A revision of the genus *Stilbohypoxylon* (Xylariaceae)

Liliane E. Petrini

Tèra d'sott 5, CH-6949 Comano, Switzerland

Petrini, L. E. (2004). A revision of the genus *Stilbohypoxylon* (Xylariaceae). – Sydowia 56 (1): 51–71.

Ten species of *Stilbohypoxylon* are recognized. With the exceptions of *S. macrosporum*, *S. minus* and *S. novae-zelandiae*, all have one or more synonyms in *Roselllinia*. Six taxa described as *Rosellinia* are transferred to *Stilbohypoxylon* based on examination of type specimens. One of them (*R. bresadolae* var. *minor*) is raised to species rank and renamed as *S. theissenii*, because of the prior existence of *S. minor* Hladki & A. I. Romero. *Stilbohypoxylon moelleri* is a later taxonomic synonym of *S. elaeicola*, and *S. samuelsii* is a later taxonomic synonym of *S. immundum*. *Astrocystis cocoës* is considered conspecific with *S. elaeicola*. A key to all *Stilbohypoxylon* species is provided.

Keywords: *citrino-pulverulenta*, *coffeicola*, *didolotii*, *hypoxylina*, *ignobilis*, *samoensis*, *picaceae*, *Rosellinia*, taxonomy.

Rogers & Ju (1997) resurrected the genus *Stilbohypoxylon* Henn. (Xylariaceae) and, based on an epitype, redescribed its type species, *S. moelleri*. They transferred *Hypoxylon quisquiliarum* to *Stilbohypoxylon* and described *S. samuelsii* as new. Since then several publications have focussed on *S. moelleri* and *S. quisquiliarum* (Fröhlich & Hyde, 2000; Ju & Rogers, 1999). Recently, Hladki & Romero (2003) described two new species from Argentina, *S. macrosporum* and *S. minor* and Petrini (2003) described *S. novae-zelandiae* from New Zealand. *Stilbohypoxylon moelleri*, *S. quisquiliarum*, *S. novae-zelandiae* and the Argentinean taxa were grown in pure culture and their anamorphs were described (Hladki & Romero, 2003; Petrini, 2003; Rogers & Ju, 1997). Rogers & Ju (1997) emphasized stromal development, cultural characters and anamorphic states. One or more spinose, conical synnemata arise from the incipient stroma. The perithecial initials develop in the young stroma as conidia are being formed from the synnema. As the perithecia develop, the stroma enlarges, conidial production ceases and the synnema is eventually pushed aside. The old synnemata remain as sharp protuberances or denticles on mature stromata. The stromata are mostly leathery and do not split when cut. The surface of the ectostroma is usually verrucose and furrowed. The entostroma is persistent, white to cream and usually is tightly attached to the ectostroma and the perithecia.

Stilbohypoxylon quisquiliarum is unusual because synnemata have not been observed in nature; rather, in nature conidia arise from scales on the stroma surface. However, Rogers & Ju (1997) observed the formation of fragile synnemata in culture.

Ten species of *Stilbohypoxylon* are known, all of which are tropical to subtropical in distribution. *Stilbohypoxylon moelleri* occurs exclusively on monocots, *S. novae-zelandiae* is known basically from pteridophytes, only single records are from monocots. All other species were found on dicotyledonous wood, mainly unidentifiable. *Stilbohypoxylon moelleri* and *S. quisquiliarum* are common as numerous collections from various parts of the world demonstrate. *S. novae-zelandiae* is represented outside New Zealand only by single collections from Taiwan and Argentina. Several specimens of *S. immundum*, *S. macrosporum* and *S. theissenii* were collected, however, from a restricted area. *Stilbohypoxylon coffeicola, S. ignobilis, S. hypoxylinum,* and *S. minor* are known from one specimen.

Intensive studies of type specimens filed as species of *Rosellinia* De Not. revealed that several of them are, in fact, *Stilbohypoxylon*. The respective type specimens show the typical generic features. They are transferred here to *Stilbohypoxylon*. Earlier epithets were discovered for *S. moelleri* and *S. samuelsii*. For these species and for *S. quisquiliarum* additional synonyms are given. Moreover, some remnants of the anamorph were detected on stromata of *S. quisquiliarum*.

Material and methods

Dried herbarium specimens from the herbaria FH, HBG, K, PACA, PC, RO, S, W, WSP, ZT and George Carroll (G.C.C.) were studied. The terminology and explanation of differentiating characters basically follow Rogers & Ju (1997) and Petrini (2003). Stromata were examined with a dissecting microscope; microscopic characters by bright field or interference contrast microscopy. Ascospores were observed and measured in water and ascus apical rings in Melzer's reagent (0.5 g J, 1.5 g KJ, 20 ml distilled water, 22 g chloralhydrate). Conidiophores and conidia were examined in lactic acid. The photographic plates were prepared by assembling microphotographs using Adobe Photoshop® 7.0.

Whenever possible, 5 stromata, 30 ascospores, and 5 apical rings were measured for each specimen. Minimum and maximum values, mean and standard deviation (SD) as well as the 95% confidence interval (95% CI) of ascospore length and width for each species were calculated. The values are presented in the text as (minimum) mean ± SD (maximum) (95% CI; n = number of measurements). When only two figures are given, they display the range between minimum and maximum values. J+ means that the ascus apical rings

stain blue in Melzer's reagent. All descriptive statistics were computed using SYSTAT® 10 (SPSS, Chicago, Illinois). SYSTAT® 10 was also used to prepare graphical displays of data.

Key to *Stilbohypoxylon* species

1. Average ascospore length < 13 µm 2
1*. Average ascospore length > 13 µm 3

2. Average ascospore length < 10 µm, stromal width < 1 mm . . . . . 4. *S. ignobile*
2*. Average ascospore length > 10 µm, stromal width > 1 mm . . . . . 1. *S. coffeicola*

3. Ascospore length 13–22 µm, if shorter, then germ slit sigmoid . . 4
3*. Ascospore length > 22 µm 6

4. Germ slit 6–8 µm long, straight . . . . . 3. *S. hypoxylinum*
4*. Germ slit over the whole spore length, straight or sigmoid . . . 5

5. Ascospores with a slimy cap at each end, germ slit straight . . . . . 2. *S. elaeicola*
5*. Ascospores lacking slimy caps, often with one cellular appendage, germ slit predominantly sigmoid . . . 8. *S. novae-zelandiae*

6. Germ slit straight or oblique 7
6*. Germ slit sigmoid to spiral 9

7. Average ascospore width < 11 µm, germ slit 15–18 µm, ending clearly before spore end . . . . . 10. *S. theissenii*
7*. Average ascospore width > 11 µm, germ slit over the whole spore length 8

8. Ascospore length 23.5–26(–27.5) µm, stromal width < 600 µm . . . . . 7. *S. minus*
8*. Ascospore length 27–39 µm, stromal width > 600 µm . . . . . 5. *S. immundum*

9. Average spore length < 30 µm, stromata with yellow-grey squamules; synnemata not seen in nature . . . . . 9. *S. quisquiliarum*
9*. Average spore length 30–40 µm, yellow scales lacking; stromata with spinose synnemata . . . . . 6. *S. macrosporum*

Description of species

1. *Stilbohypoxylon coffeicola* (Pat.) L. E. Petrini, comb. nov. – Figs. 1, 8a.

Basionym: *Rosellinia coffeicola* Pat., Bull. Soc. Myc. France 18: 179. 1902.

Stromata 825–1250 µm high, 1000–1500 µm wide (n = 5), globose to pulvinate, black, with scales or blunt spines on surface, singly or 2–3

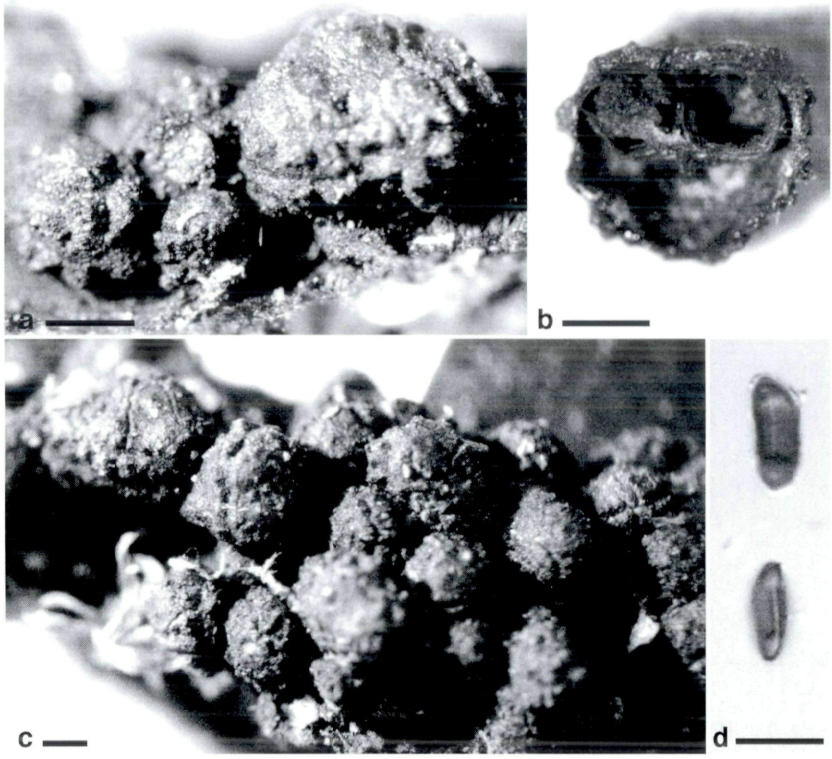


Fig. 1. *Stilbohypoxylon coffeicola*. – a, c. Stromata. – b. Longitudinal section of stroma. – d. Ascospores. – Bars: a–c = 0.5 mm; d = 10 µm. – From type.

fused together, crowded, ostioles finely papillate, seated in a 200–250 µm diam disk; ectostroma 50–75 µm thick, black, entostroma cream, with age detached from ectostroma and reduced or absent leaving a space below perithecia. – Ascospores 11.0–13.0 × 5.0–6.5 µm (95% CI: 11.7–12.5 × 5.0–6.0 µm; n = 10), inequilaterally ellipsoidal, brown, with straight germ slit running over the whole spore length on flat side.

Specimen examined. – Guadaloupe: Cam-Jacob, on *Coffea arabica*, Juin 1901, Duss, FH 503, as *Rosellinia coffeicola*, type.

Host. – *Coffea arabica*.
Distribution. – Caribbean region: Guadaloupe.

The type specimen is in poor condition and synnematal remains were not observed. The stromal surface, however, shows a rough, verrucose surface typical for other *Stilbohypoxylon* species such as *S. immundum* or *S. quisquiliarum*. Therefore, the new combination is proposed.

2. *Stilbohypoxylon elaeicola* (Henn.) L. E. Petrini, comb. nov. – Figs. 2, 8b–g.

Basionym: *Rosellinia elaeicola* Henn., in Engler, A., Bot. Jahrbuch für Systematik, Pflanzengeschichte und -geographie 22: 77. 1897.
= *Rosellinia samoensis* Henn., in Engler, A., Bot. Jahrbuch für Systematik, Pflanzengeschichte und -geographie 23: 287. 1897.
= *Stilbohypoxylon moelleri* Henn., Hedwigia 41: 16. 1902.
= *Astrocystis cocoës* (Henn.) Læssøe & Spooner, Kew Bulletin 49: 27. 1994.
≡ *Rosellinia cocoës* Henn., Hedwigia 47: 256. 1908.

For description and illustration of teleomorph, culture and anamorph see Rogers & Ju (1997) as *Stilbohypoxylon moelleri*.

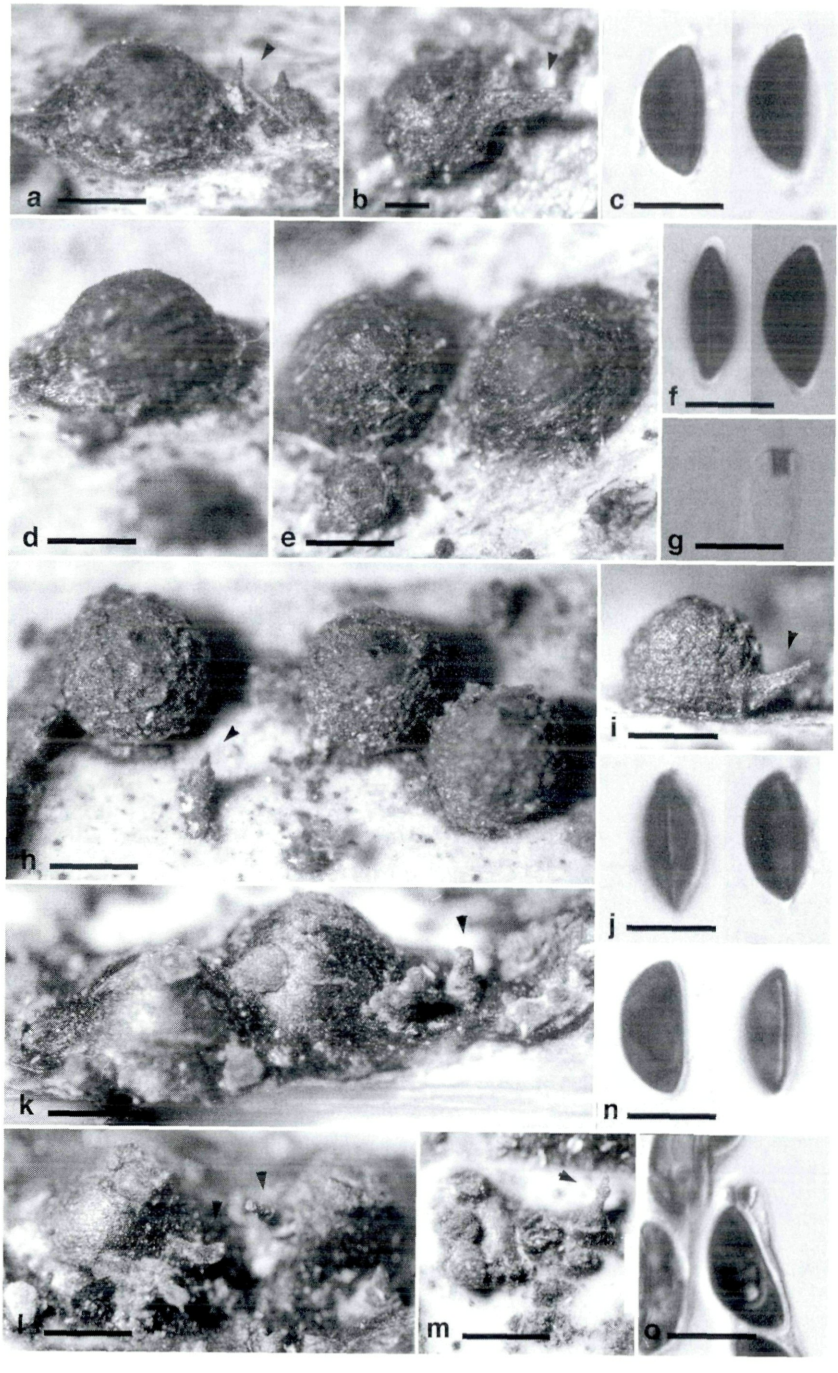
Stromata (400–)605 ± 80(–825) µm high, (550–)813 ± 110 (–1125) µm wide (n = 55), globose, subglobose to conical, dark brown to black, with rough, rugose surface, sometimes with cracks, dull or shiny, sometimes covered by host material, singly, sometimes 2–3 fused together; ostioles finely to coarsely papillate, sometimes seated in a small disk formed by denticles of a detached synnema; synnemata to 550 µm high on substratum or on perithecial stroma, light brown, covered by green-grey conidiophores at base; ectostroma 50–75 µm thick, black, entostroma confined to lower part of stroma forming a thin layer, white, perithecia tightly adhering to it. – Ascus apical ring 2–4 µm high, upper width 3–4 µm, lower width 2–3 µm (n = 25), J+ blue. – Ascospores (13.0–)16.0 ± 1.5(–22.0) × (6.0–) 7.0 ± 0.5(–8.5) µm (95% CI: 16.2–16.5 × 7.0–7.3 µm; n = 305), inequilaterally ellipsoidal with pinched ends, dark brown, with a slimy cap at each end and a slimy sheath on the flat side, with straight germ slit on flat side running over the whole spore length. – Conidiogenous cells on synnemata 10–13 × 4–5 µm (n = 6). – Conidia 6.0–9.5 × 3.4–4.5 µm (n = 10).

Specimens examined. – CAMEROUN: Bibundi, on *Elaeus*, 1.1891, J. R. Jungner 41, BPI, as *R. elaeicola*, type. – GRENADA: Grand Etang, on *Euterpe* sp., 1913, R. Thaxter, W, Rel. Farl. ≠ 633, as *Stilbohypoxylon moelleri*, duplicate of epitype selected by Rogers & Ju (1997). – PHILIPPINE ISLANDS: Los Banõs, on *Arenga saccharifera*, 2.1914, C. F. Baker, W, ZT, Fungi Malayana 388, as *R. cocoës*; Luzon, prov. Laguna, Mt. Maquiling, on *Calamus* sp., 22.2.1912, P. W. Graff, HBG, W, Syd Fungi exotici 183, as *R. cocoës*; Mindanao, Davao, on *Cocoës nucifera*, March 1904, E. B. Copeland 456, K 33874, as *R. cocoës*, isotype; *ibid.* 3. 1906, Copeland ≠ 456, W, herb. Petrak 00829, as *R. cocoës*, isotype. – PUERTO RICO: Mt. Britten, El Yunque Peak, 980 m. a. s., *Prestoea*, 18.6.1998, W. Gams, ZT; Caribbean National Forest, Calmitillo, Big tree Trail & Palo Colorado Trail, 550 m. a. s., *Prestoea*, 19.6.1998, W. Gams, ZT. – SAMOA: on Gramineae (*Sorghum*), Dr. Reinecke, S, ex Herb. Sydow, as *R. samoensis*, probably type.

Specimen of *Rosellinia sancta-cruciana* examined. – VIRGIN ISLANDS: St. Croix, Jolly Hill, 22.1.1906, C. Raunkiaer 1761, C, type.

Host. – Monocotyledonous wood.

Distribution. – Worldwide in tropical and subtropical areas (Fröhlich & Hyde, 2000; Rogers & Ju, 1997).



An earlier epithet for *S. moelleri* is available. Accordingly, this taxon's name is *S. elaeicola*. The priority of the epithet "*elaeicola*", however, has no influence on the type of the genus, as designated by Rogers & Ju (1997). *Astrocystis cocoës* is considered a synonym of *S. elaeicola*. Læssøe & Spooner (1994) transferred *Rosellinia cocoës* to *Astrocystis* and indicated the specimen *R. cocoës* Philippine Islands, Mindanao, Davao, on *Cocoës nucifera*, March 1904 ['1906' in Hennings], E. B. Copeland 456, K 33874 as isotype. A duplicate is deposited in the F. Petrak's Pilzherbarium (W). This material clearly shows some synnemata (Fig. 2a, b). Læssøe & Spooner (1994) examined, among others, two specimens of *R. cocoës* deposited at K (Fungi Malayana Baker 388 and Sydow, Fungi exotici exsiccati 183). Duplicates of the former are in W and ZT, of the latter in HBG and W. Upon examination, synnemata were present on the material from W and HBG, only in the ZT specimen they were not observed. Apparently, when the collections were split for the various exsiccata envelopes, some pieces were devoid of the synnemata. Descriptions and illustrations of ascospores of *A. cocoës* (Læssøe & Spooner, 1994; Smith & Hyde, 2001) match those given for *S. moelleri* (Rogers & Ju, 1997), emphasizing the pinched spore ends and hyaline caps and sheath. Moreover, there is no statistically significant difference in ascospore size ranges between the K and W isotypes, the two specimens considered to represent *A. cocoës* by Læssøe & Spooner (1994), and all other specimens examined, including the Thaxter collection (Reliquiae Farlowianae 633), which was selected as epitype of *S. moelleri* by Rogers & Ju (1997) (data of statistical analysis not shown). Therefore, the synonymy is justified.

Smith & Hyde (2001) cite *R. sancta-cruciana* Ferd. & Winge as a synonym of *A. cocoës*. I have examined the type specimen of the former. However, it does not match the isotype specimen of *R. cocoës* in respect of ostioles, which are much more coarse in *R. sancta-cruciana*. Moreover, differences were seen in the respective anamorphs (synnemata in *A. cocoës* vs. conidia nonsynnematous, borne from stromatic patches from which stromata arise in *R. sancta-cruciana*), ascus apical rings (urn-shaped in *R. sancta-cruciana*, nearly cylindrical in *A. cocoës*) and ascospores (*R. sancta-cruciana* ascospores have two cellular appendages surrounded by slimy caps and no pinched ends and lack a slimy sheath (Fig. 8aa–ad). For these reasons *R. sancta-cruciana* is not considered a synonym of *S. elaeicola*.

Fig. 2. *Stilbohypoxylon elaeicola*. – a, b, d, e, h, i, k–m. Stromata and synnemata (arrows). – c, f, j, n. Ascospores, some of them showing a germ slit and slimy caps and sheath. – g, o. Ascus apical ring staining blue in Melzer's reagent. – Bars: a, b, d, e, h, i, k–m = 0.5 mm; c, f, g, j, n, o = 10 µm. – a–c from *R. cocoës* Copeland 456, W, isotype; d–g from *R. cocoës* Copeland 456, K, type; h–j from *R. elaeicola*, BPI, type; k–o from *R. samoensis*, S, probably type.

3. *Stilbohypoxylon hypoxylinum* (Ces.) L. E. Petrini, comb. nov. – Figs. 3, 8h–i.

Basionym: *Rosellinia hypoxylina* Ces., Atti Reale Accad. Scienze Fisiche e Matematiche di Napoli 8: 22. 1878.

Stromata 450–700 µm high, 375–450 µm wide (n = 5), globose to ampulliform, dark brown to black, with dull, powdery, surface, uniperitheciate, solitary but forming a dense layer including young synnemata, ostioles integrated in stroma apex, appearing umbilicate; ectostroma 25 µm thick, black. – Ascus apical ring 4.0–4.5 µm high, upper width 4.0–4.5 µm, lower width 3.5–4.5 µm (n = 5), J+. – Ascospores (14.0–)17.0 ± 1.5(–21.0) × (6.5–)8.0 ± 0.8(–9.0) µm (95% CI: 16.5–18.0 × 7.5–8.5; n = 30), inequilaterally ellipsoidal, dark brown, with straight, 6–8 µm long germ slit.

Specimen examined. – SARAWAK: Borneo, O. Beccari, RO 186, as *Rosellinia hypoxylina*, type.

Host. – Dicotyledonous wood without bark.
Distribution. – Asia: Borneo.

The stromal surface and the occurrence of single synnemata justify the accommodation of *R. hypoxylina* in *Stilbohypoxylon*.

4. *Stilbohypoxylon ignobile* (Ces.) L. E. Petrini, comb. nov. – Figs. 4, 8j.

Basionym: *Rosellinia ignobilis* Ces., Atti Reale Accad. Scienze Fisiche e Matematiche di Napoli 8: 22. 1878.

Stromata 750–925 µm high, 625–800 µm wide (n = 5), cupulate with elongate broad base, dark brown to black, with cracks and warts on the surface, singly or 2–4 fused together, crowded, touching each other, ostioles finely papillate; ectostroma 25–50 µm thick, black. – Ascospores 9.0–10.5 × 4.5–5.0 µm (n = 3), inequilaterally ellipsoidal, dark brown, germ slit straight, over the whole spore length.

Specimen examined. – BORNEO: Sarawak, O. Beccari, RO 186, as *Rosellinia ignobilis*, type.

Host. – Dicotyledonous wood without bark.
Distribution. – Asia: Borneo.

The type specimen is in poor condition. Only three ascospores were seen indicating that the material is old. This may be the reason why no synnemata were observed. The stroma surface, however, is similar to the one of other *Stilbohypoxylon* species, rough, warty with fine cracks. Therefore, the new combination is proposed.

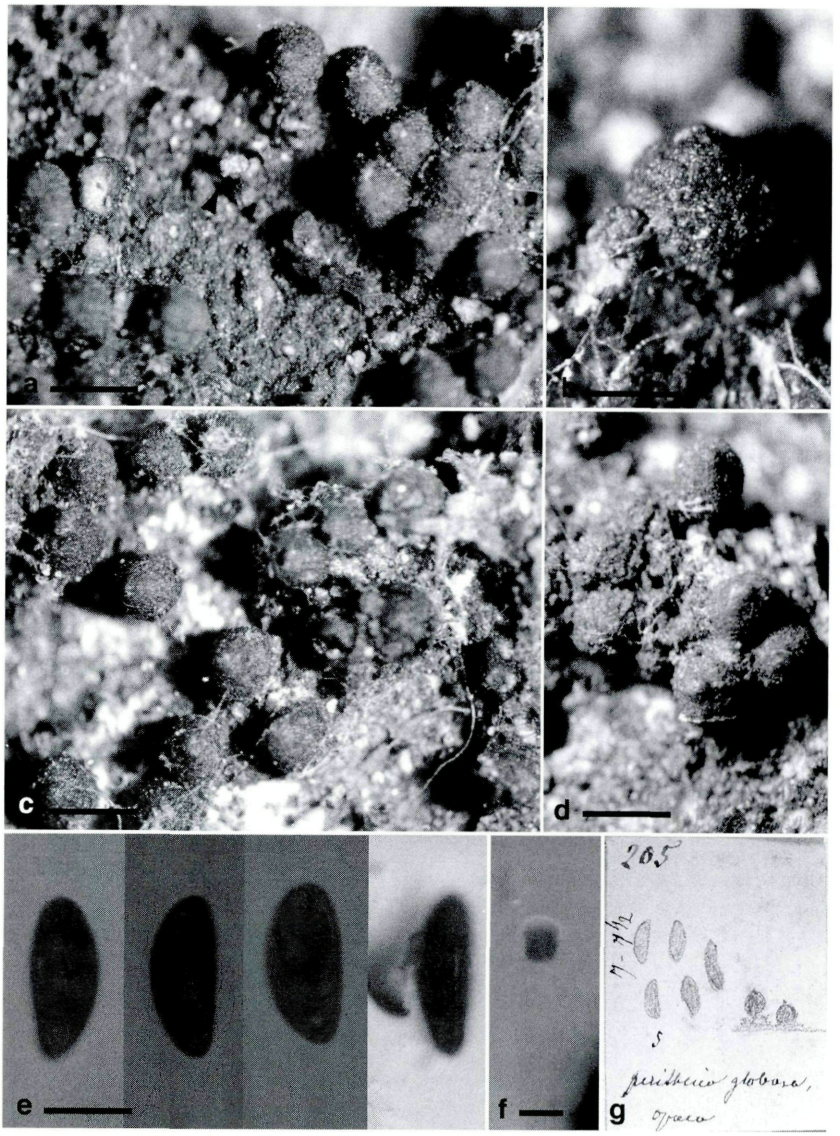


Fig. 3. *Stilbohypoxylon hypoxylinum*. – a–d. Stromata. – e. Ascospores. – f. Ascus apical ring. – g. Original drawing by Cesati (1:1). – Bars: a, c, d = 0.5 mm; b = 0.25 mm; e = 10 µm; f = 5 µm. – From type.

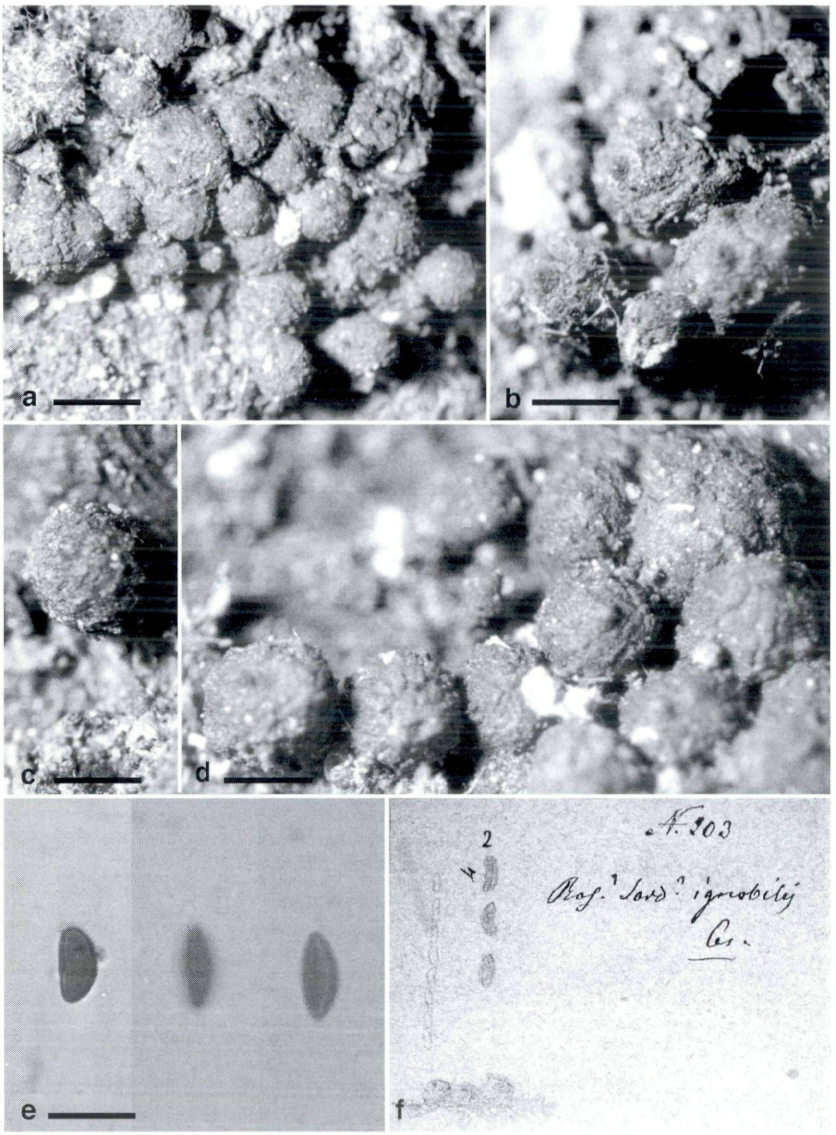


Fig. 4. *Stilbohypoxylon ignobile*. – a–d. Stromata. – e. Ascospores. – f. Original drawing by Cesati (1:1). – Bars: a = 1 mm; b–d = 0.5 mm; e = 10 µm. – From type.

5. *Stilbohypoxylon immundum* (Berk. & Cooke) L. E. Petrini, comb. nov. – Figs. 5, 8k–p.

Basionym: *Sphaeria immunda* Berk. & Cooke., J. Linn. Soc. Bot. 14: 387. 1869.
≡ *Rosellinia immunda* (Berk. & Cooke) Sacc., Syll. F. 1: 256. 1882.
= *Hypoxylon bresadolae* (Theissen) P.M.D. Martin, J. South African Bot. 42: 72. 1976.
≡ *Rosellinia bresadolae* Theissen, Ann. Mycol. 6: 351. 1908.
= *Stilbohypoxylon samuelsii* J. D. Rogers & Y.-M. Ju, Mycol. Res. 101: 137. 1997.

Stromata (625–)930 ± 175(–1300) µm high, (625–)920 ± 190 (–1250) µm wide (n = 15), globose, subglobose, obovate to cupulate, brown when young, then darkening, black in age, surface warty, the upper part with scales, rugulose with minute furrows, cylindrical synnemata growing out from the upper part, crowded, forming a dense layer on the substratum; ectostroma up to 125 µm thick, black, entostroma white, thin at sides, mostly confined to base, with perithecia closely adherent. – Ascus apical ring 6–11 µm high, upper width 4–7 µm, lower width 3.5–6.0 µm (n = 10), cylindrical, J+ dark blue. – Ascospores (27.0–)32.0 ± 3.0(–39.0) × (8.5–)11.0 ± 1.5 (–14.0) µm (95% CI: 31.0–32.5 × 10.5–11.5 µm; n = 90), inequilaterally ellipsoidal, dark brown, with straight, rarely oblique germ slit running almost over the whole spore length, ending shortly before, immature ascospores with a 1 × 1 µm subglobose cellular appendage.

Specimens examined. – CUBA: C. Wright 538, K, as *Rosellinia immunda*, type. – FRENCH GUIANA: Upper Marouini River, ca. 3 hr. walk W of river toward Roche Koutou, 1 km E of Roche Koutou, elev. 150–350 m, wood, 15.–18.8.1987, G. J. Samuels & al5797, WSP 69724, as *S. samuelsii*, isotype. – Collecting information unknown, FH 3, as *R. bresadolae*, authentic.

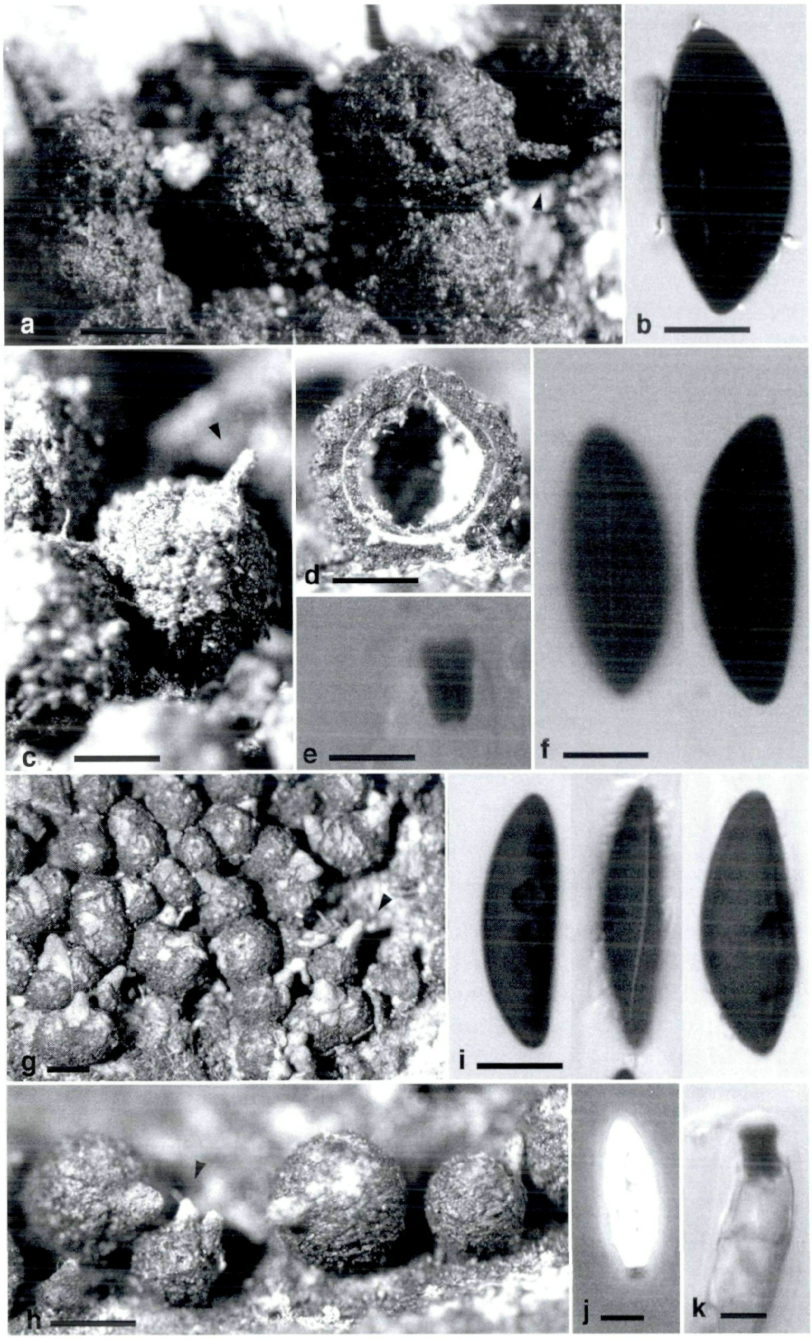
Host. – Dicotyledonous wood.
Distribution. – Caribbean region: Cuba. South America: Brazil (Theissen, 1908), Ecuador (Rogers & Ju, 1997), French Guiana.

Stromata in the type of *R. bresadolae* are the largest among the three type specimens studied. Ascospore morphology and size are similar in all three collections. The isotype specimen of *S. samuelsii* had narrower ascospores than those of the other two species. However, the dimensions derived from more than one specimen indicated by Rogers & Ju (1997) fit well in the range of the ascospore size of *R. immunda* and *R. bresadolae*.

6. *Stilbohypoxylon macrosporum* Hladki & A. I. Romero, Sydowia 55: 67. 2003.

For description and illustrations see Hladki & Romero (2003).

Host. – Dicotyledonous wood.
Distribution. – South America: Argentina.



7. *Stilbohypoxylon minus* Hladki & A. I. Romero, Sydowia 55: 70. 2003.

For description and illustrations see Hladki & Romero (2003).

Host. – Dicotyledonous wood.
Distribution. – South America: Argentina.

This species was described using the epithet "*minor*". As the gender of *Stilbohypoxylon* is neuter, the correct form of this epithet is "*minus*".

8. *Stilbohypoxylon novae-zelandiae* L. E. Petrini, New Zealand J. Bot. 41: 128. 2003. – Fig. 8q–t.

For description and illustrations see Petrini (2003).

Hosts. – *Arenga engleri* (Ju & Rogers, 1999, sub *Stilbohypoxylon* sp.), *Cyathea* spp., *Dicksonia squarrosa* (G. Forst.) Sw. (Petrini, 2003).
Distribution. – Asia: Taiwan. Oceania: New Zealand. South America: Argentina.

9. *Stilbohypoxylon quisquiliarum* (Mont.) J. D. Rogers & Y.-M. Ju, Mycol. Res. 101: 137. 1997. – Figs. 6, 8u–x.

Basionym: *Sphaeria quisquiliarum* Mont., Ann. Sci. Nat. Bot., II, 14: 321. 1840.
≡ *Hypoxylon quisquiliarum* (Mont.) Mont., Ann. Sci. Nat., Bot. IV, 3: 117. 1855.
= *Rosellinia picacea* Massee, Kew Bull. No. 138: 118. 1898.
= *Rosellinia citrino-pulverulenta* Henn. & Nym., Monsunia 1: 166. 1899.
= *Hypoxylon rosellinioides* Henn., Bot. Jahrb. Syst. 38: 115. 1905 (fide Rogers & Ju, 1997).
= *?Rosellinia didolotii* Saccas, L'agronomie tropicale 11: 584. 1956.

For anamorph and culture descriptions see Rogers & Ju (1997).

Stromata (575–)955 ± 240(–1600) µm high, (600–)1020 ± 265 (–1500) µm wide (95% CI: 865–1045 × 920–1120 µm; n = 29), globose to subglobose, ovoid, dark brown to black, when young covered by yellow scales, later turning brown, surface warty, powdery, with

Fig. 5. *Stilbohypoxylon immundum*. – a, c, g, h. Stromata with synnemata (arrows). – d. Longitudinal section of stroma; note adhering perithecial wall. – b, f, i. Ascospores. – e, k. Ascus apical rings. – j. Immature ascospore with cellular appendage. – Bars: a, c, d, g, h = 0.5mm; b, e, f, i = 10 µm; j, k = 5 µm. – a, b from *Rosellinia immunda*, K, type; c–f from *R. bresadolae*, FH authentic; g–k from *S. samuelsii*, WSP isotype.

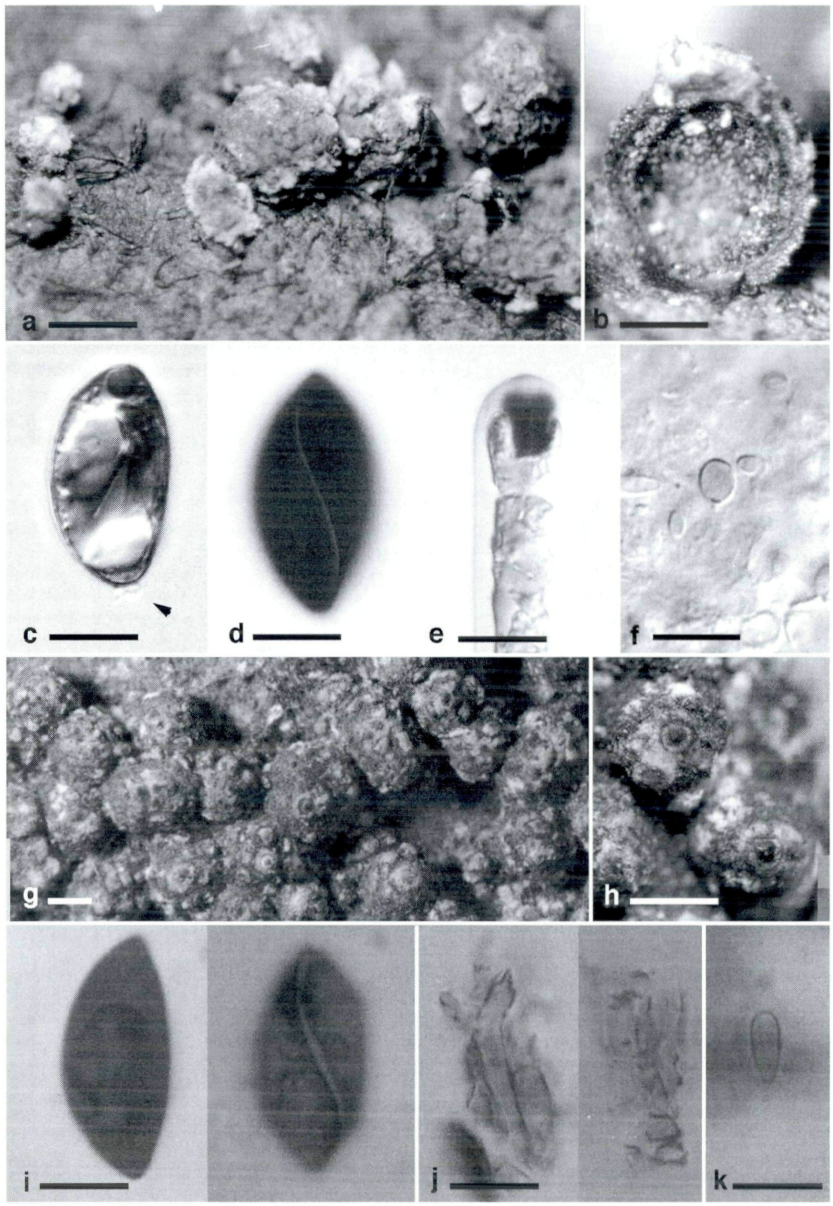


Fig. 6. *Stilbohypoxylon quisquiliarum*. – a, g, h. Stromata. – b. Longitudinal section of stroma; note adhering perithecial wall. – c. Immature ascospore with hyaline appendage (arrow). – d, i. Mature ascospores with a sigmoid germ slit. – e. Ascus apical ring. – f, k. Conidia from scales on stroma surface. – j. Conidiophores from scales on stroma surface. – Bars: a, g, h = 0.5 mm; b = 0.25 mm; c–f, i–k = 10 µm. – a–f from *R. citrino-pulverulenta*, type; g–k from *R. picacea*, type.

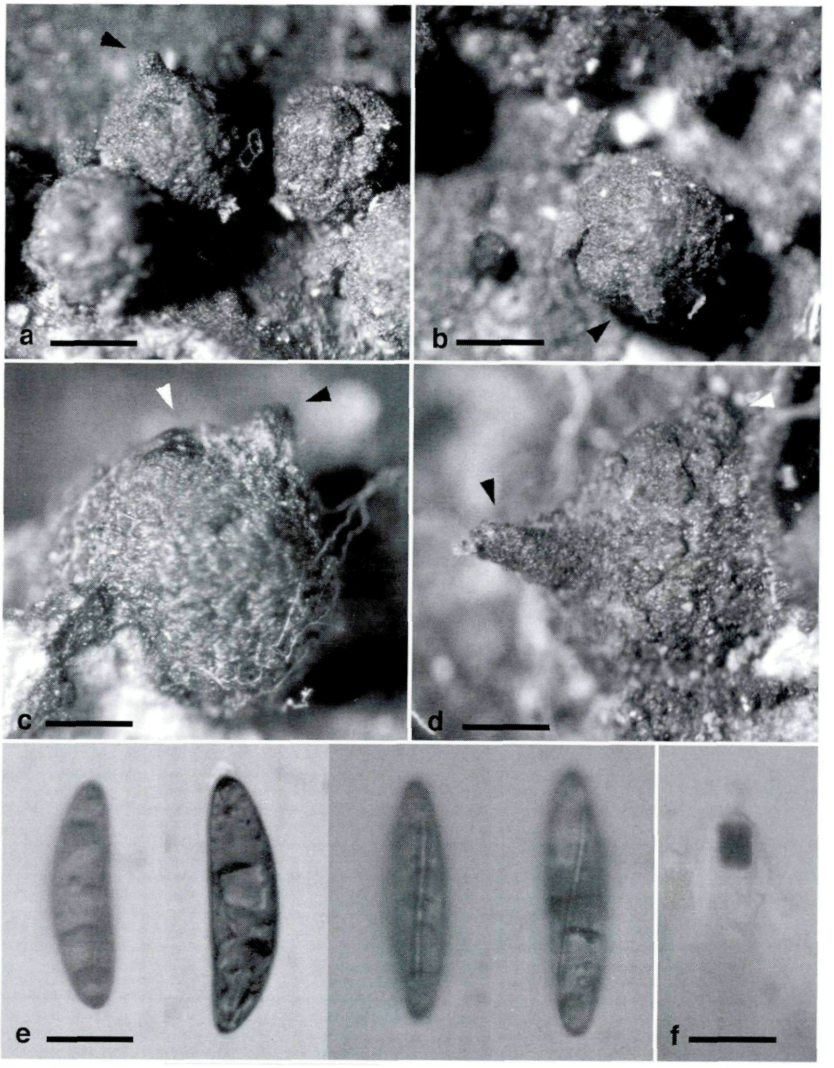


Fig. 7. *Stilbohypoxylon theissenii*. – a–d. Stromata with synnemata (black arrows), white arrows (c, d) pointing towards ostioles. – e. Ascospores. – f. Ascus apical ring. – Bars: a, b = 0.5 mm; c, d = 0.25 mm; e, f = 10 µm. – a–c, e, f from PACA 19060; d from PACA 19007 both as *R. bresadolae* var. *minor*.

cracks;, crowded, sometimes up to 6 fused together; ostioles finely papillate, seated in an up to 250 µm diam disk; ectostroma to 75 µm thick, black; entostroma cream to light brown, very thin at sides or completely absent. – Ascus apical ring 6–10 µm high, upper width 5–8 µm, lower width 4–7 µm (n = 20), J+ dark blue. – Asco-

spores (23.0–)28.0 ± 2.0(–34.0) × (10.0–)13.0 ± 1.0(–16.0) µm (95% CI: 27.5–28.5 × 13.0–13.5 µm; n = 170), inequilaterally ellipsoidal, dark brown, with sigmoid to spiral germ slit running over the whole spore length. – Conidiophores forming on squamules, up o 20 µm long, 2–3 µm wide, hyaline to light brown, arranged in palisades, pluriloculate. – Conidiogenesis holoblastic, sympodial. – Conidia 5.0–8.5 × 3.0–4.5 µm, subglobose to obovoid with truncate base, hyaline.

Specimens examined. – BRAZIL: São Leopoldo, 1939, Rick, PACA 19013, as *Rosellinia bresadolae*. – CENTRAL AFRICAN REPUBLIC: Oubangui-Chari, on *Coffea robusta*, A. M. Saccas 18, PC, as *R. didolotii*, authentic; *ibid.*, on *Hevea* sp., A. M. Saccas, PC, authentic. – COSTA RICA: San Pedro, University of Costa Rica Campus, 4.9.1964, G. C. Carroll 697, private herbarium Carroll, as *Rosellinia* sp. JAVA: Hort. Bogor, 23.02.1898, E. Nyman, S, ex herb. Sydow, as *R. citrino-pulverulenta*, type. – SINGAPORE: on bark, April 1896, Ridley, K, as *R. picacea*, type.

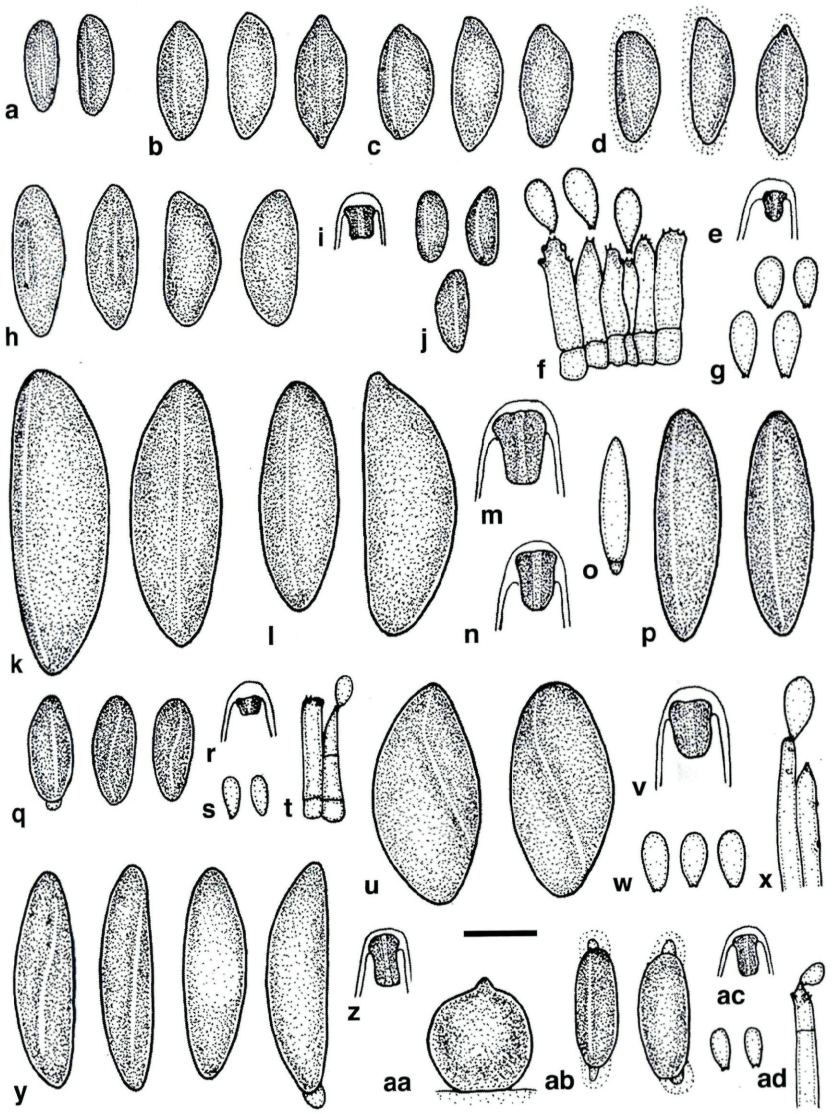
Hosts. – Monocotyledonous and dicotyledonous wood.

Distribution. – Worldwide in tropical and subtropical areas (Fröhlich & Hyde, 2000; Ju & Rogers, 1999; Rogers & Ju, 1997).

S. quisquiliarum is a very common, pantropical and subtropical species.

The two specimens collected and identified by Saccas as *R. didolotii* show the typical features of *S. quisquiliarum*. Saccas' (1956) description and illustration of *R. didolotii*, however, attribute a straight germ slit to the species, refer to a subiculum, and give a spore range between 26–37 × 11–14 µm. The specimens examined from PC seem to be the only material left by Saccas. It is probable that *R. didolotti* is a synonym of *S. quisquiliarum*.

Fig. 8. *Stilbohypoxylon* spp. – a. *S. coffeicola*, Ascospores, from type. – b–g. *S. elaeicola*. – b. Ascospores, from *R. elaeicola*, type. – c. Ascospores, from *R. cocoës*, Copeland, W. – d. Ascospores. – e. Ascus apical ring. – f. Conidiophores. – g. Conidia (d–g from W. Gams, 18.6.1998, ZT). – h, i. *S. hypoxylinum*. – h. Ascospores. – i. Ascus apical ring (h, i from type). – j. *S. ignobile*, Ascospores, from type. – k–p. *S. immundum*. – k. Ascospores, from *R. immunda*, type. – l. Ascospores. – m. Ascus apical ring (l, m from *R. bresadolae*, FH). – n. Ascus apical ring. – o. Immature ascospore. – p. Ascospores (n–o from *S. samuelsii*, isotype, WSP). – q–t. *S. novaezelandiae*. – q. Ascospores. – r. Ascus apical ring. – s. Conidia. – t. Conidiophores (q–s from PDD 49473). – u–x. *S. quisquiliarum*. – u. Ascospores. – v. Ascus apical ring. – w. Conidia. – x. Conidiophores (u–x from *R. picacea*, type). – y, z. *S. theissenii*. – y. Ascospores. – z. Ascus apical ring (y, z from *R. bresadolae* var. *minor*, lectotype). – aa–ad. *R. sancta-cruciana*. – aa. Stroma. – ab. Ascospores. – ac. Ascus apical ring. – ad. Conidia and conidiogenous cell (aa–ad from type, C). – Bar = 10 µm except for aa; aa = 0.5 mm.



10. *Stilbohypoxylon theissenii* L. E. Petrini, stat. et nom. nov. – Figs. 7, 8y–z.

Basionym: *Rosellinia bresadolae* var. *minor* Theissen, Ann. Mycol. 6: 351. 1908. Non *Stilbohypoxylon minus* Hladki & A. I. Romero, 2003.

Stromata 750–1000 µm high, 750–1000 µm wide (n = 20), globose, subglobose, dark brown to black, with dull, rugose surface covered with fine cracks, ostioles conical, integrated, with up to 625 µm long, conical synnemata on the upper part; ectostroma 25–50 µm thick, black, entostroma white, closely adherent to ectostroma. – Ascus apical ring 6–7 µm high, upper width 4.0–5.5 µm, lower width 3–5 µm (n=9), J+ dark blue. – Ascospores (22.0–)27.0 ± 2.0 (–33.0) × (7.0–)8.5 ± 1(–11.0) µm (95% CI: 26.5–27.5 × 8.0–8.5 µm; n = 110), narrowly inequilaterally ellipsoidal, brown to dark brown, rarely with 1 × 1 µm large subglobose cellular appendage, with central, 15–18 µm, straight to oblique germ slit.

Specimens examined. – BRAZIL: São Leopoldo, in ligno frondoso, 1907, Theissen, PACA 19060, lectotype, designated here, as *Rosellinia bresadolae* var. *minor*; *ibid.*, PACA 19009, as *R. bresadolae* var. *minor*; São Leopoldo, Rick, PACA 19007, as *R. bresadolae* var. *minor*; FH, herb. Theissen 4, as *R. bresadolae* var. *minor*.

Host. – Bark of dicotyledonous wood.
Distribution. – South America: Brazil.

Theissen (1908) assigned the rank of variety to this taxon. It differs, however, from *S. immunda* not only by spore size, but also by narrower ascospores with shorter germ slit as well as smaller stromata. For these reasons this taxon deserves species rank. As the epithet "*minus*" is not available, "*theissenii*" was chosen.

Four specimens exist, one in FH, three in PACA. The PACA specimens date all from 1907 and were collected at Sào Leopoldo. All packages contain inside a handwritten label. The one in PACA 19007 includes as well a description. The material in PACA 19060 and 19009 is from the same piece of wood broken up. The 19009 specimen is parasitized by a hyphomycete. Therefore the specimen PACA 19060 is designated as lectotype, as it is in far better condition than PACA 19007.

Discussion

Ascospore size and germ slit are the primary characters for differentiating *Stilbohypoxylon* species. *Stilbohypoxylon macrosporum* and *S. quisquiliarum* have ascospores with a spiral germ slit. Ascospores of *S. novae-zelandiae* have a predominantly sigmoid germ slit,

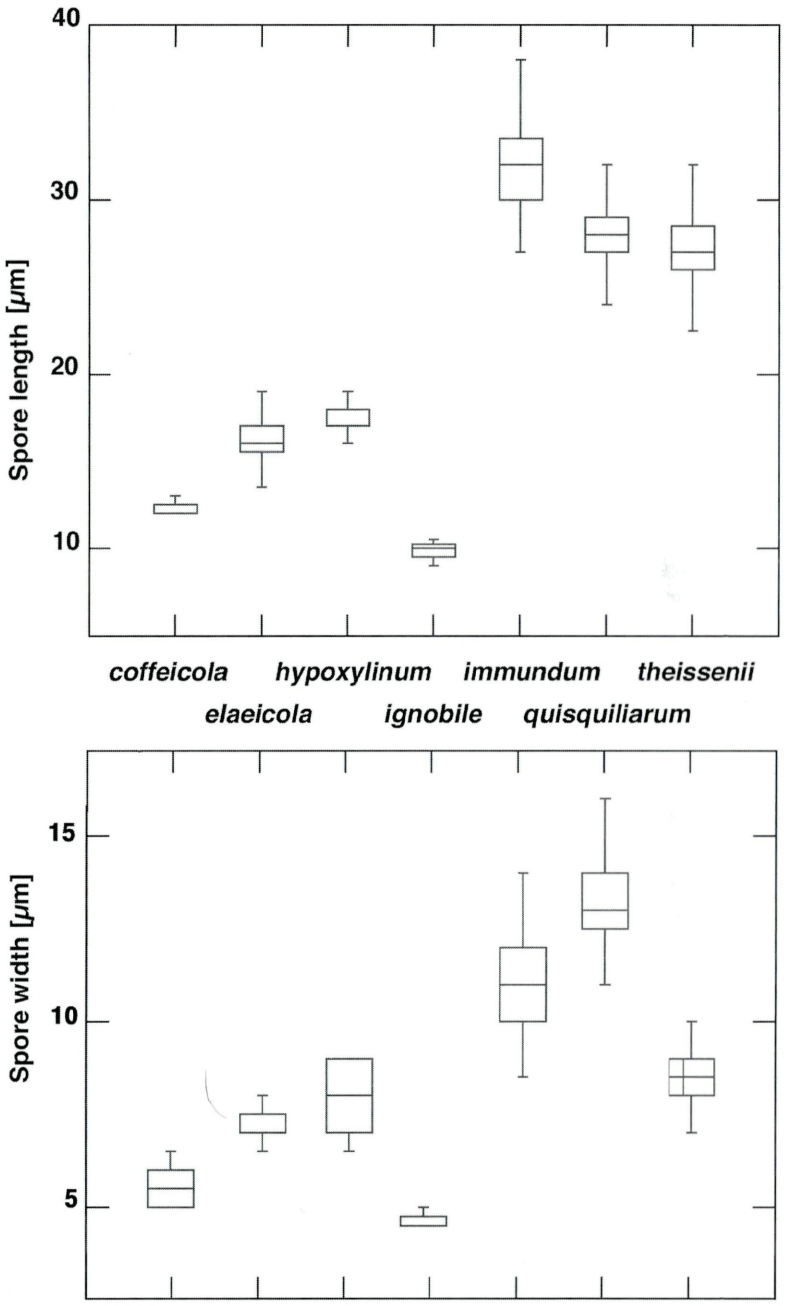


Fig. 9. – Box plots of ascospore length and width of *Stilbohypoxylon* spp. Line within box: median value; upper and lower lines: 75th, resp. 25th percentiles. Length of vertical bar indicates the 80% confidence interval of median.

whereas the slits of ascospores of *S. hypoxylinum* and *S. theissenii* are straight and shorter than the spore length. All other species have a straight germ slit running over the whole spore length.

Box plots of the median value with the 25th and 75th percentiles for the ascospore length and width as well as their 80% CI and are displayed in Fig. 9. *Stilbohypoxylon ignobile* has the smallest ascospores, being shorter than 10.5 µm. Ascospore length of *S. coffeicola* ranges between 11 and 13 µm. Ascospores measuring between 13 and 22 µm are observed for *S. elaeicola*, *S. hypoxylinum* and *S. novae-zelandia*. The species can readily be distinguished by germ slit morphology. Moreover, ascospores of *S. elaeicola* have slimy caps and a sheath on one side, whereas those of *S. novae-zelandiae* have often a cellular appendage. No such attributes were observed on ascospores of *S. hypoxylinum*. Ascospores of *S. immundum* are nearly equal in size to those of *S. macrosporum*, but differ from the latter by having a straight germ slit running over the whole spore length. Ascospore size of *S. minus* and *S. quisquiliarum* overlap, however, the two taxa are clearly distinguished by germ slit morphology. Ascospore length of *S. theissenii* is not statistically significantly different from those of *S. immundum*, *S. macrosporum*, *S. minus* and *S. quisquiliarum*. *Stilbohypoxylon theissenii* can be well recognised by ascospores with a straight to oblique germ slit terminating clearly before the spore ends and being narrower than those of the other species.

Acknowledgments

The keepers of the herbaria cited herein kindly provided type specimens to study. Egon Horak and Mrs Tanner, herbarium ZT, Zurich, Switzerland, handled these loans. Orlando Petrini, Comano, Switzerland, performed the statistical evaluations. Jack Rogers, Washington State University, Pullman, USA, carefully read and commented on the manuscript. The help and support of all these individuals are warmly acknowledged.

References

Fröhlich, J. & K. D. Hyde (2000). Palm microfungi. – Fungal Diversity Research Series: 3, 393pp.

Hladki, A. I. & A. I. Romero (2003). Two new species of *Stilbohypoxylon* and the taxonomic positions of *Hypoxylon cyclopicum*, *H. chionostomum* and *Anthostoma chionostoma*. – Sydowia 55: 65–76.

Ju, Y.-M. & J. D. Rogers (1999). The Xylariaceae of Taiwan (excluding *Anthostomella*). – Mycotaxon 73: 343–440.

Læssøe, T. & B. M. Spooner (1994). *Rosellinia* & *Astrocystis* (Xylariaceae): New species and generic concepts. – Kew Bulletin 49: 1–70.

Petrini, L. E. (2003). *Rosellinia* and related genera in New Zealand. – New Zealand J. Bot.: 41: 71–138.

Rogers, J. D. & Y.-M. Ju (1997). The genus *Stilbohypoxylon*. – Mycol. Res. 101: 135–138.

Saccas, A. M. (1956). Les *Rosellinia* des cafétiers en Oubangui-Chari. – L'Agronomie Tropicale 11 : 596–613.

Smith, G. J. D. & K. D. Hyde (2001). Fungi from palms. XLIX. *Astrocystis*, *Biscogniauxia*, *Cyanopulvis*, *Hypoxylon*, *Nemania*, *Guestia*, *Rosellinia* and *Stilbohypoxylon*. – Fungal Diversity 7: 89–127.

Theissen, (1908). Novitates riograndenses, Rio Grande do Sul, Brasilia. – Ann. Mycol. 6: 341–352. 1908.

(Manuscript accepted 2nd January 2004)