

known. On driftwood, mangrove roots, and submerged wood and branches in marine habitats. Description modified from Kohlmeyer & Volkmann-Kohlmeyer (1993).

NOTES.— Kohlmeyer & Volkmann-Kohlmeyer (1993) established this genus for two taxa previously described in *Hydronectria*. They provided a thorough account of the genus including the type, *K. tethys*, and one additional species, *K. glabrum* (Kohlm.) Kohlm. & Volkm.-Kohlm. (= *Hydronectria tethys* var. *glabra* Kohlm.). *Kallichroma tethys* occurs in warm temperate and tropical regions of the Atlantic, Indian and Pacific Oceans, while *K. glabrum* has been less commonly collected, known only from the Indian Ocean and the Pacific Ocean on the east coast of Australia.

LASIONECTRIA (Sacc.) Cooke, *Grevillea* 12: 111. 1884.

= *Nectria* subgenus *Lasionectria* Sacc., *Syll. Fung.* 2: 505. 1883.

Lectotype, designated by Clements & Shear (1931): *L. mantuana* (Sacc.) Cooke (= *Nectria mantuana* Sacc.).

Ascomata non-stromatic, superficial, orange to dark red-orange or dark brown, slightly darker in KOH but not KOH+, subglobose to globose, collapsed slightly cupulate when dry or not, often with fasciculate and/or solitary hairs. Ascomatal wall generally more than 20 μm thick, of two regions: outer region of thick-walled, pigmented cells; inner region of elongate, thin-walled, hyaline cells. Asci clavate. Ascospores broadly ellipsoid, 1-septate, hyaline, generally smooth-walled. Anamorph, where known, *Acremonium*. On dead woody and herbaceous substrata including basidiocarps.

NOTES.— Saccardo (1883) established *Nectria* subgenus *Lasionectria* for nine species of *Nectria* having hairs on the ascomata. Cooke (1884) listed nineteen species in *Lasionectria* including many of the original nine species; he divided the genus into two subgenera based on ascospore septation. The presence of hairs on the ascomata is not a characteristic that reflects relatedness, thus most species previously placed in *Lasionectria* are excluded from the genus. Clements & Shear (1931) considered *Dasyphthora* Clem., *Epinectria* Syd. & P. Syd., and *Neohenningsia* Koord. to be later synonyms of *Lasionectria*. Based on an examination of their type specimens, none of these genera are synonyms of *Lasionectria* and they are discussed elsewhere. The type specimen of *Lasionectria mantuana* was examined. This species is similar to species previously placed in the *Nectria sylvana*-group (Samuels, 1976b) for which *Lasionectria* provides a generic name. The genus *Lasionectria* is distinct among genera in the *Bionectriaceae* in that the ascomatal wall is composed

of thick-walled cells each with a small lumen. Three species are included in *Lasionectria* as described below.

Lasionectria mantuana (Sacc.) Cooke, *Grevillea* 12: 111. 1884. — Plate 2, e; Plate 5, f, g.

= *Nectria mantuana* Sacc., *Michelia* 1: 52. 1877.

Ascomata superficial with bases slightly immersed on decorticated wood fibers, solitary or in groups of 2–3; ascomata subglobose, collapsed cupulate when dry, 150 μm high \times 250 μm diam, dark red-orange, becoming slightly darker in KOH but not blood-red or purple, without papilla. Ascomatal wall appearing roughened due to both short, fasciculate and solitary hairs. Ascomatal wall 18–35 μm thick, of two regions: outer region 12–15 μm thick, of thick-walled cells forming a *textura angularis*, walls pigmented in the upper portion of the ascomata, hyaline towards the base, about 1.5 μm thick, each with a small lumen; inner region 8–21 μm thick, cells elongate, forming a thin-walled *textura angularis* to *textura prismatica*. Short, solitary hairs extending from the outer region, hairs 12–18 μm long \times 3–3.5 μm wide, 0–1-septate, slightly flexuous to wavy, hyaline, tapering slightly from the base to the broadly rounded apex. Around the apex beset with sparse, fasciculate hairs, 30–36 μm long \times 15–22 μm wide at the base, individual hyphae 3–4.5 μm wide with rounded apices. Asci clavate, 42 \times 6 μm , apex simple, 8-spored, ascospores uniseriate. Ascospores broadly ellipsoid, 8.5–9.5 \times 3–3.5 μm , 1-septate, slightly constricted, hyaline, smooth (although one striate spore was seen).

HABITAT AND DISTRIBUTION.— Known only from the type specimen.

HOLOTYPE.— ITALY. Mantova, Migliaretto, on decorticated poplar wood, Feb 1873. A. Magnaguti-Rondinini (PAD).

ILLUSTRATIONS.— Weese (1916, Figs. 4 A–C).

Lasionectria sylvana (Mouton) Rossman & Samuels, *comb. nov.*

= *Nectria sylvana* Mouton, *Bull. Soc. Roy. Bot. Belgique* 39: 49. 1900.

= *Calonectria fimbriata* Seaver & Waterston, *Mycologia* 32: 404. 1940.

Anamorph: *Acremonium* sp.

Ascomata superficial on sparse subtending hyphae, hyphae septate, branched, smooth, ca 3 μm diam, walls ca 1 μm thick. Ascomata urniform, ca 150 μm high \times (185–)210–250 μm across the flat top, superficial, solitary or in groups of 2–4, orange, becoming slightly colabent, when dry; papilla lacking or very short and acute; ostiolate, apex flattened, of cylindrical, septate, unbranched hyphae, tips of the hyphae rounded, ca 2 μm wide. Ascomatal wall 15–25 μm thick, cells in lon-

itudinal section indistinct, walls *ca* 1 μm thick; outer wall cells producing ascumal hairs. Hairs orange, up to 100 μm long, *ca* 3 μm wide, walls *ca* 1 μm thick, septate, unbranched, straight, smooth, solitary or bound in fascicles and forming triangular projections. Asci clavate to fusiform, 55–75 \times 6–9 μm , apex simple, 8-spored, ascospores biserial. Ascospores fusiform-ellipsoid, (9–)11–15(–17) \times (2.5–)3–4(–5) μm , equally 2-celled, not constricted or slightly constricted at the septum, hyaline, smooth-walled.

ANAMORPH.— Conidiophores arising from the agar surface and aerial hyphae, monophialidic, unbranched or rarely verticillately branched, straight or undulate below the tip, smooth, (40–)45–55(–78) \times (2–)2.5–3(–4) μm wide at the base. Phialides terminal, (17–)37–50(–54) μm long, 1–2 μm wide at the unflared tip. Conidia ellipsoid to nearly cylindrical, rarely elongating, (3–)5–7(–11) \times (1.5–)2–3 μm , unicellular, without a visible basal abscission scar, hyaline, arising in basipetal succession, held in a solitary, hyaline drop of liquid.

HABITAT.— On decaying herbaceous stems.

DISTRIBUTION.— Belgium, Bermuda, Germany, New Zealand, and United States (New York).

TYPES.— BELGIUM. Near Liège, on stems of *Angelica sylvestris*, no. 21 (BR, holotype of *N. sylvana*); BERMUDA. On dead stems of *Foeniculum vulgare* (NY, holotype of *Calonectria fimbriata*).

ADDITIONAL SPECIMENS EXAMINED.— GERMANY. Kirnitschthal: near Schandow, on stems of *Calamagrostis arundinacea*, 6 June 1898. Krieger, Fungi Saxonici no. 1421, as *Nectria graminicola* Berk. & Broome (NY). UNITED STATES. New York: Fort Hunter, Erie Canal State Park, Yankee Hill Lock, on *Equisetum arvense*, 29 July 1972, Haines 2191 (NY). — NEW ZEALAND. Westland Prov., ex rachis of *Cyathea smithii*, G.J.S. 74–75 = CBS 566.76.

ILLUSTRATIONS.— Samuels (1976a, Fig. 14; 1976b, Fig. 18, both as *N. sylvana*); Seaver & Waterston (1940, Fig. 3 lower, as *C. fimbriata*).

NOTES.— The *Acremonium* anamorph known in culture (CBS 566.76) is present on the type specimen and on the Haines collection. *Neohenningsia stellulata* Koord. and *N. brasiliensis* Henn., previously regarded as synonyms of *L. sylvana* (as *N. sylvana*) by Samuels (1976 a, b), are here considered synonyms of *Hydropisphaera rufofusca*.

Lasionectria vulpina (Cooke) Rossman & Samuels, *comb. nov.*

= *Nectria vulpina* (Cooke) Ellis, North Amer. Fungi no. 774, 1882.

= *Peziza vulpina* Cooke, Hedwigia 14: 82, 1875.

= *Dialonectria vulpina* (Cooke) Cooke, Grevillea 12: 83, 1884.

= *Nectriella vulpina* (Cooke) Sacc., Syll. Fung. 9: 941, 1891.

= *Nectria incrustans* Weese, Z. Gärungsphysiol. 1: 144, 1912.

Anamorph: *Acremonium* sp.

Mycelium white, flat, scanty, hyphae septate, branched, 3–4 μm wide, thin-walled. Ascumata urniform, (155–)190–220(–230) μm high \times (200–)240–270(–375) μm across the flattened apices, solitary or in groups of a few, orange, becoming slightly cupulate when dry; papilla lacking or very short; ostiolar area formed by cylindrical, septate unbranched hyphae with rounded tips, *ca* 2 μm wide; periphyses 15–20 μm long. Ascumatal wall when dry shining, 15–25(–40) μm thick; cells ellipsoid, 5–7 \times 3–4 μm , with *ca* 1 μm thick walls, cells becoming progressively more flattened toward the interior. Hairs orange, 10–50 μm long, 3–5 μm wide, with *ca* 1 μm thick walls, septate, unbranched, straight, solitary, or in triangular fascicles. Asci broadly cylindrical to clavate, 37–58 \times 6–8(–10) μm , 8-spored; with an apical ring, ascospores obliquely uniseriate, becoming irregularly arranged. Ascospores fusiform-ellipsoid, (7–)8–11(–13) \times 3–4 μm , equally 2-celled, slightly constricted at the septum, hyaline, striate.

ANAMORPH.— Conidiophores arising from surface of the agar and the aerial mycelium; monophialidic, unbranched, aseptate, straight, smooth, 49–57 μm long, 2.5–3 μm wide at the base. Conidiogenous cells phialidic, 44–52 μm long, 1–1.5 μm wide at the unflared apex. Conidia ellipsoid to cylindrical, 5–7 \times 1.5–2 μm , unicellular, hyaline, lacking a visible basal abscission scar, arising in basipetal succession, held in a solitary pink to salmon or hyaline drop of liquid.

HABITAT.— On decorticated, deciduous wood and on basidiocarps of *Stereum subpileatum*.

KEY TO THE SPECIES OF *LASIONECTRIA*

1. Ascospores (9–)11–15(–17) \times (2.5–)3–4(–5) μm , averaging more than 12 μm long, striate; ascumal hairs 70–200 μm long *L. sylvana*
1. Ascospores less than 12 μm long, striate or smooth; ascumal hairs less than 70 μm long 2
2. Ascospores striate, 8–11 \times 3–4 μm ; ascumal hairs 10–50 μm long *L. vulpina*
2. Ascospores smooth, 8.5–9.5 \times 3–3.5 μm ; ascumal hairs 12–36 μm long ... *L. mantuana*

DISTRIBUTION.— Common in temperate regions.

TYPES.— UNITED STATES. New Jersey: Newfield, on fallen apple wood, 6 Dec 1874 (NY, lectotype of *P. vulpina*, designated in Samuels, 1976a). GERMANY. Mark Brandenburg: Triglitz in der Prignitz, on *Alnus glutinosa*, 6 Oct 1908, Jaap, Höhnel 5519 (FH-Höhnel), lectotype of *Nectria incrustans*, designated in Samuels, 1976a); same location, on *Betula*, 1 Oct 1909, Jaap, Höhnel 5519 (FH, paratype of *N. incrustans*). Culture: CBS 565.76.

ILLUSTRATIONS.— Samuels (1976a, Figs. 9f, 15; 1976b, Figs. 6, 29, both as *N. vulpina*).

MYCOARACHIS Malloch & Cain, *Canad. J. Bot.* 48: 1820. 1970.

Type: *M. inversa* Malloch & Cain.

Ascomata subglobose to globose, dark olive-green to black, non-ostiolate. Asci subglobose to globose, irregularly disposed, 8-spored. Ascospores one-septate, hyaline, smooth-walled. Conidia borne in clusters at the tips of simple phialides, one-celled, hyaline, smooth. Anamorph *Acremonium*. Isolated from herbivore dung.

NOTES.— The unispecific genus *Mycoarachis* was described in the cleistothecial family *Pseudeurotiaceae* and distinguished by dark olive-green to black ascomata, hyaline, one-septate ascospores, and an *Acremonium* anamorph. Later Benny & Kimbrough (1980) suggested that the fungus belonged in the *Hypocreales* because of the two-celled ascospores and *Acremonium*-like anamorph. Rehner & Samuels (1994, 1995) included the type culture in their molecular study and confirmed that *M. inversa* is a cleistothecial member of the *Hypocreales* related to *Bionectria*. Ogawa *et al.* (1997) reported the affinity of another cleistothecial genus, *Emericellopsis*, with *Mycoarachis* in a subclade of the *Bionectriaceae*.

Mycoarachis inversa Malloch & Cain, *Canad. J. Bot.* 48: 1822. 1970.

Anamorph: *Acremonium* sp.

Mycelium hyaline, hyphae septate, branched, 1–3 μm wide, occasionally developing very thick walls near the septa and swelling up to 7 μm wide. Ascomatal initials at first simple coils with filaments about 1–3 μm wide, later becoming compact and contorted as a result of abundant proliferation. Ascomata subglobose to globose, 50–200 μm diam, metallic in reflected light when dry, dark green to black, non-ostiolate; ascomatal wall 11–30 μm thick, consisting of a pale outer region and a darker inner region; outer region of hyaline to pale brown cells, 3–22 μm diam; inner region of dark brown, flattened, cells, 4–20 \times 2–10.5 μm . Asci subglobose to globose, 5.5–11 μm diam, evanescent, 8-

spored. Ascospores cylindrical to broadly ellipsoid, 5–5.5 \times 3–3.5 μm , with a constricted, single median septum dividing the spore into two equal globose cells, hyaline, smooth.

ANAMORPH.— Conidiophores arising from submerged mycelium, simple or sparingly branched, septate, tapering from the base to the apex, ending in a phialide, 14–35 \times 2–3.5 μm . Conidia ellipsoid, fusoid, ovoid, cylindrical or allantoid, 3–10 \times 1.5–3.5 μm , non-septate, hyaline, smooth-walled, borne in moist clusters at the tip of the conidiophores. Description modified from Malloch & Cain (1970).

HABITAT.— Isolated from cow-, elephant- and unidentified herbivore dung.

DISTRIBUTION.— Tanzania, Uganda, and United States (Nebraska), as reported by Malloch & Cain (1970).

HOLOTYPE.— UGANDA. Mweya Lodge: Queen Elizabeth National Park, isolated from elephant dung, 27 July 1966, Cain, Griffin & Krug (TRTC 66.2166f, not examined). Culture CBS 517.70.

ILLUSTRATIONS.— Malloch & Cain (1970, Figs. 20–25).

MYCOCITRUS A. Möller, *Bot. Mitt. TROPEN* 9: 297. 1901.

Type: *M. aurantium* A. Möller.

= *Shiraiella* Hara, *Bot. Mag. (Tokyo)* 28: 274. 1914. — Type: *S. phyllostachydis* (Syd. & P. Syd.) Hara (= *Ustilago noidea phyllostachydis* Syd. & P. Syd.), recognized as *Mycocitrus phyllostachydis* (Syd. & P. Syd.) Doi.

Stroma well-developed, buff to rufous, clasping and surrounding the substratum. Ascomata immersed, with apices barely visible, densely gregarious, forming a single layer. Asci cylindrical, ascus apex simple. Ascospores ellipsoid, 1-septate, hyaline, spinulose. Anamorph *Acremonium*. On living stems of bamboo.

NOTES.— *Mycocitrus* is characterized by ascomata partially to fully immersed in the upper region of large, fleshy stromata that clasp and surround bamboo stems. Möller (1901) illustrated an *Acremonium*-like anamorph. Although the type specimen of *M. aurantium* probably no longer exists, an excellent illustration serves to characterize this species. The unispecific genus *Shiraiella* was established for *Ustilago noidea phyllostachydis*. Doi (1967a) was unable to locate the type specimen of *U. phyllostachydis* at B suggesting that it was destroyed. He designated a non-type specimen examined by Hara (TNS 209286) as the neotype and transferred *U. phyllostachydis* to *Mycocitrus*. *Mycocitrus* is recognized with these two species.