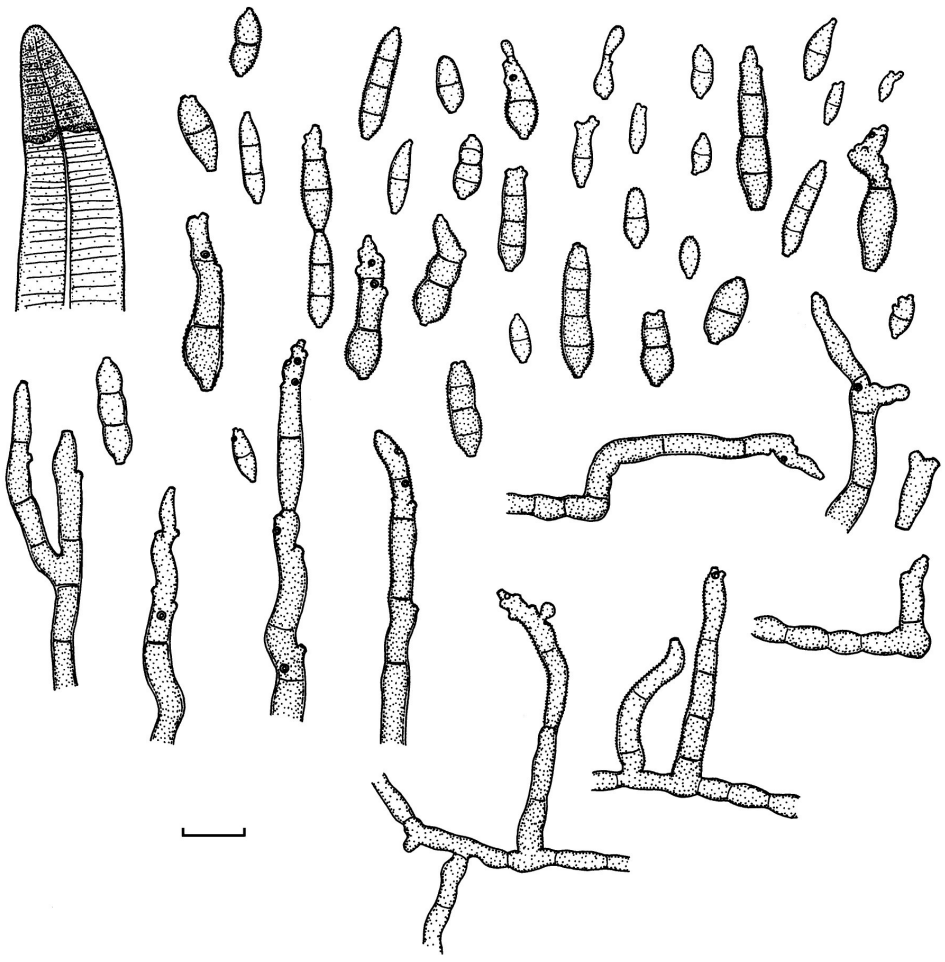

Fig. 47: *Cladosporium neriicola*. Symptoms, conidiophores and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Nerium* spp. (Apocynaceae), Asia – *Nerium indicum* (Pakistan) (only known from the type collection).

Notes: With its superficially growing, smooth to verruculose secondary mycelium and its sometimes verruculose conidiophores and conidia, this species resembles species of the genus *Stenella*, but SEM examinations conclusively showed that *C. neriicola* is a genuine member of *Cladosporium* s. str. (Pl. 20, Fig. B).

Cladosporium microporum Rabenh., described on leaves of *Nerium oleander* from Italy, proved be synonymous with *C. herbarum*. Type material of *C. nerii* Gonz. Frag., recorded on faded and dried leaves of *Nerium oleander* from Spain, could not be located in herb. MA and is probably not preserved. However, the latter species seems to be quite distinct

from *C. neriicola*, since it was described to have longer and wider, 130 × 7 µm, irregularly pluriseptate conidiophores and wider, oval, cylindrical to subclavate conidia, up to 30 × 8 µm (GONZÁLES-FRAGOSO 1920). ZHANG et al. (2003) reported *C. nerii* on *Nerium indicum* from China, but this record possibly refers to *C. neriicola*.

(40) *Cladosporium nigrelloides* U. Braun & Mouch.

Fig. 48

Cladosporium nigrelloides U. Braun & Mouch., in Braun, Mouchacca & McKenzie, New Zealand J. Bot. 37(2): 302 (1999).

Holotype: on leaves of *Manihot utilissima* (Euphorbiaceae), French Polynesia, Isles Gambier, Mangareva, Rikitaea, 2 Apr. 1966, Huguenin (PS 66.684, PC, as '*Cercospora henningsii*').
Ill.: BRAUN et al. (1999: 300, Fig. 2).

Leaf spots amphigenous, subcircular to irregular, 2–40 mm wide, sometimes oblong, up to 70 mm in length, ochraceous to pale brown, later greyish to greyish brown, margin indefinite or with a narrow somewhat darker marginal line, occasionally somewhat raised. *Colonies* amphigenous, punctiform, sometimes dense, dark greyish brown. *Mycelium* internal, occasionally with a few superficial hyphae; hyphae branched, septate, brown, smooth, thin-walled. *Stromata* intraepidermal, occasionally substomatal, 15–50 µm diam., brown, composed of swollen hyphal cells, 2.5–8 µm diam., walls somewhat thickened. *Conidiophores* solitary or in small to fairly large fascicles, loose to dense, arising from stromata, erumpent through the cuticle, occasionally emerging through stomata, erect to decumbent, unbranched or branched, straight, subcylindrical to slightly geniculate-sinuous, 10–90 × 2.5–6 µm, olivaceous to medium brown throughout or paler towards the apex, smooth, walls thin to somewhat thickened. *Conidiogenous cells* integrated, terminal, conidiogenous loci protuberant, about 1–2 µm diam., thickened and darkened. *Conidia* catenate, often in branched chains, ellipsoid-ovoid, fusiform, subcylindrical, 4–18 × 4–6 µm, 0–3-septate, pale olivaceous to olivaceous-brown, smooth or almost so, ends obtuse, rounded or attenuated, subacute, hila protuberant, about 1.5–2 µm diam., thickened and darkened.

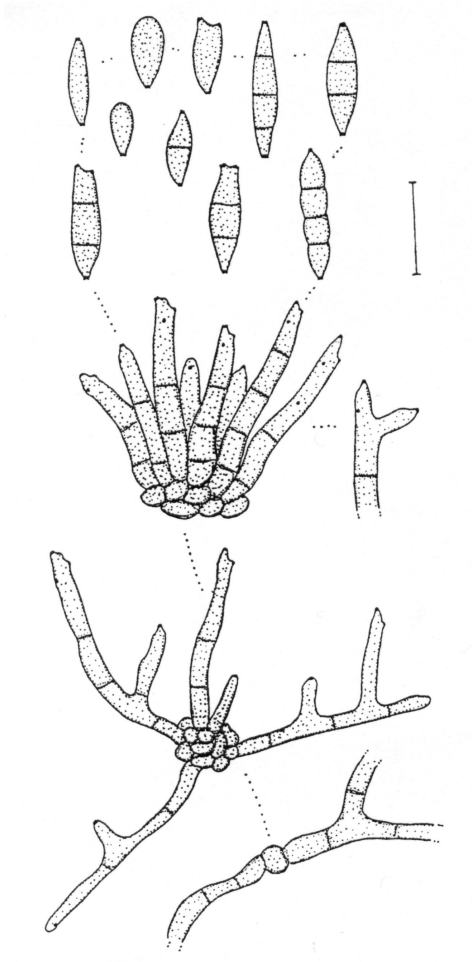

Fig. 48: *Cladosporium nigrelloides*. Conidiophores and conidia (from BRAUN et al. 1999). Bar = 20 µm.

Host(s)/substrate(s) & distribution: on *Manihot* spp. (Euphorbiaceae), Oceania – *Manihot utilissima* (French Polynesia) (only known from the type collection).

(41) *Cladosporium obtectum* Rabenh. ex Cooke

Fig. 49; Pl. 19, Figs J–L

Cladosporium obtectum Rabenh. ex Cooke, Grevillea 17(83): 66 (1889).
≡ *Cladosporium obtectum* Rabenh., Unio itin. crypt., No. 36 (1866), nom. nud.

Syntypes: on fading leaves of *Artemisia maritima* (Asteraceae), Italy, Sardinia, Alghero, Dr. Marcucci, Unio itin. crypt. 36 (e.g., HBG) and Rabenh., F. eur. 2783 (e.g., HBG).
Lit.: SACCARDO (1892: 602, 1895: 619), FERRARIS (1912: 348), ELLIS (1976: 342).
Ill.: ELLIS (1976: 341, Fig. 259 C).
Exs.: Unio itin. crypt. 36, Rabenh., F. eur. 2783.

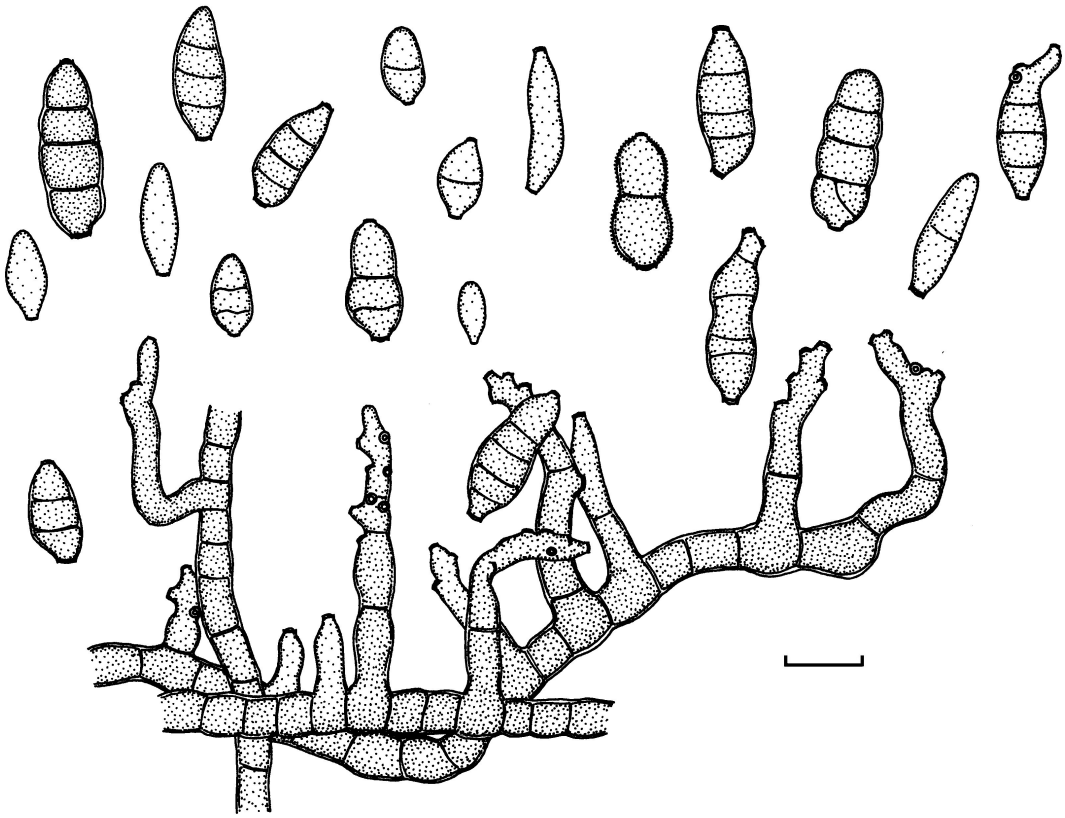

Fig. 49: *Cladosporium obtectum*. Conidiophores and conidia (Rabenh., F. eur. 2783, syntype material from herb. HBG). Bar = 10 µm.

On leaves, without distinct leaf spots or discolorations. *Colonies* hypophyllous, sometimes also epiphyllous, punctiform to subeffuse, pale olivaceous-brown, thin, mostly not very conspicuous, between leaf hairs. *Mycelium* external, superficial; hyphae creeping, branched, 3–11 µm wide, with swellings and constrictions, pluriseptate, closely septate, cells narrow, 3–10 µm long, pale to medium olivaceous-brown, smooth, walls thickened, forming loose to dense, small to extended stromatic hyphal aggregations. *Conidiophores* solitary or in loose to somewhat denser groups, but not fasciculate, sometimes forming large, expanded, sporodochium-like layers, arising from external creeping hyphae or stromatic hyphal aggregations, more or less erect and flexuous, non-nodulose, sometimes slightly geniculate-sinuous, unbranched or branched, 5–60 µm long but usually much shorter, 3–5(–7) µm wide, 0–2(–3)-septate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown, smooth, walls more or less thickened. *Conidiogenous cells* terminal or conidiophores often reduced to conidiogenous cells, later becoming also intercalary, 5–25 µm long, sometimes slightly geniculate-sinuous towards the apex,

proliferation sympodial, with a single or several protuberant conidiogenous loci, often situated on small shoulders, subdenticulate, short cylindrical, obconically truncate, 1.5–2.5 µm diam., thickened and darkened-refractive. *Conidia* catenate, usually in short unbranched chains, occasionally in branched chains, straight or somewhat curved, broadly ellipsoid to cylindrical, 8–25(–34) × (3–)5–8 µm, 0–5-septate, often 3-septate, sometimes slightly constricted at the septa, occasionally with a single longitudinal septum, septa becoming somewhat sinuous with age, pale to medium olivaceous-brown, smooth or sometimes verruculose, walls more or less thickened, slightly attenuated towards apex and base, hila protuberant, obconically truncate, 1.5–2.5 µm diam., thickened and darkened-refractive; microcyclic conidiogenesis occasionally occurring.

Host(s)/substrate(s) & distribution: on *Artemisia* spp. (Asteraceae), Europe – *Artemisia maritima* (Italy) (only known from the type collection).

Notes: Unio itin. crypt. (1866) is a selection of species made by Marcucci and determinated by Rabenhorst. Since a description was not given, *C. obtectum* was not validly published, but in Cooke's 'Omitted Diagnoses' (1889) a brief Latin diagnosis of this species was provided. During the course of the recent morphotaxonomic examinations within the genus *Cladosporium*, type material of *C. obtectum* has been re-examined, and showed that this species is a genuine member of the latter genus. ELLIS (1976) described longer conidia, up to 34 µm, and somewhat wider conidiophores, which could not be observed. ZHANG et al. (2003) reported this species from China on *Artemisia hedinii* and *Solanum melongena*. These records are very probably not identical with *C. obtectum* since the authors described and illustrated much longer conidiophores, 51–102 µm, and 0–2-septate, shorter and narrower conidia.
Several other *Cladosporium* species occur on hosts belonging to the Asteraceae. *C. agoseridis* on *Agoseris glauca* in North America and *C. praecox*, known from the Czech Republic on *Tragopogon orientalis*, are easily distinguishable by internal mycelium, usually fasciculate conidiophores and 0–1(–3)-septate conidia with different surface ornamentations (loosely to densely verruculose or verrucose in *C. agoseridis*; faintly to distinctly verrucose-echinulate in *C. praecox*). *C. inopinum*, known from South America on *Gynoxys hallii*, differs in forming small stromata, often fasciculate, longer conidiophores, up to 120 µm long, and narrower conidia, 2.5–6 µm wide.

(42) *Cladosporium oncobae* K. Schub. & C.F. Hill

Fig. 50; Pl. 21, Figs A–G

Cladosporium oncobae K. Schub. & C.F. Hill, **sp. nov.**

Differt a *C. cladosporioides* et *C. uredinicola* conidiophoris crassitunicatis, interdum bistratos, conidiis brevioribus, 0–3-septatis, et a *C. myrtacearum* conidiophoris non fasciculatis, locis conidiogenis aggregatos et conidiis 0–3-septatis.

Holotype: on *Oncoba spinosa* (Flacourtiaceae), New Zealand, Auckland, Princes Street, Auckland University Campus, 19 Sept. 2004, C. F. Hill, No. 1076 (HAL 1832 F).

On living leaves, causing necrotic leaf margins, leaf spots amphigenous, small to extended, irregular in shape, infections mostly starting at leaf margins, later enlarging and covering large areas of the leaf surface, pale to dark brown, sometimes somewhat zonate, at first without definite border, later with a distinct, small to wide, irregular, dark brown to purple-brown margin, often turning fragile at the leaf margins. *Colonies* amphigenous, scattered, loosely caespitose, pale olivaceous-grey to dark olivaceous-brown. *Mycelium* internal, subcuticular, rarely external; hyphae emerging through stomata and growing superficially, creeping, loosely branched, 2–6 µm wide, septate, sometimes slightly constricted at the septa, often with small swellings, pale olivaceous, smooth, walls slightly thickened, form-

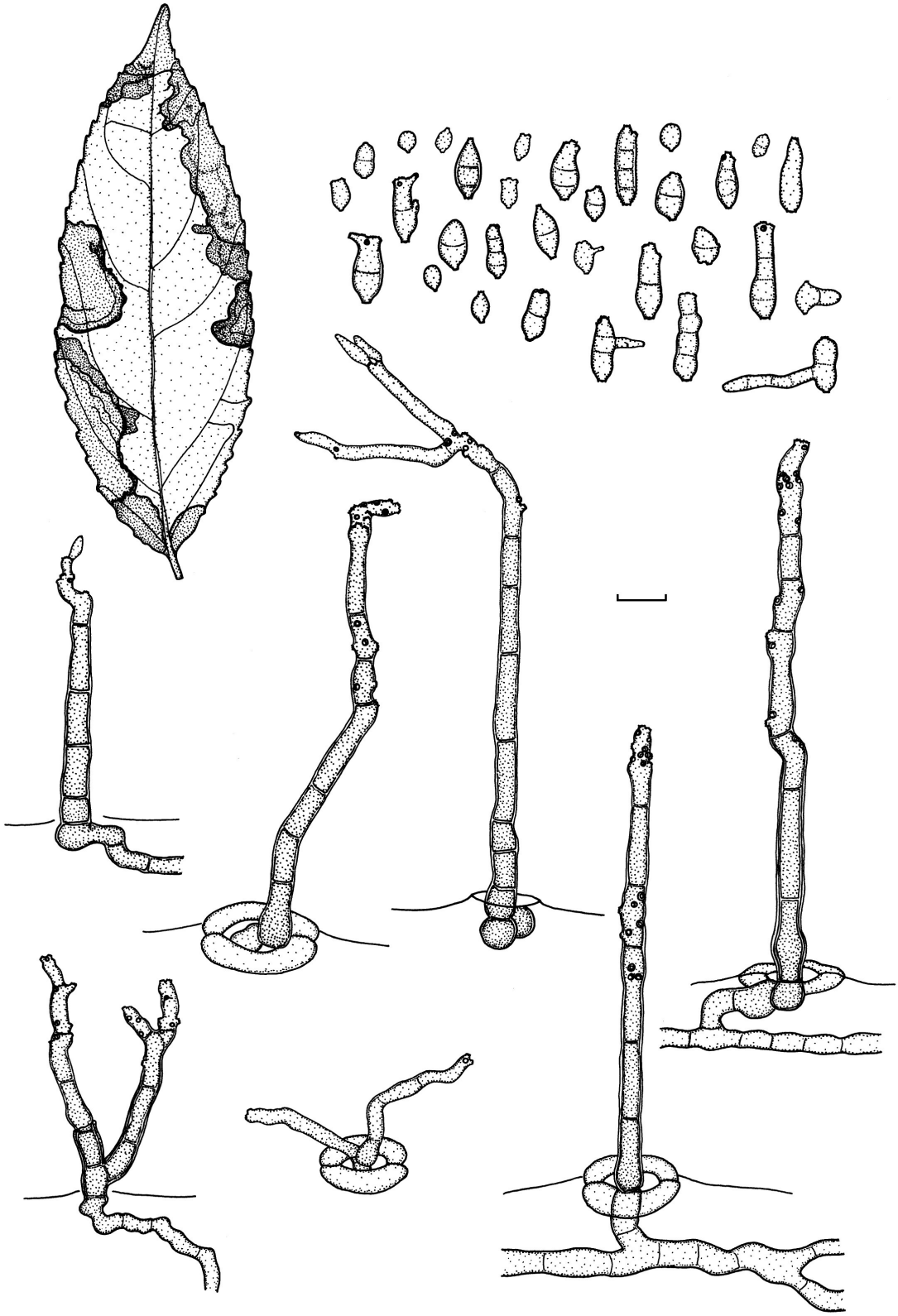

Fig. 50: *Cladosporium oncobae*. Symptoms, conidiophores and conidia. Bar = 10 µm.

ing a loose network, at the base of the conidiophores often somewhat swollen and darker, pale to medium olivaceous-brown. *Stromata* mostly absent to rarely well-developed, substomatal, 15–40 µm diam., forming dense stromatic aggregations composed of swollen hyphal cells, subglobose, 6–13 µm diam., pale to medium or dark olivaceous-brown, thick-walled. *Conidiophores* mostly solitary, rarely in pairs or in small groups, arising from

swollen hyphal cells or from internal, rarely superficial, creeping hyphae, usually emerging through stomata, erect, straight to flexuous, often somewhat geniculate-sinuous, subnodulose, with small lateral shoulders or one-sided swellings, sometimes with somewhat head-like, swollen tips, unbranched or rarely branched, 15–162 × (2.5–)3–6(–7) µm, pluriseptate, pale olivaceous to medium or dark olivaceous-brown, often somewhat paler at the apex, smooth, walls thickened, often distinctly two-layered, (0.5–)1–2 µm thick, sometimes enteroblastically proliferating, often somewhat swollen at the base. *Conidiogenous cells* integrated, terminal and intercalary, 8–36 µm long, proliferation sympodial, somewhat geniculate-sinuous, with few to numerous conidiogenous loci, often crowded and situated on small lateral shoulders, protuberant, 0.5–2(–2.5) µm diam., thickened, more or less darkened-refractive. *Conidia* in branched chains, numerous, variable in shape, subglobose, obovoid, limoniform, narrowly to broadly ellipsoid to subcylindrical or somewhat irregular, 3–20(–25) × 2.5–6(–7) µm, 0–3-septate, occasionally constricted at the septa, pale olivaceous, smooth, very rarely somewhat rough-walled, walls thickened, often rounded at the ends, usually with a single or few apical protuberant hila, 0.5–2(–2.5) µm diam., thickened, more or less darkened-refractive; microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Oncoba* spp. (Flacourtiaceae), New Zealand – *Oncoba spinosa* (New Zealand, Auckland) (only known from the type collection).

Notes: *Cladosporium idesiae* Bres. (type: on *Idesia* sp., Germany, Späth'sche Baumschule, Oct. 1895, P. Sydow, B 70-6556 and Syd., Mycoth. march. 4498, HBG, re-examined), the only species of the genus *Cladosporium* hitherto described on a host belonging to the Flacourtiaceae, has to be reduced to synonymy with *C. herbarum* var. *macrocarpum*.
Cladosporium oncobae is morphologically comparable with *C. cladosporioides*, *C. myrtacearum* and *C. uredinicola* Speg. However, *C. cladosporioides* differs from the new species in having somewhat longer and narrower, 0–1-septate conidia, usually terminal conidiogenous cells only with a single or few conidiogenous loci and conidiophores with only somewhat thickened and usually one-layered walls (ELLIS 1971); in *C. myrtacearum* the conidiophores are often arranged in loose to somewhat dense fascicles, crowded conidiogenous loci are lacking, and the conidia are 0–1(–2)-septate (BRAUN et al. 2005); and in the hyperparasitic *C. uredinicola* the walls of the conidiophores are only slightly thickened, not two-layered and the conidia are longer, 3–39 µm, 0–2(–3)-septate, without any constrictions (HEUCHERT et al. 2005). *C. alneum* is also morphologically closely allied to *C. oncobae*, but differs in its occurrence on an unrelated host (on *Alnus* spp.), distinct lesions and conidiophores with thinner walls [0.5–1 µm wide in *C. alneum* versus (0.5–) 1–2 µm wide in *C. oncobae*]. Based on these differences, and since leaf-spotting *Cladosporium* species are generally confined to related hosts of a single plant family, *C. oncobae* is considered a separate species.
Based on its morphology, examined by means of light and scanning electron microscopy (Pl. 21, Figs D, F, G), and molecular examinations (Fig. 2), carried out at the CBS, it could clearly be demonstrated that *Cladosporium oncobae* belongs in *Cladosporium* s. str. Since the two cultures isolated by Frank Hill cluster at two different places within the monophyletic subclade of *Cladosporium* s. str., these cultures have to be checked to clarify their identities.

(43) *Cladosporium orchidearum* Cooke & Massee

Fig. 51; Pl. 20, Figs E–G

Cladosporium orchidearum Cooke & Massee, in Cooke, Grevillea 16(79): 80 (1888).

Holotype: on leaves of an orchid (*Oncidium crispum*) (Orchidaceae), Great Britain, Surrey, Kew, Kew Gardens, H. Low's nursery, Borough of Richmond (NY 72454).

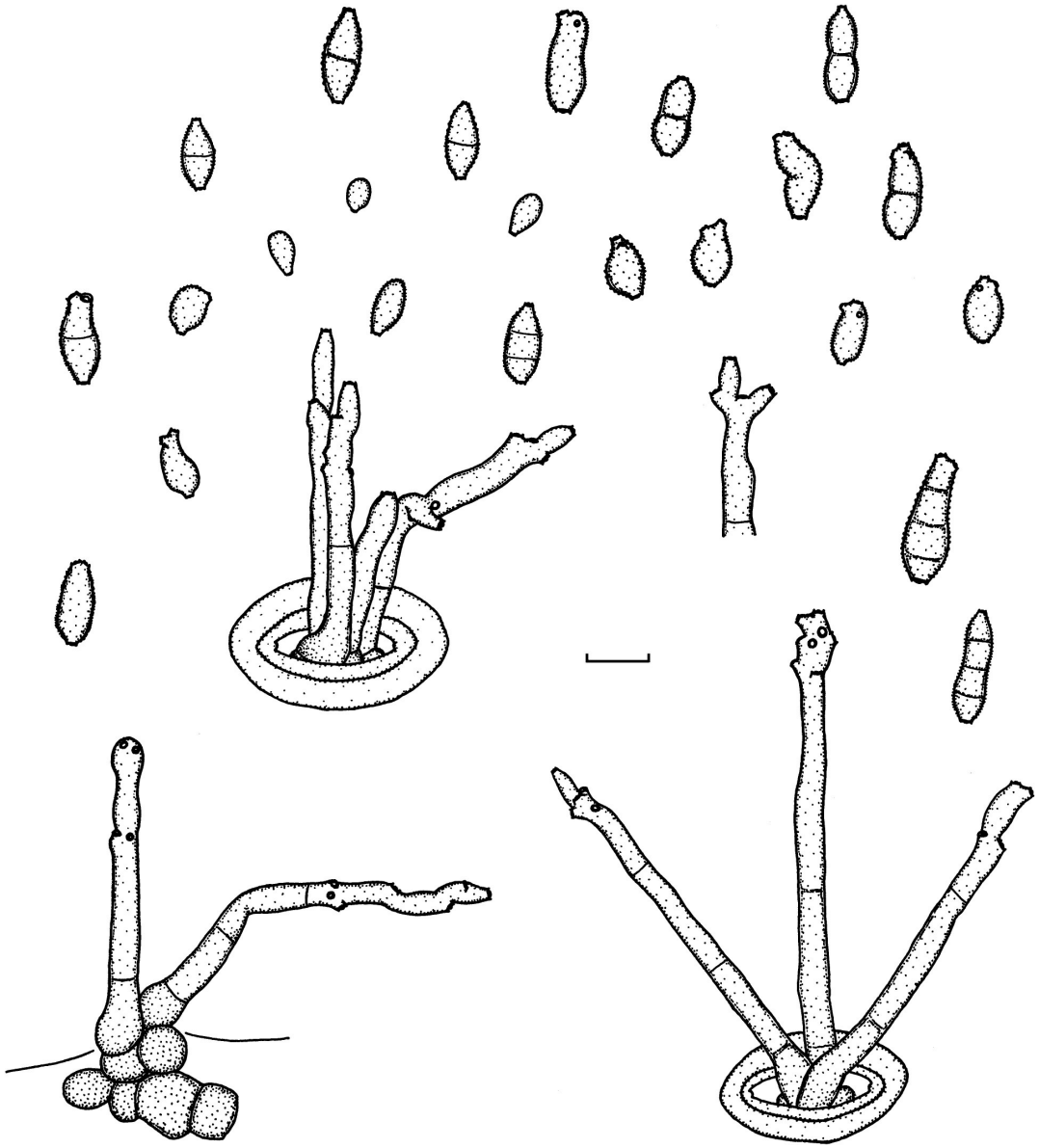

Fig. 51: *Cladosporium orchidearum*. Conidiophores, emerging through stomata or erumpent through the cuticle and conidia. Bar = 10 µm.

Lit.: SACCARDO (1892: 605), ELLIS (1976: 339), SCHUBERT & BRAUN (2004: 305).
Ill.: ELLIS (1976: 339, Fig. 257 B), SCHUBERT & BRAUN (2004: 306, Fig. 4).

On living leaves, distinct leaf spots lacking. *Colonies* hypophyllous, punctiform, in small tufts, scattered to dense, dark olivaceous-brown. *Mycelium* immersed, subcuticular; hyphae sparingly branched, 2–4.5 µm wide, septate, not to slightly constricted at the septa, sometimes with small swellings, up to 7 µm wide, subhyaline, pale olivaceous to pale brown, smooth, walls not or only slightly thickened. *Stromata* 25–65 µm diam., composed of subcircular to somewhat angular or oblong cells, 5–11 µm wide, pale to medium brown, walls slightly thickened. *Conidiophores* solitary or in small fascicles, arising from stromata, mostly emerging through stomata, or erumpent through the cuticle, erect, straight to slightly flexuous, sometimes somewhat geniculate-sinuous, unbranched, occasionally branched, 20–75 × (3–)4–6 µm, 0–3-septate, pale to medium olivaceous-brown, smooth, walls not or only very slightly thickened, not or somewhat swollen at the base, up to 7 µm

wide. *Conidiophores* reduced to conidiogenous cells or conidiogenous cells integrated, terminal, 20–45 µm long, proliferation sympodial, with one to several conidiogenous loci, often crowded at the apex, loci protuberant, subdenticulate to denticulate, truncate to slightly convex, 1.5–2.5 µm diam., slightly thickened, darkened-refractive. *Conidia* catenate, usually in branched chains, ellipsoid, ovoid, subcylindrical, 5–20 × 4–7 µm, 0–3-septate, sometimes slightly constricted at the septa, pale olivaceous, almost smooth to usually verruculose, walls only slightly thickened, somewhat attenuated towards apex and base, with up to three scars at the apex, hila truncate to slightly convex, 1–2(–2.5) µm diam., thickened, darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Oncidium* spp. (Orchidaceae), Europe – *Oncidium crispum* (Great Britain) (only known from the type collection).

Notes: *Cladosporium orchidearum* is only known from the type material; several collections from BPI identified as '*C. orchidearum*' proved to be misidentified and had to be referred to other taxa or they had to be described as new species. *C. orchidearum* belongs into a complex of foliicolous *Cladosporium* species with consistently short conidiophores, but differs in having narrower conidiophores [(3–)4–10(–13) wide in *C. agoseridis*; 3–8 µm in *C. lupiniphilum*] and smaller, above all, narrower conidia, respectively [(6.5–)12–26(–31) × 4–8 µm in *C. praecox*; (10–)12–40(–50) × (5–)6–13 (–15) µm in *C. agoseridis*; 6–28 × 4–8 µm in *C. lupiniphilum*] (BRAUN & ROGERSON 1995; BRAUN 1998, 2000).
Cladosporium orchidis E.A. Ellis & M.B. Ellis, described on *Dactylorhiza majalis* ssp. *praetermissa* from Great Britain, was excluded and re-allocated to *Fusicladium* and *C. cattleyae*, known from Belgium on dead leaves of *Cattleya mossia*, proved to be a synonym of *Dendryphiella vinosa* (SCHUBERT & BRAUN 2004).

(44) *Cladosporium orchidiphilum* K. Schub. & U. Braun

Fig. 52; Pl. 22, Figs A–C

Cladosporium orchidiphilum K. Schub. & U. Braun, Sydowia 56(2): 306–308 (2004).

Holotype: on leaves of *Cypripedium* sp. (Orchidaceae), Australia, Canterbury, 19 Aug. 1914 (VPRI 2488, as '*C. orchidearum*').
Ill.: SCHUBERT & BRAUN (2004: 307, Fig. 5).

On living leaves, causing leaf spots, irregular in shape, on the upper leaf surface with a greyish centre, surrounded by a dark reddish brown margin, on the lower leaf surface more or less zonate, with a pale greyish brown centre, surrounded by dark red-brown and pale reddish brown segments, partly surrounded by a narrow dark red-brown margin and a pale to dark reddish brown halo. *Colonies* hypophyllous, punctiform, in small tufts, scattered, blackish brown. *Mycelium* internal; hyphae sparingly branched, 2–4 µm wide, septate, often slightly constricted at the septa, cells sometimes slightly swollen, pale olivaceous to pale olivaceous-brown, smooth, walls slightly thickened. *Stromata* dense, small to large, substomatal, subcuticular to intraepidermal, 35–75(–100) µm diam., composed of subglobose to somewhat angular or irregular, thick-walled cells, up to 13 µm wide, medium to dark brown, smooth. *Conidiophores* mostly densely fasciculate, arising from stromata, emerging through stomata or erumpent through the cuticle, more or less erect, straight to flexuous, often somewhat geniculate-sinuous, nodulose, but swellings not connected with any conidiogenous loci, mostly unbranched, rarely branched, 50–175 × (2.5–)3–6 µm, pluriseptate, medium brown, paler towards the apex, smooth, thick-walled, sometimes two-layered, 0.5–1 µm wide, somewhat attenuated towards the apex, often enteroblastically proliferating, visible as discontinuity in pigmentation and thickness of the wall, protoplasm sometimes aggregated at the septa, so that the walls and septa appear to

be thickened, similar to distoseptation. *Conidiogenous cells* integrated, terminal or intercalary, 12–35 µm long, with numerous, often crowded conidiogenous loci, sometimes situated on small lateral shoulders, more or less protuberant, subdenticulate, 0.5–1.5 µm diam., slightly thickened, darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight to curved, subglobose, ovoid, ellipsoid to somewhat irregular in shape, 3–15(–19) × 2–5(–7) µm, 0–3(–4)-septate, sometimes constricted at the septa, usually very pale to pale brown, rarely somewhat darker, pale medium brown, smooth to minutely verruculose, thick-walled, sometimes with an unusual cell structure, forming a paler irregular cavity in the centre of the cells, surrounded by the somewhat darker protoplasm, apex rounded or attenuated, often with one or several apical hila, hila protuberant, truncate to slightly convex, 0.5–1.5 µm diam., slightly thickened, somewhat darkened-refractive, microcyclic conidiogenesis often occurring.

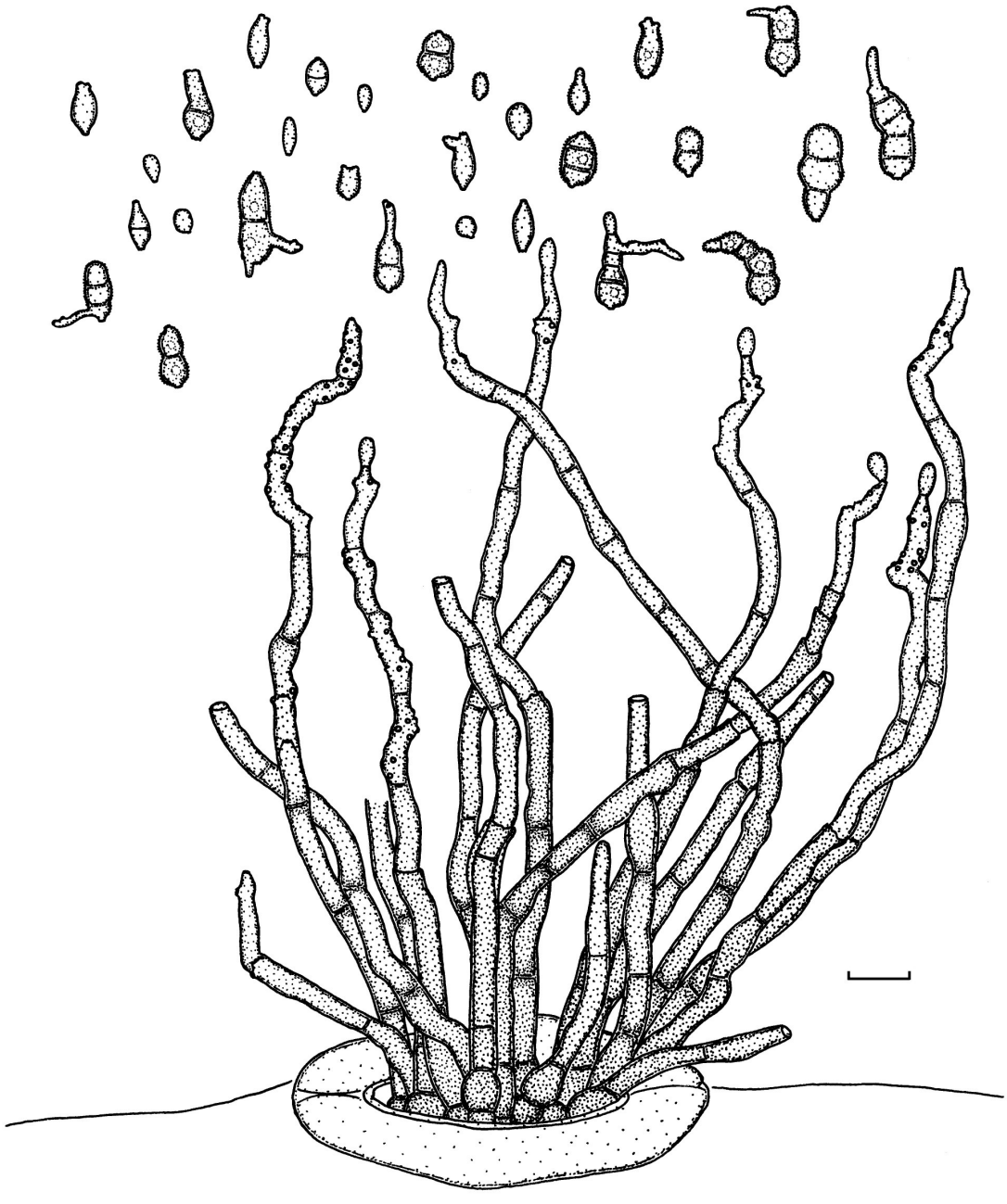

Fig. 52: *Cladosporium orchidiphilum*. Fascicle of conidiophores emerging through stomata and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Cypripedium* spp. (Orchidaceae), Australia – *Cypripedium* sp. (Australia) (only known from the type collection).

Notes: *Cladosporium orchidearum* is a similar species, but easily distinguishable by having shorter, 0–3-septate conidiophores, without swellings and enteroblastic proliferations, and wider conidiogenous loci and hila, (1–)1.5–2.5 µm; microcyclic conidiogenesis does not occur (ELLIS 1971). The identity of the host plant is not quite clear. *Cypripedium* spp. are not native in Australia, and they are not commercially grown. The cultivation of these orchids is very difficult, and they are generally only found in specialist hobby orchid collections. Confusion with commercially grown *Paphiopedilium* or *Phragmipedium* spp. is possible (C. F. Hill, in litt.).

(45) *Cladosporium oreodaphnes* Allesch. ex K. Schub.

Fig. 53; Pl. 23, Figs A–G

Cladosporium oreodaphnes Allesch. ex K. Schub., **sp. nov.**
≡ *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, non attenuatis ad apicem, 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 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 or almost hyaline 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 wide, 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 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.

Host(s)/substrate(s) & distribution: on *Ocotea* spp. (Lauraceae), Europe – *Ocotea foetens* (Germany) (only known from the type collection).

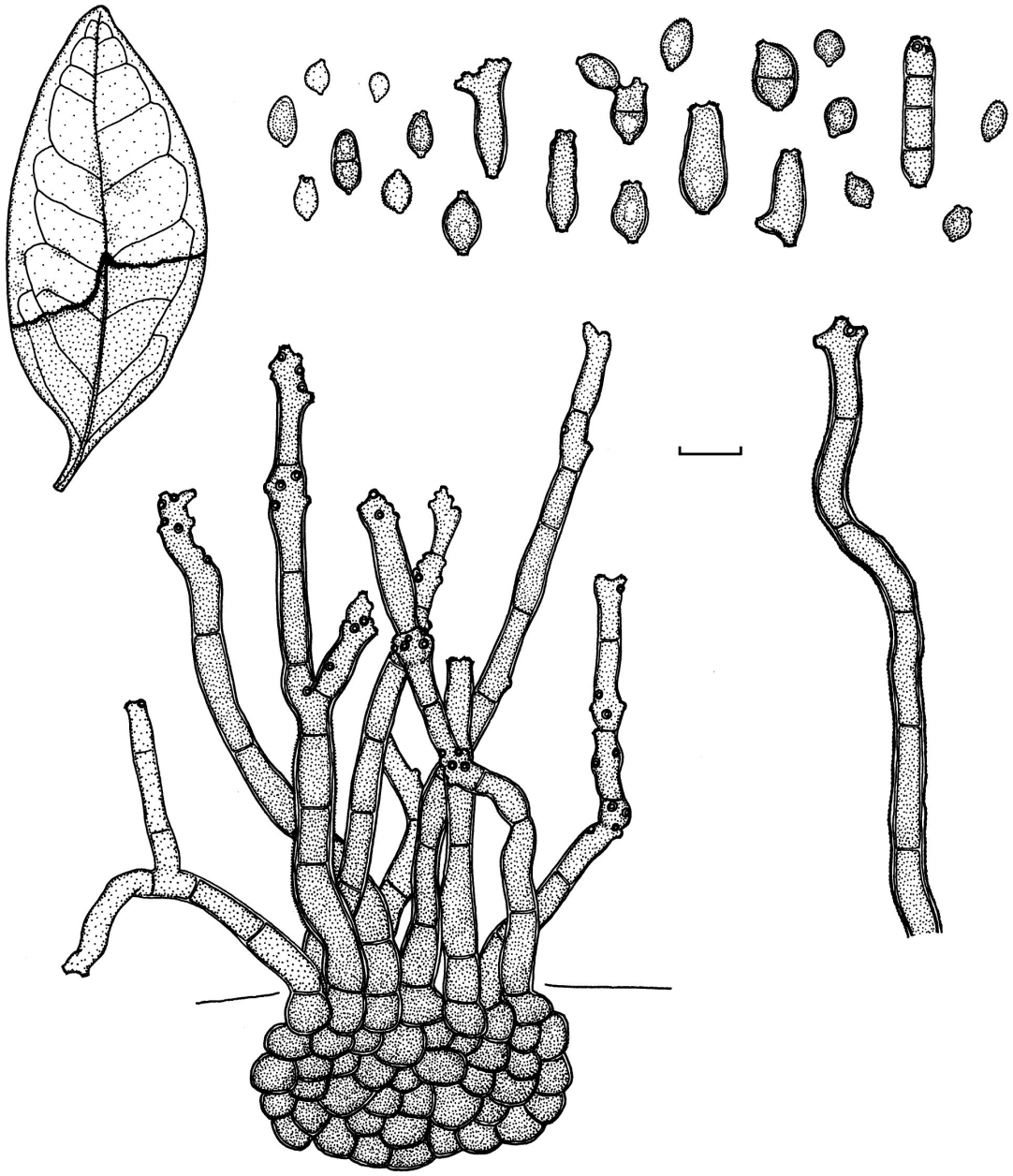

Fig. 53: *Cladosporium oreodaphnes*. Symptoms, fascicle of conidiophores and conidia. Bar = 10 µm.

Notes: 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 cinnamomeum* (Racib.) Höhn. (≡ *Scolecotrichum cinnamomeum* Racib.) was assigned to *Stenella* (BRAUN 2002). *C. congestum* Berk. & Broome proved to be conspecific with

Spiropes scopiformis (ELLIS 1968). *C. 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 non cladosporioid, but their taxonomic affinities are not yet clear. *C. lauri* Raybaud was described to form leaf 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*, *C. dracaenatum* and *C. fusicladiiformis*; however, the latter species is easily distinguishable by its dimorphic conidiophores and somewhat shorter and narrower conidia, which are usually smooth or almost so. *C. 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.

(46) *Cladosporium phyllogenum* K. Schub.

Fig. 54–55; Pl. 24, Figs A–J

Cladosporium phyllogenum K. Schub., **sp. nov.**

Differt a *C. diaphanum* mycelio externo, conidiophoris non fasciculatis, saepe geniculatis, ramoconidiis (s. str.) longioribus, ad 60 µm longis, 0–3(–5)-septatis et conidiis 0–2-septatis.

Holotype: on living leaves of *Ulmus laevis*, Germany, Sachsen-Anhalt, Halle (Saale), botanical garden, 9 Jul. 2004, K. Schubert (HAL 1845 F).

On living leaves and petioles, hypophyllous, sometimes epiphyllous, at first occurring at the lower part of the leaves, especially near to or at leaf veins, then spreading along leaf veins, subcircular, later confluent, at first without symptoms or lesions almost inconspicuous, epiphyllous, irregular, paler green with small punctiform brown areas, which later becoming larger, up to 1.5 mm wide, without margin but surrounded by a pale greenish or yellowish green halo. *Colonies* mostly hypophyllous, rarely epiphyllous, punctiform to effuse, caespitose, loose to dense, pustule-like, medium to dark olivaceous-brown or even blackish, velvety. *Mycelium* external, superficial; hyphae sparingly branched, 2.5–7 µm wide, septate, sometimes with small swellings, subhyaline to pale dingy olivaceous or olivaceous-brown, smooth or almost so, walls thin to slightly thickened, forming a hyphal network. *Stromata* lacking. *Conidiophores* solitary, arising from superficially growing, creeping hyphae, terminal or lateral, erect to subdecumbent or decumbent, straight to often flexuous, often growing like and confusable with hyphae, often several times mildly to distinctly geniculate-sinuous, sometimes with intercalar swellings, up to 11 µm wide, but not connected with conidiogenesis, mostly once or several times branched, often right-angled, rarely unbranched, 58–325 × 3.5–9(–11) µm, septate, dingy olivaceous-green or olivaceous-brown, concolorous with hyphae, smooth or almost so to irregularly rough-walled, walls thickened, often two-layered, lumen of the cells sometimes appearing to be granular. *Conidiogenous cells* integrated, usually terminal, cylindrical-oblong, often geniculate towards the apex, 13–65 µm long, proliferation sympodial, with a single or few conidiogenous loci, protuberant, obconically truncate, 1.5–3 µm diam., thickened, somewhat darkened-refractive. *Ramoconidia* s. str. frequently formed, subcylindrical to cylindrical-oblong, 17–60 × 4.5–8 µm, 0–3(–5)-septate, dingy olivaceous to olivaceous-brown, smooth or almost so, walls thickened, sometimes even

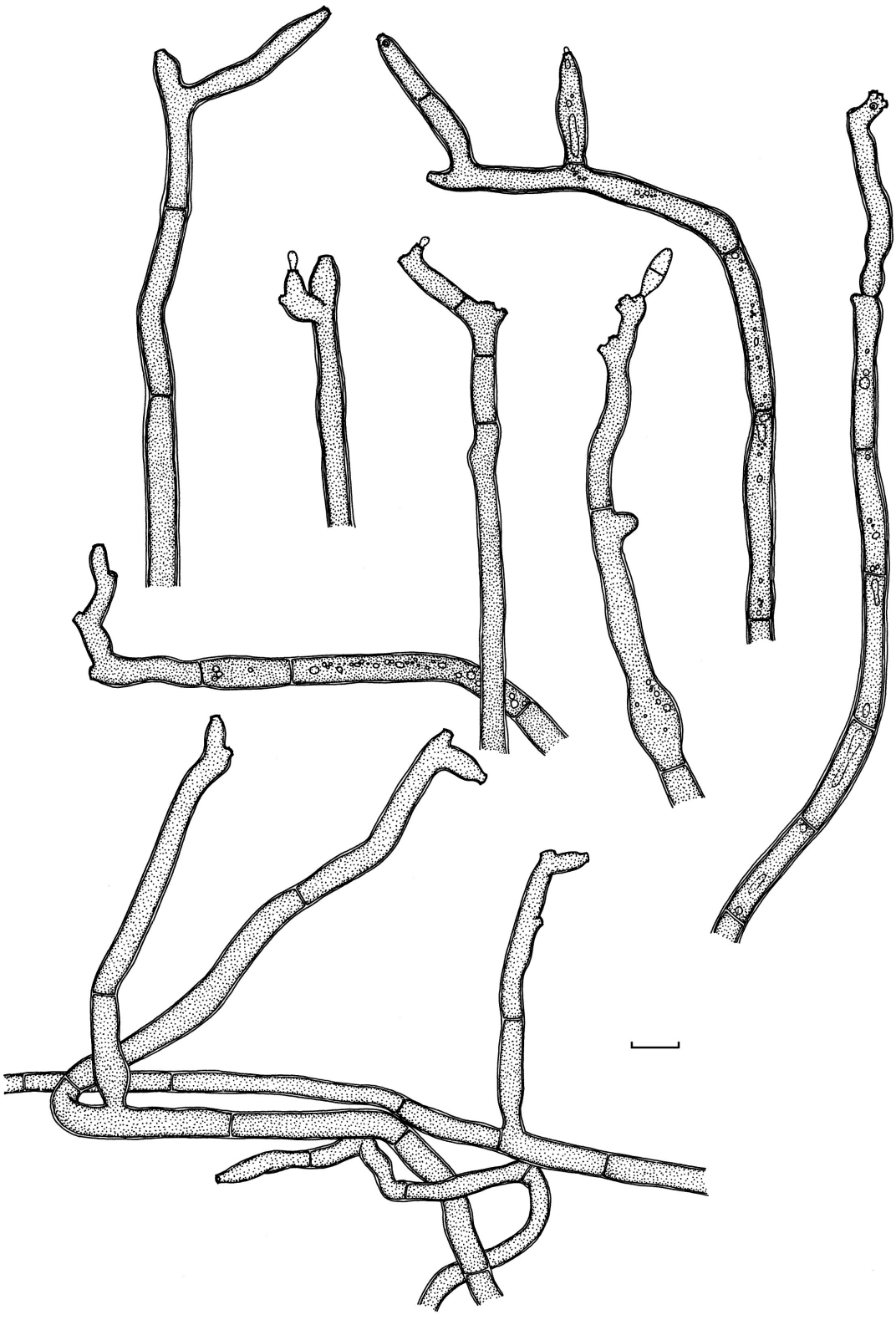

Fig. 54: *Cladosporium phyllogenum*. Conidiophores. Bar = 10 µm.

two-layered, base broadly truncate, unthickened, 2–4.5 µm wide, somewhat refractive or darkened, but not cladosporioid. *Conidia* polymorphous, very variable in shape and size, catenate, in branched chains, straight to curved, small conidia (without apical hilum) subglobose, ovoid, obovoid, 2–13 × 2–4.5 µm, aseptate, pale olivaceous, hila 0.5–1 µm diam., larger, branched conidia (with a single or several hila at the apex) subglobose,

ovoid, obovoid, limoniform, ellipsoid, subcylindrical or cylindrical, 4–32 × 3–7 µm, 0–2-septate, not constricted at the septa, pale olivaceous to dingy olivaceous-brown, smooth or almost so, walls more or less thickened, lumen of the cells sometimes appearing to be granular, hila protuberant, short cylindrical, 0.5–2.5 µm diam., thickened, somewhat refractive to slightly darkened; microcyclic conidiogenesis sporadically occurring.

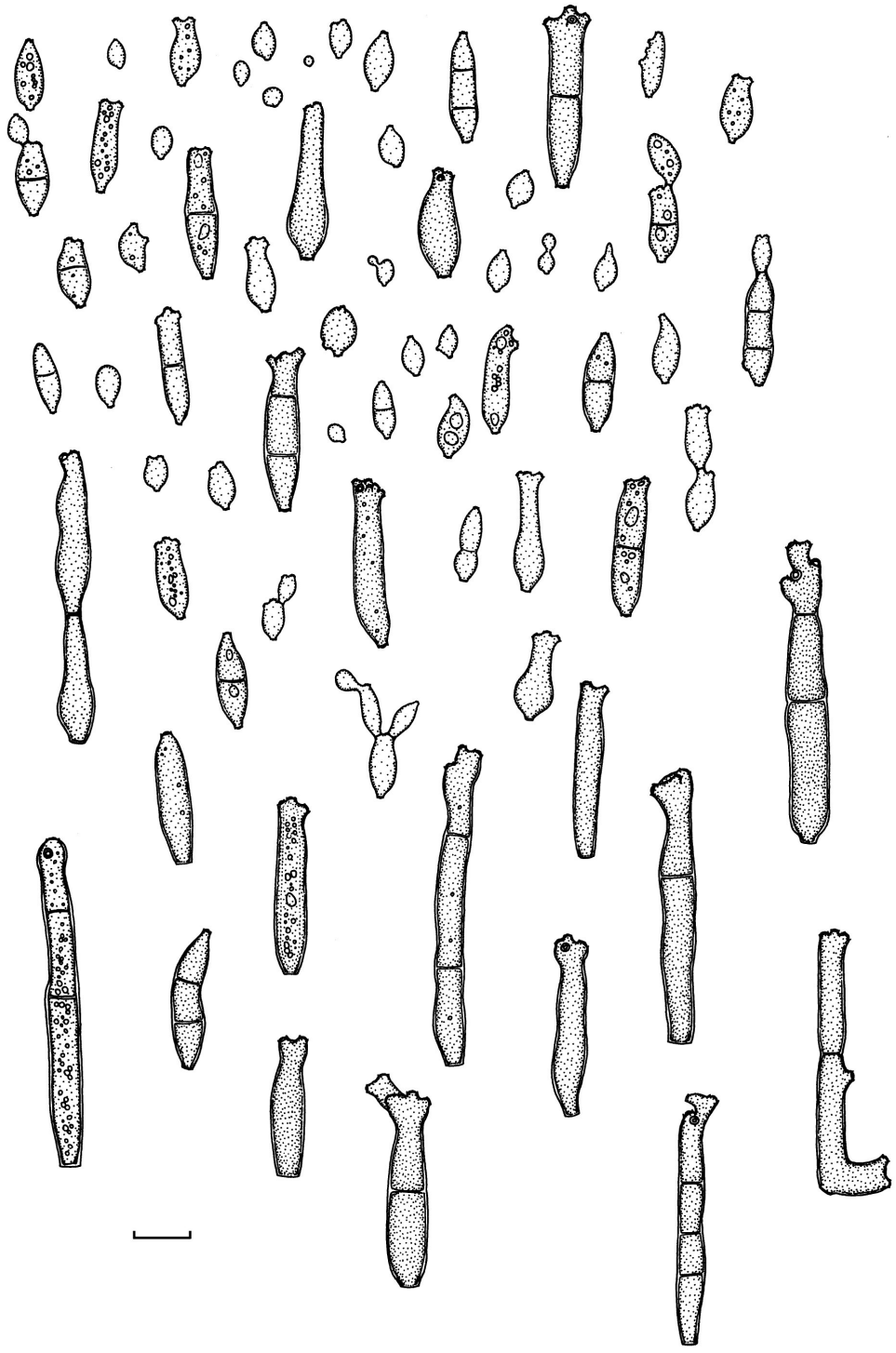

Fig. 55: *Cladosporium phyllogenum*. Ramoconidia s. str., ramoconidia s. lat. and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Ulmus* spp. (Ulmaceae), Europe – *Ulmus laevis* (Germany).

Notes: *C. phyllogenum* is well characterised by its habit and morphology, its numerous, large ramoconidia s. str. and the caused symptoms. SEM (Pl. 24, Figs C, H) as well as molecular examinations (Fig. 2) conclusively showed this species to be a true member of *Cladosporium* s. str., but its biology is not yet clear. *C. phyllogenum* is undoubtedly not saprobic. It was found on green healthy leaves, but without causing any lesions. Maybe it is a biotrophic fungus, usually living as an endophyte. The external growth and fructification was probably caused and influenced by unusual environmental conditions (high temperature and very high, almost 'subtropical' humidity during the summer of 2004).
Cladosporium diaphanum is superficially similar, but forms internal mycelium, usually fasciculate conidiophores emerging through stomata, not distinctly geniculate, (0–)1–6-septate conidia, and somewhat shorter ramoconidia s. str. occur only occasionally. *C. hypophyllum* and its synonym *C. microstictum*, described on *Ulmus minor* from Germany and Italy, are easily distinguishable by having much shorter and narrower conidiophores, 10–80(–100) × (2–)2.5–4(–5) µm, shorter and narrower, 0–1(–3)-septate conidia, 4–17(–19) × 2–5 µm, and, above all, narrower conidiogenous loci and hila, 0.5–1.5 µm. Original material of *C. fumago* [Link] f. *ulmi-effusae* Thüm. (nom. nud., *Ulmus* sp., Thüm., Herb. myc. oec. 237, B 70-6428) consists of green leaves infected with several hyphomycetes, including a trimmatostroma-like hyphomycete and a herbarum-like *Cladosporium* with nodulose conidiophores and conidiogenous loci mostly confined to swellings but smooth conidia often constricted at the septa. A single collection on leaves of *Ulmus* sp., from Texas, USA, deposited at herb. NY as '*Cladosporium brunneum* Corda' proved to be identical with *C. oxysporum*.

(47) *Cladosporium pipericola* R.A. Singh & Shankar

Fig. 56; Pl. 22, Figs D–F

Cladosporium pipericola R.A. Singh & Shankar, Mycopathol. Mycol. Appl. 43(1): 110 (1971), as '*pipericolum*'.

Syntypes: on living leaves of *Piper betle* (Piperaceae), India, Uttar Pradesh, Varanasi, 15 Jan. 1965, G. Shankar (IMI 116933; MSP no. 342).
Lit.: DAVID (1988c).
Ill.: SINGH & SHANKAR (1971: 111, Pl. 1, Figs 3–4), DAVID (1988c: 1, Fig.).

Leaf spots irregular in shape, 20–100 × 15–30 mm wide, brown, with characteristically zonate ring formation, starting on the lower leaf surface but eventually affecting both sides. *Colonies* usually hypophyllous, rarely epiphyllous, pale greenish to olivaceous-brown, villose. *Mycelium* external, superficial; hyphae branched, 1–3(–4) µm wide, septate, not constricted at the septa, pale brown, smooth or rarely slightly rough-walled, walls slightly thickened, forming stromata by aggregation. *Stromata* (40–)50–80(–100) diam., composed of more or less isodiametrical brown cells, (5–)7–9.5(–12) µm wide, forming a textura angularis. *Conidiophores* solitary, arising from creeping hyphae, or in small loose groups, arising from stromata, erect, straight to slightly flexuous, unbranched or often branched, at the base and, above all, towards the apex, 15–300 × 2.5–8 µm, septate, not constricted at the septa, pale olivaceous to olivaceous-brown, thick-walled, verruculose and wider at the base, becoming thin, smooth-walled and attenuated towards the apex, sometimes more or less nodulose with small swellings which are not connected with the conidiogenesis. *Conidiogenous cells* integrated, mostly terminal, cylindrical, 14–35 µm long, proliferation sympodial, with a single or only few conidiogenous loci, protuberant, subdenticulate,

truncate to slightly convex, 1–2.5 µm diam., thickened, somewhat darkened-refractive. *Conidia* catenate, in branched chains, straight to slightly curved, variable in shape and size, obovoid, ellipsoid, limoniform, fusiform, cylindrical, (3–)4.5–21(–28.5) × (1.5–)3–6.5 (–8.5) µm, 0–2(–5)-septate, not constricted at the septa, pale olivaceous-brown to olivaceous-brown, smooth, sometimes distinctly verrucose with age, walls unthickened to slightly thickened, apex rounded or with up to 4 apical hila, truncate or slightly convex at the base, hila protuberant, 0.5–2(–2.5) µm diam., thickened and somewhat darkened-refractive; microcyclic conidiogenesis not observed.

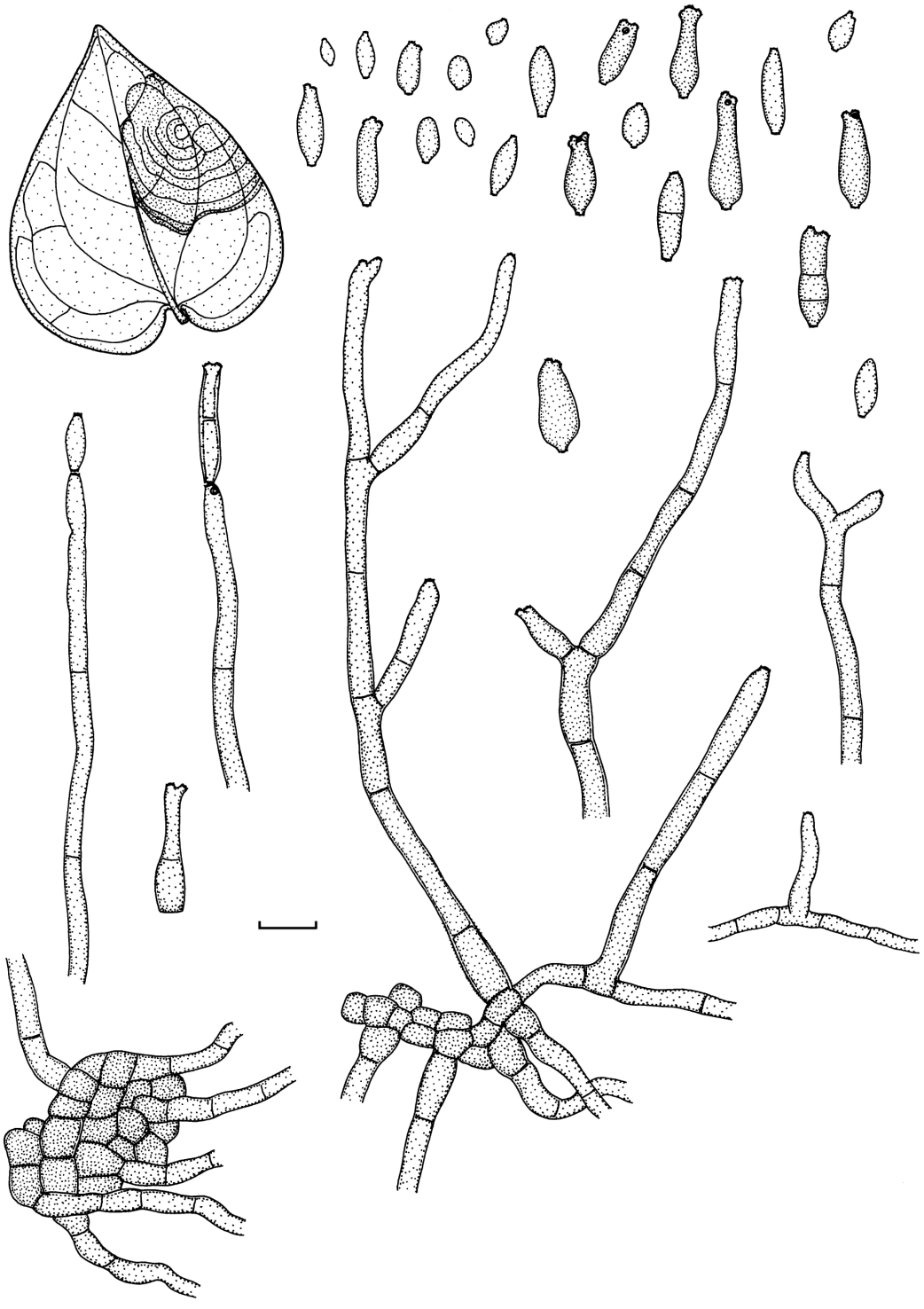

Fig. 56: *Cladosporium pipericola*. Symptoms, stromata (textura angularis), conidiophores and conidia (from syntype IMI 116933). Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Piper* spp. (Piperaceae), Asia – *Piper betle* (India) (only known from the type collection).

Notes: Infection starts at the tips or margins of the leaves and spreads over main parts of the leaf lamina. Lesions develop fast under favourable conditions (cold damp weather) and soon cover the entire leaf surface causing premature defoliation. Infection symptoms initially are evident in December becoming severe in January and February (SINGH & SHANKAR 1971).
Cladosporium pipericola is morphologically closely allied to *C. cladosporioides* but differs, in having wider, often branched and sometimes nodulose conidiophores and 0–2 (–5)-septate, somewhat wider conidia.

(48) *Cladosporium populicola* K. Schub. & U. Braun

Fig. 57; Pl. 25, Figs A–H

Cladosporium populicola K. Schub. & U. Braun, **sp. nov.**

Differt a *C. cladosporioides* conidiophoris latioribus, (4–)5–8(–11) µm, crassitunicatis, saepe bistratos, conidiis brevioribus, 4–14 µm, et a *C. oncobae* conidiophoris latioribus, conidiis brevioribus, saepe 0–1-septatis.

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.

Host(s)/substrate(s) & distribution: on *Populus* spp. (Salicaceae), Europe – *Populus tremula* (Germany) (only known from the type collection).

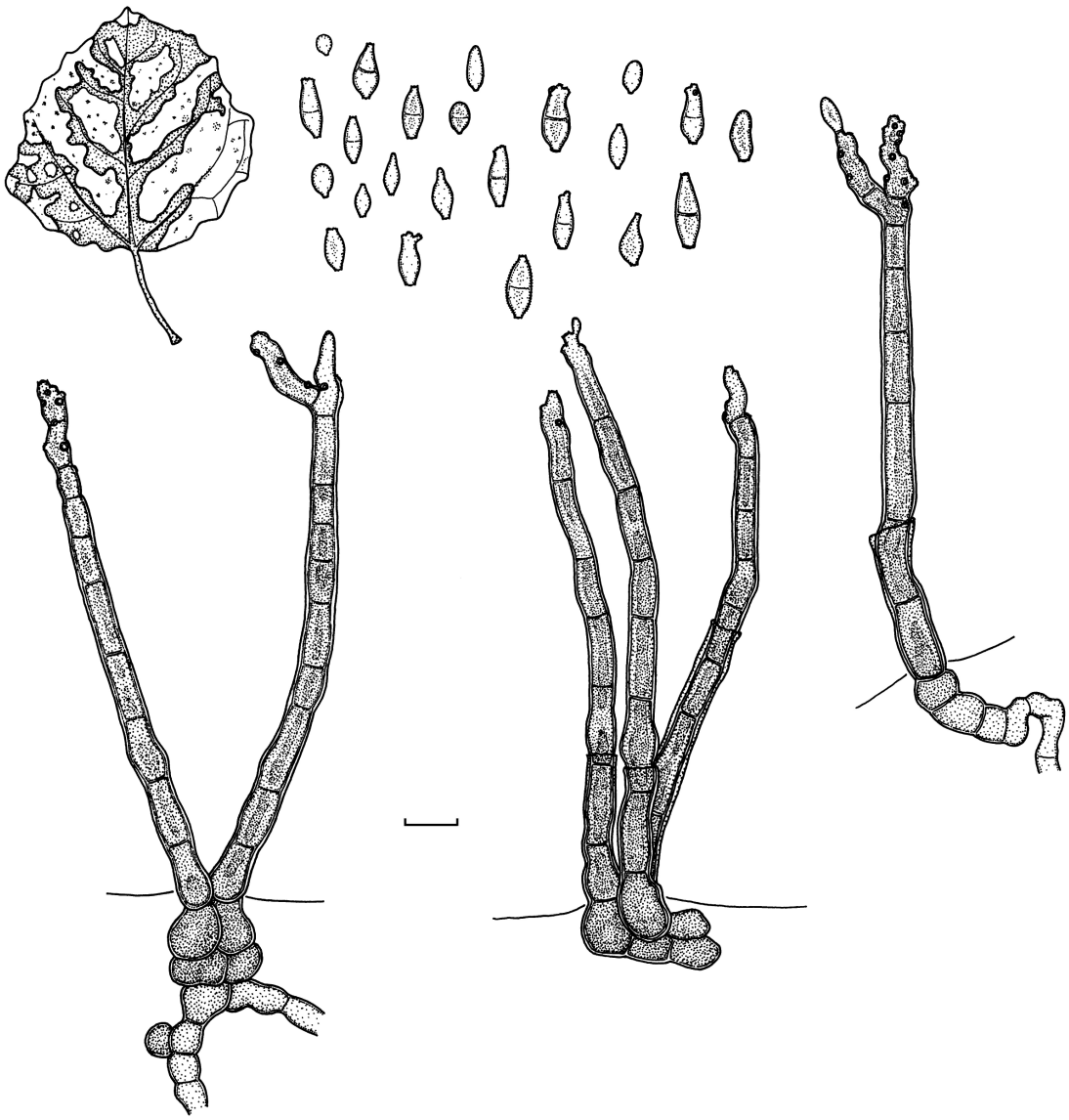

Fig. 57: *Cladosporium populicola*. Symptoms, conidiophores and conidia. Bar = 10 µm.

Notes: 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.
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. *C. oncobae* is also morphologically close to this species, but clearly separated by narrower conidiophores, (2.5–)3–6(–7) µm wide, cells without a distinct, separated lumen, and longer conidia, 3–20(–25) µm, with up to three septa.

(49) *Cladosporium praecox* (Niessl) U. Braun

Fig. 58; Pl. 22, Figs G–I

Cladosporium praecox (Niessl) U. Braun, Schlechtendalia 5: 34 (2000).

≡ *Fusicladium praecox* Niessl, in Rabenhorst, F. eur., Ed. Nov., Ser. II, No. 1166 (1868) and Hedwigia 7: 124 (1868).

Syntypes: on leaves of *Tragopogon orientalis* (Asteraceae), Czech Republic, 'pr. Bistenz ad Brunnam Moraviae', May, G. de Niessl, Rabenh., F. eur. 1166 (e.g., B, HAL, HBG, M-57733).

Ill.: BRAUN (2000: 33, Fig. 3).

Exs.: Rabenh., F. eur. 1166.

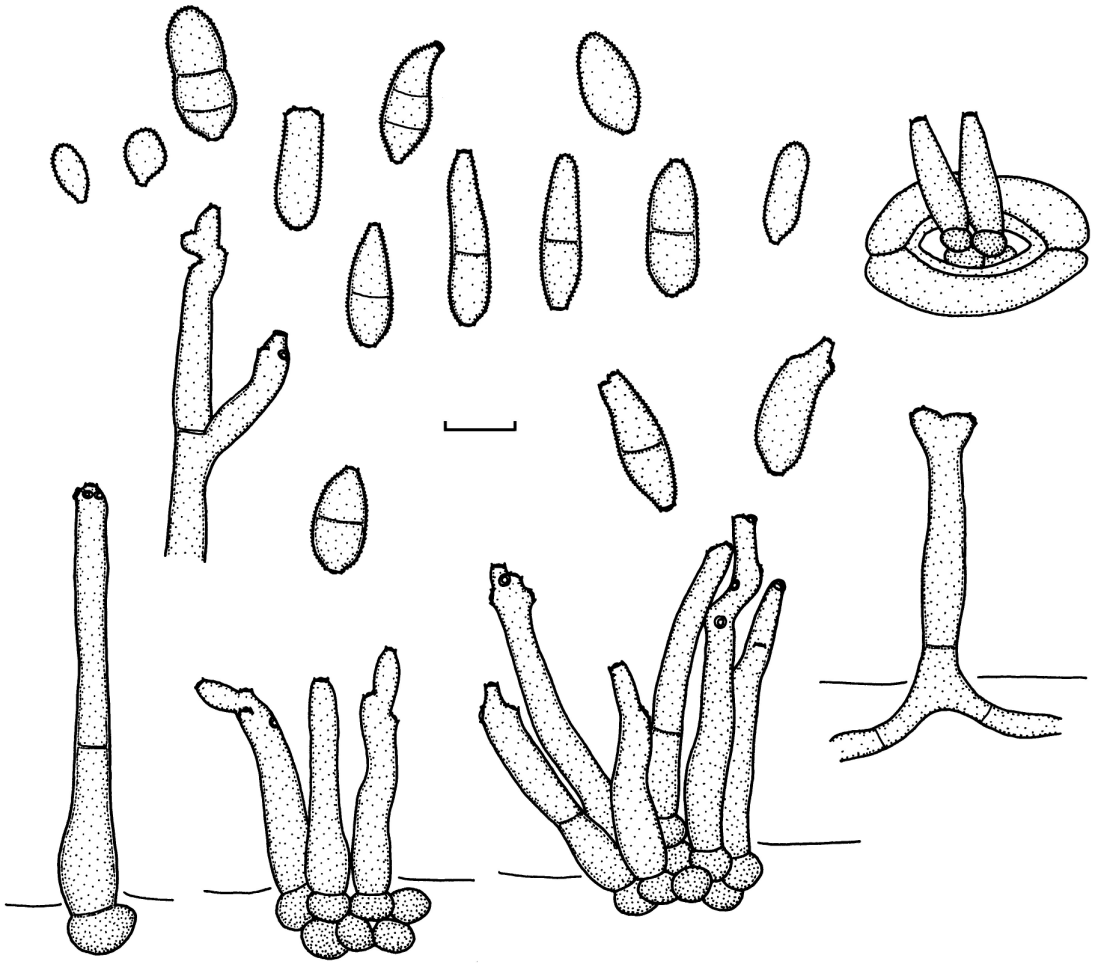

Fig. 58: *Cladosporium praecox*. Conidiophores and conidia (from syntype M-57733). Bar = 10 µm.

On living and fading leaves, causing diffuse yellowish ochraceous to yellowish brown discolorations. *Colonies* amphigenous, subeffuse, not very conspicuous, ochraceous, brownish. *Mycelium* internal, substomatal and intraepidermal; hyphae branched, 3–4.5 µm wide, septate, pale olivaceous, smooth. *Stromata* absent to well developed, 10–55 µm diam., cells subcircular to irregular in outline, 2–8 µm diam., yellowish brown, ochraceous. *Conidiophores* solitary or in small to moderately large fascicles, loose to dense, arising from hyphae, swollen hyphal cells or stromata, emerging through stomata or erumpent through the cuticle, erect, straight, subcylindrical to attenuated towards the apex, somewhat geniculate-sinuous, unbranched or rarely branched, 8–54 × (2.5–)3.5–6(–7) µm, 0–1(–2)-

septate, subhyaline to pale yellowish ochraceous or yellowish brown, smooth, walls slightly thickened, often somewhat swollen at the base, up to 9 µm wide. *Conidiophores* often reduced to conidiogenous cells or conidiogenous cells integrated, terminal, 8–50 µm long, with one to several conidiogenous loci, protuberant, (1–)1.5–2.5 µm diam., thickened, darkened-refractive. *Conidia* catenate, in unbranched or branched chains, ellipsoid-ovoid, fusiform, (6.5–)12–26(–31) × 4–7(–8) µm, 0–1(–3)-septate, yellowish, pale yellowish brown, ochraceous or pale brown, faintly to conspicuously verruculose-echinulate, walls thin to slightly thickened, with 1–3 hila, protuberant, 1–2 µm diam., thickened, darkened-refractive; rarely microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Tragopogon* spp. (Asteraceae), Europe – *Tragopogon orientalis* (Czech Republic) (only known from the type collection).

Notes: Based on the cladosporioid structure of the conidiogenous loci and hila BRAUN (2000) assigned *Fusicladium praecox* to *Cladosporium*. *C. praecox* is well characterised by having uniformly short, very pale conidiophores. *C. agoseridis*, known from North America on *Agoseris* spp., is easily distinguishable in having longer and wider conidiophores and conidia and, above all, wider conidiogenous loci and hila; and *C. inopinum*, occurring on another host belonging to the Asteraceae, differs in forming mainly external mycelium on trichomes and 0–3(–4)-septate conidia.

(50) *Cladosporium psoraleae* M.B. Ellis

Fig. 59; Pl. 26, Figs A–D

Cladosporium psoraleae M.B. Ellis, Mycol. Pap. 131: 16 (1972).

Holotype: on living leaves of *Psoralea corylifolia* (Fabaceae), Myanmar (Burma), Mandalay, 25 Nov. 1971, M. Thaung (IMI 163005).
Lit.: ELLIS (1976: 344).
Ill.: ELLIS (1972: 17, Fig. 16), ELLIS (1976: 343, Fig. 260 C).

Leaf spots amphigenous, subcircular to irregular in outline, 1–4(–9) mm wide, pale brown to greyish brown, surrounded by a narrow, irregular, medium brown margin and a somewhat irregular yellowish ochraceous halo. *Colonies* amphigenous, short caespitose, pale greyish brown, short villose. *Mycelium* internal, subcuticular; hyphae branched, 2–6 µm wide, septate, not or slightly constricted at the septa, sometimes swollen, up to 8 µm wide, pale olivaceous, sometimes subhyaline, smooth, with slightly thickened walls, forming swollen hyphal cells, subcircular to somewhat oblong, up to 15 µm diam., smooth, walls thickened. *Conidiophores* solitary or in loose, small groups, arising from hyphae or swollen hyphal cells, erumpent through the cuticle, straight to slightly flexuous, somewhat geniculate-sinuous, non-nodulose, unbranched or only once or twice branched, 22–130 × 3–6 µm, septate, with 1–4 septa, not constricted at the septa, pale brown, pale olivaceous, sometimes subhyaline, smooth, walls slightly thickened, one-layered, occasionally swollen at the base, up to 10 µm wide. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, oblong, proliferation sympodial, with numerous, occasionally crowded conidiogenous loci, protuberant, sometimes subdenticulate, truncate to slightly convex, 1.5–3 µm diam., dome and periclinal rim conspicuous, thickened and somewhat darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight, cylindrical, ellipsoid, fusiform, limoniform, 5–30 × 3.5–7 µm, 0–1(–2)-septate, septum more or less median, not constricted at the septum, subhyaline to pale brown, smooth, walls slightly thickened, apex rounded to attenuated or with 1–5 apical scars, truncate at the base, hila protuberant, truncate to slightly convex, 1–2.5 µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Psoralea* spp. (Fabaceae), Asia – *Psoralea corylifolia* (Myanmar) (only known from the type collection).

Notes: *Cladosporium psoraleae* is morphologically close to *C. cladosporioides* but distinct in having conidiogenous cells with numerous, sometimes crowded conidiogenous loci, somewhat wider conidia and, above all, conspicuous leaf spots. *C. vignae* is also very close, but possesses somewhat narrower conidiogenous loci and hila and somewhat shorter and narrower conidia; subglobose and obovoid terminal conidia are usually lacking in *C. psoraleae*. Owing to these small differences *C. psoraleae* is tentatively maintained as a separate species, but additional collections and, above all, molecular data are urgently needed to clarify the status of this taxon. BILGRAMI et al. (1991) cited a record of the latter species on living leaves of *Gardenia turgida* from India (UP), which seems to be very doubtful.

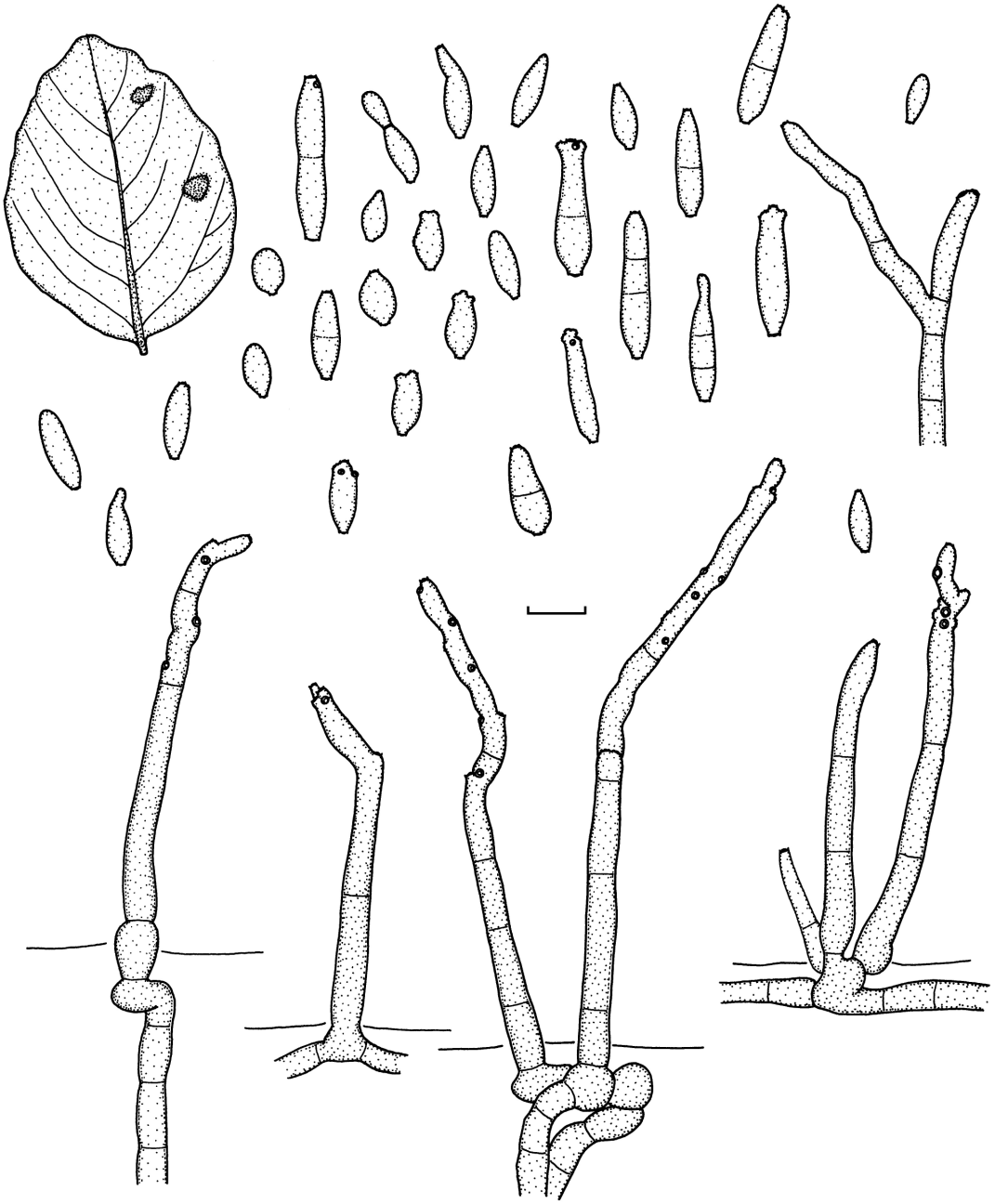

Fig. 59: *Cladosporium psoraleae*. Symptoms, conidiophores and conidia. Bar = 10 µm.

(51) *Cladosporium rectangulare* K. Schub. & U. Braun

Fig. 60; Pl. 22, Figs J–L

Cladosporium rectangulare K. Schub. & U. Braun, Sydowia 56(2): 309 (2004).

Holotype: on still living and fading leaves of *Epidendrum prismatocarpum* (Orchidaceae), ex England, intercepted at Hoboken, New Jersey, USA, 29 Sept. 1941, D.P. Limber (BPI 427292, as '*C. orchidearum*').
Ill.: SCHUBERT & BRAUN (2004: 310, Fig. 6).

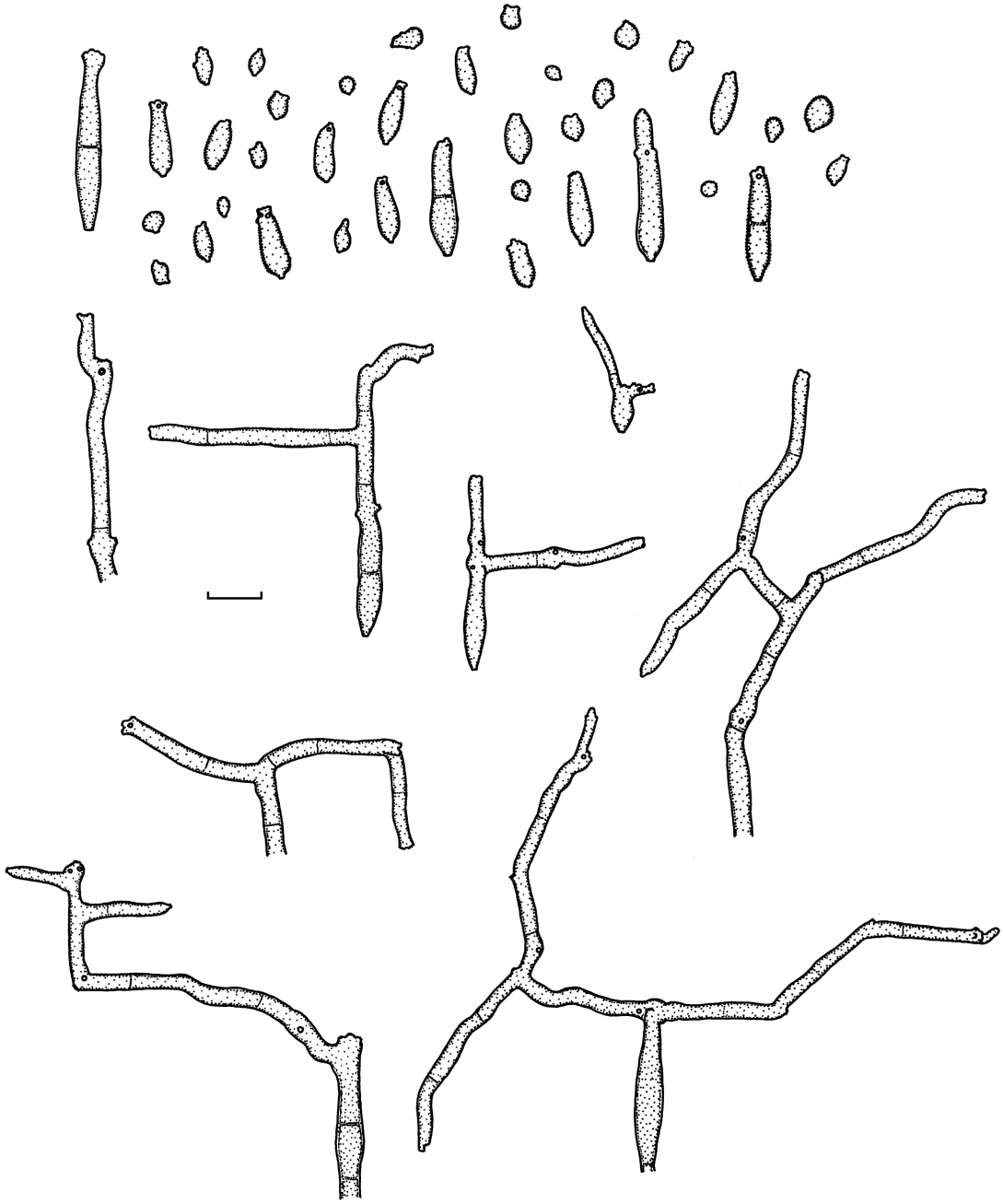

Fig. 60: *Cladosporium rectangulare*. Conidiophores and conidia. Bar = 10 µm.

On leaves, forming crustaceous, stromatic layers, effuse, dark brown to black. *Mycelium* internal. *Conidiophores* solitary, erect to decumbent, straight to flexuous, somewhat geniculate-sinuous, occasionally subnodulose, at first unbranched, later repeatedly characteristically branched, right-angled, 25–125 × 2.5–4(–5) µm, sometimes longer,

attenuated towards the apex, septate, septa not very conspicuous, olivaceous-brown to somewhat reddish brown, paler towards the apex, smooth, walls slightly thickened, occasionally two-layered, 0.5(–1) µm wide. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, 8–28 µm long, proliferation sympodial, with few subdenticulate, protuberant conidiogenous loci, 0.5–1.5 µm diam., slightly thickened and darkened-refractive. *Conidia* catenate, often in branched chains, straight, small conidia (without or only with a single apical hilum) numerous, subglobose, ovoid, obovoid, limoniform, ellipsoid, 2.5–9 × 2–4(–5) µm, aseptate, large conidia (ramoconidia s. lat.) ovoid, ellipsoid, subcylindrical to cylindrical, 5–33 × 2.5–5(–6) µm, 0(–1)-septate, pale to medium olivaceous-brown or somewhat reddish brown, almost smooth to verruculose, walls only slightly thickened, apex rounded or slightly attenuated towards apex and base, hila protuberant, 0.5–1.5 µm diam., somewhat thickened and darkened-refractive; microcyclic conidiogenesis often occurring with conidia forming secondary conidiophores and conidia.

Host(s)/substrate(s) & distribution: on *Epidendrum* spp. (Orchidaceae), North America – *Epidendrum prismatocarpum* (USA, NJ) (only known from the type collection).

Notes: The characteristic features described above could also be observed in a small dried culture added to this collection. There are no differences between the collections in vitro and in vivo with regard to colour, septation, ramification and length, although these features are often variable in cultures of *Cladosporium* species. The distinctive right-angled branched and erect to decumbent, geniculate-sinuous conidiophores segregate *C. rectangulare* from the superficially similar *C. cladosporioides* and allied taxa.

(52) *Cladosporium rhododendri* K. Schub.

Fig. 61; Pl. 27, Figs A–F

Cladosporium rhododendri K. Schub., **sp. nov.**

Differt a *C. jacarandicola* conidiis saepe 0–1-septatis.

Holotype: on *Rhododendron* sp. (Ericaceae), Germany, Sachsen-Anhalt, Halle (Saale), Pyrastraße, 11 Jun. 2004, D. Seidel, mixed infection with *C. herbarum* (HAL 1834 F).

On living leaves, leaf spots amphigenous, irregular in shape and variable in size, often arising at leaf margins and extending towards the midrib, dark brown to somewhat greyish brown, on the upper leaf surface often covered by the whitish grey, membranous detached cuticle. *Colonies* hypophyllous, scattered, low, in dense tufts, pale olivaceous, velvety. *Mycelium* internal, subcuticular to intraepidermal. *Stromata* absent to well-developed, 20–50 µm diam., composed of subglobose to somewhat oblong, densely aggregated cells, 5–9 µm wide, pale to medium olivaceous-brown, smooth, thick-walled. *Conidiophores* in small to large, loose to dense fascicles, arising from swollen hyphal cells or stromata, usually emerging through stomata, occasionally erumpent through the cuticle, erect, straight to slightly flexuous, unbranched, occasionally branched at the base, often somewhat geniculate-sinuous, without intercalar swellings, 15–80 × 3–6 µm, mostly up to 50 µm long, 0–5-septate, not constricted at the septa, pale olivaceous to medium olivaceous-brown throughout or sometimes slightly paler towards the apex, smooth, walls slightly thickened, somewhat swollen at the base and slightly attenuated towards the apex. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical, 8–30 µm long, proliferation sympodial, with several conidiogenous loci, often crowded and situated on small shoulders, protuberant, 1–1.5(–2) µm diam., well differentiated in a central convex dome and a periclinal rim, thickened, slightly darkened-refractive. *Conidia* catenate, usually in branched chains, straight to slightly curved, subglobose, obovoid, limoniform, ellipsoid, fusiform, subcylindrical, 1.5–18 × (1–)2–5 µm, 0–1(–2)-septate, septum more or less median and not constricted, very pale olivaceous to pale olivaceous-brown, smooth or

almost so to minutely verruculose or irregularly rough-walled, walls only slightly thickened, apex rounded or somewhat attenuated, hila protuberant, slightly convex, 0.5–1.5(–2) µm diam., dome and raised rim conspicuous, thickened, slightly darkened-refractive; occasionally with microcyclic conidiogenesis.

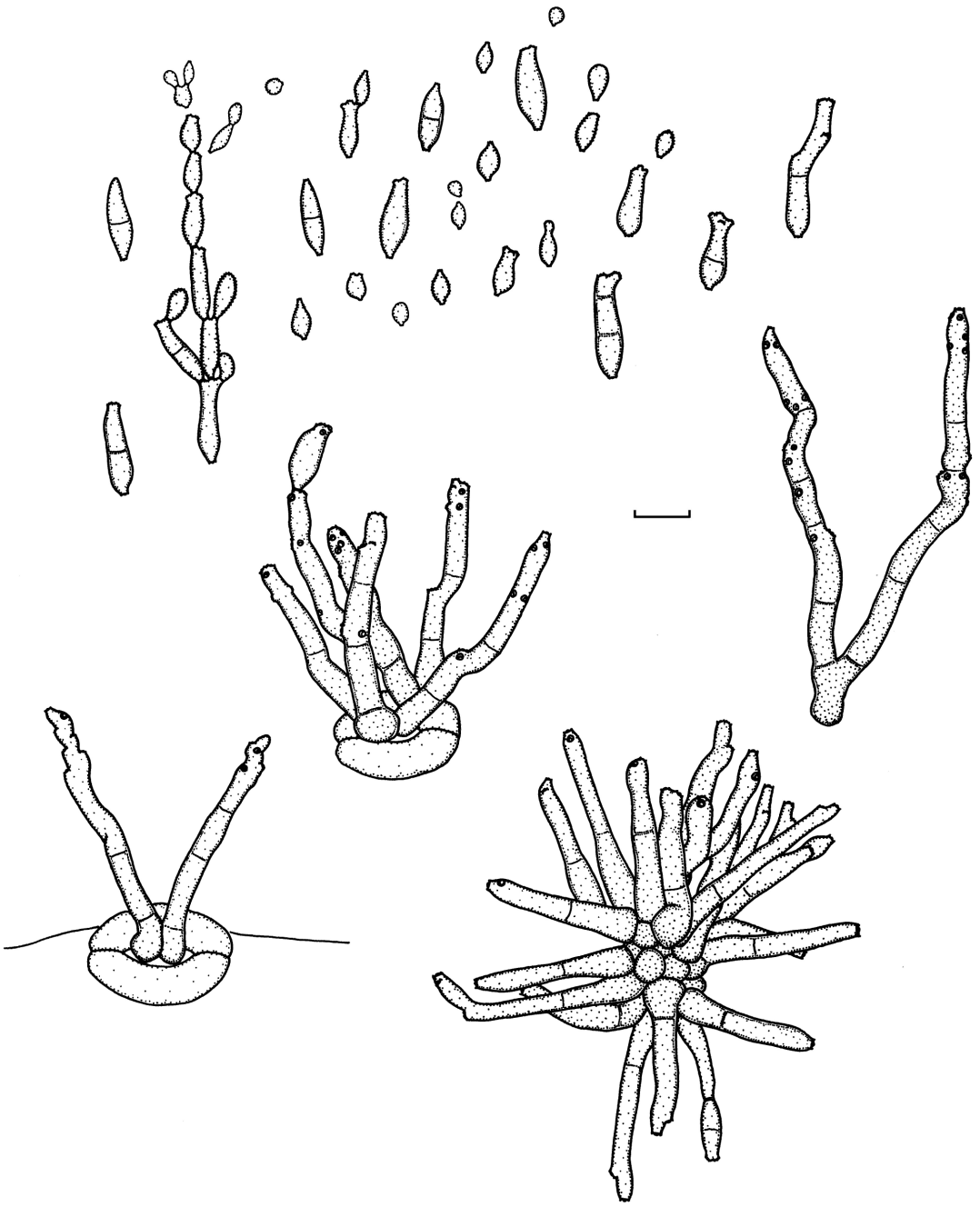

Fig. 61: *Cladosporium rhododendri*. Conidiophores and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Rhododendron* spp. (Ericaceae), Europe – *Rhododendron* sp. (Germany) (only known from the type collection).

Notes: The hyphomycete found on a herbarium sample deposited under the name '*Cladosporium rhododendri*' (in herb., on *Rhododendron* sp., Switzerland, Bern, Berner Oberland, vom Faulhorn, 7/58, B 70-6700, without any author and collector) does not

belong in *Cladosporium* s. str. and must be excluded, although the generic affinity of this fungus is not yet clear.
C. rhododendri pertains to a group of leaf-spotting *Cladosporium* species characterised by relatively short, fasciculate conidiophores usually emerging through stomata, as e.g., *C. praecox* [conidia larger, above all wider, (6.5–)12–26(–31) × 4–8 µm, faintly to conspicuously verruculose-echinulate], *C. orchidearum* (conidia wider, 4–7 µm, 0–3-septate, usually verruculose, and loci wider, 1.5–2.5 µm), *C. agoseridis* [conidiophores wider, (3–)4–10(–13) µm, conidia larger and, above all, wider, (10–)12–40(–50) × (5–)6–13(–15) µm, densely verrucose] and *C. lupiniphilum* (conidiophores wider, 3–8 µm, conidia larger and, above all, wider, 6–28 × 4–8 µm) [BRAUN 1998, 2000; BRAUN & ROGERSON 1995; ELLIS 1976; SCHUBERT & BRAUN 2004]. It is morphologically also close to *C. jacarandicola*, described from New Zealand on living leaves of *Jacaranda mimosifolia*, which is, however, distinguished by having 0–3-septate conidia (SCHUBERT & BRAUN 2004).

(53) *Cladosporium rivinae* Speg.

Fig. 62; Pl. 26, Figs E–H

Cladosporium rivinae Speg., Anales Mus. Nac. Buenos Aires 20: 437 (1910).

Holotype: on living leaves of *Rivina laevis* (= *R. humilis*) (Phytolaccaceae), Argentina, near Metán, Salta, Jun. 1905, C. Spegazzini, Mycetes Argent. Nr. 1108 (LPS 13.137).
Lit.: SACCARDO (1913a: 1369), FARR (1973: 251).

Leaf spots amphigenous, subcircular-oval to somewhat irregular, 2–7 mm wide, very pale yellowish ochraceous, membranous, pale greyish brown in the centre, sometimes surrounded by a narrow, pale yellowish brown, raised margin, finally leaf spots turning fragile and dropping out, forming shot holes symptoms. *Colonies* epiphyllous, loose, pale greyish brown, villose, often only sparingly fruiting. *Mycelium* internal; hyphae branched, 1.5–7 µm wide, septate, often with small swellings and constrictions, subhyaline to pale olivaceous or pale olivaceous-brown, smooth, walls unthickened or slightly thickened, at the base of the conidiophores somewhat swollen and darker, concolorous with conidiophores, up to 10 µm wide, sometimes aggregated. *Stromata* absent. *Conidiophores* solitary or in small groups of 2–3, non-fasciculate, arising from hyphae or swollen hyphal cells, erumpent through the cuticle, sometimes also emerging through stomata, erect, more or less straight, sometimes slightly flexuous towards the apex, filiform, attenuated towards the apex, usually non-geniculate and non-nodulose, unbranched, rarely branched at the apex, 40–240 µm long, (4–)6–9(–11) µm wide near the base, narrower towards the apex, 3.5–5 µm wide, septate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown, smooth to somewhat asperulate with age, walls thickened, mostly distinctly two-layered, 0.5–2(–2.5) µm wide, usually distinctly swollen, bulbous and somewhat darker at the base, up to 16 µm wide. *Conidiogenous cells* integrated, terminal and intercalary, 6–26 µm long, proliferation sympodial, with a single to several conidiogenous loci, often somewhat crowded near the apex, protuberant, subdenticulate, 1–2 µm diam., thickened, darkened-refractive. *Conidia* catenate, in branched chains, more or less straight, globose or almost so, obovoid, ellipsoid to cylindrical, 3–23 × 2.5–4.5(–6) µm, 0–3-septate, sometimes slightly constricted at the septa, very pale olivaceous to pale olivaceous-brown, almost smooth to usually minutely verruculose, apex rounded or with a single or several hila, protuberant, short cylindrical, 0.5–2 µm diam., thickened, darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Rivina* spp. (Phytolaccaceae), South America – *Rivina humilis* (Argentina) (only known from the type collection).

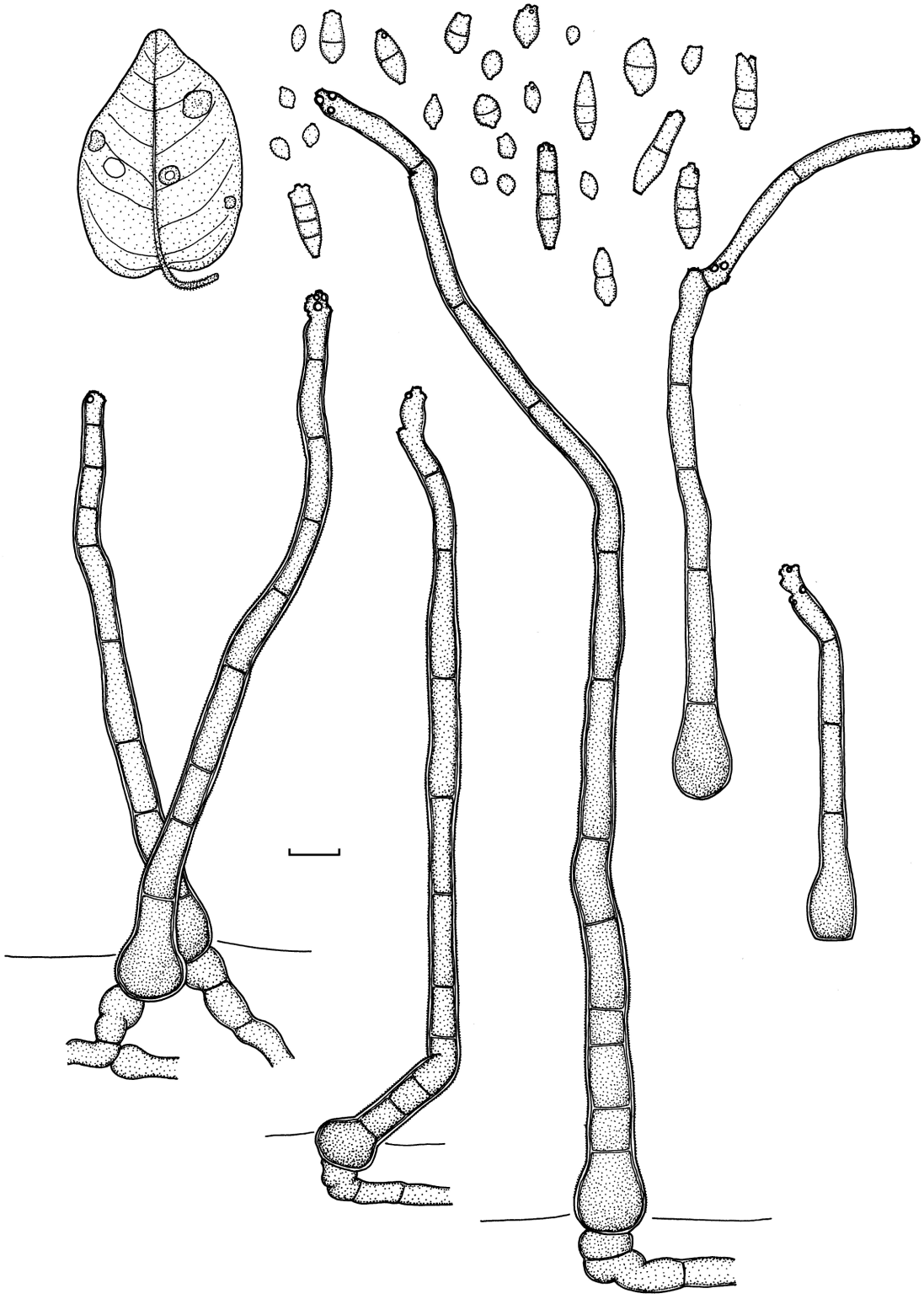

Fig. 62: *Cladosporium rivinae*. Symptoms, conidiophores and conidia. Bar = 10 µm.

Notes: *C. rivinae*, which is the only species occurring on a host belonging to the Phytolaccaceae, differs from all morphologically allied taxa in having conidiophores with a wide, distinctly swollen, bulbous base, up to 16 µm wide.

(54) *Cladosporium rutae* (T.M. Achundov) U. Braun

Fig. 63

Cladosporium rutae (T.M. Achundov) U. Braun, A Monograph of *Cercosporella*, *Ramularia* and Allied Genera (Phytopathogenic Hyphomycetes), Vol. 2: 306 (1998).
≡ *Ramularia rutae* T.M. Achundov, Novosti Sist. Nizsh. Rast. 24: 96 (1987).

Holotype: on *Ruta graveolens* (Rutaceae), Azerbaijan, Apscheron, botanical garden, 25 Mar. 1961, Achundov (BAK).
Isotype: LE 42008.
Ill.: BRAUN (1998: 307, Fig. 571).

Leaf spot amphigenous, shape and size variable, often entire leaves discoloured, yellowish-ochraceous to pale brown, margin indefinite. *Colonies* amphigenous, mostly hypophyllous, effuse to dense, greyish white to pale brown. *Mycelium* internal; hyphae pale, forming loose to dense hyphal aggregations, substomatal to intraepidermal, pale olivaceous to olivaceous-brown, composed of swollen hyphal cells, 3–8 µm diam. *Conidiophores* solitary to caespitose, loosely fasciculate, arising from stromatic hyphal aggregations, erect, straight, subcylindrical to somewhat geniculate-sinuous, often somewhat attenuated towards the apex, unbranched, rarely branched, 10–40 × 3–7 µm, 0–1(–2)-septate, subhyaline to pale olivaceous or olivaceous-brown, smooth. *Conidiogenous cells* integrated, terminal or conidiophores often reduced to conidiogenous cells, with a single or two conidiogenous loci, protuberant, 1.5–2.5 µm diam., thickened and darkened. *Conidia* catenate, often in branched chains, broadly ellipsoid-ovoid, subcylindrical-fusiform, 6–18 × 3–6 µm, 0–1-septate, subhyaline to pale olivaceous, almost smooth to verruculose, ends obtuse to attenuated, hila protuberant, 1.5–2.5 µm diam.; thickened, and darkened.

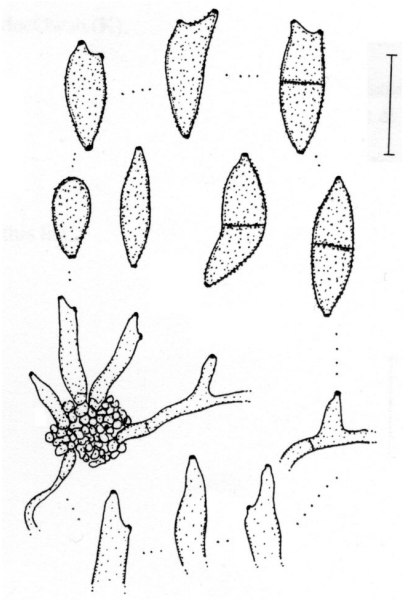

Fig. 63: *Cladosporium rutae*. Conidiophores and conidia (from BRAUN 1998). Bar = 20 µm.

Host(s)/substrate(s) & distribution: on *Ruta* spp. (Rutaceae), Asia – *Ruta graveolens* (Azerbaijan) (only known from the type collection).

Notes: During the course of monographic studies within the genus *Ramularia*, BRAUN (1998) re-examined the type material of *Ramularia rutae*. Due to the cladosporioid structure of the conidiogenous loci and hila and the pigmented conidiophores he placed it in *Cladosporium* s. str. stating that there is no closely allied species in the latter genus.

(55) *Cladosporium smilacicola* K. Schub.

Fig. 64; Pl. 28, Figs A–G

Cladosporium smilacicola K. Schub., **sp. nov.**

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.'].

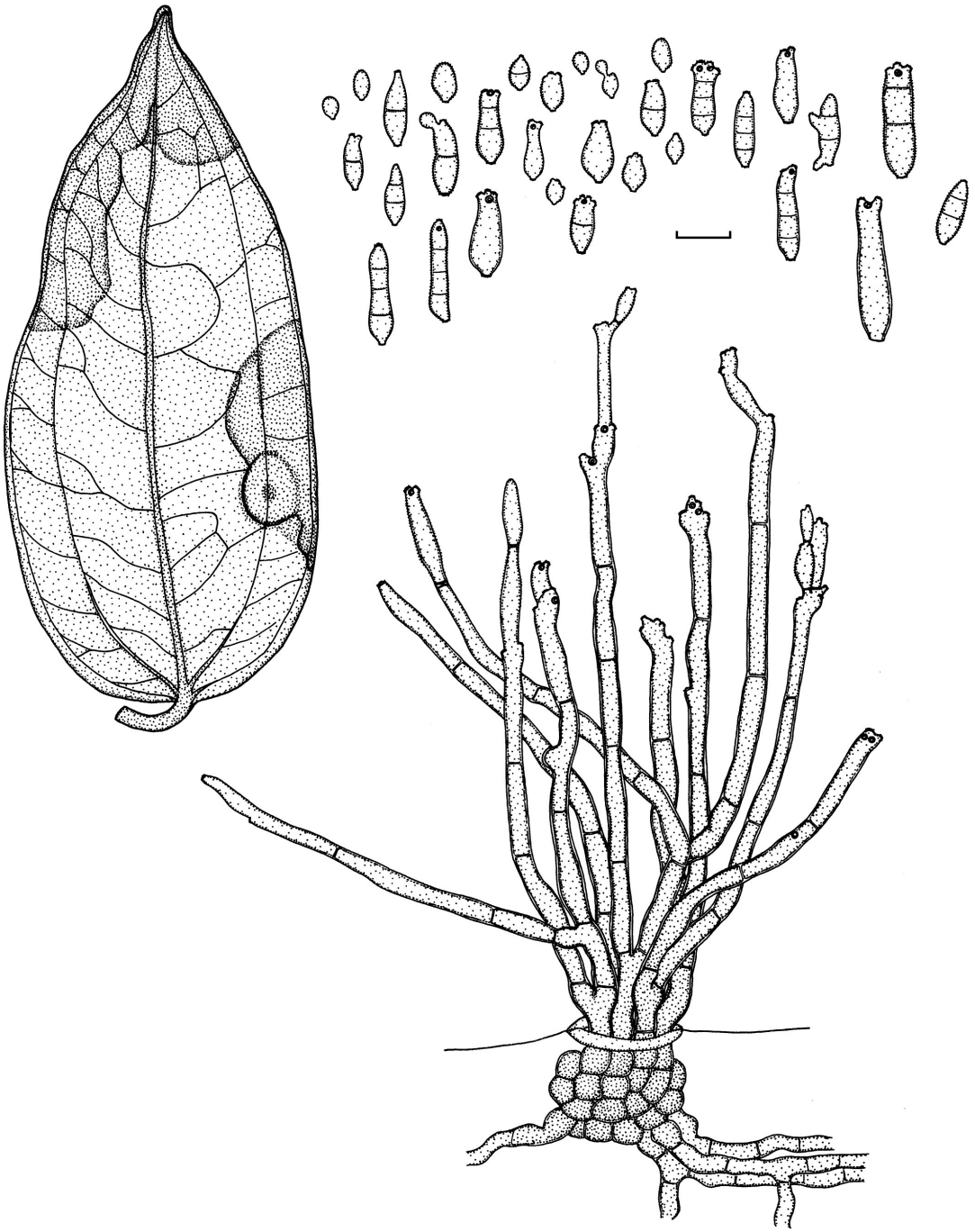

Fig. 64: *Cladosporium smilacicola*. Symptoms, fascicle of conidiophores and conidia. Bar = 10 µm.

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 with dense fructification (visible with 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.

Host(s)/substrate(s) & distribution: on *Smilax* spp. (Smilacaceae), Europe – *Smilax grandifolia* (Germany) (only known from the type collection).

Notes: 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 record on *Smilax china* determinated as *C. smilacis*, which could not be checked.
C. smilacicola is morphologically comparable with *C. foliorum* and *C. oreodaphnes*, but the latter species is quite distinct in having wider, 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). *C. 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.

(56) *Cladosporium soldanellae* Jaap

Fig. 65; Pl. 29, Figs A–D

Cladosporium soldanellae Jaap, Ann. Mycol. 5: 270 (1907).
= *Cladosporium stysanoides* Bubák, Bot. Közlem. 15(3–4): 81 (1915), **syn. nov.**

Type: on dead leaves of *Soldanella alpina* (Primulaceae), Switzerland, Simplonhospiz, 2010 m alt.
Lit.: LINDAU (1910: 796), FERRARIS (1912: 348), SACCARDO (1913a: 1368).

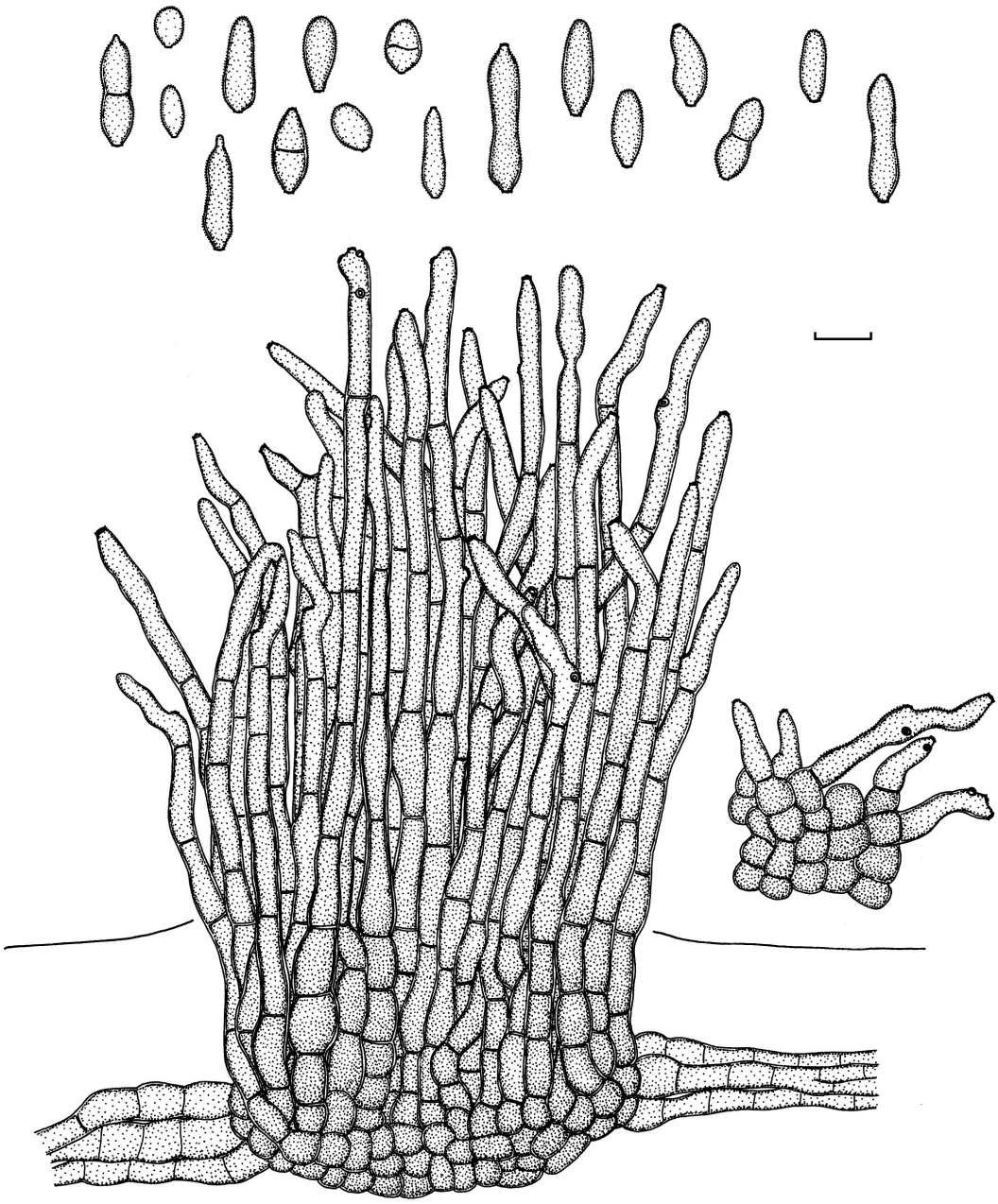

Fig. 65: *Cladosporium soldanellae*. Fascicle of conidiophores and conidia (from holotype material of *Cladosporium stysanoides*). Bar = 10 µm.

On leaves and petioles, leaf spots as subcircular, whitish or pale brown, somewhat raised discolorations. *Colonies* amphigenous, scattered, punctiform, in small tufts, brown, at first concentrically arranged at the border of the raised discolorations, later extending. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 1.5–8 µm wide, septate, without swellings and constrictions, subhyaline or even hyaline to very pale olivaceous-green, smooth, walls not or slightly thickened, radiating, forming hyphal plates. *Stromata* intraepidermal, sometimes substomatal, subglobose to somewhat oblong-angular, usually effuse, 40–150 µm wide, sometimes confluent and larger, several layers deep, compact, composed of subglobose to angular-oblong, polygonal cells, 4–9 µm wide, medium to dark brown, smooth, thick-walled. *Conidiophores* mostly in large, dense fascicles, numerous, arising from stromata, emerging through stomata or erumpent through the cuticle, erect, straight, especially at the base of the conidiomata more or less parallel,

synnema-like, somewhat flexuous towards the apex, short cylindrical to cylindrical-oblong, non-geniculate or rarely slightly geniculate near the apex, non-nodulose or sometimes subnodulose, unbranched, rarely branched, 12–180 × 3.5–7 µm, 0–5-septate, pale to medium olivaceous-brown, paler towards the apex, smooth or almost so to minutely verruculose, walls slightly thickened, one-layered, rarely two-layered near the base, protoplasm of the cells somewhat aggregated at the septa appearing to be thickened, sometimes somewhat swollen at the base, slightly attenuated towards the apex, sporadically enteroblastically proliferating. *Conidiogenous cells* integrated, usually terminal, occasionally intercalary, or short conidiophores reduced to conidiogenous cells, cylindrical-oblong, sometimes slightly geniculate, 12–40 µm long, mostly with a single conidiogenous locus, sometimes with few loci, protuberant, 1.5–2(–2.5) µm diam., thickened, somewhat darkened-refractive. *Conidia* solitary or in unbranched chains, obovoid, ellipsoid to cylindrical, straight, 6.5–26 × 4–6(–7) µm, 0(–1)-septate, sometimes slightly constricted at the septa, pale to medium olivaceous-brown, concolorous with conidiophores, minutely verruculose, walls slightly thickened, apex rounded or attenuated towards apex and base, base often broadly truncate, hila protuberant, (1–)1.5–2(–2.5) µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Soldanella* spp. (Primulaceae), Europe – *Soldanella alpina* (Italy, Montenegro, Switzerland).

Additional collection examined: on *Soldanella alpina*, MONTENEGRO, Durmitor, Lokvice, ca. 2200 m, 15 Aug. 1904, F. Bubák (BPI 427476, holotype of *C. stysanoides*).

Notes: Type material of *Cladosporium stysanoides* was re-examined and showed a true, well-characterised *Cladosporium* species. The original diagnosis of *Cladosporium soldanellae* (JAAP 1907), recorded on leaves of *Soldanella alpina* from Switzerland, has been compared with this species and proved to be very close to and almost identical with *C. stysanoides*. JAAP (1907) described the colonies as punctiform, at first concentrically arranged at pale subcircular leaf spots, later extended, unbranched conidiophores in dense fascicles, 100–175 × 4–5 µm, and 0–1-septate, cylindrical-oblong conidia, 13–15 × 4–5 µm. Although type material of *C. soldanellae* could not be traced neither at herb. B nor HBG, both species are considered as conspecific. *C. soldanellae*, which antedates *C. stysanoides*, has priority according to the Code of Botanical Nomenclature, and therefore, *C. stysanoides* is reduced to synonymy with the latter species. Type material of *C. soldanellae* is probably not preserved, so a neotype have to be proposed, but this is not yet possible since additional collections of this species were not available. FERRARIS (1910) mentioned a record from Tyrol, Italy. *Soldanella hungarica* ssp. *major*, *S. montana* and *S. pusilla* have been reported as additional hosts from Romania (BONTEA 1985).
C. soldanellae superficially resembles the saprobic *C. herbarum* but deviates in having densely fasciculate, synnema-like conidiophores arranged in punctiform, non-caespitose tufts, which usually do not have terminal and intercalar swellings with conidiogenous loci confined to them, and 0(–1)-septate conidia.

(57) *Cladosporium spongiosum* Berk. & M.A. Curtis

Fig. 66; Pl. 27, Figs G–H

Cladosporium spongiosum Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10(46): 362 (1869).

≡ *Helminthosporium spongiosum* (Berk. & M.A. Curtis) Cif., Atti Ist. Bot. Lab. Crittog. Univ. Pavia, Ser. 5, 19: 109 (1962).

Holotype: on inflorescences of *Cenchrus* sp. (Poaceae), Cuba, C. Wright, No. 287 (K 121570).

Lit.: SACCARDO (1886: 365), ELLIS (1971: 317).
Ill.: ELLIS (1971: 316, Fig. 218 B).

Colonies on still closed, dried inflorescences, effuse, dense, dark olivaceous-brown to almost blackish, sometimes crustaceous, densely felt-like. *Mycelium* internal and external, superficial; hyphae branched, 2–7(–9) µm wide, septate, often with swellings and constrictions, pale to medium brown or olivaceous-brown, smooth, walls only slightly thickened, somewhat swollen at the base of the conidiophores. *Stromata* absent. *Conidiophores* solitary, arising from internal and external creeping hyphae, terminal and lateral, erect, straight to somewhat flexuous, slightly geniculate-sinuous towards the apex, unbranched or sometimes branched, 5–90 × 3–5(–6) µm, septate, often slightly constricted at the septa, pale to medium yellowish brown or olivaceous-brown, somewhat paler towards the apex, smooth, walls slightly thickened, one-layered, sometimes growing like and confusable with hyphae. *Conidiogenous cells* integrated, terminal and intercalary, cylindrical to somewhat geniculate, 4–35 µm long, proliferation sympodial, with several, subdenticulate conidiogenous loci, protuberant, short cylindrical, truncate to obconically truncate, 0.5–1.5(–2.5) µm diam., thickened, refractive to somewhat darkened. *Conidia* catenate, in unbranched or branched chains, straight to slightly curved, very variable in shape and size, small conidia subglobose, ovoid, ellipsoid, 3–13 × 2–5 µm, 0–1-septate, larger conidia ellipsoid, fusiform, subcylindrical or cylindrical, 6–41(–60) × 3.5–5.5(–7) µm, 0–4(–7)-septate, commonly 3-septate, sometimes slightly constricted at the septa, septa often thickened and distinctly darkened, pale brown to medium yellowish brown, smooth, walls somewhat thickened, apex rounded or mostly attenuated towards the apex and base, hila protuberant, short cylindrical, obconically truncate to slightly convex, 0.5–1.5(–2.5) µm diam., conspicuously differentiated in central dome and periclinal rim, thickened, refractive to darkened; microcyclic conidiogenesis occasionally occurring.

Host(s)/substrate(s) & distribution: on *Cenchrus* spp. (Poaceae), Caribbean – *Cenchrus* sp. (Cuba).

Notes: BERKELEY (1869) mentioned *Setaria* as a second host genus and compared the habit of his newly described species with *Helminthosporium ravenelii* M.A. Curtis. CIFERRI (1962) did not examine type material of *Cladosporium spongiosum*, but rather based his new combination on material collected by himself on *Cenchrus echinatus* in the Dominican Republic (in comparing it with the very brief description given by Berkeley and Curtis). He described wider conidiophores, 6–8.5 µm, and solitary, elliptic or subfusate, wider conidia with acuminate ends, with the free end as a rule more acutate than the basal cell, 20–40.5 × 6–10 µm, which do not agree with the description given above. A re-examination of the type material showed *C. spongiosum* to be a genuine member of *Cladosporium* s. str. The conidia with its distinctly darkened and thickened septa remind one of *C. episclerotiale*, but the latter, fungicolous species is quite distinct in having much longer and, above all, wider conidiophores, (22–)97–295(–322) × 5–8(–10) µm, shorter and wider conidia, with thickened, mostly distinctly two-layered walls and somewhat wider conidiogenous loci and hila (HEUCHERT et al. 2005).
ALFIERI et al. (1984) recorded *C. spongiosum* from Florida on *Cenchrus* sp. and AHMAD (1969) listed it on *Cenchrus pennisetiformis* from Pakistan. Furthermore, the species is mentioned in literature on several hosts belonging to quite distinct plant families. ZHANG et al. (2003) recorded it on *Amaryllis vittata*, *Areca catechu*, *Cassia siamea*, *Chrysanthemum coronarium*, *Coix lacryma-jobi*, *Freesia refracta* and *Platycodon grandiflorus*. *Panicum maximum* (Zambia), *Setaria chevalieri* (Sierra Leone) and *Setaria pallidifusca* (Zambia) are given as additional hosts in LENNÉ (1990). VITTAL & DORAI (1994/1995) reported *C. spongiosum* from India as colonising leaves of *Eucalyptus tereticornis* and WILLIAMS & LIU (1976) cited *Melinis minutiflora* as host species from Sabah, Malaysia. In Haiti the

species was recorded on *Chaetochloa setosa* (BENJAMIN & SLOT 1969). However, most of these records, which could not be checked, are probably misidentified and not identical with *C. spongiosum*.
BILGRAMI et al. (1991) listed this species from India as hyperparasite on *Acrosporium* (= *Oidium*) *dendrophthoae* (Erysiphales), and MATHUR & MUKERJI (1981) published two additional Indian records on *Phyllactinia dalbergiae* and *P. moricola* [as *P. corylea*], but these collections probably refer to the hyperparasitic *C. uredinicola* (HEUCHERT et al. 2005).

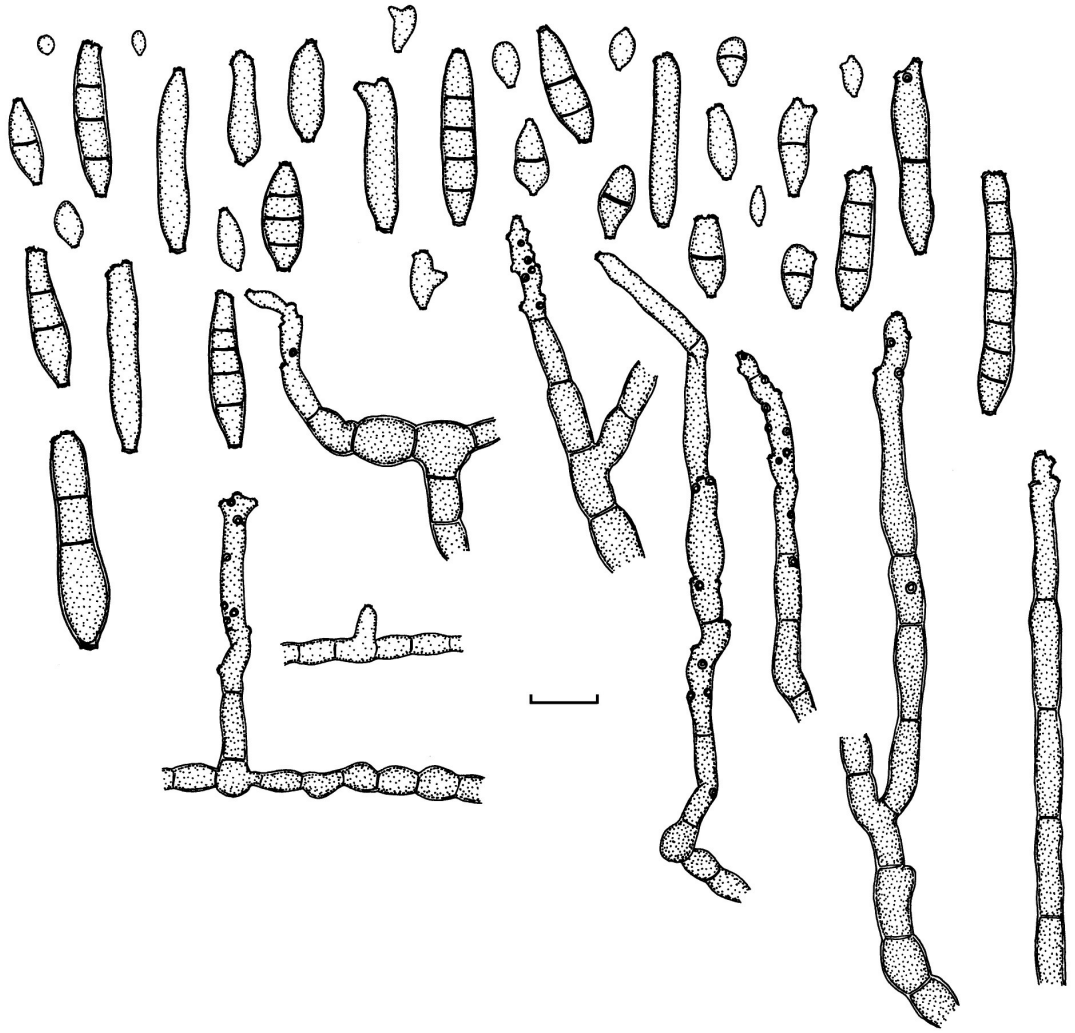

Fig. 66: *Cladosporium spongiosum*. Conidiophores and conidia. Bar = 10 µm.

(58) *Cladosporium stanhopeae* Allesch.

Fig. 67; Pl. 29, Figs E–G

Cladosporium stanhopeae Allesch., Hedwigia 34: 221 (1895).

Holotype: on faded leaves of *Stanhopea* sp. (Orchidaceae), Germany, München, botanical garden, Sept. 1894, Allescher (M-57717).
Lit.: SACCARDO (1895: xlviii; 1899: 1081), LINDAU (1907: 817), SCHUBERT & BRAUN (2004: 311).
Ill.: SCHUBERT & BRAUN (2004: 312, Fig. 7).

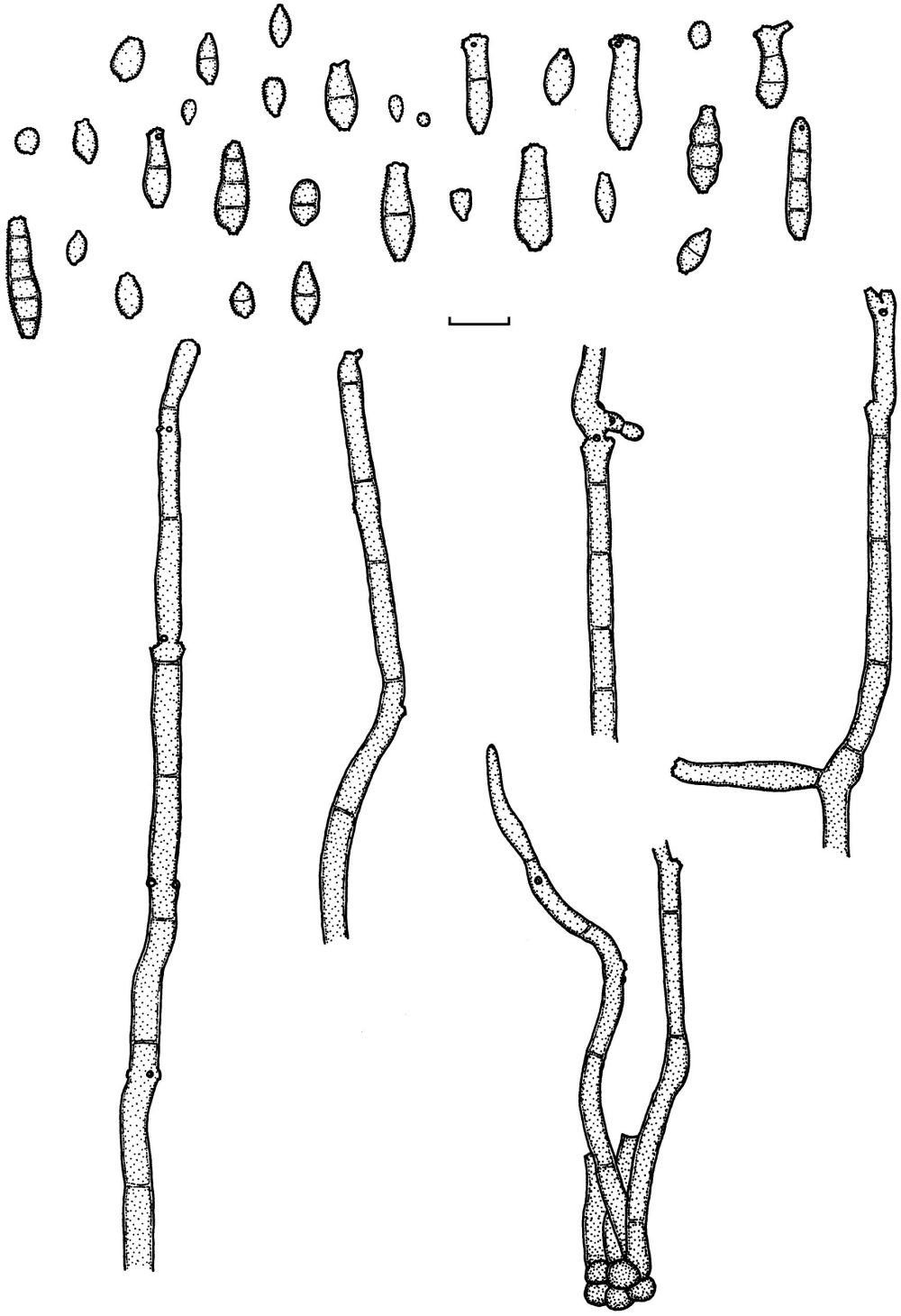

Fig. 67: *Cladosporium stanhopeae*. Conidiophores and conidia. Bar = 10 µm.

On faded leaves, leaf spots amphigenous, varying in shape and size, mostly irregular, medium to dark brown, sometimes almost blackish, stromatic, occasionally somewhat shiny. *Colonies* hypophyllous, small, punctiform, scattered, greyish brown, not confined to leaf spots. *Mycelium* internal; hyphae sparingly branched, 1.5–3 µm wide, septate, subhyaline to pale yellowish brown, walls unthickened to slightly thickened. *Stromata* dense, often large, up to 130 µm diam., composed of subglobose to somewhat angular cells, 4–12 µm diam., medium to dark brown, smooth, walls only slightly thickened. *Conidiophores* solitary or in small, loose fascicles, arising from stromata, erumpent

through the cuticle, erect, usually more or less flexuous, unbranched, up to 250 µm long, 3–5.5 µm wide, septate, pale to medium brown, slightly paler towards the apex, smooth, walls thickened, somewhat attenuated towards the apex, without swellings. *Conidiogenous cells* integrated, terminal or intercalary, 5–25 µm long, with a single or only few conidiogenous loci, arranged on about the same level (like a garland), sometimes situated on small lateral shoulders, loci 1–2 µm diam., thickened, only slightly darkened-refractive. *Conidia* catenate, in branched chains, subglobose, ovoid, obovoid, ellipsoid, subcylindrical to cylindrical, 2–25 × 2–6 µm, 0–4(–5)-septate, mostly not constricted at the septa, pale olivaceous to pale olivaceous-brown, smooth or almost so to verruculose, walls more or less thickened, apex rounded or with up to six apical hila, truncate to slightly convex at the base, hila 0.5–2 µm diam., thickened, somewhat darkened-refractive; occasionally with microcyclic conidiogenesis.

Host(s)/substrate(s) & distribution: on *Stanhopea* spp. (Orchidaceae), Europe – *Stanhopea* sp. (Germany) (only known from the type collection).

Notes: *Cladosporium herbarum*, *C. oxysporum* and *C. sphaerospermum*, widespread saprobic species occurring on a wide range of substrates, are easily distinguishable from *C. stanhopeae*. The conidia of *C. oxysporum* are smooth and only 0–1(–2)-septate, the conidiophores are consistently nodulose. *C. herbarum* differs in having conidiophores with intercalary and terminal swellings, which are connected with conidiogenesis, and verruculose to verrucose conidia (small subglobose conidia absent). *C. sphaerospermum* forms small conidia, which are globose to subglobose and distinctly verrucose, as well as 0–3-septate, smooth or verruculose ramoconidia (s. lat.), and the conidiophores do not have any swellings.

(59) *Cladosporium subsclerotioideum* Bubák & Dearn.

Fig. 68; Pl. 30, Figs A–G

Cladosporium subsclerotioideum Bubák & Dearn., in Bubák, Hedwigia 58: 33 (1916).

Syntypes: on living leaves of *Turritis* (= *Arabis*) *glabra* (Brassicaceae), Canada, Ontario, London, Jun.–Jul. 1910, J. Dearness, mixed infection with *Peronospora parasitica* and *Albugo candida* (BPI 427479; DAOM).
Lit.: SACCARDO (1931: 790).

On still living or dying leaves and stems, without distinct leaf spots or discolorations. *Colonies* amphigenous, at first punctiform, subcircular-oval, later confluent, caespitose, dense, dark brown, somewhat raised, velvety. *Mycelium* internal, subcuticular to intra-epidermal; hyphae sparingly branched, 3–7 µm wide, septate, with swellings and constrictions, pale to medium olivaceous-brown or even dark brown, smooth or almost so to somewhat rugose or rough-walled, thick-walled, cells with oil droplets giving them a granular appearance, forming dense, compact hyphal aggregations. *Conidiophores* solitary or in loose groups, arising from stromatic hyphal aggregations, erumpent through the cuticle, erect, straight to more or less flexuous, sometimes slightly geniculate-sinuous, subnodulose, but conidiogenous loci not confined to swellings, unbranched or branched, 59–240 × 4–8.5(–10) µm, pluriseptate, sometimes slightly constricted at the septa, olivaceous-brown, paler towards the apex, tips sometimes subhyaline, smooth or almost so to irregularly rugose or rough-walled, distinctly thick-walled, often distinctly two-layered, with small to somewhat larger, shiny or refractive oil droplets. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical, 15–50 µm long, proliferation sympodial, with a single or only few conidiogenous loci, protuberant, slightly convex, 1–2.5 µm diam., thickened, darkened-refractive. *Conidia* catenate, in unbranched or rarely branched chains, straight, ovoid, ellipsoid, fusiform, subcylindrical to cylindrical, 6–33(–44) × 4–8(–

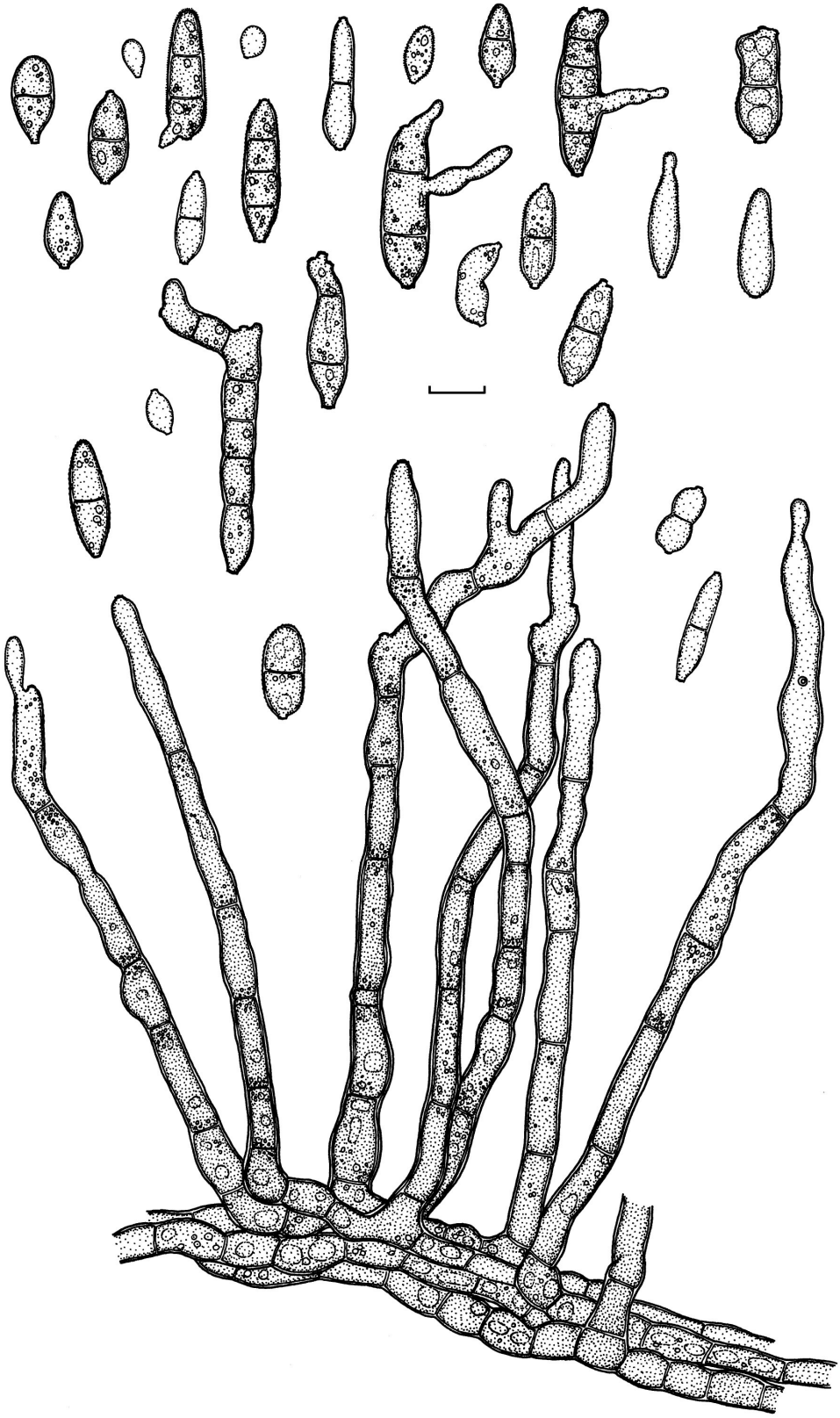

Fig. 68: *Cladosporium subsclerotioideum*. Conidiophores and conidia (from syntype material of herb. DAOM). Bar = 10 µm.

9) µm, 0–4-septate, occasionally slightly constricted at the septa, occasionally distoseptate, pale to medium olivaceous-brown, surface ornamentation variable, smooth or almost so to

irregularly rugose or verruculose, thick-walled, sometimes even two-layered, apex rounded or attenuated, often with small oil droplets, hila protuberant, truncate to slightly convex, 1–2.5 µm diam., thickened, darkened-refractive; often germinating, occasionally microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Arabis* spp. (Ranunculaceae), North America – *Arabis glabra* (Canada, Ont.) (only known from the type collection).

Notes: On the label of the type collections the date is given as 1911, whereas in the original diagnosis (BUBÁK 1916) 1910 is published. This species is morphologically comparable with *C. herbarum*, but the latter species is quite distinct in having subnodulose or nodulose conidiophores with conidiogenous loci confined to swellings, cells without oil droplets, and usually shorter, verruculose or sometimes even verrucose, but not rugose conidia without oil droplets.

(60) *Cladosporium syringicola* K. Schub.

Fig. 69; Pl. 31, Figs A–G

Cladosporium syringicola K. Schub., **sp. nov.**

Differt a *C. gallicola* 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: Braun, F. sel. exs. 36.

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 sometimes 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.

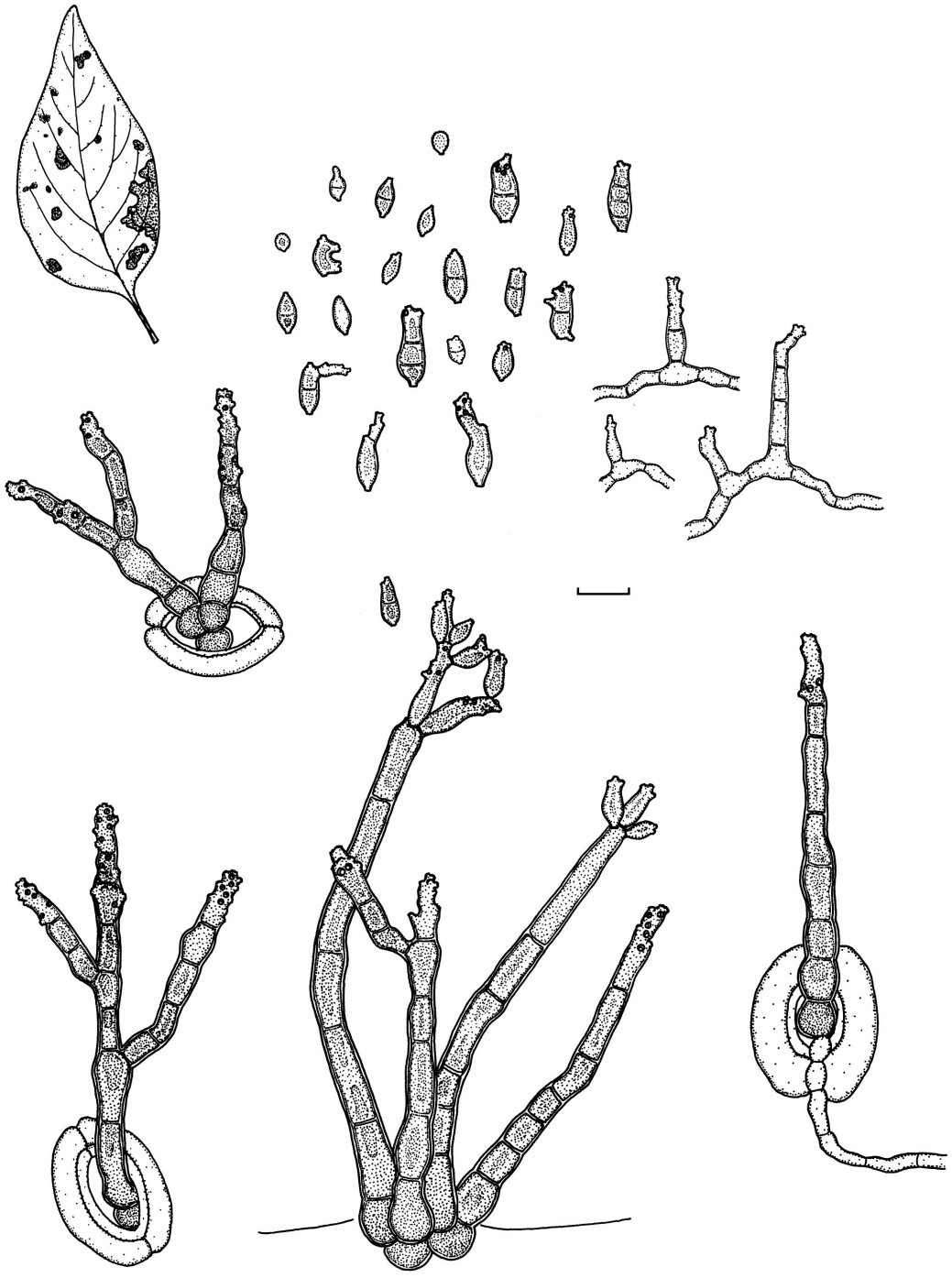

Fig. 69: *Cladosporium syringicola*. Symptoms, dimorphic conidiophores and conidia. Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Syringa* spp. (Oleaceae), Europe – *Syringa* ×*chinensis* (Germany).

Notes: 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*, Thüm., Mycoth. univ. 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. *C. fumago* f. *syringae-vulgaris* Thüm. (type: on *Syringa vulgaris*, Thüm., Herb. mycol. oec. 393, M-57668, examined) is a trimmatostroma-like hyphomycete, which has to be exclud-ed from *Cladosporium* s. str. *C. 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).

(61) *Cladosporium trillii* Ellis & Everh.

Fig. 70; Pl. 32, Figs A–D

Cladosporium trillii Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 47: 430 (1895).
= *Heterosporium trillii* Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 382 (1894).
≡ *Cladosporium trillii* (Ellis & Everh.) J.C. David, Mycol. Pap. 172: 94 (1997), nom. illeg., homonym, non *C. trillii* Ellis & Everh., 1895.
≡ *Cladosporium trilliicola* J.C. David, Schlechtendalia 11: 88 (2004).

Holotype: on leaves of *Trillium petiolatum* (Trilliaceae), USA, Washington, Pullman, Jun. 1894, C.V. Piper, no. 341, mixed infection with *Phyllosticta trillii* Ellis & Everh. (NY).
Lit.: DAVID (1997: 94).
Ill.: DAVID (1997: 89, Fig. 22 C–F; 95, Fig. 25).

Leaf spots amphigenous, subcircular-elliptical, 2–7(–20) mm wide, with a whitish grey membranous centre, turning greyish brown with dense fructification, margin narrow, brown to reddish brown, sometimes surrounded by a yellowish brown halo. *Colonies* amphigenous, effuse, scattered, in small tufts, loose to somewhat dense, caespitose, brown. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 2–7 µm wide, septate, sometimes slightly constricted at the septa, occasionally with small swellings, up to 10 µm wide, subhyaline to pale olivaceous or olivaceous-brown, smooth, walls slightly thickened. *Stromata* small, compact, 15–40 µm diam., composed of subglobose to somewhat angular cells, 5–10 µm wide, pale to medium olivaceous-brown, smooth, walls thickened. *Conidiophores* in small loose fascicles, arising from stromata, erumpent through the cuticle or emerging through stomata, erect, straight to somewhat flexuous, often geniculate-sinuous, subnodulose or slightly nodulose, unbranched or rarely once branched, 30–155 × 6–9(–10) µm, septate, with only few septa, septa sometimes not very conspicuous, pale brown to medium reddish brown, smooth, walls thickened but one-layered, up to 0.5 µm wide, often somewhat swollen at the base, up to 11 µm wide, slightly attenuated towards the apex, occasionally enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, 6–45 µm long, proliferation sympodial, often geniculate-sinuous, subnodulose or slightly nodulose, conidiogenous loci situated on small unilateral shoulders

or multilateral swellings, protuberant, short cylindrical, 1.5–2(–2.5) µm diam., mostly 1 µm high, clearly differentiated in a somewhat raised central dome and a periclinal rim, thickened, somewhat darkened-refractive. *Conidia* catenate, in unbranched chains, more or less straight, obovoid, broadly ellipsoid to mostly cylindrical, (5–)11–36(–41) × (3.5–)6–11(–12) µm, (0–)1–4(–5)-septate, sometimes slightly constricted at the septa, pale olivaceous to olivaceous-brown, distinctly verruculose or verrucose, walls only slightly thickened, apex and base rounded or slightly attenuated, hila protuberant, 1–2(–2.5) µm diam., thickened, darkened-refractive; occasionally microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Trillium* spp. (Trilliaceae), North America – *Trillium ovatum* (USA, ID, MT, WA), *T. petiolatum* (USA, WA), *Trillium* sp. (USA, WA).

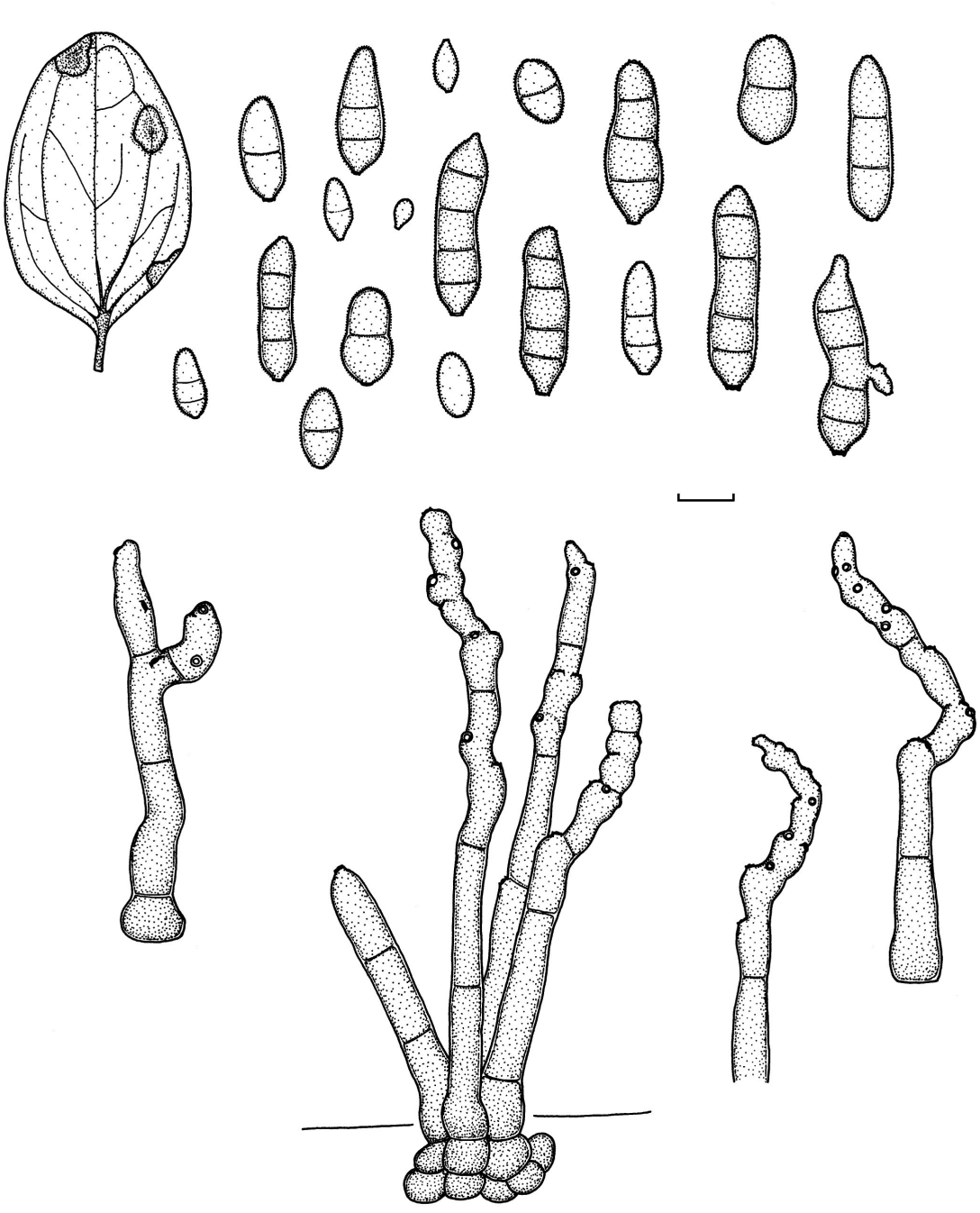

Fig. 70: *Cladosporium trillii*. Symptoms, conidiophores and conidia. Bar = 10 µm.

Notes: In 1894, ELLIS & EVERHARDT described the new species *Heterosporium trillii* as causing leaf spots on *Trillium ovatum*, eventually killing off the leaves. One year later they introduced *Phyllosticta trillii* on *Trillium petiolatum* and mentioned a *Cladosporium trillii* occurring on the same spots for which they gave a short description (ELLIS & EVERHARDT 1895). DAVID (1997), who revised the fungi previously referred to *Heterosporium*, examined the type material of *Heterosporium trillii* and assigned this species to *Cladosporium* s. str., but failed to recognise that the name *Cladosporium trillii* already existed. Later, *C. trilliicola* was published as new name for this homonym (DUGAN et al. 2004). However, a re-examination of type material of *Cladosporium trillii* revealed that both species are conspecific.
Cladosporium magnusianum (Jaap) M.B. Ellis and *C. variabile* are morphologically comparable with *C. trillii* but *C. magnusianum* differs in the somewhat narrower, longer conidiophores, generally shorter and somewhat narrower conidia and the degree of septation; and *C. variabile*, the causal agent of leafs spot of spinach, possesses tortuose, spirally twisted aerial hyphae, wider and somewhat longer conidia, (6.5–)10–45(–55) × (5–)7–14(–17) µm, and wider conidiogenous loci and hila, (1–)2–3(–3.5) µm diam.

(62) *Cladosporium ushuwaiense* Speg.

Fig. 71; Pl. 32, Figs E–H

Cladosporium ushuwaiense Speg., Bol. Acad. Nac. Ci. 27(4): 399 (1924), as '*ushuwaiensis*'.

Holotype: on dead leaves of *Berberis ilicifolia* (Berberidaceae), Argentina, Tierra del Fuego, Ushuwaia, 18 Jan. 1924, C. Spegazzini (LPS 13.144).
Lit.: SACCARDO (1972: 1340), FARR (1973).

On the lower leaf surface as greyish or greyish brown discolorations, covering large areas or even the entire leaf surface. *Colonies* hypophyllous, effuse, loosely scattered or somewhat denser, in tufts, dark brown, villose to bristle-like. *Mycelium* internal; hyphae branched, 2–4 µm wide, septate, sometimes slightly constricted at the septa, pale brown or pale olivaceous-brown, smooth, walls somewhat thickened. *Stromata* substomatal to intraepidermal, small to extended, several layers deep, compact, composed of more or less angular to irregularly polygonal cells, 5–13 µm wide, pale to medium brown or medium dark brown, smooth, thick-walled. *Conidiophores* solitary or mostly in small fascicles, 2–10 per fascicle, arising from stromata, emerging through stomata or erumpent through the cuticle, erect, straight to slightly flexuous, especially near the apex, cylindrical-oblong, mostly distinctly attenuated towards the apex, somewhat geniculate and subnodulose towards the apex (in connexion with conidiogenesis), unbranched or apically branched, once to several times, 80–310 µm long or even longer, 5–15 µm wide near the base, 3–5 (–6) µm at the apex, pluriseptate, medium to mostly dark brown, paler towards the apex, almost smooth to asperulate or verruculose throughout, walls thickened, usually distinctly two-layered, 0.5–2(–3) µm wide, occasionally somewhat swollen at the base, sometimes enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, 6–36 µm long, proliferation sympodial, subnodulose and somewhat geniculate in connexion with conidiogenesis, with several conidiogenous loci often situated on small shoulders or swellings, often somewhat crowded, protuberant, subdenticulate, 1–1.5(–2) µm diam., thickened, somewhat darkened-refractive. *Conidia* catenate, in branched chains, subglobose, obovoid, narrowly to broadly ellipsoid or subcylindrical, 3–15(–20) × 3–7(–9) µm, 0–1(–2)-septate, sometimes slightly constricted at the septa, pale to medium brown or olivaceous-brown, almost smooth to verruculose, slightly to distinctly thick-walled, often two-layered, protoplasm often aggregated at the septa and walls appearing to be thickened and with a more or less large and paler cavity in the centre of the cells, apex and base more

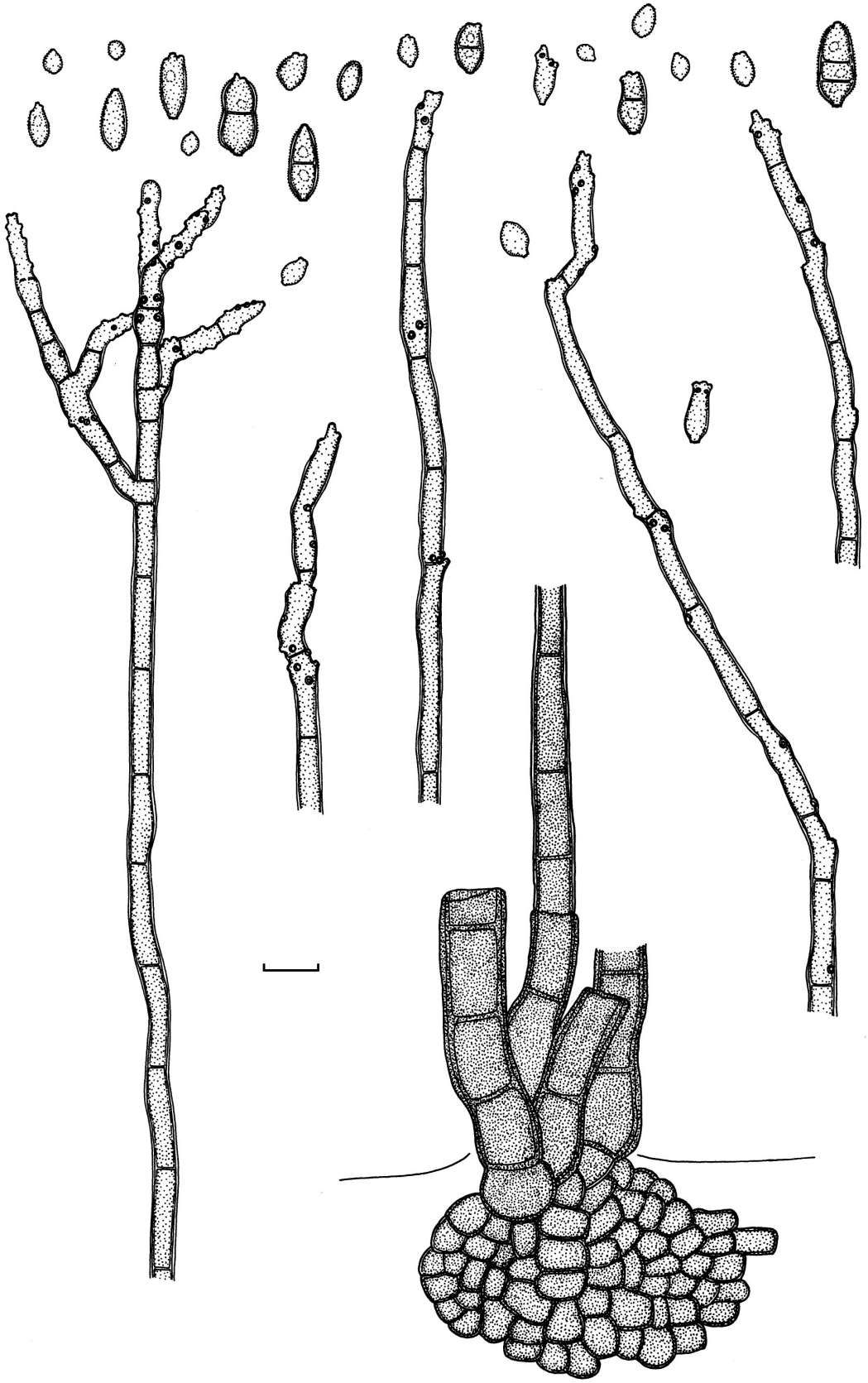

Fig. 71: *Cladosporium ushuwaiense*. Conidiophores and conidia. Bar = 10 µm.

or less rounded or attenuated, with a single to several apical hila, protuberant, slightly convex to short cylindrical, 0.5–1.5(–2) µm diam., thickened, somewhat darkened-refractive; microcyclic conidiogenesis not observed.

Host(s)/substrate(s) & distribution: on *Berberis* spp. (Berberidaceae), South America – *Berberis ilicifolia* (Argentina) (only known from type material).

Notes: This species is morphologically comparable with *C. apicale*, known from Sri Lanka on *Cycas circinalis*, but the latter species is quite distinct in having 0–3-septate, usually smooth and somewhat narrower conidia with one-layered walls, somewhat wider conidiogenous loci and hila and more frequently branched conidiophores with somewhat thicker walls, 0.75–3 µm wide.

(63) *Cladosporium victorialis* (Thüm.) U. Braun & H.D. Shin

Fig. 72; Pl. 33, Figs A–D

Cladosporium victorialis (Thüm.) U. Braun & H.D. Shin, in Braun & Mel'nik, Proc. Komarov Bot. Inst. (St. Petersburg) 20: 101 (1997).
≡ *Cercospora victorialis* Thüm., Hedwigia 21: 172 (1882).
= *Cladosporium alliicola* H.D. Shin & U. Braun, Korean J. Mycol. 23(2): 141 (1995) [T: HAL 1533 F, SMK 12597].

Lectotype: on *Allium victorialis* (Alliaceae), Russia, West Sibiria, Mt. Kerlygan, Martjanov (LE 40451, selected by Braun, in BRAUN & MEL'NIK 1997).
Isolectotype: LE 40452.
Lit.: CROUS & BRAUN (2003: 422).
Ill.: SHIN & BRAUN (1995: 140–141, Figs 1–2), BRAUN & MEL'NIK (1997: Fig. 71).

Leaf spots amphigenous, subcircular to irregular, up to 5 cm wide, without definite margin, at first discoloured, yellowish, later becoming greyish brown, also on inflorescences, causing severe flower rot. *Colonies* hypophyllous, loosely scattered, often not very conspicuous, pale to medium grey-brown, on inflorescences loosely to densely caespitose, greyish brown, velvety. *Mycelium* internal, subcuticular to intraepidermal; hyphae branched, 1–8 µm wide, septate, often slightly constricted at the septa, pale yellowish to medium brown, smooth, walls somewhat thickened, forming stromatic hyphal aggregations. Stromata substomatal, small to moderately large, well-developed, cells somewhat angular, often cylindrical-oblong, medium brown or yellowish brown, walls smooth and somewhat thickened. *Conidiophores* usually densely fasciculate, 3–20 in a divergent fascicle, arising from stromata, emerging through stomata, sometimes solitary, formed as lateral branches of internal hyphae, erect, straight, cylindrical, often geniculate near the apex, 10–50(–68) × 4–7(–10) µm, 0–1(–2)-septate, yellowish, olivaceous-brown to medium brown, paler towards the apex, smooth, walls unthickened or only very slightly thickened. *Conidiogenous cells* integrated, terminal or conidiophores often reduced to conidiogenous cells, proliferation sympodial, 0–3 times mildly geniculate, conidiogenous loci often on small lateral shoulders, protuberant, obconically truncate to slightly convex, 2–3(–4) µm diam., up to 1 µm high, conspicuously thickened and darkened-refractive. *Conidia* solitary or in short unbranched or branched chains, more or less straight, subcylindrical-fusiform to often cylindrical, 10–45(–68) × (3–)4.5–8(–9) µm, occasionally up to 180 µm in length, 0–4(–7)-septate, not constricted at the septa, occasionally slightly constricted at the septa, yellowish, pale olivaceous to pale olivaceous-brown, smooth or almost so, walls unthickened or only very slightly thickened, apex rounded or somewhat attenuated, hila protuberant, often short cylindrical, (1–)1.5–3(–4) µm diam., 0.5–1 µm high, dome often somewhat higher than the surrounding rim, thickened and darkened-refractive; occasionally microcyclic conidiogenesis occurring.

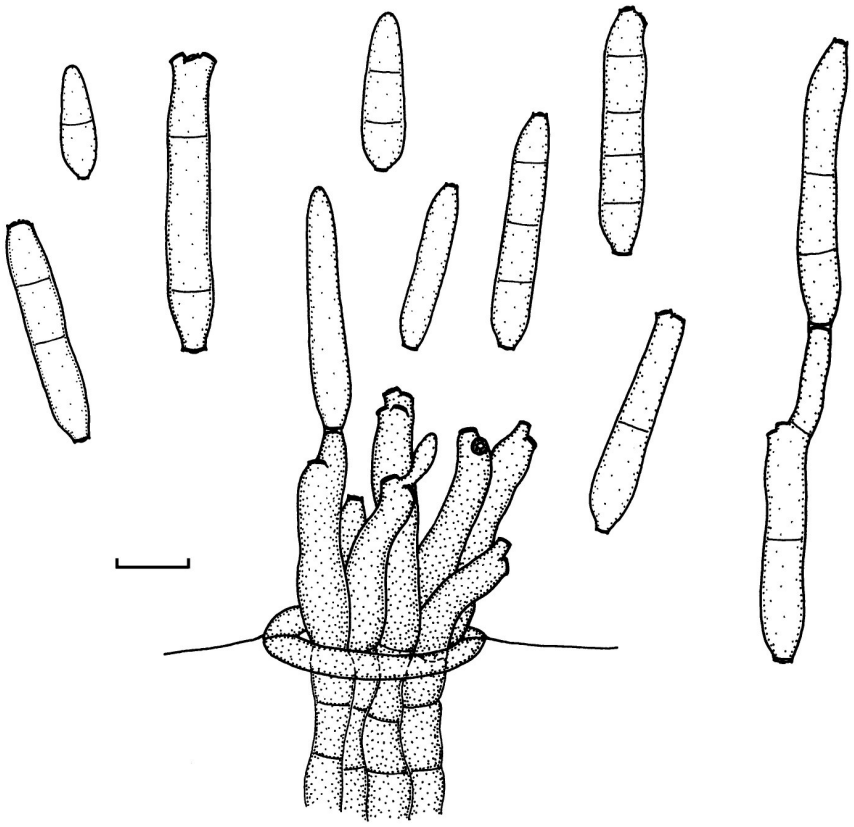

Fig. 72: *Cladosporium victorialis*. Fascicle of conidiophores and conidia (from isotype material of *C. alliicola* HAL 1533 F). Bar = 10 µm.

Host(s)/substrate(s) & distribution: on *Allium* spp. (Alliaceae, Liliaceae s. lat.), Asia – *A. ochotense* (Russia), *A. victorialis* (Korea).

Additional collection examined: on *Allium victorialis* var. *platyphyllum*, KOREA, Suwon, 3 Sept. 1993, H.D. Shin (HAL 1533 F, isotype of *C. alliicola*).

Notes: In comparing this fungus with *Cladosporium* spp. on *Allium* plants, *C. victorialis* is easily distinguishable from *C. allii* and *C. allii-cepae* by catenate, multiseptate, smooth and, above all, narrower conidia and often aseptate, short conidiophores. In SHIN & BRAUN (1995) a key to the *Cladosporium* species occurring on *Allium* spp. is provided.
MENDES et al. (1998) recorded *Cercospora victorialis* on *Allium cepa* and *A. sativum* from Brazil. However, the identity of these records is unclear and doubtful. Material was not available and could not be proven.

(64) *Cladosporium vignae* M.W. Gardner

Fig. 73; Pl. 33, Figs E–F

Cladosporium vignae M.W. Gardner, Phytopathology 15(8): 457 (1925).

Lectotype (designated here): on *Vigna sinensis* (= *V. unguiculata*) (Fabaceae), USA, Indiana, LaFayette, M.W. Gardner (BPI 427608).
Isolectotype: on *Vigna sinensis* (= *V. unguiculata*), USA, Indiana, LaFayette, Sept. 1924, M.W. Gardner (BPI 427604).
Topotype: 25 Aug. 1925, M.W. Gardner (BPI 427602).
Lit.: DE VRIES (1952: 99), MORGAN-JONES & MCKEMY (1992), HO et al. (1999: 144).
Ill.: MORGAN-JONES & MCKEMY (1992: 13, Fig. 1; 15, Pl. 1; 17, Fig. 2), HO et al. (1999: 145, Fig. 51).

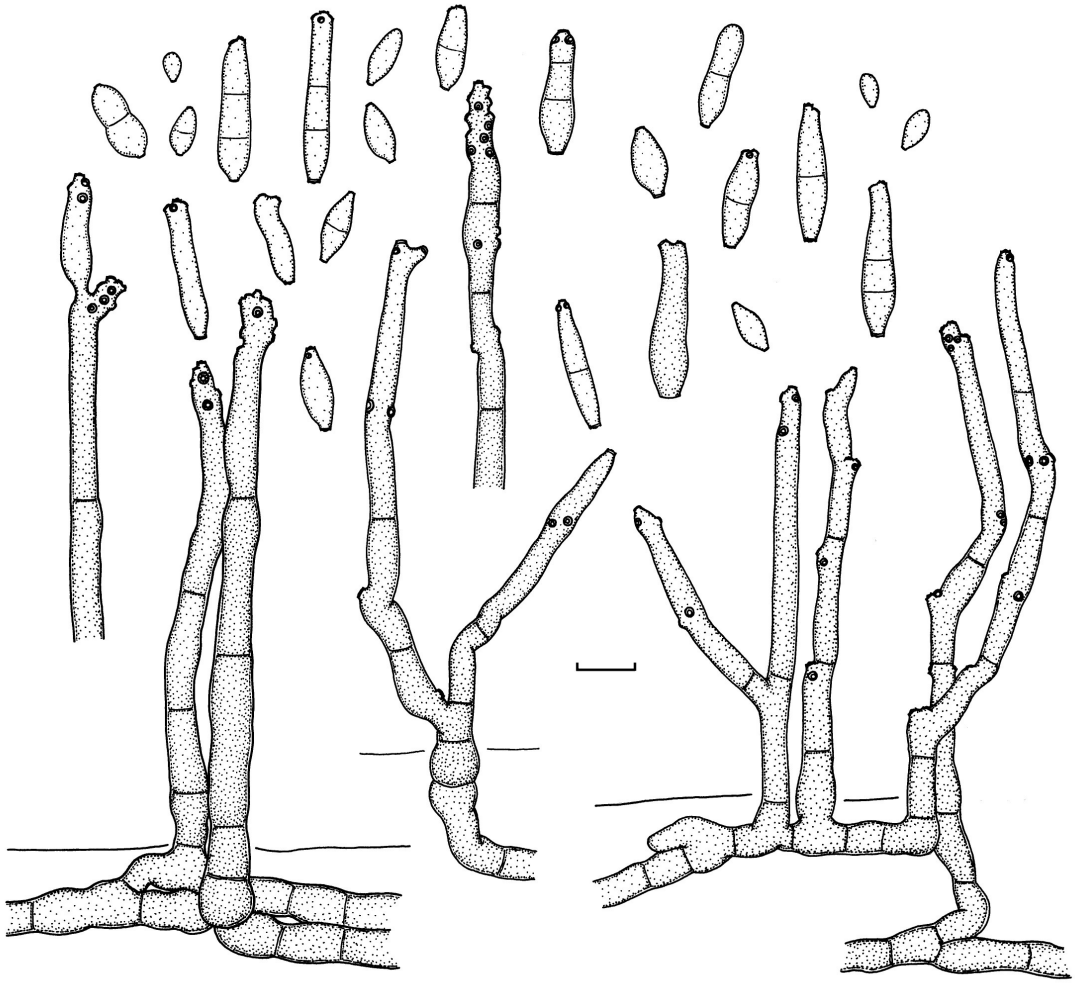

Fig. 73: *Cladosporium vignae*. Conidiophores and conidia (from lectotype BPI 427608). Bar = 10 µm.

On pods, peduncles, stems, petioles and leaves, causing scab, leaf and pod blight, leaf spots amphigenous, irregular in shape, 1–3 mm wide, with a pale yellowish centre, surrounded by a more or less broad, irregular, reddish brown margin; on pods at first punctiform, subcircular, later effuse, oblong-irregular, up to 6 mm diam., red-brown turning blackish, scab-like, sometimes corky and cracked, often somewhat raised; on stems and petioles red-brown to dark brown, somewhat sunken, covering large areas of the host tissue. *Colonies* caespitose, loose to dense, effuse, greyish brown to dark brown, velvety, confined to necrotic areas. *Mycelium* immersed, subcuticular; hyphae branched, 2–7 µm wide, septate, subhyaline to pale yellowish brown, smooth or almost so, often swollen and aggregated, swollen hyphal cells subglobose to somewhat angular, 7–13 µm wide, yellowish brown, smooth, thick-walled. *Stromata* lacking. *Conidiophores* solitary or in small groups, arising from hyphae or swollen hyphal cells, terminal or lateral, or from swollen hyphal cells, erumpent through the cuticle, sometimes emerging through stomata, erect, straight to slightly flexuous, cylindrical, somewhat geniculate-sinuous, unbranched, rarely branched near the apex, 12–132 × 3–7(–8) µm, septate, septa not very conspicuous, pale to medium yellowish brown or almost dark brown, smooth, with age somewhat asperulate, walls at first only slightly thickened, later thickened, sometimes even two-layered, often wider or somewhat swollen at the base, up to 13 µm wide. *Conidiogenous cells* integrated, terminal to intercalary, cylindrical, 10–52 µm long, proliferation sympodial, with a single to numerous, apically often somewhat crowded conidiogenous loci, protuberant, more or less

subdenticulate, short cylindrical, slightly convex, 1–2 µm diam., thickened, refractive or only somewhat darkened. *Ramoconidia* s. str. occasionally formed, cylindrical, base truncate, unthickened, up to 3.5 µm wide. *Conidia* catenate, frequently in branched chains, straight, small primary conidia (with only a basal hilum) subglobose to obovoid, 3–6 × 2–3(–4.5) µm, aseptate, pale brown, secondary conidia limoniform, ellipsoid, 5–12 × 3–5 µm, 0(–1)-septate, pale yellowish brown, ramoconidia (s. lat.) ellipsoid, cylindrical, 10–22(–29) × 3–6 µm, 0–1(–2)-septate, not constricted at the septa, pale yellowish brown, smooth, rarely minutely verruculose, walls unthickened or slightly thickened, often somewhat attenuated towards the apex and base, hila truncate to slightly convex, 0.5–2 µm diam., thickened, darkened-refractive; occasionally microcyclic conidiogenesis occurring.

Host(s)/substrate(s) & distribution: on *Lespedeza* spp. and *Vigna* spp. (Fabaceae), Africa, Asia, Australia, North America, South America – *Lespedeza bicolor* (USA, AL), *Lespedeza thunbergii* (USA, AL), *Vigna catjang* (Brazil), *V. unguiculata* (Australia, New South Wales, Queensland; China, Henan; South Africa; USA, AL, CA, FL, GA, IN, MD, MS, NC, TX), *V. unguiculata* ssp. *dekindtiana* (Zimbabwe); *V. unguiculata* ssp. *sesquipedalis* (USA, IN).

Additional collections examined: on *Vigna unguiculata*, USA, Alabama, Grady, 13 Jul. 1926, S.A. Wingard (BPI 427603); near Oneonta, Jul. 1926, L.E. Miles (BPI 427607); Florida, Fort Meade, 25 May 1938, K.O. Varn (BPI 427605); Gainesville, 1 Jun. 1935, Erdman West. (NY); Wauchula, 23 Apr. 1935, G.F. Weber (NY); Maryland, Beltsville, 25 Apr. 1949, C.L. Lefebvre (BPI 427606); Mississippi, Nesly, 26 Jun. 1930, Fungi of Mississippi 1386 (NY); North Carolina, Chadburn, 6 Jul. 1934, G.A. Mackstroth (BPI 427609).

Notes: This species, which is a seed borne parasite, is the causal agent of the scab, leaf and pod blight on *Vigna unguiculata* and *Lespedeza bicolor*. GARDNER (1925), who introduced this species, stated that only young growing tissues are susceptible. Inoculation experiments were carried out to prove the pathogenicity of *C. vignae*. Under favourable conditions infections occurred with great rapidity and virulence, and visible lesions already causing crinkling of the leaves may be present within 48 hours after inoculation. Attempts to infect field pea seedlings (*Pisum sativum*) with the cowpea fungus have been unsuccessful. Records of *C. vignae* on *Pisum* spp. (e.g., WINSTEAD et al. 1960) are, therefore, very doubtful and probably misdetermined. DA SILVA & MINTER (1995) recorded this species from Brazil on *Vigna catjang* (‘*Vigna cajanga*’).

DE VRIES (1952) examined an isolate of *C. vignae* sent to the CBS by M.W. Gardner in 1925, but found sporulation to be poor. On the basis of what could be observed, he concluded that this species had similarity with *C. cladosporioides* and that it would probably have to be considered as a forma specialis of that species once better isolates were studied. MORGAN-JONES & MCKEMY (1992) and HO et al. (1999) examined *C. vignae* in culture, provided detailed descriptions of its features in vitro and discussed its morphological similarity with *C. cladosporioides* treating them as two separate species. Besides its pathogenicity to *Vigna* and *Lespedeza* spp. and its very characteristic symptoms, *C. vignae* is distinguished from *C. cladosporioides* in having somewhat wider conidiophores with several to numerous often somewhat crowded conidiogenous loci. *C. cucumerinum*, causal agent of crown blight and scab or gummosis disease of Cucurbitaceae, is morphologically also close to *C. vignae* but separated by its mostly longer conidiophores, its somewhat longer and wider ramoconidia and its immersed hyphae often possessing a slime coat.

C. lupiniphilum known from Byelorussia on *Lupinus luteus* differs in having somewhat wider, 0–3-septate conidia and terminal conidiogenous cells with only few conidiogenous loci, and *C. robiniae* (Kabát & Bubák) J.C. David on *Robinia pseudacacia*, originally

described as a species of *Heterosporium*, possesses fasciculate, nodulose conidiophores and two types of conidia being verrucose to echinulate, wider and more frequently septate (Heterosporium-type, 23–37 × 8.5–13.5 µm, 1–6-septate and Cladosporium-type, 12.5–25 × 6–8.5 µm, 0–3-septate) (DAVID 1997). *C. psoraleae* on *Psoralea corylifolia* (Fabaceae, tribus Phoraleae) is tentatively maintained as a separate species since the conidiogenous loci are somewhat wider and the conidia are usually somewhat longer and wider, subglobose and obovoid terminal conidia are usually lacking. Additional collections, cultures and molecular data are needed to clarify whether this species is distinct from *C. vignae* or not.

(65) *Cladosporium xyridis* Tracy & Earle

Fig. 74; Pl. 33, Figs G–H

Cladosporium xyridis Tracy & Earle, Bull. Torrey Bot. Club 23(5): 206 (1896), as '*Gladisporium* (sic) *xyridis*'.

Lectotype (designated here): on petals of *Xyris fimbriata* (Xyridaceae, Poales), USA, Mississippi, Ocean Springs, 29 Sept. 1895, F.S. Earle (NY).
Isolectotypes: BPI 427627–427628; NY.
Lit.: SACCARDO (1899: 1081).

Blackening the persistent withering petals. *Colonies* stretching petals, effuse, loosely caespitose, pale brown, villose. *Mycelium* internal, subcuticular to often intraepidermal; hyphae branched, 2.5–9 µm wide, septate, often with swellings and constrictions, subhyaline or even hyaline to pale medium brown, smooth, walls thickened, cells occasionally with a distinct inner lumen clearly separated from the thickened wall, often appearing to be granular, hyphae forming a loose network, sometimes aggregated. *Stromata* lacking. *Conidiophores* solitary or arranged in small loose groups, arising from internal hyphae, erumpent, erect, more or less straight or only very slightly flexuous, filiform, sometimes slightly geniculate-sinuous, mostly non-nodulose, unbranched, 25–275 × 2–4.5 µm, slightly swollen at the base, up to 6 µm wide, pluriseptate, pale to medium brown, often paler towards the apex, sometimes subhyaline at the apex, smooth or almost so, often faintly verruculose near the base, thick-walled, 0.5–1 µm thick, often more or less distinctly two-layered, protoplasm sometimes aggregated at the septa, appearing to be thickened, sporadically enteroblastically proliferating. *Conidiogenous cells* integrated, terminal and intercalary, narrowly cylindrical-oblong, sometimes somewhat geniculate-sinuous, 10–48 µm long, proliferation sympodial, with a single or several conidiogenous loci, often somewhat crowded at the same level, protuberant, subdenticulate, short cylindrical, 1–1.5(–2) µm diam., thickened, somewhat darkened-refractive. *Conidia* catenate, in branched chains, more or less straight, subglobose, obovoid, ellipsoid, somewhat fusiform, subcylindrical to cylindrical or irregular, 3.5–23(–31) × 2–5(–7) µm, 0–2(–3)-septate, not or only slightly constricted at the septa, subhyaline or even hyaline to very pale brown, smooth or almost so, walls more or less thickened, apex rounded or often slightly attenuated towards apex and base, apex often with 1–5 hila, protuberant, 0.5–1.5(–2) µm diam., clearly differentiated in a central dome and a periclinal rim, thickened, somewhat darkened-refractive; microcyclic conidiogenesis often occurring.

Host(s)/substrate(s) & distribution: on *Xyris* spp. (Xyridaceae), Caribbean, North America – *Xyris fimbriata* (USA, MS), *Xyris jupicai* (Cuba), *Xyris* spp. (USA, AL).

Additional collections examined: on *Xyris communis* (= *X. jupicai*), CUBA, Herradura, 30 Oct. 1917, F.S. Earle No. 803 (NY). On *Xyris* sp., USA, Alabama, Tuskegen (?), 12 Jul. 1897, G.W. Carren (?) (NY). On *Xyris* sp., USA, Alabama, Lee Co., Auburn, 8 Sept. 1897, F.S. Earle & C.F. Baker (NY).

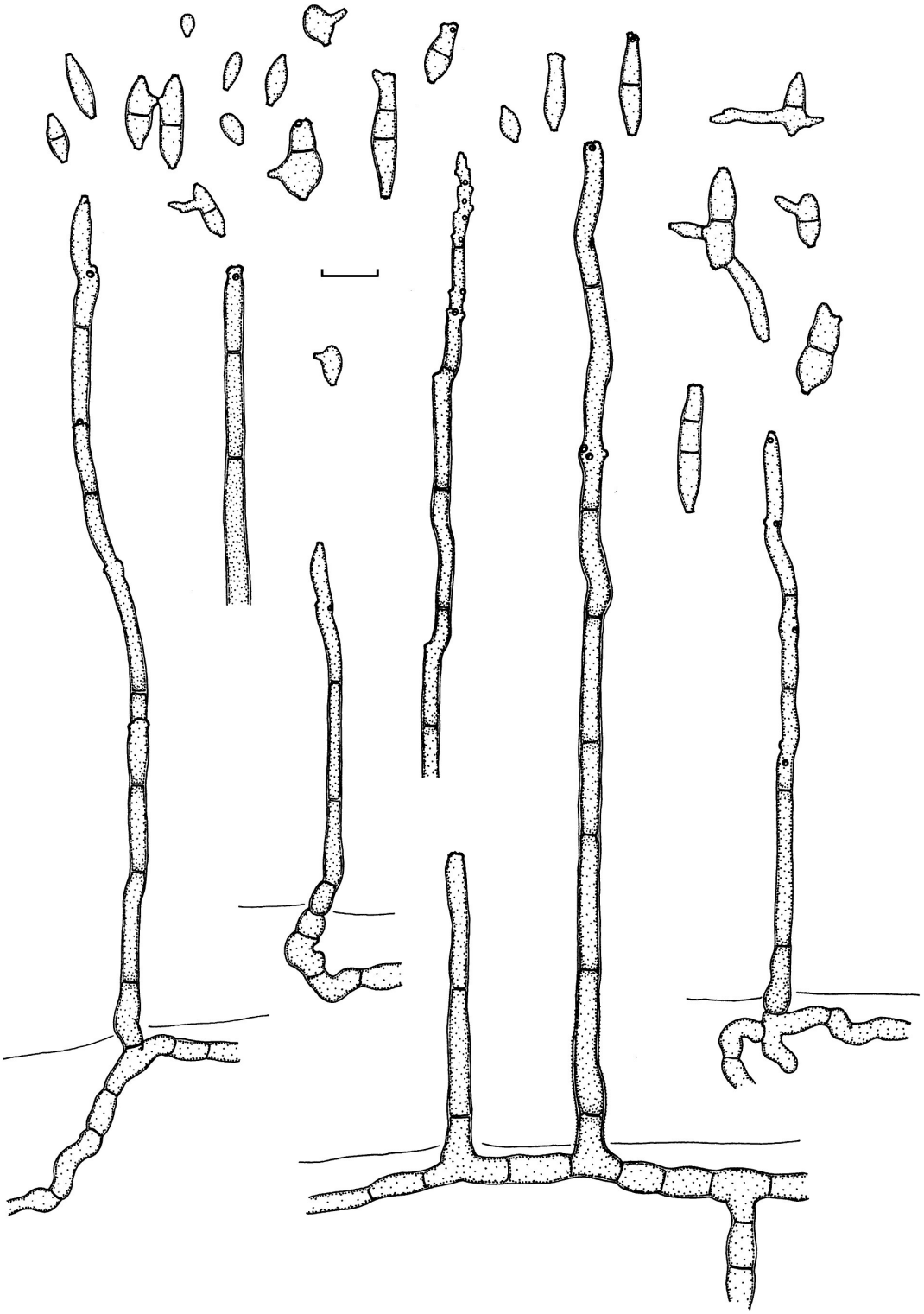

Fig. 74: *Cladosporium xyridis*. Conidiophores and conidia (from lectotype material). Bar = 10 µm.

Notes: Branched conidiophores as described in the original diagnosis (TRACY & EARLE 1896) could not be observed in the collections examined. On the web site of the herbarium BPI the name of this species is given as 'hyridis', which is very probably a spelling error.
C. xyridis is the only species known to occur on a host belonging to the Xyridaceae. It could morphologically be compared with *C. uredinicola* and *C. cladosporioides* but the

latter species differs, however, in having wider conidiogenous loci and hila, usually 0–1-septate conidia and conidiophores with a single or only few conidiogenous loci. The conidia of the fungicolous *C. uredinicola* are often much longer and somewhat wider, 3–39 × 2–6.5(–8) µm, the walls of the conidiophores are one-layered and somewhat narrower, the conidiogenous loci are somewhat wider, and sometimes ramoconidia s. str. are formed (HEUCHERT et al. 2005).

8.3. *'Leaf inhabiting, biotrophic' Cladosporium species which proved to be synonymous with saprobic, fungicolous or heterosporium-like Cladosporium species*

In this chapter, common, widespread, saprobic *Cladosporium* species, which often occur as secondary invaders on living or fading leaves of numerous hosts, are discussed. Species, which proved to be conspecific with one of the saprobic taxa, are given as new synonyms. Additional synonyms are listed in DUGAN et al. (2004). Since comprehensive treatments of these species have already been published, detailed descriptions and illustrations of the species concerned have not been included in this work. *C. vincae* Moesz, described on living leaves of *Vinca herbacea*, proved to be identical with the fungicolous *C. aecidiicola* Thüm. and is reduced to synonymy with the latter species. *C. subnodosum* Cooke on *Spinacia oleracea* is shown to be a synonym of *C. variabile*, originally described as a species of the genus *Heterosporium*. Both species are briefly discussed.

(1) *Cladosporium aecidiicola* Thüm.

Cladosporium aecidiicola Thüm., Mycoth. univ., Cent. IV, No. 373 (1876).
= *Cladosporium vincae* Moesz, Bot. Közlem. 23: 123 (1926), nom. illeg., homonym, non *C. vincae* Fairm., 1911, **syn. nov.**

Syntypes: on aecia of a rust on living leaves of *Euphorbia cyparissias* (Euphorbiaceae), Germany, Bavaria, Bayreuth, 1874, Thümen, Thüm., Mycoth. univ. 373 (e.g., B 70-6144, B 70-6146; BPI 426074; HAL; HBG; M-57483).
Lit.: SACCARDO (1886: 368, 1913a: 1371), LINDAU (1907: 806–807, 1910: 796), FERRARIS (1912: 350), GONZÁLES-FRAGOSO (1927: 211), ELLIS (1976: 330), ELLIS & ELLIS (1985: 571, 1988), BRAUN & ROGERSON (1995: 142), HEUCHERT et al. (2005: 14–17).
Ill.: ELLIS (1976: 330, Fig. 248), HEUCHERT et al. (2005: 15, Fig. 1).

Collection examined: on uredospores of *Puccinia vincae* on living leaves of *Vinca herbacea* (Apocynaceae), HUNGARY, Budapest, 25 Apr. 1926, Dr. Moesz (W 10216: lectotype of *C. vincae* Moesz, selected here).

Notes: *Cladosporium vincae* Moesz was described and illustrated as phytopathogenic, causing leaf spots, with conidiophores emerging through stomata (MOESZ 1926). A re-examination of type material showed that the leaves were infected by uredosori of *Puccinia vincae* (DC.) Plowr., on which a *Cladosporium* species parasitized. With its fasciculate conidiophores, 20–75(–105) × 3–6(–7.5) µm, and 0–3-septate, verruculose conidia, 4.5–25(–33) × 3–7 µm, this species agrees very well with the species concept of *C. aecidiicola*. HEUCHERT et al. (2005) described and illustrated the latter species in detail recording the colonies to occur on aecia of numerous rust fungi, which are usually completely overgrown by the *Cladosporium*, and the surrounding leaf tissue. *C. aecidiicola* has not yet been reported to grow also on uredospores.

(2) *Cladosporium cladosporioides* (Fresen.) G.A. de Vries

Cladosporium cladosporioides (Fresen.) G.A. de Vries, Contr. Knowl. Genus *Cladosporium*: 57 (1952).
= *Cladosporium herbarum* [(Pers.: Fr.) Link] f. *camelliae-japonicae* Bubák, in Rabenhorst-Pazschke, F. eur., Cent. 43, No. 4289 (1901) (nom. nud.), **syn. nov.**

Type: on overwintered leaves of *Hydrangea* sp. (Hydrangeaceae), Germany (not preserved).

Lit.: YAMAMOTO (1959: 3), ELLIS (1971: 319), SUBRAMANIAN (1971: 285), DOMSCH et al. (1980: 202), ELLIS & ELLIS (1985: 290, 468), WANG & ZABEL (1990), BRAUN (1998: 301), HO et al. (1999: 121), SAMSON et al. (2000: 108), DE HOOG et al. (2000: 583), SAMSON et al. (2001: 340), SCHUBERT & BRAUN (2004: 304).
Ill.: FRESENIUS (1850: Taf. 3, Figs 23–28), DE VRIES (1952: 58–59, Figs 10–11), YAMAMOTO (1959: 4, Figs 9–12), ELLIS (1971: 318, Fig. 219 C), DOMSCH et al. (1980: 203, Fig. 82), HO et al. (1999: 122, Figs 8–9), DE HOOG et al. (2000: 583–584, Figs), SAMSON et al. (2000: 108, Fig. 48; 109, Pl. 46), SCHELL (2003: 582, Fig. 16).

Collections examined: on *Aquilegia vulgaris* (Ranunculaceae), NEW ZEALAND, Nelson, Nelson City, Trafalgar Square, 11 Jul. 2003, C.F. Hill, Lynfield 878 (HAL). On leaves of *Camellia japonica* (Theaceae), CZECH REPUBLIC, Bohemia, Tabór, Mar. 1901, F. Bubák, Rabenh., F. eur. 4289 (BPI 426941; HBG: syntypes of *C. herbarum* f. *camelliae-japonicae*). On leaves of *Cyclamen persicum* (Primulaceae), AUSTRALIA, Victoria, Monbulk, Grandview nursery, 22 Jan. 1991, C. Richardson (VPRI 17392a). On a blossom of *Phalaenopsis* sp. (Orchidaceae), BRUNEI, 25 Feb. 1975, W.T.H. Peregrine, SIB 1974 (IMI 192091, as *C. oxysporum*).

Notes: *Cladosporium cladosporioides* is a very common, cosmopolitan saprobic species. It often occurs as a secondary invader on necrotic parts of many different host plants, has been isolated from air, soil, textiles and several other substrates (ELLIS 1971) and is a common endophytic fungus (RIESEN & SIEBER 1985, EL-MORSY 2000, KUMARESAN & SURYANARAYANAN 2002). Some leaf-spotting races have also been reported, which could not be proven (ANILKUMAR & SESHADRI 1975, ARYA & ARYA 2003). DAVID (1997) introduced section *Hormodendropsis* of the subgenus *Cladosporium* typified by *C. cladosporioides*, characterised by determinate, non-proliferating conidiophores.
Type material of *C. cladosporioides*, cited by FRESENIUS (1850) for *Penicillium cladosporioides*, could not be traced in the Fresenius herbarium at the Senckenberg-Museum in Frankfurt and is undoubtedly not preserved. DE VRIES (1952) discussed the fact that *C. cladosporioides* has often been considered as a form of *C. herbarum*, compared these two species and found sufficient morphological differences to justify the recognition of *C. cladosporioides* as a distinct species. As type of this species he invalidly and erroneously proposed to choose Bisby's dried 'standard culture' [isol. fr. *Arundo* leaves, Bamboo Garden, Kew, 1943 (IMI 25324, 60507, 60509)], which, however, proved to be conspecific with *C. herbarum*. According to this, it is necessary to select a neotype and, above all, an epitype culture close to the current concept of *C. cladosporioides*. Belonging to a species complex with broadly similar conidiophore and conidium morphology, *C. cladosporioides* is close to several foliicolous *Cladosporium* species, e.g., *C. cucumerinum* and *C. vignae*, but, besides their pathogenicity to specific host plants, these species differ in some additional aspects. However, the name *C. cladosporioides* has probably often been misapplied. Numerous cultures determinated as '*C. cladosporioides*' have to be re-examined to clarify identity and taxonomic status of the fungi concerned. Further investigations using both morphological and molecular approaches are urgently needed.

(3) *Cladosporium herbarum* (Pers.: Fr.) Link s. lat.

Cladosporium herbarum (Pers.: Fr.) Link, Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 7: 37 (1816) (incl. var. *macrocarpum*).
= *Cladosporium sparsum* Schwein., Trans. Amer. Philos. Soc., N.S., 4(2): 277 (1832), **syn. nov.**
= *Cladosporium brunneum* Corda, Icon. fung. 1: 15 (1837), as '*bruneum*', **syn. nov.**
= *Cladosporium caespiticium* Rabenh., F. eur., Cent. VI, No. 579 (1863) and Bot. Zeitung (Berlin) 21: 230 (1863) (nom. nud.), **syn. nov.**

= *Cladosporium microporum* Rabenh., Unio itin. crypt., No. 42 (1866) (nom. nud.), **syn. nov.**
≡ *Cladosporium microporum* Rabenh., in Cooke, Grevillea 17(83): 66 (1889), **syn. nov.**
= *Cladosporium elegans* Penz., in Saccardo, Michelia 2(8): 471 (1882), **syn. nov.**
= *Cladosporium punctulatum* Sacc. & Ellis, Michelia 2(8): 578 (1882), **syn. nov.**
= *Cladosporium brunneum* Cooke & Harkn., Grevillea 12: 96 (1884), nom. illeg., homonym, non *C. brunneum* Corda, 1837, **syn. nov.**
≡ *Cladosporium brunneolum* Sacc., Syll. fung. 4: 358 (1886), **syn. nov.**
= *Cladosporium kniphofiae* Cooke, Grevillea 14(70): 40 (1885), **syn. nov.**
= *Cladosporium velutinum* Ellis & Tracy, J. Mycol. 6: 76 (1890), **syn. nov.**
= *Cladosporium phoenicis* Roum., F. sel. gall. exs., Cent. 58, No. 5798 (1891) and Rev. Mycol. (Toulouse) 13: 133 (1891), as '*phaenicis*', **syn. nov.**
= *Cladosporium menispermi* Allesch., Hedwigia 34: 220 (1895), **syn. nov.**
= *Cladosporium idesiae* Bres., in Sydow, Hedwigia 35(1), Beih.: 62 (1896), **syn. nov.**
= *Cladosporium acutum* Ellis & Dearn., Proc. Canad. Inst., N.S., 3, 1: 91 (1897), **syn. nov.**
= *Cladosporium fusicladium* Sacc., in Bresadola & Saccardo, Malpighia 11: 321 (1897), **syn. nov.**
= *Cladosporium laricis* Sacc., Ann. Mycol. 3: 515 (1905), **syn. nov.**
= *Cladosporium magnoliae* Lindau, Verh. Bot. Vereins Prov. Brandenburg 47: 74 (1905), **syn. nov.**
= *Cladosporium vincae* Fairm., Ann. Mycol. 9: 148 (1911), **syn. nov.**
= *Cladosporium alnicola* Bubák & Vleugel, in Vleugel, Svensk Bot. Tidskr. 11(3–4): 322 (1917), nom. illeg., homonym, non *C. alnicola* Corda, 1837, **syn. nov.**
= *Cladosporium epiphyllum* [(Pers.: Fr.) Nees] var. *acerinum* Sacc., Nuovo Giorn. Bot. Ital., N.S., 27: 86 (1920), **syn. nov.**
= *Cladosporium moldavicum* Fosteris, Bull. Sect. Sci. Acad. Roumaine 26(7): 494 (1944)? and in Herb. Mycol. Rom., Fasc. 27, No. 1341 (1944) (nom. inval.), **syn. nov.**
= *Cladosporium equiseti* Pass., in herb. (B 70-6324), **syn. nov.**
= *Cladosporium hederae*, in herb. (HBG), **syn. nov.**

Lectotype: ex herb. Persoon (L 910.225-733).
Lit.: SACCARDO (1886: 350, 1972: 327, 1304), LINDAU (1907: 800, 1910: 795), FERRARIS (1912: 331), GONZÁLES-FRAGOSO (1927: 194), DE VRIES (1952: 71), HUGHES (1958: 750), ELLIS (1971: 313), DOMSCH et al. (1980: 204), SIVANESAN (1984: 225), ELLIS & ELLIS (1985: 290, 468, 1988: 168), PRASIL & DE HOOG (1988), WANG & ZABEL (1990: 202), MCKEMY & MORGAN-JONES (1991c), DUGAN & ROBERTS (1994), DAVID (1997: 59), HO et al. (1999: 129), DE HOOG et al. (2000: 587), SAMSON et al. (2000: 110), SAMSON et al. (2001).
Ill.: FERRARIS (1912: 327, Fig. 101), DE VRIES (1952: 73, Fig. 15), YAMAMOTO (1959: 2, Figs 1–4), ELLIS (1971: 314, Fig. 217 A), DOMSCH et al. (1980: 206, Fig. 83), ARX (1987: 57, Fig. 27), PRASIL & DE HOOG (1988: 51, Fig. 3), MCKEMY & MORGAN-JONES (1991c: 311, Pl. 1; 313, Fig. 1), DUGAN & ROBERTS (1994: 516, Figs 4–7), DAVID (1997: 62, Fig. 17 F, G, I), HO et al. (1999: 130, Figs 21–22), DE HOOG et al. (2000: 587–588, Figs), SAMSON et al. (2000: 110, Fig. 49; 111, Pl. 47).

Collections examined: on leaves, partly becoming dry, of *Acer platanoides* (Aceraceae), USA, Idaho, Coeur d' Alene, Sept. 1918, N.W. Scherer, No. 10027 (PAD: type of *C. epiphyllum* var. *acerinum*). On leaves of *Allium cepae* and *Allium* sp. (Alliaceae), USA, Pennsylvania, Bethlehem, No. 2602 (PH 1020413, 1020414: syntypes of *C. sparsum*). On *Alnus incana* var. *borealis* (Betulaceae), SWEDEN, prov. Vesterbotten, Umeå, Sept. 1911, J. Vleugel (BPI 426104: holotype of *C. alnicola* Bubák & Vleugel). On leaves of *Andropogon sorghum* (= *Sorghum vulgare*), CZECH REPUBLIC, Mähren, in den

Eisgruber Weingärten, 15 Sept. 1907, Hugo Zimmermann (BPI 426832, as *C. graminum* var. *sorghi*). On living leaves of *Citrus limonum* (Rutaceae), ITALY, Padova, botanical garden, Aug. 1902, associated with *Epicoccum vulgaris*, Saccardo, Mycoth. ital. 1189 (HBG: neotype of *C. elegans* Penz., designated here; Sacc., Mycoth. ital. 1189: isoneotypes, e.g., PAD). On the surface of living leaves of *Corylus avellana* (Corylaceae), GERMANY, Sachsen-Anhalt, Halle, botanical garden, 11 Jun. 2004, B. Heuchert, det. K. Schubert (HAL). On *Equisetum ramosum* (Equisetaceae), ITALY, Emilia Romagna, Parma, 1873, G. Passerini (B 70-6324: original material of *C. equiseti*). On dead leaves of *Eryngium pandanifolium* (Apiaceae), ITALY, Padova, botanical garden, Mar. 1903, P.A. Saccardo, Mycoth. ital. 1386 (HBG: isoneotype of *C. macrocarpum*). On leaves of *Euonymus japonicus* (Celastraceae), USA, New Jersey, Newfield, 17 Apr. 1881, J.B. Ellis, no. 3585 (NY: lectotype of *C. punctulatum*, selected here; BPI 427402, PAD: isolectotypes). On *Festuca ovina* (Poaceae), ROMANIA, Moldova, Neamț District, Broşteni, Neagră Valley, 15 Aug. 1943, S. Fosteris, Herb. Mycol. Rom. 1341 (BPI 427266; MA-Fungi 8381: syntypes of *C. moldavicum*). On *Fraxinus excelsior* (Oleaceae), GERMANY, Triglitz, 7 Apr. 1898, O. Jaap (HBG, as *C. elegans* Penz.); 12 Aug. 1897, O. Jaap (HBG, as *C. elegans* Penz.); HUNGARY, Gebirgspark, Oct. 1886, J.A. Bäumler, Flora Posoniensis (HBG, as *C. elegans* Penz.). On fallen leaves of *Fraxinus* sp., Cadine, Nov. 1922, Roufi (BPI 426449, as *C. desmotrichum*); CANADA, Ontario, London, Victoria park, Oct./Nov. 1896 (DAOM, NYS: syntypes of *C. acutum*). On fallen leaves of *Ginkgo biloba* (Ginkgoaceae), RUSSIA, St. Petersburg, Komarov Botanical Garden, near the building of botanical museum, 27 Nov. 2002, V. Mel'nik (HAL). On dead leaves of *Hedera helix* (Araliaceae), USA, California, Dec. 1880, Henkney, No. 1954, mixed infection with a second hyphomycete (K 121546: holotype of *C. brunneum* Cooke & Harkn.; BPI 426168: isotype). On leaves of *Hedera* sp. (HBG: original material of *C. hederae*). On leaves of *Idesia* sp. (Flacourtiaceae), GERMANY, Berlin, Späth'sche Baumschule, Oct. 1895, P. Sydow (B 70-6556: holotype of *C. idesiae*; Sydow, Mycoth. march. 4498: isotypes, e.g., HBG). On leaves of *Kniphofia aloides* (Asphodelaceae), GREAT BRITAIN, Surrey, Kew, Royal Botanic Gardens, Aug. 1885, M.C. Cooke (K 121560: holotype of *C. kniphofiae*). On still living leaves of *Larix europaea* (= *Larix decidua*) (Pinaceae), ITALY, Apenninen, Giogo di Scarparia (Mugello), Sept. 1905, Prof. V. Perona (PAD: holotype of *C. laricis*). On dead leaves attached to stem, sphagnum bog ex *Lycopodium annotinum* (Lycopodiaceae), GERMANY, Sachsen-Anhalt, Harz, Schierke, ca. 1.5 km E of town, Königsmoor, 26 Jul. 2003, F. Klenke (KR-12198). On leaves of *Magnolia soulangeana* (Magnoliaceae), GERMANY, Brandenburg, Tamsel, Dec. 1904, Vogel (B 70-6614: holotype of *C. magnoliae*). On fading leaves of *Menispermum canadense* (Menispermaceae), GERMANY, Munich, botanical garden, Sept. 1894, Allescher (M-57686: holotype of *C. menispermi*). On leaves of *Nerium oleander* (Apocynaceae), ITALY, Sardinia, Gonnos-Fanadiga, Dr. Marcucci, Unio itin. crypt. 42 (e.g., HBG; M-57685: syntypes of *C. microporum*). On leaves of *Phalaris canariensis* (Poaceae), USA, Mississippi, Starkville, 25 Mar. 1890, S.M. Tracy, No. 1323 (NY: holotype of *C. velutinum*; BPI 427595, 427596, 427597: topotypes). On leaves of *Phoenix tenuis* (Arecaceae), FRANCE, Toulouse, 1891, G. Machado, Roum., F. sel. gall. exs. 5798 (e.g., B; FH: syntypes of *C. phoenicis*). On rotten leaves of *Populus* sp., CZECH REPUBLIC, Prague, 1847, E.D. Hofmann (PRM 657440: neotype of *C. brunneum* Corda, designated here). On living leaves of *Prunus domestica* (Rosaceae), GERMANY, Hirschberg, Schmilka near Schandau, Jul. 1896, G. Wagner (M-57518, as *C. condylonema*); ITALY, Parma, Jun. 1889, Briosi & Cav., F. paras. 79 (e.g., BPI 426388; HAL: syntypes of *C. condylonema*). On leaves of *Rhamnus alaternus* (Rhamnaceae), 'ad Gandam', winter 1861, E. Coemans, Rabenh., F. eur. 579 (M-57455: lectotype of *C. caespiticium*, selected here; HAL, HBG, M-57454: isolectotypes). On leaves of *Salix*

incana (Salicaceae), ITALY, Riva-Valsesia, 28 Apr. 1891, Carestia, No. 770 (PAD: holotype of *C. fusicladium*). On dead leaves of *Vinca minor* (Apocynaceae), GERMANY, Hessen, Wiesbaden-Dotzheim, 23 Apr. 1963, R. Steppan, No. 1074 (B 70-6766, as '*Ramularia vincae* Sacc.', revised by U. Braun as *C. vincae* Moesz); USA, New York, Lyndonville, 6 May 1910, C.E. Fairman [CUP-F2873(24-68): holotype of *C. vincae* Fairm.].

Notes: *Cladosporium herbarum*, type species of the genus *Cladosporium*, is a very common, widespread saprobic species especially abundant in temperate regions on dead herbaceous and woody plants frequently isolated from air, soil, foodstuffs, paints, textiles, humans and numerous other matters. It is known to occur on old carpophores of mushrooms and other fungi and as a secondary invader on necrotic leaf lesions on still living or fading leaves. Under favourable climatic conditions *C. herbarum* also germinates and superficially grows on the surface of green leaves without causing any symptoms. It is very variable and polymorphous but, nevertheless, well-characterised by its subnodulose or nodulose conidiophores and usually verruculose or verrucose, 0–3-septate conidia. Several authors provided detailed treatments of *C. herbarum* (DE VRIES 1952; ELLIS 1971; DOMSCH et al. 1980; PRASIL & DE HOOG 1988), and there are literally thousands of records of it in the literature. MCKEMY & MORGAN-JONES (1991c) and HO et al. (1999) examined this species in culture and published detailed descriptions of its features in vitro. On the base of wider and somewhat larger, frequently 2- and 3-septate, more regularly verrucose conidia, shorter conidial chains and more pronounced prolongations of the conidiophores, *C. macrocarpum* has been treated as allied, but morphologically distinct species for a long time. DUGAN & ROBERTS (1994) carried out examinations of morphological and reproductive aspects of both species, demonstrated a morphological continuum between *C. macrocarpum* and *C. herbarum* and stated that the species should be united under the latter name. HO et al. (1999) introduced the new combination *C. herbarum* var. *macrocarpum*. During the course of recent monographic studies within the genus *Cladosporium* type material of numerous species, described on leaves of many different host plants, have been re-examined. Many of them proved to be conspecific with *C. herbarum*, which are, however, transitional forms, intermediate between *C. herbarum* s. str. [conidia usually (5–)8–20(–25) × (3–)4–7(–8) µm] and *C. macrocarpum* [conidia usually 9–28 × (7–)8–10 (–13) µm]. In the absence of Preuss's type material (not preserved) DE VRIES (1952) 'lectotypified' *C. macrocarpum* on the specimen in Saccardo's collection (Herb. Myc. P.A. Saccardo no. 419, PAD). This material, subsequently distributed in Mycotheca italica no. 1396, should correctly be regarded as neotype (DAVID 1997). A single collection of Saccardo's Mycotheca italica no. 1396 from herb. HBG, which can be considered as isoneotype material, was re-examined and proved to be also a transitional form between the two species. The conidia were formed in simple, rarely branched chains, 6–26 × (4–)5.5–8(–9) µm, 0–3-septate, almost smooth or minutely to densely verruculose or verrucose. Further critical studies are required to clarify the taxonomic status of *C. macrocarpum*. Molecular examination carried out at the CBS including numerous strains of *C. herbarum* s. lat. are in progress to prove the morphological and genetic variability of this species.

(4) *Cladosporium oxysporum* Berk. & M.A. Curtis

Cladosporium oxysporum Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10: 362 (1869).
= *Cladosporium sorghi* S.R. Chowdhury, Sydowia 23(6): 50 '1969' (1970), **syn. nov.**

Holotype: on dead leaves of *Passiflora* sp. (Passifloraceae), Cuba, C. Wright, Fungi cubensis Wrightiani, No. 489 (K 121562).

Lit.: SACCARDO (1886: 363), ELLIS (1971: 312), MCKEMY & MORGAN-JONES (1991b), DAVID (1997: 81), BAGYANARAYANA & BRAUN (1999: 13), HO et al. (1999: 137), DE HOOG et al. (2000: 589), SCHUBERT & BRAUN (2004: 308–309).
Ill.: ELLIS (1971: 313, Fig. 216 A), MCKEMY & MORGAN-JONES (1991b: 399, Pl. 1; 401, Fig. 1; 403, fig. 2), DAVID (1997: 62, Fig. 17 A–E), HO et al. (1999: 138, Fig. 39), DE HOOG et al. (2000: 589–590, Figs).

Collections examined: on pods of *Adenanthera pavonina* (Fabaceae), CUBA, Boyamo, 13 Sept. 1967, R. Urtiaga (IMI 130161). On *Ficus hispida* (Moraceae) (M-57754). On *Oncidium* sp. (Orchidaceae), from MEXICO, intercepted at Laredo, Texas, USA, by Cary, 13 Apr. 1954, det. A.H. Lewis (BPI 427293, as *C. orchidearum*). On inflorescences of *Sorghum vulgare* (Poaceae), INDIA, Madhya Pradesh, Raipur, Coll. of Science, Dec. 1966, S.R. Chowdhury (IMI 125190b: holotype of *C. sorghi*). On leaves of *Ulmus* sp. (Ulmaceae), USA, Texas, 1894 (NY, as *C. brunneum* Corda).

Notes: *Cladosporium oxysporum*, a common and widespread saprophyte especially in the tropics on dead parts of leaves and stems of herbaceous and woody plants, occurs also as secondary invader on necrotic leaf lesions caused by other fungi, and has been recorded by several authors to induce leaf spots on several host plants (FISHER 1967; HAMMOUDA 1992; LAMBOY & DILLARD 1997). With its usually very long, more or less regularly nodulose or nodose conidiophores and smooth, 0–1(–2)-septate conidia it is a well-characterised species easily distinguishable from the morphologically allied *C. herbarum* and *C. colocasiae*. Type material of *C. oxysporum* has been re-examined, described and illustrated by MCKEMY & MORGAN-JONES (1991b) and DAVID (1997) confirming the interpretation of the species by ELLIS (1971) to be accurate. Now, the type material is in poor condition and should therefore not be re-examined. Only few typical conidia and nodulose conidiophores could be observed.

(5) *Cladosporium variabile* (Cooke) G.A. de Vries

Cladosporium variabile (Cooke) G.A de Vries, Contr. Knowl. Genus *Cladosporium*: 85 (1952).
≡ *Heterosporium variabile* Cooke, Grevillea 5: 123 (1877).
= *Cladosporium subnodosum* Cooke, Grevillea 17(83): 67 (1889), **syn. nov.**

Holotype: on *Spinacia oleracea* (Chenopodiaceae), Great Britain, Wales, Montgomery-shire, Welshpool, Forden Vicarage, J.E. Vize, Cooke, F. brit. exs. 360 (K).
Lit.: ELLIS (1971: 315), ELLIS & ELLIS (1985: 429), DAVID (1995, 1997: 94), HO et al. (1999: 144).
Ill.: MINOURA (1966: 141, Fig. 5D), ELLIS (1971: 314, Fig. 217 B), DAVID (1995: 1, Fig.; 1997: 97, Fig. 26), FUENTES-DAVILA & GABRIELSON (1996: 54–55, Figs 1–2), HO et al. (1999: 145, Fig. 50).

Collections examined: on leaves of *Spinacia oleracea* (Chenopodiaceae), AUSTRIA, garden near Stadlau, Jun., F. de Höhnel, Krypt. exs. 1498 (HBG); BELGIUM, Bruxelles, botanical garden, Jun. 1884, E. Marschal, Rabenh.-Winter, F. eur. 3283 (HBG, as *Heterosporium variabile* Cooke); CZECH REPUBLIC, Mährisch-Weißkirchen (Hranice), in a garden, Mar. 1935, F. Petrak, Reliqu. Petrak. 2359 (M-57768, as *Heterosporium variabile*); GERMANY, Jun. 1949, Dr. v. Horn (B 70-6608, as *C. macrocarpum*); Baden-Württemberg, Karlsruhe, Durlach, Oct. 1948, Dr. J. Hruby (B 70-6612, as *C. macro-carpum*); SWITZERLAND, Graubünden, Fürstenach, Versuchsgarten, 1780 m, 22 Sept. 1901, A. Volkart (HBG, as *Heterosporium variabile*); USA, South Carolina, Aiken, Rav., F. amer. exs. 294 (NY: lectotype of *C. subnodosum*; Rav., F. amer. exs. 294, e.g., BPI 427478, NY, PH: isolectotypes).

Notes: Type material of *Cladosporium subnodosum*, described on leaves of *Spinacia oleracea*, has been re-examined. At first sight it seemed to resemble *C. herbarum* var. *macrocarpum*, especially the collection from herb. PH, but additional collections showed this species to be conspecific with *C. variabile*, the well known causal agent of leaf spots on spinach. The geniculate, subnodulose conidiophores were formed solitarily or in small fascicles, emerging through stomata or erumpent through the cuticle, 35–200 × (3.5–)5–8.5 µm, swellings 7–11 µm wide; the obovoid-cylindrical conidia, becoming soleiform with age, were 0–4(–5)-septate, often constricted at one of the median septa, sometimes with a single longitudinal septum, verruculose to distinctly verrucose, (6.5–)10–45(–55) × (5–)6–14(–17) µm, very thick-walled, walls up to 2 µm wide; and the conidiogenous loci and hila were (1–)2–3(–3.5) µm wide and about 1 µm high.

8.4. *Uncertain and doubtful foliicolous species of Cladosporium s. lat.*

Type material of the following taxa, described on leaves of various hosts, could not be traced or was not available so that the generic affinity and taxonomic status of these taxa could not be proven and remain unclear. Original descriptions and illustrations, if present and available, are reproduced.

(1) *Cladosporium aeruginosum* F. Patt.

Cladosporium aeruginosum F. Patt., Bull. Torrey Bot. Club 27: 284 (1900).
Type: on living leaves of *Olea fragrans* (Oleaceae) affected by *Gloeosporium oleae*, USA, Department of Agriculture, greenhouse, Jan. 1900, F.W. Patterson (type in herb. of 'Division of Vegetable Physiology and Pathology, U.S. Department of Agriculture').
Topotype: 6 Feb. 1900 (BPI 426094).
Lit.: SACCARDO (1902: 1058).

Original diagnosis (PATTERSON 1900): Tufts epiphyllous, verdigris green, densely fasciculate, distinct, upon light-coloured arid spots; hyphae simple, septate, nodulose, very light green, 45–90 × 3–3.5 µm; conidia lateral and terminal, in chains of 5 or more, almost hyaline, generally oblong and continuous, sometimes oblong-elliptical and once or twice septate, 5–12 × 2–2.5 µm.

Notes: Type material of *Cladosporium aeruginosum* could not be located. The collection from BPI can be considered as topotype material, but could not be examined during the course of the recent morphotaxonomic studies.

(2) *Cladosporium albiziae* S.N. Khan & B.M. Misra

Fig. 75

Cladosporium albiziae S.N. Khan & B.M. Misra, Indian Forester 125(7): 746 (1999).
Holotype: on leaves of *Albizia lebbek* (Mimosaceae), India, Uttar Pradesh, Kalsi (Dehra Dun) (IMI 282484).
Ill.: KHAN & MISRA (1999: 745, Fig. 2).

Original diagnosis (KHAN & MISRA 1999): Conidiophora simplica, raro ramosa, brunnea ad atro-brunnea ad cinereo-brunneae, septata, parietibus parum crassibus, levi 60–180 × 5–7 µm. Ramoconidia pallida brunnea, 0–3 septata, ovalia vel cylindrica, 16–22 × 4–5 µm. Conidia pallida-brunnea, cylindrica, levi 8–12 × 5–6 µm.

Notes: KHAN & MISRA (1999) reported this species as being allied to *C. psoraleae* but different in its virulence, lesion formation and conidial characters. However, type material, cited to be deposited at IMI, could not be traced and is probably not preserved.

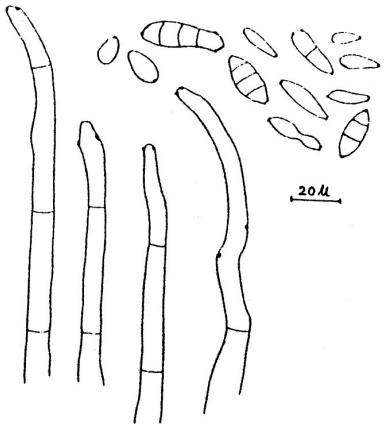

Fig. 75: *Cladosporium albiziae* (from KHAN &MISRA 1999). Conidiophores and conidia.

(3) *Cladosporium alliorum* Hanzawa

Fig. 76

Cladosporium alliorum Hanzawa, Mycol. Centralbl. 5: 11 (1914).
Type: on leaves of *Allium cepa* (Alliaceae), Japan, Sapporo.
Lit.: SACCARDO (1931: 793).

Ill.: HANZAWA (1914: 6, Fig. 2).

Original diagnosis (HANZAWA 1914): Der Pilzrasen besteht aus vielen Conidienträgern, er entspringt aus den Spaltöffnungen der Blätter. Die Conidienträger sind unverzweigt, schwach gebogen, stellenweise etwas angeschwollen, bräunlich gefärbt, vacuoliert. Ihre Länge ist verschieden, bis 135 µm lang, 4–6 µm (auch 10 µm breit), angeschwollene 8 µm breit. Conidien oval, elliptisch, besitzen kleine Auswüchse an der Spitze, Oberfläche feinpunctiert, gelb-bräunlich, ohne oder mit 1–2 Septen. Größe verschieden, meistens 14–25 µm lang, 12–17 µm breit.

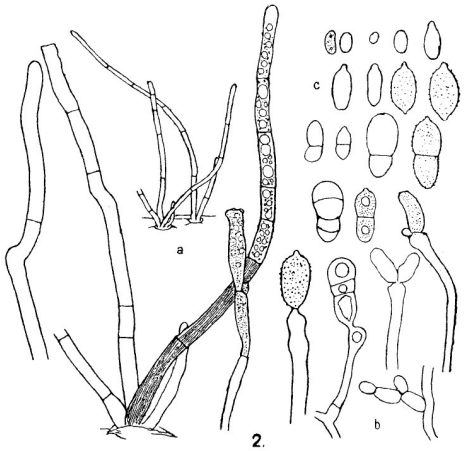

Fig. 76: *Cladosporium alliorum* (from HANZAWA 1914), a – Conidiophores, b – Conidiophores with attached conidia, c – conidia.

Notes: HANZAWA (1914) described the species as closely related to *Cladosporium herbarum* but distinct by having somewhat swollen conidiophores and thick conidia. Judging from the description and figure given above *C. alliorum* is possibly identical with *C. herbarum* var. *macrocarpum*, but the conidia of *C. alliorum* are somewhat wider. *C. allii-cepae*, occurring on *Allium cepa*, possesses wider conidiophores and usually solitary, much longer conidia.

(4) *Cladosporium alpiniae* T. Zhang & Z.Y. Zhang

Fig. 77

Cladosporium alpiniae T. Zhang & Z.Y. Zhang, Plant Diseases and Their Control: 108 (1998).

Holotype: on living leaves of *Alpinia galanga* (Zingiberaceae), China, Hubei, Wuchang, 22 Sept. 1980, J.Y. Li & T.Y. Zhang, No. 4074 (MHYAU 03947).

Ill.: ZHANG & ZHANG (1998b: 109, Fig. 1), ZHANG et al. (2003: 38, Fig. 12; Pl. 10, Fig. 2).

Original diagnosis (ZHANG & ZHANG 1998b): Maculis amphigenis, apicis vel marginis, atro-brunneis, longi-striatis, marginalibus pallide brunneis longi-undulatis ornatis, spot blight usque ad 18 × 1.2 cm vel 3–5 × 1.2 cm, olivaceis mucoris amphigenis, inusitatis. Conidiphoris solitariis vel rarius ramosis, erectis, septatis, sympoditer proliferis denticulatis vel cicatrisosis, brunneis, prope apicem pallescentis, 11.5–219.0 × 2.6–4.6 µm. Ramoconidiis 0–1-septatis, rarius 2–3-septatis, cicatricibus protrudentibus, praeditis, pallide brunneis, 5.0–18.0 × 3.3–4.6 µm. Conidiis catenatis, fusiformis, subsphaericis, continuis, laevis, pallide brunneis, 2.6–7.2 × 2.6–5.1 µm.

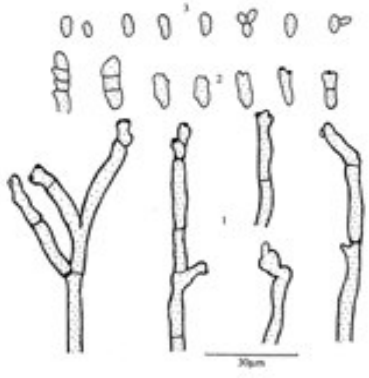

Fig. 77: *Cladosporium alpiniae* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Notes: ZHANG & ZHANG (1998b) cited *Alpinia zerumbet* as an additional host species and com-pared *C. alpiniae* with *C. cladosporioides*, the only other species occurring on a host belonging to the Zingiberaceae (on *Zingiber officinale*), stating that the latter species possesses longer, limoniform or ellipsoid conidia. Since type material was not available the status of this taxon remains unclear.

(5) *Cladosporium aristolochiae* H. Zhang & Z.Y. Zhang

Fig. 78

Cladosporium aristolochiae H. Zhang & Z.Y. Zhang, Mycosystema 17(4): 304 (1998).
Holotype: on living leaves of *Aristolochia kwangsiensis* (Aristolochiaceae), China, Hubei, Wuchang, 22 Sept. 1980, J.Y. Li & T.Y. Zhang (MHYAU 03956).
Ill.: ZHANG & ZHANG (1998a: 304, Fig. 1), ZHANG et al. (2003: 46, Fig. 19).

Original diagnosis (ZHANG & ZHANG 1998a): Maculae amphigenae, flavo-brunneae vel griseae, longe undulatae, atro-brunneae, 4.5 × 8.0 cm. Conidiophora solitaria, erecta, simplicia, septata, sympodialia cicatricosa brunnea, sursum pallide brunnea, 39–90 × 3.7–3.8 µm. Ramoconidia 0–1 interdum 3-septata, ellipsoidea vel ellipsoideo-cylindrica, pallide brunnea, cicatricibus conspicuis, 3.9–22 × 3.9–9.1 µm. Conidia catenata, continua vel raro 1-septata, subsphaerica vel ellipsoidea, laevia, pallide brunnea, 2.8–11.1 × 2.8–5.1 µm.

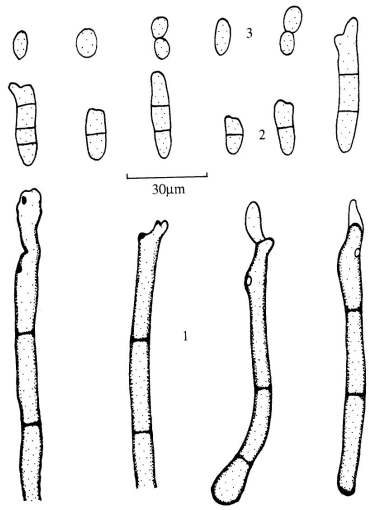

Fig. 78: *Cladosporium aristolochiae* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(6) *Cladosporium boenninghauseniae* Togashi & Katsuki

Fig. 79

Cladosporium boenninghauseniae Togashi & Katsuki, in Katsuki, Kyushu Agric. Res. 8: 84 (1951).
Type: on leaves of *Boenninghausenia albiflora* (Rutaceae), Japan, Kyushu, Pref. Fukuoka, Mizunashi, Ito-mura, 15 Oct. 1950, S. Katsuki.
Ill.: KATSUKI (1951: 84, Fig. 1).

Original diagnosis (KATSUKI 1951): Maculis amphigenis, sparsis vel laxe gregariis, rotundatis vel subrotundatis 3–10 mm diametris, supra griseo-brunneis, infra brunneis vel nigro-brunneis; caespitulis hypophyllis, effusis, brunneis; conidiophoris erectis vel flexuosis, ascendentibus, cylindraceis, simplicibus, 1–3 septatis, olivaceo-brunneis, 70–105 × 5.0–7.5 µm; conidiis oblongis, cylindraceis vel fusiformibus, utrimque rotundatis, rectis, non vel leniter constrictis, 1–3 septatis, raro non-septatis, olivaceo-brunneis, 12.5–30 × 5–6 µm.

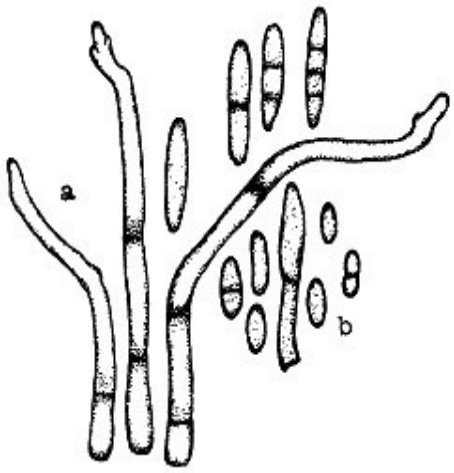

Fig. 79: *Cladosporium boenninghauseniae* (from KATZUKI 1951), a – Conidiophores, b – Conidia (× 615).

(7) *Cladosporium brachormium* Berk. & Broome

Cladosporium brachormium Berk. & Broome, Ann. Mag. Nat. Hist., Ser. 2, 7: 99 (1851).
Type: on leaves of *Fumaria officinalis* (Fumariaceae), King's Cliffe.
Lit.: COOKE (1871: 584), SACCARDO (1886: 363).

Original diagnosis (SACCARDO 1886): Effusum tenue, griseum; hyphis erectis, flexuosis, sursum nodulosis; conidiis ellipsoideis oblongis, breviter concatenatis, terminalibus.

Notes: Since the conidiophores were described as nodulose and conidia as being ellipsoid-oblong, this species is maybe conspecific with *C. herbarum*, but the diagnosis is too sparse for a final conclusion.

(8) *Cladosporium brassicicola* Sawada

Fig. 80

Cladosporium brassicicola Sawada, Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 195 (1959), nom. inval.

Type: on leaves of *Brassica juncea* (Brassicaceae), Taiwan, Pref. Taichung, Taichung, 17 Feb. 1913, K. Sawada.

Ill.: SAWADA (1959: Pl. 3, Figs 4–5).

Original diagnosis (SAWADA 1959): Lesions on leaves, broadly spreading, 30–50 mm, yellowish brown; conidiophores amphigenous, single or more or less fasciculate, not branched, 2–4-septate, yellowish brown, 55–104 × 5–7 µm; conidia catenulate, hyaline or yellowish brown, elliptical or short cylindrical, rounded at both ends or truncate at base, 0–2-septate, 7–26 × 3–5 µm.

Notes: *Cladosporium brassicicola* was invalidly published since the author failed to provide a Latin diagnosis. *C. brassicae* (Ellis & Barthol.) M.B. Ellis, known from North America on *Brassica oleracea*, is distinguished from the latter taxon by its coarsely verrucose or echinulate, much wider conidia, 10–14 µm (DAVID 1997).

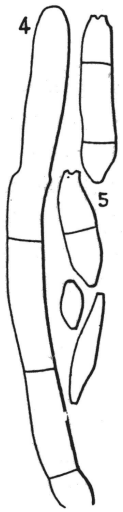

Fig. 80: *Cladosporium brassicicola* (from SAWADA 1959). 4 – Conidiophores. 5 – Conidia.

(9) *Cladosporium caricinum* C.F. Zhang & P.K. Chi

Fig. 81

Cladosporium caricinum C.F. Zhang & P.K. Chi, Guangdong Guoshu Zhenjun Binghai Zhi.: 54 (2000), nom. inval. (ICBN Art. 37.6).

Type: on living leaves and fruits of *Carica papaya* (Caricaceae), China, Guangzhou, 1993, C.F. Zhang, No. 01371.

Ill.: ZHANG & CHI (l.c.: 54, Fig. 41).

Original diagnosis (ZHANG & CHI, l.c.): Maculae saepe hypophyllae, primo albidae tandem flavo-albidae, orbiculares vel ellipsodeae, convexae, 1.7–3.3 µm diam. Fructis morbidis vivis. Cultura in malt-extracto agaro (25°C, 7 dies): Coloniae 3.8 cm diam., effusae, velutinae, griseo-brunneae vel olivaceo-brunneae, dorsale atroviridis. Conidiophora solitaria vel fasciculata, fusco-brunnea, flexuosa, nodosa, 39–183 × 3.0–6.8 µm, laevia, septata. Conidia saepe 0-septata, interdum 1–2-septata, catenata, orbicularia, ellipsoidea vel cylindrica, dense verrucosa, subhyalina vel pallide olivaceo-brunnea, 4–16.2 × 2.5–5.0 µm vulgo 5–9 × 2.5–4.2 µm.

Notes: The name *C. caricinum* is not validly published since there is no indication where the type material has been deposited.

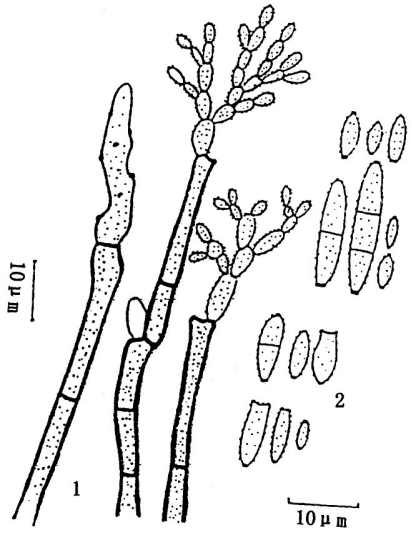

Fig. 81: *Cladosporium caricinum* (from ZHANG & CHI, l.c.). 1 – Conidiophores. 2 – Conidia.

(10) *Cladosporium carpesii* Sawada

Cladosporium carpesii Sawada, Bull. Gov. Forest Exp. Sta. 105: 93 (1958).
Type: on leaves of *Carpesium abrotanoides* var. *thunbergianum* (Asteraceae), Japan, Tohoku District, 12 Sept. 1947, K. Sawada.

Original diagnosis (SAWADA 1958): Macula phyllogena, rotundata vel varieformis, viridi-lutea, limite indistincta, denique ex centro fuscescens vel bodiescens, 3–10 cm diam. Conidiophorum assurgentum, cylindricum, simplex vel 1–2 ramificans, hyalinum vel pallifulvum, 7–9 septatum, apud quodque nodum vel 2 noda cum parvis processis, ex quarum apicibus. Conidia catanulata pauce, brevi-fusiformia vel elliptici-fusiformia vel cylindrica, apice raro 2 sporifera, continua vel raro 1 septata, hyalina vel pallida, 5–14 × 2.5–3.5 µm.

Notes: Type material of *C. carpesii* could not be traced, neither in PPMH nor BPI, and is probably not preserved.

(11) *Cladosporium circaeae* Y. Qin & Z.Y. Zhang

Fig. 82

Cladosporium circaeae Y. Qin & Z.Y. Zhang, Mycosystema 18(2): 135 (1999).
Holotype: on living leaves of *Circaea mollis* (Onagraceae), China, Jiangxi, Lushan, 5 Oct. 1980, J.Y. Li & T.Y. Zhang, No. 41440 (MHYAU 03953).
Ill.: QIN & ZHANG (1999: 135, Fig. 1), ZHANG et al. (2003: 69, Fig. 38; Pl. 13, Fig. 4).

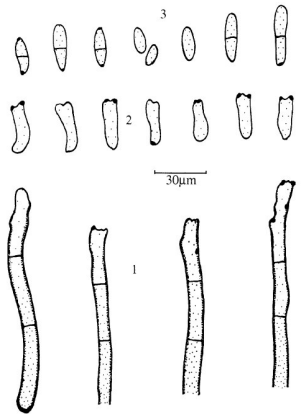

Fig. 82: *Cladosporium circaeae* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Original diagnosis (QIN & ZHANG 1999): Maculae amphigenae, ellipsoideae, rubro-brunneae, centro sub-orbiculares griseae, 6 mm diam. Conidiophora solitaria, erecta, simplicia, septata, apice sympodialiter prolifera, atro-brunnea, prope apicem pallescentia, 46–77 × 3.4–5.1 µm. Ramoconidia continua, pallide brunnea, apice inflata denticulata, cicatrices evidentes, 8.2–12.9 × 2.6–2.8 µm. Conidia catenata, clavata vel soleiformia, bicellularia, raro simplicia fusiformia, pallide brunnea, basi vel utrinque cicatricosa, 1-septata, 5.7–15.9 × 2.6–3.1 µm.

(12) *Cladosporium citri* Massee

Cladosporium citri Massee, Text book Pl. Diseas. 1899: 310 (1899).
Type: on leaves and fruits of *Citrus limon* (Rutaceae), USA, Florida and Louisiana (K ?).
Lit.: SACCARDO (1913a: 1367), JENKINS (1925).

Original diagnosis (SACCARDO 1913a): Conidiophoris caespitulosis, erectis, ramosis, septatis, brunneis, 30–75 × 2–4 µm; conidiis fusoideis, obscuris, pro more continuis, interdum 1–3-septatis, 8–9 × 2.5–4 µm.

Notes: Massee gave no specimen or herbarium designations, nor a description, but on p. 311 refers to 'Bull. Torrey Bot. Club 13: 181'. The only reference in this article to a named fungus is that to a *Fusarium* on page 182, but on the same page 'oblong, oval one-celled conidia' are mentioned. On page 311 Massee also cites 'USDA Bull. No. 8', which refers to the above article from 'Bull. Torrey Bot. Club' and other literature. The USDA Bulletin attributes the disease of *Citrus* to a *Cladosporium*, for which a short description is rendered without specifying specimens or herbaria. FAWCETT (1936: 535) wrote on the identity of

C. citri Massee that the fungus is now regarded as a *Sphaceloma*. The name *Cladosporium citri* Massee, based on descriptions given by Scribner and Swingle & Weber, applies to the fungus observed by Swingle & Weber on the old lesions (JENKINS 1925). The pathogen isolated by Fawcett and reported as *C. citri* Massee is described as a new species, *Sphaceloma fawcettii* Jenkins.

(13) *Cladosporium clemensiae* P.W. Graff

Cladosporium clemensiae P.W. Graff, in Merrill, Philipp. J. Sci. 9: 40 (1914).
Type: on leaves of *Eragrostis tenella* (Poaceae), Guam, Agaña, 27 Nov. 1910, M.S. Clemens.

Original diagnosis (MERRILL 1914): Hypophyllis, caespitulis erumpentibus, fuscis; hyphis ramosis, flexuosis, septatis; hyphis fertilibus sparsis, erectis, septatis, fuscis, simplicibus, 100–150 × 4–5.5 µm; conidiis concoloribus, ellipticis oblongis subcylindraceisve, continuis dein 1–3-septatis, leniter constrictis, 23–35 × 7.5–11.5 µm.

(14) *Cladosporium corchori* Z.Y. Zhang & T. Zhang

Fig. 83

Cladosporium corchori Z.Y. Zhang & T. Zhang, in Zhang, Liu, Wei & He, Plant Diseases and Their Control: 103 (1998).
Holotype: on living stems of *Corchorus capsularis* (Tiliaceae), China, Shaanxi, Yizhan, 20 Aug. 1973, J.Y. Li & T.Y. Zhang, No. 0412 (MHYAU 03955).
Ill.: ZHANG, LIU, WEI & HE (1998: 104, Fig. 1), ZHANG et al. (2003: 79, Fig. 43; Pl. 11, Fig. 3).

Original diagnosis (ZHANG, LIU, WEI & HE 1998): Caulinus blightus, 40 mm longus, coloniae punctiformae, interdum confluentia, velutinae, fuscae. Mycelium immersum. Conidiophora solitaria, erecta, simplicia, septata, brunnea, prope apicem pallescenta, 40 × 40 µm, parte fertili sympodialiter prolifera leviter geniculata denticulata. Ramoconidia continua vel raro 1-septata, pallide brunnea, apice ± inflata denticulata, 7.7–19.3 × 2.8–3.9 µm. Conidia catenata, continua, fusiformis, laevia, pallide brunnea, utrinque cicatricis fuscis, 4.4–8.0 × 2.6–4.6 µm.

Notes: This species is reported to cause stem blight on *Corchorus capsularis*. Induced symptoms are shown in ZHANG et al. (2003, Pl. XI, Fig. 3).

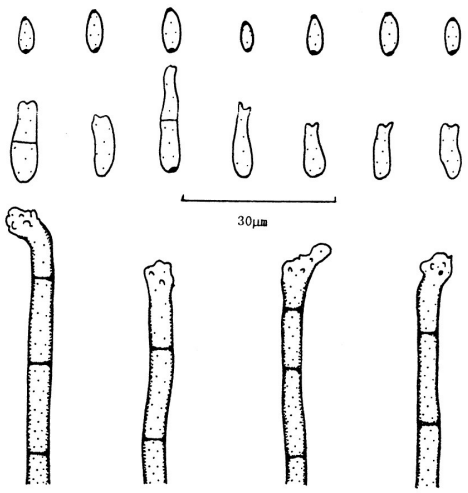

Fig. 83: *Cladosporium corchori* (from ZHANG LIU, WEI & HE 1998). Conidiophores and conidia.

(15) *Cladosporium cycadis* Marcolongo

Cladosporium cycadis Marcolongo, Riv. Patol. Veg., Ser. 2, 7(1): 8 (1914).
Type: on leaves of *Cycas revoluta* (Cycadaceae), Italy, Napoli (type at 'R. Istituto Botanico di Napoli'?).
Lit.: SACCARDO (1931: 790).
Exs.: Cav. & Poll., F. paras. 439; Cif., Mycofl. Domin. exs. 392.

Original diagnosis (MARCOLONGO 1914): Maculis hypophyllis, effuses, olivaceis, mycelio exiguo, ramoso, septato, intercellulari; conidiophoris erectis, septatis, 4–5 µm crassis; conidiis olivaceis, subrotundis vel ovoideis vel cylindraceis, raro uniseptatis, 7.8 × 2.4 µm.

Collections examined: on *Cycas revoluta*, ITALY, Napoli, botanical garden, I. Marcolongo, Cav. & Poll., F. paras. 439 (M-57511); DOMINICAN REPUBLIC, Llano Costero, prov. Santo Domingo, Ciudad Trujillo, in a garden, Jul. 1928, R. Ciferri, Cif., Mycofl. Domin. exs. 392 (M-57512).

Notes: Type material of *Cladosporium cycadis* could not be traced. Two additional collections have been examined, but proved to be in very poor condition, not allowing a final conclusion about the taxonomic status of this species. The collection from Italy can be considered as topotype material, but only few small conidia could be observed. MARCOLONGO (1914) compared the newly described species with *C. apicale*, known from Sri Lanka on *Cycas circinalis*, stating that both species are quite distinct. ZHANG, PENG, LIU & ZHANG (1998) reported *C. cycadis* from China on *Cycas rumphii* and provided a figure for this species. However, it is unclear whether this Chinese collection is conspecific with *C. cycadis* or not.

(16) *Cladosporium cyrtomii* Z.Y. Zhang, H.H. Peng & H. Zhang

Fig. 84

Cladosporium cyrtomii Z.Y. Zhang, H.H. Peng & H. Zhang, in Zhang, Peng, Liu & Zhang, Mycosystema 17(1): 4 (1998).

Type: on living leaves of *Cyrtomium caryotideum* (Dryopteridaceae), China, Prov. Yunnan, Gejiu, 9 Dec. 1994, Wang Ying-Xiang & Li Mao-Lan (MHYAU 04048).

Ill.: ZHANG, PENG, LIU & ZHANG (1998: 4, Fig. 1), ZHANG et al. (2003: 84, Fig. 48; Pl. 11, Fig. 4).

Original diagnosis (ZHANG, PENG, LIU & ZHANG 1998): Maculis amphigenis, distinctis, interdum confluentibus, rotundis, atro-brunneis, marginibus fuligineis prominulis, 2–4 mm diam., postea interdum perforatis, epiphyllis velutinis, atro-viridibus, hypophyllis fulvis. Conidiophoris fasciculatis, rectis vel leniter flexuosis, septatis, atro-brunneis, ad apicem pallide brunneis, 167–321 × 2.6–4.6 µm. Cellulis conidiogenis in conidiophoris coalitis, sympodialibus, cicatricibus conspicuis. Ramoconidiis 0–1 septatis, ad apicem denticulatis, cicatricibus conspicuis, 7.7–17.9 × 2.6–5.1 µm. Conidiis subellipsoideis, fusiformibus, longe ellipsoideis vel cylindricis, continuis, laevis, atro-olivaceis, 2.6–12.8 × 2.6–5.1 µm.

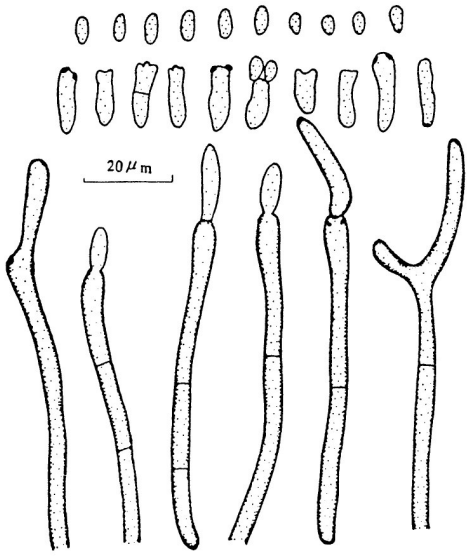

Fig. 84: *Cladosporium cyrtomii* (from ZHANG, PENG, LIU & ZHANG 1998).Conidiophores, ramoconidia and conidia.

(17) *Cladosporium dianellicola* Y. Cui & Z.Y. Zhang

Fig. 85

Cladosporium dianellicola Y. Cui & Z.Y. Zhang, in He & Zhang, Mycosystema 20(4): 470 (2001).

≡ *Cladosporium dianellicola* Z.Y. Zhang & Y. Cui, in Zhang et al., Flora Fungorum Sinicorum, Vol. 14: 88 (2003), nom. superfl.

Holotype: on living leaves of *Dianella ensifolia* (Phormiaceae), China, Zhejiang Prov., Hang-zhou, 2 Nov. 1980, J.Y. Li & T.Y. Zhang (MHYAU 03922).
Ill.: HE & ZHANG (2001: 470, Fig. 2), ZHANG et al. (2003: 88, Fig. 52).

Original diagnosis (HE & ZHANG 2001): Maculis purpureo-brunneis, in centro griseis, 1.5–3.5 cm longis. Conidiophoris brunneis, 1–3-septatis, 82.2–187.6 × 2.6–4.6 µm. Ramoconidiis 0–2-septatis, 7.5–18.5 × 4.6–5.1 µm. Conidiis ellipsoideis vel subglobosis, continuis, pallide brunneis, 3.1–10.3 × 3.1–4.1 µm.

Notes: *Heterosporium dianellae* Sawada (nom. inval.), described on leaves of *Dianella ensifolia* from Taiwan, proved to be a genuine member of the genus *Stenella* [= *Stenella dianellae* (Sawada & Katsuki) Goh & W.H. Hsieh] (DAVID 1997; CROUS & BRAUN 2003) and possesses finely verruculose, longer conidia, 20–45 × 2.5–3.5 µm.

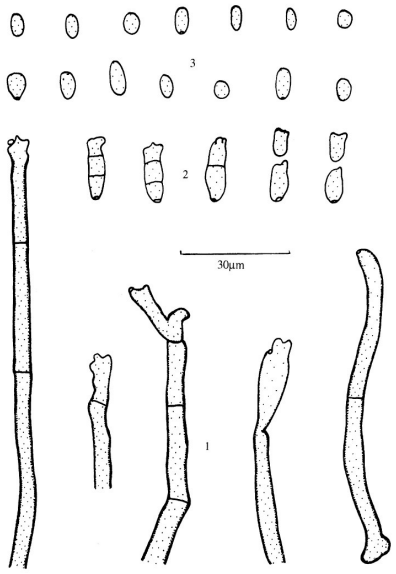

Fig. 85: *Cladosporium dianellicola* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(18) *Cladosporium digitalicola* Z.Y. Zhang, T. Zhang & W.Q. Pu

Fig. 86

Cladosporium digitalicola Z.Y. Zhang, T. Zhang & W.Q. Pu, in Zhang, Wei & Zhang, Mycosystema 17(3): 195 (1998).
Type: on living flowers of *Digitalis purpurea* (Scrophulariaceae), China, Prov. Yunnan, Kunming, 25 Jun. 1990, Li Hua (MHYAU 03934).
Ill.: ZHANG, WEI & ZHANG (1998: 196, Fig. 1), ZHANG et al. (2003: 90, Fig. 53).

Original diagnosis (ZHANG, WEI & ZHANG 1998): Maculis amphigenis vel Petalicolis, circularibus, brunneis vel atrobrunneis, 0.5 mm diam. Conidiophoris singularibus vel usque ad 36 fasciculatis, rectis vel geniculatis, 3–10 septatis, ad apicem 3–5 cicatricibus conspicuis, nod is 5.2–9.1 µm crassis, atrobrunneis, ad apicem brunner is vel hyalinis, 45–502 × 4.0–7.9 µm. Ramoconidiis longe cylindricis, ovoideis vel limoniformibus, 0–1 septatis, cicatri-cibus 3–5 hyalinis vel pallide brunneis, 5.2–20.8 × 2.6–7.8 µm. Cellulis in conidiogenis in conidiophoris coalitis, sympodialibus. Conidiis longe ellipsoideis, ovoideis, limoniformibus vel cylindricis, 0–4 septatis, levis, catenulatis, cicatricibus conspicuis, hyalinis vel pallide brunneis, 3.9–15.6 × 2.6–11.8 µm.

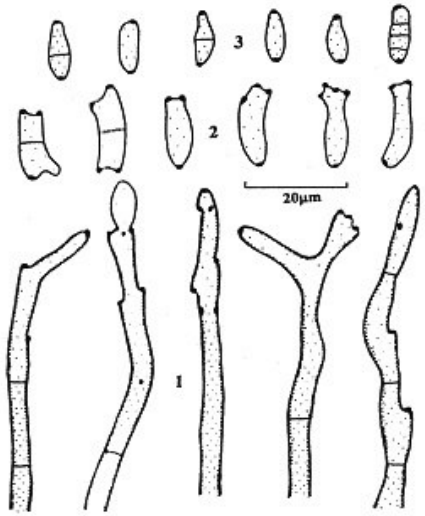

Fig. 86: *Cladosporium digitalicola* (from ZHANG, WEI & ZHANG 1998). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(19) *Cladosporium edgeworthiae* H. Zhang & Z.Y. Zhang

Fig. 87

Cladosporium edgeworthiae H. Zhang & Z.Y. Zhang, Mycosystema 17(4): 305 (1998).

Holotype: on living leaves of *Edgeworthia chrysantha* (Thymelaeaceae), China, Jiangxi, Lushan, 15 Oct. 1980, J.Y. Li & T.Y. Zhang (MHYAU 03957).
Ill.: ZHANG & ZHANG (1998a: 305, Fig. 2), ZHANG et al. (2003: 92, Fig. 55).

Original diagnosis (ZHANG & ZHANG 1998a): Maculis amphigenis distinctis vel confluentibus, griseo-brunneis, margine fuligeneis prominulis, atro-brunneis, flave holonatis, 6.0 × 1.0 cm. Conidiophoris solitariis, erectis, simplicibus, septatis, apice sympodialiter elongatis, pallide brunneis, prope apicem pallescentibus, 54–183 × 2.8–3.9 µm. Ramoconidiis 0–1-septatis, laevibus, pallide brunneis, ad apicem inflatis denticulatis, cicatricibus conspicuis, fuscis, 7.5–23.0 × 4.1–5.1 µm. Conidiis catenatis, fusiformibus, continuis, laevibus, pallide brunneis, basi vel utrinque cicatricibus protudentibus praeditis, 3.9–10.3 × 2.8–4.6 µm.

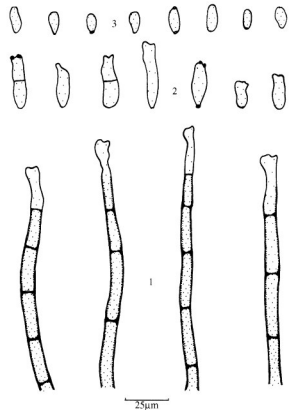

Fig. 87: *Cladosporium edgeworthiae* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(20) *Cladosporium euphorbiae* Politis

Cladosporium euphorbiae Politis, Pragmat. Akad. Athen 4: 39 (1935).
Type: on *Euphorbia sibthorpii* (Euphorbiaceae), Greece, Attica, near Athina.
Lit.: SACCARDO (1972: 1337).

Original diagnosis (POLITIS 1935): Caespitulis parvis, nigricantibus, dispersis, v. gregariis; conidiophoris in fasciculos densos, erectos, atro-olivaceos confertis, septatis, 40–70 × 5–6 µm; conidiis acrogenis flavido-brunneis, ovoideis, v. oblongis, continuis v. uniseptatis, 5–11 × 4–5 µm.

(21) *Cladosporium festucae* Sawada

Cladosporium festucae Sawada, Bull. Gov. Forest Exp. Sta. 105: 95 (1958).
Type: on leaves of *Festuca japonica* (Poaceae), Japan, Tohoku District, 29 Sept. 1947.

Original diagnosis (SAWADA 1958): Sine maculis. Fungus amphigenus, sparsus vel confertus, solum affixus in epidermide, obscuri-cinereus, minutus, 0.1–0.5–0.7 mm diam. Conidiophorum epigenum, assurgens recte vel oblique ex serpente hypha, simplex vel 1–2 ramificans, septum partis, apud quam conidiophorum divisum ex hypha, locatum 18–20 µm distans adversum conidiophorum, 6–10 septatum, cinereo-fuscum, cylindricum, 235–390 × 4.5–5 µm. Conidium catenulatum, hilum leviter exertum, brevi-ellipticum vel longi-oblongum, 0–1 septatum, cinereum, 5–15 × 4–6 µm.

Notes: Type material could not be traced, neither in herb. PPMH nor BPI, and is probably not preserved.

(22) *Cladosporium fici* F. Patt.

Cladosporium fici F. Patt., Bull. Torrey Bot. Club 27: 285 (1900).
Type: on living leaves of *Ficus parcelli* (Moraceae), USA, Department of Agriculture, green-house, Jan. 1900, F.W. Patterson (herb. of the 'Division of Vegetable Physiology and Pathology, U.S. Department of Agriculture').
Lit.: SACCARDO (1902: 1059).

Original diagnosis (PATTERSON 1900): Not forming spots; tufts conspicuous, aggregated, sometimes confluent, olive green; hyphae long, erect, slightly wavy, very rarely branched, septate, 45–250 × 4 µm; conidia light olive, terminal and lateral, more especially borne near the tips of the hyphae, oblong continuous ones 6–9 × 4 µm, sometimes in chains of 4, those 1–3 septate, oblong-elliptical to cylindrical, 9–25 × 4–5 µm, somewhat thickened at the septa and the longer ones often equilateral.

Collections examined: on *Ficus religiosa*, Antilles, CUBA, Santiago de Las Vegas, 12 Feb. 1920, S. Bruner (BPI 426579); 28 Enero 1920, D.C. Brunner & B. Chias (?) (BPI 426578).

Notes: Type material of this species could not be traced and was not available for a re-examination. Two collections from BPI, determinated as *C. fici*, showed a *Passalora* species well agreeing with the species concept of *Passalora urostigmatis* (Henn.) Crous & M.P.S. Câmara. The latter species deviates from the description of *Cladosporium fici* given above in forming shorter and wider conidiophores and solitary conidia so that this name was very probably misapplied. *Ficus religiosa* is a new host species of *Passalora urostigmatis*, until now known from Brazil, Venezuela and Florida, USA (CROUS & CÂMARA 1998).

(23) *Cladosporium forsythiae* Z.Y. Zhang & T. Zhang

Fig. 88

Cladosporium forsythiae Z.Y. Zhang & T. Zhang, in Zhang, Zhang, Liu & He, J. Anhui Agric. Univ. 26: 36 (1999).

Holotype: on living leaves of *Forsythia suspensa* (Oleaceae), China, Henan, Zhengzhou, 20 Aug. 1992, Qing Yun (MHYAU 07030).

Ill.: ZHANG, ZHANG, LIU & HE (1999: 37, Fig. 1), ZHANG et al. (2003: 101, Fig. 63).

Original diagnosis (ZHANG, ZHANG, LIU & HE 1999): Maculis amphigenis, apeicis vel marginis, brunneis vel atro-brunneis, marginalibus fuligineis longi-undulatis ornatis, spot blight usque ad 5–10 × 3–8 mm vel 35 × 30 mm, olivaceis mucoris punctatis hypophyllis. Myceliis immersis. Stromata praeditis Conidiophoris solitariis, erectis vel sinualatis, simplicibus, septatis, apice denticulatis, cicatricibus conspicuis, brunneis vel atro-brunneis, prope apicem pallescentibus, 21.0–69.0 (36.3) × 3.6–5.1 (4.4) µm. Cellulis in conidiogenis in conidiophoris coalitis, sympodialibus. Ramoconidiis cylindricis, 0–1 septatis, rarius 2 septatis, cicatricibus protrudentibus praeditis, brunneis, 7.7–18.0 (12.9) × 4.4–5.9 (5.2) µm. Conidiis catenatis, fusiformis, cylindricis, ovoides, laevis, rarius echinatis, 0–1 septatis, rarius 2 septatis, pallide brunneis vel hyalinis, cicatricibus ornatis, 5.7–38.6 (10.1) × 4.4–5.1 (4.8) µm.

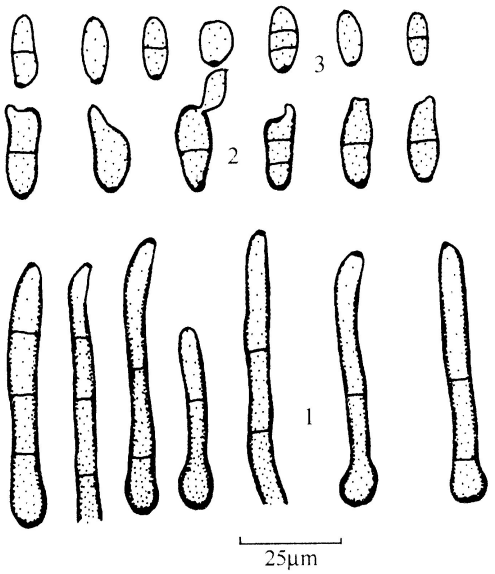

Fig. 88: *Cladosporium forsythiae* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Notes: A second collection is mentioned by ZHANG, ZHANG, LIU & HE (1999) on *Forsythia* sp. from Liaoning, China.

(24) *Cladosporium fulvum* [Cooke] var. ***violaceum*** Voglino

Cladosporium fulvum [Cooke] var. *violaceum* Voglino, Ann. Reale Accad. Agric. Torino 55: 381, 1912 (1913).
Type: on leaves of *Solanum lycopersicum* (= *Lycopersicon esculentum*) (Solanaceae), Italy, Liguria, Albenga.
Lit.: SACCARDO (1931: 794).

Original diagnosis (VOGLINO 1913): Maculis flavescentibus, rotundis, 6–8–10 mm latis, numerosis; caespitulis effusis, lanosis, violaceis vel violaceo-fuliginosis, fulvis; conidioforis erectis, septatis, non vel parce ramosis, apice clavatis, violaceo-fuliginosis, fulvis, 100–150 µm longis, 5–7–10 µm crassis; conidiis ellipsoideis, continuis, 1-septatis, pallide flavis, 14–20–28, rar. 40 µm longis, 8–10–12 µm latis.

Notes: Very probably synonymous with *Passalora fulva* (Cooke) U. Braun & Crous.

(25) *Cladosporium funiculosum* W. Yamam.

Cladosporium funiculosum W. Yamam., Sci. Rep. Hyogo Univ. Agric., Ser. Agric. 4(1): 5 (1959).
Type: on leaves of *Phaseolus chrysanthos* (Fabaceae), Japan, Prov. Tamba, Tannan-cho, Komakura, 29 Oct. 1958, W. Yamamoto.
Ill.: YAMAMOTO (1959: 6, Figs 21–24).

Original diagnosis (YAMAMOTO 1959): Coloniis in agaro Czapeki rapide crescentibus; caespitulis floccosis, plus minusve pulverulentibus, olivaceis vel griseo-olivaceis, postea griseo-brunneis, reversum obscure purpureum vel atro-purpureum; mycelio compacto intertexto, ex hyphis laxe vel dense ramosis, irregulariter septatis, ad septa non constrictis, e hyalino pallide olivaceis, scabris, plus minusve mucilaginis, interdum aggregatis, postea griseo-olivascentibus, 2.2–5.5 µm crassis composito; conidiophoris solitariis vel fasciculatis, saepe funiculosis, simplicibus vel breviter ramosis, rectis vel parum sinuosis, raro sursum geniculatis, saepe ad septa 1–4 denticulatis, 7–50 vel pluriseptatis, ad septa non constrictis, scabris griseo-olivaceis, 170–1270 × 2.5–4 µm; conidiis acropleurogenis, catenulatis, in catenulas dense ramosas dispositis; conidiis basis subcylindraceis, deorsum attenuato-truncatis, apice non vel plus minus inflatis et cum 2–4 indistincte hilis, continuis vel 1–2-septatis, minutissime verruculosis, griseo-olivaceis, 10–20 × 3–4.5 µm; conidiis supernis, ellipsoideis vel ellipsoideo-oblongis, utrimque obtusis, interdum apice cum 1–3 hilis, minutissime verruculosis, e hyalino pallide olivaceis, continuis vel 1-septatis, 4.5–10 × 2–4 µm.

Notes: This name is valid since the author only cited a single collection, which can be considered the holotype. The shape of the funiculose conidiophores was considered to be the most important distinctive character of this species (YAMAMOTO 1959). Owing to the description of indistinct hila, *C. funiculosum* probably do not belong in *Cladosporium* s. str. ZHANG et al. (2003) reported a collection determinated as *C. funiculosum* from China on *Phaseolus vulgaris*.

(26) *Cladosporium glochidionis* C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas
Fig. 89

Cladosporium glochidionis C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas, Indian Phytopathol. 51(2): 152 (1998).
Holotype: on living leaves of *Glochidion* sp. (Euphorbiaceae), India, Madhya Pradesh, Shahdol circle, Amarkantak (south forest division), Kapil dhara, Jan. 1993, C.D. Sharma (S.U. Herb. No. C.S.1).

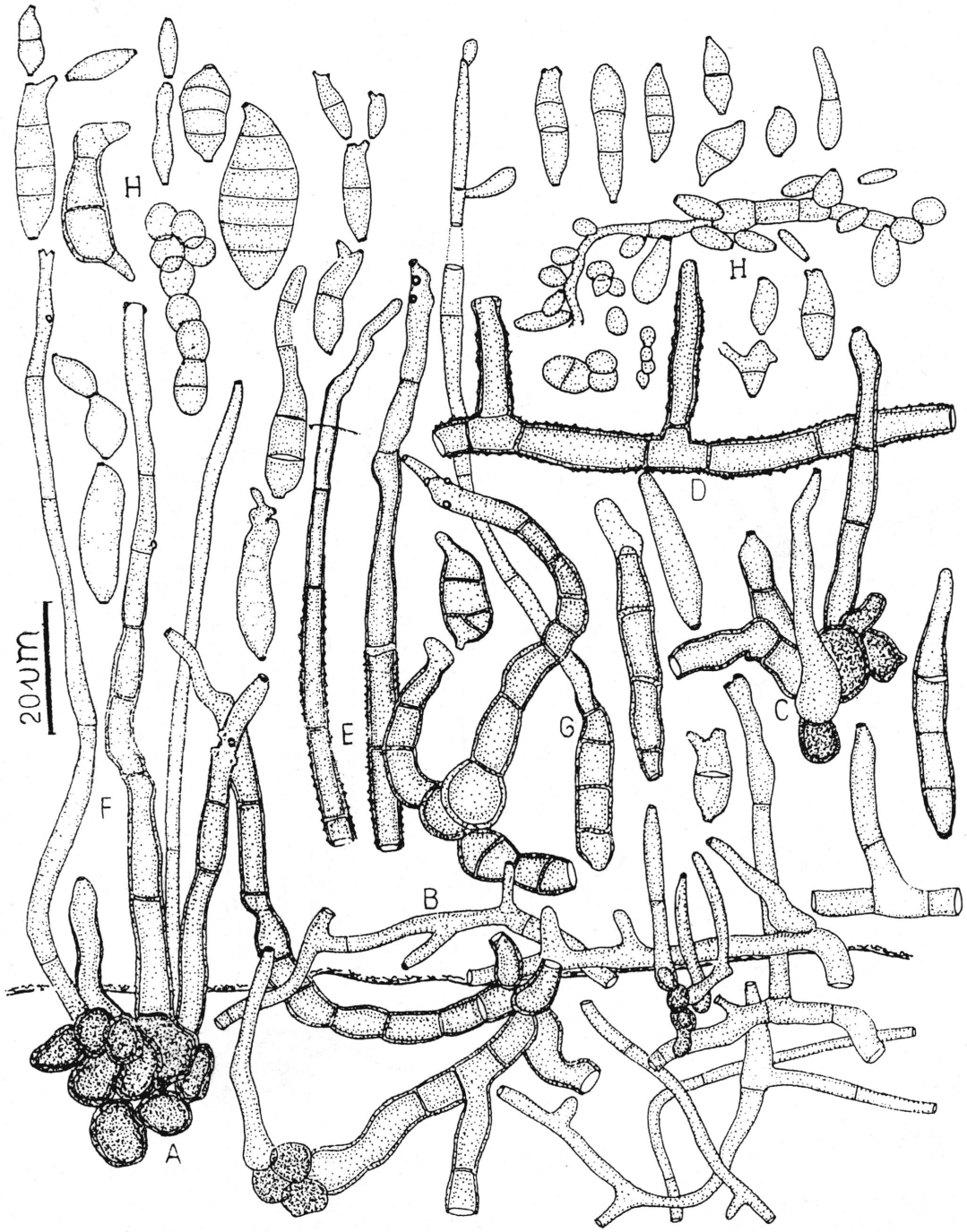

Fig. 89: *Cladosporium glochidionis* (from SHARMA et al. 1998). A – Stroma. B – Repent hyphae with conidiophores. C, F – Conidiophores in a fascicle. D – Verruculose repent hyphae. E – Conidiophores (verruculose in a lower half). G – Proliferated conidia with long ploliferation tube. H – Solitary to branched conidia.

Isotype: IMI 356765.
Ill.: SHARMA et al. (1998: 153, Fig. 1).

Original diagnosis (SHARMA et al. 1998): Maculae amphigenosae, parvae vel magnae, aetate progrediente, se extendentes per majorum superficiem folii, plerumque initiate ad marginateae, interdum necroticae, brunneae infra superficiem et griseo albidus supra superficiem, cum fuscae brunneae margin. Caespitulli amphiphyllae plerumque hypophyllae, ad maculae limitatae, plus minusve lanatae, brunneae atro. Mycelium hypharum, immersum vel superficiales, angustum, laevia, ramosum, septatum, olivacea brunneae,

1.5–5 µm diametro, hyphae repentes usque 6.5 µm crassa. Stromata bene evoluta, irregulares, pseudoparenchymatosa, obscure brunneae, 24–70 µm diametro. Conidiophora caespitosa vel solitaria, macronematosa, mononematosa, septata eramosa, erecta vel suberecta, recta vel interdum flexuousa, plerumque glabra interdum verruculosa plerumque tumoribus ad apices, olivaceo-brunneae 7–137 × 1.5–6.5 µm et usque 9.5 µm ad basim. Cellulae conidiogenosae integrateae, terminales et intercalares, polyblasticae, sympodiales, cicatricatae, cicatricis fuscis distinctae et crassato. Conidia simplicia, variabilis catenata vel solitaria, arida, acropleurogenosa, subcylindrata vel obclavato-cylindrata interdum clavato-cylindrata, doliiformia, ellipsiformia, fusiformia, ovata, spheriformia vel subspheriformia, apices obtusa vel subacuta, bases rotundatae, obconico-truncata vel subtruncata, usque 0–5 transversae septata rarissime oblique septata, hilo fuscae distinctae et crassata, interdum emenentia, conidia progenerentes progenrent tube longa et eramosa, laevia, septata, usque 28 × 3 µm pallide vel moderate olivacea, 2–45 × 1.5–12 µm.

Notes: Type material was not available neither from India nor IMI (probably lost). *C. glochidionis* was morphologically compared with *C. spongiosum*, *C. diaphanum* and *C. buteicola* Cooke but proved to be distinct in its symptomatology, well developed, irregular stromata, olivaceous-brown, smooth, sometimes verruculose conidiophores and comparatively thicker, variously shaped, light to medium olivaceous conidia (SHARMA et al. 1998). SHARMA et al. (1998) described and illustrated protuberant, darkened and thickened conidiogenous loci and hila, so *C. glochidionis* possibly belongs to *Cladosporium* s. str. New collections are necessary to prove the generic affinity of this species.

(27) *Cladosporium herbarum* [(Pers.: Fr.) Link] f. ***agaves-echeveriae*** Savelli

Cladosporium herbarum [(Pers.: Fr.) Link] f. *agaves-echeveriae* Savelli, Ann. Reale Accad. Agric. Torino 56: 113 (1914) (dated 1913).
Type: on living leaves of *Agave americana* (Agavaceae) and *Echeveria* sp. (Crassulaceae), Italy, Torino, Mar. 1913, A. Tonelli.
Lit.: FERRARIS (1914: 882), PRASIL & DE HOOG (1988: 53).

Original diagnosis (FERRARIS 1914): Maculis subcircularibus luteolis; caespitulis gossypino-pulverulentis, fulvis; hyphis sterilibus intercellularibus, cylindraceis, septatis ramosis, 4–5 µm crass.; conidiophoris caespituloso-erumpentibus epiphyllis, olivaceis, flexuosis, septatis, simplicibus, 100–150 × 6–7 µm, subdenticulato-conidigeris; conidiis fulvo-olivaceis, continuis vel 1-septatis, 12–20 × 10–12 µm.

Notes: PRASIL & DE HOOG (1988) did not find any authentic material in FI, PDA, PAV, RO, ROPV and TO and considered it to be unlikely that this forma was a true *Cladosporium*.

(28) *Cladosporium heuglinianum* Thüm.

Cladosporium heuglinianum Thüm., Rev. Mycol. (Toulouse) 1: 11 (1879).
Type: on leaves of *Buddleja polstachya* (Buddlejaceae), near Nakfa on Red Sea (Nakfa ad Mare Rubrum).
Lit.: SACCARDO (1892: 603).

Original diagnosis (SACCARDO 1892): Maculis amphigenis, sparsis, plus minus orbiculatis, magnitudine variis, nitido-atris, subeffusis, velutinis; hyphis subrectis, subulato-rigidis, simplicibus, septatis, 6 mm. cr., longis, dilute fuscis; conidiis 1-septatis, cylindrico-subellipticis, utrinque subacutis, non constrictis, 12–20 × 6–8 µm; hyphis concoloribus.

Notes: Type material could not be located.

(29) *Cladosporium hydrangeae* Z.Y. Zhang & T.F. Li

Fig. 90

Cladosporium hydrangeae Z.Y. Zhang & T.F. Li, in Zhang, Li, Zhang & Wang, J. Anhui Agric. Univ. 26: 40 (1999).
Holotype: on living leaves of *Hydrangea macrophylla* (Hydrangeaceae), China, Liaoning, 16 Sept. 1992, Wang & Li (MHYAU 07029).
Ill.: ZHANG, LI, ZHANG & WANG (1999: 41, Fig. 1), ZHANG et al. (2003: 110, Fig. 70).

Original diagnosis (ZHANG, LI, ZHANG & WANG 1999): Maculis petalicolis vel sepalis, distinctis vel confluentibus, atro-brunneis, 4 × 2 mm, amphigenis, brunneis, atro-brunneis, longe undulatis purpuratis vel fuscus brunneis, 10 × 2.5 cm. Myceliis immersis. Conidiophoris solitariis, erectis, sinualatis, simplicibus, septatis, apice sympodialiter elongatis, inflatis denticulatis, cicatricibus conspicuis, brunneis, prope apicem pallescentibus, 25.2–121.0 (60.0) × 4.1–5.1 (4.5) µm. Ramoconidiis longe cylindricis, 0–1 septatis, rarius 2–3 septatis, pallide brunneis, ad apicem inflatis denticulatis, cicatricibus fuscis, 9.8–20.5 (14.3) × 3.9–5.1 (4.7) µm. Conidiis catenatis, cylindricis, fusiformibus, 0–1 septatis, laevibus, pallide brunneis, laxe vel utrimque cicatricibus protrudentibus praeditis, 6.2–22.6 (14.6) × 3.6–5.1 (4.8) µm.

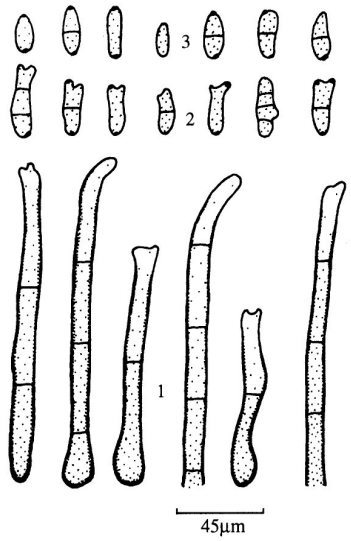

Fig. 90: *Cladosporium hydrangae* (from ZHANG et al. 2003). 1 – conidiophores. 2 – ramoconidia. 3 – conidia.

Notes: Additional collections on *Hydrangea macrophylla* were reported from Liaoning and Yunnan, China (ZHANG et al. 2003), and LU et al. (2003) mentioned *Viburnum macrocephalum* f. *keteleer* is as additional host.

(30) *Cladosporium hypophloeum* Berk. & M.A. Curtis

Cladosporium hypophloeum Berk. & M.A.Curtis, in Berkeley, J. Linn. Soc., Bot. 10: 362 (1869).
Type: on leaves of a Sapindaceae, Cuba, February.
Lit.: SACCARDO (1886: 359), STEVENSON (1975).

Original diagnosis (BERKELEY 1869): Maculis orbicularibus; floccis flexuosis implexis; sporis curvulis oblongis triseptatis.

Additional collection examined: on leaves of *Thouinia* sp., Puerto Rico, limestone hills on the coast eight miles west of Ponce, 1 Dec. 1902, A.A. Heller, Porto Rican Fungi 6172 (B 70-6554).

Notes: Type material of *C. hypophloeum* could not be traced and is probably not preserved. A single collection from herb. B could be examined and proved to be conspecific with *Pseudocercospora thouiniae* (F. Stevens) U. Braun & Crous.

(31) *Cladosporium iridicola* Schwein.

Cladosporium iridicola Schwein., Trans. Amer. Philos. Soc., N.S., 4(2): 277 (1832).
Type: on leaves of *Iris virginica* (Iridaceae), USA, Pennsylvania, Bethlehem, No. 2604.
Lit.: SACCARDO (1886: 367, as '*iridicolum*').

Original diagnosis (SCHWEINITZ 1832): C. minutissimum, sparsum, acervulis nempe non confluentibus, quanquam e longinquo maculam sistunt latiusculam ob approximationem. Floccis brevibus, cum sporidiis, fusco-nigris. Acervulis floccorum exsoletis, quasi sphaeriaemorphibus.

Notes: Type material could not be located in herb. PH and is probably not preserved. A record of this species from China is reported by ZHANG, LI, ZHANG & WANG (1999), but the name is probably misapplied.

(32) *Cladosporium kapildharens* C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas **Fig. 91**

Cladosporium kapildharens C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas, Indian Phytopathol. 51(2): 160 (1998).

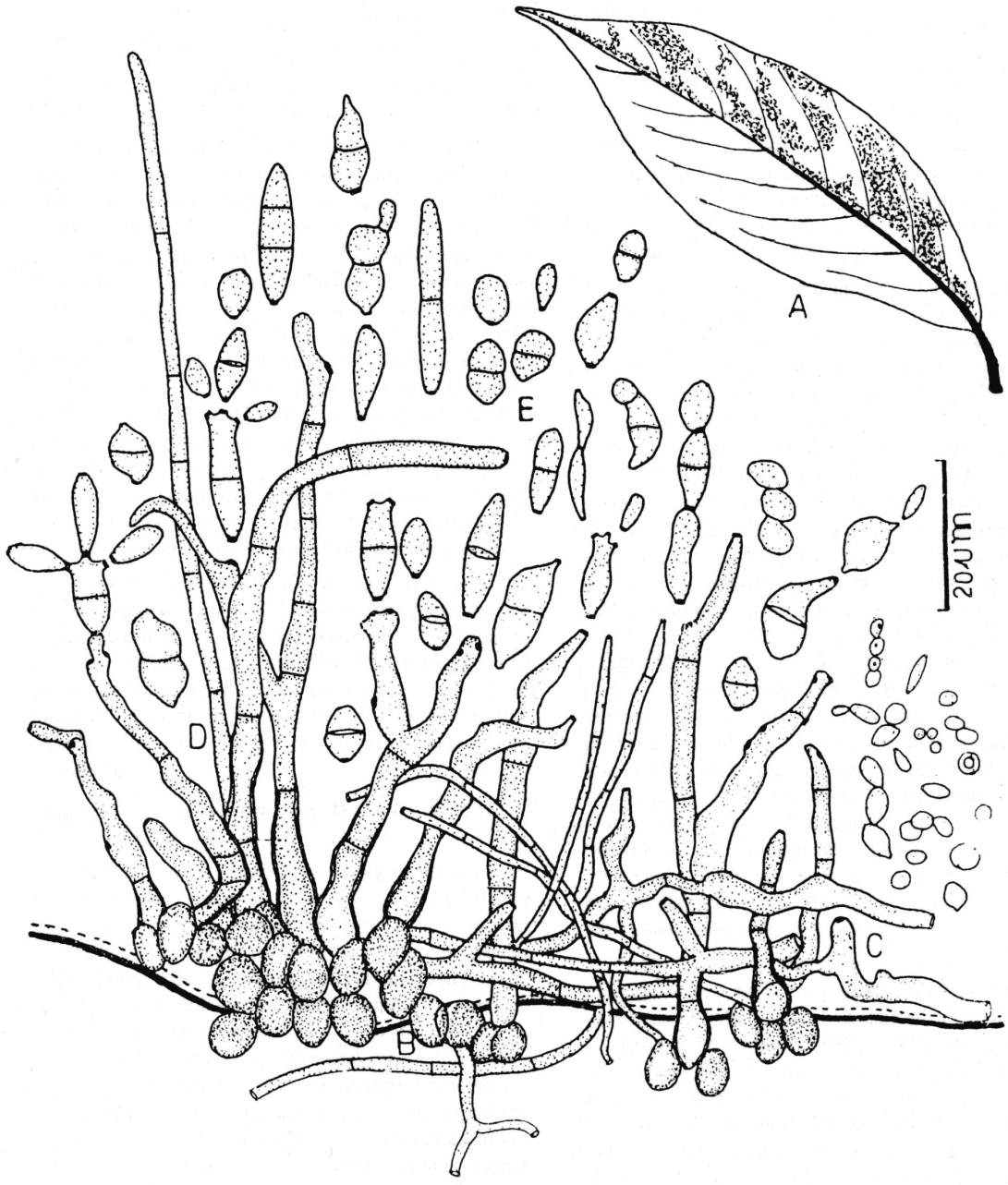

Fig. 91: *Cladosporium kapildharens* (from SHARMA et al. 1998). A – Symptom. B – Stroma cells. C – Conidiophores on repent hyphae. D – Conidiophores. E – Conidia.

Holotype: on living leaves of an unknown hosts ('hospitis ignoti'), India, Madhya Pradesh, Shahdol circle, Amarkantak (south forest division), Kapil dhara, Jan. 1993, C.D. Sharma (S.U. Herb. No. C.S.2).
Isotype: IMI 356766.
Ill.: SHARMA et al. (1998: 155, Fig. 3).

Original diagnosis (SHARMA et al. 1998): Maculae epigenosae, expando per totam superficiem folii, brunneae atro. Coloniae epiphyllosae, effusae, latescentes atro. Mycelium hypharum, plerumque superficiales, angustum, septatum, laevia, et ramosum, hyphae repentes, pallide vel moderate olivacea, usque 1–4.5 µm diametro. Stromata presentia, tenuiter evoluta, irregulares, pseudoparenchymatosi, obscure, olivaceae. Conidiophori plerumque solitaria raro caespitosi, macronematosi, mononematosi, usque 6 transversae septati, laevia, raro ramosi erecti vel suberecti, recti vel flexuousi, cum tumoribus, pallide vel moderate olivacea, 9–116 × 1.5–5.5 µm. Cellulae conidiogenosae integratae, terminales et intercalares, polyblastae, sympodiales, conidis orientibus ex tumoribus, terminalibus, quae, fiunt, postea intercalares, cicatricatae, cicatricis distincto crassae, conidia simplicia, arida, catenata, incatenis ramosis, acropleurogenosae, pallide olivacea, cylindrata, doliiformia, ellipsiformia, fusiformia, ovata, globosa vel subglobosa, apices obtusi, bases rotundatae vel obconico-truncatae, laevia, usque 2 transverse septata, hilo distincto et crassae, interdum eminentia, few conidis having banded septa, pallide olivacea, et parvae, conidia hyalini, 1.5–26 × 1–6.5 µm.

Notes: SHARMA et al. (1998) reported this species as being morphologically similar to *C. psoraleae* and *C. acaciicola* M.B. Ellis but different in its colour and nature of colonies, presence of poorly developed stromata, size and colour of conidiophores and variable conidia. However, type material could not be traced at herb. IMI and is probably lost. *C. acaciicola* proved to be a black yeast-like hyphomycete and, therefore, has been excluded from *Cladosporium* s. str.

(33) *Cladosporium laricis* [Sacc.] var. ***pini-pineae*** Sacc. & Trotter

Cladosporium laricis [Sacc.] var. *pini-pineae* Sacc. & Trotter, I Funghi dell'Avellinese, Avellino: 154 (1920).
Type: on sheaths of living leaves or leaves becoming dry ('in vaginis adhuc vivis vel arescentibus foliorum') of *Pinus pinea* (Pinaceae), Italy, Campania, near Avellino, mixed infection with *Pestalozzia hartigi*.
Lit.: SACCARDO (1931: 790).

Original diagnosis (SACCARDO 1931): Caespitulis fusco-griseis, subeffusis, in vaginis foliorum sitis; cetera eadem.

Notes: Type material of *Cladosporium laricis* could be re-examined and proved to be synonymous with *C. herbarum*. Var. *pini-pineae* is possibly an additional synonym.

(34) *Cladosporium lathyri* Z.Y. Zhang & Y.L. Liu

Fig. 92

Cladosporium lathyri Z.Y. Zhang & Y.L. Liu, J. Yunnan Agric. Univ. 15(3): 219–221 (2000).
Holotype: on leaves and stems of *Lathyrus quinquenervius* (Fabaceae), China, Liaoning, Shenyang, 20 Oct. 1992, Y.X. Wang & H. Li (MHYAU 07835).
Ill.: ZHANG & LIU (2000: 219, Fig. 1), ZHANG et al. (2003: 115, Fig. 74).

Original diagnosis (ZHANG & LIU 2000): Maculis brunneis, 1–6 mm longis, coloniis dispersis, punctiformibus, aliquando confluentibus, velutinis, olivaceis vel atro-brunneis. Myceliis immersis. Stromatibus praeditis. Conidiophoris singularibus vel 3–4 fasciculatis, rectis vel geniculatis, septatis, simplicibus, ad apicem 1–3 cicatricibus conspicuis, nodis 5–8 µm crassis, pallide brunneis, 19.3–56.5 × 4.6–5.1 (av. 36.5 × 5.0) µm. Cellulis conidiogenis conidiophoris coalitis, sympodialibus. Ramoconidiis longe cylindricis, 0–1-septatis, ad apicem inflatis denticulatis, cicatricibus ornatis, pallide brunneis, 10.3–21.0 × 4.1–5.1 (av. 14.3 × 4.2) µm. Conidiis catenatis, fusiformibus, cylindricis, 0–1-septatis, laevibus, cicatricibus protrudentibus praeditis, pallide brunneis, 8.9–20.6 × 3.6–5.6 (av. 11.5 × 4.4) µm.

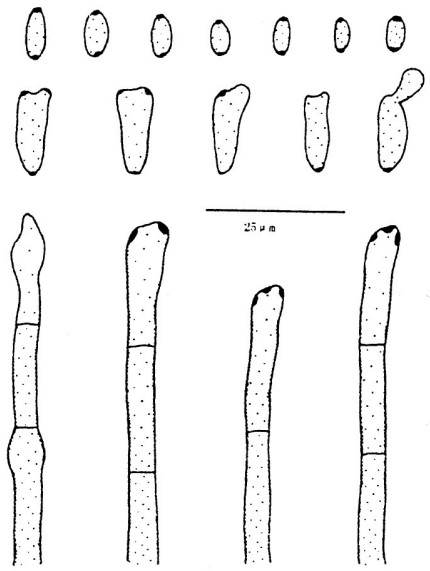

Fig. 92: *Cladosporium lathyri* (from ZHANG & LIU 2000). Conidiophores and conidia.

(35) *Cladosporium longipes* Sorokīn

Cladosporium longipes Sorokīn, On nekot. bolez. vinograda i drug. rast. Kavkazk. Kraja, Tiflis: 26 (1892), also in Z. Pflanzenkrankh. 3: 154 (1893).
Type: on leaves of *Vitis vinifera* (Vitaceae), Caucasus, 'im kubanischen Bezirk'.
Lit.: SACCARDO (1895: 619).
Ill.: SOROKĪN (1893: Tab. 4, Figs 49–50).

Original diagnosis (SOROKĪN 1893): Nach ihrem äusseren Aussehen sind die durch diesen Pilz verletzten Blätter den durch das *Cladosporium fasciculatum* geschädigten sehr ähnlich. Hier finden wir dieselben bräunlichen Flecken ohne deutliche Umrisse, mit dunklen Punkten im Zentrum, welche den Wohnsitz des Parasiten anzeigen. Aber bei der mikroskopischen Untersuchung ist ein grosser Unterschied sogleich zu bemerken; hier haben wir ein Bündel von Hyphen, welche auch aus einer Spaltöffnung der Nährpflanze herauskommen, aber sich durch eine ungewöhnliche Länge unterscheiden. Keine der bekannten Cladosporium-Arten hat solche langen fruchttragenden Hyphen; darum der Name *Cl. longipes*. Das Bündel ist an der Stelle, wo es aus der Spaltöffnung heraustritt, etwas angeschwollen, gleichsam eine Zwiebel bildend; die hellgrauen Hyphen sind durch zahlreiche Querwände geteilt und schnüren auf ihrer Spitze durchsichtige und farblose, längliche Sporen ab. Die reifen Sporen sind durch 1–3 Querwände geteilt, 2–3 µm breit und 6–9 µm lang; sie entspringen nicht nur aus der Spitze der Hyphe, sondern bisweilen auch an der Seite, so dass man Präparate finden kann, wo die fruchttragende Hyphe nicht eine sondern mehrere Sporen trägt. Innerhalb des kranken Blattes findet man das Mycelium, welches aus Fäden von verschiedener Dicke besteht. Im Protoplasma liegen hier und da glänzende Öltropfen. Querwände hat Verf. im Mycelium nicht bemerkt.

(36) *Cladosporium lychnidis* Z.Y. Zhang & Y.L. Liu

Fig. 93

Cladosporium lychnidis Z.Y. Zhang & Y.L. Liu, in Zhang, Liu, Wei & He, Plant Diseases and Their Control: 104 (1998).
Holotype: on *Lychnis coronata* (Caryophyllaceae), China, Hubei, Wuchang, 21 Sept. 1980, J.Y. Li & T.Y. Zhang, No. 13632 (MHYAU 03958).
Ill.: ZHANG, LIU, WEI & HE (1998: 105, Fig. 2), ZHANG et al. (2003: 118, Fig. 76).

Original diagnosis (ZHANG, LIU, WEI & HE 1998): Coloniae effusae, tenuis atro-brunneae, dispersae, punctatae vel patulae. Mycelium immersum. Conidiophora solitaria, erecta, simplicia, septata, atro-brunneae, 33.4–56.5 × 3.3–3.3 µm, apice sympodialiter elongata cicatricosa. Ramoconidia continua vel 1-septata, laevia, apice ± inflata denticulata, basi atro-brunnea apicem versus brunnea, 7.7–13.1 × 4.6–7.2 µm. Conidia catenata, ellipsoidea, ovoides vel subrotunda, continua vel raro uniseptata, laevia pallide brunnea, 4.1–12.3 × 2.8–3.1 µm.

Notes: ZHANG et al. (2003) mentioned a second collection on *Dianthus chinensis*.

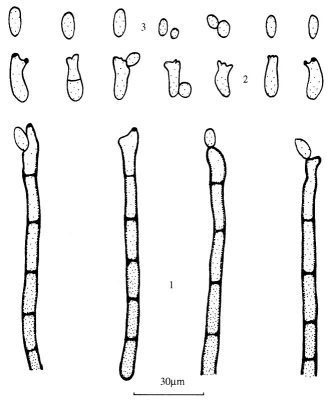

Fig. 93: *Cladosporium lychnidis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(37) *Cladosporium malvacearum* C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas **Fig. 94**

Cladosporium malvacearum C.D. Sharma, Gadp., Firdousi, A.N. Rai & K.M. Vyas, Indian Phytopathol. 51(2): 156 (1998).

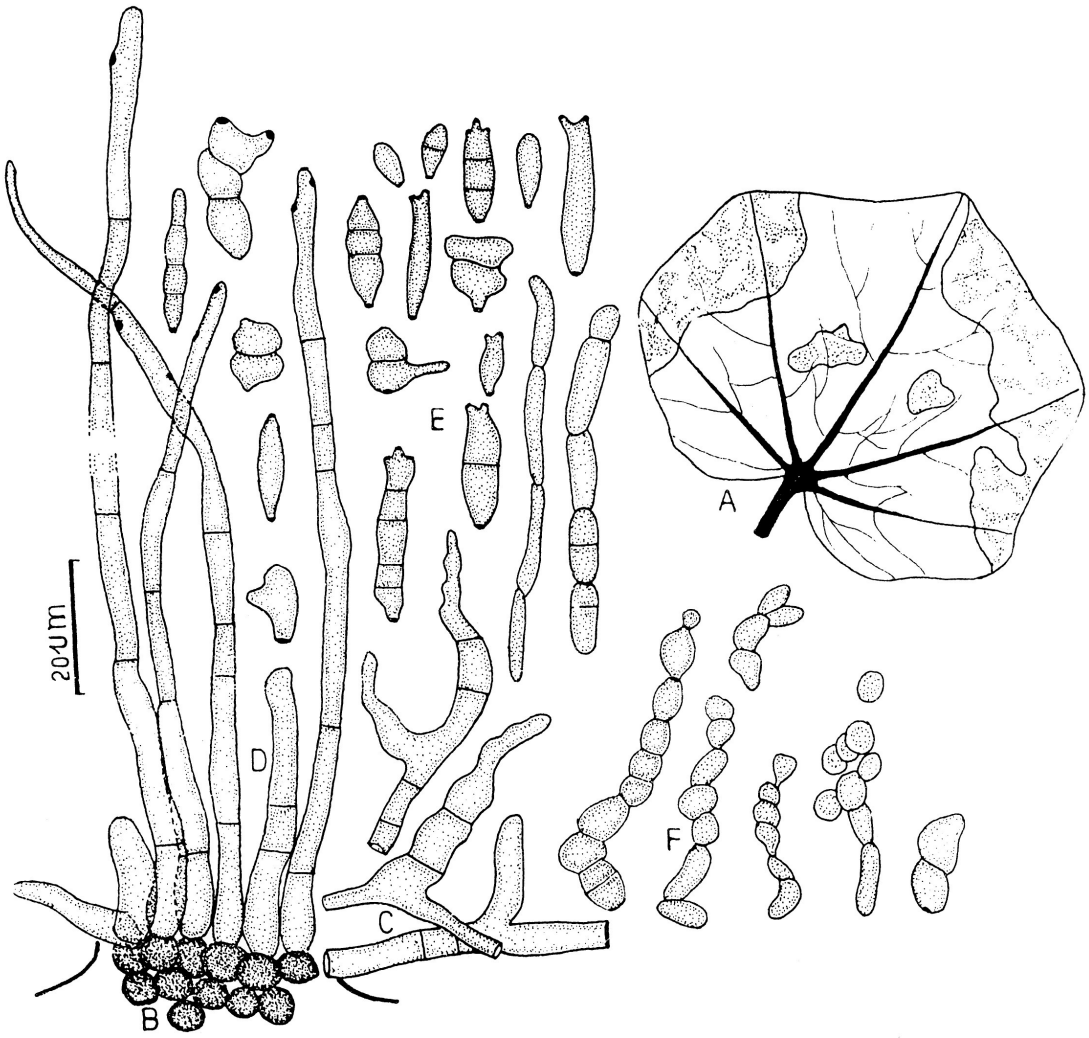

Fig. 94: *Cladosporium malvacearum* (from SHARMA et al. 1998). A – Symptom. B – Stroma cells. C – Conidiophores on repent hyphae. D – Conidiophores. E – Conidia.

Holotype: on living leaves of *Kydia calycina* (Malvaceae), India, Madhya Pradesh, Shahdol circle, Amarkantak (south forest division), Jan. 1993, C.D. Sharma (S.U. Herb. No. C.S.5). **Isotype:** (?) IMI 254691.
Ill.: SHARMA et al. (1998: 154, Fig. 2).

Original diagnosis (SHARMA et al. 1998): Maculae amphigenosae, fere irregulares et parvae sed avadentes magnae, et aetate progrediente se extendents per totam superficiem folii atro. Coloniae epiphyllosae, forma punctorum, tenuissimorum, glaucae atrae. Mycelium hypharum, plerumque immersum, interdum superficiales septatum, angustum, laeve et ramosum, hyphae repentes, medio vel fusce brunneis, usque 2.5–5 µm diametro. Stromata presentia, misere formata, pseudoparenchymatosa, obscure brunneae vel atro. Conidiophori plerumque solitarii, interdum caespitosi, lax fasciculati, macronematosi, mononematosi, usque 11 transversae septati glabrae, raroramosi, erecti vel suberecti, parvum curvati, medio vel fusce brunneae, 18.5–228 × 1.5–6.5 µm. Cellulae conidiogenosae integratae, terminales et intercalares, polyblastae, sympodiales, conidis, orientibus ex tumoribus, terminalibus, quae, fiunt, postea intercalares, cicatricatae, cicatrices, distinctae, crassae. Conidia simplicia, catenata in catenis, ramosis, arida, acropleurogenosa, cylindrata, doliiformia, ellipsiformia, fusiformia, ovata, globosa vel subglobosa, apices obtusi, bases rotundatae vel obconico-truncatae, laevia, usque 4 transverse septati, hilo distincto crassae interdum non crassae, cum eminentia, plerumque moderate brunneae, et parvae conidis fusce olivacea, 3–25.5 × 1.5–9.5 µm.

Notes: Data given on the label of the isotype collection in herb. IMI (254691) [on *Grewia* sp. (Tiliaceae), India, Univ. Gorakhpur, A.N. Rai] deviate from the data cited in the original diagnosis. Isotype material of *C. malvacearum* has probably been mixed up with a second, quite distinct collection. The collection on leaves of *Grewia* sp. showed a stenella-like or ramichloridium-like hyphomycete. SHARMA et al. (1998) compared the symptomatological and morphological features of *C. malvacearum* with those of earlier validly published species of *Cladosporium* on various hosts stating that the species differs considerably from all in its important taxonomical characters. They reported *C. malvacearum* as showing some affinities with *C. apicale* and *C. uredinicola* but being distinct in having amphigenous, irregular, small to very large leaf spots and epiphyllous colonies, mid to dark brown comparatively smaller conidiophores, and olivaceous-brown, up to 4 transversely septate, broad conidia.

(38) *Cladosporium manoutchehrii* Esfand.

Cladosporium manoutchehrii Esfand., Sydowia 5: 368 (1951).
Type: on living leaves of *Quercus atropatena* (Fagaceae), Iran, Polé Zangouleh, 27 Jul. 1948, Manoutchehri.

Original diagnosis (ESFANDIARI 1951): Caespituli hypophylli, raro etiam epiphylli, ambitu orbiculares vel omnino irregulares, saepe confluentes et magnam folii partem aequaliter et densissime obtegentes, obscure olivacei; conidiophora solitaria vel saepe complura e hypostromate innato-erumpenti, pseudoparenchymatico, pellucide olivaceo oriunda, divergentia, recta vel plus minusve flexuosa, septata, 25–90 µm, raro usque 120 µm longa, 3–6 µm crassa, olivacea, simplicia vel apicem versus 2–3-furcata, ramulis inaequialtis, valde divergentibus; conidia quoad formam et magnitudinem variabilissima, minora plerumque plus minusve globosa, 2.5–4 µm diam., continua, majora ellipsoidea vel oblonga, interdum subfusiformia vel clavato-oblonga, continua vel circa medium septata, non vel lenissime constricta, mellea vel pallide olivacea, 5–15 × 3.5–5 µm.

Notes: ESFANDIARI (1951) reported this species to occur in dense caespituli mainly on the lower leaf surface on pale brown spots caused by a gloeosporioid fungus, so that *C. manoutchehrii* is probably only a secondary invader.

(39) *Cladosporium melanophlaei* Thüm.

Cladosporium melanophlaei Thüm., Flora 60: 412 (1877).
Type: on living leaves of *Myrsine melanophlaeos* (Myrsinaceae), South Africa, Promont, near Grahamstown, summer 1876, P. Mac. Owan, No. 1255.
Lit.: SACCARDO (1886: 358).

Original diagnosis (THÜMEN 1877): Cl. in foliorum pagina inferiore maculas indeterminatas, fibrosas, velutinas, explanatas, inquinantes formans; hyphis longissimis, gracillimis, erectis, subrectis vel minime curvatis, breviarticulatis, tenuissimis, fuscis; sporis cylindraceis, apice rotundatis, basi obtusis, uniseptatis, 14–16 mm. long, 3 mm. crass., pallide fusco-stramineis, subdiaphanis.

Notes: Type material could not be located.

(40) *Cladosporium metaplexis* Z.Y. Zhang & X.Y. Wang

Fig. 95

Cladosporium metaplexis Z.Y. Zhang & X.Y. Wang, in Zhang, Wang, Liu & Li, Mycosystema 19(2): 165 (2000).
Holotype: on living leaves of *Metaplexis japonica* (Asclepiadaceae), China, Heilongjiang, Harbin, Xiangfang, 2 Sept. 1992, Y.X. Wang & H. Li (MHYAU 07830).
Ill.: ZHANG, WANG, LIU & LI (2000: 166, Fig. 1), ZHANG et al. (2003: 123, Fig. 80).

Original diagnosis (ZHANG, WANG, LIU & LI 2000): Maculis angularibus, irregularibus, pallide flavis vel flavido-brunneis, coloniis brunneis vel atro-brunneis hypophyllis, dispersis vel interdum confluentibus, 1.5–5.0 × 1.5–4.0 mm. Myceliis immersis. Conidiophoris solitariis, erectis, flexuosis vel undulatis, simplicibus, septatis, geniculatis, pallide brunneis, versus apicem pallidis, 3–5-cicatricosis, 31–103 × 5.1–5.7 µm. Ramoconidiis continuis, rarenter ad apicem inflatis denticulatis, basi cicatricibus conspicuis, 20.6 × 7.7 µm. Conidiis solitariis, cylindricis, obclavatis, rectis vel sinuosis, 0–1-septatis, raro 2–3-septatis, cellulis amplitudine inaequalibus, laevibus, pallide brunneis, basi cicatricibus praeditis, 15.4–28.3 × 6.4–7.7 µm.

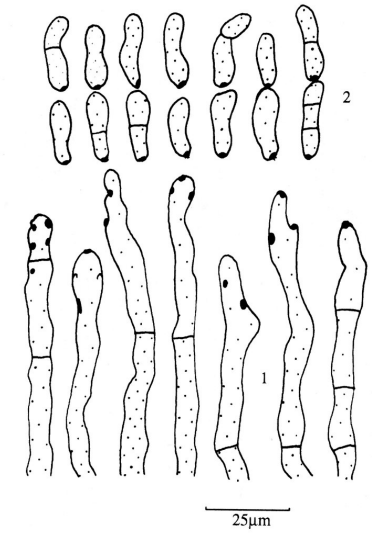

Fig. 95: *Cladosporium metaplexis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Conidia.

(41) *Cladosporium microspermum* Berk. & M.A. Curtis

Cladosporium microspermum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 107 (1875).
Type: on leaves of *Quercus obtusiloba* (Fagaceae), USA, South Carolina, No. 1686.
Lit.: SACCARDO (1886: 360).

Original diagnosis (BERKELEY 1875): Floccis tenuibus divaricato-furcatis articulatis; sporis minutis uniseptatis.

Notes: ZHANG, WEI & ZHANG (1998) described and illustrated a collection determinated as *C. microspermum* on *Lithocarpus viridis* from China, which could not be checked.

(42) *Cladosporium microspilum* Syd. & P. Syd.

Cladosporium microspilum Syd. & P. Syd., Ann. Mycol. 18: 102 (1920).
Type: on leaves of *Cissampelos pareira* (Menispermaceae), Philippines, Luzon, Prov. Laguna, Mt. Maquiling, 26 Apr. 1919, T. Collado, No. 6271.
Lit.: SACCARDO (1931: 793).

Original diagnosis (SYDOW & SYDOW 1920): Maculae minutae, orbiculares, 1–2 mm diam.; caespituli amphigeni, saepius hypophylli, olivaceo-brunnei; hyphae fuscae vel fuscidulae, usque 400 µm longae, pluries septatae (articulis 20–50 µm longis), 4–5 µm crassae, rectae vel leniter curvatae; conidia sive continua 8–12 × 4–5 µm, sive 1-septata usque 20 µm longa, rarius 2-septata et tunc usque 25 µm longa, non constricta, fuscidula, levia.

Notes: Type material could not be traced, neither in herb. B nor S.

(43) *Cladosporium microsporum* Trab.

Cladosporium microsporum Trab., in Roum., F. sel. gall. exs., Cent. XV, No. 1426 (1881).
≡ *Bispora trabutiana* Sacc., Bull. Soc. Roy. Bot. Belgique 31(2): 237 (1892).
Type: on leaves of *Nerium oleander* (Apocynaceae), Algeria, Trabut.
Lit.: SACCARDO (1895: 616), LINDAU (1907: 768).

Original diagnosis (SACCARDO 1895): Caespitulis hypophyllis, exiguis, atris, e stromatum locellis oriundis; catenulis fasciculatis, 45–60 × 6–7 µm, hyphopodio brevi, 15 × 2.5 µm, continuio, simplici, rarius furcate suffultis; conidiis ellipsoideis, utrinque obtusis, 8–9 × 6–7 µm, ternis-senis in quaque catenula, typice 1-septatis, non v. vix constrictis, rarissime 3-septatis v. submuriformibus, fuligineis.

Notes: Type material was not available for a re-examination. LINDAU (1907) reported an additional collection of this species on leaves of *Rhododendron ponticum* from the Netherlands.

(44) *Cladosporium miyakei* Sacc. & Trotter

Cladosporium miyakei Sacc. & Trotter, Syll. fung. 22: 1370 (1913).
≡ *Cladosporium oryzae* I. Miyake, J. Coll. Agric. Imp. Univ. Tokyo 2: 262 (1910), nom. illeg., homonym, non *C. oryzae* Sacc. & P. Syd., 1899.
Type: on leaves of *Oryza sativa* (Poaceae), Japan.
Lit.: PADWICK (1950: 170).
Ill.: MIYAKE (l.c.: Tab. 14, Figs 68–70).

Original diagnosis (SACCARDO 1913a): Mycelio superficiali, repente, maculas nigras efficiente; conidiophoris prominentibus obscuris, varie longis, plerumque 45–70 × 4–5 µm, septatis, apice alterne denticulatis; conidiis brunneis, 1–4-sed plerumque 2-locularibus, magnitudine variabilibus, 7–20 × 4–6 µm, septis constrictulis.

Notes: 'A. *Cl. maculani* mycelio superficiali distinctum.' (SACCARDO 1913a). PADWICK (1950) cited a record of this species from Bengal, India.

(45) *Cladosporium mori* (Yendo) H. Zhang & Z.Y. Zhang

Fig. 96

Cladosporium mori (Yendo) H. Zhang & Z.Y. Zhang, Proceedings of Phytopathological Symposium Organized by Phytopathology Laboratory of Yunnan Province 2: 306 (1998).
≡ *Hormodendrum mori* Yendo, Dai-Nihon Sanshi Kaiho 335: 6 (1919).
Type: on *Morus* sp. (Moraceae), Japan.
Ill.: YENDO (1919: Fig. 2), YENDO (1927: 217–218, Figs 91–92), ZHANG et al. (2003: 127, Fig. 83).

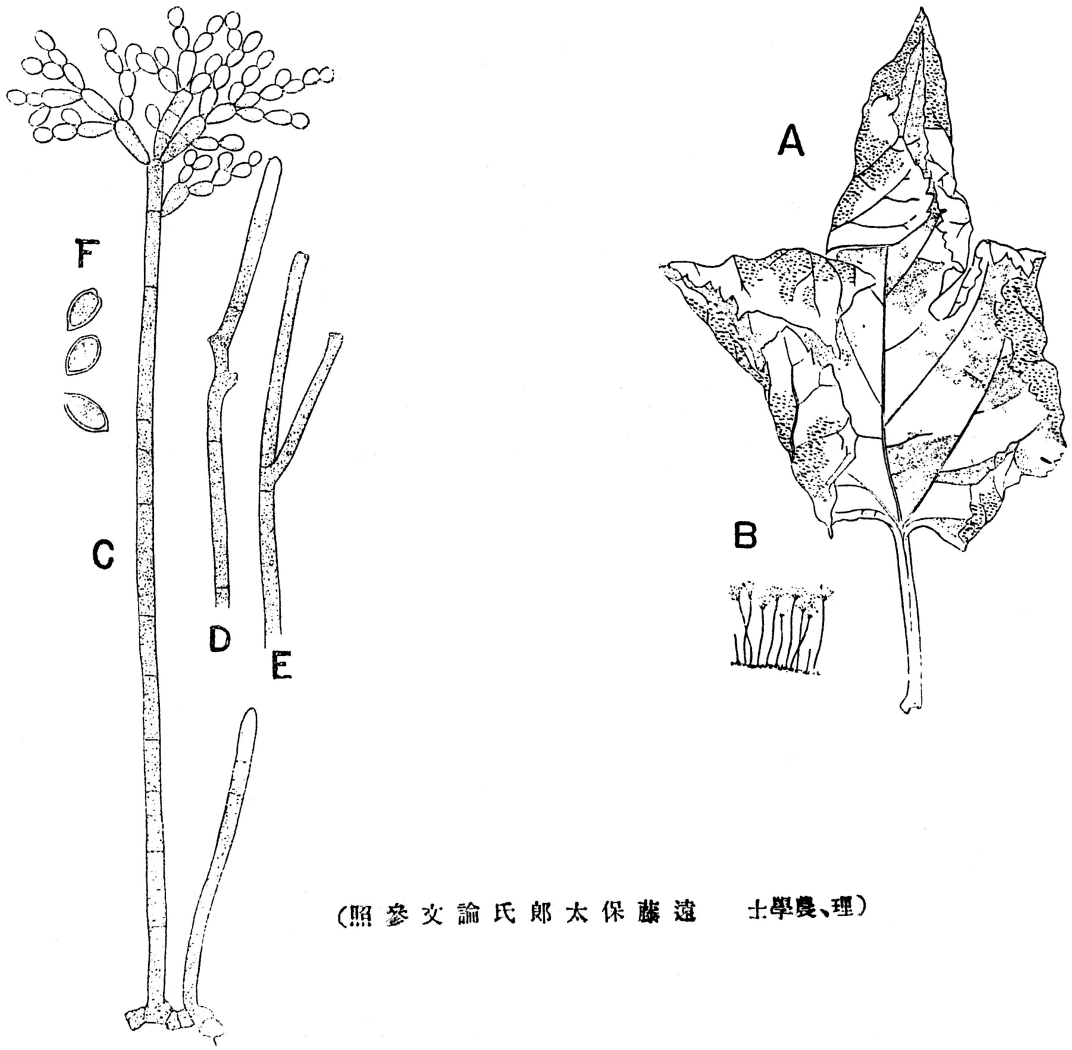

Fig. 96: *Cladosporium mori* (from YENDO 1919). A – Diseased leave. B – Conidiophores. C – Conidiophores and conidia. D – Sympodial proliferation. E – Branched conidiophores.

Original diagnosis (YENDO 1919): Leaf spots distinct, irregular to angular, vein-limited, later confluent and enlarged, greyish-brown. Fruit bodies amphigenous, mainly hypophyllous dark indigo brown, velvety. Hyphae immersed and creeping on the leaf surface. Conidiophores emerging from creeping hyphae, straight, 235–290 × 5–7 µm, brown, simple or branched, 6–9-septate, occasionally sympodially proliferating. Conidial scars thickened. Conidia in simple or branched chain, lower conidia brown, 1–3-septate or non-septate and 23–30 x 6–8 µm, pale brown, ellipsoidal to limoniform and 6–10 × 5–6 µm.

Notes: YENDO (1919) provided a Japanese diagnosis for the new species *Hormodendrum mori*, which has been kindly translated by C. Nakashima (Japan). ZHANG & ZHANG (l.c.) assigned this species to *Cladosporium* s. str. and mentioned several records from China on

Morus alba. However, neither type material of *Hormodendrum mori* nor the Chinese collections have been available for a re-examination, so the taxonomic status of this taxon remains unclear.

(46) *Cladosporium neocheiropteridis* Y.L. Liu & Z.Y. Zhang

Fig. 97

Cladosporium neocheiropteridis Y.L. Liu & Z.Y. Zhang, in Liu, He & Zhang, Mycosystema 19(2): 169 (2000).
Holotype: on living leaves of *Neocheiropteris palmatopedata* (Polypodiaceae), China, Yunnan, Kunming, Jindian, 4 Apr. 1997, K. Li & H. Xiong (MHYAU 07827).
Ill.: LIU et al. (2000: 170, Fig. 1), ZHANG et al. (2003: 129, Fig. 85).

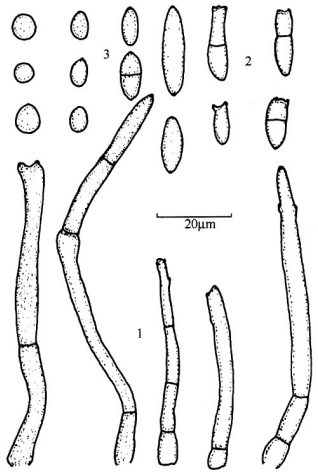

Fig. 97: *Cladosporium neocheiropteridis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Original diagnosis (LIU et al. 2000): Maculis amphigenis, irregularibus, fulvis, 2–11 mm diam., postea interdum perforatis. Coloniis in PDA effusis, velutinis, fulvis. Conidiophoris fasciculatis, rectis vel flexis, non ramosis, septatis, pallide brunneis, 27.6–141.0 × 3.8–8.0 µm. Cellulis conidiogenis in conidiophoris coalitis, sympodialibus. Cicatricibus conspicuis. Ramoconidiis 0–1 septatis, laevis, 10.1–30.1 × 7–7.7 µm. Conidiis globosis, ovatis, ellipsoideis, pallide brunneis, laevis, 0–1 septatis, 3.7–8.8 × 3.7–7.8 µm.

(47) *Cladosporium neottopteridis* Y.L. Liu & Y.H. He

Fig. 98

Cladosporium neottopteridis Y.L. Liu & Y.H. He, in Liu, He & Zhang, Mycosystema 19(2): 169 (2000).
Holotype: on living leaves of *Neottopteris nidus* (Aspleniaceae), China, Yunnan, Kunming, Jindian, 4 Apr. 1997, K. Li & H. Xiong (MHYAU 07828).
Ill.: LIU et al. (2000: 170, Fig. 2), ZHANG et al. (2003: 130, Fig. 86).

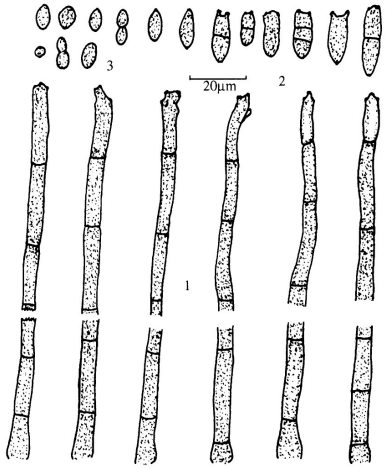

Fig. 98: *Cladosporium neottopteridis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Original diagnosis (LIU et al. 2000): Maculis amphigenis, saepe margine folii occupantibus, ellipsoideis, atro-brunneis, 3–8 mm diam., postea interdum perforatis. Coloniis in PDA effusis, velutinis, atro-brunneis. Conidiophoris fasciculatis, rectis, non ramosis, septatis, atro-brunneis, 190–563 × 3.5–7.7 µm. Cellulis conidiogenis in conidiophoris coalitis, sympodialibus. Cicatricibus conspicuis. Ramoconidiis 0–2 septatis, brunneis, laevis, 6.1–23.1 × 3.8–6.2 µm. Conidiis fusiformibus, ovatis vel ellip-soideis, 0–1 septatis, brunneis, laevis, 2.7–12.6 × 2.8–6.4 µm.

(48) *Cladosporium nervisequum* Mont.

Cladosporium nervisequum Mont., Ann. Sci. Nat. Bot., Sér. 4, 8: 298 (1857).
Type: on leaves of *Eriobotrya japonica* (Rosaceae), France, L. Castagne, No. 2789.

Original diagnosis (MONTAGNE 1857): Maculae variae magnitudinis in pagina foliorum superiori conspiciuntur ex epidermide emortua dealbataque griseae, subtus rufidulae, initio orbiculares tandem confluentia, ut evenire solet, irregulares, omnes limbo fusco plus minus lato ut in Depazeis vel Phyllostictis cinctae. Fibrarum fasciculi e fissuris cuticulae erumpentes nervos ultimi ordinis folii sequentes et tum reticulum visu mirabile efformantes. Fibrae ipsae stromate celluloso junctae, basi ob cellulam globosam subbulbosae, tunc erectae, flexuosae, tunc apice declinatae, ramum plerumque singulum gerentes, inaequales et inaequaliter septatae, septis modo appressis modo laxiusculis, oculo nudo vel armato atrae, at microscopii ope visae rufo-fuscae, 1/5–1/8 millim. longae, 0^{mm},0050 ad 0^{mm},006 crassae, sensim a basi ad apicem saepe decolorem et fructificantem attenuatae. Sporae acrogenae, initio continuae, ovoideae, mox deciduae, oblongae, septo transversali divisae, tandem septis ternis quadriloculares, longitudine inter 0^{mm},005 et 0^{mm},01 variabiles.

(49) *Cladosporium nitrariae* Dumitraş & Bontea

Fig. 99

Cladosporium nitrariae Dumitraş & Bontea, in Bontea & Dumitraş, Rev. Roumaine Biol., Sér. Bot. 12(6): 387 (1967).
Type: on living leaves, fruits and twigs of *Nitraria schoberi* (Zygophyllaceae), Romania, Ploeşti, between Pîclele Mari and Pîclele Mici, Jul. 1962, Tiberiu Oprescu (BUCM).
Ill.: BONTEA & DUMITRAŞ (1967: 388, Fig. 2).

Original diagnosis (BONTEA & DUMITRAŞ 1967): Conidiophoris brunneis apice pallidioribus, erectis vel geniculatis, 3–5 septatis, rare continuis, 17–57 × 3–5 µm, solitariis vel 5–8 fasciculatis. Conidiis terminalis, ovatis, elongatis vel globosis, uni- rare 2-septatis, primum hyalinis deinde pallide brunneis vel atro-brunneis, 4–12 × 2–5 µm, solitaribus vel breviter catenulatis, facile caduci.

Notes: *Cladosporium nitrariae* parasitizes all aerial parts of its host plant *Nitraria schoberi*, an endemic plant in Romania, but particularly the fruits and apices of young shoots. Discoloured zones bordered by a blackish brown margin appear on fruits, which soon blacken due to the formation of the fructification of the fungus. The early attacked fruits wrinkle, dry and fall before maturation. The apices of attacked shoots defoliate prematurely and present blackish, elongated spots, sometimes comprising the shoot all around (BONTEA & DUMITRAŞ 1967). Type material of this species was not available for a re-examination.

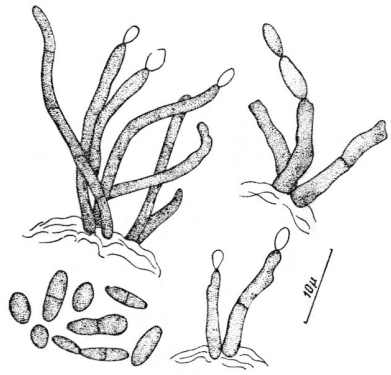

Fig. 99: *Cladosporium nitrariae* (from BONTEA & DUMITRAŞ 1967). Conidiophores and conidia.

(50) *Cladosporium ophiopogonis* T. Zhang & Z.Y. Zhang

Fig. 100

Cladosporium ophiopogonis T. Zhang & Z.Y. Zhang, Plant Diseases and Their Control: 110 (1998).
Holotype: on living leaves of *Ophiopogon mairei* (Liliaceae s. lat.), China, Zhejiang, Hangshou, 3 Nov. 1980, J.Y. Li & T.Y. Zhang, No. 44132 (MHYAU 03951).

Ill.: ZHANG & ZHANG (1998b: 110, Fig. 2), ZHANG et al. (2003: 136, Fig. 91; Pl. 13, Fig. 2).

Original diagnosis (ZHANG & ZHANG 1998b): Maculata amphigena, subrotunda vellonge-ellipsoidea, ochracea, lineolata red-brunnea margina, prominula, 1–2(–5) mm longa. Conidiophora solitaria, erecta, simplicia, septata, recta vel sinuolata, sympodialiter prolifera denticulata, flavo-brunnea sursum pallescentia, 54.0–244.0 × 4.6–5.9 µm. Ramoconidia continua vel raro 1–2 septata, denticulata, pallide brunnea, 5.1–15.4 × 3.1–5.1 µm. Conidia catenata, continua, fusiformia, longe-ellipsoidea, sphaerica, laevia, pallide brunnea, hili non evident, 2.8–11.6 × 2.8–4.6 µm.

Notes: *Chlorophytum elatum* was given as an additional host (ZHANG & ZHANG 1998b). Since hila have been described as 'non evident' this species probably does not belong in *Cladosporium* s. str.

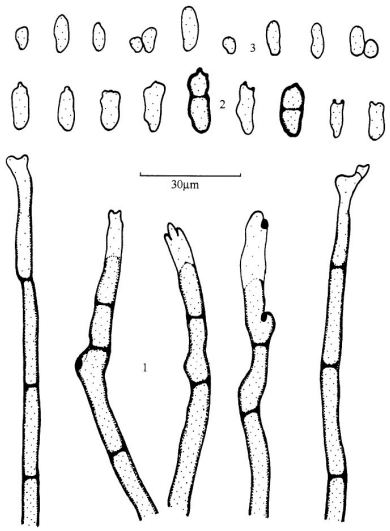

Fig. 100: *Cladosporium ophiopogonis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(51) *Cladosporium oplismeni* Syd.

Cladosporium oplismeni Syd., Philipp. J. Sci., (Ser. C., Bot.) 8: 507 (1913).
Type: on spikes of *Oplismenus undulatifolius* (Poaceae), Philippines, Luzon, Ifugao, Mt. Polis, McGregor.
Lit.: SACCARDO (1931: 792).

Original diagnosis (SACCARDO 1931): Caespitulis crassis, fructus totos densissime obtegentibus et eos omnino destruentibus, olivaceo-brunneis; hyphis simplicibus, remote septatis, olivaceo-brunneis, usque ad 90 µm longis, 3–5 µm crassis; conidiis olivaceo-brunneis, continuis, 6–10 × 3.5–4.5 µm, vel elongatis, 1–3-septatis et tunc usque ad 20 µm longis, levibus.

Notes: Type material could not be traced, neither at herb. B nor at herb. S.

(52) *Cladosporium pallidum* Berk. & M.A. Curtis

Cladosporium pallidum Berk. & M.A. Curtis, Proc. Amer. Acad. Arts 4: 127, 1858 (1860).
≡ *Cercospora pallida* (Berk. & M.A. Curtis) Cooke, Grevillea 17(81): 21 (1888), nom. illeg., homonym, non *C. pallida* Ellis & Everh., 1887.
Type: on leaves of an unidentified host, Nicaragua, Greytown, 1856, U.S. Pac. Ex. 354 (K).
Lit.: SACCARDO (1886: 361; 1892: 638), CHUPP (1954: 609), CROUS & BRAUN (2003: 304).

Original diagnosis (BERKELEY & CURTIS 1860): Maculis orbicularibus pulveraceis; floccis erectis simplicibus; sporis oblongis sinuatis.

(53) *Cladosporium phlei-pratensis* Sawada

Cladosporium phlei-pratensis Sawada, Bull. Gov. Forest Exp. Sta. 105: 96 (1958), as '*phlei-pratense*', nom. inval.
Types: on leaves of *Phleum pratense* (Poaceae), Japan, Tohoku District, 27 Jul. 1940, Iizuka (10516) and 18 Jul. 1941, Ikeda (10440).

Original diagnosis (SAWADA 1958): Macula phyllogena, sparsa, fusiformis vel utrimque truncata, fulva vel centro rotunde fulva vel cana et circum fulva, circa 3 mm longa. Nonnulla–10 et nonnulla conidiophora densa badia, cylindrica, continua, 70–131 × 4.5–6 µm, apice cum nonnullis conidiis. Conidium ellipticum vel oblongum, 0–3 septatum, apud septa non constrictum vel constrictum, fuscum, 6–20 × 3–6 µm.

Notes: Type material could not be traced. In the original diagnosis two collections were mentioned, but the author did not designate a type. *Cladosporium phlei* (C.T. Greg.) G.A. de Vries, known from Asia, Europe and North America on *Phleum pratense*, deviates from the description of *Cladosporium phlei-pratensis* given above in having longer and wider conidiophores, up to 300 × 6–9 µm, and longer and wider conidia, 13–36(–57) × 6–14 µm (DAVID 1997).

(54) *Cladosporium platycodonis* Z.Y. Zhang & H. Zhang

Fig. 101

Cladosporium platycodonis Z.Y. Zhang & H. Zhang, in Zhang, Zhang & Li, Mycosystema 19(3): 308 (2000).

Holotype: on living leaves and petals of *Platycodon grandiflorus* (Campanulaceae), China, Heilongjiang, Monte Maoer, 5 Sept. 1992, H. Li & Y.X. Wang (MHYAU 07826).

Ill.: ZHANG, ZHANG & LI (2000: 309, Fig. 1), ZHANG et al. (2003: 145, Fig. 97).

Original diagnosis (ZHANG, ZHANG & LI 2000): Maculae in petalis evolutae vel amphigenae, circulares, brunneae, margine atrobrunneae, 1–2 mm diam. Coloniae punctiformes, interdum confluentes, velutinae, fuscae. Mycelium immersum. Conidiophora solitaria vel fasciculata, erecta vel leniter curvata, simplicia, septata, geniculata, denticulata vel cicatricosa, brunnea, sursum pallescentia, 29.6–110.5 × 3.6–4.6 µm. Ramoconidia continua vel raro 1-septata, ellipsoidea, ellipsoideo-cylindrica, apice denticulata vel cicatricosa, pallide brunnea, 7.2–19.3 × 2.6–4.7 µm. Conidia catenata, continua vel 1-septata, fusiformia, longe ellipsoidea, laevia, pallide brunnea vel hyalina, 5.1–16.7 × 3.1–5.1 µm, sporarum cicatrices visibiles.

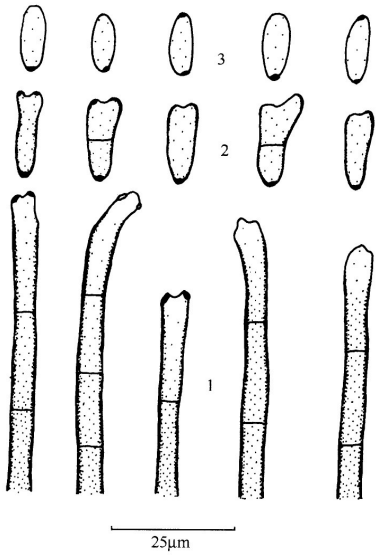

Fig. 101: *Cladosporium platycodonis* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Notes: ZHANG, ZHANG & LI (2000) reported the species also on *Adenophora stricta* from Jilin, China.

(55) *Cladosporium polygonaticola* Z.Y. Zhang & W.Q. Pu

Fig. 102

Cladosporium polygonaticola Z.Y. Zhang & W.Q. Pu, in Zhang, Liu, Wei & He, Plant Diseases and Their Control: 105 (1998).

Holotype: on living leaves of *Polygonatum cirrhifolium* (Liliaceae s. lat.), China, Jiangxi, Lushan, 6 Oct. 1980, J.Y. Li & T.Y. Zhang, No. 41551 (MHYAU 03949).

Ill.: ZHANG, LIU, WEI & HE (1998: 106, Fig. 3), ZHANG et al. (2003: 146, Fig. 98; Pl. 13, Fig. 5).

Original diagnosis (ZHANG, LIU, WEI & HE 1998): Maculata amphigena, ellipsoidea, grisea, marginae atrobrunnea, protrudenta, 5 × 3 mm. Conidiophora solitaria, erecta, simplicia, septata, pallide brunnea, 65–167 × 3.1–5.1 µm, parte fertii sympodialiter prolifera geniculata denticulata, sinuolata. Ramoconidia continua vel 1 septata, laevia, cicatricia vel denticulata praedita, pallide brunnea, 5.7–20.6 × 5.1–5.1 µm. Conidia catenata, continua, ellipsoidea, laevia, pallide brunnea, cicatricia inconspicua, 3.1–7.7 × 2.6–3.9 µm.

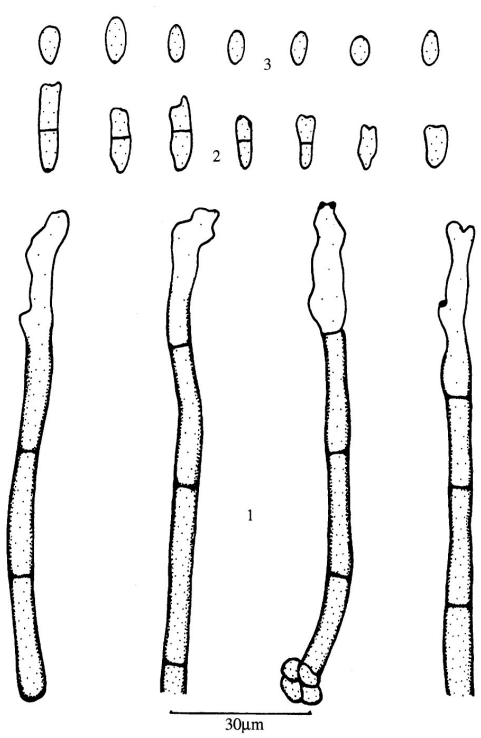

Fig. 102: *Cladosporium polygonaticola* (from (ZHANG et al). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

Notes: ZHANG et al. (2003) cited three hosts, viz., *Polygonatum cirrhifolium*, *P. cyrtonema* (China, Hubei) and *P. sibiricum* (China, Yunnan). The conidiophores of *Cladosporium polygonati* M.B. Ellis, described on *Polygonatum* sp. from Ireland, are solitary or fasciculate, typically monilioid, especially swollen at the conidiogenous loci, wider, 9–10 µm wide in the narrow parts, 15–18 µm where swollen; and the conidia are solitary or formed in short chains, 1–3-septate, longer and, above all, wider, (35–)40–70 × 18–24 µm (DAVID 1997).

(56) *Cladosporium polytrichorum* Reichardt

Cladosporium polytrichorum Reichardt, Verh. K.K. Zool.-Bot. Ges. Wien 27: 844, 1877 (1878).
Type: on *Polytrichum formosum* (Polytrichaceae), Austria, Tobelbad, near Graz, Sept. 1875, H.W. Reichardt.

Original diagnosis (REICHARDT 1878): Hyphae in stupam e ferrugineo nigricantem contextae, longissimae, flexuosae, irregulariter ramosae, cylindricae, apice obtusae, 0.003 mm crassae, fuscae, pachydermae, septatae, articulis diametro transversali terquinquies longioribus. Conidia hypharum articulis supremis lateraliter in ramulis brevibus conicis, 0.004–0.006 mm longis, 0.003 mm latis insidentia, mox decidua, unicellularia, subreniformia, 0.006–0.009 mm longa, e fusco nigricantia, cytiodermatae crasso, tuberculato. An status conidiophorus *Lizoniae emperigoniae* Ces. ?

Notes: This species is probably not a *Cladosporium*.

(57) *Cladosporium psidiicola* J.M. Yen

Fig. 103

Cladosporium psidiicola J.M. Yen, Bull. Trimestriel Soc. Mycol. France 95(3): 188 '1979' (1980).
Type: on living leaves of *Psidium guajava* (Myrtaceae), Hong Kong, Tai-Yuan-Yu-Tsun, Hsin-Chiai, Kowloon, 13 Nov. 1971, Jo-min Yen, No. 71334 (LAM).
Ill.: YEN (1980: 187, Fig. 2).

Original diagnosis (YEN 1980): Maculis irregulariter confluentibus, pallide brunneis. Hyphis internis subepidermicis vel intra cellulis epidermicis, pallide brunneis, ramosis, septatis, 3–7 µm diam. Conidiophoris plerumque fasciculatis, raro solitariis, simplicibus vel ramosis, pallide brunneis, erectis vel flexuosis, 0–5 septatis, 0–3 geniculatis, ad apicem rotundatis et cicatricibus ornatis, 15–70 × 3–5(–6) µm. Hyphis externis, hypophyllis, leviter repentibus, pallide brunneis, septatis, ramosis, 3–5(–6) µm crassis. Conidiis catenatis, ellipsoideis, fusiformibus vel cylindraceis, pallide brunneis, rectis vel leviter curvatis, 0–2(–3) septatis utrinque rotundatis et cicatricibus atrobrunneis ornatis, 5–28 × 3–6 µm.

Notes: Type material was not available for a re-examination.

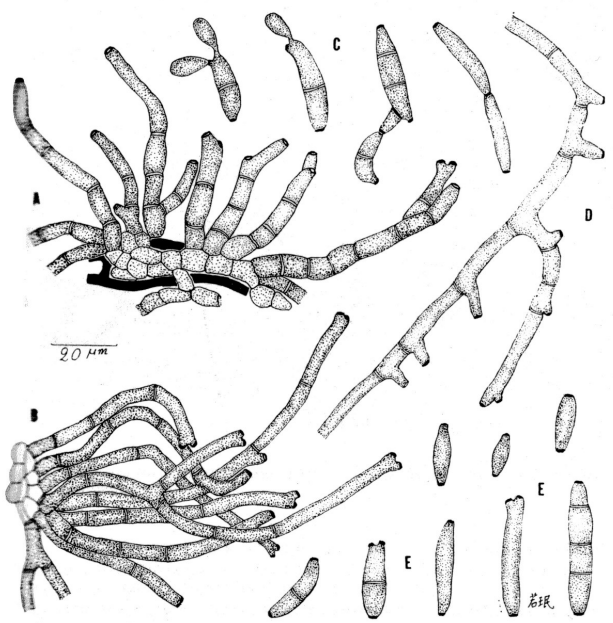

Fig. 103: *Cladosporium psidiicola* (from YEN 1980). A – Fascicle of old conidiophores. B – Fascicle of young conidiophores. C – Germination of conidia. D – Hyphae and solitary conidiophores. E – Conidia.

(58) *Cladosporium qinghaiense* T. Zhang & Z.Y. Zhang

Fig. 104

Cladosporium qinghaiense T. Zhang & Z.Y. Zhang, in Zhang, Zhang & Liu, Proceedings of Phytopathological Symposium Organized by Phytopathology Laboratory of Yunnan Province 2: 285 (1998), as '*qinghaiensis*'.

Holotype: on *Pisum sativum* (Fabaceae), China, Qinghai, Huzhu, 3 Aug. 1989, H. Li & T.F. Li, No. 087 (MHYAU 03925).

Ill.: ZHANG, ZHANG & LIU (1998: 286, Fig. 1), ZHANG et al. (2003: 148, Fig. 100).

Original diagnosis (ZHANG, ZHANG & LIU 1998): Maculis irregularibus, flavidis, 0.2–0.5 mm diam. Coloniis olivaceis hypophyllis. In CMA-cultura in 10 diebus ad 25ºC coloniis 26 mm diam., atro-olivaceis, effusis vel apiculatis, aerobiis hyphis amplis, myceliis immersis vel superficialibus. Conidiophoris plerumque fasciculatis, raro ramosis, rectis vel flexuosis, 0–3-septatis, laevis, pallide brunneis, ad apicem cicatricibus ornatis, 60–120 × 4.0–5.4 µm. Conidiis breviter catenatis, ellipsoideis vel late ellipsoideis, brunneis, verruculosis, 0–3-septatis, cicatricibus ornatis, 10.8–21.6 (15.6) × 5.4–9.5 (5.8) µm.

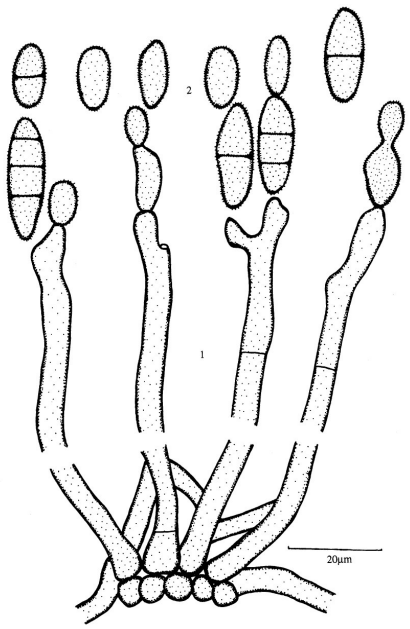

Fig. 104: *Cladosporium qinghaiense* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Conidia.

(59) *Cladosporium sambuci* Brunaud

Cladosporium sambuci Brunaud, Champ. Charente-Infer. 1892: 38 (1892).
Type: on leaves of *Sambucus nigra* (Caprifoliaceae), France, Saintes.
Lit.: SACCARDO (1895: 620).

Original diagnosis (SACCARDO 1895): Maculis brunneis; acervulis sparsis v. confluentibus; hyphis olivaceis, septatis, interdum ramosis; conidiis subfusiformibus, olivaceis, primitus continuis, dein 1–3-septatis, 15–30 × 5–8 µm, septis haud constrictis.

Notes: ZHANG et al. (2003) reported a collection on *Sambucus williamsii* from China determinated as *Cladosporium sambuci*, but the conidia of the Chinese collection were described to be much narrower, 2.6–5.1 µm.

(60) *Cladosporium stenosporum* Berk. & M.A. Curtis

Cladosporium stenosporum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 107 (1875).
Type: on *Stylosanthes* sp. (Fabaceae), USA, South Carolina, No. 2067 and on leaves of *Malus* sp. (Rosaceae), USA, No. 2529 (not in herb. K).
Lit.: SACCARDO (1886: 352).

Original diagnosis (BERKELEY 1875): Floccis continuis deorsum fuscis; sporis angustis. Flocci unbranched, darker below, slender, articulated, springing from a decumbent mycelium; spores oblong, narrow.

Notes: BUBÁK (1916) examined material of *Acrotheca dearnessiana* Sacc. sent to him by J. Dearness and thought it to be *Cladosporium stenosporum*. *Acrotheca dearnessiana* is a synonym of *Fusicladium pyrorum* (Lib.) Fuckel (SCHUBERT et al. 2003; CROUS & BRAUN 2003). ZHANG et al. (2003) reported and illustrated a collection determinated as *C. stenosporum* from Zhejiang, China on *Pyrus calleryana*.

(61) *Cladosporium strobilanthis* H.J. Lu, Y.L. Liu & Z.Y. Zhang

Cladosporium strobilanthis H.J. Lu, Y.L. Liu & Z.Y. Zhang, Mycosystema 22: 49 (2003).
Holotype: on living leaves of *Strobilanthes cusia* (Acanthaceae), China, Shaanxi Prov., Xian, 29 Aug. 1989, T.F. Li & H. Li (MHYAU 07908).

Original diagnosis (LU et al. 2003): Maculae amphigenae, suborbiculares, ellipticae, griseo-viriduae vel pallide brunneae, margine atro-brunneae, 0.4–10 mm diam. Caespituli saepe hypophylli, punctiformes, griseo-atrobrunnei. Mycelium immersum. Conidiophora solitaria, erecta, 1–3-septata, pallide brunnea. Cicatrices conidiales conspicuae, fuscae, 5.1–139.8 × 2.6–7.7 µm. Ramoconidia 0–1-septata, olivacea, ad apicem denticulata, cicatricibus, 11.8–18.5 × 3.1–3.9 µm. Conidia catenata, longe ellipsoidea, fusiformia, non-septata, pallide olivacea, hila leniter incrassata.

(62) *Cladosporium syringae* Montem.

Cladosporium syringae Montem., Riv. Patol. Veg., Ser. 2, 1915: 226 (1915).
Type: on leaves of *Syringa vulgaris* (Oleaceae), Italy, Montubeccaria, Pavia.
Lit.: SACCARDO (1931: 793).

Original diagnosis (SACCARDO 1931): Amphigenum; caespitulis sparsis, brunneis, in stromate epidermico vel subepidermico insertis; hyphis fasciculatis, simplicibus, flexuosis, septatis, fuscidulis, summo subhyalinis, 60–80 × 3–4 µm; conidiis brunneis vel olivaceis, 1–2-septatis, cylindricis, levibus, 15–20 × 3 µm.

(63) *Cladosporium tabaci* Oudem.

Cladosporium tabaci Oudem., Beih. Bot. Centralbl. 11: 538 (1902).
= *Cladosporium nicotianae* Oudem., Ned. Kruidk. Arch., Ser. 3, 2(3): 769 (1902).
Type: on decaying leaves of *Nicotiana tabacum* (Solanaceae), Netherlands, Bussum, Aug. 1901, C.J. Koning (L).
Lit.: SACCARDO (1906: 576), LINDAU (1907: 829).

Original diagnosis (OUDEMANS 1902a): Hyphis caespitosis, erectis, divergentibus, simplicibus, flexuosis, subnodosis, septatis, avellaneis (Sacc. Chrom. No. 7). Conidiis acrogenis, ellipticis, 8 × 5–4 µm, primo hyalinis, denique avellaneis, 1-septatis.

Collections examined: on *Nicotiana tabacum*, Antilles, CUBA, Prov. Remedios, Dr. C. Preißecker, Krypt. exs. 1628 (B 70-6719; HBG; M).

Notes: The type of *C. nicotianae* [on decaying leaves of *Nicotiana tabacum*, Netherlands, Amerongen, Jul. 1901, C.J. Koning (L).] only consists of two drawings, and the description is rather brief [(OUDEMANS 1902b): Hyphes en touffes médiocrement denses, en partie diffuses, en partie dressées, simples, flexueuses, à peine noueuses couleur noisette (Sacc. No. 7), 150–170 × 20 µm, terminées par une conidie elliptique, 8 × 4–5 µm, d'abord hyaline, plus tard couleur noisette, ordinairement 1-septée.], and the drawings are so poor that this species was regarded as doubtful [a nomen dubium] (DE VRIES 1952).
A single collection from herb. B determinated as *C. tabaci* has been examined but proved to be quite distinct from the original description given above by having hyaline scolecosporous conidia and typical conspicuously thickened and darkened, planate conidiogenous loci and hila belonging to the *Cercospora*-type. The fungus examined belongs to *Cercospora apii* s. lat.

(64) *Cladosporium tetrapanacis* D.X. Wu & Z.Y. Zhang

Fig. 105

Cladosporium tetrapanacis D.X. Wu & Z.Y. Zhang, Mycosystema 22: 48 (2003).
Holotype: on living leaves of *Tetrapanax papyriferus* (Araliaceae), China, Shaanxi Prov., Xian, 29 Aug. 1989, T.F. Li (MHYAU 07906).
Ill.: WU & ZHANG (2003: 49, Fig. 1).

Original diagnosis (WU & ZHANG 2003): Maculae amphigenae, suborbiculares, brunneae vel griseo-albidae, centro griseo-brunneae, 0.8–5.5 mm diam., margine pallide flavido-ochraceae. Caespituli hypophylli, griseo-fusci. Conidiophora solitaria, erecta, septata, geniculata, atro-brunnea, 35.1–75.6 × 2.7–4.1 µm. Ramoconidia 0–1-septata, pallide brunnea, ad apicem denticulata vel conspicue cicatricosa, 6.8–21.6 × 3.2–4.9 µm. Conidia catenata, ellipsoidea vel fusiformia, 0(–1)-septata, sporarum cicatrices visibiles, 6.5–13.5 × 3.2–4.9 µm.

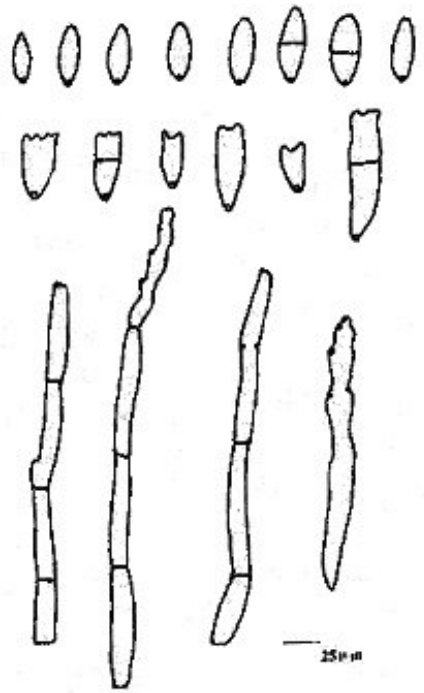

Fig. 105: *Cladosporium tetrapanacis* (from Wu & Zhang 2003). Conidiophores and conidia.

(65) *Cladosporium teucrii* Y.L. Liu & Z.Y. Zhang

Fig. 106

Cladosporium teucrii Y.L. Liu & Z.Y. Zhang, Plant Diseases and Their Control: 101 (1998).

Holotype: on living leaves of *Teucrium viscidum* (Lamiaceae), China, Hubei, Wuchang, 24 Sept. 1980, J.Y. Li & T.Y. Zhang, No. 41007 (MHYAU 03954).

Ill.: LIU & ZHANG (1998: 102, Fig. 1), ZHANG et al. (2003: 168, Fig. 116; Pl. 13, Fig. 3).

Original diagnosis (LIU & ZHANG 1998): Foliorum macula amphigena, subcircularis, brunnea vel pallide olivaceo-grisea, marginatis fuligenea prominula, hypophylla fulva, 2–3 mm diam. Conidiophora solitaria, erecta, 50–89 × 4.3–6.9 µm. Cellulosa conidiogena in conidiophora incorporta, sympodiala, cicatricia conspicuis. Ramoconidia continua, laevia, pallide brunnea, apice denticulata, 8.2 × 3.1 µm. Conidia catenata, ellipsoidea, continua, pallide brunnea, sporarum cicatricia visibilia, 3.1–9.8 × 2.6–2.8 µm.

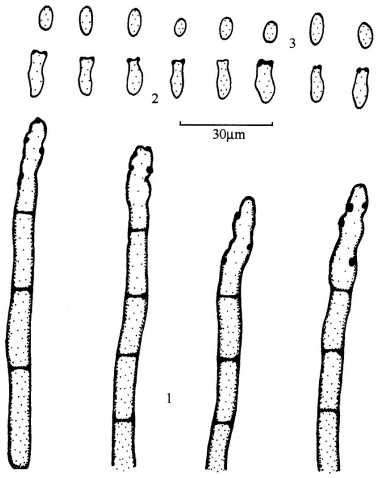

Fig. 106: *Cladosporium teucrii* (from ZHANG et al. 2003). 1 – Conidiophores. 2 – Ramoconidia. 3 – Conidia.

(66) *Cladosporium theobromicola* Av.-Saccá

Figs 107–109

Cladosporium theobromicola Av.-Saccá, Bol. Agric. (São Paulo) 21: 59 (1920), as '*theobromicolum*'.

Type: on *Theobroma cacao* (Sterculiaceae), Brazil.

Ill.: AVERNA-SACCÁ (l.c.: Figs. 3–5).

Original diagnosis (AVERNA-SACCÁ, l.c.): Nas folhas atacadas (fig. 3, a) primeiramente se nota o empardecimento do ápice, que, aos poucos, seguindo as margens, attinge até 2/3 da lamina; raramente chega até á base. Estas manchas augmenttam e mudam de côr, tendo no fim uma coloração cinzenta ou branca. São quebradiças e cobertas por uma intensa efflorescencia granulosa, fina, preta, formada pelos orgãos de fructificação do fungo. As folhas assim atacadas, estando em ambiente humido, mostram uma efflorescencia cotonilhosa, branca, devido á intensa formação dos esporos. As folhas ficam, durante algum tempo, presas aos ramos, mas depois se desarticulam e cáem. Como se vê, o *Cladosporium* em questão poderá produzir ao cacaueiro graves prejuizos. No

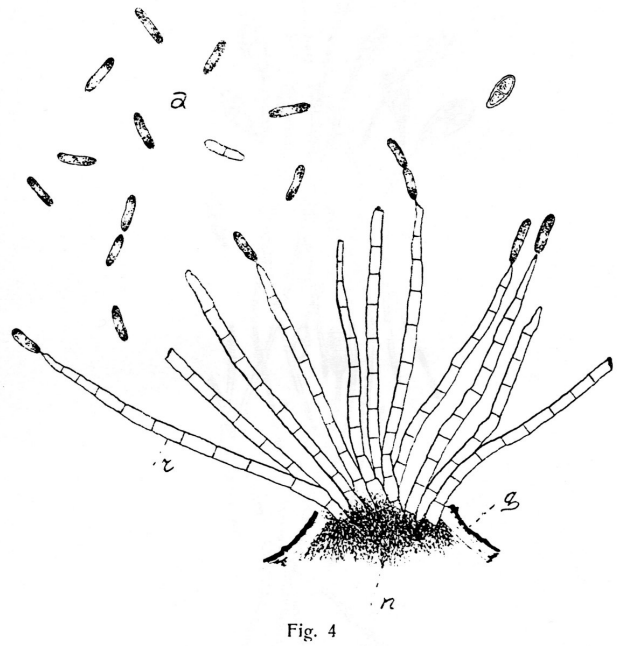

Fig. 107: *Cladosporium theobromicola* (from AVERNA-SACCÁ, l.c.). Fascicle of conidiophores and conidia.

caso em exame a sécca apical descendente das folhas e o concomitante desenvolvimento do *Cladosporium* são frequentes nas plantas já atacadas pela gommose, ao que confirma ainda uma vez a theoria de Comes sobre as causas que determinam os phenomenos da *Brusca* nas plantas cultivacas. Nos tecidos atacados se nota um mycelio relativamente grosso, primeiro hyalino, depois pardo, ramificado, septado, que invade os elementos do parenchyma elaborante e do respiratorio, envolve e atravessa as cellulas e finalmente emitte touceiras de conidiophoros (fig. 4, r) formadas por 3 a 15 conidiophoros, divergentes, sinuosos ou rectos, septados fuliginosos, tendo um crescimento apical muito accentuado, ligeiramente reentrantres em relação dos septos. No ápice dos conidiophoros se formam, agamicamente, os conidios. Elles são cylindricos ou ovaes, com ápices arredondados, muito ligeiramente curvados (fig. 4, a), hyalinos (13 a 17,5 × 4.5 a 8 microns), alguns continuos, outros uni-septados, com conteúdo homogeneo e parede relativamente grossa. Germinam facil e rapidamente (fig. 5, n, s, g) produzindo um ou dois tubos de germinação, um da cada loculo, primeiro continuo, depois setado, ramificado.

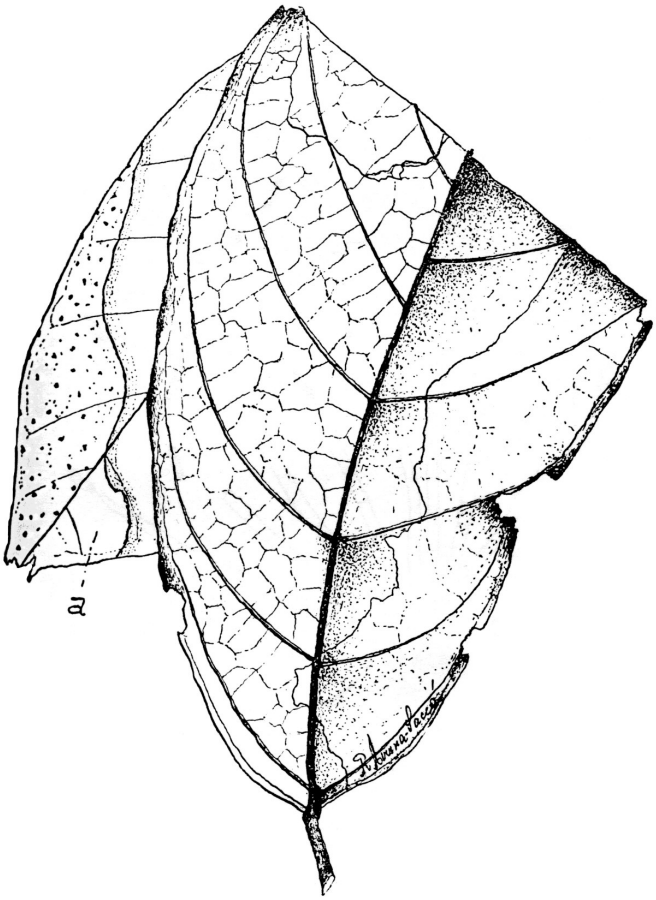

Fig. 3

Fig. 108: *Cladosporium theobromicola* (from AVERNA- SACCÁ, l.c.). Symptoms.

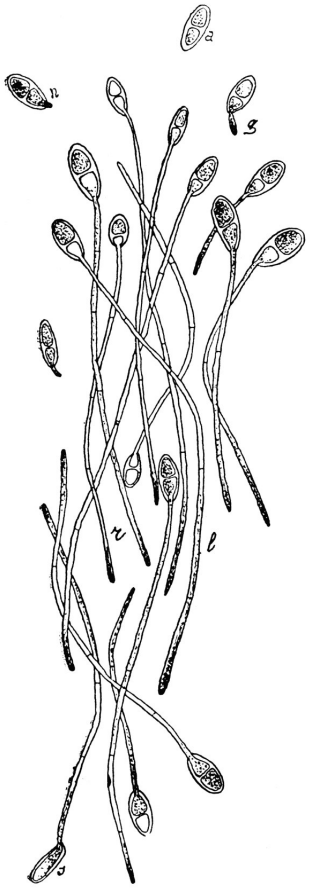

Fig. 5

Fig. 109: *Cladosporium theobromicola* (from AVERNA- SACCÁ, l.c.). Germinating conidia.

8.5. *Excluded foliicolous species*

The names of the excluded foliicolous species are alphabetically arranged including bibliographic citations, type collections, basionyms, current taxonomic status if known, additional references, hosts, distribution and notes. For additional synonyms CROUS & BRAUN (2003) and DUGAN et al. (2004) can be consulted. Some excluded species not yet published are treated in detail providing descriptions and illustrations.

adianticola R.F. Castañeda, Fungi Cubenses II: 3 (1987), as '*adianticolum*'.

Holotype: on living leaves of *Adiantum* sp. (Adiantaceae), Cuba, prov. Matanzas, San Miguel de los Baños, 23 Jan. 1987, R.F. Castañeda (INIFAT C87/40).
Lit.: CROUS et al. (2005).
Host(s) & distribution: *Adiantum* sp. (Adiantaceae); Cuba.
Notes: This species clusters close to *Metulocladosporiella musae*, but due to morphological differences and the absence of fertile cultures, its generic affinity remains uncertain (CROUS et al. 2005).

aequatoriense Petr., Sydowia 2: 380 (1948).

Syntype: on living leaves of *Mikania* sp. (Asteraceae), Ecuador, prov. Pichincha, Guarumos near Nono, 17 Oct. 1937 (M-57478).
≡ ***Parastenella aequatoriensis*** (Petr.) K. Schub. & U. Braun, Mycol. Progress 4(2): 103 (2005).
Host(s) & distribution: *Mikania* sp. (Asteraceae); Ecuador.

album Dowson, J. Roy. Hort. Soc. 49(2): 211 (1924).

Type: on living leaves of *Lathyrus odoratus* (Fabaceae), Great Britain.
= ***Ramularia deusta*** [(Fuckel) Karak.] var. ***alba*** U. Braun, Nova Hedwigia 56: 429 (1993).
Lit.: BRAUN (1998: 157).
Host(s) & distribution: see BRAUN (1998: 157).

alternicoloratum R.F. Castañeda & W.B. Kendr., Univ. Waterloo Biol. Ser. 35: 20 (1991).

Holotype: on leaves and stems of *Cyperus alternifolium* (Cyperaceae), Cuba, Pinar del Río, Cuchillas de San Simón, 24 Mar. 1990, R.F. Castañeda (INIFAT C90/129).
Host(s) & distribution: *Cyperus alternifolium* (Cyperaceae); Cuba.
Notes: Excluded, generic affinity unclear.

americanum H.C. Greene, Amer. Midl. Naturalist 41(3): 723 (1949).

Syntypes: on living leaves of *Prunus americana* (Rosaceae), USA, Wisconsin, Dane Co., Madison, University of Wisconsin Arboretum, 18 Sept. 1944, H.C. Greene (BPI 426105; WIS).
= ***Fusicladium carpophilum*** (Thüm.) Oudem., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk. 1900: 388 (1900).
Lit.: BRAUN (2001: 53), SCHUBERT (2005: 56–57).
Host(s) & distribution: see *carpophilum* below.

ampelinum Pass., Erb. Critt. Ital., Ser. 2, No. 595 (1872).

Syntypes: on leaves of *Vitis* sp. (Vitaceae), Italy, Erb. Critt. Ital. 595 (E; IMI 112146).
= ***Pseudocercospora vitis*** (Lév.) Speg., Anales Mus. Nac. Buenos Aires 20: 438 (1910).
Lit.: SACCARDO (1886: 458), LINDAU (1910: 116), SIVANESAN (1984: 210), CROUS & BRAUN (2003: 427).
Host(s) & distribution: see CROUS & BRAUN (2003: 427).

anomalum Berk. & M.A. Curtis, in Berkeley, J. Linn. Soc., Bot. 10: 362 (1869).

Type: on the underside of leaves of a Malvaceae, Cuba, C. Wright, Fungi cubensis Wrightiani, No. 639 (K).

≡ ***Pseudocercospora anomala*** (Berk. & M.A. Curtis) de Hoog, Persoonia 15(1): 68 (1992).

Host(s) & distribution: unidentified Malvaceae and *Sida* sp.; Cuba, Dominican Republic.

araguatum (Syd.) Arx, Genera Fungi Sporul. Pure Cult., ed. 2: 224 (1974).

Types: on living leaves of *Pithecellobium lanceolatum* (Mimosaceae), Venezuela, Aragua, La Victoria, between La Victoria and Suata, Jan. 1928, H. Sydow (BPI 443420, 443421, 443422; IMI 15728, IMI 34905).

≡ ***Stenella araguata*** Syd., Ann. Mycol. 28: 205 (1930).

Host(s) & distribution: *Pithecolobium lanceolatum* (Mimosaceae); Venezuela.

araliae Sawada, Rep. Gov. Res. Inst. Formosa 85: 91 (1943), nom. inval.

≡ ***Stenella araliae*** K. Schub. & U. Braun, **sp. nov.** **Fig. 110**

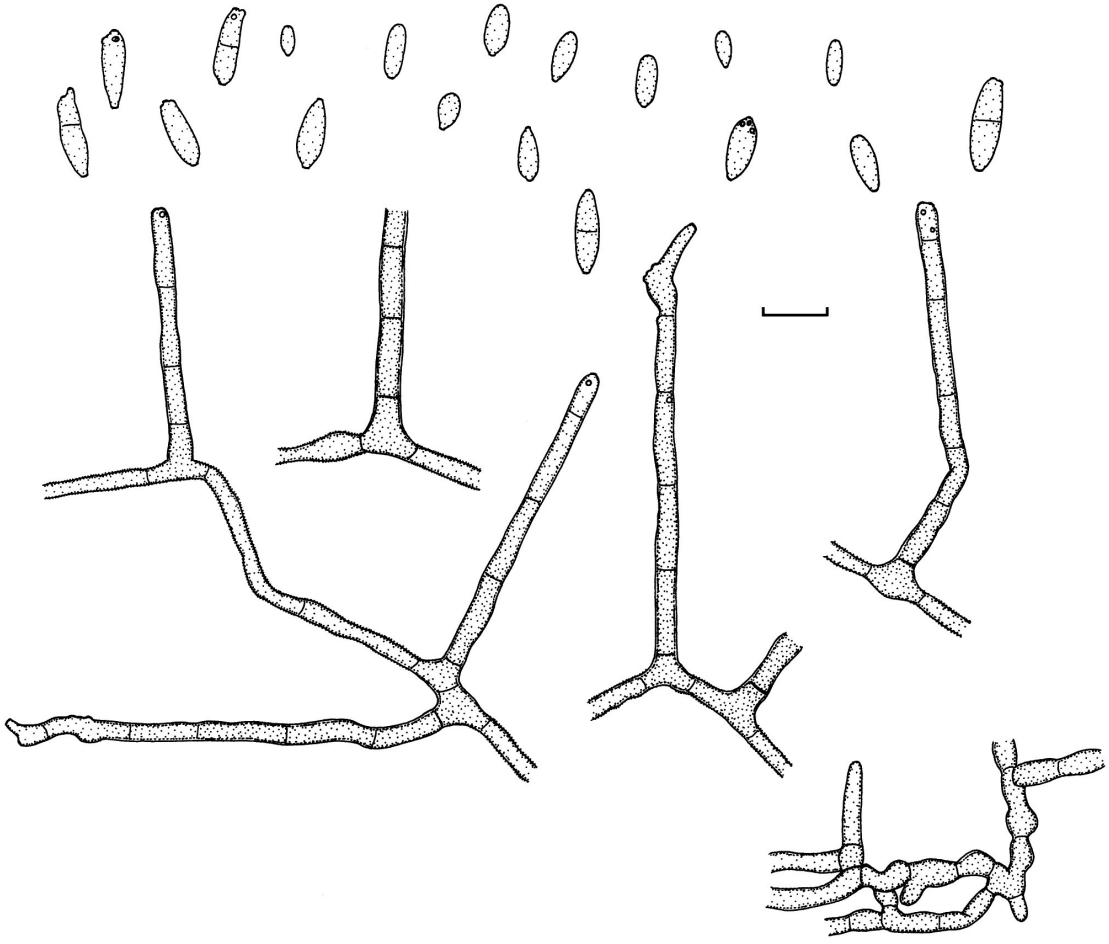

Fig. 110: *Stenella araliae*. Conidiophores and conidia (from syntype material BPI 426122). Bar = 10 µm.

Differt a *Stenella paulliniae* conidiophoris non ramosis, brevioribus et leniter latioribus, conidiis levibus.

Syntypes: on leaves of *Aralia decaisneana* (Araliaceae), Taiwan, 26 Nov. 1928, K. Sawada (BPI 426122, PPMH).

Without distinct leaf spots, on the lower leaf surface as pale reddish orange-brown, effuse discolorations. *Colonies* hypophyllous, scattered to effuse, very pale orange-brown, not very conspicuous. *Primary mycelium* internal; hyphae branched, 2–5.5 µm wide, septate, with swellings and constrictions, pale olivaceous or brown, smooth, with slightly thickened walls. *Stromata* absent. *Secondary mycelium* external, superficial; hyphae branched, 1.5–4 µm wide, sometimes aggregated, rarely with small swelling, septate, mostly not constricted at the septa, very pale yellowish brown to pale brown, smooth to minutely verruculose, walls slightly thickened. *Conidiophores* solitary, arising from superficial hyphae, lateral or terminal, erect, straight to somewhat flexuous, unbranched, 15–75 × 2–4 µm, septate, sometimes slightly constricted at the septa, pale to medium brown, somewhat paler towards the apex, smooth, walls thickened, sometimes somewhat inflated at the base. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical-oblong, proliferation sympodial, with a single or several conidiogenous loci, often crowded at the apex, more or less truncate, 0.5–1.5 µm diam., somewhat thickened and darkened-refractive. *Conidia* in unbranched or branched chains, straight, ellipsoid to subcylindrical, 4–14 × 2–4 µm, 0–1-septate, not constricted at the septum, subhyaline, very pale olivaceous-brown, smooth, walls unthickened, apex rounded or with 1–4 hila, more or less truncate at the base, hila not very conspicuous, 0.5–1(–1.5) µm diam., more or less thickened, somewhat darkened-refractive.

Host(s) & distribution: *Aralia decaisneana* (Araliaceae); Taiwan.

aromaticum Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 47(3): 439 (1895).

Syntypes: on living leaves of *Rhus aromatica* (Anacardiaceae), USA, California, Pasadena, Aug. 1894, A.J. McClatchie (BPI 426124; NY).

≡ ***Fusicladium aromaticum*** (Ellis & Everh.) K. Schub. & U. Braun, Fungal Diversity (2005), in press.

Host(s) & distribution: *Rhus aromatica*, *R. copallina*, *R. glabra*, *R. typhina* (Anacardiaceae); Canada (Ont., Que.), USA (CA, IA, MS, NE, NY, WI, WV).

artemisiae H.C. Greene, Amer. Midl. Naturalist 48(3): 757 (1952).

Syntypes: on living leaves of *Artemisia caudata* (= *A. campestris* ssp. *caudata*) (Asteraceae), USA, Wisconsin, Dane Co., Madison, University of Wisconsin Arboretum, sandy slope, 7 Jul. 1951, H.C. Greene (BPI 426134; WIS).

≡ ***Fusicladium artemisiae*** (H.C. Greene) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 57 (2005).

Host(s) & distribution: *Artemisia campestris* spp. *caudata* (Asteraceae); USA (WI).

astericola Davis, Trans. Wisconsin Acad. Sci. 20: 428 (1922).

Syntypes: on upper leaves and upper portions of stems of *Aster umbellatus* (Asteraceae), USA, Wisconsin, Mellen, 4 Aug. 1919, J.J. Davis (BPI 426143; WIS).

≡ ***Fusicladium astericola*** (Davis) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 59 (2005).

Host(s) & distribution: *Aster umbellatus*, *Aster* sp., *Doellingeria umbellata*, *Eurybia macrophylla*, *Euthamia graminifolia*, *Solidago canadensis*, *S. castrensis*, *S. gigantea*, *S. nemoralis*, *S. speciosa*, *S. uliginosa*, *S. ulmifolia*, *Solidago* sp., *Symphyotrichum cordifolium*, *S. oblongifolium*, *S. oolentangiense* (Asteraceae); USA (IA, WI).

asteroma Fuckel, Jahrb. Nassauischen Vereins Naturk. 23–24: 355 ‘1869’ (1870).

Syntypes: on living leaves of *Populus tremula* (Salicaceae), Germany, between Homburg and Wehrheim, Fuckel, F. rhen. 2208 (e.g., HAL).

= ***Fusicladium radiosum*** (Lib.) Lind var. ***radiosum***, Ann. Mycol. 3: 430 (1905).
Lit.: SACCARDO (1886: 357, 1913a: 1376), LINDAU (1907: 777), LIND (1913: 520), BALDACCI & CIFERRI (1937: 61), SIVANESAN (1984: 618), SCHUBERT et al. (2003: 85).
Host(s) & distribution: *Populus* spp. (Salicaceae); widespread in Asia, Europe.

asteroma [Fuckel] var. *macrosporum* Sacc., Michelia 2(6): 126 (1880).

Type: on leaves of *Populus alba* (Salicaceae), France.
= ?***Fusicladium radiosum*** (Lib.) Lind, Ann. Mycol. 3: 429 (1905).
Lit.: SCHUBERT et al. (2003: 85).

asteroma [Fuckel] var. *microsporum* Sacc., Syll. fung. 4: 357 (1886).

Type: on leaves of *Populus tremula* (Salicaceae), Italy, Conegliano.
= ?***Fusicladium radiosum*** (Lib.) Lind, Ann. Mycol. 3: 429 (1905).
Lit.: LINDAU (1907: 777), BALDACCI & CIFERRI (1937: 61), SIVANESAN (1984: 618), SCHUBERT et al. (2003: 85).

bacilligerum Mont. & Fr., in Montagne, Ann. Sci. Nat. Bot., Sér. 2, 6: 31 (1836).

Type: on *Alnus glutinosa* (Betulaceae), France, Lyons, Rochecardon near 'Lugdunum'.
≡ ***Passalora bacilligera*** (Mont. & Fr.) Mont. & Fr., in Montagne, Syll. gen. sp. crypt.: 305 (1856).
Lit.: COOKE (1871: 584), DEIGHTON (1967: 5–8), CROUS & BRAUN (2003: 440).
Host(s) & distribution: *Alnus glutinosa* (Betulaceae); Europe.

baptisiae H.C. Greene, Amer. Midl. Naturalist 39(2): 456 (1948).

Syntypes: on living leaves of *Baptisia leucophaea* (Fabaceae), USA, Wisconsin, Dane Co., Madison, University of Wisconsin Arboretum, 14 Jul. 1947, H.C. Greene (BPI 426163; WIS).
≡ ***Fusicladium baptisiae*** (H.C. Greene) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 62 (2005).
Host(s) & distribution: *Baptisia bracteata* var. *leucophaea* (Fabaceae); USA (WI).

bellynckii Westend., Bull. Acad. Roy. Sci. Belgique 21(8): 240 (1854).

Holotype: on faded leaves of *Cynanchum vincetoxicum* (≡ *Vincetoxicum hirundinaria*) (Asclepiadaceae), Belgium, Bois de Dave, near Namur, Prof. Bellynck (BR).
≡ ***Passalora bellynckii*** (Westend.) U. Braun, Mycotaxon 55: 228 (1995).
Lit.: SACCARDO (1886: 450), LINDAU (1910: 129), CHUPP (1954: 69), CROUS & BRAUN (2003: 78).
Host(s) & distribution: see CROUS & BRAUN (2003: 78).

berkheyae Syd., Ann. Mycol. 12: 267 (1914).

Holotype: on leaves of *Berkheya* sp. (Asteraceae), South Africa, Natal, Cramond, 2 Dec. 1913, No. 6852 (S).
≡ ***Passalora berkheyae*** (Syd.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 441 (2003).
Lit.: SACCARDO (1931: 789), CROUS & BRAUN (1996: 250).
Host(s) & distribution: *Berkheya* sp. (Asteraceae); South Africa.

betuligenum Ellis & Galloway, in herb.

≡ ***Fusicladium betuligenum*** K. Schub. & U. Braun, **sp. nov.** **Fig. 111**

Differt a *Fusicladium caducum* conidiophoris longioribus et latioribus, 70–275 × 5–10 µm, conidiis 0–3(–4)-septatis, longioribus et latioribus, (12–)20–40 × (5–)7–10(–12) µm, locis conidiogenis latioribus, (1.5–)2–4(–5) µm.

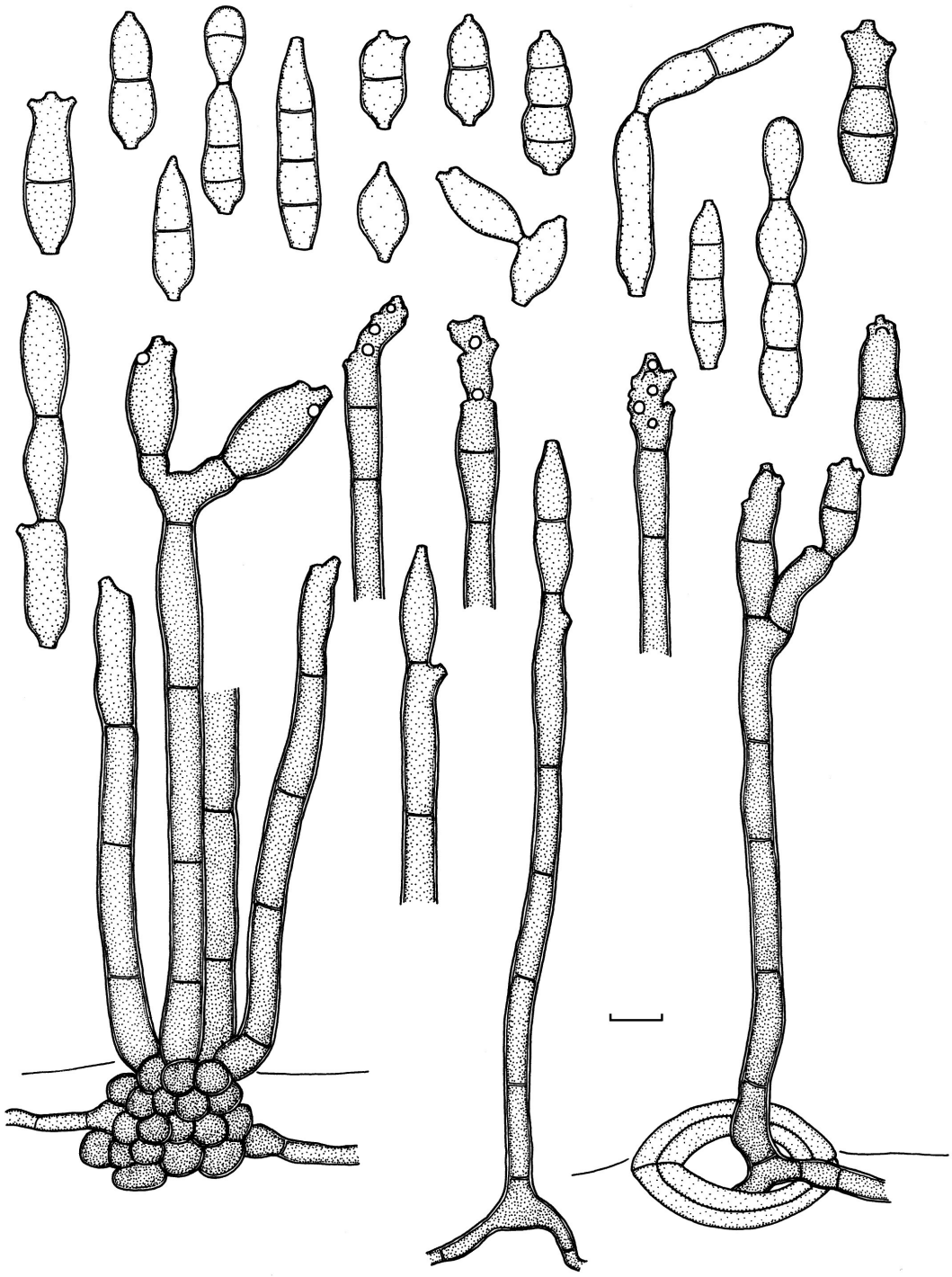

Fig. 111: *Fusicladium betuligenum*. Conidiophores, ramoconidia and conidia. Bar = 10 µm.

Holotype: on leaves of *Betula nigra* (Betulaceae), USA, Washington D.C., 2 Oct. 1887, B.T. Galloway (BPI 426165).

Leaf spots almost indistinct to distinct, amphigenous, at first punctiform, later larger, extended, angular-irregular, brown or somewhat reddish brown, scattered over large areas of the leaf surface, confluent. *Colonies* amphigenous, in tufts or loosely scattered, punctiform to effuse, dark brown, bristle-like. *Primary mycelium* internal; hyphae branched, (1.5–)2–4(–5) µm wide, septate, pale olivaceous to medium olivaceous-brown, smooth or almost so, walls slightly thickened, forming expanded plates of stromatic aggregations of swollen hyphal cells, intra- to subepidermal, cells subglobose to somewhat angular, 4–12 µm wide, medium or almost dark brown, walls thickened. *Secondary mycelium* external, superficial; hyphae branched, (1.5–)2–4(–5) µm wide, pale olivaceous to medium olivaceous-brown, smooth or almost so to somewhat irregularly rough-walled, walls slightly thickened. *Conidiophores* in small to moderately large fascicles arising from stromatic hyphal aggregations, erumpent through the cuticle or sometimes emerging through stomata, or solitary, arising from internal and usually external creeping hyphae, erect, straight to somewhat flexuous, cylindrical-oblong, unbranched or apically branched, 70–275 × 5–10 µm, pluriseptate, medium dark brown, sometimes slightly paler towards the apex, smooth to somewhat rough-walled, walls distinctly thickened, mostly two-layered. *Conidiogenous cells* integrated, terminal, sometimes intercalary, proliferation sympodial, with a single or numerous conidiogenous loci, subdenticulate, truncate to slightly convex, 2–4(–5) µm wide, unthickened, not or somewhat darkened-refractive, often detaching and behaving like ramoconidia s. str., then confusable with conidia but somewhat darker, concolorous with the tips of the conidiophores, thicker walls and wider at the base, 4.5–7 µm wide. *Conidia* in unbranched or branched chains, rarely solitary, fusiform, ellipsoid, subcylindrical-oblong or obclavate, (12–)20–40 × (5–)7–10(–12) µm, 0–3(–4)-septate, not constricted or distinctly constricted at the septa, pale to pale medium brown, smooth or almost so, walls thickened, apex rounded or apiculate or somewhat attenuated towards apex and base, hila truncate to slightly convex, (1.5–)2–4(–5) µm wide, unthickened, not or somewhat darkened-refractive; often germinating, microcyclic conidiogenesis not observed.

Host(s) & distribution: *Betula nigra* (Betulaceae); USA.

Notes: Based on the structure of the conidiogenous loci and conidial hila (unthickened, truncate or slightly convex, without any dome and raised rim), this herbarium name has to be assigned to *Fusicladium* and described as a new species. *F. betuligenum* is morphologically very close to *F. caducum* (J.J. Davis) K. Schub. & U. Braun (SCHUBERT 2005). The latter species, which occurs on the same host species in North America, is similar in its habit, but quite distinct by having smaller conidiogenous loci and hila, 1–2(–2.5) µm wide, shorter and narrower conidiophores, always arising from superficially growing hyphae, 30–90(–175) × (3.5–)4–5.5(–6.5) µm, and aseptate, shorter and narrower conidia, 6.5–18 × (4–)5–7(–8.5) µm. These features, viz. the length and width of the conidiophores and conidia as well as the width of conidiogenous loci, proved to be diagnostic for the differentiation of species within the genus *Fusicladium* (SCHUBERT et al. 2003). *F. betulae* Aderh. and *F. scribnerianum* (Cavara) M.B. Ellis, the two other *Fusicladium* species occurring on *Betula* spp., are easily distinguishable in having shorter and narrower conidiophores arising from internal mycelium, narrower, non-apiculate conidia and somewhat narrower conidiogenous loci.

brachyelytri H.C. Greene, Trans. Wisconsin Acad. Sci. 53: 214 (1964).

Syntypes: on living leaves of *Brachyelytrum erectum* (Poaceae), USA, Wisconsin, Sawyer Co., Flambeau State Forest near Oxbow, 22 Jul. 1964, H.C. Greene (BPI 426166; WIS).

= ***Passalora fusimaculans*** [(G.F. Atk.) U. Braun & Crous] var. ***barretoana*** U. Braun & Crous, in Crous & Braun, Mycosphaerella and its anamorphs: 1. Names published in Cercospora and Passalora. CBS Biodiversity Ser. 1: 453 (2003).
Lit.: SCHUBERT (2005: 63–65).
Host(s) & distribution: *Brachyelytrum erectum*, *Echinochloa polystachya*, *Panicum boreale* (Poaceae); Brazil, USA (NY, WI).

brevipes Ellis & Barthol., Erythea 4: 27 (1896), nom. illeg., non *C. brevipes* Peck, 1887.

≡ ***Fusicladium subsessile*** (Ellis & Barthol.) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 152, No. 1519 (2002).
Notes: see *subsessile*.

brevipes Peck, Rep. (Annual) New York State Mus. Nat. Hist. 40: 64 (1887).

Holotype: on living leaves of *Quercus alba* (Fagaceae), USA, New York, Menands, July, C.H. Peck (NYS 523).
Lit.: SACCARDO (1892: 604).
Host(s) & distribution: *Quercus alba* (Fagaceae); USA (NY).
Notes: Excluded, taxonomic status unclear.

caducum Davis, Trans. Wisconsin Acad. Sci. 21: 298 (1924).

Syntypes: on leaves of *Betula nigra* (Betulaceae), USA, Wisconsin, along the Wisconsin river, 21 Jul. 1922, J.J. Davis (BPI 426179; WIS).
≡ ***Fusicladium caducum*** (Davis) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 65 (2005).
Host(s) & distribution: *Betula nigra* (Betulaceae); USA (WIS).

caesalpiniae Sawada, Rep. Gov. Res. Inst. Formosa 85: 91 (1943), nom. inval.

Syntypes: on *Caesalpinia nuga* (Caesalpiniaceae), Taiwan, Kaohsiung Prov., 24 Mar. 1930, K. Sawada (BPI 426182; PPMH).
= ***Fusicladium caesalpiniae*** Sawada ex K. Schub. & U. Braun, Fungal Diversity (2005), in press.
Host(s) & distribution: *Caesalpinia nuga* (Caesalpiniaceae); Taiwan.

callae Peck & Clinton, in herb.

On leaves of *Calla* sp., USA, New York, Buffalo, G.W. Clinton (BPI 426184).
= ***Cercospora callae*** Peck & Clinton, Rep. (Annual) New York State Mus. Nat. Hist. 29: 52 (1876).
Lit.: CHUPP (1954: 57).
Host(s) & distribution: see CROUS & BRAUN (2003: 94).
Notes: The examined collection is syntype material of *Cercospora callae*.

calotropidis F. Stevens, Trans. Illinois State Acad. Sci. 10: 207 (1917).

Syntypes: on leaves of *Calotropis procera* (Asclepiadaceae), Puerto Rico, Jul. 1915 (ILL 15842; IMI 19791; K; MICH; PC).
≡ ***Passalora calotropidis*** (Ellis & Everh.) U. Braun, Schlechtendalia 5: 60 (2000).
Lit.: SACCARDO (1931: 789), SUBRAMANIAN (1971: 293), CROUS & BRAUN (2003: 96).
Host(s) & distribution: see CROUS & BRAUN (2003: 96).

capsici Kovatsch., Z. Pflanzenkrankh. Pflanzenschutz 48(7): 335 (1938), nom. nov., as '(É.J. Marchal & Steyaert) Kovatsch.'.

Type: on *Capsicum frutescens* (Solanaceae), Congo belge, Prov. di l'Equateur.
≡ ***Passalora capsicicola*** (Vassiljevsky) U. Braun & F. Freire, Cryptog. Mycol. 23: 299 (2002).
Lit.: CHUPP (1954: 553), SACCARDO (1972: 1336), CROUS & BRAUN (2003: 103).
Host(s) & distribution: see CROUS & BRAUN (2003: 103).

carpophilum Thüm., Oesterr. Bot. Z. 27: 12 (1877).

Neotype: on fruits of *Prunus persica* (Rosaceae), Austria, Klosterneuburg, Aug. 1877, Thümen (PAD).
≡ ***Fusicladium carpophilum*** (Thüm.) Oudem., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 1900: 388 (1900).
Lit.: SACCARDO (1886: 353), LIND (1913), ELLIS (1971: 317), SIVANESAN (1974: 75; 1984: 609), SCHUBERT et al. (2003: 26, 28–30), SCHUBERT (2005: 56–57).
Host(s) & distribution: *Prunus* (s. lat.) spp. (Rosaceae); cosmopolitan, Africa, Asia, Australia, Europe, New Zealand, North & South America.

caryigenum (Ellis & Langl.) Gottwald, Mycologia 74(3): 388 (1982).

Lectotype: on leaves of *Carya illinoensis* (Juglandaceae), USA, Louisiana, St. Martin, 3 Sept. 1888, A.B. Langlois, Fl. Ludov. 1499 (NY). Isolectotypes: on *Carya illinoensis* (*C. olivaeformis*), USA, Louisiana, St. Martinsville, Sept. 1888, A.B. Langlois (BPI 426315, 426333; M).
= ***Fusicladium effusum*** G. Winter, J. Mycol. 1: 101 (1885).
Lit.: HO et al. (1999), SCHUBERT & BRAUN (2002a), SCHUBERT et al. (2003: 41–43).
Host(s) & distribution: *Carya aquatica*, *C. cordiformis*, *C. glabra*, *C. illinoensis*, *C. ovata*, *C. tomentosa*, *Carya* spp., ?*Juglans regia* (Juglandaceae); Brazil, Mexico, New Zealand, Paraguay, South Africa, USA (AL, FL, IL, KS, LA, MO, NC, OK, TX, WI).

caryigenum var. *carpineum* (Ellis & Everh.) Gottwald, Mycologia 74(3): 389 (1982), as '*carpinum*', comb. inval.

Lectotype: on *Carpinus americana* (Corylaceae), Canada, London, Oct. 1889, J. Dearness (NY). Isolectotypes: DAOM; M.
≡ *Fusicladium effusum* var. *carpineum* Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 1891: 91 (1891).
≡ ***Fusicladium carpineum*** (Ellis & Everh.) U. Braun & K. Schub., IMI Descriptions of Fungi and Bacteria 152, No. 1512 (2002).
Lit.: SCHUBERT et al. (2003: 26).
Host(s) & distribution: *Carpinus americana*, *C. caroliniana* (Corylaceae); Canada, USA (GA, WI).

catamarcense Speg., Anales Soc. Ci. Argent. 10: 63 (1880), as '*catamarcensis*'.

Holotype: on wilting leaves of *Pachylaena atriplicifolia* (Asteraceae), Argentina, 'in arenosis alpinis de Catamarca' (LPS 13.129).
Host(s) & distribution: *Pachylaena atriplicifolia* (Asteraceae); Argentina.
Notes: Type material of this species has been re-examined, but no fructification could be found. Based on the original description and drawing given on the label of the type collection, this species has to be excluded from *Cladosporium* s. str., but the taxonomic status remains unclear.

cerasi (Rabenh.) Aderh., Centralbl. Bakteriol., 2. Abth., 7: 656 (1901).

Iconotype: on fruits of *Prunus cerasus* (Rosaceae), Germany, Borussia (BRAUN 1853: Tab. 1, B, 1–2).

≡ *Acrosporium cerasi* Rabenh., in Braun, Verh. Vereins Beförd. Gartenbaues Königl. Preuss. Staaten 1: 176 (1853).
≡ ***Fusicladium cerasi*** (Rabenh.) Erikss., Meddeland. Kongl. Lantbruksakad. Exp.-fält 1: 73 (1885).
Lit.: SIVANESAN & HOLLIDAY (1981), SIVANESAN (1984), SCHUBERT et al. (2003: 33–35).
Host(s) & distribution: *Prunus* (s.lat.) spp., especially *P. cerasus* (Rosaceae); widespread, Asia, Australia, Europe, New Zealand, North America, South America.

cercestidis Deighton, Mycol. Res. 94(4): 570 (1990).

Holotype: on living leaves of *Cercestis congensis* (Araceae), Sierra Leone, Njala (Kori), 25 Apr. 1934, F.C. Deighton (IMI 7735).
≡ *Stenella cercestidis* (Deighton) U. Braun, Schlechtendalia 5: 54 (2000), as '*cercestis*', nom. illeg., non *S. cercestidis* (J.M. Yen & Gilles) Deighton (1979).
≡ ***Stenella deightoniana*** (Deighton) U. Braun, in Braun & Crous, Mycotaxon (2005), in press.
Host(s) & distribution: *Cercestis congensis* (Araceae); Sierra Leone.

chaetomium Cooke, Grevillea 17(83): 66 (1889).

Type: on leaves of *Euphorbia* sp. (Euphorbiaceae), USA, New Jersey, Newfield, J.B. Ellis, No. 2289 (K).
≡ ***Passalora chaetomium*** (Cooke) Arx, Proc. Kon. Ned. Akad. Wetensch. C, 86(1): 44 (1983).
Lit.: SACCARDO (1892: 602), ELLIS (1971: 281), CROUS & BRAUN (2003: 445).
Host(s) & distribution: *Euphorbia nutans*, *E. hypericifolia*, *Euphorbia* sp. (Euphorbiaceae); Cuba, USA (AL, FL, IA, KS, MO, NE, NJ, OH, PA).

cinnamomeum (Racib.) Höhn., in Kabát & Bubák, F. imp. exs., Fasc. XIII, No. 643 (1910).

Type: on *Cinnamomum* sp. (Lauraceae), Indonesia, Java, Buitenzorg, Tjenkumeh, 1908, F. v. Höhnel, Kab. & Bub., F. imp. exs. 643 (PC).
≡ *Scolecotrichum cinnamomeum* Racib., Paras. Alg. Pilz. Javas: 40 (1900).
≡ ***Stenella cinnamomea*** (Racib.) U. Braun, Schlechtendalia 8: 37 (2002).
Host(s) & distribution: *Cinnamomum sulphureum*, *Cinnamomum* sp. (Lauraceae); India, Indonesia (Java).

cladrastidis Naumov, Bull. Soc. Mycol. France 30: 80 (1914).

Holotype: on leaves of *Cladrastis amurensis* (=*Maackia amurensis*) (Fabaceae), Russia, Far east, Juzhno-Ussurijskij Kray, 24 Jul. 1912, No. 10, N. Naumov (PC).
= ***Pseudocercospora cladrastidis*** (Jacz.) J.K. Bai & M.Y. Cheng, Acta Mycol. Sin. 11: 121 (1992).
Lit.: SACCARDO (1931: 792), CROUS & BRAUN (2003: 126).
Host(s) & distribution: *Maackia amurensis*, *M. hupehensis* (Fabaceae); China, Japan, Korea, Russia.

compactum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 106 (1875).

Types: on leaves of *Arundinaria* sp. (Poaceae), North America, No. 3767 (IMI 69771; K; STR).
≡ ***Passalora compacta*** (Berk. & M.A. Curtis) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 133 (2003).

Lit.: SACCARDO (1886: 364), LINDAU (1907: 833).
Host(s) & distribution: *Arundinaria* sp. (Poaceae); USA (AL).

congestum Berk. & Broome, J. Linn. Soc., Bot. 14: 99, 1873 (1875).

Type: on leaves of *Litsea* sp. (Lauraceae), India, Ceylon (K 115280).
= ***Spiropes scopiformis*** (Berk.) M.B. Ellis, Mycol. Pap. 114: 30 (1968).
Lit.: SACCARDO (1886: 359).

coreopsidis H.C. Greene, Trans. Wisconsin Acad. Sci. 45: 190 (1956).

Syntypes: on living leaves of *Coreopsis palmata* (Asteraceae), USA, Wisconsin, Dane Co., Madison, University of Wisconsin Arboretum, 27 Jun. 1955 (BPI 426392; WIS).
≡ ***Fusicladium coreopsidis*** (H.C. Greene) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 67 (2005).
Host(s) & distribution: *Coreopsis palmata*, *Parthenium integrifolium* (Asteraceae); USA (WI).

cornigenum Bubák, in Handel-Mazzetti, Ann. K.K. Naturhist. Hofmus. 23: 106 (1909).

Holotype: on living leaves of *Cornus australis* (= *C. sanguinea*) (Cornaceae), Turkey, Stephanos, near Trapezunt, 7 Jul. 1907, Handel-Mazzetti, No. 214 (BPI 426393).
Lit.: SACCARDO (1913a: 1367).
Host(s) & distribution: *Cornus sanguinea* (Cornaceae); Turkey.
Notes: Excluded, conidiogenous cells probably monophialidic.

cubisporum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 107 (1875).

Type: on *Ribes* sp. (Grossulariaceae), USA, Maine, Rev. J. Blake, No. 6318 (K).
≡ ***Coremiella cubispora*** (Berk. & M.A. Curtis) M.B. Ellis, Dematiaceous Hyphomycetes: 33 (1971).
Lit.: SACCARDO (1886: 355).
Host(s) & distribution: on dying and dead leaves, stems and branches of herbaceous plants, shrubs and trees; Europe, Eastern & Southern Africa, North America (USA).

cyclaminis Massey & Tilford, Phytopathology 22(1): 19 (1932).

Lectotype: on *Cyclamen* sp. (Primulaceae), USA, 'received Aug. 1932 from L.M. Massey' (BPI 426434: part of type culture).
= ***Ramularia cyclaminicola*** Trel., Trans. Illinois State Acad. Sci. 9: 145 (1916).
Lit.: BAKER et al. (1950), BRAUN (1998: 226), ZHANG, ZHANG, LIU & HE (1999: 38).
Host(s) & distribution: *Cyclamen persicum*, *Cyclamen* spp. (Primulaceae); ?China, USA (CA, IL, MN, NJ, NY, OH, OK, PA).
Notes: ZHANG, ZHANG, LIU & HE (1999) recently reported this species from China. Since collections deposited at herb. MHYAU were not available for a re-examination, it remains unclear whether the Chinese collection is conspecific with the North American *Ramularia cyclaminicola* or not.

daphniphylli Sawada, Rep. Gov. Res. Inst. Formosa 85: 91 (1943), nom. inval.

Holotype: on leaves of *Daphniphyllum glaucescens* (Daphniphyllaceae), Taiwan, 8 Feb. 1931, K. Sawada (PPMH).

Without distinct leaf spots, sometimes with mosaic-like, ochraceous or brown discolorations. *Colonies* hypophyllous on discolorations, punctiform, scattered, dark brown

to blackish, sparsely fruiting. *Mycelium* at first internal, later also external, emerging through stomata and growing superficially; hyphae branched, sometimes with small swellings, 2–4 µm wide, septate, not constricted at the septa, pale olivaceous-brown, smooth, sometimes somewhat rough-walled, more or less thin-walled, forming small stromatic hyphal aggregations, often substomatal, composed of swollen, subglobose hyphal cells, 4–7 µm wide, pale to medium brown, walls only slightly thickened. *Conidiophores* in dense fascicles, numerous, arising from stromatic hyphal aggregations, emerging through stomata or erumpent through the cuticle, straight to flexuous, unbranched, 105–150 × 3.5–4.5 µm, length of the conidiophores subequal in particular fascicles, pluriseptate, not constricted at the septa, medium brown, at the base sometimes even dark brown, paler towards the apex, smooth, walls thickened below, less thickened towards the apex, often somewhat head-like swollen at the apex, up to 6 µm wide. *Conidiogenous cells* integrated, terminal, 6–15 µm long, with a single or several conidiogenous loci, non-protuberant or at most somewhat subdenticulate, slightly convex and thickened, with a somewhat refractive ring and a paler centre, 1–1.5 µm wide. *Conidia* solitary, small, ellipsoid, fusiform, obovoid, 5–20 × 2.5–4 µm, 0–2-septate, not constricted at the septa, pale brown, smooth, thin-walled, hila truncate, more or less planate, 1–1.5 µm wide, slightly thickened, somewhat refractive.

Host(s) & distribution: *Daphniphyllum glaucescens* (Daphniphyllaceae); Taiwan.

Notes: According to the non-cladosporioid conidiogenous loci and conidial hila this taxon has to be excluded from the genus *Cladosporium*, but its generic affinity is not yet clear.

dendriticum Wallr., Fl. crypt. Germ. 2: 169 (1833).

Syntypes: on leaves of *Pyrus malus* (= *Malus sylvestris*) (Rosaceae), Germany, Thuringia (B; STR).
= ***Fusicladium pomi*** (Fr.) Lind, Dan. fung.: 521 (1913).
Lit.: SACCARDO (1886: 345), LINDAU (1907: 779), SIVANESAN (1984: 616), CROUS & BRAUN (2003: 485), SCHUBERT et al. (2003: 76).
Host(s) & distribution: *Amelanchier*, *Aronia*, *Cotoneaster*, *Docynia*, *Eriobotrya*, *Heteromeles*, *Kagenackia*, *Malus*, *Prunus*, *Pyracantha*, *Pyrus* and *Sorbus* spp. (Rosaceae); cosmopolitan.

dendriticum [Wallr.] var. *heteromeles* Harkn. (1881), in herb.

On *Heteromeles arbutifolia* (Rosaceae), USA, California, Jun. 1881 (BPI 426448).
= ***Fusicladium pomi*** (Fr.) Lind, Dan. fung.: 521 (1913).
Lit.: SCHUBERT et al. (2003: 76).

depressum Berk. & Broome, Ann. Mag. Nat. Hist., Ser. 2, 7: 99 (1851).

Type: on *Angelica sylvestris* (Apiaceae), Great Britain (K).
≡ ***Passalora depressa*** (Berk. & Broome) Sacc., Nuovo Giorn. Bot. Ital. 8: 187 (1876).
Lit.: COOKE (1871: 584), LINDAU (1907: 786), CROUS & BRAUN (2003: 157).
Host(s) & distribution: see CROUS & BRAUN (2003: 157).

effusum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 106 (1875).

Lectotype: on *Polygonum punctatum* (Polygonaceae), USA, South Carolina, Society Hill, No. 3775 (K). Isolectotype: IMI 104922.
≡ ***Passalora effusa*** (Berk. & M.A. Curtis) U. Braun, Mycotaxon 55: 231 (1995).
Lit.: SACCARDO (1886: 362, 447), CHUPP (1954: 451), DEIGHTON (1986: 637), CROUS & BRAUN (2003: 170).
Host(s) & distribution: see CROUS & BRAUN (2003: 170).

effusum (G. Winter) Demaree, J. Agric. Res. 37: 186 (1928), nom. illeg., homonym, non *C. effusum* Berk. & M.A. Curtis, 1875.

Holotype: on *Carya tomentosa* (= *Carya alba*) (Juglandaceae), USA, Illinois, Cobden Zels., 1 Oct. 1882, F.S. Earle (B).
≡ ***Fusicladium effusum*** G. Winter, J. Mycol. 1: 101 (1885).
Lit.: SCHUBERT & BRAUN (2002a), SCHUBERT et al. (2003: 41–43).
Host(s) & distribution: *Carya* spp. (Juglandaceae); Brazil, Mexico, New Zealand, Paraguay, South Africa, USA (AL, FL, IL, KS, LA, MO, NC, OK, TX, WI).

elegans [Penz.] var. *singaporense* Sacc., Bull. Orto. Bot. Regia Univ. Napoli 6: 60 (1921).

Holotype: on leaves of *Citrus acida* (Rutaceae), Singapore, Botanical Garden, Aug. 1917, Baker, No. 4985 (PAD).
= ***Spiropes guareicola*** (F. Stevens) Cif., Sydowia 9: 303 (1955).
Lit.: SACCARDO (1931: 795), SCHUBERT & BRAUN (2005a: 107).
Host(s) & distribution: on colonies of *Asteridiella*, *Irenopsis* and *Meliola* spp. on many different flowering plants; Assam, Bougainville, Ghana, India, Malaya, Netherlands, New Guinea, Philippines, Puerto Rico, Sabah, Sarawak, Sierra Leone, Singapore, Solomon Islands, Uganda.
Notes: SACCARDO (1921) described this variety on leaves of *Citrus acida*. A re-examination of type material showed that the leaves were infected by a *Meliola* sp., on which *Spiropes guareicola* parasitized.

epacridis McAlpine, Victoria Naturalist 17(10): 186 (1901).

Holotype: on living leaves of *Epacris impressa* (Epacridaceae), Australia, Victoria, Caulfield, Aug. 1900, C. French (VPRI).
Lit.: SACCARDO (1902: 1058).
Notes: Excluded from *Cladosporium* s. str., but its taxonomic status is not yet certain.

eriolobi Thaung, Trans. Brit. Mycol. Soc. 63(3): 620 (1974).

≡ ***Stenella eriolobi*** (Thaung) K. Schub. & U. Braun, **comb. nov.**

Holotype: on living leaves of *Eriolobus indica* (Rosaceae), Myanmar (Burma), Maymyo, botanical garden, 28 Dec. 1972, Mya Thaung (IMI 175732).

On living leaves without distinct leaf spots, forming greyish olivaceous to olivaceous-brown discolorations on the lower leaf surface, effuse. *Colonies* hypophyllous, scattered, loose to dense, villose, non-caespitose, erect to somewhat decumbent, dark brown to blackish. *Primary mycelium* internal; hyphae branched, 2–3 µm wide, septate, pale brown, smooth, sometimes swollen, swollen hyphal cells 3–5 µm wide, often substomatal, pale brown or somewhat darker than hyphae, walls unthickened or only slightly thickened, hyphae emerging through stomata and forming rough-walled superficial mycelium. *Stromata* absent. *Secondary mycelium* external, superficial; hyphae branched, 2–4 µm wide, septate, pale olivaceous-brown to pale yellowish brown, verruculose to verrucose or very coarsely echinulate, walls unthickened or only slightly thickened, sometimes climbing leaf hairs. *Conidiophores* solitary, arising from superficial hyphae, lateral or terminal, erect, straight to flexuous, more or less rigid, unbranched, 76–550 × 4.5–6 µm, often inflated at the base, 4.5–7 µm wide, pluriseptate, not constricted at the septa, medium to dark brown, somewhat paler towards the apex, smooth to slightly rough-walled, verruculose, walls distinctly thickened, up to 1 µm wide. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical to subcylindrical, proliferation sympodial, with a single

or several conidiogenous loci, not very conspicuous, truncate to slightly convex, 1–2(–2.5) µm wide, very slightly thickened, refractive, sometimes somewhat darkened. *Conidia* solitary or in unbranched or branched chains, ellipsoid, subcylindrical, fusiform, 8–19(–29) × 2.5–5 µm, mostly only up to 10 µm long, 0–3-septate, sometimes slightly constricted at the septa, pale yellowish brown, concolorous with the hyphae, smooth to verruculose, walls unthickened or only slightly thickened, apex rounded or more or less truncate, base truncate, hila subconspicuous, 1–2 µm wide, very slightly thickened, refractive, sometimes somewhat darkened.

Host(s) & distribution: *Eriolobus indica* (Rosaceae); Myanmar.

eschscholtziae (Harkn.) Dingley, nom. ined.

Holotype: on leaves of *Eschscholtzia californica* (Papaveraceae), USA, California, San Francisco, Jan. [1884], Harkness, No. 3116 (destroyed).
≡ *Heterosporium eschscholtziae* Harkn., Bull. Calif. Acad. Sci. 1: 38 (1884).
≡ ***Acroconidiella eschscholtziae*** (Harkn.) M.B. Ellis, More Dematiaceous Hyphomycetes: 407 (1976).
Lit.: DAVID (1997: 111).
Host(s) & distribution: *Eschscholtzia californica*, *Eschscholtzia* sp. (Papaveraceae); Mauritius, USA (CA).

ferrugineum Allesch., in Hennings, Hedwigia 34: 116 (1895).

Lectotype: on leaves of *Sweetia bijuga* (Fabaceae), Brazil, Minas Geraës, Paranahyba, Jul. 1892, E. Ule, No. 1905 (M-57571). Isolectotype: HBG.
≡ ***Passalora sweetiae*** K. Schub. & U. Braun, Mycol. Progress 4(2): 105 (2005).
Lit.: SACCARDO (1895: 619).
Host(s) & distribution: *Sweetia bijuga* (Fabaceae); Brazil.

ferrugineum R.F. Castañeda, Fungi Cubensis II: 4 (1987), nom. illeg., homonym, non *C. ferrugineum* Allescher, 1895.

Holotype: on living leaves of *Nectandra coriacea* (Lauraceae), Cuba, prov. Matanzas, Calimete, 24 Jan. 1987, R.F. Castañeda (INIFAT C87/45). Ex-type: CBS 784.87.
Host(s) & distribution: *Nectandra coriacea* (Lauraceae); Cuba.
Notes: Excluded, taxonomic affinity unclear.

flueggeae Thüm., ad. int., in Rabenhorst, F. eur., Cent. XVI, No. 1571 (1872), nom. nud.

Syntypes: on leaves of *Flueggea japonica* (Euphorbiaceae), Greece, Athina, 20 Sept. 1869, de Heldreich, Rabenh., F. eur. 1571 (e.g., HAL; HBG).
Host(s) & distribution: *Flueggea japonica* (Euphorbiaceae); Greece.
Notes: Excluded, mixed infection with *Alternaria* sp., *Colletotrichum* sp. and an unknown phialidic hyphomycete.

foveolicola Speg., Anales Mus. Nac. Buenos Aires 20: 437 (1910).

Fig. 112

≡ ***Passalora foveolicola*** (Speg.) K. Schub. & U. Braun, **comb. nov.**

Holotype: on living leaves of *Eupatorium bupleurifolium* (Asteraceae), Argentina, near San Javier, Misiones, Aug. 1909 (LPS 13.136).
Lit.: SACCARDO (1913a: 1369), FARR (1973).

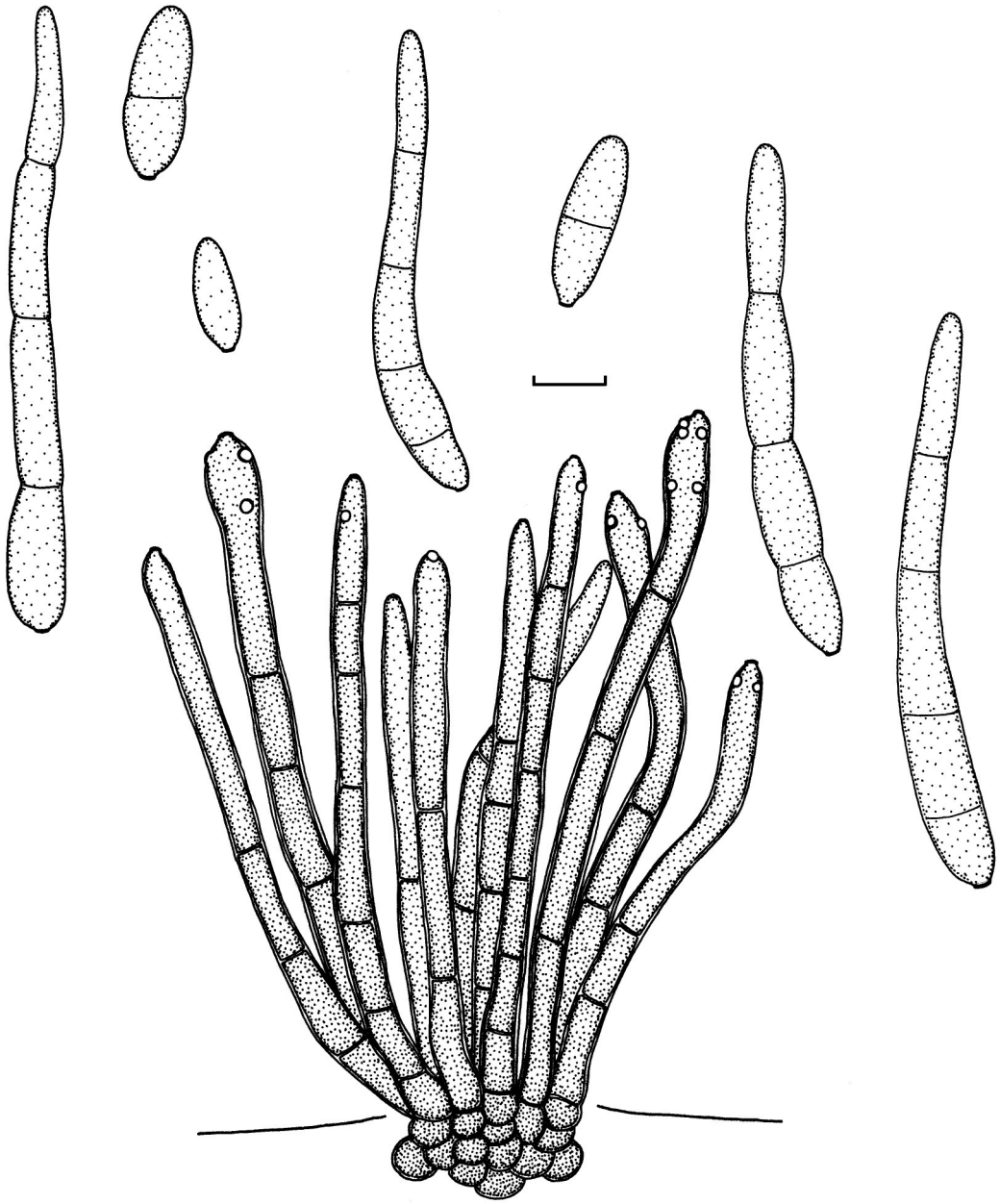

Fig. 112: *Cladosporium foveolicola*. Fascicle of conidiophores and conidia. Bar = 10 µm.

On living leaves, without distinct leaf spots. *Colonies* amphigenous, not very conspicuous, erumpent through foveoles, caespitose, dense, dark brown or blackish, velvety. *Mycelium* internal. *Stromata* intraepidermal, compact, 20–90 µm wide, composed of subglobose, swollen hyphal cells. *Conidiophores* in large fascicles, loose to dense, arising from stromata, erumpent through the cuticle, erect, straight to somewhat flexuous, cylindrical-oblong, non-geniculate, unbranched, 50–110 × 4–8 µm, pluriseptate, pale to medium dark brown, paler towards the apex, smooth or almost so, walls thickened, up to 1(–2) µm wide, sometimes distinctly two-layered. *Conidiogenous cells* integrated, usually terminal, cylindrical-oblong, proliferation sympodial, with a single or several conidiogenous loci, truncate, 1.5–2 µm wide, somewhat thickened and darkened-refractive. *Conidia* solitary, straight to slightly curved, subcylindrical to obclavate, (15–)25–85 × 5–8 µm, 1–4-septate, often slightly constricted at the septa, pale brown, smooth, walls more or less unthickened, somewhat attenuated towards the apex, ends rounded, hila truncate, 1.5–2.5 µm wide, somewhat thickened and darkened-refractive.

Host(s) & distribution: *Eupatorium bupleurifolium* (Asteraceae); Argentina.

Notes: *Passalora assamensis* (S. Chowdhury) U. Braun & Crous, *P. costaricensis* (Syd.) U. Braun & Crous and *P. perfoliati* (Ellis & Everh.) U. Braun & Crous, also known to occur on *Eupatorium* spp., are all mycovellosiella-like and, therefore, quite distinct by forming an external, secondary mycelium and conidia in chains.

fulvum Cooke, Grevillea 12(61): 32 (1883).

Type: on leaves of tomato (*Lycopersicon esculentum*) (Solanaceae), USA, South Carolina, Rav., F. amer. exs. 599 (K).

≡ ***Passalora fulva*** (Cooke) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 453 (2003).

Lit.: SACCARDO (1886: 363), LINDAU (1907: 829; 1910: 797), FERRARIS (1912: 349; 1914: 885), DE VRIES (1952: 70), ELLIS (1971: 306–307), HOLIDAY & MULDER (1976), ARX (1987: 195), HO et al. (1999: 128).

Host(s) & distribution: *Lycopersicon esculentum* (Solanaceae); cosmopolitan.

gloeosporioides G.F. Atk., Cornell Univ. Sci. Bull. 3(1): 39 (1897).

Lectotype: on leaves and stems of *Hypericum mutilum* (Hypericaceae), USA, Alabama, Lee Co., Auburn, 2 Sept. 1891, Duggar (CUP-A2170). Syntype: on leaves of *Ascyrum stans* (≡ *Hypericum stans*), USA, Alabama, Lee Co., Auburn, 29 Aug. 1891, G.F. Atkinson (CUP-A2064).

≡ ***Dischloridium gloeosporioides*** (G.F. Atk.) U. Braun & K. Schub., in Schubert & Braun, Fungal Diversity (2005), in press.

Lit.: SACCARDO (1899: 1080).

Host(s) & distribution: *Hypericum mutilum*, *H. stans*, *H. virginicum* (Hypericaceae); USA (AL, MA, MS, NJ, NY, WI).

guanicense F. Stevens, Trans. Illinois Acad. Sci. 10: 207 (1917), as '*guanicensis*'.

Syntypes: on leaves of *Argemone mexicana* (Papaveraceae), Puerto Rico, Guanica, 2 Mar. 1913, F.L. Stevens, Porto Rican Fungi 347 (a) (BPI 426841, 426844, 426487; ILL 15873; MICH; PC).

≡ ***Passalora guanicensis*** (F. Stevens) U. Braun & R.F. Castañeda, in Castañeda Ruiz & Braun, Cryptog. Bot. 1(1): 46 (1989).

Lit.: SACCARDO (1931: 794), CROUS & BRAUN (2003: 206).

Host(s) & distribution: *Argemone mexicana* (Papaveraceae); Brazil, Cuba, Dominican Republic, India, Jamaica, Puerto Rico, USA (IL), Venezuela, Virgin Islands.

gynoxidicola Petr., Sydowia 2: 381 (1948), as '*gynoxidicolum*'.

Types: on living leaves of *Gynoxys* sp. (Asteraceae), Ecuador, Pichincha mountains near Quito, 30 Nov. 1937 (M-57615; IMI 88949: slide).

≡ ***Passalora gynoxidicola*** (Petr.) K. Schub. & U. Braun, Fungal Diversity (2005), in press.

Lit.: ELLIS (1976: 342), MULDER (1982: 478).

Host(s) & distribution: *Gynoxys* sp. (Asteraceae); Ecuador.

herbarum [(Pers.: Fr.) Link] f. *rubi* Gonz. Frag., Mem. Real Acad. Ci. Barcelona, Ser. 3, 15(17): 458 (32) (1920).

Syntypes: on leaves of *Rubus rusticanus* (= *R. ulmifolius*) and *Rubus* sp. (Rosaceae), Spain, Barcelona, Bonanova and Vallvidrera, Sept. 1915 and Jul. 1918, Fr. Sennen (MA 06328, 06329).

= ***Pseudocercospora rubi*** (Sacc.) Deighton, Mycol. Pap. 140: 152 (1976).
Lit.: SACCARDO (1931: 795), PRASIL & DE HOOG (1988: 53).
Host(s) & distribution: see CROUS & BRAUN (2003: 359).

heterosporium, in herb.

On an unidentified host plant, USA, New York, Buffalo, G.W. Clinton (BPI 427204).
Host(s) & distribution: unidentified host plant; USA (NY).
Notes: Excluded, conidiophores with tretic conidiogenous loci. Taxonomic affinity unclear.

hoveae Syd. & P. Syd., Ann. Mycol. 15: 148 (1917).

Holotype: on leaves of *Hovea longifolia* var. *pannosa* (Fabaceae), Australia, Brisbane River, 1863–1865, A. Dietrich, comm. J. Bornmüller (S).
≡ ***Pseudocercospora hoveae*** (Syd. & P. Syd.) K. Schub. & U. Braun, Mycol. Progr. 4(2): 106 (2005).
Lit.: SACCARDO (1931: 792).
Host(s) & distribution: *Hovea longifolia* var. *pannosa* (Fabaceae); Australia.

humile Davis, Trans. Wisconsin Acad. Sci. 19: 702 (1919).

Lectotype: on leaves of *Acer rubrum* (Aceraceae), USA, Wisconsin, Luck, 25 Aug. 1916, J.J. Davis (WIS). Isolectotype: BPI 427214.
≡ ***Fusicladium humile*** (Davis) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 152, No. 1520 (2002).
Lit.: SACCARDO (1931: 788), ELLIS (1976: 340), SIVANESAN (1984: 607), SCHUBERT et al. (2003: 57), PARTRIDGE & MORGAN-JONES (2003: 366).
Host(s) & distribution: *Acer* spp. (Aceraceae); Canada (NB., Nfld., Ont.), USA (AL, MI, NC, NY, WI).

infuscans Thüm., Rev. Mycol. (Toulouse) 1: 59 (1879).

Syntypes: on living stems of *Desmodium strictum* (Fabaceae), USA, South Carolina, Aiken, H.W. Ravenel, Thüm., Mycoth. univ. 1573 (e.g., BPI 427232, 427231; HAL; M; NY).
≡ ***Dendryphiella infuscans*** (Thüm.) M.B. Ellis, Dematiaceous Hyphomycetes: 500 (1971).
Lit.: SACCARDO (1886: 361).
Host(s) & distribution: herbaceous stems; widely distributed in Europe and North America.

jacarandae Viégas, Bragantia 7(2): 33 (1947).

Holotype: on living leaves of *Jacaranda* sp. (Bignoniaceae), Brazil, Minas Gerais, Agua Limpa, Exp. de Agua Limpa, 21 May 1945, E.P. Heringer (IACM).
≡ ***Fusicladium jacarandae*** (Viégas) K. Schub., U. Braun & F. Freire, in Schubert & Braun, Sydowia 56(2): 302 (2004)
Host(s) & distribution: *Jacaranda* sp. (Bignoniaceae); Brazil.

lactucae Sawada, Rep. Gov. Res. Inst. Formosa 85: 92 (1943), nom. inval.

Syntypes: on *Lactuca indica* (Asteraceae), Taiwan, Taipeh, 9 Mar. 1924, K. Sawada (BPI 427238; PPMH).
= ***Passalora lactucicola*** (Y. Cui & Z.Y. Zhang) K. Schub. & U. Braun, Mycol. Progr. 4(2): 105 (2005).

lactucicola Y. Cui & Z.Y. Zhang, in He & Zhang, Mycosystema 21(1): 22 (2002).

Holotype: on living leaves of *Lactuca indica* (Asteraceae), China, Sichuan Prov., Chengdu, 15 Aug. 1985, Y. Qing (MHYAU 03881).

≡ ***Passalora lactucicola*** (Y. Cui & Z.Y. Zhang) K. Schub. & U. Braun, Mycol. Progr. 4(2): 105 (2005).

Host(s) & distribution: *Lactuca indica*, *L. sativa* (Asteraceae); China, Taiwan.

lantanae K. Bhalla & A.K. Sarbhoy, Indian Phytopathol. 53(3): 263 (2000).

Holotype: on living leaves of *Lantana camara* (Verbenaceae), Cuba, Bayamo, Mar. 1967, R. Urtiaga (IMI 126781b).

≡ ***Passalora lantanae*** var. ***cubensis*** (Deighton) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 243 (2003).

Host(s) & distribution: *Lantana camara* (Verbenaceae); Cuba.

laxum Kalchbr. & Cooke, Grevillea 9(49): 24 (1880).

Types: on fading leaves of *Printzia pyrifolia* (Asteraceae), South Africa (IMI 115272; K).

≡ ***Passalora laxa*** (Kalchbr. & Cooke) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 458 (2003).

Lit.: SACCARDO (1886: 358).

Host(s) & distribution: *Printzia pyrifolia* (Asteraceae); South Africa.

lethiferum Peck, Rep. (Annual) New York State Mus. Nat. Hist. 40: 64 (1887).

Holotype: on living leaves of *Populus tremuloides* (Salicaceae), USA, New Hampshire, Keene, Jun. 1887, Peck (NYS). Isotype: BPI 427241.

≡ ***Fusicladium radiosum*** [(Lib.) Lind] var. ***lethiferum*** (Peck) Ritschel & U. Braun, in Schubert, Ritschel & Braun, Schlechtendalia 9: 87 (2003).

Lit.: SACCARDO (1892: 604).

Host(s) & distribution: *Populus* spp., (Salicaceae); Belgium, Canada (Alta., BC., Labr., Man., NB., NS., Ont., PEI, Que., Sask.), Great Britain, USA (AK, ID, ME, MD, MT, NH, NY, PA, SD, WI).

levieri (Magnus) Hara, Agric. & Hort. 12: 2706 (1937).

Holotype: on *Diospyros lotus* (Ebenaceae), Caucasus, Georgia, Batum, 'in silvis litoris Euscini', 16 Jun. 1890 (HBG).

≡ ***Fusicladium levieri*** Magnus, in Sommier & Lévier, Trudy Imp. S.- Peterburgsk. Bot. Sada 16: 543 (1900).

Lit.: CROUS & BRAUN (2003: 482), SCHUBERT et al. (2003: 61–62), SCHOLLER et al. (2004: 132–134).

Host(s) & distribution: *Diospyros kaki*, *D. lotus*, *D. virginiana* (Ebenaceae); China, Georgia, India, Japan, Romania, USA (CT, FL, IN, MS).

lonicerae Sawada, Rep. Gov. Res. Inst. Formosa 86: 163 (1943), nom. inval.

Type: on *Lonicera japonica* var. *sempervillosa* (Caprifoliaceae), Taiwan, Taipeh, 20 Dec. 1914, K. Sawada (BPI 427243).

= ***Stenella lonicericola*** (Y.H. He & Z.Y. Zhang) K. Schub., H.D. Shin & U. Braun, in Schubert & Braun, Fungal Diversity (2005), in press.

lonicericola Y.H. He & Z.Y. Zhang, Mycosystema 20(4): 469 (2001) and in Zhang et al., Flora Fungorum Sinicorum, Vol. 14: 116 (2003).

Holotype: on living leaves of *Lonicera japonica* (Caprifoliaceae), China, Yunnan Prov., Kunming, 3 Aug. 1990, H. Li (MHYAU 03533).

≡ ***Stenella lonicericola*** (Y.H. He & Z.Y. Zhang) K. Schub., H.D. Shin & U. Braun, in Schubert & Braun, Fungal Diversity (2005), in press.

Host(s) & distribution: *Lonicera japonica* (Caprifoliaceae); China, Taiwan.

Notes: *Abelia biflora* and *Leycesteria formosa* have been reported as additional hosts (ZHANG et al. 2003).

lysimachiae H.C. Greene, Trans. Wisconsin Acad. Sci. 38: 232 (1946), nom. illeg., homonym, non *C. lysimachiae* Guba, 1939.

Syntypes: on living leaves and stems of *Lysimachia terrestris* (Primulaceae), USA, Wisconsin, Dane Co., Madison, Univ. Wisconsin Arboretum, Marsh, 24 Aug. 1943, H.C. Greene (BPI 427245; WIS).

= ***Fusicladium lysimachiae*** (Guba) K. Schub. & U. Braun, Mycol. Progr. 4(2): 102 (2005).

lysimachiae Guba, Rhodora 41: 513 (1939).

Holotype: on living leaves, rarely on the stems of *Lysimachia vulgaris* (Primulaceae), USA, Massachusetts, Nantucket Co., Nantucket, in waste places near the waterfront east of Main Street, 15 Aug. 1936, E.F. Guba, No. 115 (ILL 21101).

≡ ***Fusicladium lysimachiae*** (Guba) K. Schub. & U. Braun, Mycol. Progr. 4(2): 102 (2005).

Host(s) & distribution: *Lysimachia terrestris*, *L. vulgaris* (Primulaceae); USA (MA, WI).

lythri Westend., Bull. Acad. Roy. Sci. Belgique 21(8): 240 (1854).

Holotype: on leaves of *Lythrum salicaria* (Lythraceae), Belgium, near Courtrai, Westendorp, No. 1091 (BR).

≡ ***Stenella lythri*** (Westend.) J.L. Mulder, Trans. Brit. Mycol. Soc. 65: 517 (1975).

Lit.: SACCARDO (1886: 452), LINDAU (1910: 122, 803), CHUPP (1954: 362), CROUS & BRAUN (2003: 259).

Host(s) & distribution: see CROUS & BRAUN (2003: 259).

machili Sawada, Special Publ. Coll. Agric. Natl. Taiwan Univ. 8: 196 (1959), nom. inval.

Holotype: on leaves of *Machilus thunbergii* (≡ *Persea thunbergii*) (Lauraceae), Taiwan, Pref. Taipei, Taipei, 15 Nov. 1914, Y.F. (PPMH).

On the lower leaf surface as greyish brown discolorations, pale to dark, scattered, punctiform to effuse, without definite margin. *Colonies* hypophyllous, loose, straight to somewhat decumbent, dark brown to blackish, villose. *Mycelium* internal, subcuticular; hyphae branched, 2–3(–4) µm wide, septate, with swellings and constrictions, pale brown, smooth, sometimes slightly rough-walled, walls slightly thickened. *Stromata* absent. *Conidiophores* solitary, arising from hyphae, erumpent through the cuticle, erect to subdecumbent, straight to flexuous, lower part unbranched, several times branched towards the apex, 90–200 long, 5–7 µm wide near the base, attenuated towards the apex, 3–4 µm wide, pluriseptate, more closely septate towards the apex, without any constrictions, medium to dark brown, paler towards the apex, pale brown at the apex, sometimes concolorous with hyphae and conidia, smooth, thick-walled, walls less thickened towards the apex, often swollen at the base, up to 13 µm wide, sporadically enteroblastically

proliferating, which is not connected with conidiogenesis. *Conidiogenous cells* integrated, terminal or intercalary, 5–20 µm long, proliferation sympodial, with numerous conidiogenous loci, subdenticulate, truncate to slightly convex, 1–1.5 µm wide, slightly thickened, somewhat darkened-refractive. *Conidia* solitary, straight to slightly curved, ellipsoid, obclavate, subcylindrical, 6–16.5 × 2.5–4 µm, 0–2-septate, sometimes slightly constricted at the septa, pale brown, smooth, walls more or less unthickened, apex attenuated or rounded, hila truncate, 1–1.5 µm wide, slightly thickened, somewhat darkened-refractive.

Host(s) & distribution: *Machilus thunbergii* (≡ *Persea thunbergii*) (Lauraceae); Taiwan.

Notes: A re-examination of type material showed a gonatophragmium-like hypomycete, so that *C. machili* has to be excluded from *Cladosporium* s. str.

maculatum Cooke, Fungi britannici exsiccati, No. 162 (?), nom. nud.

On an unidentified host, Great Britain, Channel Islands, Jersey, Cooke, F. brit. exs. 162 (B 70-6613).
Lit.: OUDEMANS (1921).
Host(s) & distribution: unidentified host; Great Britain.
Notes: Cercosporoid, material immature and poor.

maculicola Ellis & Barthol., in herb.

On leaves of *Populus monilifera*, USA, Kansas, Rockport, Sept. 1894, E. Bartholomew, ex herb. Ellis (BPI 427256, isolectotype of *Cladosporium subsessile*).
= ***Fusicladium subsessile*** (Ellis & Barthol.) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 152, No. 1519 (2002).

maculicola (Romell & Sacc.) M. Morelet, Bull. Soc. Sci. Nat. Archéol. Toulon & Var 201: 4 (1972), as '*maculicolum*'.

Lectotype: on living leaves of *Populus tremula* (Salicaceae), Sweden, Nacka Vikdalen, 24 Jun. 1890, L. Romell (S). Isolectotypes: IMI 17008, PAD, WINF(M) 11082.
≡ ***Fusicladium romellianum*** Ondřej, Česká Mykol. 27(4): 237 (1973).
Lit.: ELLIS (1976: 322), SCHUBERT & BRAUN (2002b, c), SCHUBERT et al. (2003: 90–92).
Host(s) & distribution: *Populus* spp. (Salicaceae); Canada (Alta., BC., Man., Nfld., NWT., Ont., Que., Sask.), Finland, Germany, India, Kazakhstan, Latvia, Sweden, USA (AK, CO, UT, WI).

malorum Rühle, Phytopathology 21: 1146 (1931).

Type: on living fruits of *Pyrus malus* (= *Malus sylvestris*) (Rosaceae), USA, Washington.
≡ ***Alternaria malorum*** (Rühle) U. Braun, Crous & Dugan, in Braun, Crous, Dugan, Groenewald & de Hoog, Mycol. Progr. 2(1): 5 (2003).
Lit.: HO et al. (1999: 134).
Host(s) & distribution: pathogenic in ripe apples (*Malus sylvestris*) and ripe cherris, generally saprobic, isolated from different substrates; Canada, Pakistan, South Africa, Syria, Turkey, USA.

marinum A.K. Pal & Purkay., J. Mycopathol. Res. 30(2): 175 (1992).

Holotype: on living leaves of *Avicennia marina* (Avicenniaceae), India, West Bengal, Sundarban, Bakkhali, 10 Jun. 1991 (on the label) / 14 May 1991, A.K. Pal (IMI 351331).
Host(s) & distribution: *Avicennia marina* (Avicenniaceae); India.

Notes: Excluded, but status unclear. PAL & PURKAYASTHA (1992) described micronematous conidiophores and thick-walled, brownish chlamydospores.

martianoffianum Thüm., Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 55(1): 74 (1880).

Lectotype: on living leaves of *Populus laurifolia* (Salicaceae), Russia, Sibiria, Minussinsk, near river Jenissei, Aug. 1879, N. Martianoff (M). Isolectotypes: Thüm., Mycoth. univ. 2067.

≡ ***Fusicladium martianoffianum*** (Thüm.) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 152, No. 1515 (2002).

Lit.: SACCARDO (1886: 357), LINDAU (1907: 818; 1910: 796), SCHUBERT et al. (2003: 64–65).

Host(s) & distribution: *Populus* spp. (Salicaceae); India, Kazakhstan, Kirghizia, Russia (Siberia), Tadzhikistan, Turkmenistan, Uzbekistan.

mikaniae F. Stevens, Trans. Illinois Acad. Sci. 10: 208 (1917).

Types: on leaves of *Mikania* sp. (Asteraceae), Puerto Rico, Las Marias, 22 Mar. 1913, F.L. Stevens (ILL 314; IMI 119607).

≡ ***Passalora mikaniae*** (F. Stevens) U. Braun & F. Freire, Cryptog. Mycol. 23: 300 (2002).

Lit.: SACCARDO (1931: 790), CROUS & BRAUN (2003: 460).

Host(s) & distribution: *Mikania* sp. (Asteraceae); Brazil, Puerto Rico.

milii Syd., Ann. Mycol. 12: 538 (1914).

Syntypes: on leaves of *Milium effusum* (Poaceae), France, 'Lothringen', 'Wald am Oetinger Tälchen' near Forbach, 22 Jun. 1913, A. Ludwig, Syd., Mycoth. germ. 1295; on leaves of *Milium effusum*, 'Ostpreussen, Warnicken, Samland', 11 Jul. 1914, H. Sydow, Syd., Mycoth. germ. 1296 (BPI 427263; HBG; M).

≡ ***Passalora milii*** (Syd.) G.A. de Vries, Contr. Knowl. Genus *Cladosporium*: 94 (1952).

Lit.: SACCARDO (1931: 792), CROUS & BRAUN (2003: 460).

Host(s) & distribution: *Milium effusum* (Poaceae); France, Russia.

minor R.F. Castañeda, Fungi Cubensis III: 22 (1988), as '*minus*', nom illeg., homonym, non *C. minor* Spreng. 1827.

Holotype: on an unidentified leaf, Cuba, Prov. Pinar del Río, Viñales, 25 Sept. 1987, R.F. Castañeda (INIFAT C87/292-2).

≡ ***Castanedaea minor*** A. Baker & Partridge, in Partridge, Baker & Morgan-Jones, Mycotaxon 78: 178 (2001), nom. nov., as '(R.F. Castañeda) A. Baker & Partridge'.

Host(s) & distribution: unidentified leaf; Cuba.

modestum Syd., Ann. Mycol. 37: 252 (1939).

Type: on living leaves of *Anthostema senegalensis* (Euphorbiaceae), Sierra Leone, Kenema, 5 Dec. 1938, F.C. Deighton (IMI 7520).

≡ ***Denticularia modesta*** (Syd.) Deighton, Trans. Brit. Mycol. Soc. 59(3): 422 (1972).

Lit.: ELLIS (1976: 183).

Host(s) & distribution: *Anthostema senegalensis* (Euphorbiaceae); Sierra Leone.

molle Cooke, Grevillea 6(40): 139 (1878).

Types: on under surface of dead leaves of *Asclepias* sp. (Asclepiadaceae), USA, South Carolina, Aiken [IMI (slide); K; M].

≡ ***Passalora venturioides*** (Peck) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 419 (2003).
Lit.: SACCARDO (1886: 363), LINDAU (1907: 828).
Host(s) & distribution: see CROUS & BRAUN (2003: 419).

monardae H.C. Greene, Amer. Midl. Naturalist 50(2): 508 (1953).

Syntypes: on living leaves of *Monarda punctata* (Lamiaceae), USA, Wisconsin, Dane Co. Madison, Univ. Wisconsin Arboretum, Prairie, 10 Aug. 1952, H.C. Greene (BPI 427271; WIS).
≡ ***Fusicladium monardae*** (H.C. Greene) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 71 (2005).
Host(s) & distribution: *Monarda punctata* (Lamiaceae), USA (WI).

musae E.W. Mason, in E.B. Martyn, Mycol. Pap. 13: 2 (1945).

Lectotype: on leaves of *Musa* sp. (Musaceae), Jamaica, 7 Sept. 1942, E.B. Martyn (IMI 7521, slide ex type collection). Epitype: on *Musa* sp., Honduras, R.H. Stover (CBS 14788).
≡ ***Metulocladosporiella musae*** (E.W. Mason) Crous, Schroers, Groenewald, U. Braun & K. Schub., Mycol. Res. (2005), in press.
Lit.: ELLIS (1971: 317), DAVID (1988b), HO et al. (1999: 136).
Host(s) & distribution: *Musa* spp., incl. *M.* ×*paradisiaca* (incl. var. *sapientum*) and *M. schweinfurthii* (= *Ensete gillesii*); Bangladesh, Burundi, Cameroon, Côte d'Ivoire, Cuba, Democratic Republic of Congo, Ecuador, Egypt, Ethiopia, Ghana, Guinea, Hong Kong, Honduras, Indonesia, Jamaica, Kenya, Malaysia, Mexico, Mozambique, Nepal, Rwanda, Sabah, Sierra Leone, Solomon Islands, Sri Lanka, South Africa, Sudan, Thailand, Togo, Uganda, Vietnam, West Samoa, Zimbabwe.

myrticola Bubák, Ann. Mycol. 13: 113 (1915).

Holotype: on leaves of *Myrtus communis* (Myrtaceae), Italy, Tyrol, Gries near Bozen, 30 May 1914, Dr. W. Pfaff (BPI 427273).
≡ ***Fusicladium myrticola*** (Bubák) K. Schub. & U. Braun, Fungal Diversity (2005), in press.
Lit.: SACCARDO (1931: 793).
Host(s) & distribution: *Myrtus communis* (Myrtaceae); Italy.

nervale Ellis & Dearn., in Bartholomew, F. columb., Cent. 21, No. 2010 (1905).

Syntypes: on living leaves of *Rhus typhina* (Anacardiaceae), Canada, London, Jul. / Aug. 1904, J. Dearness, Barthol., F. columb. 2010 (BPI 427277–427278; ILL; NY).
= ***Fusicladium aromaticum*** (Ellis & Everh.) K. Schub. & U. Braun, Fungal Diversity (2005), in press.
Notes: *Cladosporium nervale*, which proved to be conspecific with *Fusicladium aromaticum*, was reported from China as causal agent of leaf spots on *Rhodea japonica*, Convallariaceae (ZHANG et al. 2003). However, description, illustration and host species of the Chinese record are quite distinct and the name is undoubtedly misapplied.

orbiculans Schwein.?, in herb.

On leaves of *Ixora* sp. (Rubiaceae), Surinam (PH 01020416).
Host(s) & distribution: *Ixora* sp. (Rubiaceae), Surinam.
Notes: Excluded, but status unclear.

orbiculatum Desm., Ann. Sci. Nat. Bot., Sér. 3, 11: 275 (1849).

Lectotype: on living leaves of *Sorbus domestica* (Rosaceae), herb. Desmazières (PC).
= ***Fusicladium pomi*** (Fr.) Lind, Dan. fung.: 521 (1913).
Lit.: LINDAU (1907: 782), CROUS & BRAUN (2003: 485), SCHUBERT et al. (2003: 76).
Host(s) & distribution: *Amelanchier*, *Aronia*, *Cotoneaster*, *Docynia*, *Eriobotrya*, *Heteromeles*, *Kagenackia*, *Malus*, *Prunus*, *Pyracantha*, *Pyrus* and *Sorbus* spp. (Rosaceae); cosmopolitan.

orchidis E.A. Ellis & M.B. Ellis, in M.B. Ellis, Mycol. Pap. 131: 17 (1972).

Holotype: on living leaves of *Orchis praetermissa* (≡ *Dactylorhiza majalis* subsp. *praetermissa*) (Orchidaceae), Great Britain, Norfolk, Horsey Warren, 17 Jul. 1955, E.A. Ellis (IMI 60545).
≡ ***Fusicladium orchidis*** (E.A. Ellis & M.B. Ellis) K. Schub. & U. Braun, Sydowia 56(2): 314 (2004).
Lit.: ELLIS (1976: 338), ELLIS & ELLIS (1985).
Host(s) & distribution: *Dactylorhiza majalis* subsp. *praetermissa* (Orchidaceae); Great Britain.

osterici Ces., in herb.

On *Ostericum verticillare* (≡ *Peucedanum verticillare*) (Apiaceae), Italy (B 70-6651).
= ***Passalora depressa*** (Berk. & Broome) Sacc., Nuovo Giorn. Bot. Ital. 8: 187 (1876).
Host(s) & distribution: *Angelica* spp., *Peucedanum* spp. (Apiaceae); see CROUS & BRAUN (2003: 157).

oudemansii Kupka, Oesterr. Bot. Z. 67: 157 (1918), nom. nov.

Type: on leaves of *Phragmites communis* (= *P. australis*) (Poaceae), Netherlands.
≡ *Cladosporium phragmitis* J. Opiz ex Oudem., Ned. Kruidk. Arch., Ser. II, 6: 57 (1892), non *C. phragmitis* J. Opiz, 1852.
= ***Deightoniella arundinacea*** (Corda) S. Hughes, Mycol. Pap. 48: 29 (1952).
Lit.: LINDAU (1907: 814), DE VRIES (1952: 96), DAVID (1997: 137).
Host(s) & distribution: *Phragmites* spp. (Poaceae); Australia, Japan, Europe, North America.

oxycocci Shear, Bull. Torrey Bot. Club 34(6): 306 (1907).

≡ ***Stenella oxycocci*** (Shear) K. Schub. & U. Braun, **comb. nov.**

Holotype: on living leaves of *Vaccinium macrocarpon* (Ericaceae), Canada, Nova Scotia, Arichat, 21 Jun. 1902, C.L. Shear, No. 1492 (BPI 427299).
Lit.: SACCARDO (1913a: 1368).

Leaf spots reddish brown, frequently becoming paler at the centre with age. *Colonies* hypophyllous, scattered. *Primary mycelium* internal. *Stromata* small, subcuticular to intraepidermal, 25–45 µm diam., several layers deep, brown, composed of somewhat angular-irregular, swollen hyphal cells. *Secondary mycelium* external, superficial; hyphae sparingly branched, 1–3 µm wide, septate, pale brown or pale yellowish brown, rough-walled, somewhat enlarged and inflated at the base of the conidiophores. *Conidiophores* solitary, formed as lateral branches of external, creeping hyphae or in small fascicles, arising from stromata, erect, straight or slightly flexuous, cylindrical-oblong or filiform, unbranched, 50–100 × 2–5 µm, septate, brown or yellowish brown, paler at the tips, smooth, walls thickened. *Conidiogenous cells* integrated, terminal, with a single or few

conidiogenous loci, not very conspicuous, planate, ca. 1 µm wide, only somewhat thickened and darkened-refractive. *Conidia* solitary, ellipsoid-ovoid, short cylindrical or short subclavate, 9–26 × 2–4 µm, 0–1(–3)-septate, not constricted at the septa, yellowish brown, almost smooth to minutely verruculose, thin-walled, hila planate, ca. 1 µm wide, somewhat thickened and darkened-refractive.

Host(s) & distribution: *Vaccinium macrocarpon* (Ericaceae); Canada (NS.), USA (MA, NJ, WA).

Notes: Two additional collections from herb. NY, determinated as *C. oxycocci*, are not conspecific with the latter species. They showed only sparse fructification of several hyphomycetes, including *C. oxysporum*.

paeoniae Pass., in Thümen, Herb. myc. oec., Fasc. IX, No. 416 (1876) and Just's Bot. Jahresber. 4: 235 (1876). **Fig. 113; Pl. 34, Figs A–F**

Syntypes: on living leaves of *Paeonia edulis* (= *P. lactiflora*) (Paeoniaceae), Italy, Thüm., Herb. myc. oec. 416 (e.g., M-57753) and Thüm., Mycoth. univ. 670 (e.g., HAL; M-57752).
Lit.: SACCARDO (1886: 362), LINDAU (1907: 822), FERRARIS (1912: 348), LIND (1913: 524), DE VRIES (1952: 94), MCKEMY & MORGAN-JONES (1991a).
Exs.: Briosi & Cav., F. paras. 78; Ellis, N. Am. F. 543; F. latv. exs. 799; Herb. Mycol. Rom. 298; Krieger, F. sax. 1545; Syd., Mycoth. germ. 2447; Thüm., Herb. myc. oec. 416; Thüm., Mycoth. univ. 670.

Leaf spots amphigenous, variable in shape and size, subcircular-oval to irregular, broad, oblong and extended, up to 25 mm long or even longer, sometimes even covering the entire leaf surface, forming olivaceous-brown or blackish brown patches, without margin, diseased areas turning dry, also occurring on young, green stems. *Colonies* amphigenous, punctiform to effuse, loose to dense, caespitose, brown, villose. *Mycelium* internal, subcuticular to intraepidermal; hyphae sparsely branched, 4–7(–10) µm wide, septate, sometimes with swellings and constrictions, swollen hyphal cells up to 13 µm wide, subhyaline to pale brown, smooth, walls thickened, sometimes aggregated. *Conidiophores* solitary or in small, loose groups, arising from hyphae or swollen hyphal cells, erumpent through the cuticle, occasionally emerging through stomata, erect, straight to somewhat flexuous, cylindrical-oblong, unbranched, occasionally branched, 13–80(–120) × (4–)5–8(–10) µm, slightly attenuated towards the apex, often closely septate, not constricted at the septa, pale to medium brown, sometimes paler towards the apex, smooth, thick-walled, often distinctly two-layered, often inflated at the base, up to 14 µm wide, occasionally enteroblastically proliferating. *Conidiogenous cells* integrated, terminal or intercalary, cylindrical-oblong, 7–45 µm long, proliferation sympodial, with a single or several conidiogenous loci, subdenticulate to denticulate, protuberant, broadly truncate, 1.5–3 µm wide, unthickened or almost so, somewhat darkened-refractive. *Conidia* catenate, in branched chains, polymorphous, small conidia globose, subglobose, obovoid, 3–9 × 3–5 µm, aseptate, pale to medium brown, smooth, intermediate conidia limoniform, ellipsoid, fusiform, oblong, 5–23 × 3.5–6.5 µm, 0–2-septate, medium brown, smooth to minutely verruculose or irregularly rough-walled, large conidia ellipsoid, cylindrical-oblong, ampulliform, 22–45(–52) × (4.5–)5–8 µm, 0–5-septate, medium brown, smooth to minutely verruculose or irregularly rough-walled, walls thickened, hila truncate, 1–3 µm wide, unthickened or almost so, somewhat darkened-refractive; occasionally microcyclic conidiogenesis occurring.

Host(s) & distribution: *Paeonia arborea*, *P. delavayi*, *P. hybrida*, *P. lactiflora*, *P. moutan*, *P. obovata* var. *willmottiae*, *P. officinalis*, *P. potaninii*, *P. suffruticosa*, *Paeonia* spp. (Paeoniaceae); Armenia, Canada (BC., Ont.), China (Beijing, Gansu, Hebei, Heilongjiang,

Henan, Hubei, Jiangsu, Jiangxi, Jilin, Liaoning, Shaanxi, Shanxi, Sichuan, Yunnan), Denmark, Georgia Germany, Italy, Kazakhstan, Latvia, Moldavia, New Zealand, Romania, Russia, Switzerland, Ukraine, USA (range of hosts).

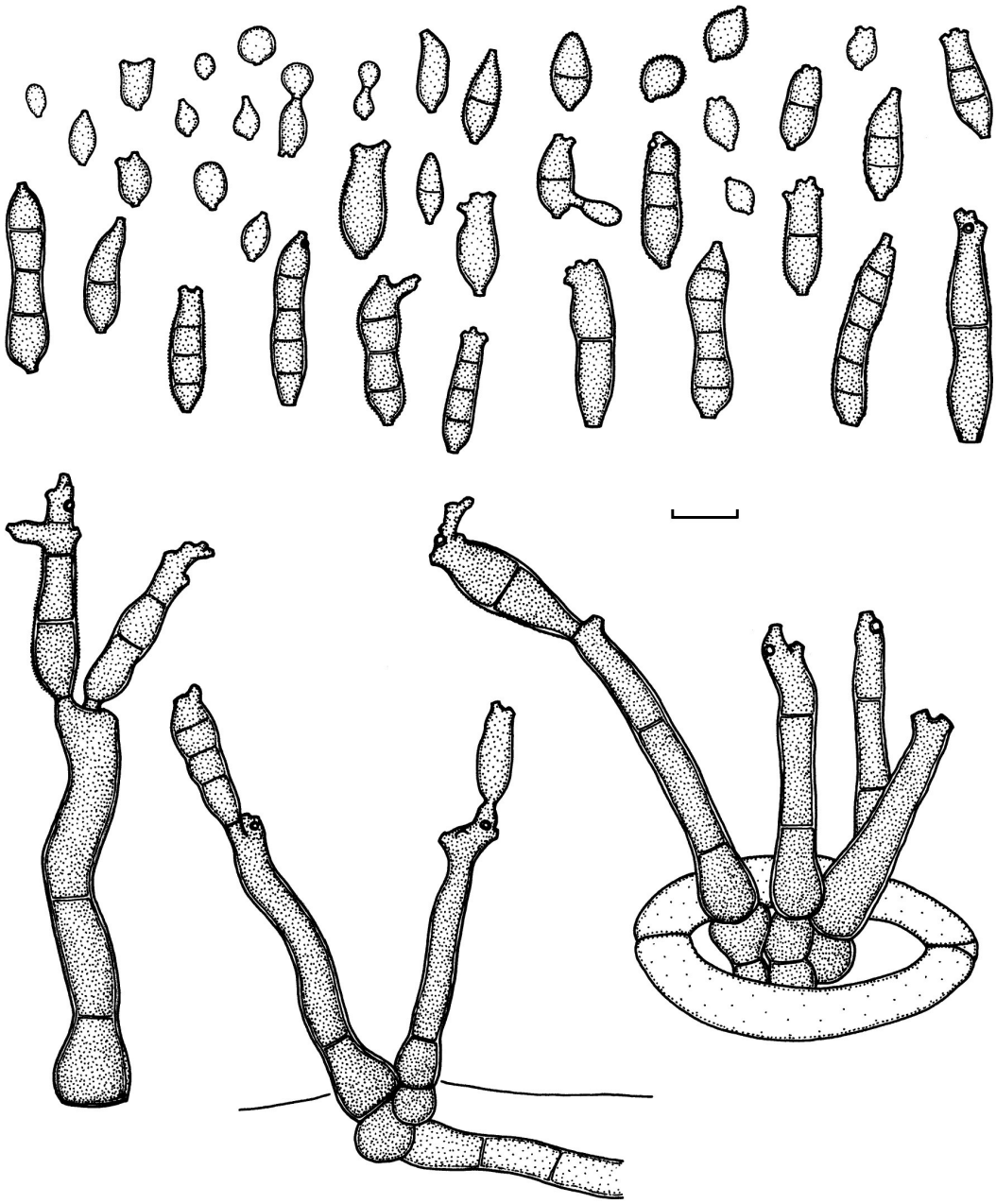

Fig. 113: *Cladosporium paeoniae*. Conidiophores and conidia (from syntype material M-57753). Bar = 10 µm.

Additional collections examined: on *Paeonia delavayi*, GERMANY, Sachsen-Anhalt, Halle (Saale), botanical garden, 22 Jun. 2004, K. Schubert (HAL). On *P. foemina* (= *P. officinalis*), LATVIA, prov. Vidzeme, Kr. Riga, Riga, in a garden, 28 Aug. 1936, J. Smarods, F. latv. exs. 799 (M-57747). On *P. officinalis*, GERMANY, Brandenburg, Schloßpark zu Tamsel, 15 Aug. 1924, P. Vogel, Syd. Mycoth. germ. 2447 (M-57751); Sachsen, Königstein, in Gärten, verbreitet, Aug. 1896, W. Krieger, Krieger, F. sax. 1545 (M-57749); Sachsen-Anhalt, Halle (Saale), botanical garden, 22 Jun. 2004, K. Schubert (HAL); ITALY, Pavia, botanical garden, summer 1889, Briosi & Cav., F. paras. 78

(M-57748); ROMANIA, Râmnicu-Vâlcea, distr. Vâlcea, Oltenia, 17 Aug. 1930, Tr. Săvulescu & C. Sandu, Herb. Mycol. Rom. 298 (M-57742). On *P. potaninii*, GERMANY, Hessen, Frankfurt am Main, botanical garden, 7 Oct. 2004, R. Kirschner (RoKi 2222). On Paeonia sp., North America, USA, Sept. 1878, Ellis, N. Am. F. 543 (M-57744).

Notes: SEM examinations (Pl. 34, Figs B, C, E, F) as well as molecular studies (Fig. 1) conclusively showed this species to be distinct from *Cladosporium* s. str., but its taxonomic affinity is not yet clear. The conidiogenous loci and conidial hila resemble those of the genus *Passalora* in being conspicuous, protuberant and more or less planate, but *C. paeoniae* does not cluster within the *Mycosphaerella* subclade. McKEMY & MORGAN-JONES (1991a) described *C. paeoniae* as semimacronematous state of *Cladosporium chlorocephalum* (Fresen.) E.W. Mason & M.B. Ellis, typically found on dead stems and leaves of *Paeonia* spp., and reduced it to synonymy with the latter species. However, both species are morphologically quite distinct. *C. chlorocephalum*, introduced by FRESENIUS (1850) as a species of the genus *Periconia* Tode, possesses long, thick, dark brown conidiophores bearing discrete, monoblastic or polyblastic conidiogenous cells on short, appressed branches toward the extreme apex giving them the appearance of a stipe and spherical head. Type material of Fresenius species could not be traced at the Senckenberg-Museum in Frankfurt and is probably not preserved. In spring 2005 it was collected on dead stems of *Paeonia officinalis* in the botanical garden of Halle, has been isolated in pure culture and included in the molecular studies carried out at the CBS. Surprisingly, *C. chlorocephalum* forms a small, well-supported subclade together with *C. paeoniae* (100% bootstrap support) (see Fig. 1). Sequences derived from the culture of *C. chlorocephalum* proved to be completely identical with sequences of *C. paeoniae*. MASON & ELLIS (1953) studied *C. chlorocephalum* in vitro and found that it readily produces micronematous conidiophores bearing ramoconidia and numerous chains of oval or spherical conidia when grown on malt agar, which are morphologically close to or even identical with those produced by *C. paeoniae* (McKEMY & MORGAN-JONES 1991a). Owing to these results both species possibly represent two, morphologically and ecologically distinct stages of the same species (synanamorphs). Further critical investigations are required to clarify the status and biology of the two species. They will be treated in more detail in a separate paper.
Type material of *Cladosporium paeoniae* var. *paeoniae-anomalae* Sacc., described from Siberia on leaves of *Paeonia anomala*, could not be traced and was, therefore, not available for a re-examination. DE VRIES (1952) considered this variety to be probably synonymous with *C. paeoniae*.

paulliniae Deighton, Mycol. Pap. 144: 54 (1979).

Holotype: on leaves of *Paullinia pinnata* (Sapindaceae), Ghana, Essipun, 9 May 1949, S.J. Hughes (IMI 37238a).
≡ ***Stenella paulliniae*** (Deighton) K. Schub. & U. Braun, Mycol. Progr. 4(2): 107 (2005).
Host(s) & distribution: *Paullinia pinnata* (Sapindaceae); Ghana, Sierra Leone.

pelliculosum Berk. & M.A. Curtis, in herb.

On leaves of *Lobelia puberulosa* (Campanulaceae), USA, South Carolina, No. 1742 (K 121567).
= ***Passalora lobeliae-cardinalis*** (Schwein.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 254 (2003).
Lit.: COOKE (1889), SACCARDO (1892: 602, 1895: 621).
Host(s) & distribution: see CROUS & BRAUN (2003: 255).

persicum, in herb.

On *Prunus persica* (Rosaceae), Japan, Iwate, Morioka, 27 Oct. 1927, K. Togashi (BPI 427388).
= ***Stenella persicae*** T. Yokoy. & Nasu, Mycoscience 41: 92 (2000).
Host(s) & distribution: *Prunus persica* (Rosaceae); Japan.
Notes: A re-examination of this collection showed *C. persicae* to be a true member of the genus *Stenella* well agreeing with the species concept of *Stenella persicae* recently described from Japan on fruits of *Prunus persica*. Some conidiophores and conidia of *C. oxysporum* and *Alternaria* sp. are intermixed.

personatum Berk. & M.A. Curtis, in Berkeley, Grevillea 3(27): 106 (1875).

Types: on leaves of *Arachis hypogaea* (Fabaceae), USA, Santee River, Ravenel, No. 1612 (IMI 104553; K).
≡ ***Passalora personata*** (Berk. & M.A. Curtis) S.A. Khan & M. Kamal, Pakistan J. Sci. Res. 13: 188 (1961).
Lit.: SACCARDO (1886: 439), SIVANESAN (1984: 219), CROUS & BRAUN (2003: 317).
Host(s) & distribution: *Arachis glabrata*, *A. hypogaea* (Fabaceae); worldwide [see CROUS & BRAUN (2003)].

personatum [Berk. & M.A. Curtis] f. *arachidis-hypogaeae* Thüm., Herb. myc. oec., Fasc. XIII, No. 608 (1878), nom. nud.

Type: on living leaves of *Arachis hypogaea* (Fabaceae), USA, South Carolina, Thüm., Herb. myc. oec. 608.
Notes: Original material could not be examined, but this forma is very probably synonymous with *Passalora personata*.

personatum [Berk. & M.A. Curtis] var. *cassiae* Thüm., Mycoth. univ., Cent. XX, No. 1964 (1881).

Syntypes: on living leaves of *Cassia occidentalis* (Caesalpiniaceae), USA, South Carolina, Aiken, 1876, H.W. Ravenel, Thüm., Mycoth. univ. 1964 (e.g., BPI; G; HBG; HAL; S; W).
≡ ***Passalora occidentalis*** (Cooke) U. Braun, Schlechtendalia 5: 70 (2000).
Lit.: ELLIS (1976: 322), CROUS et al. (2000), CROUS & BRAUN (2003: 294).
Host(s) & distribution: see CROUS & BRAUN (2003: 294).

pestis Thüm., Herb. myc. oec., Fasc. IX, No. 419 (1876) and Oesterr. Bot. Z. 27: 12 (1877).

Syntypes: on living leaves of *Vitis vinifera* (Vitaceae), Austria, Klosterneuburg, Krems, 1876, von Thümen, Thüm., Herb. myc. oec. 419 (e.g., M).
= ***Passalora dissiliens*** (Duby) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 164 (2003).
Lit.: SACCARDO (1886: 458), LINDAU (1910: 117).
Host(s) & distribution: *Vitis vinifera* (Vitaceae); widely distributed with host.

phragmitis J. Opiz, in Opiz, Seznam: 117 (1852), nom. nud., non *C. phragmitis* J. Opiz ex Oudem., 1892.

Type: on leaves of *Phragmites communis* (= *P. australis*) (Poaceae), Czech Republic (PRM).

Lit.: SACCARDO (1886: 370), LINDAU (1907: 814), OUDEMANS (1919), DE VRIES (1952: 96).
Notes: see DAVID (1997: 137).

phragmitis J. Opiz ex Oudem., Ned. Kruidk. Arch., Ser. 2, 6(1): 57 (1892).

Type: on leaves of *Phragmites communis* (= *P. australis*) (Poaceae), Netherlands, Bien de Campagne Zorgvlied, near Haye, Jul. 1889, C.E. Destrée.
≡ *Cladosporium oudemansii* Kupka, Oesterr. Bot. Z. 67: 157 (1918).
= ***Deightoniella arundinacea*** (Corda) S. Hughes, Mycol. Pap. 48: 29 (1952).
Host(s) & distribution: *Phragmites* spp.; Asia (Japan, Far East of Russia, Siberia, Central Asia), Australia, Caucasus, Europe, North America.

piricularioides Dearn. & House, Circ. New York State Mus. 24: 57 (1940), nom. inval.

Holotype: on leaves of *Panicum boreale* (Poaceae), USA, New York, Essex Co., Newcomb, 17 Aug. 1924, H.D. House (NYS 2365). Isotypes: DAOM 5741; NY.
= ***Passalora fusimaculans*** [(G.F. Atk.) U. Braun & Crous] var. ***barretoana*** U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*. CBS Biodiversity Ser. 1: 453 (2003).
Lit.: SCHUBERT & BRAUN (2005a: 104).
Host(s) & distribution: *Brachyelytrum erectum*, *Echinochloa polystachya*, *Panicum boreale* (Poaceae); Brazil, USA (NY, WI).

polymorphum Peyl, Lotos 15: 18 (1865) and Hedwigia 5: 60 (1866).

Type: on *Pyrus* sp. (Rosaceae), Czech Republic, Kačina, near Neuhof, 1864.
= ***Fusicladium pyrorum*** (Lib.) Fuckel, Jahrb. Nassauischen Vereins Naturk. 23–24: 357 '1869' (1870), as '*Fusicladium pyrinum*'.
Lit.: LINDAU (1907: 781), OUDEMANS (1921), SCHUBERT et al. (2003: 82).
Host(s) & distribution: *Aronia melanocarpa*, *Chaenomeles speciosa*, *Eriobotrya japonica*, *Malus domestica*, *Pyrus amygdaliformis*, *P. bucharica*, *P. caucasica*, *P. communis* (= *P. sativa*), *P. coronarius*, *P. korshinskyi*, *P. marmorensis*, *P. pyraster*, *Pyrus* spp. (Rosaceae); cosmopolitan.

puccinioides Cooke, Grevillea 5(33): 15 (1876).

Holotype: on under side of living leaves of an unidentified host plant, India, 1876, Colonel Hobsen, No. 57 (K 121568).
≡ ***Pseudoasperisporium puccinioides*** (Cooke) K. Schub. & U. Braun, Fungal Diversity (2005), in press.
Lit.: SACCARDO (1886: 361), SUBRAMANIAN (1971: 291).
Host(s) & distribution: unidentified host plant; India.

punctiforme Fuckel, F. rhen., Fasc. II, No. 116 (1863).

Syntypes: on living leaves of *Sanicula europaea* (Apiaceae), Germany, 'auf der Geis im Hattenheimer Wald', Fuckel, F. rhen. 116 (e.g., HAL).
≡ ***Pseudocercospora saniculae-europaeae*** (E. Müll. & Arx) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 365 (2003).
Lit.: FUCKEL (1870: 355), SACCARDO (1886: 362), LINDAU (1907: 825), OUDEMANS (1923).
Host(s) & distribution: *Sanicula europaea* (Apiaceae); Germany.

pygmaeum Ellis & Everh. (in Exs.: Flora Sequoia Gigantea Region, No. 1235, nom. nud.).

Syntypes: on *Vitis californica* (Vitaceae), USA, California, Amador Co., Pine Grove, Jul. 1893, G.E. Hansen (e.g., B; BPI 427408–427409; NY).
= ***Asperisporium minutulum*** (Sacc.) Deighton, in Ellis, More dematiaceous hyphomycetes: 242 (1976).
Lit.: SCHUBERT & BRAUN (2005b).
Host(s) & distribution: *Vitis californica* (Vitaceae); USA (CA, OR, WA).

quitense Syd., Ann. Mycol. 37: 420 (1939).

Lectotype: on leaves of *Berberis schwerinii* (Berberidaceae), Ecuador, Pichincha mountains near Quito, 11 Sept. 1937, H. Sydow (B 70-6694). Isolectotypes: B 70-6693; Syd., F. exot. exs. 1232, e.g., B 70-6695; BPI 427427; M-57728.
≡ ***Stenella quitensis*** (Syd.) K. Schub. & U. Braun, Mycol. Progr. 4(2): 108 (2005).
Host(s) & distribution: *Berberis schwerinii* (Berberidaceae); Ecuador.

radians Sacc. & D. Sacc., in Saccardo & Sydow, Syll. fung. 16: 1059 (1902).

≡ *Cladosporium radians* Sacc. & D. Sacc., Mycoth. ital., Cent. VIII., No. 787 (1901), nom. nud.
≡ ***Septonema radians*** (Sacc. & D. Sacc.) U. Braun & K. Schub., **comb. nov.**

Syntypes: on leaves of *Abies pinsapo* (Pinaceae), Italy, Padua, Apr. 1900, Sacc., Mycoth. ital. 787 (e.g., B 70-6696; BPI 427428; HBG).
Lit.: LINDAU (1907: 812), FERRARIS (1912: 336).

Colonies amphigenous, punctiform, subcircular, 100–150 µm diam., dense, greyish, subconfluent. *Mycelium* external, superficial; hyphae forming large, radiating, subcircular plates. *Stromata* lacking. *Conidiophores* arising from swollen, stromatic hyphal cells, forming aggregations, subdecumbent to somewhat erect, straight or slightly flexuous, unbranched, often branched, up to 150 µm long, 3–8 µm wide, pluriseptate, sometimes constricted at the septa, yellowish brown, medium brown or olivaceous-brown, medium dark brown in mass, almost smooth to verruculose or rough-walled, walls thickened. *Conidiogenous cells* integrated, terminal, determinate, cylindrical. *Conidia* solitary or in short, unbranched chains, ellipsoid to cylindrical, 9–16 × (4–)5–6 µm, 1–3(–4)-septate, pale to medium dark brown or olivaceous-brown, verruculose or somewhat asperulate, walls thickened, more or less truncate at the base.

Host(s) & distribution: *Abies pinsapo* (Pinaceae); Italy.

ramulosum Roberge ex Desm., Ann. Sci. Nat. Bot., Sér. 3, 18: 361 (1852) nom. illeg., homonym, non *C. ramulosum* Reissek, 1851.

Holotype: on *Populus alba* (Salicaceae), France, Paris, Parc du Libisy, May 1851, Roberge (PC 1518). Isotype: herb. Desmazières 2135 (PC).
= ***Fusicladium radiosum*** (Lib.) Lind, Ann. Mycol. 3: 429 (1905) var. ***radiosum***.
Lit.: SACCARDO (1886: 357), LINDAU (1907: 777), OUDEMANS (1920), BALDACCI & CIFERRI (1937: 61), SCHUBERT et al. (2003: 85).
Host(s) & distribution: *Populus* spp. (Salicaceae); widespread in Asia, Europe.

rhododendri, in herb.

On leaves of *Rhododendron* sp. (Ericaceae), Switzerland, Bern, Berner Oberland, vom Faulhorn, 7/58 (B 70-6700).
Notes: Excluded, but generic affinity not yet clear.

rhodomyrti Sawada, Rep. Gov. Res. Inst. Formosa 87: 74 (1944), nom. inval.

Type: on *Rhodomyrtus tomentosa* (Myrtaceae), Taiwan (PPMH).
Host(s) & distribution: *Rhodomyrtus tomentosa* (Myrtaceae), Taiwan.
Notes: Excluded, but generic affinity not yet clear.

rhois Arcang., in Thümen, Mycoth. univ., Cent. XIV, No. 1371 (1879).

Syntypes: on living leaves of *Rhus coriaria* (Anacardiaceae), Italy, Etruria, Tuscany, Settignano, near Florence, Nov. 1878, Arcangeli, Thüm., Mycoth. univ. 1371 and Erb. Critt. Ital. 849 (e.g., BPI 427440; E; HAL; K).
≡ ***Passalora marmorata*** (Tranzschel) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 267 (2003).
Lit.: SACCARDO (1886: 359), LINDAU (1907: 827), FERRARIS (1912: 346).
Host(s) & distribution: see CROUS & BRAUN (2003: 267).

roesleri Catt., Bol. Commiss. Agrar. Voghera 13: 263 (1876).

Type: on *Vitis vinifera* (Vitaceae), France, Dep. de l'Eure, Eburense, A. Malbranche.
≡ ***Passalora dissiliens*** (Duby) U. Braun & Crous, in Crous & Braun, *Mycospaerella* and its anamorphs: 1. names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 164 (2003).
Lit.: SACCARDO (1886: 458), LINDAU (1910: 117), CHUPP (1954: 604).
Host(s) & distribution: *Vitis vinifera* (Vitaceae); widely distributed with host.

salicis-sitchensis Dearn. & Barthol., in Dearness, Mycologia 16: 174 (1924).

Lectotype: on living leaves of *Salix sitchensis* (Salicaceae), USA, Washington, Langley, Sept. 1922, Grant, No. 5011 (DAOM).
≡ ***Phacellium salicinum*** var. ***tirolense*** (Bubák & Kabát) U. Braun, Nova Hedwigia 56: 438 (1993).
Lit.: SACCARDO (1972: 1339), BRAUN (1998: 337).
Host(s) & distribution: *Salix* cf. *glabra*, *S. hastata*, *S. sitchensis*, *Salix* sp. (Salicaceae); Canada, Italy, USA (WA).

sambuci Pass., in herb.

On living leaves of *Sambucus nigra* (Caprifoliaceae), Italy (B 70-6710: paratype material of *Pseudocercospora sambucigena* U. Braun & Crous).
≡ ***Pseudocercospora sambucigena*** U. Braun & Crous, Mycotaxon (2005), in press.
Host(s) & distribution: *Sambucus nigra*, *S. pubens* (Caprifoliaceae); Italy, USA (PA).
Notes: The herbarium name *Cladosporium sambuci* proved to be a true and new species of the genus *Pseudocercospora*. The well-growing collection was sparsely intermixed with a *Cladosporium* sp.

scillae Deighton, in Laundon, New Zealand J. Bot. 8(1): 55 (1970).

Holotype: on living leaves of *Scilla peruviana* (Hyacinthaceae), New Zealand, Levin, 21 Dec. 1965, G.F. Laundon, LEV 477 (IMI 116997).
≡ ***Fusicladium scillae*** (Deighton) U. Braun & K. Schub., IMI Descriptions of Fungi and Bacteria 152, No. 1518 (2002).
Lit.: SCHUBERT et al. (2003: 94–96).
Host(s) & distribution: *Scilla peruviana* (Hyacinthaceae); New Zealand.

scopiforme Berk., Hooker's J. Bot. Kew Gard. Misc. 6: 208 (1854), as '*scopæforme*'.

Types: on leaves of *Myristica* sp. (Myristicaceae), India, Khasia (Churra), Hooker (K 115206; UPS).

≡ ***Spiropes scopiformis*** (Berk.) M.B. Ellis, Mycol. Pap. 114: 30 (1968).

Lit.: SACCARDO (1886: 358).

Host(s) & distribution: *Rosenscheldiella orbis* on *Cinnamomum*, *Litsea* and *Myristica* spp. (Myristicaceae); India, Sri Lanka.

scribnerianum Cavara, in Briosi & Cavara, F. paras., Fasc. 7/8, No. 187 (1892) and Hedwigia 31: 143 (1892).

Syntypes: on leaves of *Betula populifolia* (Betulaceae), Italy, Pavia, 1890, F.L. Scribner, Briosi & Cav., F. paras. 187 (e.g., HAL).

≡ ***Fusicladium scribnerianum*** (Cavara) M.B. Ellis, More Dematiaceous Hyphomycetes: 238 (1976).

Lit.: SACCARDO (1895: 620), LINDAU (1907: 819), FERRARIS (1912: 340), SCHUBERT et al. (2003: 96–97).

Host(s) & distribution: *Betula pendula*, *P. populifolia* (Betulaceae); Germany, Italy, Kazakhstan.

solanicola Viégas, Bragantia 6: 368 (1946), as '*solanicolum*'.

Holotype: on *Solanum lycocarpum* (Solanaceae), Brazil, Prov. St. Pauli, Campinas, Bosque de Jequìtibás, 27 Jun. 1913, A.P. Viégas (IACM).

≡ ***Passalora brachycarpa*** (Syd.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 87 (2003).

Host(s) & distribution: see CROUS & BRAUN (2003: 87).

sphaeroideum Cooke, Grevillea 8(46): 60 (1879).

Holotype: on leaves of *Poa foliosa* (Poaceae), New Zealand, Canterbury Alps, No. 398 (K 121569).

= ***Passalora graminis*** (Fuckel) Höhn., Zentralbl. Bakteriol. Parasitenk., Abt. 2, 60: 6 (1923).

Lit.: SACCARDO (1886: 365), LIND (1913), SCHUBERT & BRAUN (2005b).

Host(s) & distribution: wide host range; worldwide.

stipae H.C. Greene, Trans. Wisconsin Acad. Sci. 41: 127 (1952).

Syntypes: on living leaves of *Stipa spartea* (= *Hesperostipa spartea*) (Poaceae), USA, Wisconsin, Dane Co., Madison, Univ. Wisconsin Arboretum, Oak opening, 6 Sept. 1951, H.C. Greene (BPI 427474; WIS).

≡ ***Stenella stipae*** (H.C. Greene) K. Schub. & U. Braun, in Schubert, Mycotaxon 92: 71 (2005).

Host(s) & distribution: *Hesperostipa spartea* (Poaceae); USA (WI).

subsessile Ellis & Barthol., Erythea 4: 83 (1896).

Lectotype: on living leaves of *Populus monilifera* (= *Populus deltoides* subsp. *monilifera*) (Salicaceae), USA, Kansas, 18 Sept. 1894, Bartholomew (NY). Isolectotypes: on leaves of *Populus deltoides* subsp. *monilifera*, USA, Kansas, Rockport, Sept. 1894, E. Bartholomew, Ellis & Everh., N. Am. F. 3288 (e.g., M; NY).

≡ ***Fusicladium subsessile*** (Ellis & Barthol.) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 152, No. 1519 (2002).
Lit.: SACCARDO (1899: 1081), FERRARIS (1912: 345), SCHUBERT et al. (2003: 99–100).
Host(s) & distribution: *Populus deltoides* subsp. *monilifera* (Salicaceae); USA (KS).

superficiale Petch, Ann. Roy. Bot. Gard. (Peradeniya) 9: 327 (1925).

Holotype: on leaves of *Cinnamomum ovalifolium* (Lauraceae), Ceylon (Sri Lanka), Hakgala, 27 Feb. 1922, No. 6570 (K 121571).
Lit.: SACCARDO (1972: 1339).
Host(s) & distribution: *Cinnamomum ovalifolium* (Lauraceae), Sri Lanka.
Notes: Excluded, mycelial sooty mold.

symphoricarpi Dearn., in herb.

On *Symphoricarpos acutus* (Caprifoliaceae), Canada, British Columbia, Salmo, 11 Jul. 1935, G.G. Hedgcock (BPI 427503).
= ***Passalora symphoricarpi*** (Ellis & Everh.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs. 1. Names published in *Cercospora* and *Passalora*. CBS Biodiversity Ser. 1: 393 (2003).
Host(s) & distribution: *Symphoricarpos acutus*, *S. albus*, *S. mollis*, *S. occidentalis*, *S. vaccinioides*, *S. vulgaris* (Caprifoliaceae); Canada, USA (AK, IA, ID, KS, MT, NE, OR, SD, WA, WI, WY).
Notes: As secondary invader *Cladosporium herbarum* s. lat and a cladosporioides-like *Cladosporium* species are occasionally intermixed.

tectonae Sawada, Rep. Gov. Res. Inst. Formosa 85: 92 (1943), nom. inval.

Syntypes: on *Tectona grandis* (Verbenaceae), Taiwan, Taipeh, 6 May 1930, K. Sawada (BPI 427507; PPMH).
= *Cladosporium tectonicola* Y.H. He & Z.Y. Zhang, Mycosystema 21(1): 21 (2002) and in Zhang et al., Flora Fungorum Sinicorum, Vol. 14: 164 (2003).

tectonicola Y.H. He & Z.Y. Zhang, Mycosystema 21(1): 21 (2002) and in Zhang et al., Flora Fungorum Sinicorum, Vol. 14: 164 (2003).

Holotype: on living leaves of *Tectona grandis* (Verbenaceae), China, Guangdong, Ledong, 30 Aug. 1978, D.R. Duan (HMAS 38603).

On the lower leaf surface as dark olivaceous-brown to reddish brown discolorations, effuse, at first punctiform, later confluent, often along leaf veins, on the upper side grey-brown. *Colonies* hypophyllous, pale brown, villose, between leaf hairs. *Mycelium* external, superficial; hyphae branched, 1.5–5 µm wide, septate, sometimes with swellings and slightly constricted at the septa, very pale olivaceous, subhyaline, smooth, walls unthickened or almost so. *Stromata* absent. *Conidiophores* solitary, arising from hyphae, erect, straight to flexuous, cylindrical-oblong to filiform, unbranched, 44–150 × 3.5–6 µm, pluriseptate, sometimes slightly constricted at the septa, pale to medium brown, paler towards the apex, smooth, walls slightly thickened, often somewhat swollen at the base, up to 10 µm wide. *Conidiogenous cells* integrated, terminal or intercalary, proliferation sympodial, conidiogenous loci slightly convex, not very conspicuous, 0.5–1(–1.5) µm wide, unthickened, not darkened-refractive. *Conidia* catenate, in unbranched or branched chains, straight, limoniform, ellipsoid, fusiform, subcylindrical, 6–13(–18) × 2–5 µm, 0(–1)-septate, very pale brown, smooth, thin-walled, apex rounded or with up to three

apical hila, truncate to slightly convex, 0.5–1 µm wide, unthickened, not darkened, sometimes slightly refractive.

Host(s) & distribution: *Tectona grandis* (Verbenaceae), China, Taiwan.

Notes: This species is clearly to be excluded from the genus *Cladosporium* s. str., but its taxonomic affinity is still unknown. HE & ZHANG (2002) described much longer conidiophores, up to 300 µm long, and 0–2-septate ramoconidia, which could not be observed during the re-examination of type material of *C. tectonae*.

trichophilum H.C. Greene, Amer. Midl. Naturalist 48(3): 756 (1952), nom. illeg., homonym, non *C. trichophilum* Petr. & Cif., 1932.

Syntypes: on living leaves of *Lonicera hirsuta* (Caprifoliaceae), USA, Wisconsin, Rusk Co., Hawkins, 26 Aug. 1918, J.J. Davis (BPI 427512; WIS).

= ***Passalora nopomingensis*** (B. Sutton) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*. CBS Biodiversity Ser. 1: 462 (2003).

Lit.: SHVARTSMAN et al. (1975: 96), SCHUBERT (2005: 73–75).

Host(s) & distribution: *Lonicera glaucescens*, *L. hirsuta*, *Lonicera* sp. (Caprifoliaceae); Canada (Man., Sask.), USA (WI).

trichophilum Petr. & Cif., Ann. Mycol. 30: 337 (1932).

Types: on living leaves of *Lantana trifolia* (Verbenaceae), Dominican Republic, Valle del Cibao, Prov. Santiago, Las Lagunas, at Pozo Hediondo, 7 Dec. 1930, R. Ciferri & E.L. Ekman (BPI 427513A, 43696A; IMI 127138a; M; W).

≡ ***Passalora lantanae*** (Chupp) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 242 (2003).

Host(s) & distribution: see CROUS & BRAUN (2003: 242).

triostei Peck, in Trelease, Trans. Wisconsin Acad. Sci. 6: 119 (1885) and J. Mycol. 1: 13 (1885).

Holotype: on leaves of *Triosteum perfoliatum* (Caprifoliaceae), USA, Wisconsin, La Crosse, L.H. Pammel (NYS 3219).

≡ ***Fusicladium triostei*** (Peck) K. Schub. & U. Braun, Mycol. Progr. 4(2): 102 (2005).

Lit.: SACCARDO (1886: 359), DE VRIES (1952: 99).

Host(s) & distribution: *Triosteum aurantiacum*, *T. perfoliatum* (Caprifoliaceae); Canada (Ont.), USA (MO, WI, WV).

uleanum Henn., Hedwigia 34: 116 (1895).

Syntypes: on living leaves of a Myrtaceae, Brazil, Uberaba in Minas Geraës, Jun. 1892, E. Ule, no. 1927 (B; HBG).

Lit.: SACCARDO (1895: 620), LINDAU (1907: 828), LIND (1913: 524), OUDEMANS (1923).

Host(s) & distribution: unknown Myrtaceae; Brazil.

Notes: Excluded, but taxonomic status unknown.

unedonis Gonz. Frag., Mem. Real Acad. Ci. Barcelona, Ser. 3, 15(17): 459 (33) (1920).

Type: on living leaves, becoming dry, of *Arbutus unedo* (Ericaceae), Spain, near Barcelona, Las Planas, 28 Mar. 1918, Prof. A. Caballero (MA 06466).

Lit.: GONZÁLES-FRAGOSO (1927: 204), SACCARDO (1931: 790).

Host(s) & distribution: *Arbutus unedo* (Ericaceae), Spain.
Notes: Excluded, but taxonomic status still unclear.

vangueriae (Thirum. & Mishra) Arx, Genera Fungi Sporul. Pure Cult., Ed. 2: 222 (1974).

Types: on leaves of *Vangueria spinosa* (= *Meyna laxiflora*) (Rubiaceae), India, Bihar, Darbhanga (BPI 442756; IMI 51482).
≡ *Biharia vangueriae* Thirum. & Mishra, Sydowia 7: 79 (1963).
≡ ***Stenella vangueriae*** (Thirum. & Mishra) Deighton, Mycol. Pap. 144: 53 (1979).
Host(s) & distribution: *Meyna laxiflora* (Rubiaceae); India.

versicolor T.E.T. Bond, Ceylon J. Sci., Sect. A, Bot. 12: 183 (1947), nom. illeg., homonym, non *C. versicolor* P.A. Dang., 1931.

Type: on *Ageratum conyzoides* (Asteraceae), India, Ceylon, St. Coombs, Dec. 1943 (IMI 676).
≡ ***Passalora perfoliati*** (Ellis & Everh.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*, CBS Biodiversity Ser. 1: 314 (2003).
Lit.: DEIGHTON (1974: 69).
Host(s) & distribution: see CROUS & BRAUN (2003: 314).

viticola Ces., in Rabenhorst, Flora 37: 206 (1854), as '*viticolum*' and in Klotzsch, Herb. viv. myc., Cent. XIX, No. 1877 (1854).

Syntypes: on *Vitis* sp. (Vitaceae), Italy, Klotzsch, Herb. viv. myc. 1877 (e.g., BPI 797134; HAL).
= ***Pseudocercospora vitis*** (Lév.) Speg., Anales Mus. Nac. Buenos Aires 20: 438 (1910).
Lit.: LINDAU (1910: 116), CHUPP (1954: 605), SIVANESAN (1984: 210).

vitis (Lév.) Sacc., Mycoth. ven., Cent. III, No. 284 (1875).

Type: on leaves of *Vitis vinifera* (Vitaceae), Italy, Treviso, Selva, Sept. 1874, Sacc., Mycoth. Ven. 284 (HAL).
≡ *Septonema vitis* Lév., Ann. Sci. Nat. Bot., Sér. 3, 9: 261 (1848).
≡ ***Pseudocercospora vitis*** (Lév.) Speg., Anales Mus. Nac. Buenos Aires 20: 438 (1910).
Lit.: LINDAU (1910: 116), CHUPP (1954: 605), DEIGHTON (1976: 131), SIVANESAN (1984: 210), CROUS & BRAUN (2003: 427).
Host(s) & distribution: see CROUS & BRAUN (2003: 427).

wikstroemiae (Sawada) H. Zhang & Z.Y. Zhang, Proceedings of Phytopathological Symposium Organized by Phytopathology Laboratory of Yunnan Province 2: 306 (1998), comb. inval.

Lectotype: on *Wikstroemia indica* (Thymeleaceae), Taiwan, Taipei, 19 Feb. 1913, K. Sawada (TNS F218930). Isolectotype: PPMH.
≡ *Heterosporium wikstroemiae* Sawada, Rep. Gov. Res. Inst. Formosa 87: 77 (1944), nom. inval. et illeg., homonym, non *H. wikstroemiae* Petch, 1922.
= ***Stenella wikstroemiae*** (Petch) J. Walker, in Walker & White, Mycol. Res. 95: 1010 (1991).
Lit.: DAVID (1997: 126).
Host(s) & distribution: *Wikstroemia indica*, *W. viridiflora* (Thymeleaceae); Sri Lanka, Taiwan.

zizyphi P. Karst. & Roum., Rev. Mycol. (Toulouse) 12(46): 78 (1890), non *Pseudocercospora zizyphi* (Petch) Crous & U. Braun, 1996.

Types: on faded leaves of *Zizyphus* (Rhamnaceae), 'ad Sontag', Dec. 1887 (PC and Roum., F. sel. gall. exs. 5500).

= ***Pseudocercospora jujubae*** (S. Chowdhury) N. Khan & Shamsi, Bangladesh J. Bot. 12: 117 (1983).

Lit.: SACCARDO (1892: 604), FERRARIS (1912: 342), CROUS & BRAUN (2003: 233).

Host(s) & distribution: see CROUS & BRAUN (2003: 233).

9. Summary

The present work is part of a comprehensive monographic examination of the genus *Cladosporium* s. lat. The history, phylogeny, taxonomy, circumscription and delimitation of the genus *Cladosporium* are discussed in detail. Furthermore, it is an additional contribution to a morphotaxonomic revision of *Cladosporium* species, in which all taxa classified in literature to be foliicolous (excluding species formerly referred to *Heterosporium*), occurring on living or fading leaves, are treated. Type material and additional collections of numerous species have been re-examined by means of light and scanning electron microscopy. Comprehensive descriptions, illustrations and commentaries are provided for the true foliicolous species of *Cladosporium* s. str., well-characterised by having coronate conidiogenous loci and hila. Known host range and distribution data are added. The new species *Cladosporium alneum*, *C. arthropodii*, *C. foliorum*, *C. fraxinicola*, *C. liriodendri*, *C. oncobae*, *C. oreodaphnes*, *C. phyllogenum*, *C. populicola*, *C. rhododendri*, *C. smilacicola* and *C. syringicola* are described and the new combinations *C. bosciae* and *C. chamaeropis* are introduced. Identities and interpretations of many names are clarified by lectotypifications. A tabular key to the foliicolous *Cladosporium* species, based on host genera, is provided. A general dichotomous key, based on morphology and ecology, contains foliicolous species and few saprobic ones.

Some common widespread saprobic *Cladosporium* species, often occurring as secondary invaders on living or fading leaves, are discussed. Based on re-examinations of type collections, numerous *Cladosporium* species proved to be conspecific with saprobic taxa. They are reduced to synonymy with the species concerned and marked as 'new synonyms'. Twenty-three taxa proved to be conspecific with *Cladosporium herbarum*, type species of the genus, e.g., *C. acutum*, *C. kniphofiae*, *C. velutinum*, etc. *C. vincae* is reduced to synonymy with the fungicolous *C. aecidiicola*, and type material of *C. subnodosum* agrees very well with the species concept of *C. variabile*, the causal agent of leaf spot on spinach. For species names without any available type collections or any other authentic or representative specimens, original descriptions and illustrations, if present and available, are reproduced and commentaries are supplied. The taxonomic affinity of these taxa is usually unclear.

Species not belonging in *Cladosporium* s. str. are listed separately in alphabetical order. Type collections, basionyms, taxonomic affinities if known, literature references, host range and distribution data and commentaries are given. Some excluded species, not yet redescribed and published, are treated in detail providing descriptions and in some cases also illustrations. The new species *Fusicladium betuligenum* and *Stenella araliae* are described and the new combinations *Passalora foveolicola*, *Septonema radians*, *Stenella eriolobi* and *S. oxycocci* are proposed.

Results of molecular examinations, carried out at the CBS, Utrecht, the Netherlands, and kindly provided for this work, reflect and support the results of previous phylogenetic studies. *Cladosporium* species and species of the teleomorphic genus *Davidiella* form a strongly supported, monophyletic clade. Several clades with cladosporium-like taxa are clearly delineated from *Cladosporium* s. str. The correct placement of new collections of several species in *Cladosporium* could be confirmed. *Cladosporium paeoniae* has to be excluded from *Cladosporium* s. str., which could clearly be shown by means of light and scanning electron microscopy as well as molecular examinations. It forms a well-supported group together with *Cladosporium chlorocephalum* outside of the *Davidiella* / *Cladosporium* clade. Although both species are morphologically and ecologically quite distinct, ITS sequence data of both species proved to be completely identical, which led to the conclusion that the latter species represent two stages of the same fungus (synanamorphs).

All novelties, changes and new results from recently published papers dealing with the taxonomy of *Cladosporium* s. lat., unpublished data and those just introduced in this thesis have been added to the manuscript of the recently published checklist of *Cladosporium* names marked in colour and by underlining. A CD with the latest updated version is attached.

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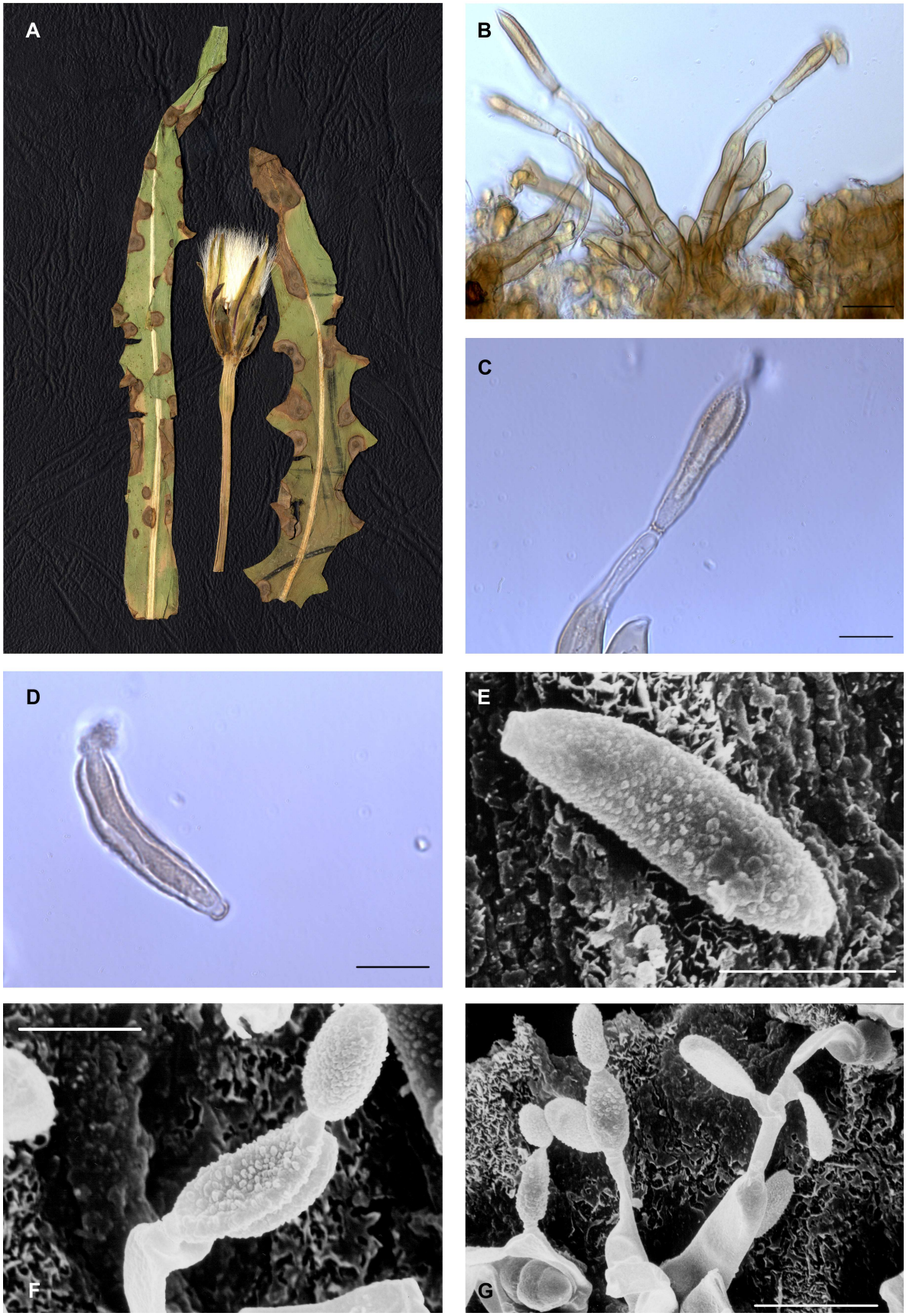
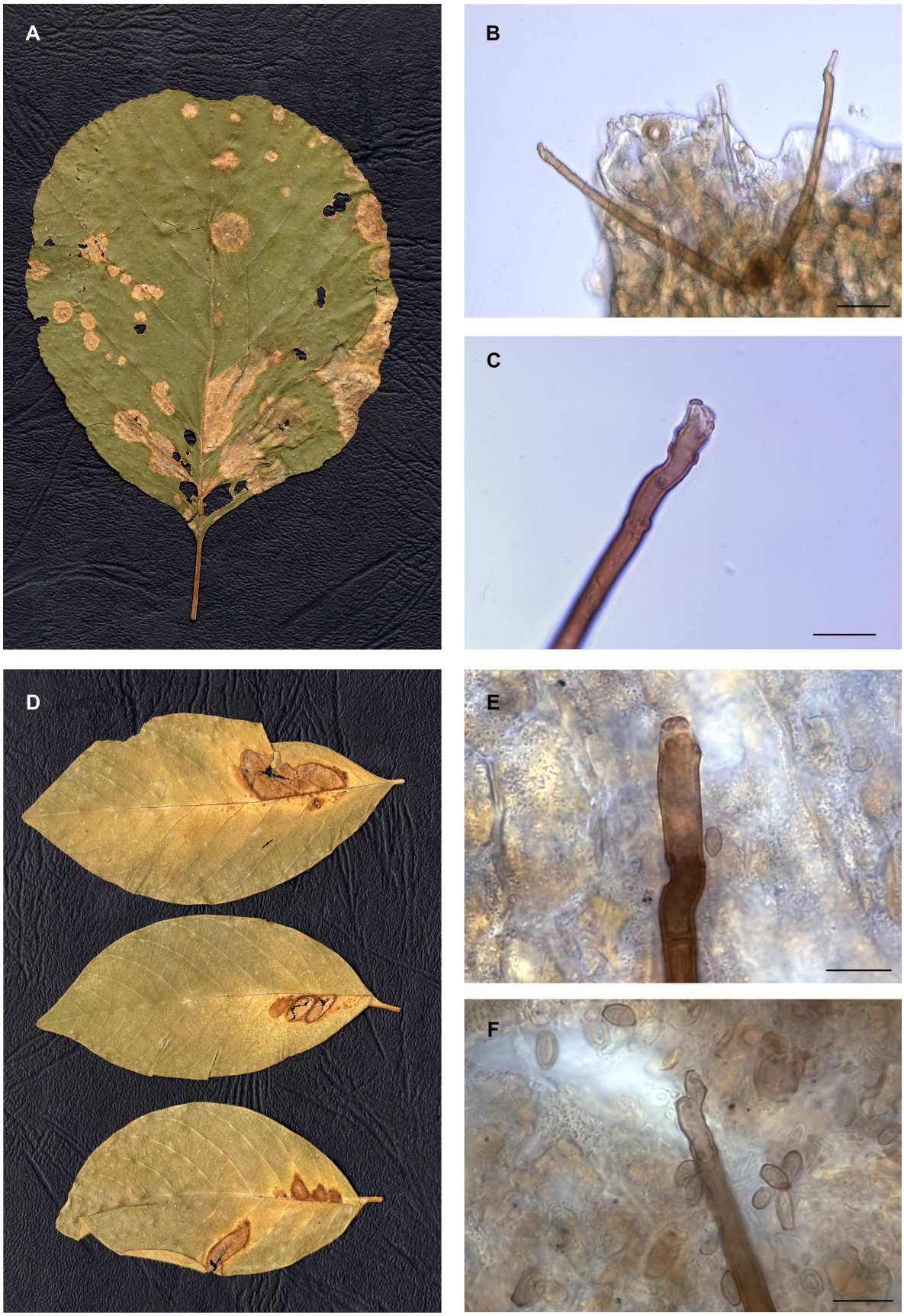
12. Appendix:

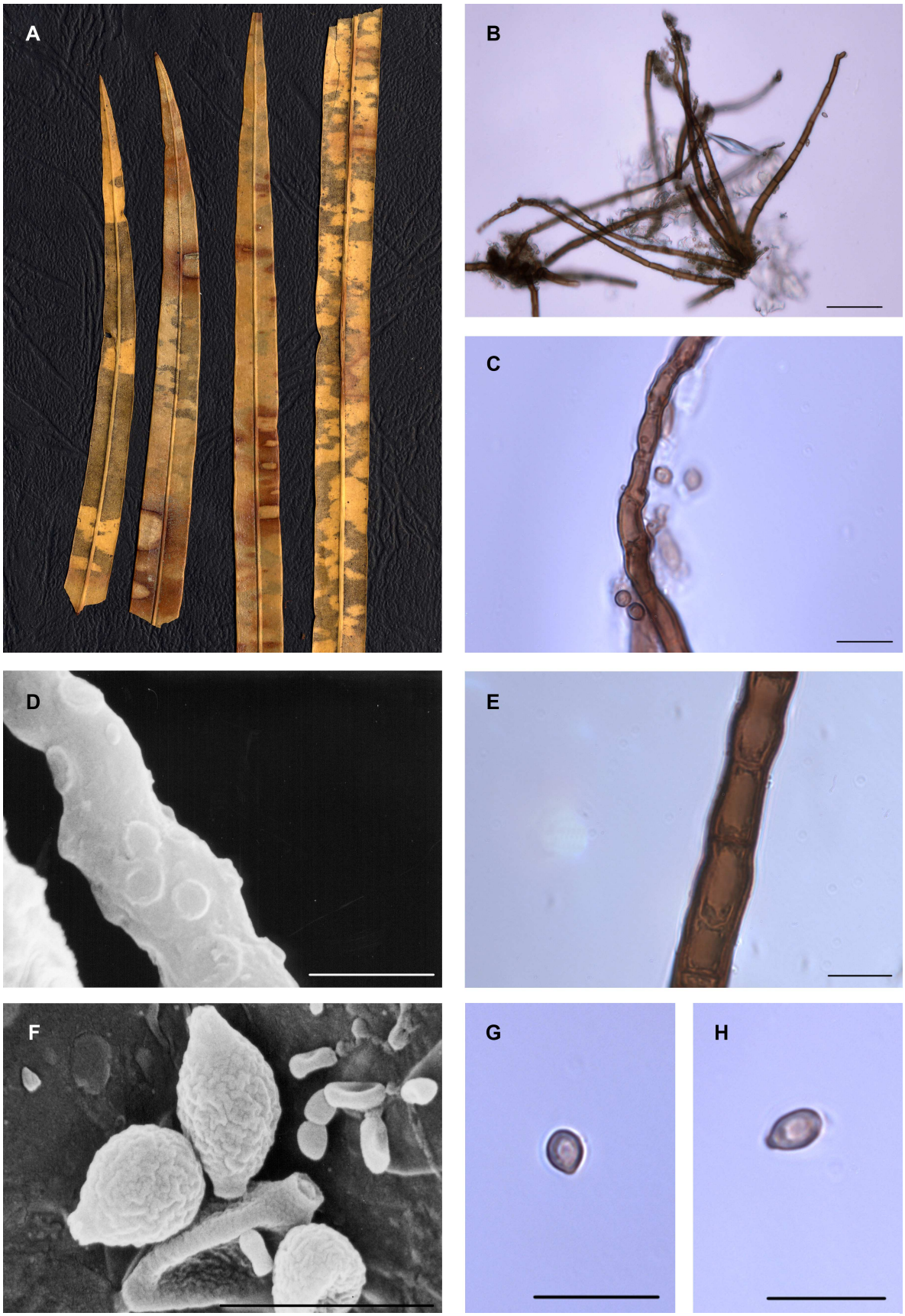
Illustrations



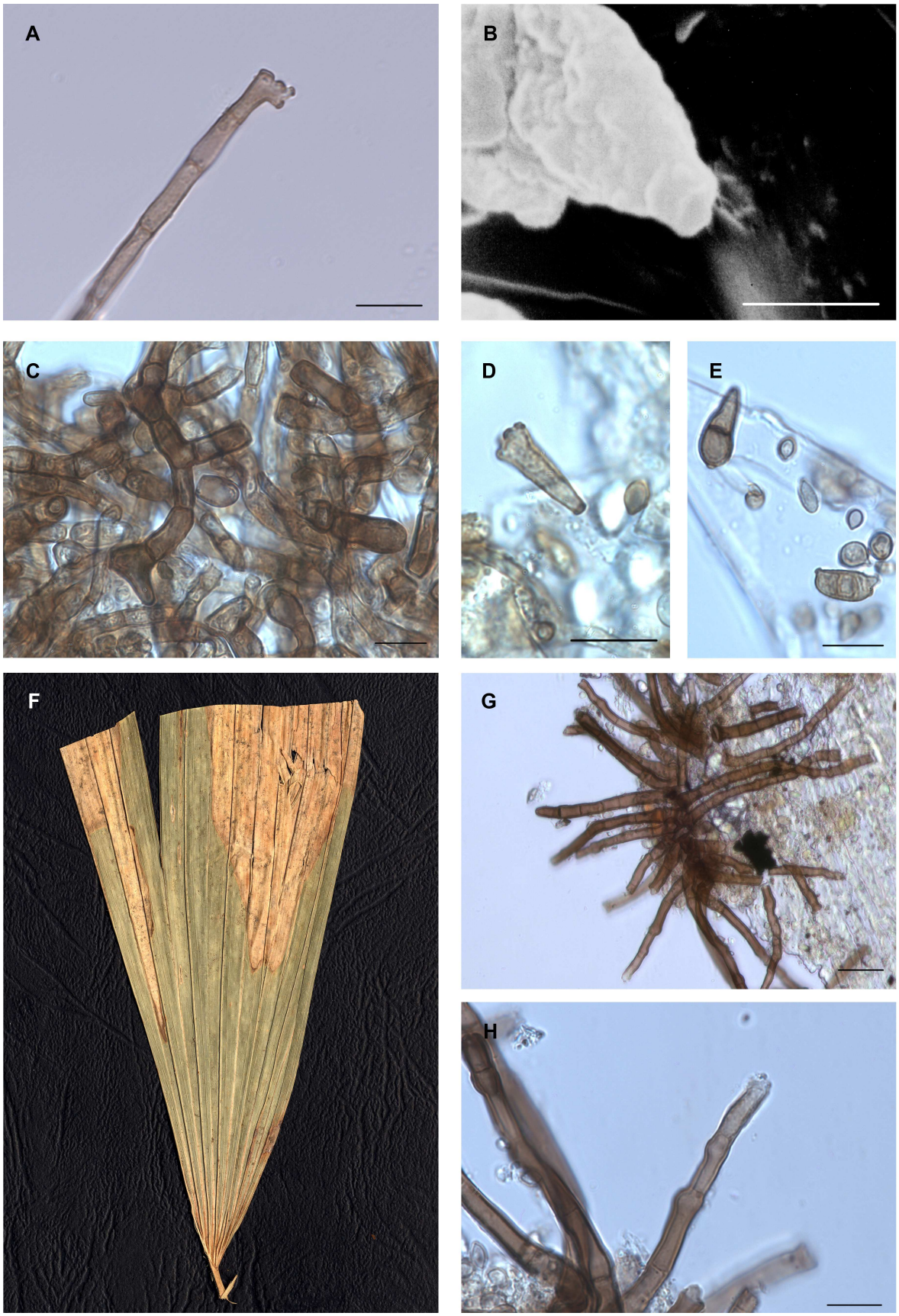
Pl. 1. A–G. ***Cladosporium agoseridis*** (isotype HAL 1556 F). A: symptoms; B: fascicle of conidiophores (bar = 20 µm); C: tip of a conidiophore with attached conidium (bar = 10 µm); D: conidium (bar = 10 µm); E: conidium showing surface ornamentation (bar = 10 µm); F: tip of a conidiophore with still attached conidia (bar = 10 µm); G: small fascicle of conidiophores (bar = 20 µm).



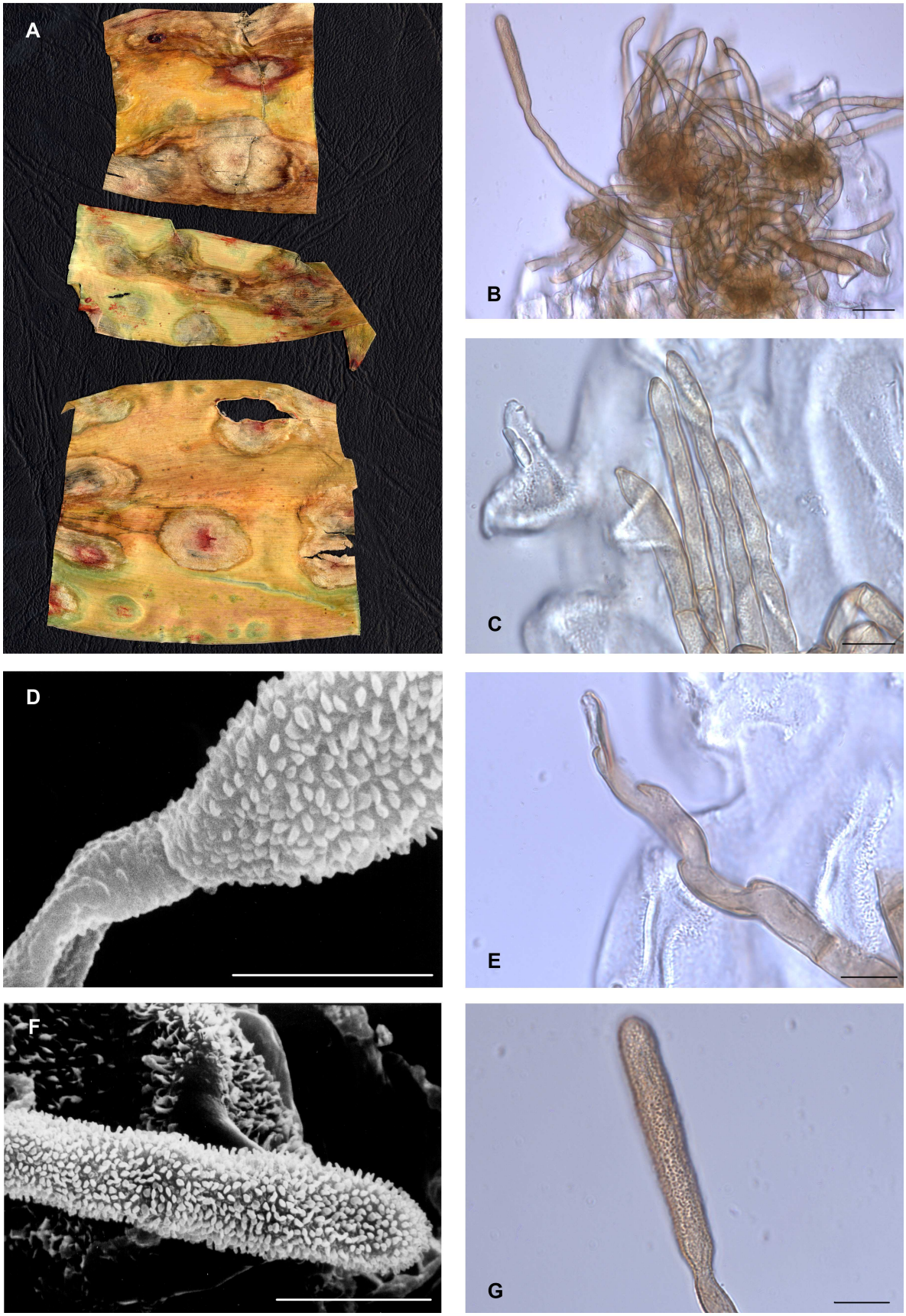
Pl. 2. A–C. ***Cladosporium alneum*** (holotype B 70-6156). A: symptoms; B: overview, small, loose group of conidiophores (bar = 20 µm); C: tip of a conidiophore with several somewhat darkened conidiogenous loci (bar = 10 µm). **D–F.** ***Cladosporium annonae*** (holotype SIENA). D: symptoms; E: tip of a conidiophore with several somewhat darkened conidiogenous loci (bar = 10 µm); F: conidiophore and conidia (bar = 10 µm).



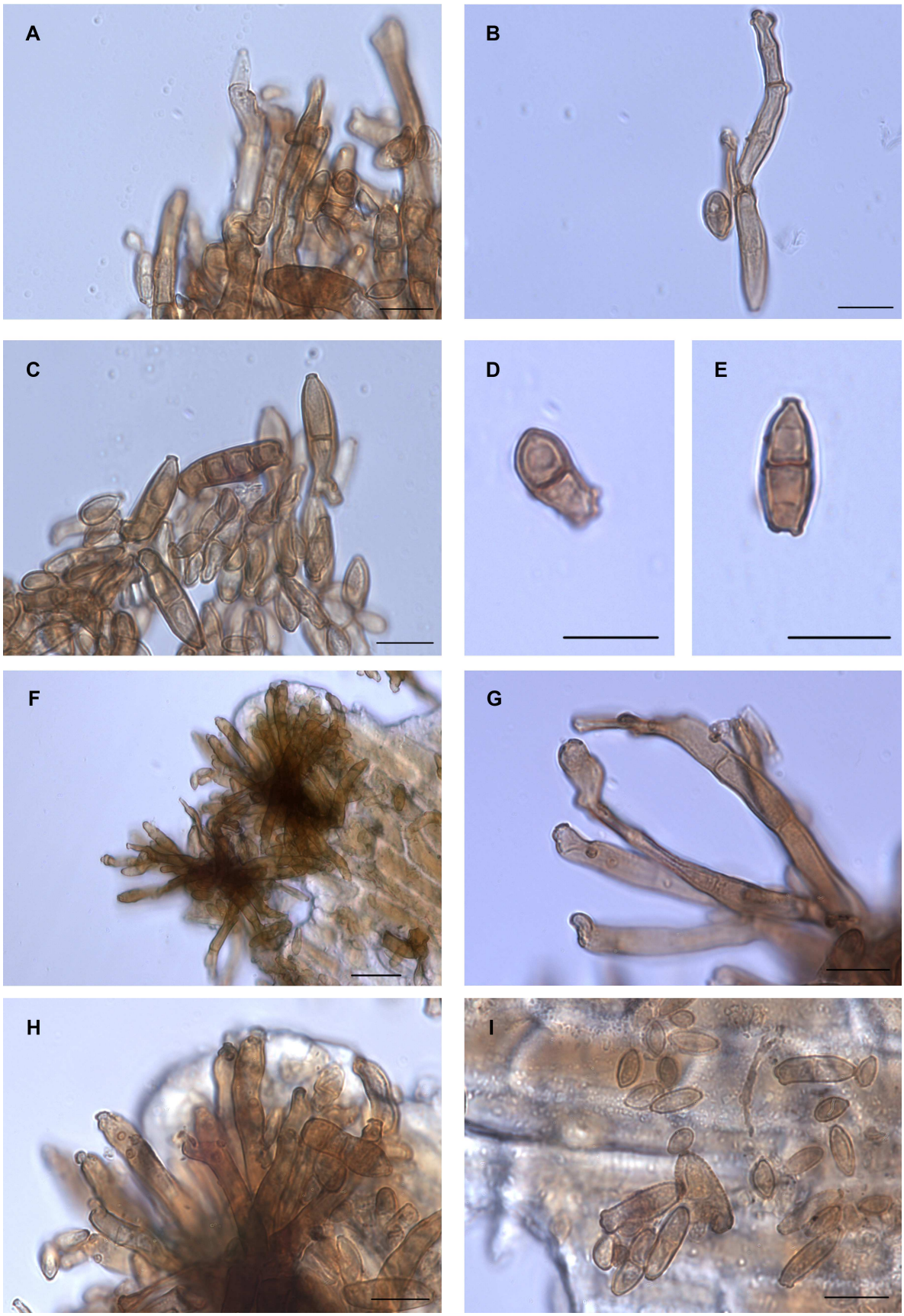
Pl. 3. A–H. ***Cladosporium apicale*** (type K 121544). A: symptoms; B: overview, fascicle of conidiophores (bar = 50 µm); C: conidiophore with numerous conidiogenous loci and small subglobose conidia (bar = 10 µm); D: conidiophore with numerous protuberant conidiogenous loci (bar = 5 µm); E: conidiophore showing cell structure, with thickened, two-layered walls and protoplasm aggregated at the septa (bar = 10 µm); F: conidia showing coronate scar structure (bar = 5 µm); G, H: conidia showing cell structure, with paler cavity in the centre (bar = 10 µm).



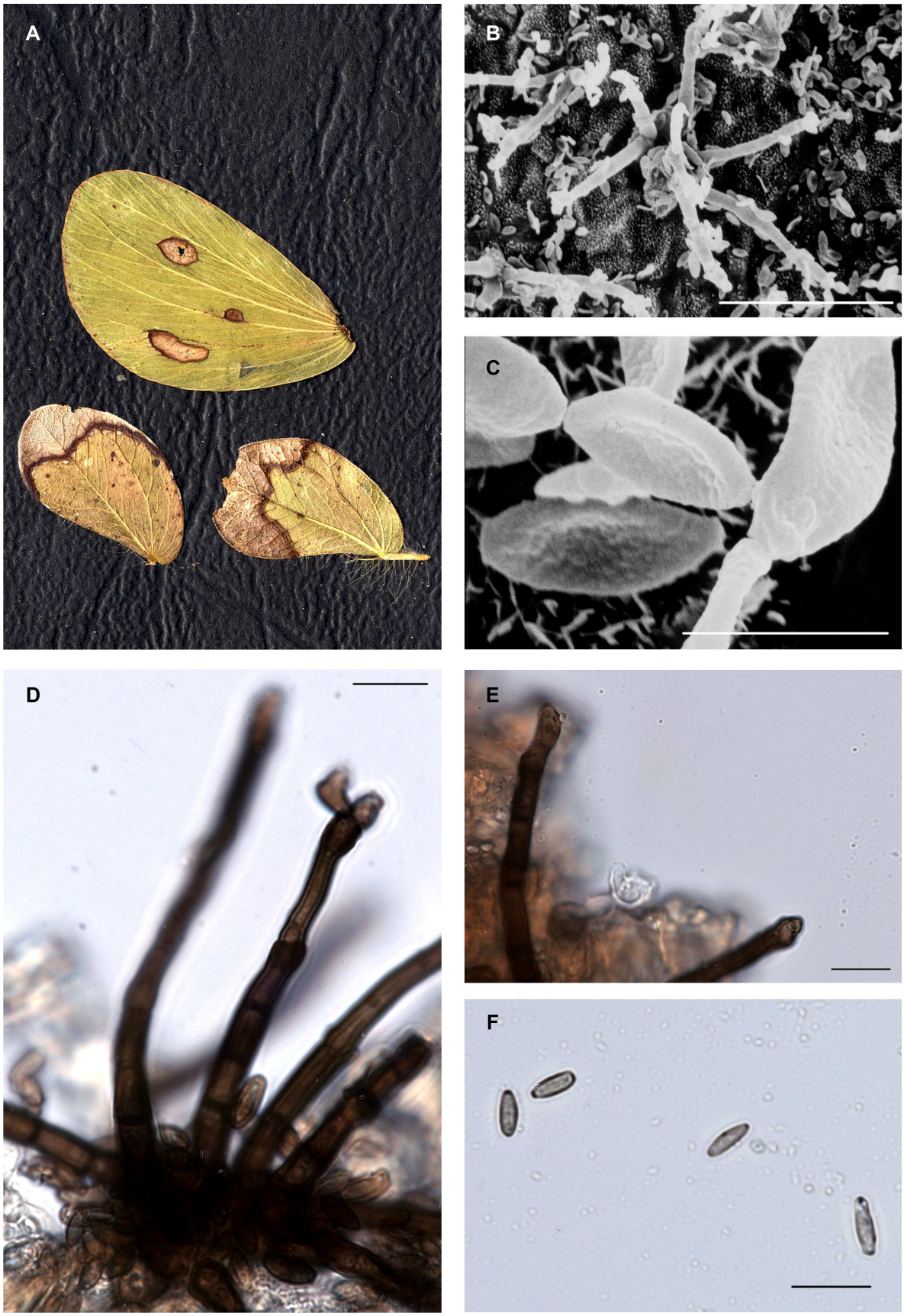
Pl. 4. A–E. ***Cladosporium arthrinioides*** (syntype M-57466). A: apex of a conidiophore (bar = 10 µm); B: conidium showing coronate scar structure (bar = 2 µm); C: superficial mycelium (bar = 10 µm); D, E: conidia (bar = 10 µm). **F–H.** ***Cladosporium borassi*** (holotype IMI 109416c). F: symptoms; G: fascicle of conidiophores (bar = 20 µm); H: nodulose conidiophores (bar = 10 µm).



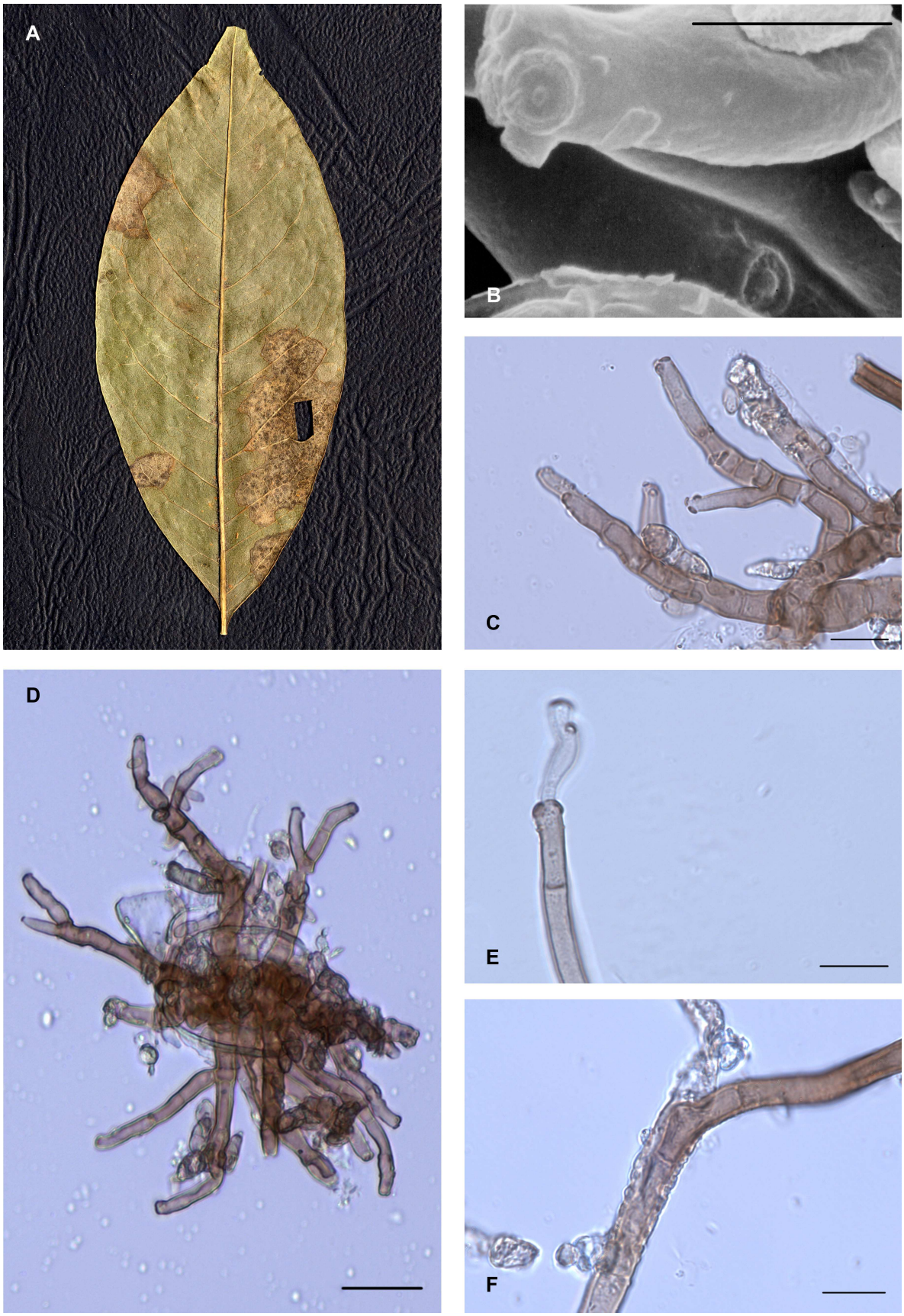
Pl. 5. A–G. *Cladosporium arthropodii* (holotype HAL 1828 F). A: symptoms; B: fascicle of conidiophores (bar = 20 µm); C: conidiophores (bar = 10 µm); D: tip of a conidiophore with still attached conidium (bar = 5 µm); E: geniculate conidiophore (bar = 10 µm); F: conidium showing surface ornamentation (bar = 10 µm); G: tip of a conidiophore with still attached conidium (bar = 10 µm).



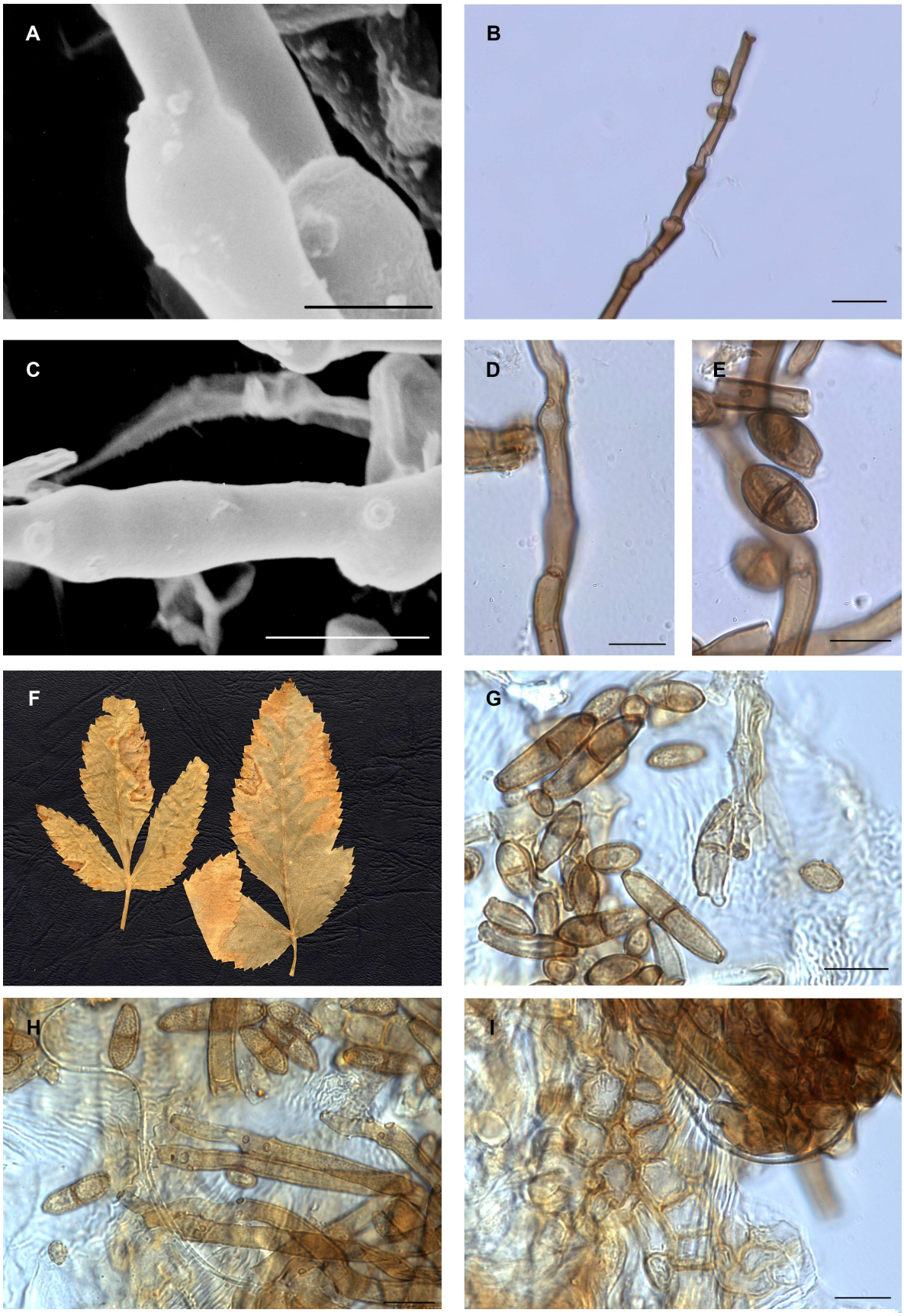
Pl. 6. A–E. ***Cladosporium bosciae*** (holotype PAD). A: conidiophores (bar = 10 µm); B: chain of conidia (bar = 10 µm); C: conidia (bar = 10 µm); D, E: conidia showing cell structure, with paler cavity in the centre of the cells (bar = 10 µm). **F–I.** ***Cladosporium chamaeropis*** (holotype MA 06416). F: overview (bar = 20 µm); G: conidiophores (bar = 10 µm); H: fascicle of conidiophores, conidiophores with numerous, conspicuous, somewhat darkened conidiogenous loci (bar = 10 µm); I: conidia (bar = 10 µm).



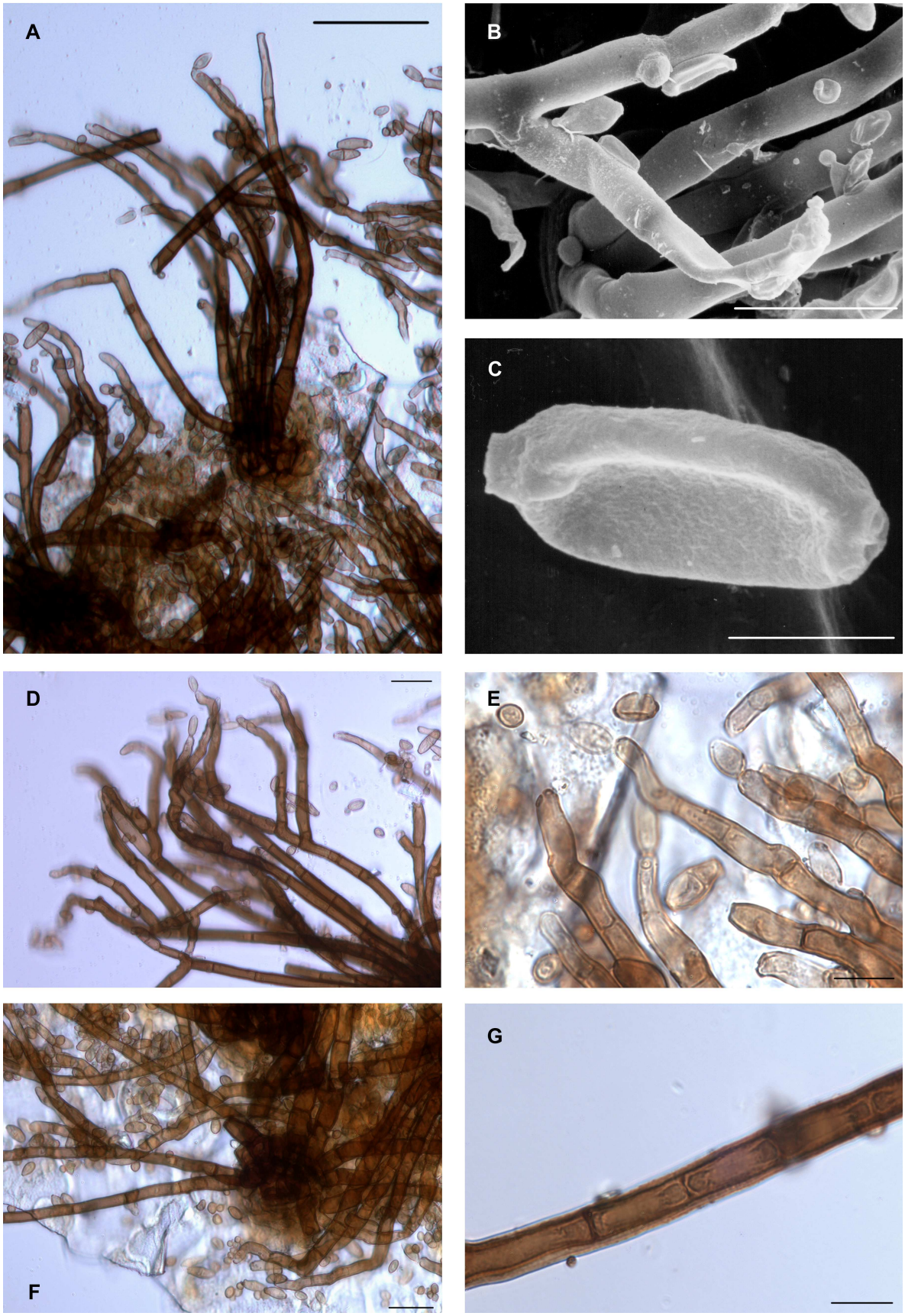
Pl. 7. A–F. *Cladosporium cassiae-surathensis* (HAL). A: symptoms on leaves of *Chamaecrista* sp.; B: fascicle of conidiophores (bar = 50 µm); C: tip of a conidiophore with still attached conidia (bar = 5 µm); D: fascicle of conidiophores, conidiophores with percurrent, enteroblastic proliferations (bar = 10 µm); E: conidiophore with terminal conidiogenous cell with numerous, small conidiogenous loci crowded near the apex (bar = 10 µm); F: conidia (bar = 10 µm).



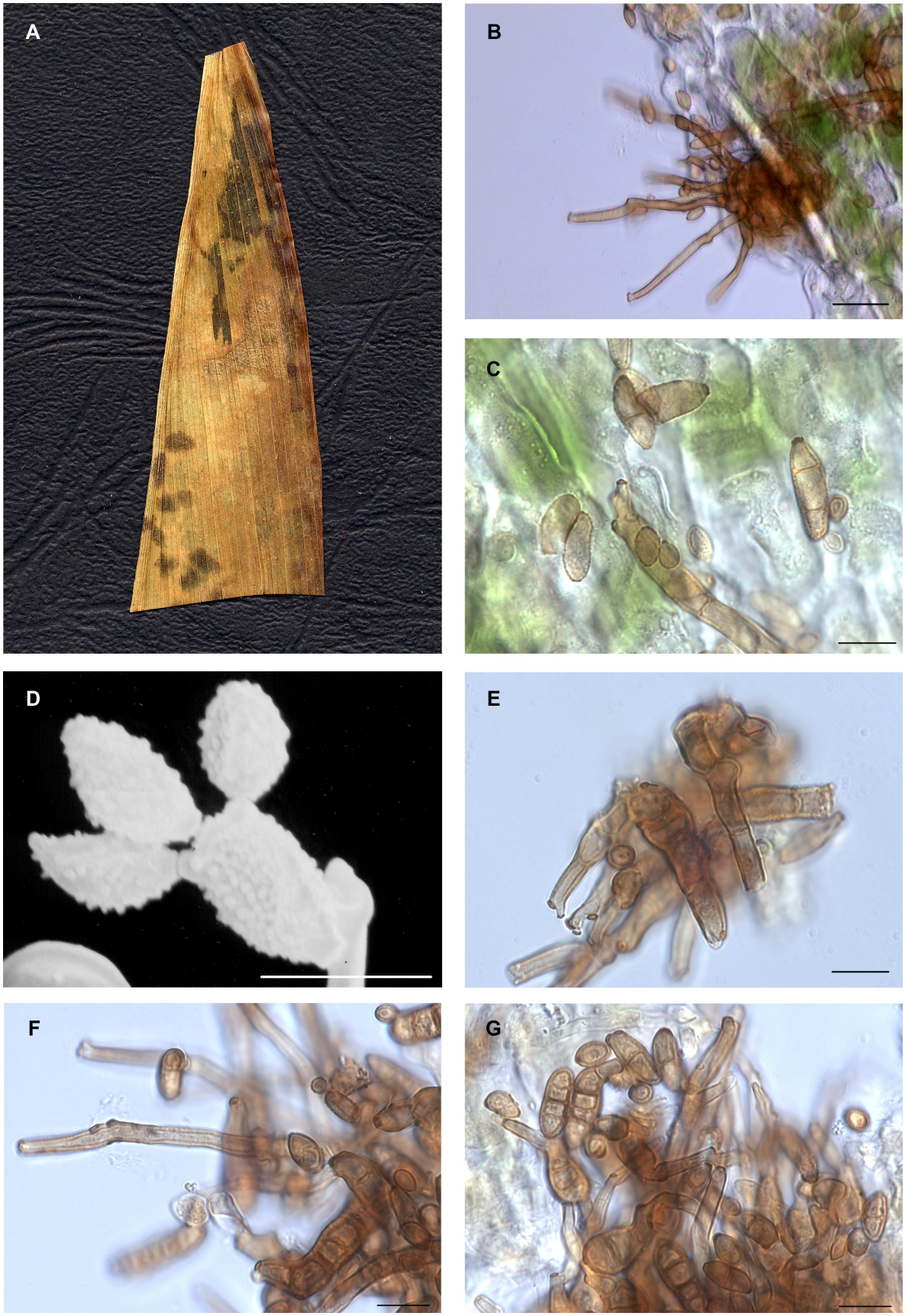
Pl. 8. A–F. ***Cladosporium chrysophylli*** (holotype IMI 17741). A: symptoms; B: conidiophore and conidium showing coronate scar structure (bar = 5 µm); C: branched conidiophores (bar = 10 µm); D: fascicle of conidiophores emerging through stomata (bar = 20 µm); E: tip of a conidiophore with several somewhat darkened conidiogenous loci (bar = 10 µm); F: conidiophore, outer wall seemingly irregularly detaching (bar = 10 µm).



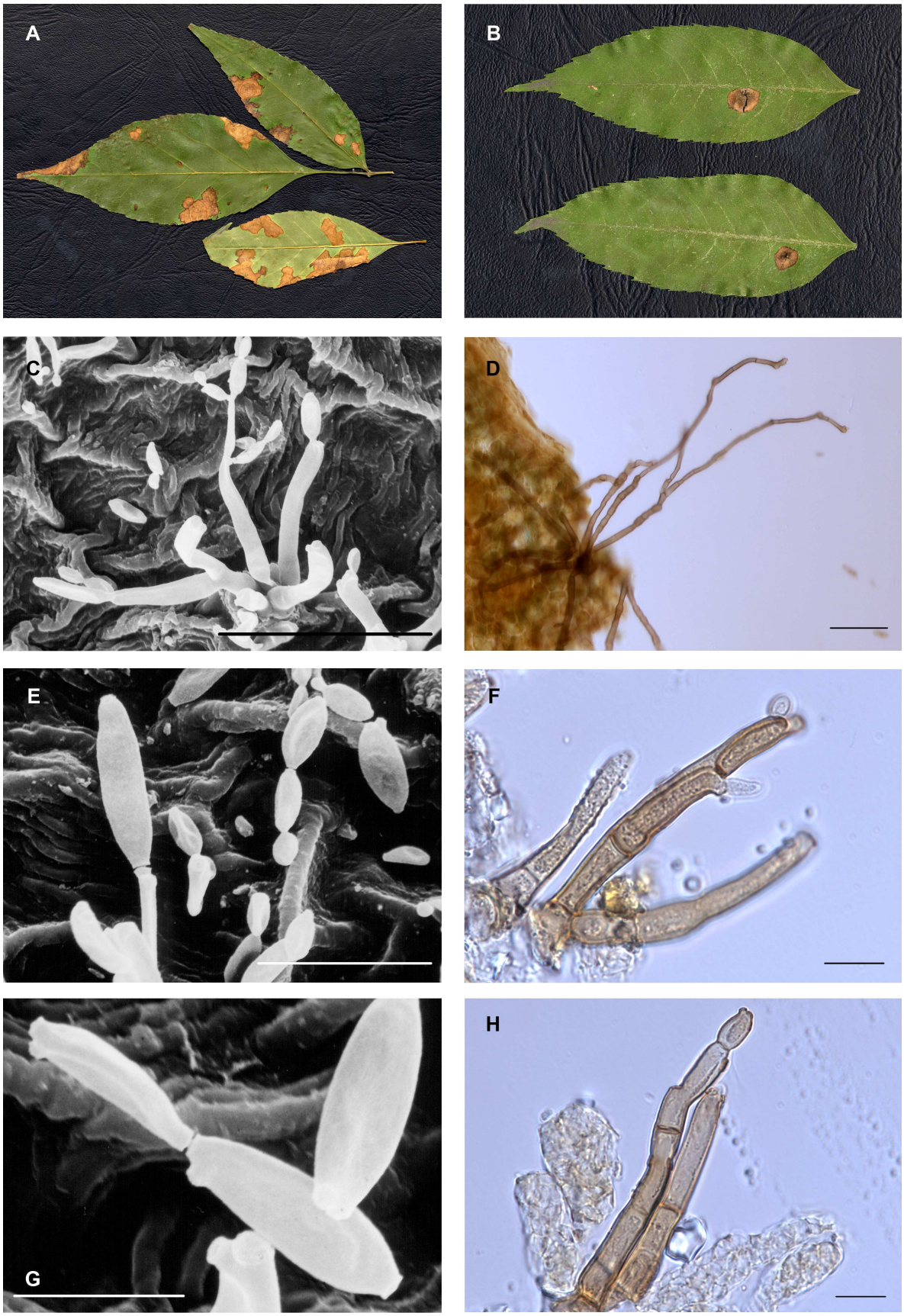
Pl. 9. A–E. ***Cladosporium colocasiae*** (BPI 426382). A: nodose conidiophore showing coronate scar structure (bar = 5 µm); B: conidiophore with distinct swellings, clearly separated and distant from each other (bar = 20 µm); C: conidiophore with coronate scars confined to swellings (bar = 10 µm); D: conidiophore (bar = 10 µm); E: conidia (bar = 10 µm). **F–I.** ***Cladosporium foliorum*** (holotype BPI 426581). F: symptoms; G: conidia (bar = 10 µm); H: conidiophores and conidia (bar = 10 µm); I: mycelium (bar = 10 µm).



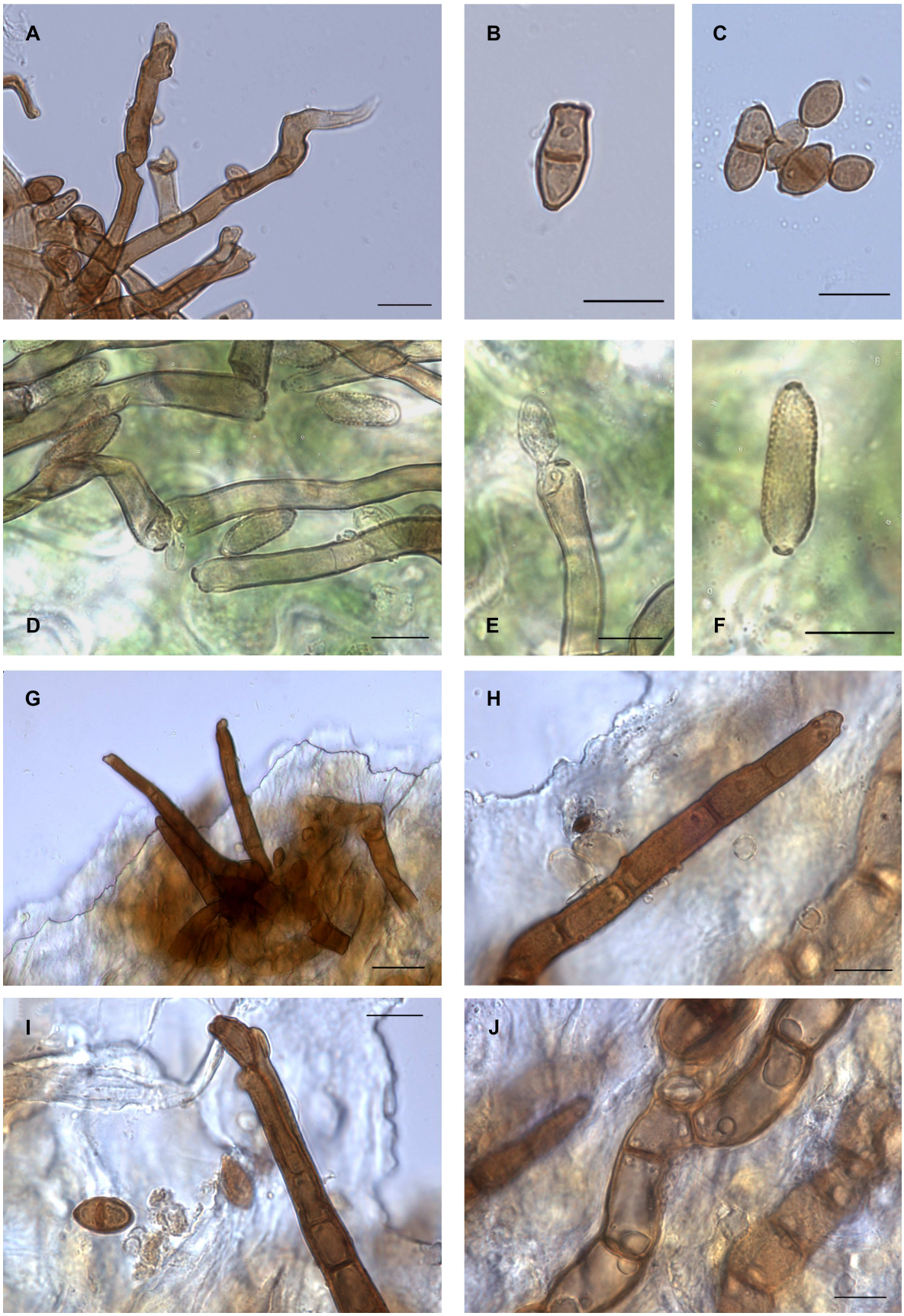
Pl. 10. A–G. ***Cladosporium diaphanum*** (isolectotype M-57507). A: overview (bar = 50 µm); B: branched conidiophore and conidia (bar = 20 µm); C: conidium showing coronate scar structure (bar = 5 µm); D: branched conidiophores (bar = 20 µm); E: tips of conidiophores and conidia (bar = 10 µm); F: base of a fascicle emerging through stomata (bar = 20 µm); G: conidiophore showing cell structure, with thickened, two-layered walls and protoplasm aggregated at the septa (bar = 10 µm).



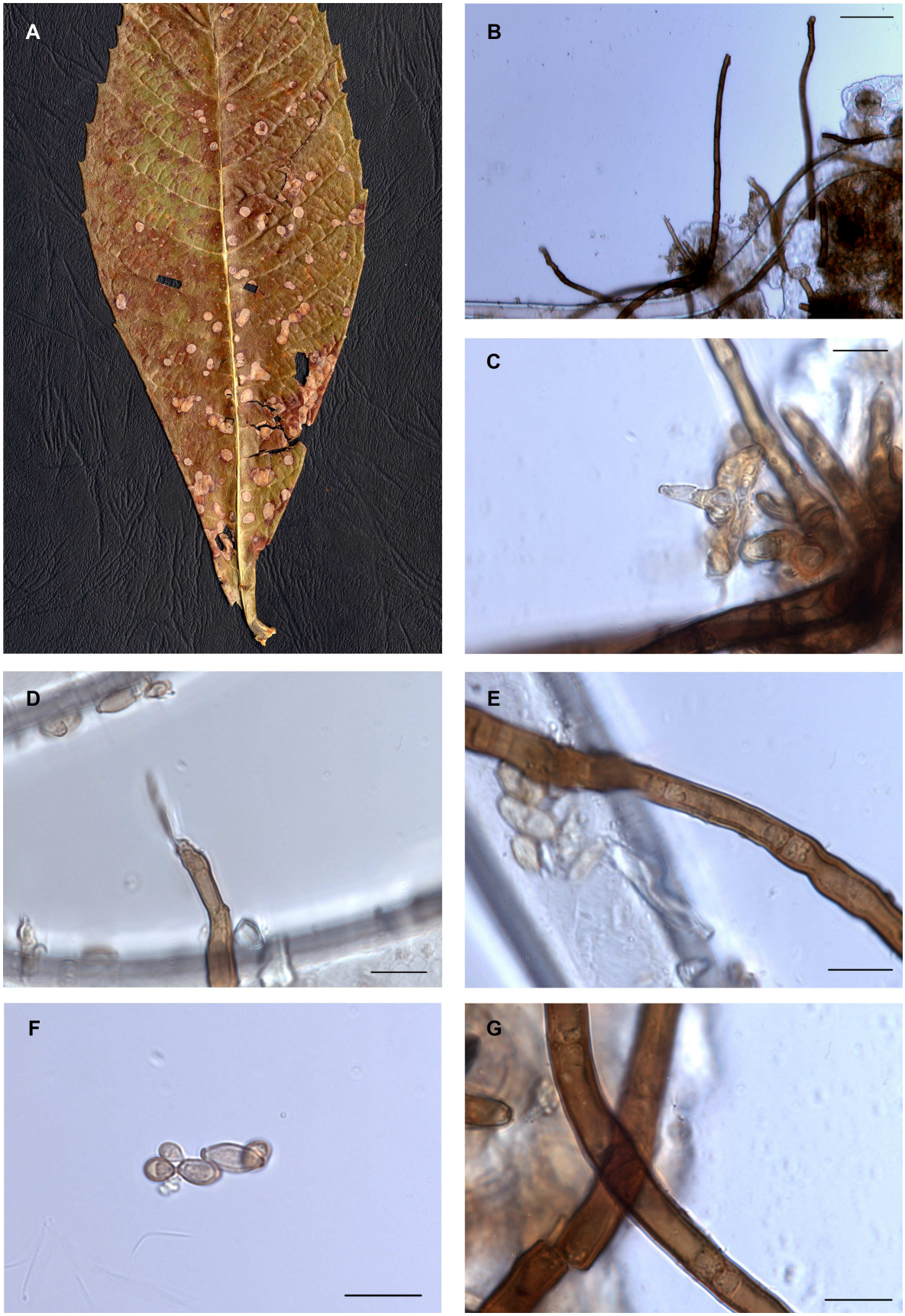
Pl. 11. A–G. ***Cladosporium dracaenatum*** (syntypes B 70-6248 and M-57504). A: symptoms; B: fascicle of conidiophores (bar = 20 µm); C: conidiophore and conidia (bar = 10 µm); D: small catenate conidia showing surface ornamentation (bar = 5 µm); E: old swollen conidia forming secondary conidiophores (microcyclic conidiogenesis) (bar = 10 µm); F, G: conidiophores and old swollen conidia (bar = 10 µm).



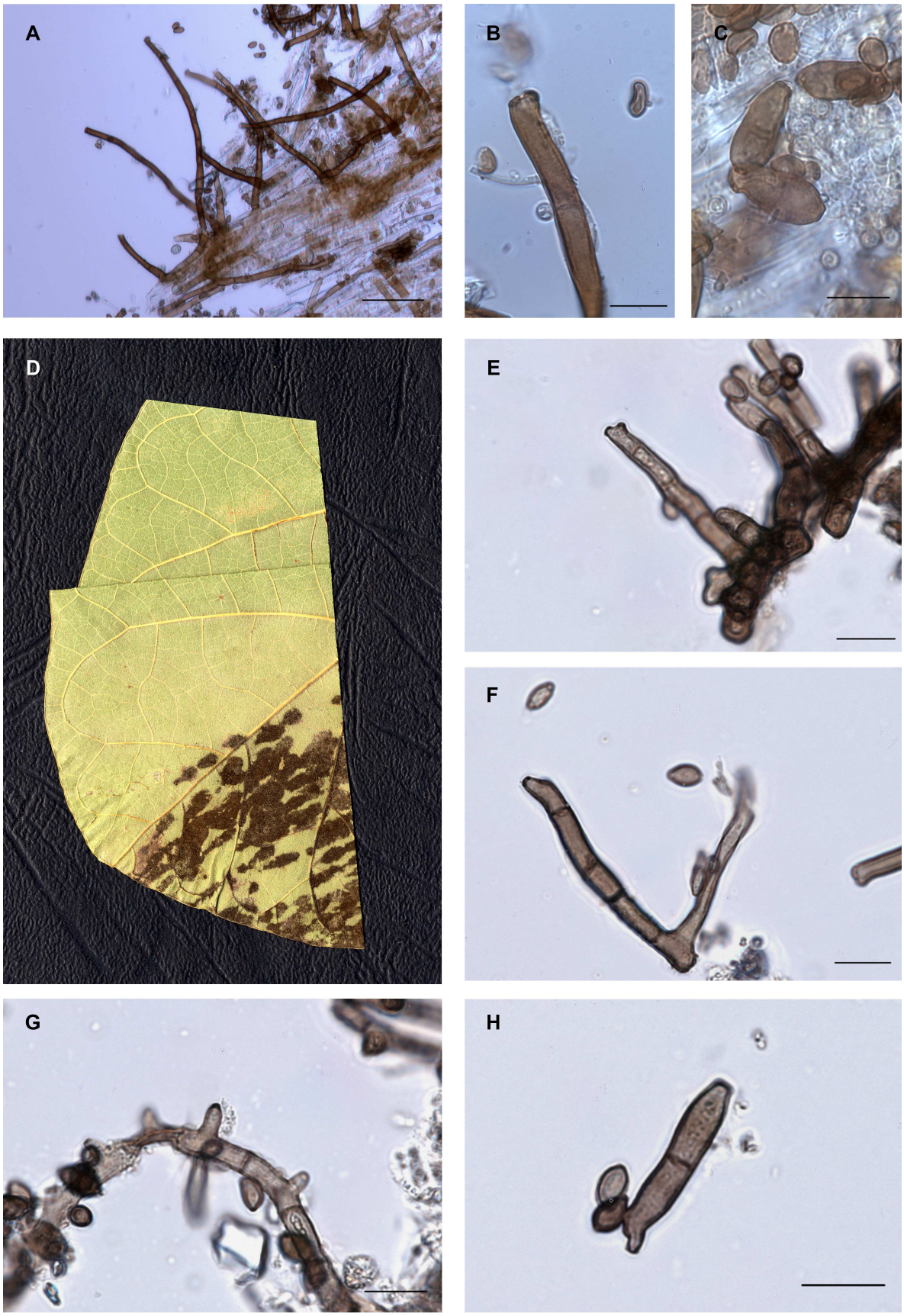
Pl. 12. A–H. ***Cladosporium fraxinicola*** (holotype HAL 1829 F and paratype HAL 1831 F). A, B: symptoms; C, D: fascicle of conidiophores (bar = 50 µm); E: tip of a conidiophore with still attached conidium and several conidia (bar = 20 µm); F, H: conidiophores (bar = 10 µm); G: conidial chain with conidia just separating but still attached at the central domes (bar = 10 µm).



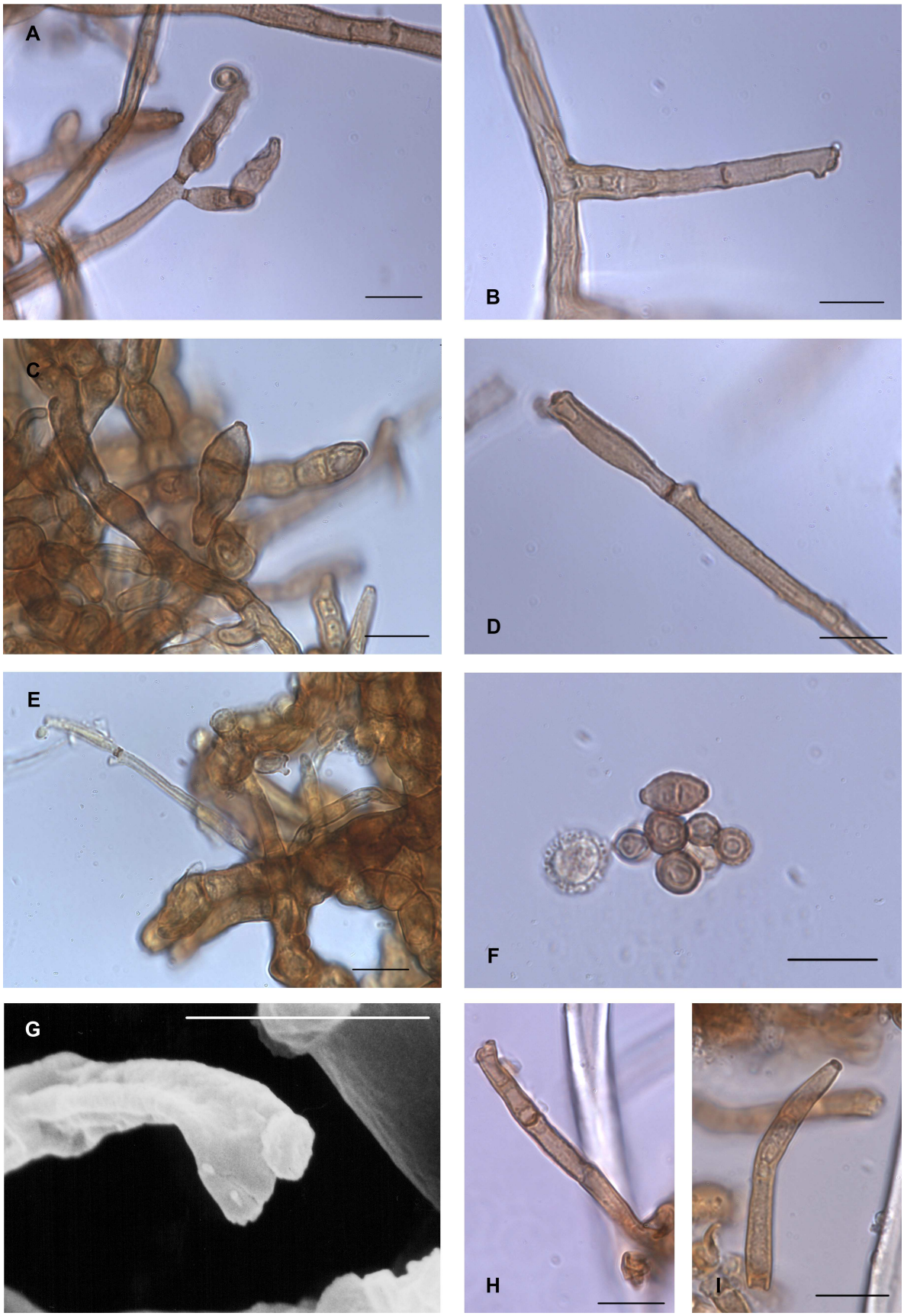
Pl. 13. A–C. ***Cladosporium fumagineum*** (lectotype PAD). A: conidiophores, somewhat geniculate-sinuous towards the apex (bar = 10 µm); B, C: conidia (bar = 10 µm). **D–F.** ***Cladosporium galii*** (isotype HAL 1811 F). D: conidiophores (bar = 10 µm); E: conidiogenesis (bar = 10 µm); F: conidium (bar = 10 µm). **G–J.** ***Cladosporium gentianae*** (holotype LE 40527). G: overview, fascicle of conidiophores (bar = 20 µm); H: conidiophore (bar = 10 µm); I: conidiophore and conidia (bar = 10 µm); J: mycelium (bar = 10 µm).



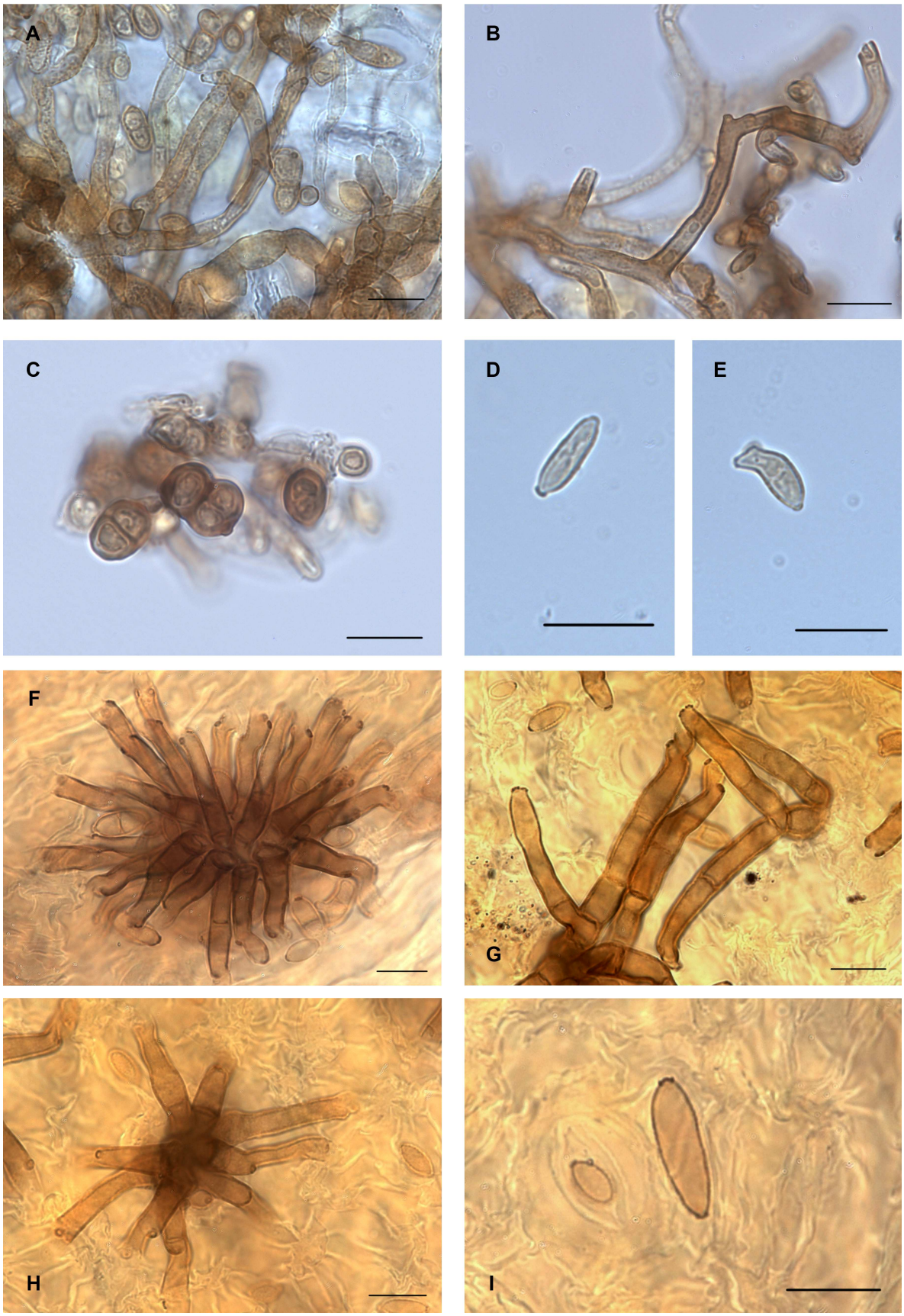
Pl. 14. A–G. ***Cladosporium fusicladiiformis*** (holotype MA 06413). A: symptoms; B: overview, fascicle of conidiophores (bar = 50 µm); C: dimorphic conidiophores, second type (bar = 10 µm); D: tip of a conidiophore (bar = 10 µm); E, G: conidiophores showing cell structure, with thickened, two-layered walls and protoplasm aggregated at the septa (bar = 10 µm); F: conidia (bar = 10 µm).



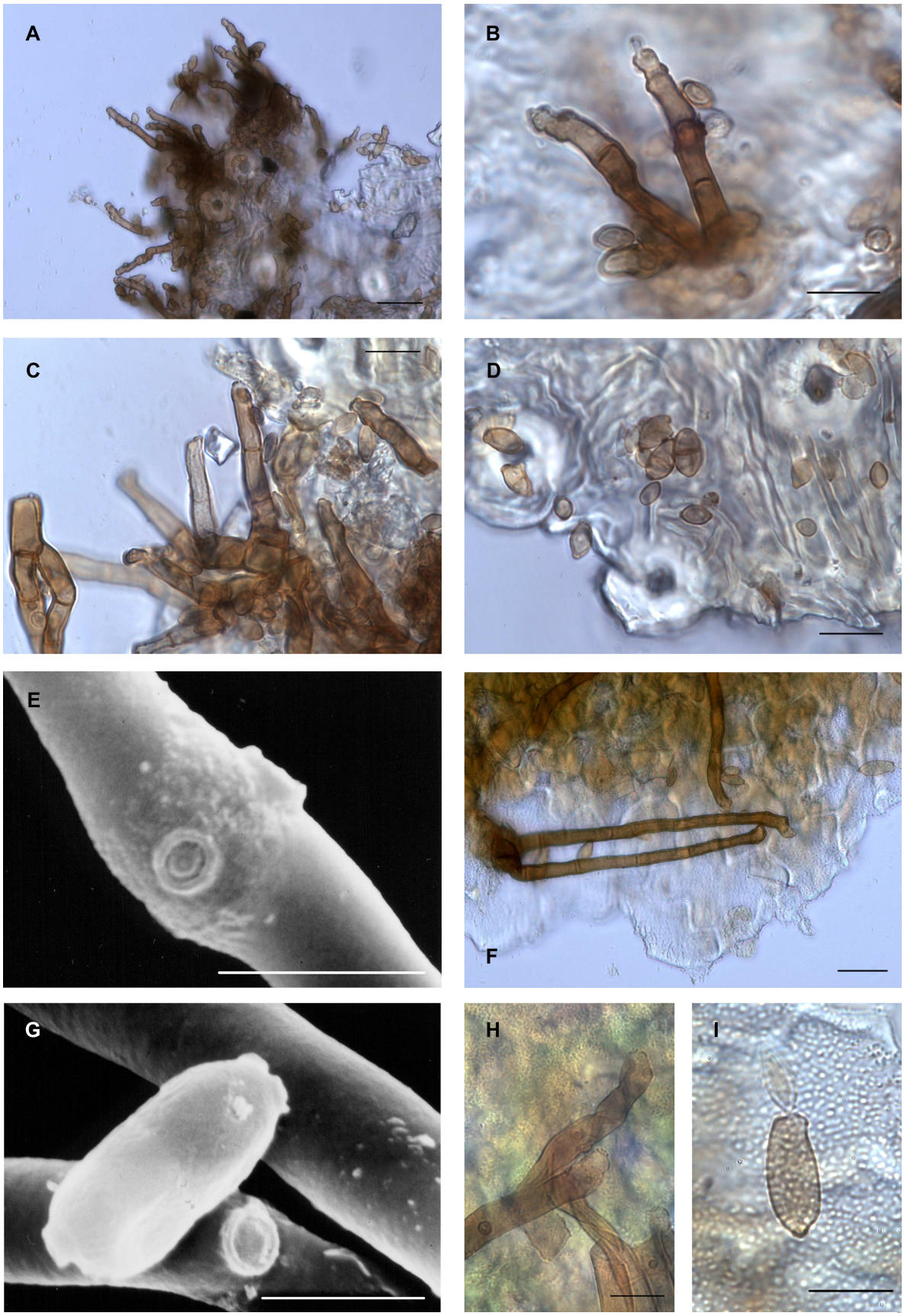
Pl. 15. A–C. ***Cladosporium grech-delicatae*** (holotype, PAD). A: overview (bar = 50 µm); B: tip of a conidiophore (bar = 10 µm); C: ramoconidium s. str. and conidia (bar = 10 µm). **D–H.** ***Cladosporium heterophragmatis*** (holotype IMI 90787). D: symptoms; E: conidiophores arising from superficial hyphae (bar = 10 µm); F: branched conidiophore and conidia (bar = 10 µm); G: small conidiophores arising from creeping hyphae (bar = 10 µm); H: conidia (bar = 10 µm).



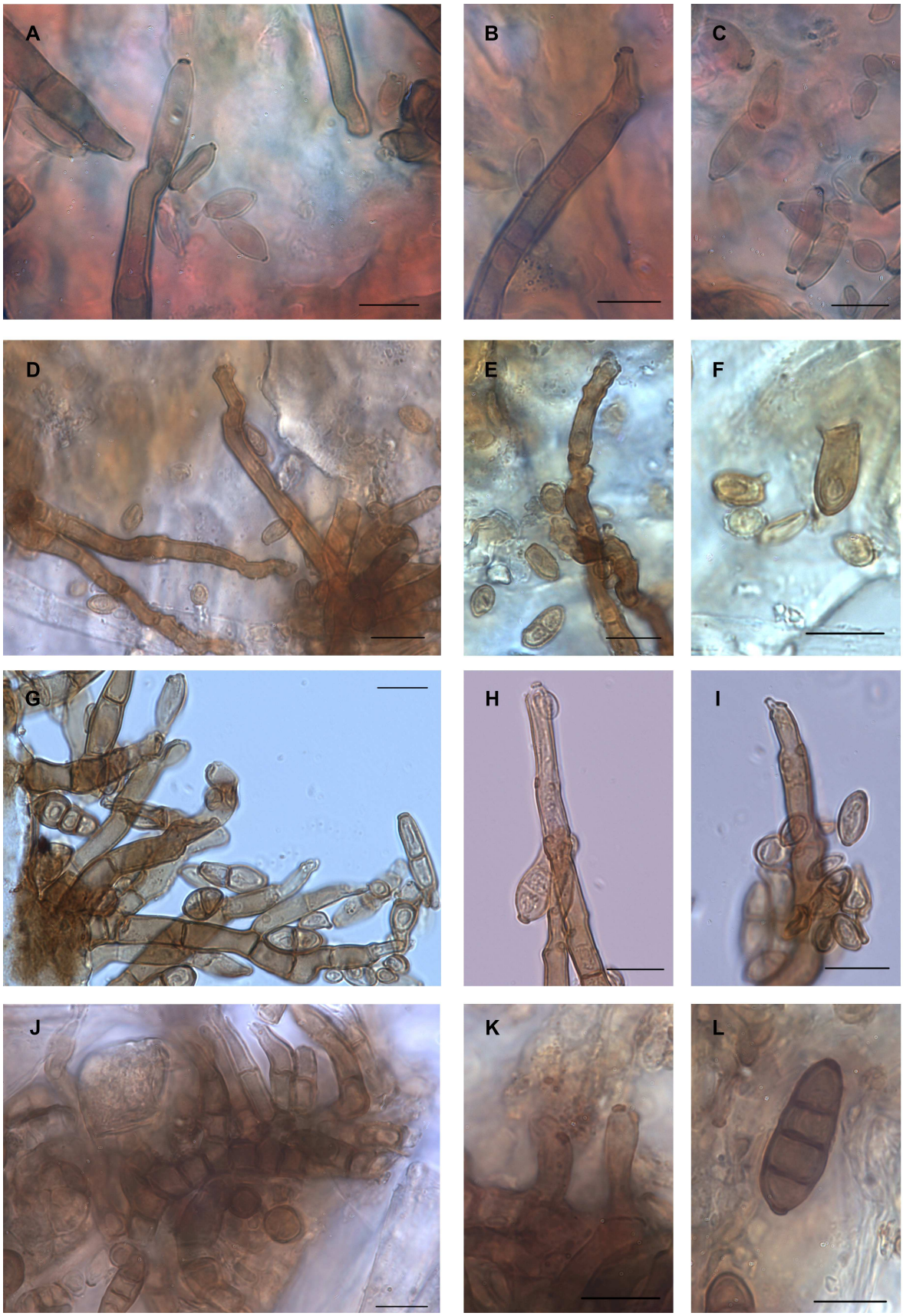
Pl. 16. A–F. ***Cladosporium heliotropii*** (syntype HBG, BPI 426853). A, D: conidiophores with still attached conidia (bar = 10 µm); B: conidiophore arising from superficially growing hyphae (bar = 10 µm); C, E: conidiophores and old swollen conidia (bar = 10 µm); F: small conidia (bar = 10 µm). **G–I.** ***Cladosporium inconspicuum*** (type B 70-6557). G: tip of a conidiophore showing coronate scar structure (bar = 5 µm); H, I: conidiophores (bar = 10 µm).



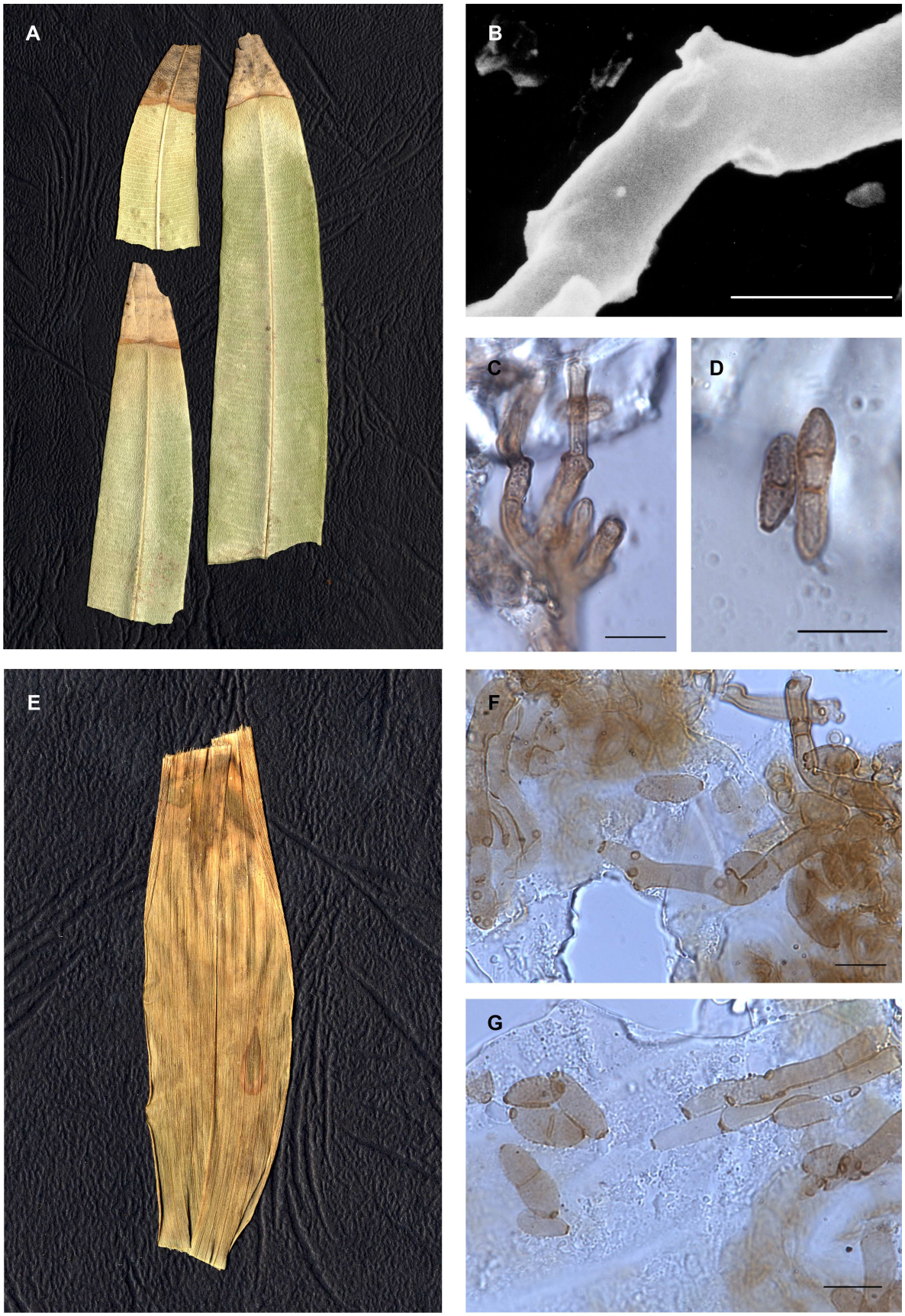
Pl. 17. A–E. ***Cladosporium hypophyllum*** (syntype M-57614). A: conidiophores, conidia and external mycelium (bar = 10 µm); B: geniculate conidiophore (bar = 10 µm); C: old, distinctly swollen conidia showing cell structure, with paler cavity in the centre (bar = 10 µm); D, E: conidia (bar = 10 µm). **F–I.** ***Cladosporium jacarandicola*** (holotype HAL 1812 F). F, H: fascicles of conidiophores emerging through stomata (bar = 10 µm); G: unbranched and branched conidiophores (bar = 10 µm); I: conidia (bar = 10 µm).



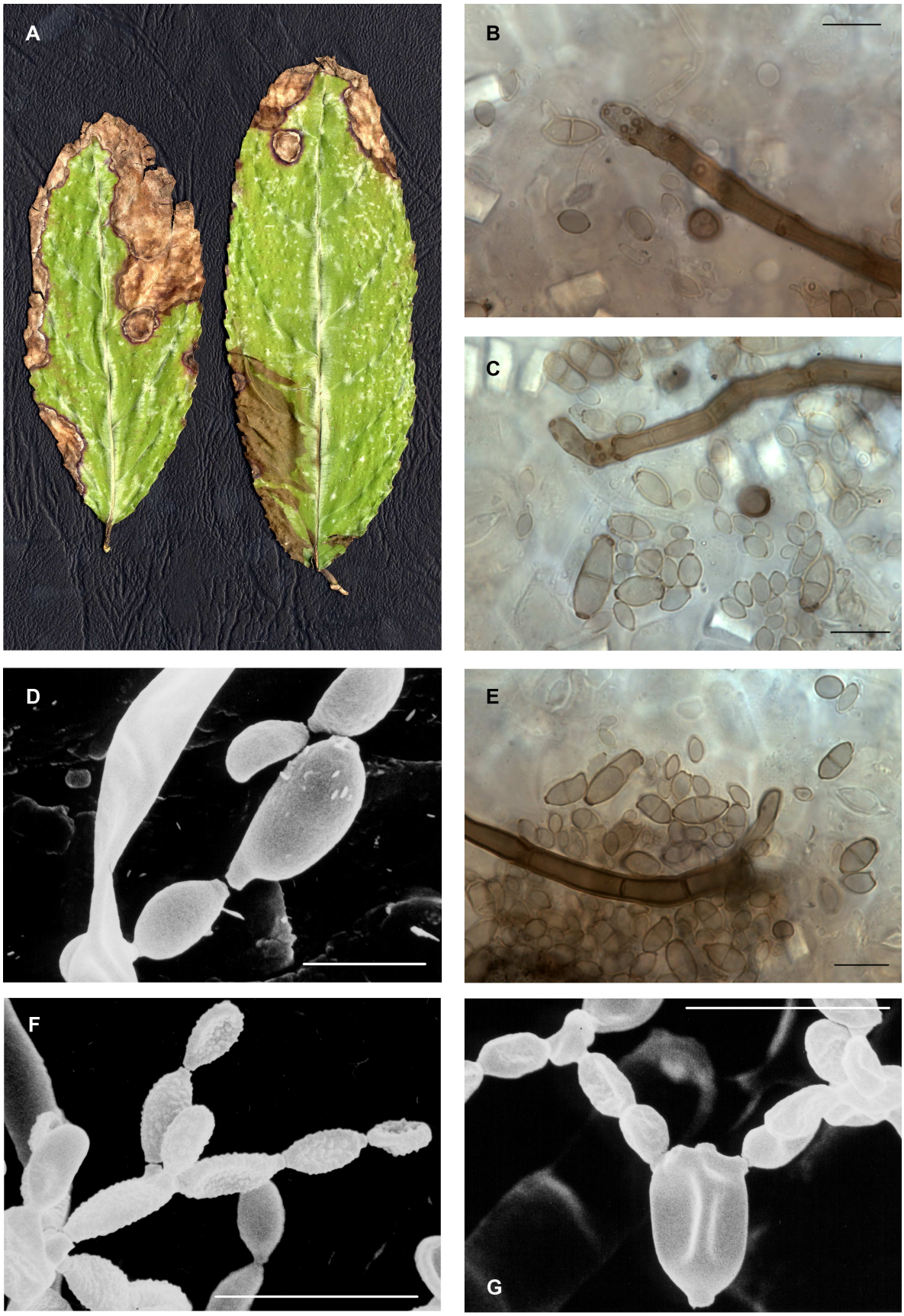
Pl. 18. A–D. ***Cladosporium lineolatum*** (lectotype PAD). A: overview (bar = 20 µm); B: small fascicle of conidiophores emerging through stomata (bar = 10 µm); C: conidiophores arising from superficial hyphae (bar = 10 µm); D: conidia (bar = 10 µm). **E–I.** ***Cladosporium liriodendri*** (holotype NY). E: conidiophore with coronate scars (bar = 5 µm); F: overview (bar = 20 µm); G: conidium showing coronate scar structure (bar = 5 µm); H: tips of conidiophores with several conspicuous, somewhat darkened conidiogenous loci (bar = 10 µm); I: conidia (bar = 10 µm).



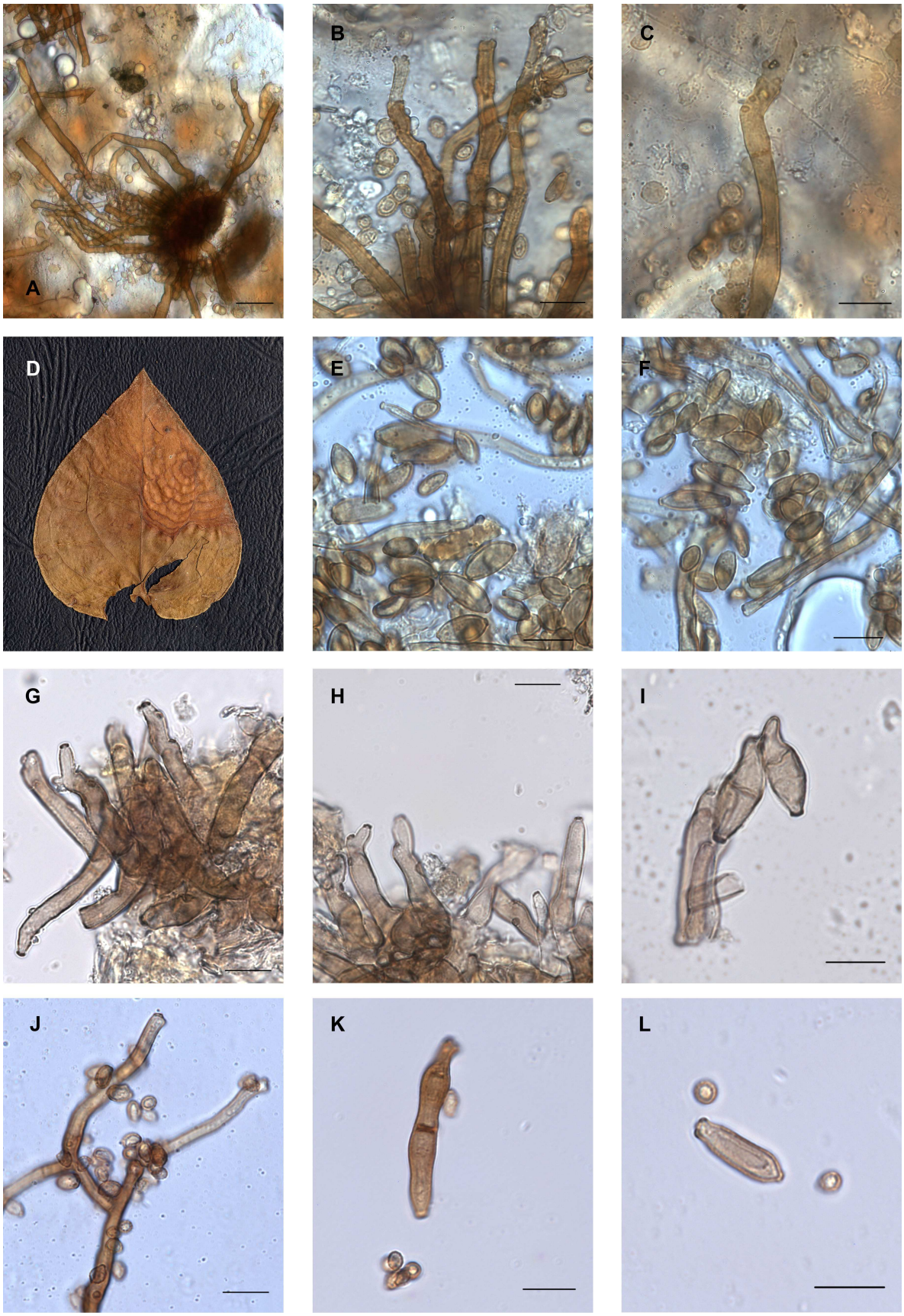
Pl. 19. A–C. ***Cladosporium maracuja*** (holotype IACM). A: conidiophores and conidia (bar = 10 µm); B: tip of a conidiophore (bar = 10 µm); C: conidia (bar = 10 µm). **D–F.** ***Cladosporium minusculum*** (holotype PAD). D: fascicles of conidiophores (bar = 10 µm); E: frequently geniculate-sinuous conidiophores and conidia (bar = 10 µm); F: conidia (bar = 10 µm). **G–I.** ***Cladosporium myrtacearum*** (holotype BRIP 26527). G: fascicle of conidiophores (bar = 10 µm); H, I: tips of conidiophores and conidia (bar = 10 µm). **J–L.** ***Cladosporium obtectum*** (syntype HBG). J: external pluriseptate mycelium (bar = 10 µm); K: conidiophores (bar = 10 µm); L: conidium (bar = 10 µm).



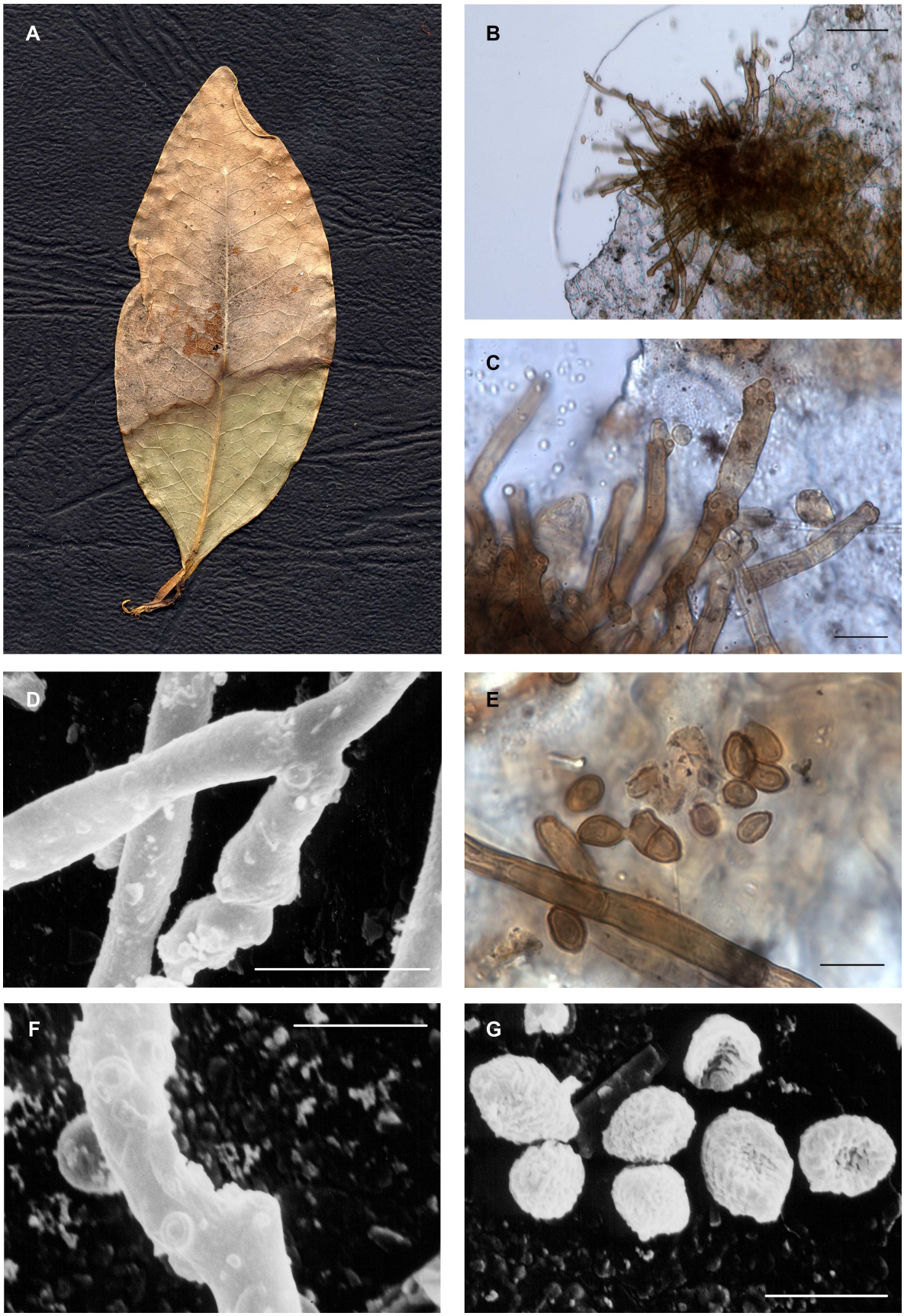
Pl. 20. A–D. ***Cladosporium neriicola*** (holotype IMI 123901). A: symptoms; B: geniculate conidiophore showing coronate scar structure (bar = 5 µm); C: conidiophores (bar = 10 µm); D: conidia (bar = 10 µm). **E–G.** ***Cladosporium orchidearum*** (holotype NY 72454). E: symptoms; F, G: conidiophores and conidia with conspicuous, darkened-refractive conidiogenous loci (bar = 10 µm).



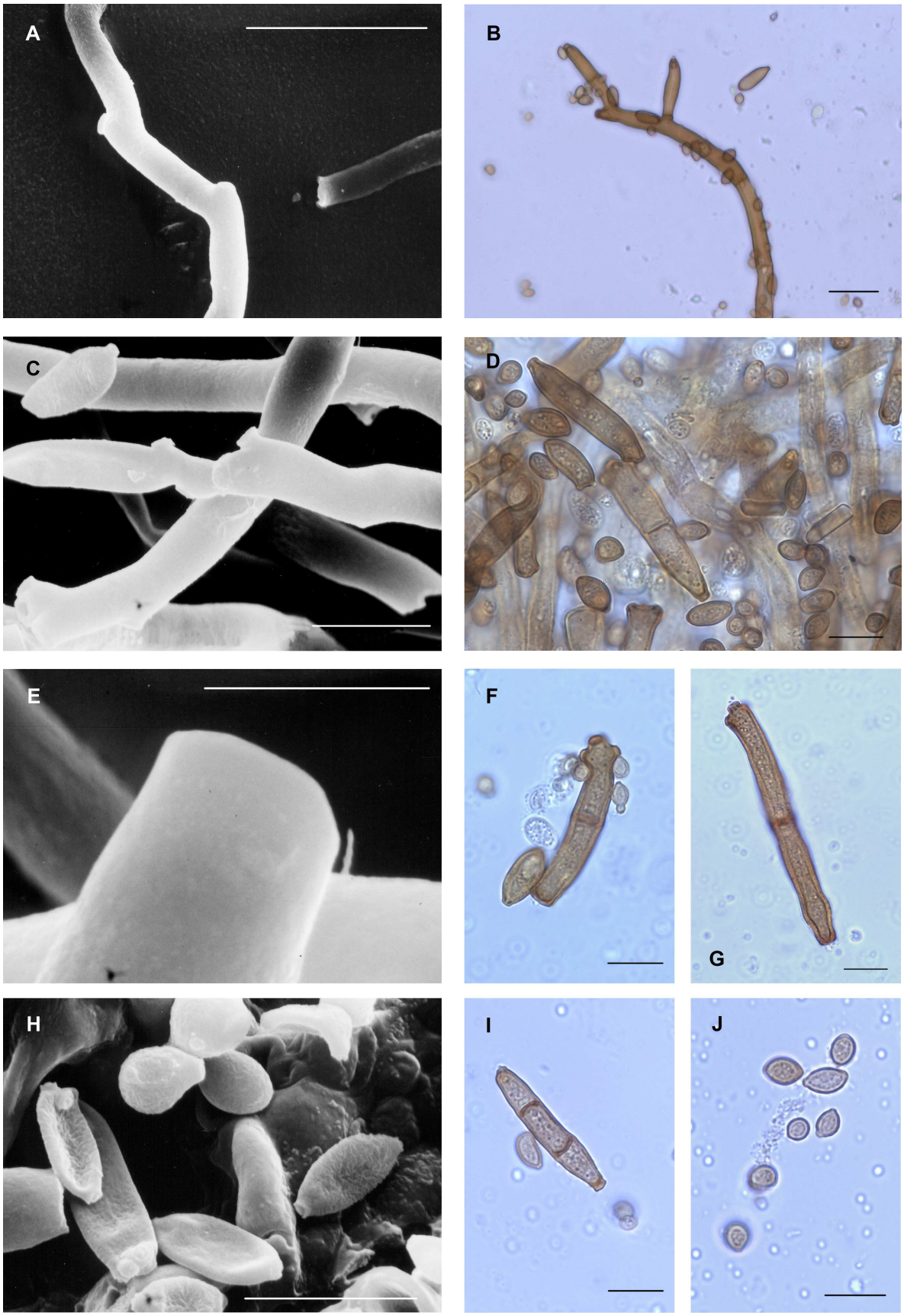
Pl. 21. A–G. ***Cladosporium oncobae*** (holotype HAL 1832 F). A: symptoms; B, C: tips of conidiophores with numerous, conspicuous, somewhat crowded conidiogenous loci and conidia (bar = 10 µm); D: conidiophore and conidia (bar = 5 µm); E: numerous conidia and base of a conidiophore with percurrent, enteroblastic proliferation and thickened, two-layered walls (bar = 10 µm); F: conidial chains (bar = 10 µm); G: conidial chain (bar = 5 µm).



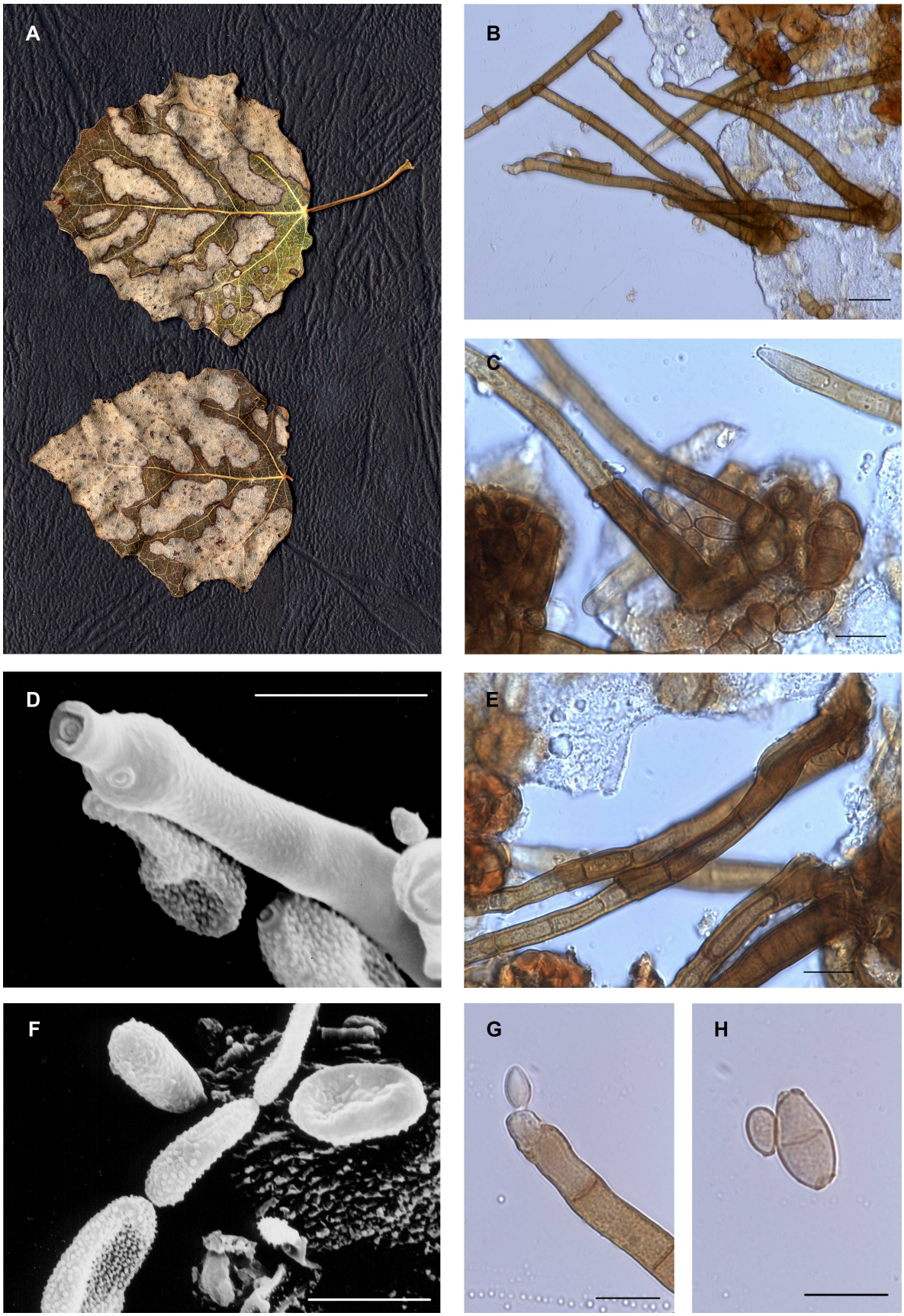
Pl. 22. A–C. *Cladosporium orchidiphilum* (holotype VPRI 2488). A: fascicle of conidiophores emerging through stomata (bar = 20 µm); B, C: conidiophores and conidia (bar = 10 µm). **D–F. *Cladosporium pipericola*** (syntype IMI 116933). D: symptoms; E, F: conidiophores and conidia (bar = 10 µm). **G–I. *Cladosporium praecox*** (syntype M-57733). G: fascicle of conidiophores (bar = 10 µm); H: conidiophores (bar = 10 µm); I: conidia (bar = 10 µm). **J–L. *Cladosporium rectangulare*** (holotype BPI 427292). J: right-angled branched conidiophore (bar = 10 µm); K, L: conidia (bar = 10 µm).



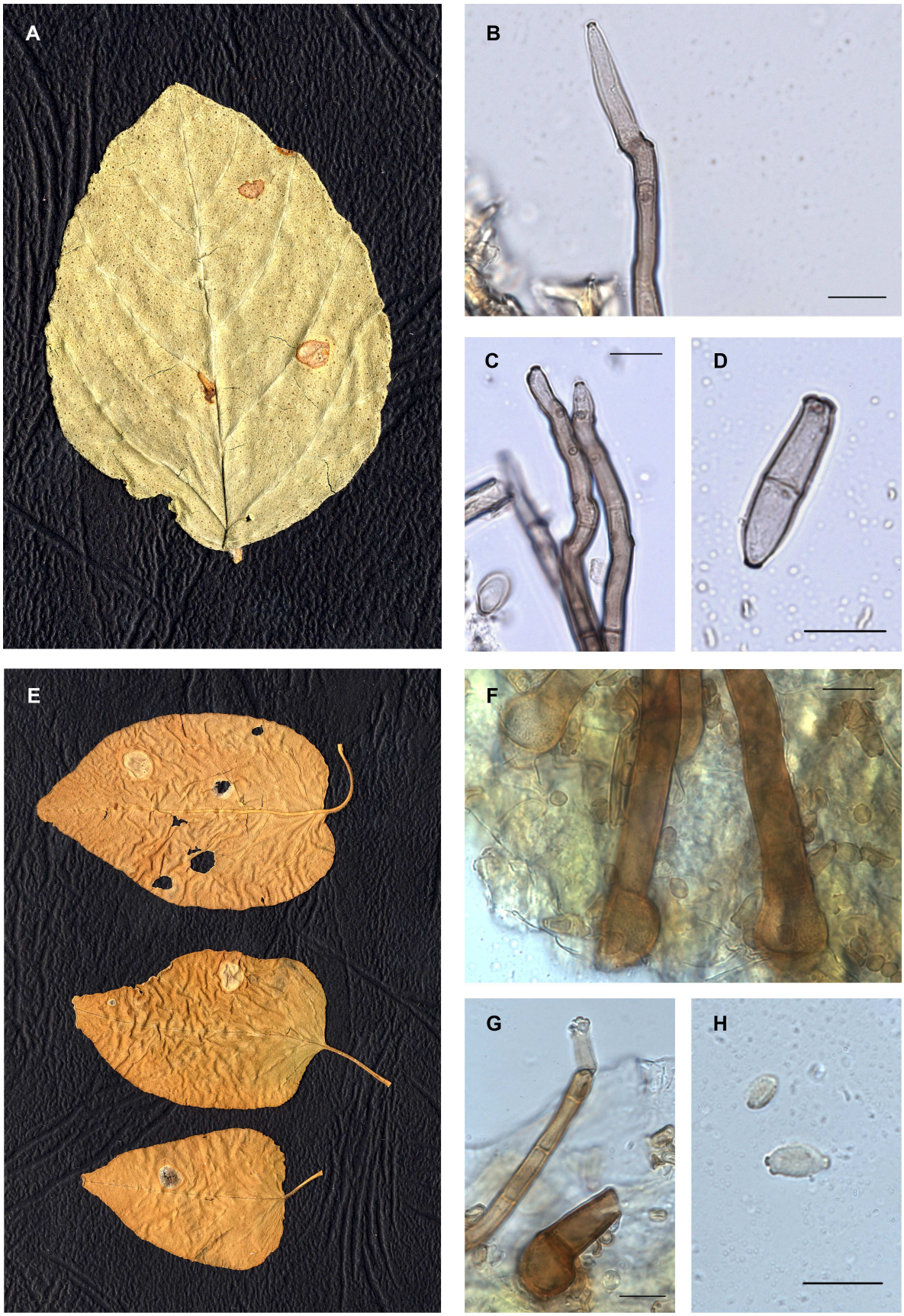
Pl. 23. A–G. ***Cladosporium oreodaphnes*** (holotype M-57756). A: symptoms; B: overview (bar = 50 µm); C: conidiophores with numerous, conspicuous, somewhat crowded conidiogenous loci (bar = 10 µm); D: branched conidiophore with several conidiogenous loci (bar = 10 µm); E: conidia showing cell structure, with paler cavity in the centre of the cells (bar = 10 µm); F: conidiophore with several coronate scars (bar = 5 µm); G: conidia (bar = 5 µm).



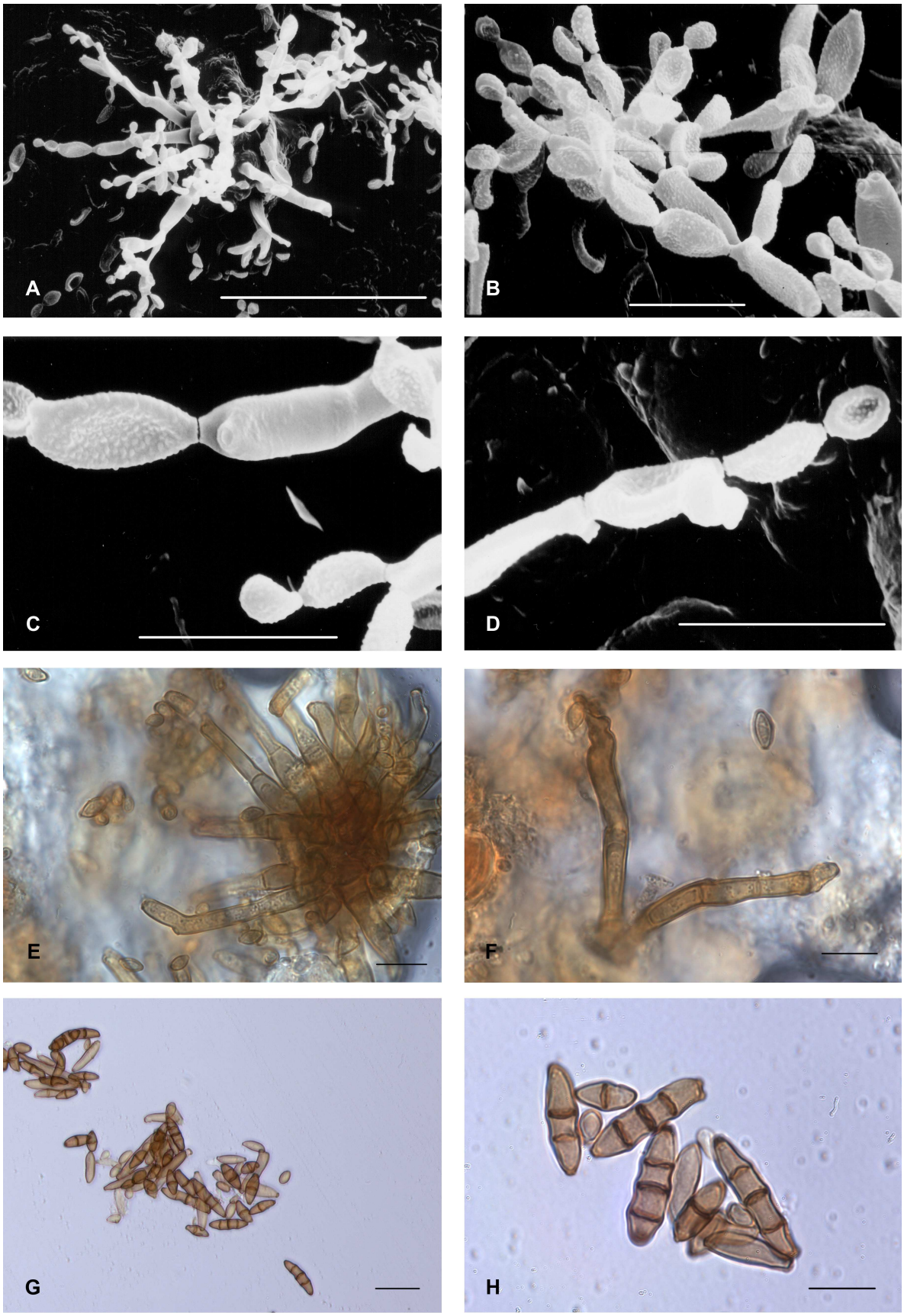
Pl. 24. A–J. ***Cladosporium phyllogenum*** (holotype HAL 1845 F). A: geniculate conidiophore (bar = 20 µm); B: branched conidiophore and conidia (bar = 20 µm); C: conidiophores with several conspicuous conidiogenous loci (bar = 10 µm); D: conidia and external mycelium (bar = 10 µm); E: truncate, unthickened base of a ramoconidium s. str. (bar = 5 µm); F, G: ramoconidia s. str. (bar = 10 µm); H: conidia showing coronate scar structure (bar = 10 µm); I, J: conidia (bar = 10 µm).



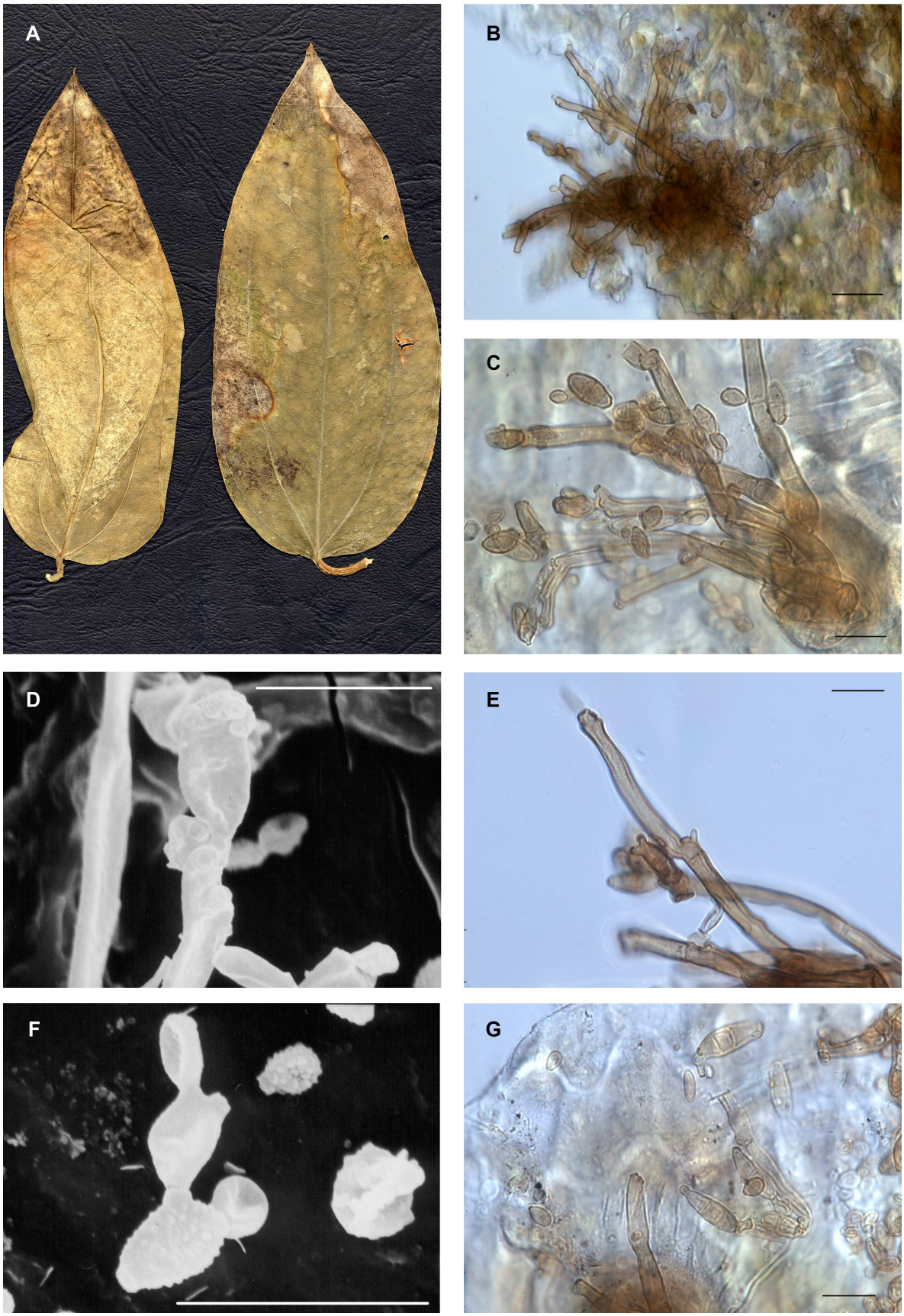
Pl. 25. A–H. ***Cladosporium populicola*** (holotype HAL 1833 F). A: symptoms; B: overview (bar = 20 µm); C, E: conidiophores with percurrent, enteroblastic proliferations and thickened, distinctly two-layered walls (bar = 10 µm); D: conidiophore and conidia with coronate scars (bar = 10 µm); F: conidia showing surface ornamentation (bar = 10 µm); G: tip of a conidiophore with young conidium (bar = 10 µm); H: conidia (bar = 10 µm).



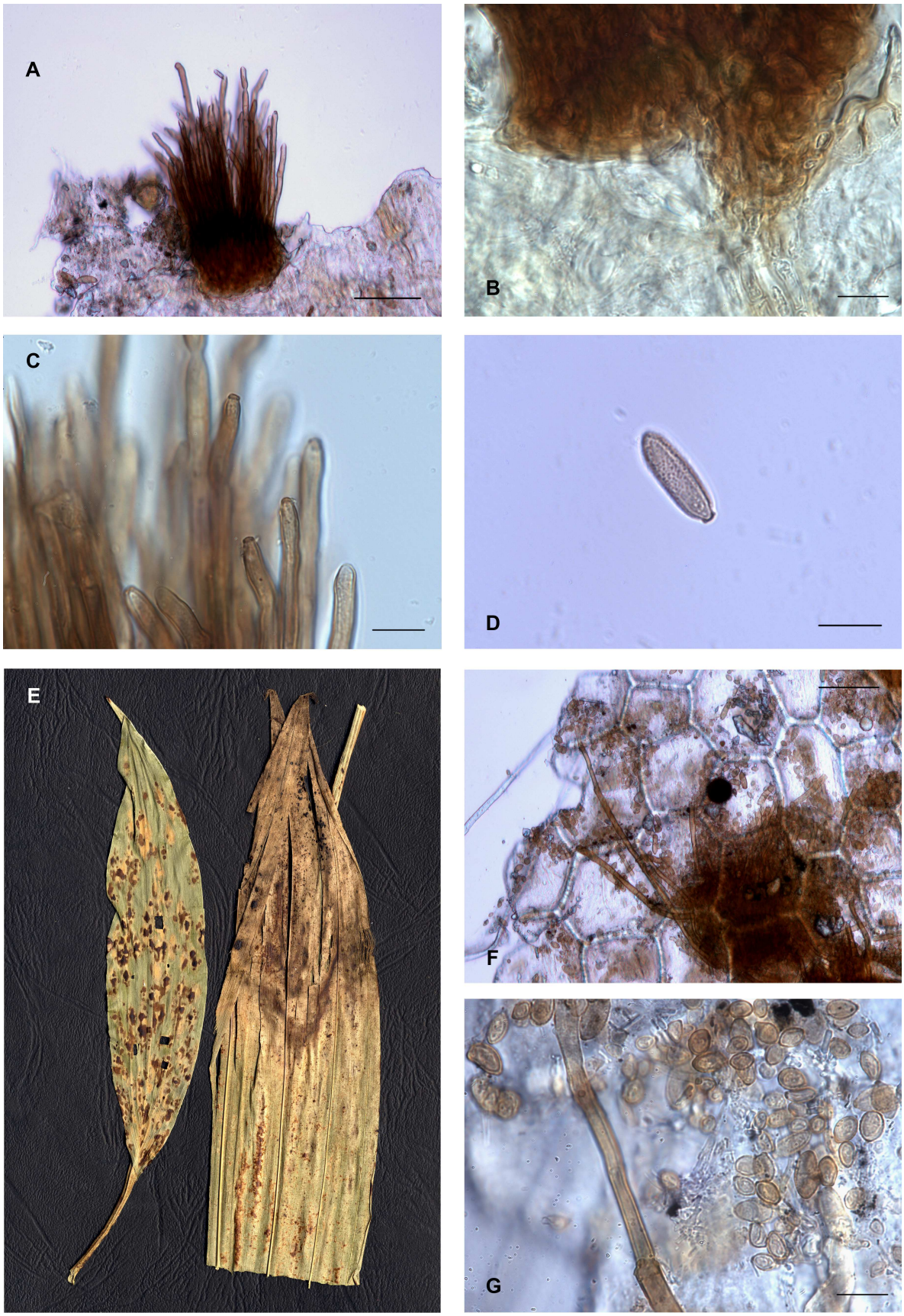
Pl. 26. A–D. ***Cladosporium psoraleae*** (holotype IMI 163005). A: symptoms; B, C: conidiophores (bar = 10 µm); D: conidium (bar = 10 µm). **E–H.** ***Cladosporium rivinae*** (holotype LPS 13.137). E: symptoms; F: bulbous, distinctly swollen bases of conidiophores (bar = 10 µm); G: tip of a conidiophore with several darkened-refractive conidiogenous loci (bar = 10 µm); H: conidia (bar = 10 µm).



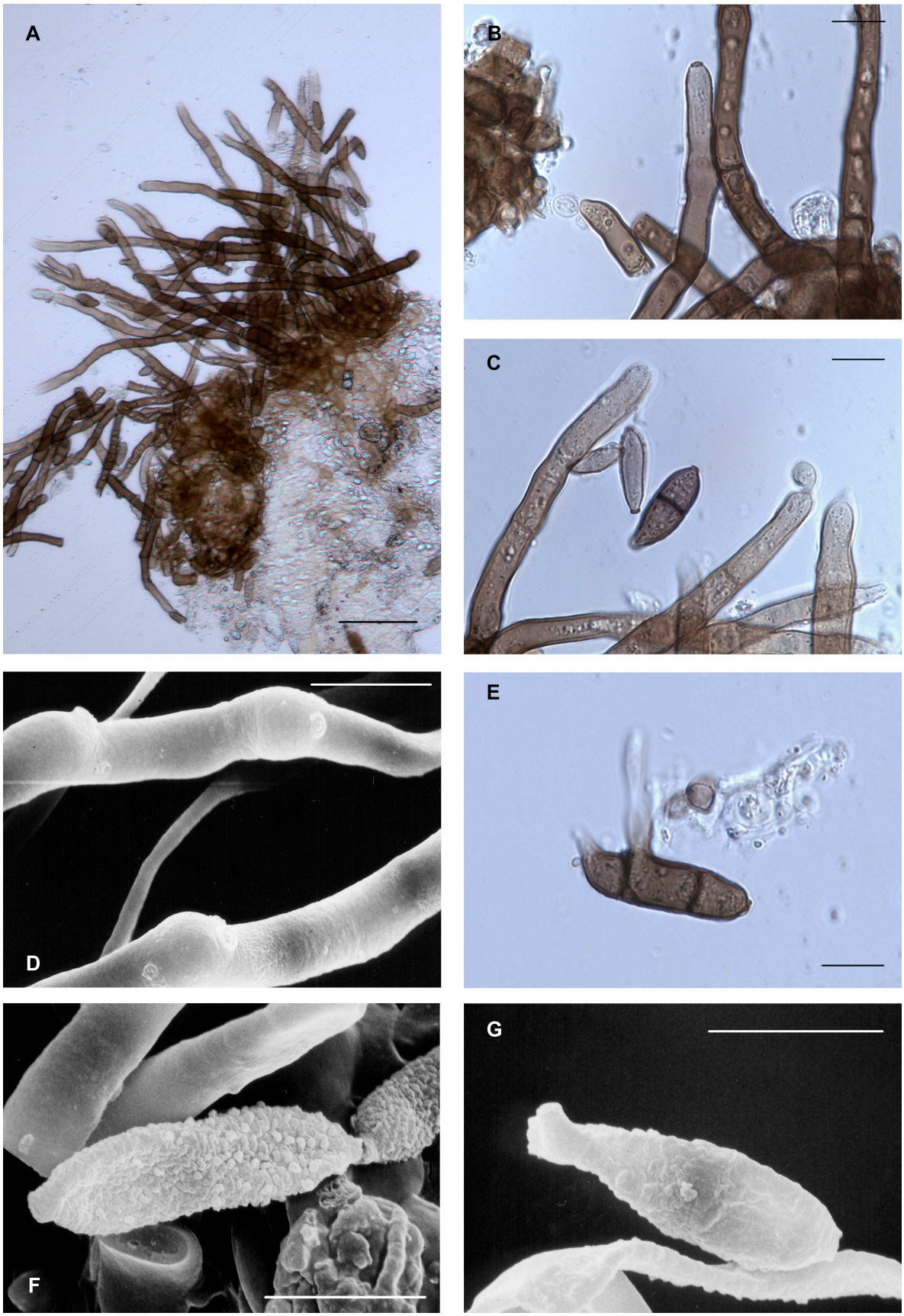
Pl. 27. A–F. ***Cladosporium rhododendri*** (holotype HAL 1834 F). A: fascicle of conidiophores (bar = 50 µm); B: conidial chains (bar = 10 µm); C: tip of a conidiophore with still attached conidium (bar = 10 µm); D: conidial chain, conidia just separating but still attached at the central domes (bar = 10 µm); E, F: fascicles of conidiophores emerging through stomata and conidia (bar = 10 µm). **G–H.** ***Cladosporium spongiosum*** (holotype K 121570). G: conidia (bar = 20 µm); H: conidia with distinctly thickened and darkened septa (bar = 10 µm).



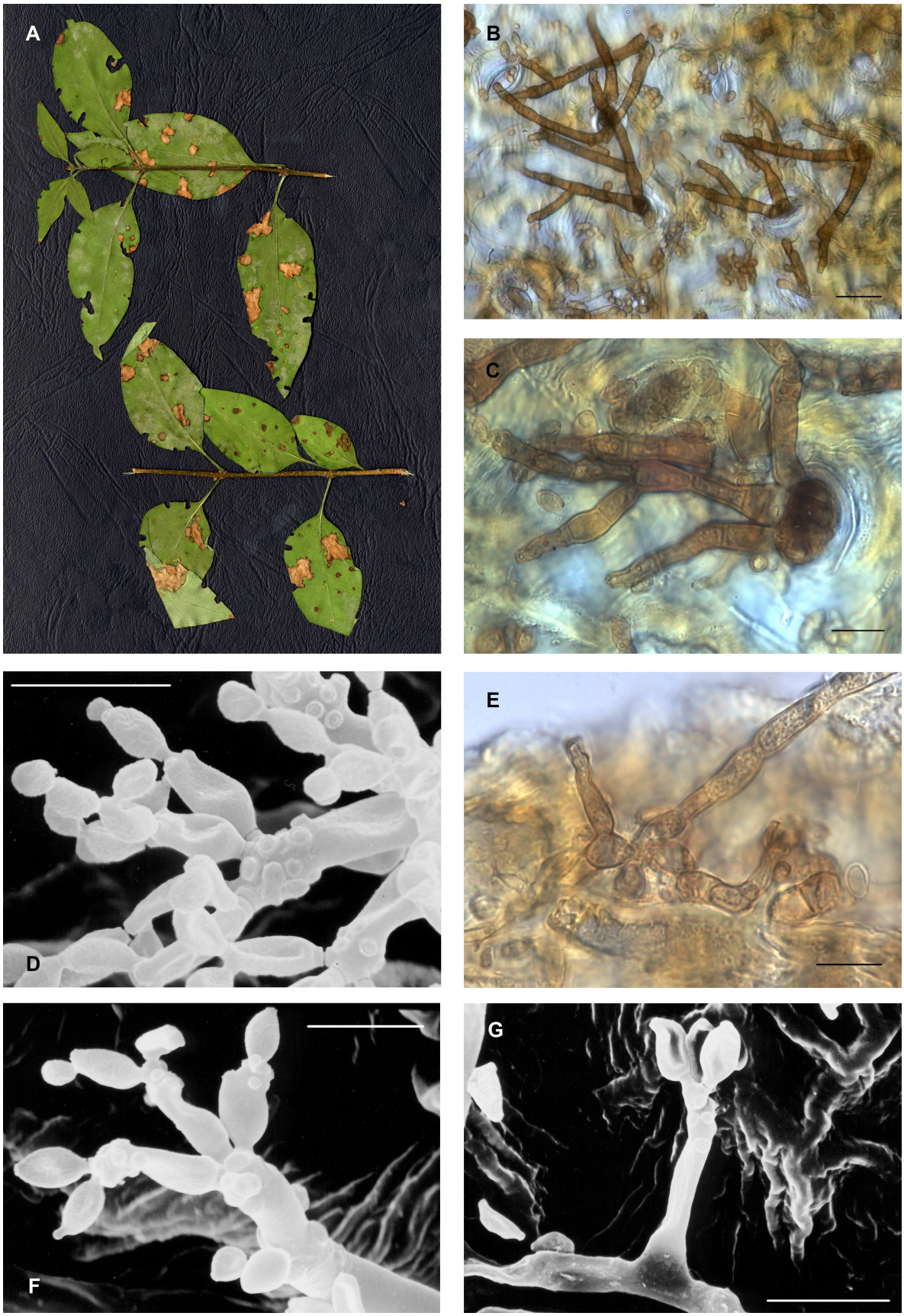
Pl. 28. A–G. ***Cladosporium smilacicola*** (holotype M-57718). A: symptoms; B: overview (bar = 20 µm); C: fascicle of conidiophores (bar = 10 µm); D: tip of a conidiophore with attached conidium, with several conidiogenous loci and hila (bar = 10 µm); E: conidiophores (bar = 10 µm); F: conidia showing surface ornamentation (bar = 10 µm); G: conidiophores, conidia and microcyclic conidiogenesis (bar = 10 µm).



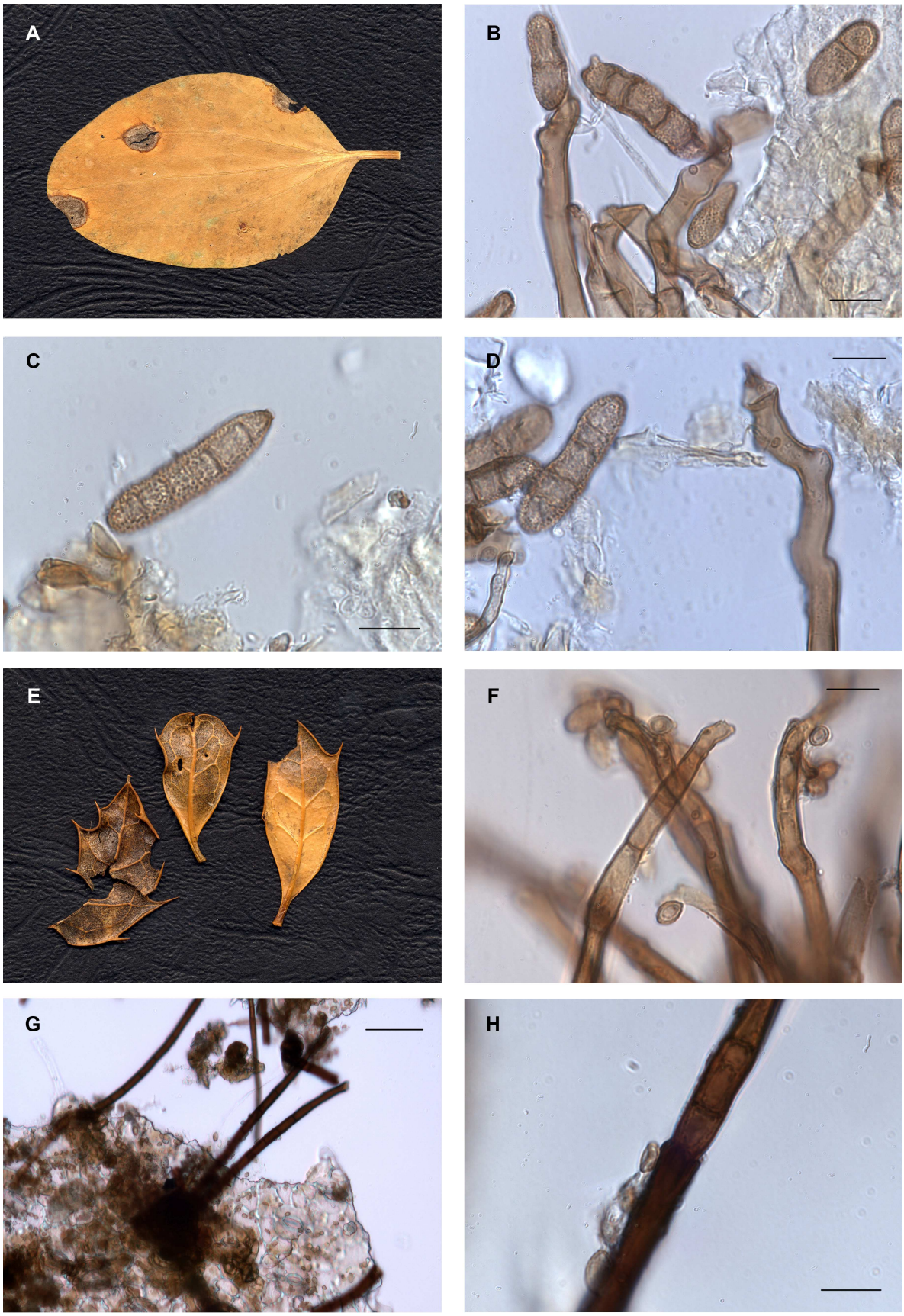
Pl. 29. A–D. ***Cladosporium soldanellae*** (holotype of *C. stysanoides* BPI 427476). A: overview, fascicle of conidiophores (bar = 50 µm); B: stromata and mycelium (bar = 10 µm); C: conidiophores (bar = 10 µm); D: conidium (bar = 10 µm). **E–G.** ***Cladosporium stanhopeae*** (holotype M-57717). E: symptoms; F: overview (bar = 50 µm); G: conidiophore and conidia (bar = 10 µm).



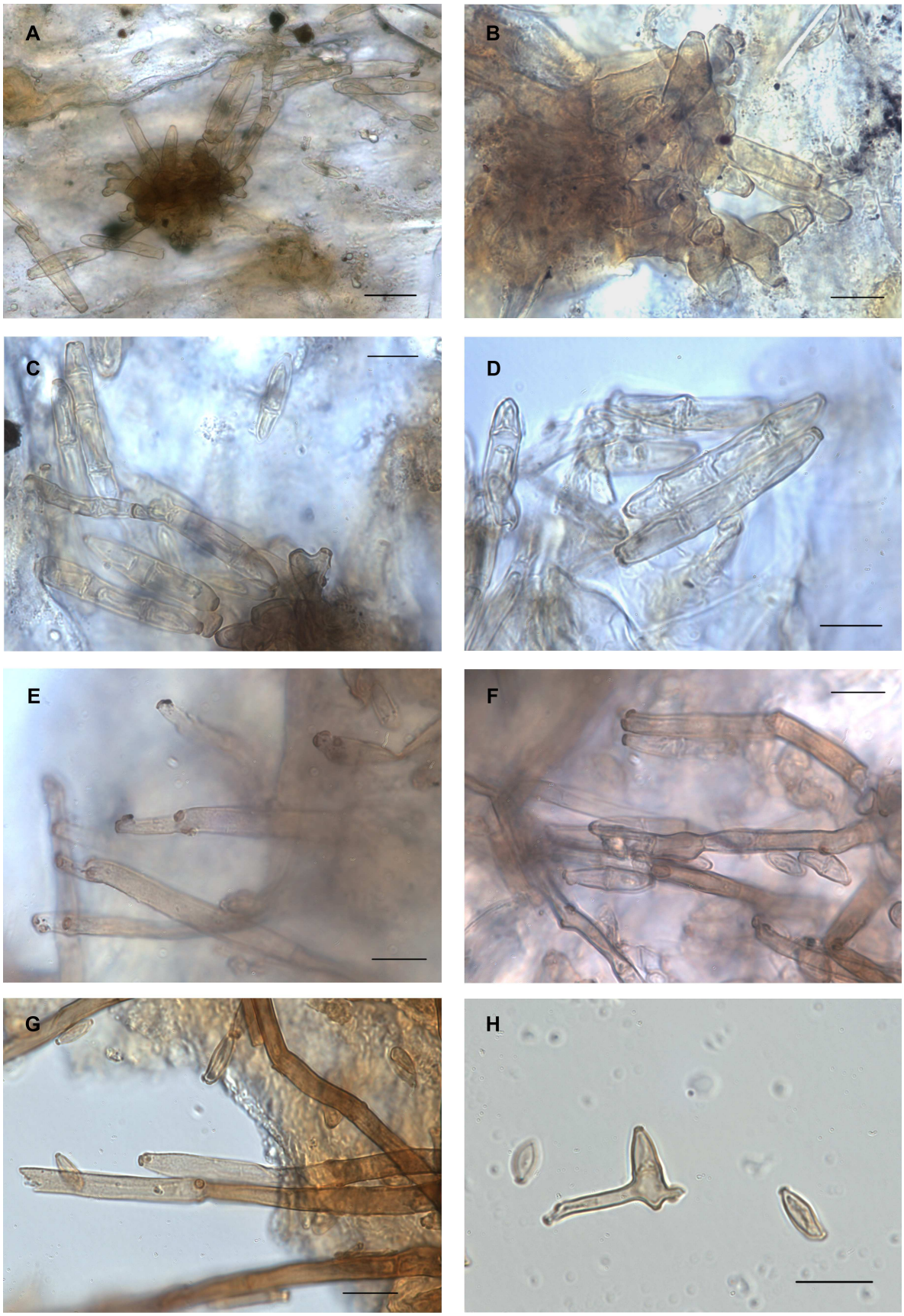
Pl. 30. A–G. ***Cladosporium subsclerotioideum*** (syntype DAOM). A: overview (bar = 50 µm); B: conidiophores (bar = 10 µm); C: conidiophores and conidia (bar = 10 µm); D: conidiophores with coronate scars (bar = 10 µm); E: germinating conidium (bar = 10 µm); F, G: conidia showing surface ornamentation (bar = 10 µm).



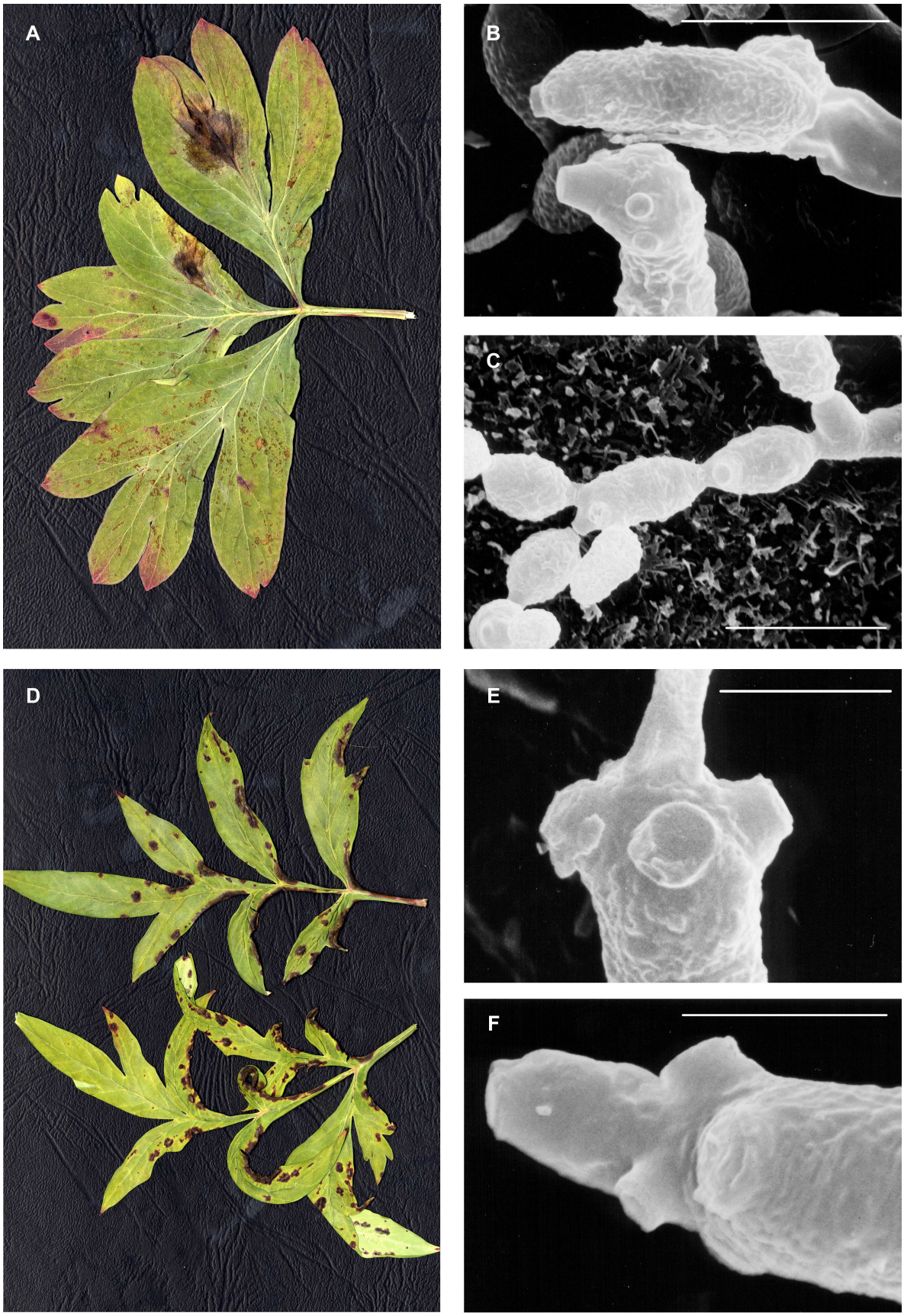
Pl. 31. A–G. ***Cladosporium syringicola*** (holotype HAL 1835 F). A: symptoms; B: overview (bar = 20 µm); C: fascicle of conidiophores emerging through stomata (bar = 10 µm); D: tip of a conidiophore with numerous, conspicuous, crowded, coronate conidiogenous loci and conidia still attached (bar = 10 µm); E, G: dimorphic conidiophores, second type of conidiophores arising from external, creeping hyphae (bar = 10 µm); F: tip of a conidiophore with conidia still attached (bar = 10 µm).



Pl. 32. A–D. ***Cladosporium trillii*** (holotype NY). A: symptoms; B: conidiophores and conidia (bar = 10 µm); C: conidium (bar = 10 µm); D: geniculate, somewhat nodulose conidiophore and conidia (bar = 10 µm). **E–H.** ***Cladosporium ushuwaiense*** (holotype LPS 13.144). E: symptoms; F: conidiophores and conidia (bar = 10 µm); G: overview, fascicle of conidiophores (bar = 50 µm); H: conidiophore with percurrent, enteroblastic proliferation and distinctly thickened walls (bar = 10 µm).



Pl. 33. A–D. *Cladosporium victorialis* (isotype of *C. alliicola* HAL 1533 F). A: overview (bar = 20 µm); B: fascicle of conidiophores (bar = 10 µm); C: conidiophores and conidia (bar = 10 µm); D: conidia (bar = 10 µm). **E–F. *Cladosporium vignae*** (lectotype BPI 427608). E: conidiophores; F: conidiophores and conidia (bar = 10 µm). **G–H. *Cladosporium xyridis*** (lectotype NY) G: conidiophores (bar = 10 µm); H: conidia and microcyclic conidiogenesis (bar = 10 µm).



Pl. 34. A–F. *Cladosporium paeoniae* (two collections from herb. HAL). A: symptoms on leaves of *Paeonia officinalis*; B: tip of a conidiophore and conidium with protuberant, truncate conidiogenous loci (bar = 10 µm); C: conidial chain (bar = 10 µm); D: symptoms on leaves of *Paeonia delavayi*; E, F: tips of conidiophores with several protuberant, truncate conidiogenous loci (bar = 5 µm).

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Ich erkläre von Eides statt, die vorliegende Arbeit selbständig und nur unter Verwendung der angegebenen Literatur und Hilfsmittel angefertigt zu haben. Die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen sind als solche gekennzeichnet.

Die Dissertation wurde bisher an keiner anderen Hochschule oder Universität vorgelegt.

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