

**Figs. 464–483.** Stromata of *Hypocrea* species. 464. *H. albocornea* (Isotype). 465. *H. atrogelatinosa* (Holotype). 466. *H. aureoviridis* (CBS 103.69). 467. *H. candida* (Holotype). 468. *H. catoptron* (G.J.S. 02-76). 469. *H. centristerilis* (Isotype). 470. *H. ceracea* (Holotype). 471. *H. ceramica* (G.J.S. 88-70). 472. *H. chlorospora* (G.J.S. 91-150). 473. *H. chromosperma* (Epitype). 474. *H. cinnamomea* (Holotype). 475. *H. clusiae* (Holotype). 476. *H. cornea* (Holotype). 477. *H. costaricensis* (Holotype). 478. *H. crassa* (G.J.S. 01-227). 479. *H. cremea* (Holotype). 480. *H. cuneispora* (Holotype). 481. *H. estonica* (Holotype). 482. *H. gelatinosa* (Epitype). 483. *H. gyrosa* (Holotype). Bars = ca. 1 mm. 471, 479–481. Adapted from Chaverri *et al.* (2003a) with permission from Mycologia.

**Excluded or doubtful species reported to have green ascospores**

**1. *Hypocrea andinogelatinosa*** Yoshim. Doi, Bull. Natl. Sci. Mus., Ser. B (Bot.) 1: 20 (1975).

Holotype and paratype specimens of this species deposited in TNS were not available for examination. Doi (1975) distinguished *H. andinogelatinosa* as having a small brownish stroma with prominent perithecial protuberances. The distal part-ascospores were described as subglobose-obovate,  $4.5\text{--}6.7 \times 4.2\text{--}5.7 \mu\text{m}$ ; and the proximal part-ascospores as obovate,  $5.0\text{--}7.3 \times 3.6\text{--}5.0 \mu\text{m}$ . This species is distributed in Colombia and Brazil. The species resembles *H. tuberosa*, which is described in the present study.

**2. *Hypocrea dacrymycella*** Cooke & Plowr., Grevillea 12: 100 (1884).

The original protologue mentions this species as having green ascospores. The type specimen deposited in K is immature and no asci or ascospores were found. The stroma of *Hypocrea dacrymycella* resembles that of *H. viscidula* Phill. & Plowr.. The label of the type of *H. viscidula* indicates that it was also collected from fir in Brandon, England.

**3. *Hypocrea dichromospora*** Yoshim. Doi, Bull. Natl. Sci. Mus. Tokyo 11: 185 (1968).

The type specimen and cultures of *H. dichromospora* were not available from TNS. Based on Doi's description (Doi 1968), *H. dichromospora* is similar to *H. phyllostachydis*. The main differences between *H. phyllostachydis* and *H. dichromospora* are in color of the stroma and size of conidia and ascospores. The stromata of *H. dichromospora* are described as being pale yellowish brown, patellate; part-ascospores dimorphic, green, roughened, subglobose or ovoid,  $3.9\text{--}5.3 \times 3.6\text{--}3.9 \mu\text{m}$ .

**4. *Hypocrea palmicola*** Berk. & Br., J. Linn. Soc. Lond. 14: 112 (1875).

≡ *Creopus palmicola* (Berk. & Broome) Boedijn, Sydowia 5: 211 (1951).

*Holotype. Sri Lanka*, on palm leaves, #42 (K). Although *H. palmicola* was originally described as being found on a palm leaf, stromata of the type specimen are actually on decorticated wood; they are mostly immature. The stromata are brown to brownish gray, somewhat similar to those of *H. rugulosa*.

**5. *Hypocrea pseudogelatinosa*** Komatsu & Yoshim. Doi, Rept. Tottori Mycol. Inst. (Japan) 10: 425 (1973).

*Hypocrea pseudogelatinosa* was reported as having yellow or yellow-brown stromata and green ascospores; distal part-ascospores subglobose or obovate,  $3.8\text{--}4.7 \times 3.7\text{--}4.0 \mu\text{m}$ ; proximal part-ascospore  $3.9\text{--}4.8 \times 2.8\text{--}3.6 \mu\text{m}$ . Conidiophores verticillium- to gliocladium-like; phialides  $8\text{--}18 \times 2\text{--}3 \mu\text{m}$ ; conidia green, ellipsoidal  $2.5\text{--}5.0 \times 2.1\text{--}3.2 \mu\text{m}$ ; abundant production of chlamydospores (Doi 1973a).

The description of this species suggests *H. cinnamomea*/T. *cinnamomeum*; the only difference is in the size of the conidia and production of chlamydospores. *Hypocrea cinnamomea*/T. *cinnamomeum* has broader conidia than *H. pseudogelatinosa* and none of the isolates of *H. cinnamomea* studied produced chlamydospores.

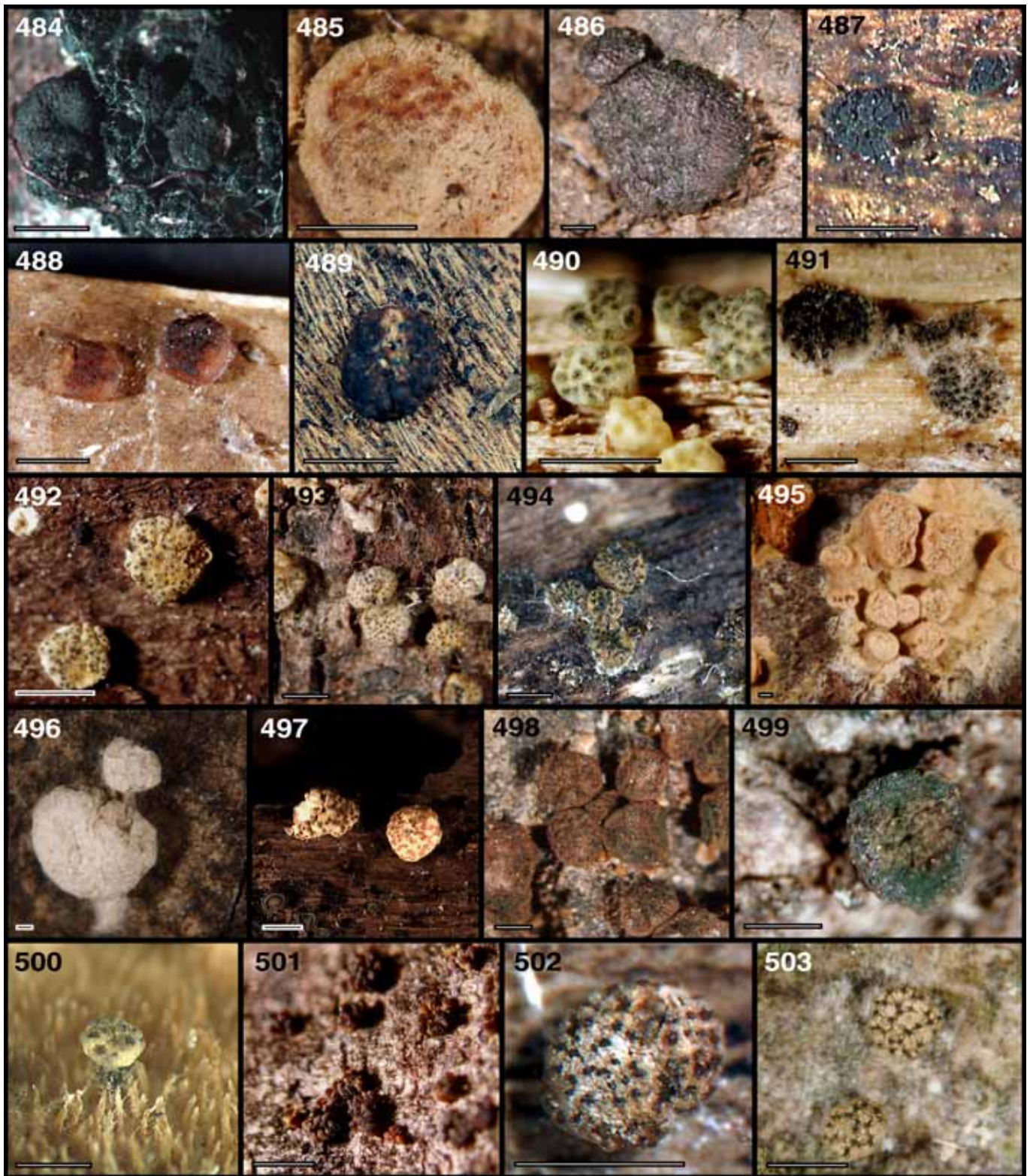
These two species may be synonyms; but, because type specimens and cultures are not available from TNS, they must remain as separate species. *Hypocrea pseudogelatinosa* was collected in Japan while *H. cinnamomea* is described from Taiwan.

**6. *Hypocrea subalbocornea*** Yoshim. Doi, Mem. Nat. Sci. Mus. Tokyo 6: 68 (1973).

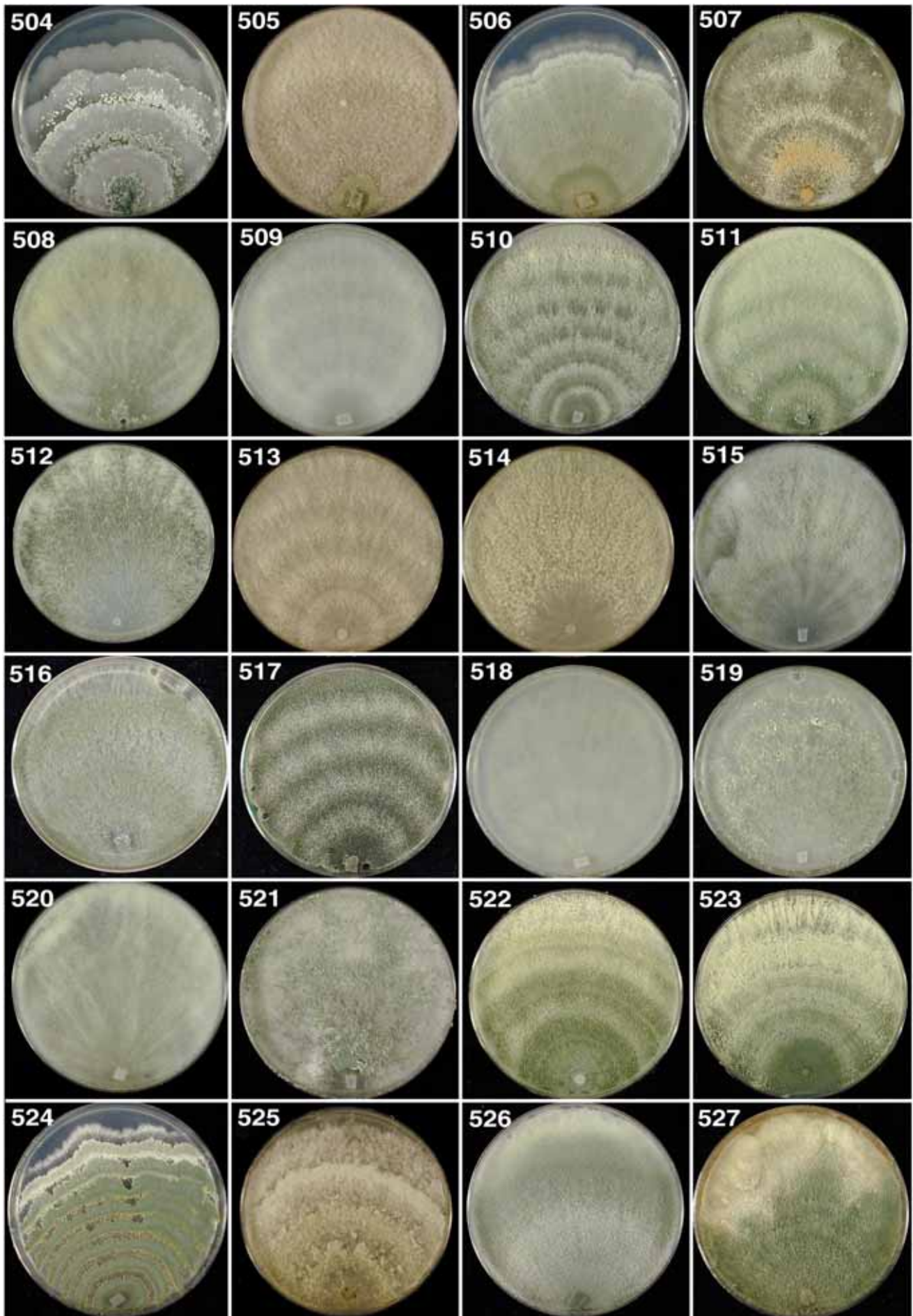
Type specimens and cultures of *H. subalbocornea* were not available for examination from TNS. Doi (1973b) described *H. subalbocornea* as having white or pale yellow disciform stromata; green, warted ascospores; distal part-ascospores subglobose or obovate,  $2.2\text{--}4.0 \times 1.9\text{--}3.6 \mu\text{m}$ ; proximal part-ascospores obovate or subcylindrical,  $2.3\text{--}4.5 \times 2.0\text{--}2.9 \mu\text{m}$ . Conidiophores verticillium- to trichoderma-like; phialides  $6\text{--}8 \times 2\text{--}2.5 \mu\text{m}$ ; conidia ellipsoidal, green,  $2.2\text{--}2.8 \times 1.8\text{--}2.2 \mu\text{m}$ . Doi (1973b) noted that *H. subalbocornea* resembled *H. albocornea*, and that *H. subalbocornea* could be distinguished by its smaller stromata and ascospores and by the anamorph morphology. *Hypocrea subalbocornea* was described from Japan.

**7. *Hypocrea subatrogelatinosa*** Yoshim. Doi, Bull. Natl. Sci. Mus. 15: 718 (1972).

The type specimen and cultures were not available from TNS. Doi (1972) described *H. subatrogelatinosa* as having pulvinate, greenish black stromata, with surface strongly roughened and perithecial protuberances; ascospores green, minutely warted; distal part-ascospores obovate to subglobose,  $2.8\text{--}4.2 \times 2.6\text{--}3.7 \mu\text{m}$ ; proximal part-ascospores obovate to subcylindrical,  $3.0\text{--}4.5 \times 2.4\text{--}3.0 \mu\text{m}$ ; the culture did not produce conidiophores or conidia.



**Figs. 484–503.** Stromata of *Hypocrea* species. 484. *H. lixii* (G.J.S. 90-22). 485. *H. macrospora* (Holotype). 486. *H. melanomagna* (Holotype). 487. *H. nigrovirens* (Holotype). 488. *H. phyllostachydis* (Holotype). 489. *H. rugulosa* (Holotype). 490. *H. sinuosa* (Holotype). 491. *H. spinulosa* (Holotype). 492. *H. straminea* (Holotype). 493. *H. strictipilosa* (G.J.S. 97-196). 494. *H. strictipilosa* (G.J.S. 95-163). 495. *H. substipitata* (Holotype). 496. *H. sulawesensis* (Holotype). 497. *H. surrotunda* (Holotype). 498. *H. tawa* (Holotype). 499. *H. thailandica* (Holotype). 500. *H. thelephoricola* (Holotype). 501. *H. tuberosa* (Holotype). 502. *H. virens* (Holotype). 503. *H. virescentiflava* (P.C. 278). Bars = ca. 1 mm. 487, 490, 498, 502. Adapted from Chaverri *et al.* (2001a, b, 2003a, 2004) with permission from Mycologia and Mycological Progress.



8. *Hypocrea tropicosinensis* P.G. Liu, Mycotaxon 136: 278 (2003).

This species was published too late to be included in the present study. Liu *et al.* (2003) described this species as having gray brown to black brown stromata, 0.5–1.2 mm diam; ascospores green, warted; the distal part-ascospores subglobose to ovoid, 4.0–5.4 × 3.9–4.6 μm, the proximal part-ascospore ovoid to subcylindrical, 5.0–7.5 × 3.8–4.5 μm. They also mention that the anamorph is of the “*Gliocladium deliquescens* series-type” (= *G. viride*); phialides 9.5–18.0 × 1.5–2.9 μm; conidia green, smooth, elongate oblong, subcylindrical, oblong-cylindrical, obovate or obovate-subglobose, 3.9–9.3 × 2.3–4.0 μm. It was collected in China. Type specimens are deposited in HKAS and TNS. This species is distinct from the species treated in the present study.

9. *Hypocrea viscidula* Phill. & Plowr., Grevillea 13: 79 (1885).

*Holotype*. U.K., Brandon, on bark of fir(?), 7 Nov. 1881, C.B. Plowright (K 114742).

*Hypocrea viscidula* was originally described as having green ascospores. However, the type specimen is immature; no asci or ascospores were observed. This specimen is similar to *H. dacrymycella*.

10. *Hypocrea viridis* (Tode:Fr.) Peck, Annual Rep. N.Y. State Mus. Nat. Hist. 31 : 49 (1879).

≡ *Sphaeria gelatinosa* f. *viridis* Tode, Fungi Mecklenb. 2: 49 (1791).

The original specimen of *H. viridis* (= *Sphaeria viridis* Tode) is lost. Because the protologue of *H. viridis* is not informative and there is no original specimen of *H. viridis*, we consider this name obsolete. In addition, this name could cause confusion because the

teleomorph of *T. viride* Pers. : Fr. is *H. rufa* (Pers. : Fr.) Fr.

11. *Chromocrea leucostroma* Saccas, Bull. IFCC 16: 78 (1981). Nom. inval. ICBN Art. 37.

*Chromocrea leucostroma* was described growing on dead stems of *Coffea robusta* in Central Africa. This specimen was not examined.

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**Figs. 504–527.** Colonies of *Hypocrea* species on PDA at 25 °C after ca. 10 d. 504. *H. candida* (Holotype). 505. *H. catoptron* (G.J.S. 02-76). 506. *H. ceracea* (G.J.S. 88-28). 507. *H. ceramica* (G.J.S. 88-70). 508. *H. chlorospora* (G.J.S. 98-1). 509. *H. chromosperma* (G.J.S. 91-128). 510. *H. cinnamomea* (Holotype). 511. *H. crassa* (Ex-type *T. crassum*). 512. *H. cremea* (Holotype). 513. *H. cuneispora* (Holotype). 514. *H. estonica* (Holotype). 515. *H. gelatinosa* (G.J.S. 88-17). 516. *H. lixii* (Ex-neotype of *T. harzianum*). 517. *H. melanomagna* (Holotype). 518. *H. nigrovirens* (Holotype). 519. *H. phyllostachydis* (Holotype). 520. *H. sinuosa* (Holotype). 521. *H. straminea* (Holotype). 522. *H. strictipilosa* (Ex-type of *T. strictipile*). 523. *H. surrotunda* (Holotype). 524. *H. tawa* (G.J.S. 02-79). 525. *H. thailandica* (Holotype). 526. *H. thelephoricola* (Holotype). 527. *H. virens* (Ex-type of *T. virens*). 507, 511–514, 518, 519, 522, 523, 527. Adapted from Chaverri *et al.* (2001a, b, 2003a, 2004) with permission from Mycologia and Mycological Progress.

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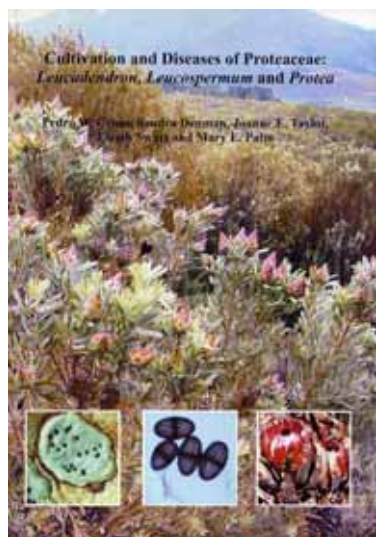
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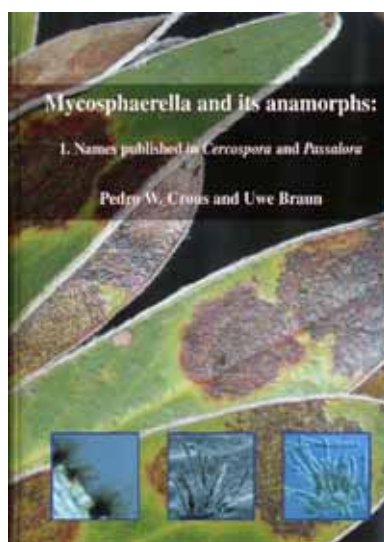


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P. W. Crous, S. Denman, J. E. Taylor, L. Swart & M. E. Palm

The *Proteaceae* represent one of the Southern Hemisphere's most prominent flowering plant families, the cultivation of which forms the basis of a thriving export industry. Diseases cause a loss in yield, and also limit the export of these flowers due to strict phytosanitary regulations. In this publication the fungi that cause leaf, stem and root diseases on *Leucadendron*, *Leucospermum* and *Protea* are treated. Data are provided pertaining to the taxonomy, identification, host range, distribution, pathogenicity, and control of these pathogens. Taxonomic descriptions and illustrations are provided and keys are included. Disease symptoms are described, and illustrated with colour photographs.

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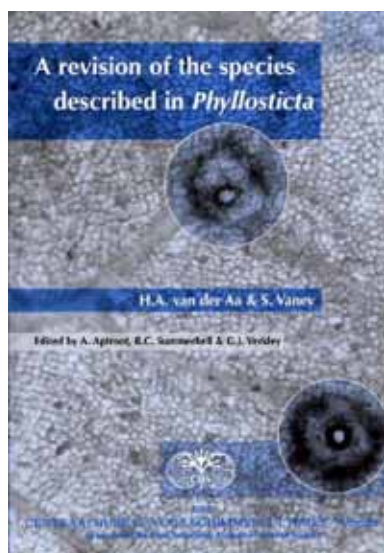


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P. W. Crous & U. Braun

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H. A. van der Aa & S. Vanev  
(A. Aptroot, R. C. Summerbell & G. J. Verkley, eds.)

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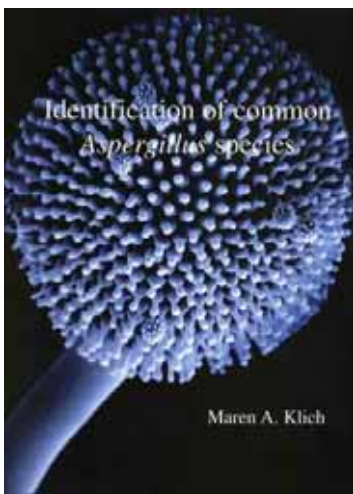


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