

boygan County, woods near Topinabee, on *Russula brevipes* Peck, 25 Jul 1964, R.L. Shaffer (NY): Plate 18, b–d. — Cheboygan County, University of Michigan Biological Station, pine woods, 31 Jul 1964, C.T. Rogerson (NY): Plate 5j (page 25), 18 a–d.

H. lateritius: UNITED STATES. New Jersey: Gloucester County, vic. Glassboro, on *Lactarius* sp., 17–18 Aug 1984, S. Stein, C.T. Rogerson 84-11 (NY): Plate 4 k (page 25), 18, g–h.

PODOSTROMA P. Karst., *Hedwigia* 31: 294. 1892.

Type: *P. leucopus* P. Karst., a synonym of *Podostroma alutaceum* (Pers. : Fr.) G.F. Atk.

= *Podocrea* Lindau, in Engler & Prantl, *Natürl. Pflanzenfam.* 1(1): 364. 1897. — Type: *P. alutacea* (Pers. : Fr.) Lindau (= *Sphaeria alutacea* Pers. : Fr.), recognized as *Podostroma alutaceum*.

Stroma well-developed, light-colored, fleshy, upright, stipitate. Ascumata immersed in the stroma. Asci cylindrical. Ascospores 1-septate, disarticulating early in the development into two globose, subglobose, ovoidal, oblong or wedge-shaped part-ascospores, hyaline or green, typically spinulose or warted, also smooth. Anamorph, where known, *Trichoderma*. On decaying woody substrata.

NOTES.— Karsten (1892) described the genus *Podostroma* in the *Hypocreaceae* for fungi characterized by 'stroma stipitate, clavate, erect, entomogenous, fleshy, bright-colored. Ascumata immersed in the stroma. Asci cylindrical, 16-spored. Spores globose, hyaline. Paraphyses lacking.' Lindau (1897) recognized the genus *Podocrea* for *Hypocrea*-like species that have an upright, often branched stroma. He attributed the name to Saccardo (1883) who had previously established *Hypocrea* subgenus *Podocrea* with three species, namely *H. larvata* (Mont.) Sacc., *H. petersii* Berk. & M.A. Curtis, and *H. brevipes* (Mont.) Sacc.; however, Lindau did not include any of these three species in the genus. Thus the generic name is ascribed to Lindau (1897). Three species were included by Lindau in *Podocrea*, namely *P. alutacea*, *P. solmsii* (E. Fisch.) Lindau and *P. cornu-damae* (Pat.) Lindau. The type species of *Podocrea*, *P. alutacea*, was considered by Atkinson (1905) to be a synonym of the type species of *Podostroma*, *P. leucopus*; thus *Podocrea* is a synonym of *Podostroma*.

Partial accounts of the genus *Podostroma* have been provided by Boedijn (1934; 1938), Doi (1966, 1967b, 1973a, 1987), Imai (1932), and Seaver & Chardon (1926), all of whom noted the strong similarity of *Podostroma* to members of the genus *Hypocrea* in both

teleomorph and anamorph characteristics. *Podostroma* is similar to *Hypocrea* differing only in the presence of a stalked stroma. In all other characters such as habitat, anamorph, stromal and centrum morphology, *Podostroma* and *Hypocrea* are indistinguishable. In several species of *Hypocrea* the stromata become raised, narrowed at the base, and could be considered stalked (Samuels & Lodge, 1996a). At present, *Podostroma* is retained with only the type species until a more detailed study has been completed of the stipitate species of *Hypocrea*-like fungi.

Podostroma alutaceum (Pers. : Fr.) G.F. Atk., *Bot. Gaz.* 40: 401. 1905. — Plate 4, l (see page 25); Plate 19, a, b; Plate 20, a.

= *Sphaeria alutacea* Pers. : Fr., *Persoon, Observ. Mycol.* 2: 66. 1797; *Fries, Syst. Mycol.* 2: 325. 1822.

= *Podocrea alutacea* (Pers. : Fr.) Lindau, Engler & Prantl's *Natürl. Pflanzenfam.* 1(1): 364. 1897.

= *Podostroma leucopus* P. Karst., *Hedwigia* 31: 294. 1892.

Anamorph: *Trichoderma* sp.

Stroma pale yellow to yellow-buff, spatulate-flattened, divided into fertile and sterile parts: stipe or sterile part cylindrical, about 0.5–1.5 cm long × 1.5–2 mm diam, longitudinally wrinkled; fertile part broad, cylindrical, sometimes flattened, 0.5 × 1–1.5 mm × 15 mm tall; surface of fertile part unwrinkled, with low tuberculations formed by individual ascumatal apices, KOH–. Cells at stromatal surface ellipsoid to globose, 5–10 μm diam, with walls less than 0.5 μm thick, appearing moniliform. Stromal surface layer 30–50 μm thick, of uniformly small pseudoparenchyma, cells ellipsoid 5–7 μm diam, wall 0.5 μm thick. Ascumata completely immersed, visible as tuberculations beneath the stromal surface, ostiolar openings appearing as vis-

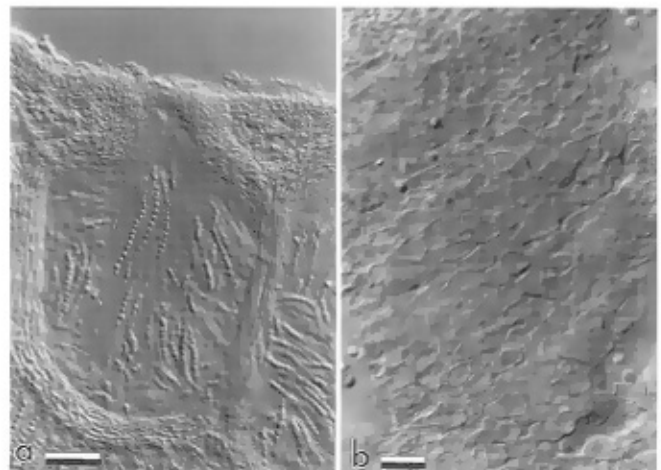


Plate 19. a, b. *Podostroma alutaceum*. a. Median section of stroma and immersed ascumata. b. Close-up of section of stroma. a, b. Holotype of *P. leucopus* – H. Scale bars: a = 50 μm; b = 10 μm.

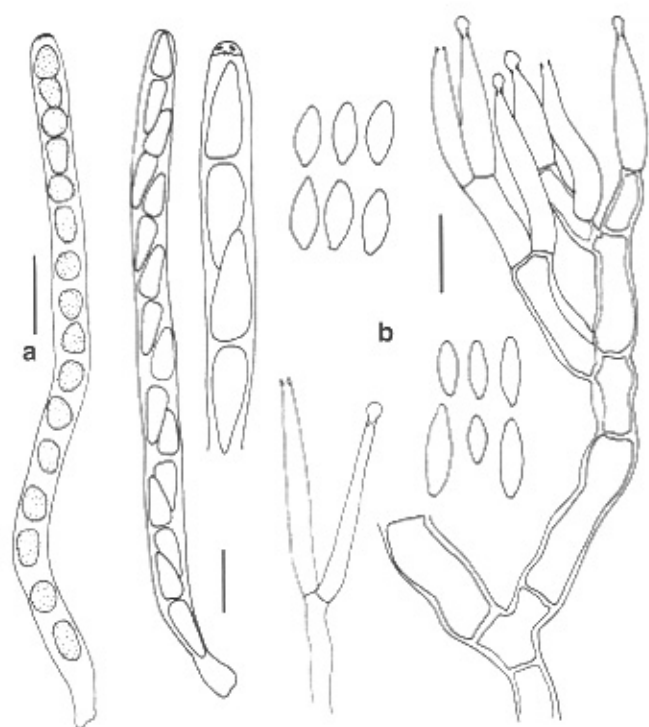


Plate 20. a. *Podostroma alutaceum*, ascus with disarticulating ascospores. b. *Pseudohypocrea citrinella*, ascus, ascus apex, conidiophores, and conidia. a. Holotype of *P. leucopus* - H. b. Guyana 4727 - NY. Scale bars: a, b = 10 μ m.

cid dots against a dull background; ascomatal apex of small cells, not sharply differentiated from the surrounding stroma. Asci cylindrical, 62–95 \times 4–6 μ m, apex with ring. Ascospores 1-septate, dividing into dimorphic part-ascospores, distal part conical to subglobose or globose, 2.9–3.9 \times 2.5–3.2 μ m; proximal part oblong to wedge-shaped 3.1–4.9 \times 1.9–2.9 μ m, hyaline, spinulose.

TYPE.— FINLAND. Tavastia australis, Tammela, Syrja, in ?larvis, P.A. Karsten 3247, 30 Sep 1892 (H, holotype of *Podostroma leucopus*). This specimen consists of several fragments of a cylindrical stroma. The type specimen of *S. alutacea* was not located at L and apparently no longer exists.

ADDITIONAL SPECIMEN EXAMINED.— FINLAND: Mustiala, versus Sarkjarvi, J. Lindroth, 8 Sep 1897, P.A. Karsten 3248 (H).

ILLUSTRATIONS.— Breitenbach & Kränzlin (1981, Fig. 316); Dennis (1975, Pl. XXXIC); Müller & von Arx (1962, Fig. 254, based on the type of *P. leucopus*); Tulasne & Tulasne (1865, Tab. IV, Figs. 1–6).

NOTES.— The description presented here is based on an examination of the holotype of *Podostroma leucopus* and one other specimen from a similar locality. Although *P. leucopus* was recorded as occurring on insect larvae, no evidence of such a host is present on the type specimen. Later collections of *P. alutaceum* have been reported on old wood from both tropical and temperate regions, although it is likely that more than one taxonomic entity has been included under this name. Doi (1966) provided a detailed account of the *Trichoderma*

anamorph of *P. alutaceum* and Eckblad & Torkelsen (1974) suggested that *P. alutaceum* is confined to the ground and decaying stumps in coniferous woods.

PROTOCREA Petch, J. Bot. 75: 219, 1937.

Lectotype, designated by Moravec (1956): *P. farinosa* (Berk. & Broome) Petch (\equiv *Hypocrea farinosa* Berk. & Broome).

Subiculum thin, cottony, arachnoid, white to pink, KOH–. Ascumata partly to completely immersed in the subiculum with adjacent ascumata remaining discrete; ascumatal wall less than 25 μ m thick, KOH–. Asci cylindrical. Ascospores fusiform to ellipsoid, 1-septate, disarticulating while in the asci into two part-ascospores, often of unequal size, hyaline to pale yellow-green, smooth or spinulose. Anamorphs *Acremonium*-like or *Verticillium*-like. On bark, decaying woody substrata and effused basidiomycetes.

NOTES.— *Protocrea* and *Arachnocrea* are similar, differing primarily in ascospore morphology. Ascospores of *Protocrea* are fusiform with rounded ends, the septum is sub-median, and the part-ascospores are of unequal size, whereas in *Arachnocrea* the part-ascospores are conical or apiculate and equal in size. Petch (1937) established the genus *Protocrea* for species that have simple ascumata immersed in or seated upon a byssoid stroma and two-celled ascospores that disarticulate into part-ascospores. The three species originally included in *Protocrea* were *P. farinosa*, *P. delicatula* (Tul. & C. Tul.) Petch, and *P. stipata* (Lib.) Petch. Moravec (1956) designated *H. farinosa* as the lectotype of *Protocrea*, restricting the genus to those species having globose part-ascospores similar to *Hypocrea*. He removed *P. stipata* to another genus, *Arachnocrea* Z. Moravec, based on the fusiform ascospores that disarticulate into part-ascospores each with a pointed end. *Arachnocrea* is herein accepted as a distinct but related genus in the *Hypocreales*. In studying *Hypocrea*, Doi (1972) maintained the segregate genera *Arachnocrea*, *Protocrea*, and *Pseudohypocrea*. Although the ascospores of *Protocrea* and *Arachnocrea* disarticulate while in the asci, these genera are similar to *Hypomyces* and *Sphaerostilbella* in having thin, effused, prosenchymatous stromata. Within *Hypocrea*, there is a series of *Hypocrea* species, typified by *H. citrina*, that have indefinite, effused stromata, but the stromata of these species are pseudoparenchymatous rather than hyphal. Besides the type, two additional species are recognized in *Protocrea*.