

Hesseltine, Bull. Torrey Bot. Club 89: 22. 1962.

Ascomata solitary, superficial on a sparse hyphal stroma, globose to subglobose, 180–260 μm diam, not collapsed when dry, wall red-orange, scarlet when dry, becoming slightly darker in KOH, yellow in lactic acid, appearing white to pale yellow due to an amorphous substance coating the ascomatal wall; amorphous substance dissolving in KOH, but not in water; ascomatal wall slightly rugose; ostiolar region without amorphous substance, thus appearing scarlet, non-papillate. Ascomatal surface cells angular to circular, 10–20 μm diam, with pigmented, about 1 μm thick walls, fine pores joining the cells, evident as small depressions in face view. Ascomatal wall about 20–25 μm thick, of two regions: outer region of angular cells, 8–12 μm diam, with 1.5 μm thick walls; inner region about 10 μm thick, of elongate cells, with 1.5 μm thick walls. Asci narrowly clavate, 50–70 \times 7–10 μm , apex with a minute ring, 8-spored; ascospores biseriolate toward the apex. Ascospores ellipsoid, (8–)9–11(–12.5) \times (2.5–)3–4 (–4.5) μm , non-septate, hyaline, smooth-walled.

ANAMORPH: In culture vegetative hyphae flexuous, 3–6 μm wide, thin-walled, becoming orange toward the colony center. Microsclerotia irregularly globose, 42–63 μm diam, of inflated cells with orange, thin walls, each cell filled with guttules. Conidiophores formed abundantly within 5 days, scattered, solitary, arising directly from the agar surface, 120–540 μm high, stipe 10–15 μm wide, thin-walled, pale orange, often once or twice branched; primary branches developing from inflated apex, 13–16 μm wide, slightly clavate, 18–23 μm long \times 4.5–7 μm wide at the base, 7.5–10 μm wide at the apex, bearing secondary branches similar to the primary branches, or conidiogenous cells. Three to six sterile, determinant 'arms' developing from below the base of the secondary branches, arms 160–220 μm long, extending well beyond the penicillus. Conidiogenous cells phialidic, narrowly clavate to cylindrical, constricted at the apex, 6–9 \times 2–3 μm . Conidia ellipsoid with ends broadly rounded to cylindrical, variable in size and shape, 3.5–10 \times 2.5–3.5 μm , hyaline, non-septate, smooth-walled, forming a droplet at the apex.

HABITAT.— On the undersurface of decaying leathery leaves and fruits of *Clusia*. Anamorph isolated from diverse substrata including soil and wood.

DISTRIBUTION.— Teleomorph known from Guyana and Puerto Rico. Anamorph only reported from the Central African Republic, India, Indonesia, Japan, Peru, Thailand, United States (Hawaii, Louisiana, West Virginia, Wisconsin).

TYPES.— GUYANA. Cuyuni-Mazaruni Region: VII: Mazaruni Subregion, VII-2, foothills immediately S of Mt. Ayangana, ca 1 km W of Pong River, 05°28' N, 60°04' W, elev. 550–650 m, on decaying leaves of *Clusia* sp., 26 Feb 1987, Samuels 4854 *et al.* (NY, holotype of *Pseudonectria clusiae*). UNITED STATES. Louisiana, Tunica Hills, isolated from a soil sample collected under moss, L.J. Wickerham, isol. C.W. Hesseltine, 24 Aug. 1960, ex-type culture of *G. bulbilium*. ATCC 22228 (= NRRL 2899 = QM 9007), (BPI 414619, lectotype of *Gliocephalotrichum bulbilium*, designated by Rossman *et al.*, 1993, NY). Additional specimens examined listed in Rossman *et al.* (1993).

ILLUSTRATIONS.— Ellis (1971, Fig. 398, anamorph); Ellis & Hesseltine (1962, Figs. 1–19, anamorph); Rossman *et al.* (1993, Figs. 1–6); Samuels & Rogerson (1990, Figs. 36–40, as *P. clusiae*); Tubaki & Fujita (1980, Figs. 1–6, 16C, 21–22, anamorph); Wiley & Simmons (1971, Figs. 1–5, anamorph).

NECTRIA (Fr.) Fr., Summa Veg. Scand. 2: 387. 1849, *nom. cons.*

= *Hypocrea* Fr. sect. *Nectria* Fr., Syst. Orb. Veg. p. 105. 1825.

Lectotype, designated by Clements & Shear (1931): *N. cinnabarina* (Tode : Fr.) Fr. (= *Sphaeria cinnabarina* Tode : Fr.).

= *Ephedrosphaera* Dumort., Commentat. bot. p. 90. 1822. — Lectotype, designated by Cannon & Hawksworth (1983): *Sphaeria decolorans* Pers., a synonym of *Nectria cinnabarina* (Tode : Fr.) Fr.

= *Sphaerostilbe* Tul. & C. Tul., Sel. Fung. Carpol. 1: 130. 1861. — Lectotype, designated by Seaver (1909b): *S. aurantiaca* Tul. & C. Tul., recognized as *Nectria aurantiaca* (Tul. & C. Tul.) Jacz.

= *Pleonectria* Sacc., Mycotheca Ven. no. 688. 1876. — Type: *P. lamyi* (Desm.) Sacc. (= *Sphaeria lamyi* Desm.), recognized as *Nectria lamyi* (Desm.) De Not.

= *Chilonectria* Sacc., Michelia 1: 279. 1878. — Lectotype, designated by Clements & Shear (1931): *C. cucurbitula* (Tode : Fr.) Sacc. (= *Sphaeria cucurbitula* Tode : Fr.), recognized as *Nectria cucurbitula* (Tode : Fr.) Fr.

= *Megalonectria* Speg., Anales Soc. Ci. Argent. 12: 211. 1881. — Type: *M. pseudotrichia* (Berk. & M.A. Curtis) Speg., recognized as *Nectria pseudotrichia* Berk. & M.A. Curtis.

= *Aponectria* (Sacc.) Sacc., Syll. Fung. 2: 516. 1883 (= *Nectria* subgenus *Aponectria* Sacc., Michelia 1: 296. 1878). — Type: *A. inaurata* (Berk. & Broome) Sacc. (= *Nectria inaurata* Berk. & Broome), a synonym of *Nectria aquifolii* (Fr.) Berk.

= *Stilbonectria* P. Karst., Hedwigia 28: 194. 1889. — Type: *S. lateritia* P. Karst., recognized as *Nectria lateritia* (P. Karst.) Rossman.

= *Allantonectria* Earle, in E.L. Greene, Plantae Bakerianae 2: 11. 1901. — Type: *A. yuccae* Earle, a synonym of *Nectria miltina* (Mont.) Mont.

= *Creonectria* Seaver, Mycologia 1: 183. 1909. — Type: *C. purpurea* (L.) Seaver (= *Tremella purpurea* L. 1753), a synonym of *Nectria cinnabarina* (Tode : Fr.) Fr.

= *Scoleonectria* Seaver, Mycologia 1: 197. 1909. — Type: *S. scoleospora* (Brefeld & Tavel) Seaver (= *Ophionectria scoleospora* Brefeld & Tavel 1891), a synonym of *Nectria cucurbitula* (Tode : Fr.) Fr.

Stroma well-developed, pseudoparenchymatous. Ascomata superficial, generally aggregated on a stroma. Ascomata subglobose, globose to ellipsoid, collapsing

cupulate, red to dark red, KOH+ purple, ostiolate, with relatively thick walls, more than 25 μm , often with warted outer region of thick-walled cells. Asci 8-spored. Ascospores broadly ellipsoid to long-fusiform, non-, 1- to multiseptate or muriform, hyaline to yellow-brown, smooth to striate. Anamorph *Tubercularia* and related pycnidial and synnematal species. On decaying woody dicotyledonous substrata, also on decaying leaves of *Agavaceae*.

NOTES.— *Nectria* was first recognized as *Hypocrea* sect. *Nectria* Fr. and raised to generic rank by Fries (1849) who included eighteen species in the genus *Nectria*, none of which was designated as type. Although Seaver (1909a) cited *N. peziza* as the type, this lectotypification is not considered legitimate because he was following the first-species rule of the American Code of Botanical Nomenclature, a code that was never officially recognized. The first legitimate typification of the genus *Nectria* was made by Clements & Shear (1931), who designated *N. cinnabarina* as lectotype. Cannon & Hawksworth (1983) proposed the conservation of *Nectria* (Fr.) Fr. with *N. cinnabarina* as the type over *Ephedrosphaera* Dumort. 1822 and *Hydropisphaera* Dumort. 1822. The conservation of this name was approved as listed in Greuter *et al.* (1994).

The concept of the genus *Nectria* had become extremely broad, including all hypocrealean fungi with uniloculate ascomata not immersed in either the stroma or substratum. At least 800 names have been proposed in *Nectria sensu lato* with the number of accepted species estimated at 200 (Booth, 1959; Rossman, 1996). No monographic account exists of *Nectria sensu lato*. Seaver (1909a) included 23 species of *Nectria* in North America and Booth (1959) provided a valuable account of the British species. Following Weese (1919), Booth (1959) arranged the British species into groups based primarily on characters of the ascomatal wall, anamorph, and host. The groups defined by Booth were expanded by Samuels & Rossman (1979), who correlated more fully the anamorph characteristics and ascomatal wall structure. Most of these groups are herein recognized at the generic level within the *Bionectriaceae* and *Nectriaceae*.

Species in *Nectria sensu stricto* were listed and discussed with a key to 28 species in a synopsis of the *Nectria cinnabarina*-group by Rossman (1989). One addi-

tional species, *N. miltina* (Mont.) Weese, is described and illustrated below. Although previously included in *Nectria sensu stricto*, *Nectria patavina* and *N. chryso-gramma* are herein excluded from *Nectria* as discussed under the excluded genera *Thyronectria* and *Thyronectrioidea*.

Nectria cinnabarina (Tode : Fr.) Fr., *Summa Veg. Scand.* 2: 388. 1849. — Plate 22, h (page 96); Plate 30, a–b.

≡ *Sphaeria cinnabarina* Tode : Fr., *Tode, Fungi mecklenb. sel.* 2: 9. 1791 : Fries, *Syst. Mycol.* 2: 412. 1823.

≡ *Cucurbitaria cinnabarina* (Tode : Fr.) Grev., *Scot. Crypt. Fl.* 3: 135. 1825.

= *Tremella purpurea* L., *Sp. Pl.* 2: 1158. 1753.

≡ *Nectria purpurea* (L.) G.W. Wilson & Seaver, *J. Mycol.* 13: 51. 1907.

≡ *Creonectria purpurea* (L.) Seaver, *Mycologia* 1: 184. 1909.

= *Sphaeria tremelloides* Weigel, *Obs. Bot.* p. 46. 1772.

= *Sphaeria decolorans* Pers. : Fr., *Persoon, Syn. Meth. Fung.*, p. 49. 1801 : Fries, *Syst. Mycol.* 2: 412. 1823.

= *Sphaeria celastri* Schwein. : Fr., *in Fries, Elenchus Fungorum* 2: 81. 1827.

= *Sphaeria dematiosa* Schwein., *Trans. Amer. Philos. Soc.* II, 4: 205. 1832.

= *Nectria russellii* Berk. & M.A. Curtis, *in Berkeley, Grevillea* 4: 45. 1875.

= *Nectria offuscata* Berk. & M.A. Curtis, *in Berkeley, Grevillea* 4: 45. 1875.

= *Nectria nigrescens* Cooke, *Grevillea* 7: 50. 1878.

= *Nectria sambuci* Ellis & Everh., *Proc. Acad. Nat. Sci. Philadelphia* 1890: 246. 1891.

= *Nectria meliae* Earle, *Bull. Torrey Bot. Club* 25: 364. 1898.

= *Nectria fuscopurpurea* Wakef., *Kew Bull.*, p. 232. 1918.

Anamorph: *Tubercularia vulgaris* Tode : Fr., *Tode, Fungi mecklenb. sel.* 1: 18. 1790 : Fries, *Syst. Mycol.* 3: 464. 1832.

≡ *Knyaria vulgaris* (Tode : Fr.) O. Kuntze, *Rev. Gen. Pl.* 2: 856. 1891.

= *Tubercularia discoidea* Pers., *Obs. Mycol.* 1: 79. 1796.

= *Tubercularia confluens* Pers., *Syn. Meth. Fung.*, p. 113. 1801.

≡ *Knyaria confluens* (Pers.) O. Kuntze, *Rev. Gen. Pl.* 2: 856. 1891.

= *Tubercularia granulata* Pers. : Fr., *Persoon, Syn. Meth. Fung.* 113. 1801 : Fries, *Syst. Mycol.* 3: 465. 1832.

= *Tubercularia sarmentorum* Fr., *Obs. Mycol.* 1: 208. 1815.

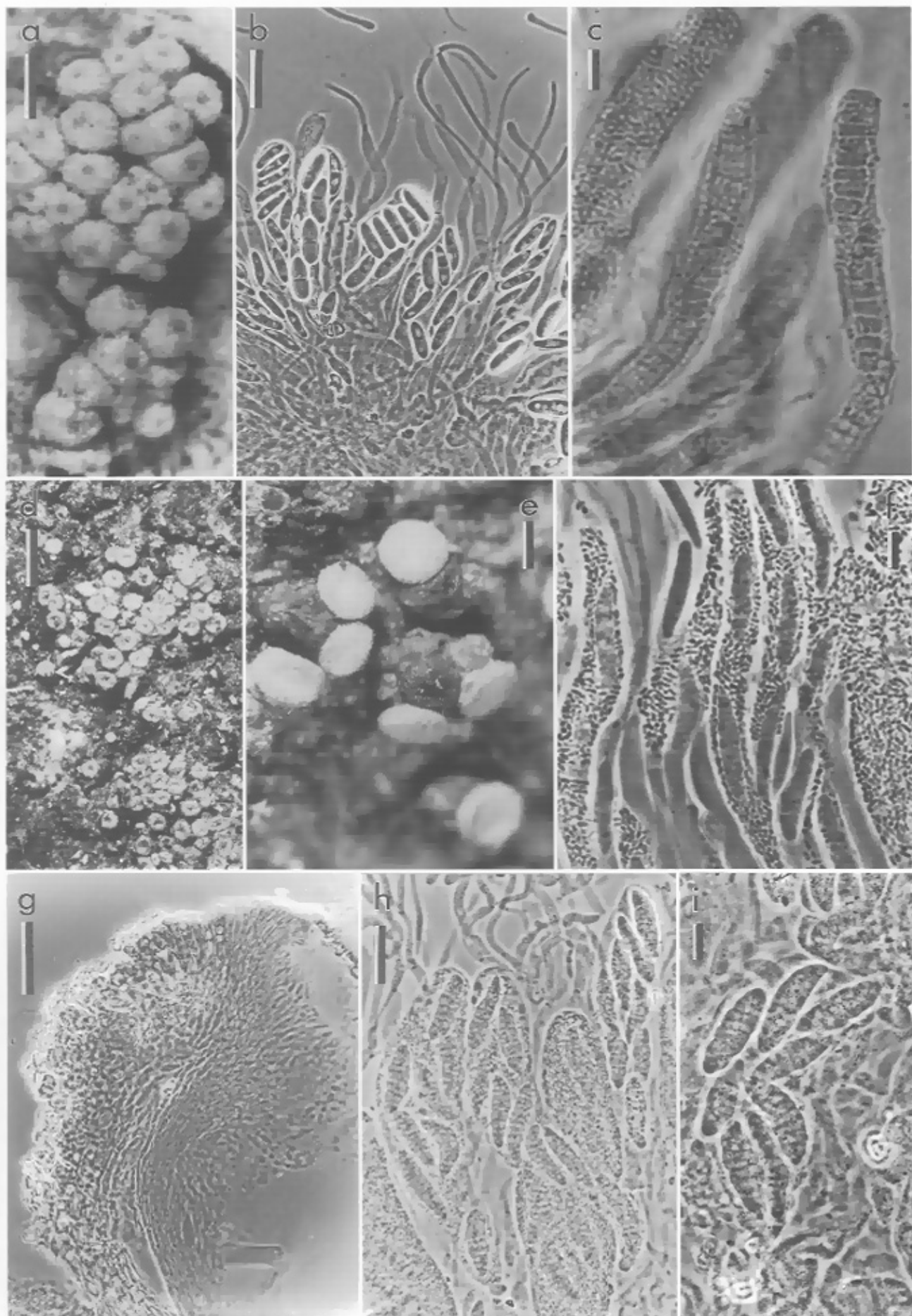
≡ *Knyaria sarmentorum* (Fr.) O. Kuntze, *Rev. Gen. Pl.* 2: 856. 1891.

= *Tubercularia minor* Link, *in Linn. Sp. Pl.* 2: 100. 1825.

≡ *Knyaria minor* (Link) O. Kuntze, *Rev. Gen. Pl.* 2: 856. 1891.

= *Tubercularia mutabilis* Nees, *in Link, Linn. Sp. Pl.* 2: 101. 1825.

Plate 30. a–b. *Nectria cinnabarina*. a. Ascomata on stroma. b. Asci with ascospores and remnants of apical paraphyses in phase contrast. **c.** *Nectria balsamea*, asci with ascospores producing ascoconidia. **d.** *Nectria guarapiensis*, ascomata on natural substratum. **e–f.** *Nectria cucurbitula*. e. Ascomata and pycnidia on natural substratum. f. Asci with ascospores producing ascoconidia. **g–i.** *Nectria lamyi*. g. Median section of ascoma. h. Asci with immature ascospores and remnants of apical paraphyses. i. Asci with ascospores. a–b. Neotype Fries, *Sclerom. Succ.* 184 – UPS. c. Seaver 321a – NY. d. Holotype – LPS. e–f. BPI 632633. g–i. Isolectotype – BPI. Scale bars: a = 500 μm ; b, h = 25 μm ; c, f, i = 10 μm ; d = 1 mm; e = 250 μm ; g = 50 μm .



= *Knyaria mutabilis* (Nees) O. Kuntze, Rev. Gen. Pl. 2: 846. 1891.
 = *Tubercularia celastri* Schwein., Proc. Amer. Philos. Soc. 4: 301. 1831.
 = *Knyaria celastri* (Schwein.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia radicalis* Schwein., Proc. Am. Philos. Soc. 4: 301. 1831.
 = *Knyaria radicalis* (Schwein.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia subpedicellata* Schwein., Proc. Am. Philos. Soc. 4: 301. 1831.
 = *Knyaria subpedicellata* (Schwein.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia calycanthi* Schwein., Proc. Am. Philos. Soc. 4: 302. 1831.
 = *Knyaria calycanthi* (Schwein.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia subdiaphana* Schwein., Proc. Amer. Philos. Soc. 4: 302. 1831.
 = *Knyaria subdiaphana* (Schwein.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia aesculi* Opiz, in Corda, Icones Fung. 1: 4. 1837.
 = *Knyaria aesculi* (Opiz) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia hysterina* Corda, Icones Fung. 1: 4. 1837.
 = *Knyaria hysterina* (Corda) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia sambuci* Corda, Icones Fung. 1: 4. 1837.
 = *Knyaria sambuci* (Corda) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia vaginata* Corda, Icones Fung. 1: 4. 1837.
 = *Knyaria vaginata* (Corda) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 [= *Tubercularia gyrosa* Opiz, Seznam Rostl. Květ. České p. 149. 1852, nom. nud.].
 = *Knyaria gyrosa* (Opiz) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 [= *Tubercularia laburni* Opiz, Seznam Rostl. Květ. České p. 149. 1852, nom. nud.].
 = *Knyaria laburni* (Opiz) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia filicis* Lasch, in Klotzsch, Herb. mycol. no. 1818. 1854.
 = *Knyaria filicis* (Lasch) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia berberidis* Thüm., Mycoth. univ. no. 696. 1877.
 = *Knyaria berberidis* (Thüm) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia evonymi* Roum., Fungi gall. exs. no. 55. 1879.
 = *Knyaria evonymi* (Roum.) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia brassicae* Libert, Herb. crypt. Ard. no. 1019.
 = *Knyaria brassicae* (Libert) O. Kuntze, Rev. Gen. Pl. 2: 856. 1891.
 = *Tubercularia ailanthi* Cooke, Grevillea 12: 26. 1883.
 = *Tubercularia aquifolii* Cooke & Masee, Grevillea 12: 45. 1887.
 = *Tubercularia conorum* Cooke & Masee, Grevillea 16: 49. 1887.
 = *Tubercularia coryli* Paol., Atti Accad. Scient. Veneto-trent.-istriana 11: 59. 1887.
 = *Tubercularia rhamni* Paol., Atti Accad. Scient. Veneto-trent.-istriana 11: 59. 1887.
 [= *Tubercularia calycanthi* Passer., Atti Reale Accad. Lincei, Rendiconti Cl. Sci. Fis. Ser. 4, 7: 51. 1891, non Schwein. 1831].

= *Tubercularia hamata* Ellis & Everhart, Proc. Acad. Nat. Sci. Philadelphia 1894: 386.
 = *Tubercularia miniata* Earle, in E.L. Greene, Plantae Bakerianae 2: 29. 1901.
 = *Tubercularia pteleae* Oudem., Ned. Kruidk. Arch., Ser. 3, 2: 925. 1903.

Stroma up to 5 mm diam, formed primarily of *textura angularis* to *textura prismatica* with cells oriented more or less vertically; cells 10–30 × 5–15 µm, with 1–3 µm thick walls; surface of stroma a palisade of closely packed hyphae with terminal cells 3.5–11 × 2–3.5 µm; basal part of the stroma sometimes a *textura intricata* of 2–5 µm wide hyphae. Ascospores solitary or caespitose up to 15 on an erumpent stroma, sometimes clustered around the sporodochia, globose to slightly pomiform, 250–400 µm diam, red-brown, KOH+ dark red, darker around the ostiole, non-papillate, usually with a conspicuously warted wall, though sometimes smooth-walled. Ascospores covered with globose to ellipsoid cells, 10–25 µm diam with 1–2 µm thick walls. Ascospores 50–100 µm thick, of two regions: outer region 40–80 µm thick, of globose to angular cells, 8–20 µm diam with 1–2 µm thick walls; inner region 10–20 µm thick, of compressed, rectangular cells, 6–20 × 1–4 µm, with thin to slightly thickened walls. Asci cylindrical to slightly clavate, 60–90 × 7–11(–14) µm, apex simple, 8-spored, ascospores uniseriate or partly biseriate. Ascospores ellipsoid, usually slightly curved, (14–)16–23 × 4–6 µm, 1(–3)-septate, hyaline to pale yellow, smooth-walled.

ANAMORPH: Sporodochia scattered, gregarious, or 2–3 caespitose, usually erumpent, sessile or stipitate, pustular, discoid or cylindrical-capitate, 375–1000 µm high × 250–2500 µm diam, stipe, when visible, pink-brown to red-brown, KOH+ dark red, 350–550 µm diam. Conidiophores with one or two basal verticillate branches, then developing acropleurogenously for 3–6 levels, straight, curved, or strongly coiled. Phialides intercalary or terminal; intercalary phialides with a cylindrical body 10–20(–30) µm long, 1.5–2.5 µm wide, and a subterminal lateral conidiogenous extension 1–6 × 1.5–2.5 µm, terminal phialides cylindrical, tapered slightly at the apex, 16–21 µm long, 1.5–2.5 µm wide, terminal cells sometimes sterile; collarettes not flared, periclinal thickening usually obvious. Conidial mass convex, usually bright pink or orange, sometimes brown, red, or even black, usually opaque, 250–2500 µm diam. Conidia oblong-ellipsoid to cylindrical, sometimes with slightly conical base, straight or slightly curved, 5–10(–12) × 1.5–3 µm. Description modified from Seifert (1985).

HABITAT.— On newly killed and weakened woody substrata.

DISTRIBUTION.— Widespread in north temperate regions, also known from southern temperate regions.

TYPE.— SWEDEN. Fries, Scleromyceti Sueciae no. 184 (UPS, as *Sphaeria cinnabarina*, **neotype** designated herein). This number was issued as both *S. decolorans* and *S. cinnabarina*; these names have long been considered synonyms. None of the Tode specimens exist, thus the name *S. cinnabarina* could be typified by Tabula IX, Fig. 68, a–d in Tode (1791), however, for a sanctioned name anything associated with the sanctioning protologue can be regarded as type (Art. 7.8): this specimen was mentioned in the protologue and therefore should be regarded as the type.

SPECIMEN ILLUSTRATED.— FRANCE. Forêt Domaniale d'Oloron (64), on *Rosa*, 19 Sep 1993, Françoise Candoussau, J.-F. Magni A9827.

ILLUSTRATIONS.— Breitenbach & Kränzlin (1981, Fig. 324); Dennis (1978, Pl. 31F); Ellis & Ellis (1985, Fig. 324); Müller & von Arx (1962, Fig. 249); Sinclair *et al.* (1987, Pls. 99–100); Tulasne & Tulasne (1865, Tab. XIII), among others.

NOTES.— *Nectria cinnabarina* is known to be plant-pathogenic causing coral spot of fruit trees and shrubs and a canker disease of honey locust (Bedker *et al.*, 1982; Sinclair *et al.*, 1987).

GENERIC SYNONYMS OF *Nectria*:

Allantonectria was implicitly placed in the *Hypocreales* by Earle (in Greene, 1901) when he described the 'ascmata as in *Nectria*' but he differentiated this genus from *Nectria* by allantoid ascospores. The type species, *Allantonectria miltina*, is similar to *Nectria cinnabarina* (Tode : Fr.) Fr. in ascematal anatomy and anamorph. *Allantonectria miltina* is recognized as *Nectria miltina* (Mont.) Mont., thus the genus is regarded as a synonym of *Nectria*. See the list of species in *Nectria sensu stricto* for a description of *Nectria miltina*.

Aponectria was described as a subgenus of *Nectria* for species having appendaged ascospores. Only one species, *Nectria inaurata*, was included. Based on an examination of the holotype specimen and authentic material, *Aponectria inaurata* is considered a synonym of *N. aquifolii* as suggested by Booth (1959). The structures interpreted as appendages by Saccardo are the phialides formed at the apex of the ascospores inside the asci. These structures eventually produce numerous ascoconidia. *Nectria aquifolii* was placed in the *Nectria cinnabarina*-group (Booth, 1959; Rossman, 1989), thus *Aponectria* is a synonym of *Nectria sensu stricto*.

HOLOTYPE of *N. inaurata*: ENGLAND. Shooter's Hill, near Bath, on dead twigs of holly, F. Currey Esq. (K).

ADDITIONAL SPECIMEN EXAMINED.— ENGLAND. Shrewsbury, W. Phillips, M.C. Cooke, Fungi Britannici, Ser. II, 476, issued 1876 (BPI).

Chilonectria was established by Saccardo (1878) for species of *Nectria* having polysporous asci. He included four species, as follows: *C. cucurbitula* (Tode : Fr.)

Sacc. as '(Currey) Sacc.', *C. myriospora* (P. Crouan & H. Crouan) Sacc., *C. rosellinii* (Carest.) Sacc., and *C. sulphurella* (De Not.) Sacc. None of these was designated as type until Clements & Shear (1931) lectotypified the genus with *C. cucurbitula* (\equiv *Nectria cucurbitula* (Tode : Fr.) Fr. \equiv *Sphaeria cucurbitula* Tode : Fr.). *Nectria cucurbitula* is a member of the genus *Nectria sensu stricto* (Rossman, 1989, 1993), thus *Chilonectria* is a synonym of *Nectria sensu stricto*.

The name *Nectria cucurbitula* has been a source of confusion because of its use in three different senses as clarified by Booth (1959). The oldest, legitimate name is *Nectria cucurbitula* (Tode : Fr.) Fr., based on *Sphaeria cucurbitula* Tode : Fr., a fungus occurring only on conifers and containing elongate, multiseptate, primary ascospores. This species was described, illustrated and discussed as *Scoleconectria cucurbitula* (Tode : Fr.) C. Booth by Booth (1959), Glawe & Jacobs (1988), and Rossman (1977). Saccardo (1878) erroneously attributed the name *Sphaeria curcubitula* to Currey rather than Tode, referring to a fungus described later in publications by Currey (1858) and Berkeley (1875). In these publications the epithet is attributed to Tode and/or Fr., not Currey. The description and illustration in Currey (1858) is of a fungus with relatively short '0.0004 inch long', one-septate ascospores that produce ascoconidia; the host is not mentioned. In Berkeley (1875) only the 'spermatia' or ascoconidia are described and the hosts mentioned are woody, dicotyledonous substrata, not conifers. The species referred to by Currey (1858) and Berkeley (1875) and thus, indirectly, by Saccardo (1878), is the long-spored species, *N. cucurbitula* (Tode : Fr.) Fr., despite the fact that these authors may have been looking at a different fungus. The fungus actually described in Berkeley (1875) and Currey (1858) is probably *N. coryli* Fuckel according to Booth (1959). Fuckel (1870) used the name *N. cucurbitula* for yet another fungus which was named *N. fuckeliana* C. Booth (1959), probably belonging to *Neonectria*. *Chilonectria cucurbitula* (Tode : Fr.) Sacc. is referred to as *Nectria cucurbitula* (Tode : Fr.) Fr.

Creonectria was proposed for *Nectria*-like species that occur on a well-developed stroma. The type species of *Creonectria*, based on *Tremella purpurea*, is a pre-Friesian name that is superseded by *Sphaeria cinnabarina* Tode : Fr. of which it is a synonym (Seaver, 1909a). The latter name is the type species of *Nectria*, of which *Creonectria* is a synonym.

Ephedrosphaera was lectotypified with *Sphaeria decolorans* Pers.: Fr. by Cannon & Hawksworth (1983). *Sphaeria decolorans* is a synonym of *Nectria cinnabarina*. Although *Ephedrosphaera* is an earlier name for *Nectria*, Cannon & Hawksworth (1983) proposed the conservation of *Nectria* over *Ephedro-*

sphaera, and this was approved as listed in Greuter *et al.* (1988, 1994).

Megalonectria was proposed by Spegazzini for species that resemble *Pleonectria* in ascospores, asci and ascospores but have ascospores associated with a synnematosus anamorph. Only one species, *M. pseudotrichia* (\equiv *Nectria pseudotrichia*), was included in the original description of the genus. This is placed in *Nectria sensu stricto* as *N. pseudotrichia*, thus *Megalonectria* is a synonym of *Nectria sensu stricto* (Rossman, 1989).

Pleonectria was described for *Nectria*-like fungi having muriform, primary ascospores that produce numerous, small ascoconidia in the asci. Seeler (1940) regarded *Pleonectria* as a synonym of *Thyronectria* and transferred many *Pleonectria* names to that genus. The type species of *Pleonectria* is recognized as *Nectria lamyi*, placed in the *Nectria cinnabarina*-group (Booth, 1959), now regarded as *Nectria sensu stricto* (Rossman, 1989); thus *Pleonectria* is a synonym of *Nectria*. All species previously named in *Pleonectria* have been redispersed, primarily in *Nectria sensu stricto* or as listed in the excluded genera.

Scoleconectria was established for *Nectria*-like fungi that are similar to *Ophionectria* in having long, multiseptate ascospores but, like *Creonectria*, produce fruiting-bodies on a well-developed stroma. The type specimen of *S. scolecospora* was examined and determined to be a synonym of *N. cucurbitula* (Booth, 1959; Rossman, 1983). *Nectria cucurbitula* was placed in the *N. cinnabarina*-group by Booth (1959) and Rossman (1983). Rossman (1989) restricted the genus *Nectria* to members of the *Nectria cinnabarina*-group, thus *Scoleconectria* is a synonym of *Nectria sensu stricto*.

Sphaerostilbe was established by Tulasne & Tulasne (1861) for five species each having 'Stilbe', i.e. synnematosus anamorphs and 'pyrenomycetous asci'. Seaver (1909b) listed *Stilbum aurantiacum* Babington as the type species. According to Seifert (1985), the Tulasnes (1861) explicitly stated that this species was intended to serve for the teleomorph of *Stilbum aurantiacum*, thus Seaver's lectotypification with *Sphaerostilbe aurantiaca* has been accepted by succeeding authors (Rogerson, 1970). Seifert (1985) designated a lectotype specimen for *Sphaerostilbe aurantiaca* from among the Tulasne specimens at PC. Based on Seifert's (1985) detailed account of both the teleomorph and anamorph, *Tubercularia aurantiaca* (Babington) Seifert, the conclusions of Booth (1959), and an examination of additional specimens, *Nectria aurantiaca* is considered to belong in the *Nectria cinnabarina*-group; thus *Sphaerostilbe* is considered a synonym of *Nectria sensu stricto*.

Stilbonectria was erected by Karsten (1889) for

species that are similar to *Calonectria*, considered at the time to include *Nectria*-like species having phragmospores, but with ascospores developing at the base of 'Stilbum'-like synnemata. Based on an examination of the type specimen, Rossman (1983) described and illustrated *Stilbonectria lateritia* and placed it in *Nectria*, as distinct from *N. pseudotrichia* in the *Nectria cinnabarina*-group; thus *Stilbonectria* is a synonym of *Nectria sensu stricto*.

ADDITIONAL SPECIES OF *NECTRIA*:

Nectria antarctica (Speg.) Rossman, Mem. New York Bot. Gard. 49: 257. 1989.

\equiv *Pleonectria antarctica* Speg., Bol. Acad. Nac. Ci. 11: 236. 1887.

\equiv *Thyronectria antarctica* (Speg.) Seeler, J. Arnold Arbor. 21: 437. 1940.

= *Pleonectria vagans* Speg., Bol. Acad. Nac. Ci. 11: 236. 1887.

Anamorph: *Tubercularia* sp.

Nectria antarctica is similar to *N. pseudotrichia* but distinguished by the strictly horizontal transverse septa of the ascospores and the sporodochial anamorph. *Nectria antarctica* was described and illustrated by Seeler (1940) as *Thyronectria antarctica*. Previously known only from Argentina and Chile; a recently collected specimen from Washington represents a new record for North America.

SPECIMEN EXAMINED.— UNITED STATES. Washington: Seattle, Washington Memorial Park, on standing dead stem of *Berberis aquifolium*, 29 July 1998, Walter Jaklitsch W.J. 1180, isol. Amy Y. Rossman 2767 (BPI 746217).

Nectria aquifolii (Fr.) Berk., Outl. Brit. Fungol., p. 393. 1860.

\equiv *Sphaeria aquifolii* Fr., Elench. Fung. 2: 82. 1828.

= *Nectria inaurata* Berk. & Broome, Ann. Mag. Nat. Hist., Ser. 2, 8: 467. 1854.

\equiv *Aponectria inaurata* (Berk. & Broome) Sacc., Michelia 1: 296. 1878.

= *Nectria aquifolii* (Fr.) Berk. var. *appendiculata* Feltgen, Vorstud. Pilzfl. Luxemb. 3: 305. 1903.

Anamorph: *Tubercularia*-like, known only in culture.

This species was described and illustrated by Booth (1959).

Nectria aurantiaca (Tul. & C. Tul.) Jacz., Opredelitel' Gribov, T. 1, p. 215. 1913.

\equiv *Sphaerostilbe aurantiaca* Tul. & C. Tul., Select. Fung. Carpol. 1: 131. 1861.

Anamorph: *Tubercularia aurantiaca* (Babington) Seifert, Stud. Mycol. 27: 106. 1985.

= *Stilbum aurantiacum* Babington, in Berkeley & Broome, Ann. Mag. Nat. Hist., Ser. 1, 6: 432. 1841.

= *Botryonipha aurantiaca* (Babington) O. Kuntze, Rev. Gen. Pl. 2: 845. 1891.

= *Stilbella aurantiaca* (Babington) Lindau, Rabenhorst's Kryptog.-Fl. 1, Pilze 9: 298. 1910.

= *Ditiola tubercularioides* Lib., Herb. Cryptog. Arden. No. 470.

= *Cilicipodium tubercularioides* (Lib.) Sacc., Fungi italici autogr. delin. T. 755. 1881.

= *Dendrostilbella moravica* Petrak, Ann. Mycol. 22: 65. 1924.

This species was described and illustrated by Booth (1959), Samuels & Brayford (1994), and Seifert (1985).

Nectria aurigera Berk. & Rav., Grevillea 4: 46. 1875.

= *Calonectria aurigera* (Berk. & Rav.) Sacc., Michelia 1: 308. 1878.

Anamorph: None known.

This species was described and illustrated by Rossman (1983).

Nectria australiensis Seifert, Stud. Mycol. 27: 109. 1985.

Anamorph: *Tubercularia australiensis* Seifert, Stud. Mycol. 27: 109. 1985.

This species was described and illustrated by Seifert (1985).

Nectria austroamericana (Speg.) Rossman, Mem. New York Bot. Gard. 29: 257. 1989.

= *Pleonectria austroamericana* Speg., Anales Soc. Ci. Argent. 10: 22. 1880.

= *Thyronectria austroamericana* (Speg.) Seeler, J. Arnold Arbor. 21: 405. 1940.

= *Chilonectria crinigera* Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 1890: 246. 1891.

= *Pleonectria denigrata* G. Winter, Bull. Torrey Bot. Club 10: 49. 1883.

= *Thyronectria denigrata* (G. Winter) Seaver, Mycologia 1: 204. 1909.

= *Pleonectria guaranitica* Speg., Anales Soc. Ci. Argent. 19: 44. 1885.

= *Pleonectria nigropapillata* Starbäck, Ark. Bot. 2: 13. 1904.

= *Nectria sphaerospora* Ellis & Everh., in Bessey & Weber, Nebraska State Board Agric. Annual Rep. 1889: 53. 1890.

= *Thyronectria sphaerospora* (Ellis & Everh.) Seaver, Mycologia 1: 206. 1909.

Anamorph: *Gyrostroma austroamericanum* Seeler, J. Arnold Arbor. 21: 447. 1940.

This species is the cause of honey-locust canker and has been described and illustrated in Bedker & Wingfield (1983) and Seeler (1940), both as *Thyronectria austroamericana*.

Nectria balsamea Cooke & Peck, in Cooke, Grevillea 12: 81. 1884. — Plate 30, c.

= *Calonectria balsamea* (Cooke & Peck) Sacc., Syll. Fung. 9: 986. 1891.

= *Thyronectria balsamea* (Cooke & Peck) Seeler, J. Arnold Arbor. 21: 442. 1940.

= *Scoleconectria balsamea* (Cooke & Peck) Seaver, Mycologia 1: 200. 1909.

= *Pleonectria balsamea* (Cooke & Peck) Vassilyeva, Plantae non Vasc., Fungi et Bryopsidae, Orientis Extremi Rossica, Fungi, Pyrenomycetidae et Loculoascomycetidae 4: 167. 1998.

= *Pleonectria pinicola* Kirschst., Abh. Bot. Ver. Prov. Brandenburg 48: 59. 1906.

= *Ophionectria cylindrospora* (Sollm.) Berl. & Voglino var. *tetraspora* Weese, Centralbl. Bakteriolog., Abt. 2, 42: 598. 1914.

= *Pleonectria calonectrioides* Wollenw., Z. Parasitenk. (Berlin) 3: 493. 1931.

Anamorph: *Zythiostroma* sp.

This species was described and illustrated by Booth (1959), Rossman (1985), and Seeler (1940) as *Thyronectria balsamea*.

SPECIMEN ILLUSTRATED.— CANADA. Newfoundland: Waghome, on fir, 13 Nov 1897, F.J. Seaver 321a (NY).

Nectria berolinensis (Sacc.) Cooke, Grevillea 12: 107. 1884.

= *Pleonectria berolinensis* Sacc., Michelia 1: 123. 1878.

= *Thyronectria berolinensis* (Sacc.) Seaver, Mycologia 1: 205. 1909.

= *Nectria ribis* Nießl, Verh. Naturf. Vereins Brünn 2: 114. 1865.

= *Nectria fenestrata* Berk. & M.A. Curtis, in Cooke, Grevillea 12: 81. 1884.

= *Pleonectria fenestrata* (Berk. & M.A. Curtis) Berl. & Voglino, Syll. Fung. Addit. 1–4: 216. 1886.

Anamorph: *Tubercularia berolinensis* (Wollenw.) Rossman, Mem. New York Bot. Gard. 49: 258. 1989.

= *Dendrodochium berolinense* Wollenw., Z. Parasitenk. (Berlin) 3: 492. 1931.

This species was described and illustrated by Booth (1959) and Seeler (1940), both as *Thyronectria berolinensis*, and Ellis & Everhart (1892) as *Pleonectria berolinensis*.

Nectria canadensis Ellis & Everh., Bull. Torrey Bot. Club 11: 74. 1884.

= *Calonectria canadensis* (Ellis & Everh.) Berl. & Voglino, Syll. Fung. Addit. 1–4: 212. 1886.

= *Scoleconectria canadensis* (Ellis & Everh.) Seaver, Mycologia 1: 199. 1909.

Anamorph: *Tubercularia grayana* (Sacc. & Ellis) Seifert, Stud. Mycol. 27: 112. 1985.

= *Cilicipodium grayanum* Sacc. & Ellis, Michelia 2: 581. 1882.

= *Dendrostilbella ulmi* Dearness, Mycologia 16: 175. 1924.

This species was described and illustrated by Ellis & Everhart (1892, as *Calonectria canadensis*), Rossman (1983) and Seifert (1985).

Nectria chlorinella Cooke, Grevillea 11: 108. 1883.

≡ *Calonectria chlorinella* (Cooke) Sacc., Syll. Fung. 2: 543. 1883.

≡ *Thyronectria chlorinella* (Cooke) Seeler, J. Arnold Arbor. 21: 444. 1940.

Anamorph: None known.

This species was described and illustrated by Seeler (1940) as *Thyronectria chlorinella*.

Nectria coryli Fuckel, Fung. Rhen. Exs., suppl. 1, no. 1582. 1865.

≡ *Chilonectria coryli* (Fuckel) Ellis & Everh., N. Amer. Pyrenomyc. p. 117. 1892.

≡ *Creonectria coryli* (Fuckel) Seaver, Mycologia 1: 186. 1909.

= *Coelosphaeria acervata* P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 4: 41. 1879.

= *Nectria coryli* f. *salicis* Rehm, Ascomyceten Exsicc. No. 680. 1882.

Anamorph: *Tubercularia*-like, known only in culture.

This species was described and illustrated by Booth (1959) and Breitenbach & Kränzlin (1981).

Nectria cucurbitula (Tode : Fr.) Fr., Summa Veg. Scand. 2: 388. 1849. — Plate 30, e–f.

≡ *Sphaeria cucurbitula* Tode : Fr., Tode, Fungi mecklenb. sel. 2: 38. 1791 : Fries, Syst. Mycol. 2: 415. 1823.

≡ *Scoleconectria cucurbitula* (Tode : Fr.) C. Booth, Mycol. Pap. 73: 15. 1959.

= *Nectria cylindrospora* Sollm., Bot. Zeitung (Berlin) 22: 265. 1864.

≡ *Ophionectria cylindrospora* (Sollm.) Berl. & Voglino, Syll. Fung. Addit. 1–4: 217. 1886.

= *Ophionectria scolecospora* Bref. & Tav., in Brefeld, Unters. Gesamtgeb. Mykol. 10: 178. 1891.

≡ *Scoleconectria scolecospora* (Bref. & Tav.) Seaver, Mycologia 1: 198. 1909.

Anamorph: *Zythiostroma pinastri* (P. Karst.) Höhn. ex Weese, Mitt. Bot. Lab. Techn. Hochsch. Wien 8: 90. 1931.

≡ *Zythia pinastri* P. Karst., Rev. Mycol. (Toulouse) 7: 106. 1885.

Nectria cucurbitula has been confused with *N. balsamea*, a species similar to *N. cucurbitula* but having elongate, muriform, primary ascospores that also become obscured by the production of ascoconidia within the asci (Rossman, 1983). Within the ascus the ascospores sporulate phialidically to produce ascoconidia, also referred to as secondary ascospores, which of-

ten obscure the primary ascospores, as described, illustrated and discussed by Glawe & Jacobs (1988). *Nectria cucurbitula* was also described and illustrated by Booth (1959) and Rossman (1983), both as *Scoleconectria cucurbitula*.

SPECIMENS ILLUSTRATED.— UNITED STATES. New York: North Creek, on *Abies balsamea*, 15 Aug 1919, C.L. Shear, det. F. Petrak as *Ophionectria scolecospora* (BPI 632633).

Nectria guarapiensis Speg., Anales Soc. Ci. Argent. 19: 37. 1885. — Plate 30, d.

Anamorph: None known.

Known only from the type collection in Brazil, this species was recently described and illustrated by Samuels & Brayford (1994).

Nectria lamyi (Desm.) De Not., Sfer. Ital., 1: 13. 1863. — Plate 30, g–i.

≡ *Sphaeria lamyi* Desm., Pl. Crypt. France, no. 839. 1836.

≡ *Pleonectria lamyi* (Desm.) Sacc., Mycotheca Ven. no. 688. 1876.

≡ *Thyronectria lamyi* (Desm.) Seeler, J. Arnold Arbor. 21: 449. 1940.

Anamorph: pycnidial *Tubercularia* (*Zythiostroma*).

Ascomata and pycnidia forming together in caespitose aggregates, with 3–5 ascomata in a group, on a discrete pseudoparenchymatous stroma, subcortical, becoming erumpent; reddish-brown, ostiolar area nearly black, not changing color in KOH, but becoming uniformly yellow in lactic acid. Ascomata globose to subglobose, non-papillate, rough or slightly furfuraceous, 300–600 µm diam, not collapsing when dry or becoming slightly cupulate, wall around the apex to 100 µm thick, thinner elsewhere, of globose to oblong cells, cells around the ascomatal apex appearing to have thicker walls than elsewhere, exterior cells 10–15 µm diam, with visibly thickened, pigmented walls; cells toward the interior forming a pseudoparenchyma. Asci cylindrical, increasing in size as ascospores mature, 100–145 × 25–45 µm, apex simple. Ascospores fusiform, 22–33 × 7–11 µm, muriform, with ca 5 transverse septa and one longitudinal septum, budding to produce hyaline, thin-walled, bacillar ascoconidia, 3–4.5 × 1–1.5 µm, that fill the asci.

ANAMORPH: Pycnidia globose, smooth, 350–450 µm diam, wall 30–40 µm thick, of angular cells 5–7 µm diam, outermost cells reddish-brown; innermost cells hyaline; inner wall of the pycnidium convoluted, lined with short-branched conidiophores that terminate in narrow, subulate phialides 7–9 µm long, 1–1.5 µm wide at the base. Conidia similar to the ascoconidia, bacillar to slightly curved, 3–4.5 × 1–1.5 µm, hyaline. Description modified from Booth (1959).

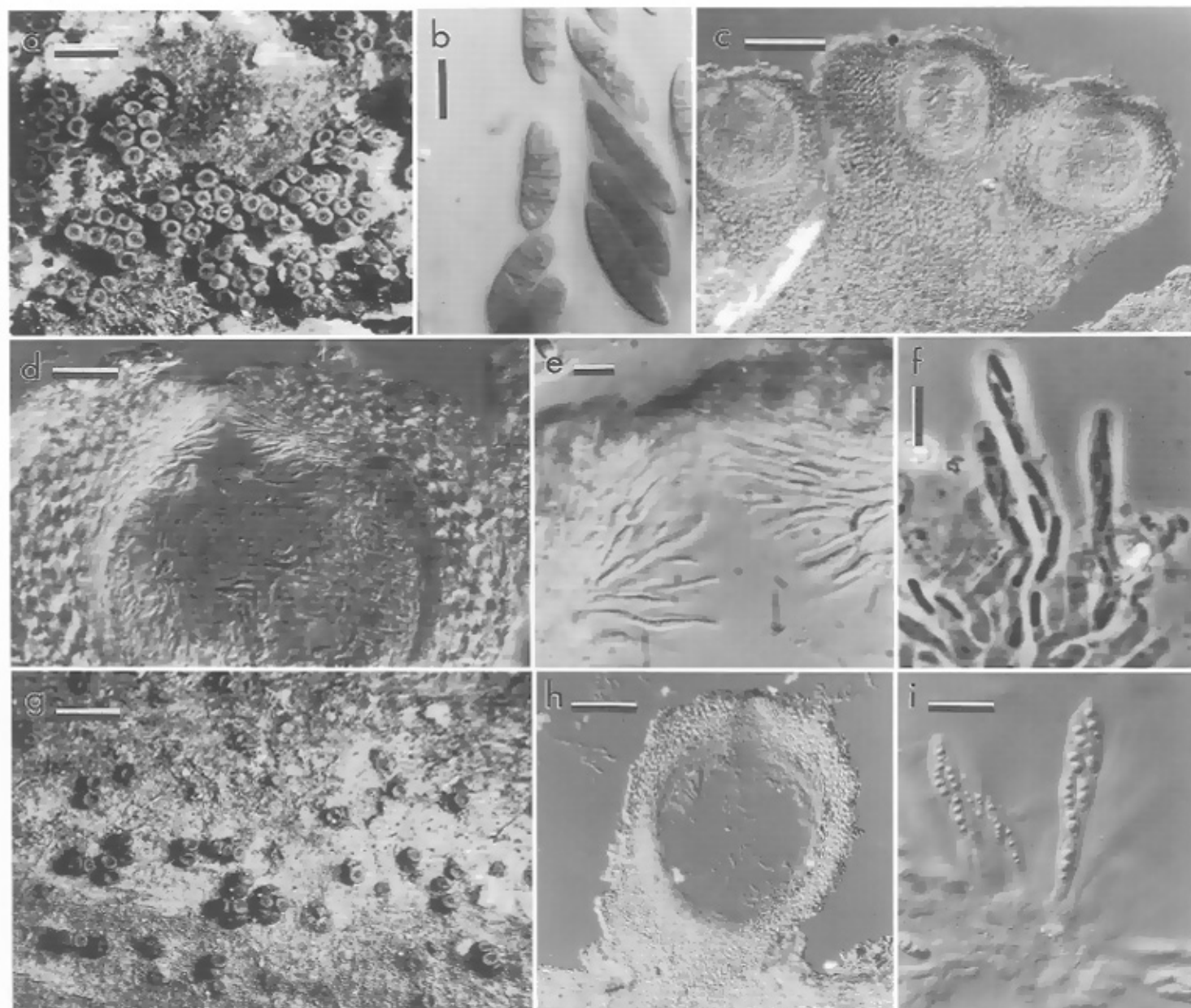


Plate 31. a–b. *Nectria lateritia*. a. Ascomata aggregated on stroma. b. Ascospores stained in cotton blue. c–f. *Nectria miltina*. c. Median section of well-developed stroma and ascomata. d. Median section of ascoma. e. Ascumatal apex. f. Asci with ascospores in phase contrast. g–i. *Nectria pseudocinnabarina*. g. Ascomata aggregated on stroma. h. Median section of ascoma. i. Asci with ascospores. a. BPI 552479. b. G.J.S. 1843. c–e. BPI 630105, holotype of *Allantonectria yuccae*. f. BPI 630124. g. BPI 552864, isotype. h, i. BPI 802837. Scale bars: a, g = 1 mm; b, e, f = 10 μ m; c, h = 100 μ m; d, i = 25 μ m.

HABITAT.— On dead branches of *Berberis* and unidentified plants.

DISTRIBUTION.— Canada (Ontario), France, Germany, Hungary, Italy, Russia, Sweden (Seeler, 1940).

LECTOTYPE, designated by Seeler (1940): FRANCE. Limoges, on dead branches of *Berberis* sp., Lamy, Desmazières, Pl. Crypt. France no. 839 (FH – not examined; BPI – isotype).

SPECIMEN EXAMINED.— AUSTRIA. Kärnten, St. Margareten im Rosental, on dead twigs of *Berberis vulgaris*, 26 Oct 1998, W. Jaklitsch 1264 (BPI).

ILLUSTRATIONS.— Booth (1959, Fig. 5, as *T. lamyi*); Schmid &

Schmid (1990, Fig. 33); Seeler (1940, Pl. 2, Figs. 1A–F, as *T. lamyi*).

Nectria lateritia (P. Karst.) Rossman, Mycol. Pap. 150: 22. 1983. — Plate 31, a–b.

≡ *Stilbonectria lateritia* P. Karst., Hedwigia 28: 194. 1889. = *Calonectria erythrina* Syd. & P. Syd., Ann. Mycol. 10: 81. 1912.

≡ *Nectria erythrina* (Syd. & P. Syd.) Rossman, Mycotaxon 8: 508. 1979.

Anamorph: *Tubercularia* cf. *lateritia* (Berk.) Seifert, Stud. Mycol. 27: 119. 1985.

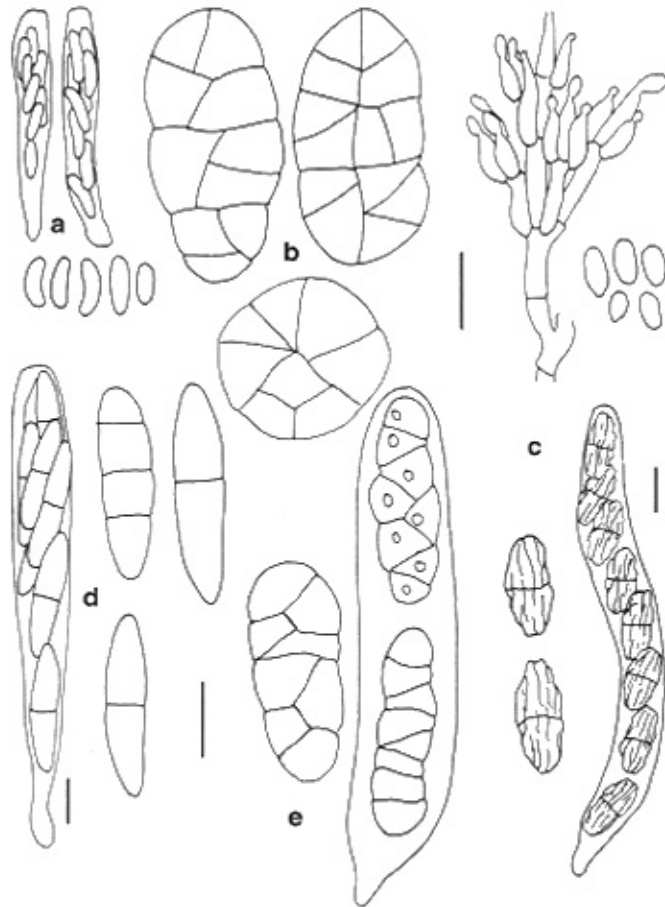


Plate 32. a. *Nectria miltina*, asci and ascospores. b. *Pleogibberella calami*, ascospores, one in cross-section. c. *Rubrinectria olivacea*, ascus, ascospores, conidiophores and conidia. d. *Stalagmites tumefaciens*, ascus and ascospores. e. *Xenonectriella lutescens*, ascus and ascospore. a. Holotype of *Allantonectria yuccae* – BPI 630106. b. Holotype – NY. c. BPI 1107210. d. Lectotype – S. e. Lectotype – BPI. Scale bars: a = b, c–c, all = 10 μ m.

\equiv *Stilbum lateritium* Berk., J. Bot., London 2: 642. 1843.

According to Seifert (1985), the stilbellaceous anamorph of *N. lateritia* (as *Stilbonectria lateritia*) is indistinguishable from the *Tubercularia* anamorph of *Nectria pseudotrichia*. The multiseptate ascospores of *N. lateritia* readily separate this species from the muriform ascospores of *N. pseudotrichia* as described and illustrated by Rossman (1983) and Samuels & Brayford (1994). Both species are common in tropical America.

SPECIMENS ILLUSTRATED.— CHINA. Yen-hsien, Hainan, on bark, 16 Jun 1934, S.Q. Deng 3429, S.C. Teng 3959, as *Calonectria polythalamia* (BPI 552479). VENEZUELA. Amazonas: Neblina base camp, on bark of recently dead tree. G.J. Samuels 1843, culture G.J.S. 84-423 (NY).

Nectria loniceræ (Seeler) Rossman, Mem. New York Bot. Gard. 49: 260. 1989.

\equiv *Thyronectria loniceræ* Seeler, J. Arnold Arbor. 21: 450. 1940.

Anamorph: None known.

This species was described and illustrated by Seeler (1940) as *Thyronectria loniceræ*.

Nectria miltina (Mont.) Mont., Syll. gen. sp. crypt. p. 225. 1856. — Plate 31, c–f; Plate 32, a.

\equiv *Sphaeria miltina* Mont., in Durieu, Expl. sci. Algérie, Bot. I, 1: 477. 1848 [1849].

\equiv *Allantonectria miltina* (Mont.) Weese, in Höhn. & Weese, Ann. Mycol. 8: 464. 1910.

\equiv *Nectriella miltina* (Mont.) Sacc., Michelia 1: 278. 1878. = *Allantonectria yuccae* Earle, in E.L. Greene, Plantae Bakerianae 2: 11. 1901.

= *Nectriella bacillisporea* Traverso & Spessa, Bol. Soc. Broteriana 25: 172. 1910.

Anamorph: *Tubercularia* sp.

Stromata erumpent, 400–800 μ m diam \times ca 210 μ m tall, brick-red to orange, KOH+ blood-red, pseudo-parenchymatous, cells forming a *textura angularis*, with pigmented, thick-walled cells, 9–14 \times 7–10.5 μ m, with about 1.5 μ m thick wall, integrating with the outer ascomatal wall. Ascomata superficial on well-developed stromata, aggregated in groups of up to 25, subglobose to globose, 175–195 μ m high \times 185–200 μ m diam, becoming slightly cupulate upon drying, sometimes with only a depressed apical region, bay to scarlet, apical region slightly darker, KOH+ blood-red, surface finely scurfy, concolorous, slightly rugose when dry. Ascomatal surface cells forming a *textura angularis*, 8–12 μ m diam, with pigmented ca 1.5 μ m thick walls. Ascomatal wall 25–35 μ m thick, of two distinct regions: outer region 20–25 μ m thick, integrating with the stroma, cells forming a *textura angularis*, walls pigmented, about 1.5 μ m thick; inner region 5–10 μ m thick, of elongate, thin-walled, hyaline cells, forming a *textura prismatica*. Asci narrowly clavate, 28–36 \times 3.6–4.8 μ m, with apical ring about 2 μ m diam, 8-spored, ascospores biseriate above, uniseriate below. Ascospores allantoid to short-cylindrical with rounded corners, straight to slightly curved, (4.5–)5.5–7 \times 1.5–2 μ m, non-septate, hyaline, smooth.

ANAMORPH in culture: colony bright orange, slimy, with *Acremonium*-like phialides, conidia ellipsoid, 3–5 \times 1–3 μ m, hyaline (Lowen, 1991).

HABITAT.— On living and dead leaves of members of the *Agavaceae* including *Agave americana*, *Agave* sp., *Dasylyrion* sp., *Furcraea gigantea*, *Nolina* sp., *Yucca baccata*, *Y. brevifolia*, *Y. glauca*, *Y. harrimaniae*, *Y. schidigera*, and *Yucca* sp.

DISTRIBUTION.— Algeria, Austria (Lowen, 1991), France, Greece, Italy, Mexico, Panama, United States: Arizona, California, Colorado, Nebraska, and Utah (Lowen, 1991).

TYPES.— ALGERIA. On *Agave americana*, Bommes 1847

(FH ex Herb. Paris, **lectotype** of *Sphaeria miltina*, designated herein, based on Lowen, 1991). PORTUGAL. Coimbra, Horto botânico Conimbricensi, on leaves of *Furcraea gigantea* (*Agavaceae*), Nov 1906, A. Möller (PAD, holotype of *Nectriella bacillispora*). UNITED STATES. Colorado, Hermosa, on *Yucca*, C. F. Baker s. n., Mar 1899, det. F.S. Earle (BPI 630106, holotype of *A. yuccae*); Colorado, Hermosa, on dead, withered leaves of *Yucca*, C.F. Baker 12, Apr 1899, det. F.S. Earle (BPI, NY, topotype specimens).

ADDITIONAL SPECIMENS EXAMINED.— FRANCE. Golfe Juan, Château Robert, on dead leaves of *Agave americana*, Dec 1894, L. Rolland, Roumeguère 6860 (BPI). GREECE. Corfu, on leaves of *Agave americana*, Reching, Apr 1912, Rehm: Ascomycetes 1962b, as *Nectriella miltina* (BPI, FH). ITALY. Naples, on rotting leaves of *Agave americana*, Cesati (FH); South Tyrol, Arco-Merano, on living leaves of *Agave americana*, Dietrich-Kalkhoff, Dr. Wolff, 1911, Rehm: Ascomycetes 1962 (BPI, FH). MEXICO, intercepted at Nogales 77179, on *Agave* sp., D.E. Noel & F.A. Allen, det. A.J. Watson, 26 Nov 1957 (BPI). PANAMA. Prov. Chiriqui, Llanos del Vacan, 1250–1300 m alt., on *Yucca* sp., G.W. Martin 2815c, 14 July 1935 (BPI, as *A. yuccae*). UNITED STATES. Arizona, Santa Rita Mountains, O.F. Cook, 22 Oct 1914, det. A.J. Watson (BPI, as *A. yuccae*); California, San Diego Co., Camp Kearney, on *Yucca* sp., O.A. Plunkett, Apr 1935, det. O.A. Plunkett (BPI, as *A. yuccae*); Colorado, Denver, on *Yucca glauca*, C.L. Shear, 11 Oct 1913, det. F. Petrak (BPI); Denver, on dead leaves of *Yucca glauca*, E. Bethel, 28 Mar 1910, E. Bartholomew, *Fungi Columbiani* 3204 (BPI); Leyden, on *Yucca glauca*, E. Bethel, 5 Feb 1910 (BPI, as *A. yuccae*); Mesa Verde, 2400 m alt., on *Yucca harrimaniae*, F.E. and E.S. Clements, 6 July 1907, *Cryptogamae Formationum Coloradensium* 460 (BPI, as *A. yuccae*); Nebraska, Valentine, on *Yucca* sp., C.L. Shear, 23 Feb 1898, det. F. Petrak (BPI); New Mexico, Lincoln Co., Valley of Fires, on dead leaves of *Nolina* sp., A. Ramaley 9316, 23 May 1993 (BPI); Texas, Pecos Co., on dead leaves of *Dasyllirion* sp., A. Ramaley 9308, 22 May 1993 (BPI).

NOTES.— *Nectria miltina* is distinguished from other species of *Nectria sensu stricto* by the non-septate ascospores and occurrence on monocotyledonous plant material rather than rotting wood of deciduous trees. The stromata of *N. miltina* develop from the woody fibers within the leaves of *Agave* and *Yucca*. Although the *Tubercularia* anamorph of *N. miltina* produces sporodochia in nature, in culture this species forms only *Acremonium*-like phialides. This is similar to the situation in *Nectria cinnabarina* and other species of *Nectria sensu stricto* (Rossman, 1989; Seifert, 1985).

Nectria missouriensis Ellis & Everh., *J. Mycol.* 4: 57. 1888.

≡ *Pleonectria missouriensis* (Ellis & Everh.) Sacc., *Syll. Fung.* 9: 990. 1891.

≡ *Paranectria missouriensis* (Ellis & Everh.) Rabenhorst, in *Winter, Fungi europaei* no. 3748. 1891.

≡ *Thyronectria missouriensis* (Ellis & Everh.) Seaver, *Mycologia* 1: 205. 1909.

Anamorph: *Gyrostroma missouriense* Seeler, *J. Arnold Arbor.* 21: 441. 1940.

This species was described and illustrated by Seeler (1940) as *Thyronectria missouriensis*.

Nectria neorehmiana Rossman, *Mycol. Pap.* 150: 23. 1983.

Anamorph: None known.

This species was described and illustrated by Rossman (1983).

Nectria novaezealandiae (Dingley) Rossman, *Mycol. Pap.* 150: 24. 1983 (as '*novaezealandica*').

≡ *Calonectria novae-zealandiae* Dingley, *Trans. & Proc. Roy. Soc. New Zealand* 79: 404. 1952.

Anamorph: None known.

This species was described and illustrated by Rossman (1983).

Nectria pseudocinnabarina Rossman, *Mem. New York Bot. Gard.* 49: 260. 1989. — Plate 31, g–i.

Anamorph: *Tubercularia* cf. *lateritia* (Berk.) Seifert, *Stud. Mycol.* 27: 119. 1985.

This species was described and illustrated by Rossman (1989) and Samuels & Brayford (1994).

SPECIMEN ILLUSTRATED.— VENEZUELA. Territorio Federal Amazona, San Carlos de Rio Negro, along road to airport, on wood, 24 Jan 1985, A. Rossman 2351 (BPI 552864 isotype); Edo. Aragua, Henry Pittier National Park, 1200–1300 m, on dead bark of tree, 3 Dec 1990, G.J. Samuels 7855, cult. 90-223, B. Hein, & S.M. Huhndorf (BPI 802837).

Nectria pseudotrichia Berk. & M.A. Curtis, *J. Acad. Nat. Sci. Philadelphia* 2, 2: 289. 1853.

≡ *Sphaerostilbe pseudotrichia* (Berk. & M.A. Curtis) Berk. & Broome, *J. Linn. Soc.* 14: 114. 1875.

≡ *Calonectria pseudotrichia* (Berk. & M.A. Curtis) Sacc., *Michelia* 1: 208. 1878.

≡ *Megalonectria pseudotrichia* (Berk. & M.A. Curtis) Speg., *An. Soc. Cient. Argent.* 2: 216. 1881.

≡ *Pleonectria pseudotrichia* (Berk. & M.A. Curtis) Wollenw., *Angew. Bot.* 8: 195. 1921.

≡ *Thyronectria pseudotrichia* (Berk. & M.A. Curtis) Seeler, *J. Arnold Arbor.* 21: 438. 1940.

= *Nectria polythalamia* Berk., *Hooker's Flora Novae-Zelandiae* 2: 203. 1855.

= *Sphaerostilbe cinnabarina* Tul. & C. Tul., *Sel. Fung. Carpol.* 1: 129 (footnote). 1861.

= *Sphaerostilbe lateritia* Berk. & M.A. Curtis, *J. Linn. Soc., Bot.* 10: 377. 1869.

= *Sphaerostilbe incerta* Ces., *Atti Accad. Sci. Fis. Mat., Napoli* 8: 14. 1879.

= *Sphaerostilbe nigrescens* Kalchbr. & Cooke, *Grevillea* 9: 15. 1880.

≡ *Megalonectria nigrescens* (Kalchbr. & Cooke) Sacc., *Syll. Fung.* 2: 561. 1883.

= *Pleonectria megalospora* Speg., *An. Soc. Cient. Argent.* 12: 216. 1881.

= *Megalonectria caespitosa* Speg., *Bol. Acad. Nac. Cienc. Córdoba* 11: 538. 1889.

≡ *Pleonectria caespitosa* (Speg.) Wollenw., *Angew. Bot.* 8: 195. 1926.

= *Megalonectria verrucosa* A. Möller, *Phycom. u. Ascom. Bras.* p. 298. 1901.

- = *Megalonectria polytrichia* (Schwein.) Speg. var *australensis* Henn., *Hedwigia* 42: 79. 1903.
 = *Megalonectria madagascariensis* Henn., in Voeltzkow, *Reise in Ostafrika* 3: 29. 1908.
 = *Megalonectria yerbae* Speg., *An. Mus. Nac. Hist. Nat. Buenos Aires* 17: 129. 1908.
 = *Pleonectria riograndensis* Theissen, *Broteria*, Ser. Bot. 9: 143. 1910.
 = *Pleonectria heveana* Sacc., *Boll. Orto Bot. Napoli* 24: 13. 1918.
- Anamorph: *Tubercularia lateritia* (Berk.) Seifert, *Stud. Mycol.* 27: 119. 1985.
- ≡ *Stilbum lateritium* Berk., *J. Bot.*, London 2: 642. 1843.
 ≡ *Botryonipha lateritia* (Berk.) O. Kuntze, *Rev. Gen. Pl.* 2: 845. 1891.
 ≡ *Stilbella lateritia* (Berk.) Bres., *Ann. Mycol.* 9: 276. 1911.
 = *Stilbum caespitosum* Welw. & Curr., *Trans. Linn. Soc. Lond.* 26: 291. 1867.
 ≡ *Ciliciopodium caespitosum* (Welw. & Curr.) Sacc., *Syll. Fung.* 4: 577. 1886.
 = *Stilbum inconspicuum* Curr., *Trans. Linn. Soc. Lond.*, Ser. 2 (Bot.) 1: 129. 1874.
 ≡ *Stilbum kurzianum* Cooke, *Grevillea* 16: 71. 1888 (unnecessary name change for *S. inconspicuum*).
 = *Crinula aurantiocinnabarina* Speg., *An. Soc. Cient. Argent.* 9: 167. 1880.
 ≡ *Stilbum aurantiocinnabarinum* (Speg.) Speg., *An. Soc. Cient. Argent.* 13: 30. 1882.
 ≡ *Calocera aurantiocinnabarina* (Speg.) Sacc., *Syll. Fung.* 6: 734. 1888.
 ≡ *Botryonipha aurantiocinnabarina* (Speg.) O. Kuntze, *Rev. Gen. Pl.* 2: 845. 1891.
 = *Sphaerostilbe rosea* Kalchbr., *Grevillea* 9: 26. 1880.
 ≡ *Stilbella rosea* (Kalchbr.) Weese, *Sitzungsber. Kaiserl. Akad. Wiss.* 128: 44. 1919.
 = *Stilbum kalchbrenneri* Sacc., *Syll. Fung.* 4: 570. 1886.
 = *Stilbum aurantiocinnabarinum* var. *fuscipes* Speg., *An. Soc. Cient. Argent.* 13: 30. 1882.
 [= *Stilbum physaroides* Speg., *Bol. Acad. Nac. Cienc. Córdoba* 11: 615. 1889, non Kalchbr. 1882.]
 ≡ *Stilbum spegazzinianum* Sacc., *Syll. Fung.* 10: 682. 1892.
 = *Stilbum fuscocinnabarinum* Speg., *Bol. Acad. Nac. Cienc. Córdoba* 11: 616. 1889.
 = *Stilbum javanicum* Henn., *Hedwigia* 32: 227. 1893.
 = *Stilbum proliferum* Marchal, *Bull. Soc. Belge Microsc.* 20: 267. 1894.
 = *Stilbum camerunense* Henn., *Bot. Jahrb. Syst.* 22: 81. 1895.
 [= *Stilbum nanum* Masee, *Kew Bull.* 1898: 112, non (Ehrenb.) Sprengel 1827.]
 = *Stilbum fructigenum* Penz. & Sacc., *Malpighia* 15: 250. 1901.
 = *Stilbella rubescens* Sydow, *Bull. Herb. Boissier* 1901: 85. 1901.
 ≡ *Stilbum rubescens* (Sydow) Sacc., *Syll. Fung.* 16: 1082. 1901.
 = *Stilbella heveae* Zimm., in Henn., *Hedwigia* 41: 148. 1902.
 ≡ *Stilbum heveae* (Zimm.) Sacc. & D. Sacc., *Syll. Fung.* 18: 631. 1906.
 = *Stilbella theae* Ch. Bernard, *Bull. Dép. Agric. Indes Néerl.* 11:25. 1907.
 ≡ *Stilbum theae* (Ch. Bernard) Sacc. & Trotter, *Syll. Fung.* 22: 1437. 1913.
 = *Ciliciopodium costaricense* Speg., *Bol. Acad. Nac. Cienc. Córdoba* 23: 591. 1919.
 [= *Ciliciopodium caespitosum* Speg., *An. Mus. Nac. Hist. Nat. Buenos Aires* 31: 442. 1922, non (Welw. & Curr.) Sacc., 1886.]
 = *Stilbum minutulum* Penz. & Sacc., *Malpighia* 15: 250. 1902.

- = *Polycephalum subaurantiacum* Peck, *Bull. New York St. Mus.* 167: 46. 1912.
 = *Dendrostilbella bonarii* E.F. Morris, *Mycopath. Mycol. appl.* 28: 100. 1966.

This species was described and illustrated by Seeler (1940, as *Thyronectria pseudotrichia*), Samuels *et al.* (1990) and Seifert (1985); the latter examined the type specimen and provided a detailed account of *N. pseudotrichia* and its anamorph, *Tubercularia lateritia*, and listed the numerous synonyms. Subramanian & Bhat (1984) published a developmental study of this species as *T. pseudotrichia*. In tropical and subtropical regions *Nectria pseudotrichia* is one of the most conspicuous and common nectrioid fungi occurring on recently killed dicotyledonous wood.
 SPECIMEN EXAMINED.— BRAZIL. São Leopoldo, on bark. S.J. Rick (FH – holotype of *Pleonectria riograndensis*).

- Nectria pulcherrima*** Berk. & Broome, *J. Linn. Soc., Bot.* 14: 166. 1873.
 ≡ *Calonectria pulcherrima* (Berk. & Broome) Sacc., *Michelia* 1: 315. 1878.

Anamorph: None known.

This species was described in Rossman (1989).

- Nectria pyrrochlora*** Auersw., in Rabenh., *Hedwigia* 8: 88. 1869.
 ≡ *Calonectria pyrrochlora* (Auersw.) Sacc., *Michelia* 1: 251. 1878.
 ≡ *Thyronectria pyrrochlora* (Auersw.) Sacc., *Michelia* 1: 325. 1878.
 ≡ *Pleonectria pyrrochlora* (Auersw.) G. Winter, *Rabenh. Krypt.-Fl. Ed. 2. 1(2), II. Abt.: Ascomyc.: Gymnoasceen* p. 108. 1884.

Anamorph: None known.

This species was described and illustrated in Seeler (1940) as *Thyronectria pyrrochlora*.

- Nectria rehmiana*** (Kirschst.) Rossman, *Mycol. Pap.* 150: 24. 1983.
 ≡ *Calonectria rehmiana* Kirschst., *Verh. Bot. Vereins Prov. Brandenburg* 48: 59. 1906 (1907).

Anamorph: None known.

This species was described and illustrated by Rossman (1983).

- Nectria sinopica*** (Fr. : Fr.) Fr., *Summa Veg. Scand.* 2: 388. 1849.
 ≡ *Sphaeria sinopica* Fr. : Fr., *Elench. Fung.* 2: 81. 1828.
 Anamorph: *Zythiostroma mougeotii* (Fr. : Fr.) Höhn., *Mitt. Bot. Tech. Hochsch. Wien* 8: 88. 1931.
 ≡ *Sphaeria mougeotii* Fr. : Fr., *Elench. Fung.* 2: 100. 1828.

KEY TO THE SPECIES OF *NECTRIA*

1. Ascospores allantoid, non-septate; on members of the *Agavaceae* *N. miltina*
1. Ascospores ellipsoid to long-fusiform, 1- to multiseptate or muriform; on woody substrata 2
- 2 (1). Ascospores budding within the asci 3
2. Ascospores not budding within the asci, sometimes budding immediately upon release from the asci 8
- 3 (2). Ascospores 1-septate 4
3. Ascospores multiseptate or muriform 5
- 4 (3). Ascomata covered with yellow-green scurf; ascospores $9-12 \times 3-5 \mu\text{m}$; on decaying branches of *Ilex*; Europe *N. aquifolii*
4. Ascomata without scurf; ascospores $11-13 \times 3-3.5 \mu\text{m}$; on decaying wood of *Corylus* and *Salix*; Europe *N. coryli*
- 5 (3). Ascospores long-fusiform, multiseptate, $30-77 \times 2-4 \mu\text{m}$; erumpent through needle scars of conifers; in Europe and North America *N. cucurbitula*
5. Ascospores ellipsoid to long-ellipsoid, muriform; on conifers or on dicotyledonous wood 6
- 6 (5). Ascomata covered with bright yellow scurf; ascospores disarticulating into single cells, $4.5-8.5 \mu\text{m}$ diam *N. chlorinella*
6. Ascomata red-orange to dark red or black, without yellow scurf; ascospores not disarticulating 7
- 7 (6). Ascospores $17-26 \times 5-6 \mu\text{m}$; erumpent through needle scars of conifers *N. balsamea*
7. Ascospores $22-33 \times 7-11 \mu\text{m}$; on dead wood of *Berberis* *N. lamyi*
- 8 (2). Ascospores 1-septate, rarely 3-septate 9
8. Ascospores multiseptate or muriform 14
- 9 (8). Ascomata covered with bright yellow-green scurf; ascospores $9-12 \times 4-6 \mu\text{m}$; on recently killed roots of *Hedera helix*; Europe *N. sinopica*
9. Ascomata with concolorous scurf; ascospores generally longer than $12 \mu\text{m}$ 10
- 10 (9). Ascospores slightly echinulate, $13-15 \times 5-6.5 \mu\text{m}$; on unidentified bark; known from Australia *N. australiensis*
10. Ascospores smooth or striate 11
- 11 (10). Ascospores $8.5-13.5 \times 4-5 \mu\text{m}$, ellipsoid with rounded ends, smooth, eventually finely striate; on decaying bark of diverse woody plants; known from northern South America *N. pseudocinnabarina*
11. Ascospores more than $15 \mu\text{m}$ long, smooth or slightly striate with age 12
- 12 (11). Ascospores $22-24 \times 9 \mu\text{m}$, narrowly ellipsoid with slightly apiculate ends, coarsely striate; on decaying bark of unidentified tree; known from Sri Lanka *N. pulcherrima*
12. Ascospores smooth to faintly striate, ends rounded; known from temperate regions 13
- 13 (12). Ascospores smooth, $16-23 \times 4-6 \mu\text{m}$; on diverse woody substrata; common throughout temperate regions *N. cinnabarina*

13. Ascospores smooth to faintly striate with age, 17–26 × 7–9 µm; on corticated branches of *Ulmaceae*; northern and central Europe *N. aurantiaca*
- 14 (8). Ascospores transversely multiseptate 15
14. Ascospores muriform 20
- 15 (14). Ascospores 7-septate, ellipsoid with broadly rounded ends, 18–26 × 5–6.5 µm; on diverse woody substrata; eastern North America *N. aurigera*
15. Ascospores 3-septate, ellipsoid to fusiform 16
- 16 (15). Ascospores striate, 14–20 × 4–6 µm; on unknown woody substrata; tropical
..... *N. lateritia*
16. Ascospores smooth, usually longer than 20 µm 17
- 17 (16). Ascospores ellipsoid with rounded ends, less than 24 µm long 18
17. Ascospores fusiform, more than 24 µm long 19
- 18 (17). Ascospores 16–26 × 5.5–7.5 µm, producing ascoconidia outside the asci; eastern Canada and the northeastern United States *N. canadensis*
18. Ascospores 20–24 × 7–10 µm, not producing ascoconidia; known from New Zealand
..... *N. novaezealandiae*
- 19 (17). Ascospores 24–30 × 6–7 µm; on *Cornus*; known from Germany *N. rehmana*
19. Ascospores 33–38 × 7–8 µm; on unidentified woody substratum; known from Ecuador *N. neorehmana*
- 20 (14). Ascomata with bright yellow, yellow-green or olive-green scurf 21
20. Ascomata with concolorous scurf 23
- 21 (20). Ascospores broadly ellipsoid, 15–20 × 7.5–10.5 µm; on *Acer*; Europe
..... *N. pyrrochlora*
21. Ascospores ellipsoid to narrowly ellipsoid, more than 20 µm long; on *Carya*, *Rhus*, or *Xanthoxylum*; North America 22
- 22 (21). Ascospores ellipsoid, 16.5–27 × 6–8 µm; on *Rhus* and *Xanthoxylum* . *N. xanthoxyli*
22. Ascospores narrowly ellipsoid, 21–49 × 8–15 µm; on *Carya* *N. missouriensis*
- 23 (20). Ascospores more than 20 µm long 24
23. Ascospores less than 20 µm long 25
- 24 (23). Ascospores 26–41.5 × 9–12.5 µm; anamorph sporodochial; on *Berberis*; temperate regions of North and South America *N. antarctica*
24. Ascospores 17–31(–40) × 6–15 µm; anamorph synnematos; on diverse woody substrata; common in tropical regions *N. pseudotrichia*
- 25 (23). Ascospores 10–15.5 × 5–9 µm; on leguminous trees, *Acacia* and *Gleditsia*; North America *N. austroamericana*
25. Ascospores generally longer than 15 µm; on *Ribes*, *Lonicera* and *Symphoricarpos*; Europe and North America 26
- 26 (25). Ascospores 15–21 × 6.5–8 µm; on *Ribes*; Europe and North America
..... *N. berolinensis*
26. Ascospores 18–23 × 6–8 µm; on *Caprifoliaceae*, *Lonicera* and *Symphoricarpos*; North America *N. loniceriae*

≡ *Zythia mougeotii* (Fr. : Fr.) Jacz., *Nouv. Mém. Soc. Imp. Naturalistes, Moscou*. 15: 367. 1898.

≡ *Sphaeronamella mougeotii* (Fr. : Fr.) Sacc., *Syll. Fung.* 3: 617. 1884.

= *Sphaeronaema hederæ* Fuckel, *Fung. Rhen. Exs.* 8: 775. 1863.

This species was described and illustrated by Booth (1959).

Nectria xanthoxyli (Peck) Rossman, *Mem. New York Bot. Gard.* 49: 264. 1989.

≡ *Valsa xanthoxyli* Peck, *Annual Rep. New York State Mus.* 31: 49. 1879.

≡ *Pseudovalsa xanthoxyli* (Peck) Sacc., *Syll. Fung.* 2: 137. 1883.

≡ *Fenestella xanthoxyli* (Peck) Sacc., *Syll. Fung.* 2: 332. 1883.

≡ *Thyronectria xanthoxyli* (Peck) Ellis & Everh., *North Amer. Pyrenomyc.* p. 92. 1892.

= *Valsonectria virens* Harkn., in Ellis & Everh., *North Amer. Fungi* 2, No. 1549. 1886.

≡ *Thyronectria virens* (Harkn.) Harkn., in Ellis & Everh., *North Amer. Pyrenomyc.* p. 92. 1892.

Anamorph: None known.

This species was described and illustrated by Seeler (1940) as *Thyronectria xanthoxyli*.

NEOCOSMOSPORA E.F. Sm., *U.S.D.A. Div. Veg. Pathol. Bull.* 17: 45. 1899.

Type: *N. vasinfesta* E.F. Sm.

Ascomata solitary to sparsely aggregated, superficial, stroma lacking, orange-brown to red, rarely hyaline, KOH+ darker, globose to pyriform, ostiolate, not collapsing on drying, surface smooth to slightly roughened. Ascum wall of two regions, outer region pigmented. Asci narrowly clavate to cylindrical, apex generally simple, 8-spored, ascospores uniseriate. Ascospores globose to ellipsoid, yellow to yellow-brown or reddish brown, thick-walled, non-, rarely one-, septate, variously ornamented with longitudinal or transverse striations or with bumps, ridges, flanges or

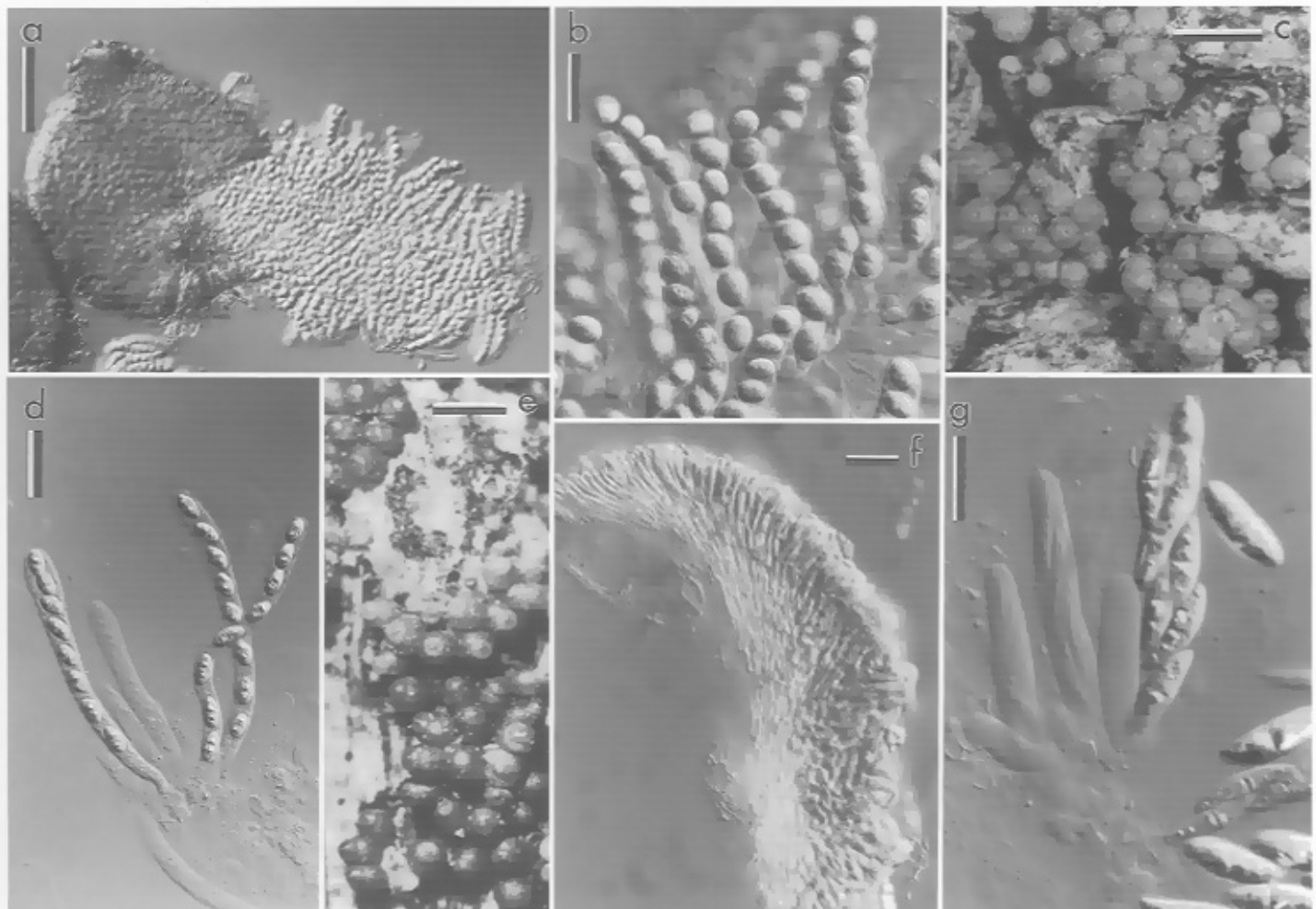


Plate 33. a, b. *Neocosmospora vasinfesta*. a. Whole ascoma broken with asci and ascospores. b. Asci with ascospores. c, d. *Neonectria coccinea*. c. Ascomata on natural substratum. d. Asci with ascospores. e, g. *Nectria jungneri*. e. Ascomata on natural substratum. g. Asci with ascospores. f. *Neonectria ramulariae*, median section of ascoma. a–b. BPI 630324, neotype of *N. vasinfesta* var. *nivea*. c, d. BPI 551493. e. BPI 745420. f. Holotype – B. g. BPI 1107212. Scale bars: a, c = 100 μ m; b, d = 25 μ m; e = 500 μ m; f = 10 μ m; g = 50 μ m.

spines. Chlamydospores generally present. Most species homothallic. Anamorph, where known, *Acremonium*-like. On herbaceous substrata, isolated from soil.

NOTES.— Within the *Nectriaceae*, *Neocosmospora* most closely resembles *Cosmospora* in having relatively thin-walled, red, KOH+ ascospores, and *Acremonium*-like anamorphs. Unlike *Cosmospora*, *Neocosmospora* species are not fungicolous. Using sequences of 18S and 28S rDNA, Rehner & Samuels (1995) and Spatafora & Blackwell (1993) demonstrated that *Neocosmospora* is closely related to *Haematonectria haematococca* and suggested that the *Acremonium*-like anamorph of *Neocosmospora vasinfecta* is comparable to the microconidial form of a *Fusarium* (O'Donnell, 1996). Most of the *Acremonium*-like anamorphs of species of *Neocosmospora* are morphologically simple and have remained unnamed. *Neocosmospora* as defined herein excludes species having green ascospores and *Penicillifer* anamorphs, which are removed to *Viridispora*. Cannon & Hawksworth (1984) monographed *Neocosmospora* with descriptions and illustrations of five species, to which Udagawa *et al.* (1989) added two species. Species of *Neocosmospora* are commonly isolated from soil and *N. vasinfecta* is known to be plant pathogenic.

Neocosmospora vasinfecta E.F. Sm., U.S.D.A. Div. Veg. Pathol. Bull. 17: 45. 1899. — Plate 33, a–b.

[= *Nectriella tracheiphila* E.F. Sm., Proc. Amer. Assoc. Advancem. Sci. 1895: 190. 1895, nom. inval. (Arts. 32, 34) (as '*trocheiphila*')].

= *Neocosmospora vasinfecta* var. *tracheiphila* E.F. Sm., U.S.D.A. Div. Veg. Pathol. Bull. 17: 45. 1899.

= *Neocosmospora vasinfecta* var. *nivea* E.F. Sm., U.S.D.A. Div. Veg. Pathol. Bull. 17: 45. 1899.

= *Pseudonectria ornata* Bat. & Maia, Anais Soc. Biol. Pernamb. 13: 74. 1955.

= *Neocosmospora vasinfecta* var. *major* Rama Rao, Mycopath. Mycol. Appl. 21: 218. 1963.

[= *Neocosmospora ornamentata* Barbosa, Garcia de Orto 13: 17. 1965, nom. inval. (Art. 37)].

Anamorph: *Acremonium*-like.

Mycelium white to pale buff, floccose, hyphae 1–4(–5) μm wide, septate, tending to aggregate in strands, anastomosing. Ascospores globose, (200–)300–500 μm high \times (170–)280–480 μm diam, orange-brown to red, KOH+ dark red, glabrous with an inconspicuous hyphal web at the base, ostiolate, neck (20–)30–70(–100) μm long, 40–100(–150) μm diam. Ascospore wall of two regions: outer region pigmented, of thick-walled *textura angularis* with cells 8–20 μm diam; inner region hyaline, of *textura angularis*. Periphyses of verti-

cally oriented rows of hyaline thin-walled cells, evanescent at an early stage. Asci cylindrical, 80–95(–105) \times 10.5–15(–16) μm , apex simple, 8- (rarely 6–7)-spored, ascospores uniseriate. Ascospores globose to ellipsoid, (9–)10–15.5(–18) \times (7–)7.5–12(–13.5) μm , non-septate, hyaline to pale yellow, buff to salmon pink in mass, rugose.

ANAMORPH: Conidiogenous cells elongate-cylindrical (20–)30–100(–150) μm long, 1–2 μm diam, hyaline, usually arising directly from the vegetative mycelium. Conidia cylindrical to oblong-ellipsoid, sometimes allantoid, 5–13 \times (1.5–)2–3.5 μm , non-septate, hyaline, aggregating in a gummy mass at the apex of the conidiogenous cell. Chlamydospores often present, hyaline to pale yellow, globose to obovoid, terminal or intercalary, smooth, 5–10 \times 4–8 μm . Description modified from Cannon & Hawksworth (1984).

HABITAT.— Isolated from soil, also from nematodes, pathogenic on crop plants causing root- and fruit-rots and seedling damping-off of *Cucurbitaceae*, *Fabaceae* (soybean stem rot), *Malvaceae*, *Piperaceae*, and others, and diseases in nurseries (Domsch *et al.*, 1980).

DISTRIBUTION.— Warm temperate and tropical regions.

TYPES.— UNITED STATES. South Carolina: Cameron, on *Gossypium herbaceum*, Oct. 1902, W.A. Orton (BPI 630336, neotype designated by Cannon & Hawksworth, 1984); *ibid.*, Monetta, on *Citrullus vulgaris*, 10 Oct 1904, W.W. Gilbert (BPI 630324 neotype of *N. vasinfecta* var. *nivea*, designated by Cannon & Hawksworth, 1984). BRAZIL. Pernambuco, Recife, on living leaves, 22 Sep. 1955, A. Chaves Batista, Fungos do Brasil no. 2960 (NY, isotype of *Pseudonectria ornata*).

ILLUSTRATIONS.— Cannon & Hawksworth (1984, Figs. 1–5, 7–10); Carris & Glawe (1989, Figs. 322–328, Fig. 422); Domsch *et al.*, 1980, Fig. 215; Rossman *et al.* (1993, Fig. 29); Smith (1899, Pl. 1–3, 5).

NOTES.— *Neocosmospora vasinfecta* was originally described as the cause of a wilt disease of cotton, watermelon, and cowpea. This fungus has since been associated with a variety of vascular plants and isolated from soil and soil environments e.g. infecting nematodes and as a saprobe on roots.

ADDITIONAL TAXA OF *NECOSMOSPORA*:

Neocosmospora boninensis Udagawa, Horie & P. Cannon, Sydowia 41: 350. 1989.

Anamorph: *Acremonium*-like.

HABITAT.— Isolated from forest soil.

DISTRIBUTION.— Japan, known only from the type (ex-type CBS 446.93).

Neocosmospora indica Wadhvani, Indian Bot. Reporter 2 (1983): 158. 1984.

Anamorph: *Acremonium*-like.