

HOLOTYPE.— UNITED STATES. New Jersey, Mickelton, on *Solanum melongena*, 8 July 1891, B.D. Halsted (BPI 552416).

ILLUSTRATIONS.— Nirenberg & Brielmaier-Liebetanz (1996, Figs. 1–10, as *Nectria ipomoeae*), Wollenweber (1916: no. 56; 1930: no. 823, 825, as *Hypomyces ipomoeae*, 1025, as *F. javanicum*).

NOTES.— The description given above is based solely on the holotype collection. Nirenberg & Brielmaier-Liebetanz (1996) described pathogenicity of *Haematonectria ipomoeae* to *Passiflora edulis* and discussed the use of the name *Fusarium striatum* for the anamorph. The species is self-fertile.

Haematonectria monilifera (Berk. & Broome) Samuels & Rossman, *comb. nov.*

≡ *Nectria monilifera* Berk. & Broome, J. Linn. Soc. Bot. 14: 114. 1873.

≡ *Neoskofitzia monilifera* (Berk. & Broome) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 121, Abt. 1: 367. 1912.

≡ *Nectriella monilifera* (Berk. & Broome) Sacc., Michelia 1: 279. 1878.

Anamorph: None known.

Ascomata solitary to gregarious, superficial, often immersed at the base, with a conspicuously shining ostiolar area, globose to ovoid, 320–520 µm high × 300–450 µm diam, orange to red, becoming darker red in KOH, warted. Ascumatal wall 40–50 µm thick, of two regions: outer region 15–35 µm thick, of thick-walled, pigmented cells. Asci narrowly clavate to cylindrical, 52–140 × 3.5–4.5 µm, ascospores uniseriate. Ascospores ellipsoid to cylindrical, 5.5–7.5 × 3–4 µm, 1-septate, disarticulating early into part-ascospores, part-ascospores subglobose, 3–3.5 µm diam, hyaline, becoming yellow-brown, smooth to spinulose.

HABITAT.— On 'laterite' soil.

DISTRIBUTION.— Indonesia (Java, specimen at FH, not examined), Sri Lanka.

HOLOTYPE.— SRI LANKA (Ceylon). Peradeniya, on soil, 1870, Berkeley 1105 (K).

ILLUSTRATION.— Weese (1924, Tab. 8, Figs. 7–12, as *Neoskofitzia 'molifera'*).

NOTES.— Although Petch (1920) suggested that *Haematonectria monilifera* (as *Neoskofitzia monilifera*) is a synonym of *H. termitum* (as *N. termitum*), the two species differ in thickness of the ascumatal wall, ascus size, ascospore ornamentation and habitat. Weese (1924) provided excellent illustrations of both species including sections of the ascumatal wall.

Haematonectria termitum (Höhn.) Samuels & Rossman, *comb. nov.*

≡ *Neoskofitzia termitum* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1, 117: 998. 1908.

Anamorph: None known.

Ascomata superficial, caespitose in groups of up to 12, densely gregarious, effused over the substratum, ovoid, 170–270 µm diam (Weese, 1924), non-papillate, red, becoming darker in KOH, yellow in lactic acid, slightly warted, not collapsing. Ascumatal wall 50–60 µm thick, of two regions: outer region continuous with the stroma, of ellipsoid, elongate cells, 15–50 µm diam, with about 3.5 µm thick walls. Ascumatal apex of a palisade of clavate hyphal elements that arise from the wall below and merge with periphyses. Asci clavate, 35–52 × 4–8 µm, disintegrating early, apex simple. Ascospores 1-septate, disarticulating into sixteen part-ascospores, part-ascospores broadly ellipsoid, 3–4(–4.5) × 3–3.5 µm, translucent yellow-brown, becoming densely spinulose.

HABITAT.— On old termite nest.

DISTRIBUTION.— Indonesia (Java).

TYPE.— INDONESIA. Java: Buitenzorg, in a termite nest, 1907, Höhnel (BPI 630983, lectotype, designated herein); same data except 1908, Rehm: Ascomycetes no. 1818 (BPI 630984, paratype, specimen overmature).

ILLUSTRATION.— Weese (1924, Tab. 8, Figs. 1–6, as *Neoskofitzia termitum*).

NOTES.— Petrak erred in noting '*n. gen. et spec.*' on the BPI packet of von Höhnel's type specimen of *Haematonectria termitum*.

LANATONECTRIA Samuels & Rossman, *gen. nov.*

Type: *Lanatonectria flocculenta* (Henn. & E. Nyman) Samuels & Rossman (≡ *Nectriella flocculenta* Henn. & E. Nyman).

Stroma pseudoparenchymatosum. Ascomata superficialia, subglobosa vel late obpyriformia, rubra, KOH+ phaeorubra, non papillata vel papilla minuta praedita; pilis hyphalibus hyalinis vel luteis, levibus vel spinulosis, uncinatis vel rectis, septatis, tenuitunicatis obiecta, interdum tomentosa; paries ascumatis extus e cellulis conspicue angularibus, 10–15 µm diam, compositus. Asci clavati vel fusiformes, apice simplici vel annulo praediti. Ascosporeae ellipsoideae vel fusiformes, ad medium 1-septatae, hyalinae vel raro ochroleucae, striatae.

Stroma continuous with the ascumatal base, pseudoparenchymatous or of highly compacted, somewhat thick-walled hyphae. Ascomata superficial on a minute basal stroma, on an erumpent, previously conidial stroma, or at the base of a synnema, subglobose to broadly obpyriform, not collapsing when dry; red, KOH+ dark red, yellow in lactic acid, non-papillate or with a minute

papilla, with hyaline to yellow hyphal hairs, hairs smooth or spinulose, hooked or straight, septate, thin-walled, arising from the surface of the ascomatal wall and from around the ascomatal base, sometimes forming a tomentum on the ascomatal surface. Ascomatal wall with outer region of conspicuously angular cells, 10–15 μm diam, with 1.5–2 μm thick walls. Asci clavate to fusiform, apex simple or with a ring, ascospores biserial. Ascospores ellipsoid to fusiform, medially 1-septate, hyaline or rarely pale yellow-brown, striate. Anamorph, where known, *Actinostilbe*. On decaying woody and herbaceous substrata, also on stromatic fungi.

NOTES.— *Lanatonectria* is most easily recognized through the spinulose, golden, often hooked hairs that form on the ascomata, striate ascospores, and distinctive anamorphs. Four species are included, all of which occur on small twigs and bark of living or recently dead trees and fruits in tropical or subtropical areas. *Lanatonectria flocculenta* is the most common, while *L. mammiformis* is known only from northern South America. This genus was previously referred to as the *Nectria flavolanata*-group (Samuels *et al.*, 1990; Samuels & Seifert, 1987).

Lanatonectria flocculenta (Henn. & E. Nyman) Samuels & Rossman, *comb. nov.* — Plate 29, i–j.

= *Nectriella flocculenta* Henn. & E. Nyman, in Warburg, *Monsunia* 1: 160. 1899.

= *Nectria flocculenta* (Henn. & E. Nyman) Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1*, 121: 360. 1912.

= *Nectria tjibodensis* Penz. & Sacc. var. *crebrior* Sacc., *Syll. Fung.* 14: 636. 1899.

= *Nectria bainii* Masee var. *hypoleuca* Sacc., *Nuovo Giorn. Bot. Ital.* II, 23: 205. 1916.

= *Nectria luteopilosa* Zimm., *Centralbl. Bakteriol., Abth.* 2, 8: 182. 1902.

= *Nectria vanillae* Zimm., *Centralbl. Bakteriol., Abth.* 2, 8: 473. 1902.

Anamorph: *Actinostilbe macalpinei* (Agnihotrudu & Barua) Seifert & Samuels, *comb. nov.*

= *Kutilakesopsis macalpinei* Agnihotrudu & Barua, *J. Indian Bot. Soc.* 36: 309. 1957, as '*macalpineae*'.

Ascomata solitary to gregarious in groups of 2 to 15, forming aggregates 1–2 mm diam, superficial on an erumpent, previously conidial stroma, globose to subglobose, (125–)224–314 μm high \times (125–)215–293 (–310) μm diam, non-papillate or with a minute papilla; hairs arising from ascomatal surface, straight or conspicuously hooked, (25–)40–70 μm long \times 4–7(–10) μm wide, septate, unbranched, with apex somewhat enlarged, wall slightly thickened, golden, prominently spinulose. Surface cells circular to angular, (7–)10–

15(–20) μm , walls 1–1.5 μm thick. Ascomatal wall 30–35 μm thick, of two regions: outer region *ca* 20 μm thick, of angular cells with lumina 10–15 \times *ca* 10 μm , walls 1.5–2 μm thick; inner region *ca* 10 μm thick, of fusiform cells with lumina 15–20 μm \times 3–5 μm and 1.5–2 μm thick walls, walls becoming thinner toward the centrum. Ascomatal apex continuous with the ascomatal wall below, ostiolar opening of vertically elongate hyphal elements, continuous with the inner region of the ascomatal wall, protruding through the outer region, increasingly narrower, merging with periphyses. Asci narrowly clavate to fusiform, (32–)42–63 (–75) \times (6.5–)7.5–10(–12) μm , apex with ring, 8-spored, ascospores obliquely uniseriate. Ascospores ellipsoid to narrowly fusiform, 10–13(–17) \times (2.5–)3–4.5(–6) μm , 1-septate, not constricted at the septum, hyaline to very pale brown, striate.

ANAMORPH: Long, flexuous, golden, unbranched, densely spinulose, hyphal setae arising from the periphery of a tuberculate sporodochium and from conidiophores within the stroma. Phialides cylindrical, 25–50 μm long \times 2–3 μm wide. Conidia cylindrical, (6–)7.5–11(–14) \times 2.5–3.5(–4.5) μm , medially 1-septate, forming a yellow, hemispherical mass.

HABITAT.— On recently dead twigs of trees, also on pyrenomycetous stromata and herbaceous debris including pods of *Theobroma cacao*.

DISTRIBUTION.— Pantropical.

TYPE.— The holotype specimen of *Nectriella flocculenta* originally housed at B (INDONESIA, Java, Bogor, on dead stems, Aug 1898, Nyman), no longer exists (Hein, 1989). However, this specimen was examined and illustrated by Wollenweber (1930), thus his illustration, namely Tab. 744 at BPI, is herein regarded as the 'neo-iconotype'. Additional specimens examined are listed in Samuels & Brayford (1994) and Samuels *et al.* (1990).

ILLUSTRATIONS.— Doi (1977, Figs. 1, 2, as *Nectria flavolanata*), Samuels & Brayford (1994, Figs. 16–20, as *N. flavolanata*), Samuels & Seifert (1987, Fig. 3.23, as anamorph of *N. flavolanata*), Samuels *et al.* (1990, Figs. 19 D–F; as *N. flocculenta*), Wollenweber (1930, Tabs. 744, 745, both as *N. flavolanata*; Tab. 746, drawn from the type of *N. vanillae*; Tab. 747, drawn from the type of *Nectriella flocculenta*), Zimmermann (1902, Figs. 1–4, as *Nectria vanillae*).

SPECIMENS ILLUSTRATED.— JAMAICA, Cane river, 16 km from Kingston, on bark, 12 Jan 1970, A. Rossman 399 (BPI 552098). VENEZUELA, Amazonas: Cerro de la Neblina, base camp, on decaying fruit of *Guarea ?glabra*, 23 Apr 1984, G.J. Samuels 1553, cult. G.J.S. 84-372 (NY).

NOTES.— *Lanatonectria flocculenta* is one of the most common of the hypocrealean fungi in tropical regions. It is frequently found on small twigs of shrubs and is conspicuous because of the hooked, spinulose, yellow, hairs and yellow conidial masses. Species-level taxonomy of *L. flocculenta* was discussed in detail by

Samuels *et al.* (1990). The species had previously been referred to as *N. flavolanata* Berk. & Broome (Doi, 1977; Nag Raj & Govindu, 1969).

ADDITIONAL SPECIES OF *LANATONECTRIA*:

Lanatonectria flavolanata (Berk. & Broome) Samuels & Rossman, *comb. nov.* — Plate 29, h.

= *Nectria flavolanata* Berk. & Broome, J. Linn. Soc., Bot. 14: 114. 1873.

= *Nectria radians* Penz. & Sacc., Malpighia 11: 510. 1897.

= *Nectria tjibodensis* Penz. & Sacc., Malpighia 11: 512. 1897.

= *Chilonectria javanica* Penz. & Sacc., Malpighia 11: 508. 1897.

= *Calonectria sulphurella* Starbäck, Bih. Kongl. Svensk Vetensk.-Akad. Handl. 25: 30. 1899.

= *Sphaerostilbe ochracea* Pat., in Duss, Énum. Champ. Guadeloupe p. 79. 1903.

Anamorph: *Actinostilbe* sp.

Ascomata associated with the base of synnemata or separate, caespitose in groups of 5–20, superficial on an erumpent stroma, with long, unbranched, septate, flexuous, spinulose, golden hairs arising from around the ascomatal base, subglobose to broadly pyriform, 340–500 µm high × 310–430 µm diam, not collapsing when dry; red, KOH+ dark red; papillate or non-papillate; ascomatal wall, exclusive of the apex, furfuraeous, with white to orange-buff tomentum, individual hyphae 50–60 µm long × 5–6 µm wide at the somewhat enlarged, clavate apex, straight and flexuous or hooked, septate, spinulose, yellow. Ascomatal surface cells angular, 10–15 µm diam, with 2–3 µm thick walls. Ascomatal wall 30–40 µm thick, of two regions: outer region, ca 20 µm thick, cells with circular lumina 5–7 µm diam, with 2–4 µm thick pigmented walls; inner region 10–15 µm thick, cells fusiform, flattened, compressed with ca 2.5 µm thick, unpigmented walls. Ascomatal apex formed at the exterior of diverging chains of more or less elongate cells; towards the interior consisting of narrow hyphal elements merging with periphyses. Asci clavate, 50–65(–110) × 6–9(–11) µm, apex with ring, 8-spored, ascospores biserial. Ascospores ellipsoid to fusiform, 13.5–18(–21) × 4–6(–7.5) µm, 1-septate, not constricted at the septum, hyaline, striate.

ANAMORPH: Synnemata 825–2000 µm high × (25–)50–375 µm wide in the stalk, white, red-orange with age, tomentose, cylindrical to subulate with a globose capitulum. Conidia oblong ellipsoid, to obovoid, 10–17(–22) × 4–7 µm, 1-septate, in a white, yellow or orange-yellow slimy mass.

HABITAT.— On bark.

DISTRIBUTION.— Pantropical.

HOLOTYPE.— SRI LANKA [Ceylon]. Thwaites 239b (K).

SPECIMEN EXAMINED.— FRENCH GUIANA. Saül, Mt. Boef Mort, on recently killed wood, 8 Feb 1986, G.J. Samuels 3584, cult. G.J.S. 86-171 (NY).

ILLUSTRATIONS.— Penzig & Saccardo (1904, Pl. 30, Fig. 4, as *N. tjibodensis*); Samuels & Brayford (1994, Figs. 6–9, 12–15, as *N. flavolanata*); Seifert (1990, Fig. 1A, anamorph only).

NOTE.— The *Actinostilbe* anamorph of *Lanatonectria flavolanata* was fully described by Seifert (1990).

Lanatonectria mammiformis (Chardón) Samuels & Rossman, *comb. nov.* — Plate 22, g (see page 96).

= *Sphaerostilbe mammiformis* Chardón, in Seaver & Chardón, Sci. Surv. Porto Rico & Virgin Islands 8: 46. 1926.

= *Nectria mammiformis* (Chardón) Samuels, in Samuels & Dumont, Calsasia 13: 393. 1982.

Anamorph: *Actinostilbe mammiformis* (Cif.) Seifert & Samuels, *comb. nov.*

= *Stromatoglyphium mammiforme* Cif., Sydowia 8: 264. 1954.

Ascomata solitary or in caespitose groups of 10 or more, superficial on a minute basal stroma, broadly obpyriform, 300–700 µm diam, with a minute papilla; apex of narrow hyphal elements continuous with middle wall region and periphyses; hairs arising from the ascomatal surface densely disposed and forming a white to off-white tomentum; terminal parts of individual hyphae of tomentum narrowly clavate, spinulose, to 50 µm long, 7.5 µm wide apically, straight or slightly hooked, unbranched. Ascomatal surface cells angular, 10–20 µm diam, walls ca 2 µm thick. Ascomatal wall 40–50 µm thick laterally, of three intergrading regions: outer region to 25 µm thick, of circular to angular cells, 7–25 µm diam, with pigmented, 2–2.5 µm thick walls; middle region ca 15 µm thick, of cells with elongate lumina, ca 25 × 3 µm, with pigmented, ca 3 µm thick walls; inner region ca 10 µm thick, of flattened, compressed cells with hyaline, thin walls. Asci clavate, (60–)75–100(–115) × 10–18 µm, 8-spored. Ascospores fusiform, (17–)24–30(–34) × (5–)7–9(–10) µm, hyaline, coarsely striate.

ANAMORPH: Synnemata to 2 mm long, off-white to white, bearing a single, terminal, globose head of clear yellow liquid. Hyphae at the surface of the synnema narrowly clavate, 4–6 µm wide, conspicuously spinulose, thin-walled, septate, branched. Phialides cylindrical, 35–50 µm long, 3.5–4.5 µm wide. Conidia oblong, (14–)25–35(–40) × (6–)10–14(–16) µm, medially 1-septate, hyaline in transmitted light, smooth-walled.

HABITAT.— On recently killed wood, found once also on stem of *Philodendron* sp.

DISTRIBUTION.— Tropical America.

KEY TO THE SPECIES OF *LANATONECTRIA*

1. Ascomatal hairs smooth-walled; anamorph not known *L. raripila*
 1. Ascomatal hairs spinulose; anamorph *Actinostilbe* 2
2. Ascospores (17–)24–30(–34) × (5–)7–9(–10) μm *L. mammiformis*
 2. Ascospores less than 20 μm long 3
3. Ascospores 10–13(–17) × (2.5–)3–4.5(–6) μm; anamorph sporodochial *L. flocculenta*
 3. Ascospores 13.5–18(–21) × 4–6(–7.5) μm; anamorph synnematosus *L. flavolanata*

TYPE.— PUERTO RICO. Maricao, forest reserve, on dead wood, 11 Nov 1921, C.E. Chardón, Cornell University Explorations of Porto Rico no. 1270 (BPI 631164, holotype). Additional specimens examined are listed in Samuels & Brayford (1994) and Samuels & Dumont (1982).

ILLUSTRATIONS.— Samuels & Brayford (1994, Figs. 32–34, 55–61, as *N. mammiformis*).

SPECIMEN ILLUSTRATED.— PUERTO RICO. Bosque Estatal de Guajataca, along Vereda Nueva, on branch, 22 Jan 1996, S.M. Huhndorf 2002 (F).

NOTES.— *Lanatonectria mammiformis* is characterized by its large ascospores and conidia and by the lanose covering on the ascomata that leaves the ostiolar area free. Two species of *Lanatonectria*, *L. flavolanata* and *L. mammiformis*, are known to have synnematosus anamorphs. Of these, the conidia and ascospores of *L. mammiformis* are larger than those of *L. flavolanata*. *Stilbella ecuadorensis* Morgan-Jones & McKemy (Morgan-Jones *et al.*, 1991) is a probable synonym of *Actinostilbe mammiformis*.

Lanatonectria raripila (Penz. & Sacc.) Samuels & Rossman, *comb. nov.*

= *Nectria raripila* Penz. & Sacc., *Malpighia* 15: 228. 1901.

Anamorph: None known.

Ascomata scattered, solitary to gregarious in small groups, superficial on a minute basal stroma, pyriform, 220–280 μm high × 220–250 μm diam, apex acute, not collapsing when dry, red to yellow, with scattered hairs; hairs flexuous, cylindrical, 80–100 μm long × 10–15 μm wide, septate, unbranched, end obtuse, walls ca 2 μm thick, smooth. Ascromatal surface cells and warts angular, 15–20 μm diam, with ca 1 μm thick walls. Ascromatal wall ca 20 μm thick, of two regions: outer region, ca 10 μm thick, of large, angular cells; inner region ca 10 μm thick, of flattened, compressed cells. Asci clavate, 60–87 × 13–17 μm, apex simple, 8-spored, ascospores biserial. Ascospores fusiform, (24–)27.5–32(–33) × (6–)6.5–8 μm, 1-septate, not constricted at the septum, hyaline, coarsely striate.

HABITAT.— On decaying stems of *Elettaria* (*Zingiberaceae*).

DISTRIBUTION.— Indonesia (Java), known only from the type collection.

TYPE.— INDONESIA. Java, [Tjibodas, on *Elettaria* sp., 1898, M. Fleischer] 923 (PAD, holotype).

ILLUSTRATIONS.— Penzig & Saccardo (1904, Pl. 32, Fig. 2); Samuels & Brayford (1994 Figs. 83, 84); Samuels *et al.* (1990 Fig. 19g), all as *N. raripila*.

NOTES.— *Lanatonectria raripila* is distinguished by its large ascospores. The hairs are unusual in the genus in being smooth-walled, not spinulose.

LEUCONECTRIA Rossman, Samuels & Lowen, *Mycologia* 85: 868. 1993.

Type: *L. clusiae* (Samuels & Rogerson) Rossman, Samuels & Lowen (= *Pseudonectria clusiae* Samuels & Rogerson).

Ascomata superficial, solitary, with a thin, hyphal stroma, globose to subglobose, scarlet, KOH+ purple, with a white to pale yellow, furfuraceous outer coating on the ascromatal wall; ascromatal wall about 25 μm thick, of two regions: outer region of angular to circular, thick-walled cells; inner region of ellipsoid to elongate, thick-walled cells, that become thinner toward the centrum. Asci narrowly clavate, apex with a ring. Ascospores non-septate, hyaline, smooth-walled. Anamorph *Gliocephalotrichum*. On decaying leaves and woody fruits of *Clusia*, also isolated from soil.

NOTES.— The genus *Leuconectria* was established for one species having both a distinctive teleomorph and anamorph. Molecular analysis of 28S rDNA sequence data (Rehner & Samuels, 1995) support the hypothesis that *Leuconectria* is similar to but not congeneric with *Calonectria*.

Leuconectria clusiae (Samuels & Rogerson) Rossman, Samuels & Lowen, *Mycologia* 85: 686. 1993.

= *Pseudonectria clusiae* Samuels & Rogerson, *Mem. New York Bot. Gard.* 64: 173. 1990.

Anamorph: *Gliocephalotrichum bulbilium* J. J. Ellis &