

1-septate, often slightly constricted, at first hyaline, then pale orange, smooth to slightly roughened, with 1 to several guttules per cell.

ANAMORPH.— None known.

HABITAT.— In thallus and perithecia of *Verrucaria*.

DISTRIBUTION.— France, United States (New York).

HOLOTYPE.— FRANCE. Nord: Dunkirk, on dunes near the lighthouse, in thallus of *Verrucaria integra* on calcareous rocks, 20 May 1904, B. de Lesdain (Herb. Vouaux; isotype, FH - Höhnelt).

ADDITIONAL SPECIMEN EXAMINED.— UNITED STATES. New York: Niagara County, Goat Island, near shore, north slope on retaining wall, in ascomata of *Verrucaria muralis* associated with *Caloplaca feracissima*, 1 Nov 1989, R.C. Harris 22856A (NY).

NOTES.— *Pronectria verrucariae* is distinguished from other species of *Pronectria* by the ascomata immersed in ascomata and thallus of the *Verrucaria* host.

*Pronectria xanthoriae* Lowen & Diederich, Mycologia 82: 788. 1990.

This species was described and illustrated in Lowen & Diederich (1990).

**PROTOCREOPSIS** Doi, Bull. Natl. Sci. Mus., Tokyo, B. 2: 129. 1976.

Type: *P. musicola* Doi, a synonym of *P. fusigera* (Berk. & Broome) Doi.

[= *Cryptothecium* Penz. & Sacc., Malpighia 1: 388. 1897,

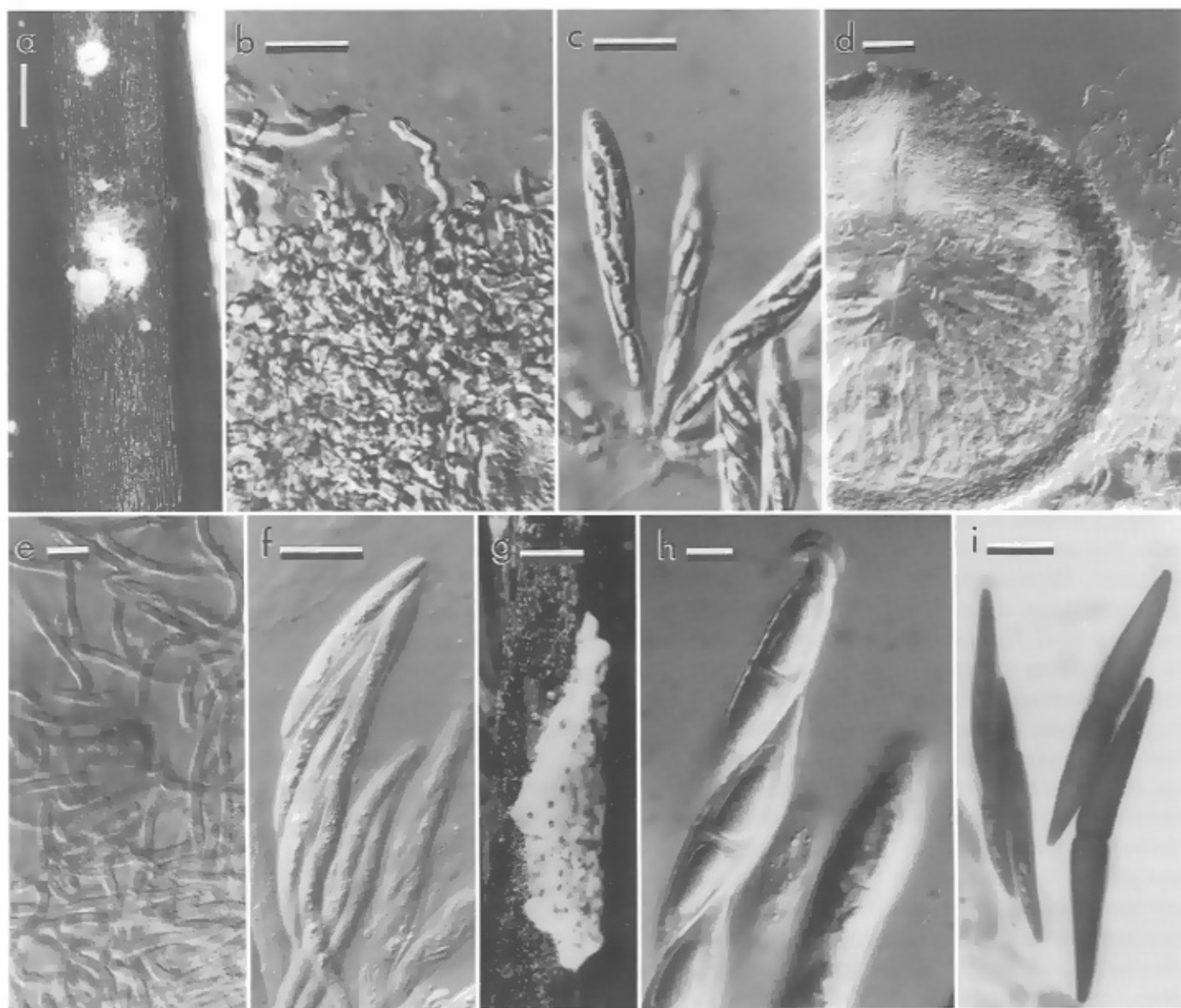


Plate 11. a-c. *Protocreopsis pertusa*. a. Ascomata on natural substratum. b. Ascomatal surface with hairs. c. Asci with ascospores. d-f. *Protocreopsis javanica*. d. Median section of ascoma. e. Hairs on ascomatal surface. f. Asci with ascospores. g-i. *P. fusigera*. g. Ascomata on natural substratum. h. Ascus apex and ascospores. i. Ascospores stained in cotton blue. a-c. G.J.S. 1288 - NY. d-f. Holotype of *P. palmicola* - TNS-F-192958. g-i. BPI 745424. h. TNS-F-226974, holotype of *P. musicola*. i. TNS-F-192691, holotype of *P. zingibericola*. Scale bars: a, g = 1 mm; b, c = 100  $\mu$ m; d, i = 25  $\mu$ m; e, h = 10  $\mu$ m; f = 50  $\mu$ m.

non Hübner 1851]. — Type: *C. javanicum* Penz. & Sacc. (= *Calonectria javanica* Höhn.), recognized as *Protocreopsis javanica* (Höhn.) Rossman & Samuels.]

Ascomata superficial on substrata, densely gregarious, less commonly solitary, surrounded by white to tan hyphae arising from ascomatal wall with few to many free ends visible, thus appearing *Hypocrea*-like, often extensive; ascomata hyaline to orange, KOH-; cells at ascomatal surface completely obscured by investing hyphae; ascomatal wall > 20  $\mu\text{m}$  thick, comprising a single region of small, brick-like cells. Asci clavate to fusiform, apex simple or with an obscure ring; ascospores bi- to pluriseriate. Ascospores ellipsoid to fusiform, 1-septate, hyaline, typically striate, also smooth, punctate-striate, or tuberculate. Anamorph, where known, *Acremonium*-like. On dead monocotyledonous substrata.

NOTES.— Doi (1976) established *Protocreopsis* for *Nectria*-like species having ascomata surrounded by a hyphal stroma. He included the type species, *P. musicola*, added two more species, *P. zingibericola* and *P. palmicola* (Doi, 1977), and later (Doi, 1978 a, b) revised the genus, adding several species and providing a key to all of them. The homonymous genus *Cryptothecium* Penz. & Sacc. was originally placed in the *Perisporieae* of the *Eurotiaceae*, although Rogerson (1970) included this genus in the *Hypocreales*. The type specimen of *C. javanicum* from PAD was examined, and, as suggested by the illustrations in Penzig & Saccardo (1897), this species was found to be an earlier name for *Protocreopsis palmicola* Doi.

*Protocreopsis* is most easily recognized by the ascomata that are completely enclosed in long, white to tan or green, flexuous hyphae. Species of *Protocreopsis* generally occur on monocotyledonous leaves, often on palms or *Musaceae*, that are decaying but still attached to living plants in tropical areas. Morphologically they are characterized by pallid ascomata surrounded by a hyphal stroma and striate ascospores. Species of *Protocreopsis* may be confused with those of *Stilbocrea*, a genus similar in having ascomata surrounded by an effused hyphal stroma or confluent hyphae or hairs. In *Stilbocrea* ascospores are generally spinulose, anamorphs are synnematosus or pycnidial, and the species are corticolous, occasionally fungicolous, while in *Protocreopsis* ascospores are usually striate, although they may be smooth or tuberculate, anamorphs are *Acremonium*, and the species are herbicolous on monocots. Characteristics of the type species of *Protocreopsis* agree with those of species that have been placed in the *Nectria subfalcatata*-group as defined by Samuels (1976 a, b). Although two species included by Samuels (1976

a, b) in the *Nectria subfalcatata*-group are now placed in *Lasionectria*, most members of that group are among the nine species of *Protocreopsis*.

**Protocreopsis fusigera** (Berk. & Broome) Doi, Bull. Natl. Sci. Mus., Tokyo, B. 4: 119, 1978. — Plate 4, c (see page 25); Plate 11, g–i.

= *Hypocrea fusigera* Berk. & Broome, J. Linn. Soc. 14: 112, 1873.

= *Nectria subfalcatata* Henn., Hedwigia 41: 4, 1902.

= *Hypocrea bromeliicola* Bat., Nascim. & Cif., Sydowia Beih. 1: 332, 1957.

= *Nectria bromeliicola* (Bat., Nascim. & Cif.) Samuels, Mem. New York Bot. Gard. 26: 32, 1976.

= *Protocreopsis bromeliicola* (Bat., Nascim. & Cif.) Doi, Bull. Natl. Sci. Mus., Tokyo, Ser. B. 4: 118, 1978.

= *Nectria heliconiae* E. Müll. & Dennis, Kew Bull. 19: 383, 1965.

= *Protocreopsis musicola* Doi, Bull. Natl. Sci. Mus., Tokyo, B. 2: 129, 1976.

= *Protocreopsis zingibericola* Doi, Kew Bull. 31: 552, 1976 [1977].

ANAMORPH.— *Acremonium*-like.

Mycelium spreading slightly from the ascomata, at first white and cottony, becoming roseous to buff, densely compacted, enveloping one to several ascomata in *Hypocrea*-like aggregates; hyphae surrounding the ascomata indefinite in length, flexuous, smooth, septate, branched, with many free ends, ca 5  $\mu\text{m}$  wide, with 1–2  $\mu\text{m}$  thick walls. Ascomata globose, 430–720  $\mu\text{m}$  diam, orange. Asci 125–185  $\times$  12–21  $\mu\text{m}$ , apex simple. Ascospores narrowly fusiform, 50–76  $\times$  6.5–9  $\mu\text{m}$ , without a sheath, smooth to finely striate.

ANAMORPH.— Conidiophores in culture unbranched, septate, monophialidic, 150–210  $\mu\text{m}$  long, 4.5–6.5  $\mu\text{m}$  wide at the base. Conidia fusiform to ellipsoid, 40–55  $\times$  11–13  $\mu\text{m}$ , basal abscission scar not recognizable, unicellular, hyaline, smooth, wall visibly thickened especially at the ends, held in a drop of hyaline liquid at the tip of each phialide.

HABITAT.— On decaying debris of monocotyledonous plants, especially *Heliconia* and *Musa*.

DISTRIBUTION.— American tropics, Indonesia (North Sulawesi), western Pacific region; probably pantropical.

TYPES.— SRI LANKA (Ceylon). Peradeniya, on leaves of monocotyledonous plant, Nov 1867, No. 44 (K, holotype of *H. fusigera*); NEW BRITAIN ISLAND. Rabaul, on decayed stems and leaves of a species of *Zingiberaceae*, 1 Jan 1970, Y. Doi D.685, TNS-F-192961; holotype of *P. zingibericola*; same locality and substratum, 2 Jan 1970, Y. Doi D.708 (TNS-F-192959, paratype of *P. zingibericola*). PERU. Tingo María, about 700 m elev., on well-decayed leaf of *Musa*, 27 Jan 1976, Y. Doi D.2276 (TNS-F-226974, holotype of *P. musicola*).

Additional specimens examined are listed in Samuels (1976a) and Samuels *et al.* (1990).

ILLUSTRATIONS.— Batista & Ciferri (1957, Figs. 11, 12, as *H. bromeliicola*); Doi (1976, Fig. 7, as *P. musicola*); Doi (1978a, Fig. 4 as *P. bromeliicola*, Fig. 5); Müller & Dennis (1965, Fig. 4, as *N. heliconiae*); Samuels (1976a, Figs. 9S, 10, as *N. subfalcatata*); Samuels *et al.* (1990, Fig. 27G, 28, as *N. subfalcatata*).

SPECIMENS ILLUSTRATED.— PUERTO RICO. Luquillo Mts., Bislely Watershed 3, trail to stream, on *Heliconia* sp. at base of plant, 10 May 1995, S.M. Huhndorf 1379, D.J. Lodge 2273 (BPI 745424). ECUADOR. Prov. Pichincha, ca 19 km from Santo Domingo, on the new road from Santo Domingo to Quito, on herbaceous stem, elev. ca 860 m, 19 July 1975, K.P. Dumont-EC 682. S.E. Carpenter and P. Buriticà (NY, as *Nectria subfalcatata*).

NOTES.— The holotype of *Protocreopsis zingibericola* Doi is clearly *P. fusigera*, although the specimen consists of a few fragments of a leaf of *Zingiberaceae*. The ascomata appear immature, no asci were seen, but a few, very large conidia typical of *P. fusigera* are present.

**Protocreopsis albofimbriata** (Penz. & Sacc.) Doi, Bull. Natl. Sci. Mus., Tokyo, B. 4: 117. 1978.

≡ *Nectria albofimbriata* Penz. & Sacc., Malpighia 11: 513. 1897.

ANAMORPH: None known.

Mycelium tan, completely covering the aggregated ascomata; ascomata 250–350 µm diam, hyphae arising from ascomatal wall, sinuous, septate, infrequently branched, with many free ends visible, 3–4 µm wide, with ca 1 µm thick walls. Asci (40–)55–75(–80) × (9–)10–11(–12) µm, apex simple, 8-spored. Ascospores ellipsoid, 15.5–21 × 4–6 µm, equally 2-celled, not constricted at the septum, with many, low, ridge-like striations.

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

LECTOTYPE, designated here.— INDONESIA. Java: Tjibodas, on dead stems of (?)*Elettaria* sp., 6 Feb 1897. [? Penzig] 436a (PAD); same data, 6 Feb 1897. [? Penzig] 430 (PAD, syntype); same data, date unknown, [? Penzig] 172 (PAD, syntype).

ILLUSTRATIONS.— Doi (1978a, Fig. 3); Penzig & Saccardo (1904, Pl. 31, Fig. 1, as *N. albofimbriata*); Samuels *et al.* (1990, Fig. 27 A, B, as *N. albofimbriata*).

NOTES.— *Protocreopsis albofimbriata* differs from *P. pertusa* in having larger ascospores with more pronounced, ridge-like striations. For discussion of this species, see Samuels *et al.* (1990).

**Protocreopsis foliicola** (Berk. & M.A. Curtis) Samuels & Rossman, *comb. nov.*

≡ *Nectria foliicola* Berk. & M.A. Curtis, J. Linn. Soc. Bot. 10: 378. 1869.

ANAMORPH: None known.

Mycelium completely enveloping groups of ascomata, hyphae straight, to 80 µm long and free ends visible, ca 3 µm wide, walls ca 0.5 µm thick, tan. Ascomata 225–275 µm diam, brown. Asci 60–80 × 10–12 µm, apex simple. Ascospores fusiform, straight or slightly curved or sigmoid, 21–27 × 4–5 µm, lacking a sheath, striate. Conidiophores not forming in culture. Ascomata forming in cultures derived from single ascospores.

HABITAT.— On leaves of *Chusquea*, *Heliconia*, *Musa*, *Puya* and on peduncles of fruits of unidentified tree.

DISTRIBUTION.— Tropical America.

TYPE.— CUBA. On leaves of *Musa*, date not known, Wright 752 (K, holotype; FH, isotype). Additional specimens examined are listed in Samuels (1976a).

ILLUSTRATIONS.— Samuels (1976a, Figs. 9D, 13, as *N. foliicola*).

NOTES.— *Protocreopsis foliicola* is characterized by brown ascomata that are clothed in tan hyphal hairs. Despite isolation from several specimens, this species has never produced conidia in culture nor has an anamorph been observed associated with the teleomorph in nature.

**Protocreopsis freycinetiae** (Samuels) Samuels & Rossman, *comb. nov.*

≡ *Nectria freycinetiae* Samuels, New Zealand J. Bot. 14: 243. 1976 [as '*freycinetii*'].

Anamorph: *Acremonium*-like.

Mycelium white, completely enveloping groups of ascomata, hyphae straight, 2–3 µm wide, with 0.5–1 µm thick walls, smooth, many free ends visible. Ascomata 260–370 µm diam, orange. Asci 100–110 × 11–17 µm, apex simple. Ascospores fusiform, straight or slightly curved, 26–32 × 6–7 µm, lacking a sheath, striate. Conidiophores in culture unbranched, 4–6-septate, monophialidic, 60–90 µm long, ca 3 µm wide at the base, spinulose on phialides. Conidia ellipsoid, 6–10 × 2–4 µm, unicellular.

HABITAT AND DISTRIBUTION.— Known only from type specimen.

HOLOTYPE.— NEW ZEALAND. Auckland, Thames County, Coromandel Forest Park, Kauaeranga Valley, vic. Thames, on leaves of *Freycinetia banksii* [= *F. baueriana* subsp. *banksii*], 27 Aug 1974, G. J. Samuels 74–115 (PDD 32577). Culture CBS 573.76.

NOTES.— This species is similar to *P. foliicola*, but the investing hyphae in the latter species are tan.

**Protocreopsis javanica** (Höhn.) Rossman & Samuels, *comb. nov.* — Plate 10 b; Plate 11, d–f.

[= *Cryptothecium javanicum* Penz. & Sacc., *Malpighia* 1: 388, 1897, genus illeg.]

= *Calonectria javanica* Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1*, 118: 1180, 1909. = *Protocreopsis palmicola* Doi, *Kew Bull.* 31: 551, 1976.

ANAMORPH: None known.

Mycelium completely enveloping groups of ascomata, hyphae straight, roughened, 6–7  $\mu\text{m}$  wide, white to tan, loosely interwoven. Ascomata 300–400  $\mu\text{m}$  diam, pale yellow. Asci 55–70  $\times$  8–12  $\mu\text{m}$ , apex with a ring. Ascospores ellipsoid to fusiform or slightly sigmoid, 15–18  $\times$  4–5  $\mu\text{m}$ , lacking a sheath, striate, with many striae visible in one plane.

HABITAT.— On decaying palm leaves.

DISTRIBUTION.— Gabon, Indonesia, New Guinea, and Thailand.

TYPES.— INDONESIA. Java: Tjibodas, in foliis putrescentibus, 4 Mar 1897 (PAD, holotype of *Cryptothecium javanicum*). NEW GUINEA. Lae: near Markham Bridge, on rachides of decayed palm leaves, 20 Jan 1970, Doi D.786 (TNS-F-192958, holotype of *P. palmicola*; PNG, isotype, not examined).

SPECIMENS EXAMINED.— GABON. Libreville: La Mondah, on dead palm parts, 8 Dec 1979, G. Gilles (BPI 745899); THAILAND. Nakorn Nayok Province: Khao Yai National Park, Phakrajai, on bamboo, 6 Aug 1997, G.J. Samuels (BPI 745855); same data (BPI 745867); same data, on palm (BPI 745858).

ILLUSTRATION.— Doi (1976, Fig. 1 A–G).

NOTES.— *Protocreopsis javanica* resembles *P. foliicola* in the tan to brown coloration of the ascomata; however, ascospores of *P. javanica* are shorter than those of *P. foliicola* and the hyphae that envelop the ascomata of *P. foliicola* are smooth-walled. *Protocreopsis javanica* is the only member of the genus that has warted hyphae.

**Protocreopsis pertusa** (Pat.) Samuels & Rossman, *comb. nov.* — Plate 11, a–c.

= *Nectria pertusa* Pat., in Patouillard & Lagerheim, *Bull. Soc. Mycol. France* 11: 227, 1895.

= *Nectria scitula* Bres., *Hedwigia* 35: 299, 1896.

= *Protocreopsis scitula* (Bres.) Doi, *Bull. Natl. Sci. Mus., Tokyo*, B, 4: 116, 1978.

= *Nectria aemulans* Rehm, *Ann. Mycol.* 7: 539, 1909.

ANAMORPH.— *Acremonium*-like.

Mycelium white but tan over individual ascomata, completely covering the ascomata; hyphae sinuous, smooth-walled, 2–2.5  $\mu\text{m}$  wide, with many short, free and hair-like ends around the ostiolar opening, walls visibly thickened, hyaline. Ascomata globose, 150–190  $\mu\text{m}$  diam, orange. Asci 70–80  $\times$  9–12  $\mu\text{m}$ , apex simple. Ascospores ellipsoid, 13–17  $\times$  4–5  $\mu\text{m}$ , 3 or fewer striations visible in one plane of view. Conidiophores in culture unbranched, 0–1-septate, monophialidic, 20–30  $\mu\text{m}$  long, 2–3  $\mu\text{m}$  wide at the base; tip of phialide not flared. Conidia ellipsoid, 4–7  $\times$  1.5–2  $\mu\text{m}$ , unicellular.

HABITAT.— On leaves of *Musa*, *Heliconia*, and palms, culms of bamboo, and rachides of tree ferns; on bark.

DISTRIBUTION.— Probably pantropical and subtropical.

TYPE.— ECUADOR. San George, on culms of *Chusquea* sp., July 1892, Lagerheim (FH, holotype of *N. pertusa*); BRAZIL. S. Catharina: Blumenau, on palm? leaf, date and collector not known, n. 9b, (lectotype of *N. scitula*, designated herein: S-herb Bresadola; isolectotype S-herb. Sydow).

ADDITIONAL SPECIMENS EXAMINED.— VENEZUELA. Amazonas. Cerro de la Neblina, elev. 1350 m, on dead fern rachis, 13 April 1984, G.J. Samuels 1288 (NY, VEN, filed as *Nectria pertusa*), and as listed in Samuels (1976 a, b, as *N. pertusa*) and Samuels *et al.* (1990, as *N. pertusa*). Culture CBS 568.76.

ILLUSTRATIONS.— Doi (1978a, Fig. 2, as *P. scitula*); Samuels (1976b, Fig. 2, as *N. pertusa*); Samuels *et al.* (1990, Figs. 27 C–F, as *N. cf. pertusa*).

NOTES.— This is a common species in the American tropics. In a collection from Indonesia, Samuels *et al.* (1990) reported smaller ascospores than is usual for this species.

**Protocreopsis pertusoides** (Samuels) Samuels & Rossman, *comb. nov.*

= *Nectria pertusoides* Samuels, *New Zealand J. Bot.* 14: 241, 1976.

ANAMORPH.— *Acremonium*-like.

Mycelium white, spreading over the substratum, completely enveloping groups of ascomata, hyphae straight to slightly sinuous, smooth-walled, 2–3  $\mu\text{m}$  wide, with 1–2  $\mu\text{m}$  thick, hyaline walls. Ascomata 220–375  $\mu\text{m}$  high  $\times$  220–280  $\mu\text{m}$  diam, orange. Asci 55–70  $\times$  5.5–9  $\mu\text{m}$ , apex with an indistinct ring. Ascospores allantoid, ellipsoid to fusiform, 9–12  $\times$  3–5  $\mu\text{m}$ , lacking a sheath, striate or punctate-striate. Conidiophores in culture un-

**Plate 12. a–g.** *Protocreopsis viridis*. a. Median section of ascomata on natural substratum. b. Close-up of ascomatal wall. c. Close-up of ascomatal apex. d. Ascomatal hairs. e. Asci with ascospores including remnants of apical paraphyses in centrum. f–g. Asci with ascospores, g. stained in cotton blue to show median striations on ascospore wall. a–g. Holotype – BPI 745254. Scale bars: a = 100  $\mu\text{m}$ ; b, c, f, g = 20  $\mu\text{m}$ ; d = 50  $\mu\text{m}$ ; e = 25  $\mu\text{m}$ .

branched, 0–1-septate, monophialidic, smooth, 30–70  $\mu\text{m}$  long, 2–3  $\mu\text{m}$  wide at the base; tip of phialide not flared. Conidia ellipsoid to oblong, 6–7  $\times$  2–2.5  $\mu\text{m}$ , unicellular.

HABITAT.— On decaying herbaceous tissue, less frequently on bark.

DISTRIBUTION.— New Zealand.

HOLOTYPE.— NEW ZEALAND: Taranaki, Mt. Egmont Natl. Park, Stratford Mountain House, on dead leaves of *Cordyline indivisa*, G. J. Samuels 73-213 & C. S. Samuels (PDD 32032).

Additional specimens examined are listed in Samuels (1976b).

ILLUSTRATIONS.— Samuels (1976b; Figs. 3, 14, 26, as *N. pertusoides*).

NOTES.— This species differs from *P. pertusa* in having smaller ascospores in which the striations are incomplete throughout the length, thus appearing punctate. Striations on ascospores of *P. pertusa* are always few in

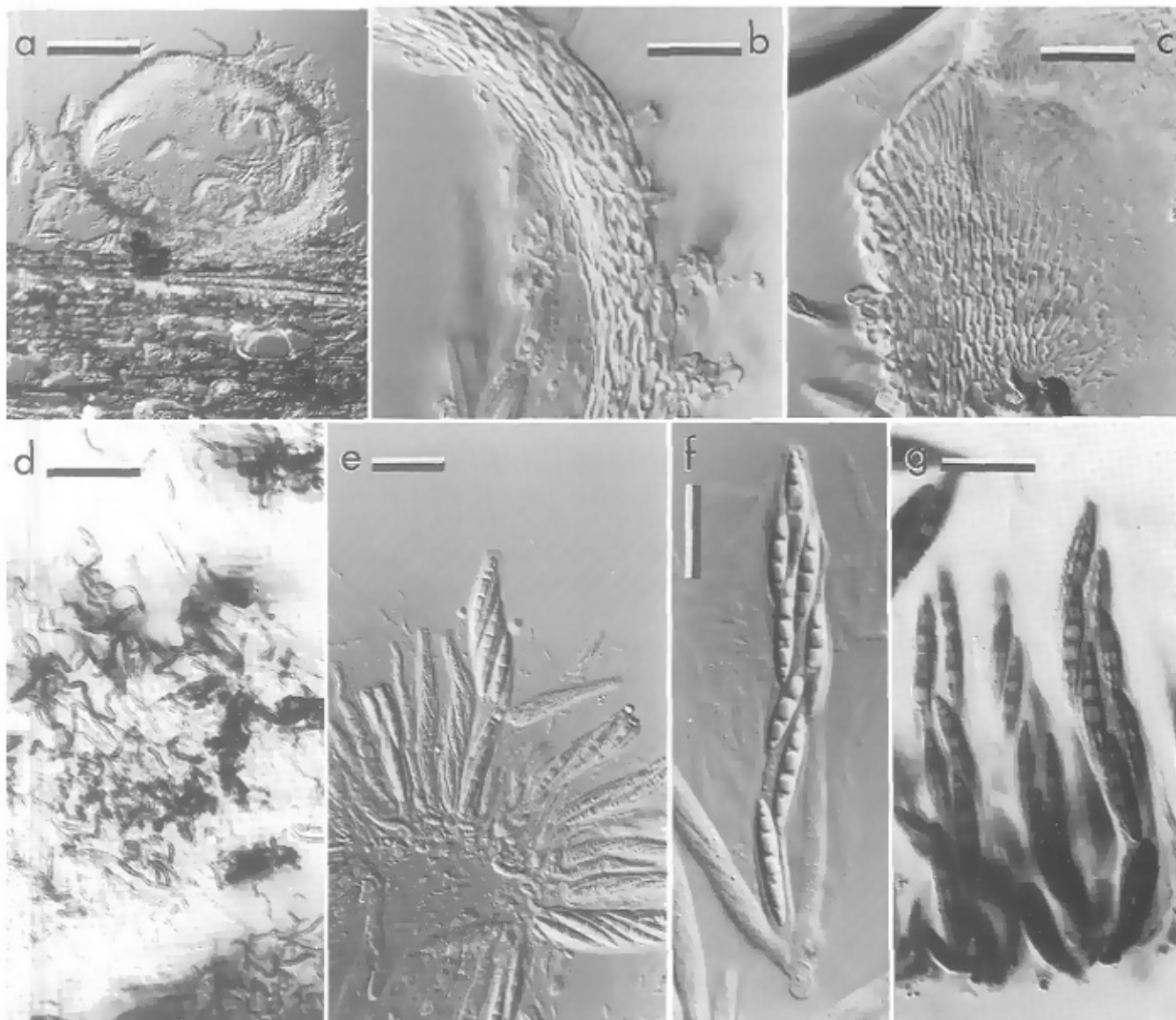
number and extend over the entire length of the ascospore.

**Protocreopsis phormiicola** (Samuels) Samuels & Rossman, *comb. nov.*

$\equiv$  *Nectria phormiicola* Samuels, New Zealand J. Bot. 14: 244, 1976.

ANAMORPH.— *Acremonium*-like.

Mycelium white, spreading over the substratum, completely covering individual ascomata; hyphae slightly sinuous, 2–3  $\mu\text{m}$  wide, walls 0.5–1  $\mu\text{m}$  thick, hyaline. Ascomata 150–220  $\mu\text{m}$  diam, yellow. Asci 60–70  $\times$  9–10  $\mu\text{m}$ , apex with an inconspicuous ring. Ascospores ellipsoid to fusiform-ellipsoid, 10–14  $\times$  3–4  $\mu\text{m}$ , surrounded by a sheath while still in the asci, tuberculate at maturity. Conidiophores in culture unbranched, 0–1-septate, monophialidic, smooth or spinulose, 33–45  $\mu\text{m}$



long, 2–3  $\mu\text{m}$  wide at the base; tip of phialide not flared. Conidia ellipsoid, 5–7  $\times$  2–3  $\mu\text{m}$ , unicellular.

**HABITAT AND DISTRIBUTION.**— Known only from the type locality.

**HOLOTYPE.**— NEW ZEALAND. Auckland: Waitemata County, Waitakere Ranges, vic. Piha, Marowhara Loop Track, on dead leaves of *Phormium tenax*, 17 Dec. 1974, J. M. Dingley *et al.* (PDD 32684; Samuels culture 74-133 = CBS 567.76 = ATCC 34049).

**ILLUSTRATIONS.**— Samuels (1976b, Figs. 5, 16, 28, as *N. phormiicola*).

**NOTES.**— This species is unusual in the genus in having tuberculate ascospores that are surrounded by a gelatinous sheath while still in the asci.

**Protocreopsis viridis** Samuels, *sp. nov.* — Plate 12, a–g.

Perithecia solitaria vel pauca aggregata, hyphis viridibus, spinulosis vestita. Ascospores (24–)26–29(–30)  $\times$  3.5–5.5  $\mu\text{m}$ , anguste fusiformes, striatae, bicellulares.

**ANAMORPH.** None known.

Ascomata scattered and solitary or caespitose in groups of a few, non-stromatic, superficial, easily removed from the substratum, clothed in green hyphae, looking

like masses of *Trichoderma* conidia, hyphae becoming brown in KOH, again green when followed by lactic acid. Ascomata subglobose, 250–300  $\mu\text{m}$  high, 250–275  $\mu\text{m}$  diam, non-papillate. Investing hyphae arising from ascomatal surface, strongly contorted, septate, branched, with few free ends visible, strongly spinulose, 2.5–3  $\mu\text{m}$  wide, walls not thickened. Ascomatal wall ca 15  $\mu\text{m}$  thick, of a single region of intertwined hyphae that appear cellular with individual cells ellipsoid, ca 5  $\mu\text{m}$  long with walls ca 1.5  $\mu\text{m}$  thick. Ascomatal apex a continuation of the wall below, the hyphae around the ostiolar opening forming a palisade of ca 3  $\mu\text{m}$  wide cells with walls 1–1.5  $\mu\text{m}$  thick. Asci narrowly clavate, 85–120(–180)  $\times$  (9–)11–13(–15)  $\mu\text{m}$ , apex with an indistinct ring; ascospores pluriseriate. Ascospores narrowly fusiform, (24–)26–29(–30)  $\times$  3.5–5.5  $\mu\text{m}$ , equally 1-septate, striate, striations ridge-like, few in number, staining in cotton blue/lactic acid.

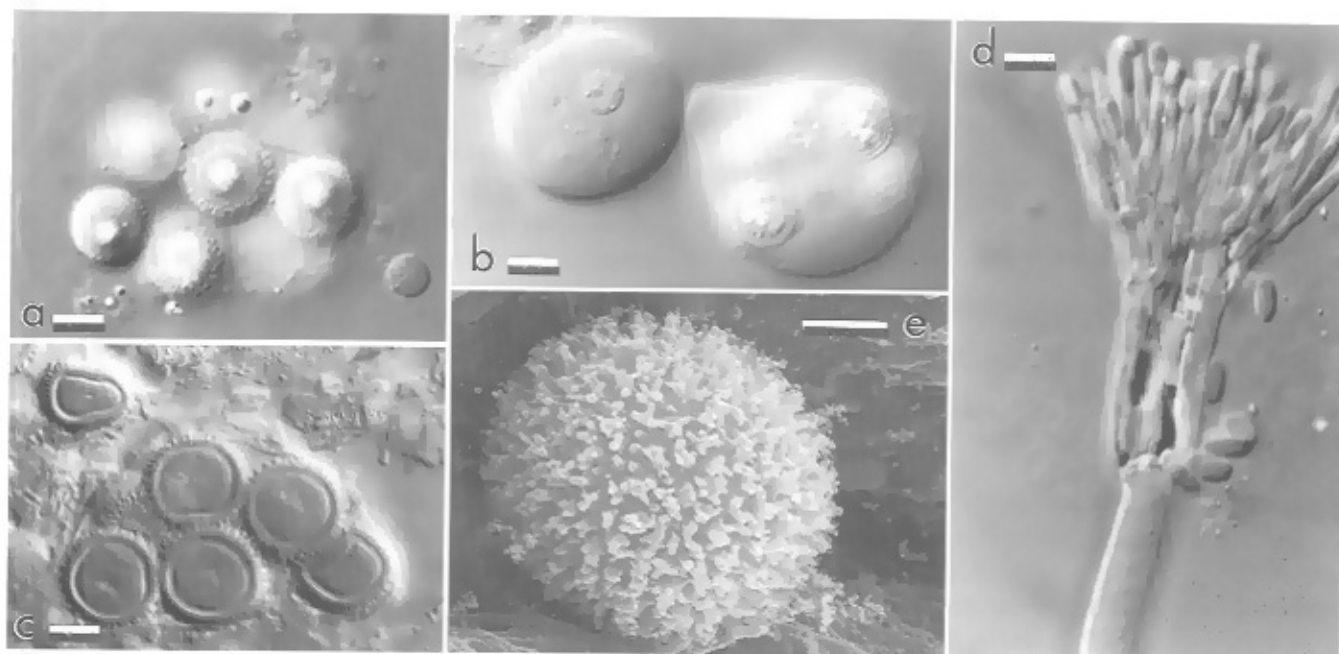
**HABITAT.**— On decaying palm leaf.

**DISTRIBUTION.**— Puerto Rico, known only from the type collection.

**HOLOTYPE.**— PUERTO RICO. Cordillera Central, Charioi Azul, off Rte. 184, elev. 550 m, on decaying palm leaf (*Praestoea monticola*), 25 Feb 1996, G. J. Samuels, D. J. Lodge & H. J. Schroers 8104 (BPI 745254).

#### KEY TO THE SPECIES OF *PROTOCREOPSIS*

- |  |                         |
|--|-------------------------|
| 1. Ascospores more than 20 $\mu\text{m}$ long .....  | 2                       |
| 1. Ascospores less than 20 $\mu\text{m}$ long .....  | 5                       |
| 2. Ascospores 50–76 $\times$ 6.5–9 $\mu\text{m}$ .....   | <i>P. fusigera</i>      |
| 2. Ascospores less than 30 $\mu\text{m}$ long .....  | 3                       |
| 3. Enveloping hyphae green; ascospores (24–)26–29(–30) $\times$ 3.5–5.5 $\mu\text{m}$ .....                                  | <i>P. viridis</i>       |
| 3. Enveloping hyphae white to tan .....  | 4                       |
| 4. Enveloping hyphae tan; ascospores 26–32 $\times$ 6–7 $\mu\text{m}$ .....  | <i>P. foliicola</i>     |
| 4. Enveloping hyphae white; ascospores 21–27 $\times$ 4–5 $\mu\text{m}$ .....  | <i>P. freycinetiae</i>  |
| 5. Ascospores tuberculate .....  | <i>P. phormiicola</i>   |
| 5. Ascospores striate or punctate-striate .....  | 6                       |
| 6. Ascospores 9–12 $\times$ 3–5 $\mu\text{m}$ , striations broken, punctate-striate, many visible in one plane of view ..... | <i>P. pertusoides</i>   |
| 6. Ascospores more than 12 $\mu\text{m}$ long, striations unbroken for the length of the spore .....                         | 7                       |
| 7. Only few (up to 3) striations visible in one plane of view .....  | <i>P. pertusa</i>       |
| 7. Many striations visible in one plane of view .....  | 8                       |
| 8. Hyphae enveloping ascomata roughened, white to tan .....  | <i>P. javanica</i>      |
| 8. Hyphae enveloping ascomata smooth, white .....  | <i>P. albofimbriata</i> |



**Plate 13. a–e.** *Roumegueriella rufula* and anamorph, *Gliocladium* sp. a. Ascus with ascospores. b. Immature asci with ascospores. c. Ascus with ascospores in median focus to show wall ornamentation. d. Conidiophore with conidiogenous cells and developing conidia. e. SEM of ascospore. a–e. CBS 346.85. Scale bars: a–d = 10  $\mu$ m; e = 5  $\mu$ m.

**NOTES.**— An attempt to isolate ascospores from the fresh specimen failed. No anamorph was associated with the ascomata on the host. This species is distinguished in *Protocreopsis* by the green hyphae that enclose the ascomata.

**ROUMEGUERIELLA** Speg., in Roumeguère & Spegazzini, *Rev. Mycol. (Toulouse)* 2: 18. 1880.

Type: *R. muricospora* Speg., a synonym of *R. rufula* (Berk. & Broome) Malloch & Cain.

= *Lilliputia* Boud. & Pat., *Bull. Soc. Mycol. France* 16: 144. 1900. — Type: *L. gaillardii* Boud. & Pat., a synonym of *R. rufula* (Berk. & Broome) Malloch & Cain.

= *Lysipenicillium* Bref., *Unters. Gesamtgeb. Mykol.* 14: 210. 1908. — Type: *L. insigne* Bref., a synonym of *R. rufula* (Berk. & Broome) Malloch & Cain.

Ascomata globose, soft, non-ostiolate, disintegrating at maturity, yellow to reddish-brown, of pseudoparenchymatous tissue; asci saccate, evanescent; ascospores globose, hyaline, ornamented. Anamorph *Gliocladium*-like. On dung and well-rotten debris.

**NOTES.**— Spegazzini's generic description of *Roumegueriella* stated that the genus stands questionably between 'Sphaeropsideos et Hyphomycetes'; he apparently did not see asci in the type specimen and considered this to be an asexual fungus. However, Hughes (1951) and later Malloch & Cain (1972) reviewed the history of this genus noting that it is a cleistothecial ascomycete. Within the *Hypocreales*, *Roumegueriella* is one of six cleistothecial genera; it is most

closely allied with another cleistothecial genus, *Heleococcum*, both of which were confirmed as members of the *Hypocreales* using molecular data (Rehner & Samuels, 1995). *Roumegueriella* includes two species.

The unispecific genus *Lilliputia* was originally described as a member of the *Tuberaceae* because of its cleistothecial ascomata. Malloch & Cain (1972) were the first to recognize that *L. gaillardii* is a synonym of *Roumegueriella rufula*.

Brefeld based his name *Lysipenicillium* upon *Penicillium insigne* without citing author and publication, simply stating: 'Eine Form von *Penicillium* ist als *P. insigne* fälschlich bezeichnet'. Although two later homonyms of this binomial exist, Brefeld was probably referring to *P. insigne* (G. Winter) Schröter based on *Eurotium insigne* G. Winter as listed below. Brefeld gave a clear description and illustration of *Roumegueriella rufula* including ascomata. The interpretation of *Lysipenicillium* as a possible synonym of *Gliocladium* as suggested by Raper & Thom (1949) is therefore not correct. All epithets described for this fungus in *Gliocladium* include the teleomorph and are therefore regarded as synonyms of *R. rufula*, while the anamorph strictly speaking has not been named.

***Roumegueriella rufula*** (Berk. & Broome) Malloch & Cain, *Canad. J. Bot.* 50: 64. 1972. — Plate 13, a–e.

= *Chaetomium rufulum* Berk. & Broome, *Ann. Mag. Nat. Hist.*, Ser. 4, 11: 348. 1873.

= *Lilliputia rufula* (Berk. & Broome) S. Hughes, *Mycol. Pap.* 42: 2. 1951.