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Fungi from palms. XLIX. Astrocystis, Biscogniauxia, Cyanopulvis, Hypoxylon, Nemania, Guestia, Rosellinia and Stilbohypoxylon

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The xylariaceous genera Astrocystis, Biscogniauxia, Cyanopulvis, Guestia gen. et sp. nov., Hypoxylon, Nemania, Rosellinia and Stilbohypoxylon from palms are discussed and 16 species are described and illustrated. Three new species of Astrocystis and one new species each of Guestia and Nemania are described, and two species of Hypoxylon are transferred to Nemania.

Key words: new genus, palm fungi, taxonomy, Xylariaceae.

Introduction

The xylariaceous genera Astrocystis, Biscogniauxia, Cyanopulvis, Hypoxylon, Kretzschmaria, Nemania, Rosellinia, Stilbohypoxylon and Xylaria have been recorded on palms (Fröhlich and Hyde, 2000). In this paper rosellinoid and hypoxyloid members are treated based on herbarium specimens and fresh material collected mainly by the senior author. Xylaria and Kretzschmaria will be dealt with in other contributions. One species could not be accommodated in any existing xylariaceous genus and is introduced as a new monotypic genus Guestia.

Palm litter is a major component of many lowland rainforests, but despite this, comparatively few xylariaceous fungi, at least based on the literature record, seem to utilise this substrate. The genera Anthostomella, Fasciatispora and Nipicola are exceptions to the rule (Hyde, 1996; Lu and Hyde, 2000). These genera are, however, mostly confined to monocotyledonous hosts. San Martín Gonzáles and Rogers (1993, 1995) did not record a single member of Biscogniauxia or Rosellinia from palm material in Mexico, whilst Rogers et al. (1987) only reported three species of Hypoxylon and one species of Kretzschmaria from North Sulawesi.

Collections of Astrocystis, Hypoxylon and Rosellinia-like species on palms were made in Australia, Brunei, Ecuador, Indonesia (Irian Jaya and Java), Malaysia, Papua New Guinea and The Philippines. The type material of taxa
within these genera, which have been described from palms, were also examined. Six species of *Astrocystis* and three species of *Hypoxylon*, four species of *Nemania* and one species of *Rosellinia* recorded from palms are accepted, including three new *Astrocystis* species and one new species of *Nemania*. One species each of *Biscogniauxia*, *Cyanopulvis*, *Guestia* gen. nov., and *Stilbohypoxylon* from palms are also accepted.

**Materials and methods**

Field collections of *Hypoxylon*-like species on palms were made in Australia, Brunei, Ecuador, Indonesia, Malaysia, Papua New Guinea and The Philippines. Herbarium material was borrowed from CP, CUP, FH, GA, HKU(M), IMI, K, PC and S. All measurements cited in this paper were made in water.

**Taxonomy**

*Astrocystis* Berk. and Broome, Journal of the Linnean Society, Botany 14: 123 (1873).

For a diagnosis of this genus and a key to species see Læssøe and Spooner (1994).

*Type species:* *Astrocystis mirabilis* Berk. and Broome.

*Anamorph:* *Acanthodochium*.

*Habitat:* Saprobic on various monocotyledonous plants.

*Distribution:* Mostly pantropical (also France, Japan and UK).

*Astrocystis* is a typical member of the *Xylariaceae*, and is only likely to be confused with other genera therein. *Rosellinia* is the most similar genus in overall morphology. *Astrocystis* is treated by Petrini (1992) and Læssøe and Spooner (1994) as being distinct from *Rosellinia*, although this stance is not followed by Ju and Rogers (1990, 1996), who treat both *Astrocystis* and *Helicogermisita* as synonyms of *Rosellinia*. Læssøe and Spooner (1994) considered the differences in ascus apparatus, ascus stipe length, and the form of the anamorph to be the most striking differences between *Astrocystis* and *Rosellinia*. The ascus apparatus of *Astrocystis* is small, with parallel or tapered sides, whereas in *Rosellinia* the ascus apparatus is massive and generally barrel-shaped (Læssøe and Spooner, 1994). Also, in *Rosellinia*, the asci typically have a long, tapered stipe, whereas in *Astrocystis* the ascus stipe is comparatively short (Læssøe and Spooner, 1994). Of greater importance, however, is the form of the anamorphs of the two genera, which is considered to be of great importance in generic delimitation of the *Xylariaceae* (Ju and Rogers, 1996). The anamorphs of *Astrocystis* can be assigned to the form genus *Acanthodochium* (Samuels et al.,
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1987) which is unique among the *Xylariaceae* (Ju and Rogers, 1990; Læsøe, 1994; Læsøe and Spooner, 1994), while the anamorphs of *Rosellinia* are referable to the form genera *Dematophora* and *Geniculosporium* (Petrini, 1992; Læsøe, 1994; Læsøe and Spooner, 1994; Ju and Rogers, 1999). With these differences in anamorphs, it is curious that Ju and Rogers (1990) chose to synonymise *Astrocystis* with *Rosellinia* given that the same authors reinstated the monotypic genus *Kretzschmariella* from *Hypoxylon*, based primarily on the form of the anamorph (Ju and Rogers, 1994). Ju and Rogers (1990) also observed a pattern of development in *Astrocystis* that is different to that observed in *Rosellinia*. As such, we prefer to maintain *Astrocystis* as a separate entity from *Rosellinia*.

*Astrocystis* is a genus confined to monocotyledons and is characterised by uni-, few or rarely multi-peritheciate stromata which are erumpent through the host epidermis or alternatively, which develop beneath the host cuticle and appear superficial. The stromata, like those of most members of the *Xylariaceae*, can be divided into an outer ectostroma, which normally functions in producing conidia, and an inner entostroma which develops under the ectostroma and bears the perithecia at its periphery (Martin, 1967; Hawksworth and Lodha, 1983). In *Astrocystis* the stromata surface may be smooth or the ectostroma may split into lobes forming a star-like pattern. There is no subiculum of hyphae around the fruiting bodies and the entostroma is sparse and carbonised throughout (Læsøe, 1994).

*Astrocystis* species have cylindrical-clavate asci that are rounded at the apex and taper downwards to a short stipe, less than 1/2 the length of the spore bearing part (Læsøe, 1994). The ascal ring is relatively small, amyloid, and may have parallel sides or taper towards the base (Læsøe and Spooner, 1994). Ascospores are ellipsoidal or beaked at one or both ends, inequilateral, dark brown, and unicellular, but in most (all?) cases unequally bicellular when immature (the smaller cell is called the “primary appendage”) (Læsøe and Spooner, 1994). The ascospores are usually surrounded by a thin gel sheath, and sometimes have secondary appendages. The germ slit is straight, of various lengths and typically on the flattened side of the ascospore (Læsøe and Spooner, 1994).

*Astrocystis* species have conical or mammiform, black, erumpent structures, which bear conidia at the apex. The perithecial stromata develop beneath these structures and grow up through them (Læsøe and Spooner, 1994).

*Astrocystis mirabilis* Berk. and Broome, the type of the genus, was described from bamboo, as was the second accepted species, *A. sublimata* (Durieu and Mont.) S. Hughes (Læsøe and Spooner, 1994). Twelve more
species have been added to the genus by Læssøe and Spooner (1994), and a further three by Dulymamode et al. (1998).

**Key to taxa of Astrocystis treated**

1. Stromata splitting stellately ......................................................... 2
   1. Stromata not splitting stellately .................................................. 3

2. Ascospores (13-21 × 5-10 μm) with thin mucilaginous sheath and pad-like polar appendages
   ..................................................................................................... *A. cocoes*
2. Ascospores (8.4-9.6 × 3.3-4.5 μm) lacking thin mucilaginous sheath and appendages
   ..................................................................................................... *A. nypae*

3. Ascospores less than 4 μm wide, ellipsoidal, with germ slit c. 4/5 total length........ *A. rachidis*
3. Ascospores greater than 4 μm wide.................................................... 4

4. Ascospores greater than 15 μm long, inequilaterally ellipsoidal, slightly convex on flattened side, a minute hyaline germ pore at one end, with full length germ slit on flattened side..................... *A. selangorensis*
4. Ascospores less than 15 μm long..................................................... 5

5. Ascospores (12.5-15 × 6.5-8.5 μm) slightly inequilaterally ellipsoidal, with full length germ slit on flattened side ......................... *A. palmarum*
5. Ascospores (10-12.5 × 5-6.7 μm) slightly inequilaterally ellipsoidal or not, with full length germ slit.................................................................................................................. *A. rudis*

**Species recorded from palms**


= *Rosellinia cocoës* Henn., Hedwigia 47: 256 (1908).
= *Rosellinia sanctacruziana* Ferd. and Winge, Botanisk Tidsskrift 29: 16 (1908).

**Stromata** erumpent, with 1 ascoma, solitary or gregarious, not or somewhat confluent, black, almost conical with a round apex, 510-800 × 700-980 μm, with or without a discoid base (up to 1300 μm diam.), stromatic wall layer thick and strongly carbonised, with an outer stellate layer; surface scurfy and with adhering persistent pale squamules from host cuticle, apex smooth and sometimes almost annulate with a minutely papillate ostiole; young erumpt stromata with host surface splitting into a star-like pattern with c. 10 rays; ascomata spherical in outline, c. 800 μm diam. **Paraphyses** to 3.5 μm diam. hypha-like, remotely septate, irregular and embedded in a gelatinous matrix. **Asci** 8-spored, spore bearing part cylindrical, 107-116 × 8-9.2 μm, stipe short and tapering, up to 43 μm long, apically rounded, with a discoid, subapical, J+ ring, 2.5-3.1 (-3.8) μm high, 2.5-3.1 μm diam, with sides tapering to the base. **Ascospores** 13-17.5 (-21) × 5-6.25 (-10) μm, overlapping uniseriate, dark reddish-brown, inequilaterally

fusiform, with one or both ends beaked, flattened side slightly convex, germ slit on flattened side, c. 4/5 of total length, with thin mucilaginous sheath and pad-like polar appendages.

**Anamorph:** Unknown.

**Known distribution:** Australia, Philippines, Virgin Islands (and possibly Brazil and India, Læssøe and Spooner, 1994).

**Known palm hosts:** Calamus, Cocos.

**Material examined:** AUSTRALIA, north Queensland, near Mossman, Rex Range, on dead rattan of Calamus sp., July 1992, K.D. Hyde [HKU(M) 1052]; PHILIPPINES, Mindanao, Davao, on dead leaves of Cocos nucifera L., March 1904 (1906 in Hennings), E.B. Copeland 456 [K, isotype of Rosellinia cocoës]; VIRGIN ISLANDS, St Croix, Jolly Hill, on rachis of Cocos nucifera, Raunkiær, 21 January 1906 [CP, holotype of Rosellinia sanctacruciana].

**Notes:** In the Australian collection the stromata differ in being irregularly mammiform, 850-2000 μm diam. 300-420 μm high with a discoid base (Figs. 8, 9). Asci are 120-160 × 9-12 μm (total length), with a J+ ring, 4-5 μm high and 3-3.5 μm diam. (Figs. 15, 16). Ascospores are 16-21 × 7-10 μm (Figs. 10-14). In type material of *Rosellinia sanctacruciana* ascospores are 15-19 × 6-7 μm (Figs. 17-25). However, as the ascal ring, ascospore shape and appendage morphology are similar, we consider these taxa to be conspecific. For further collections and notes on this species see Læssøe and Spooner (1994).

*Astrocystis nypae* G.J.D. Smith and K.D. Hyde, sp. nov. (Figs. 26-34)

*Astrocystis cocoës* (Henn.) Læssøe and Spooner similis sed ascosporae 8.4-9.6 × 3.3-4.5 μm differt.


*Etymology:* In reference to the host of the type specimen, *Nypa fruticans.*

*Stromata* erumpent, with 1 ascoma, solitary or gregarious, not or somewhat confluent, black, mammiform, 300-400 μm high × 400-600 μm diam., with a discoid base (up to 900 μm diam.), stromatic wall layer thick and strongly carbonised, with an outer stellate layer; surface smooth, apex smooth with a minutely papillate ostiole; ascomata subglobose to spherical in outline, c. 400 μm

diam. *Paraphyses* to 3-4.5 μm diam. hypha-like, remotely septate, irregular and embedded in a gelatinous matrix. *Asci* 8-spored, spore bearing part cylindrical, 100-120 × 5-7.2 μm, stipe short and tapering, up to 30 μm long, apically rounded, with a stopper-shaped, subapical, J+ ring, 0.8-1.2 μm high, 2.5-3.1 μm diam. *Ascospores* 8.4-9.6 × 3.3-4.5 μm, overlapping uniseriate, golden-brown, ellipsoidal, germ slit c. 4/5 of total length, apparently lacking a mucilaginous sheath and appendages.

*Anamorph*: Unknown.

*Known distribution*: Malaysia.

*Known palm hosts*: Nypa.

Material examined: MALAYSIA, Kuala Selangor, on intertidal frond of *Nypa fruticans*, October 1991, K.D. Hyde [HKU(M) 1626, here designated the holotype].

Notes: This species is well placed in *Astrocystis* due to the possession of a small J⁺ apical ring with sides tapering to the base, a short tapering ascal stipe, and a carbonised stromatal discoid base. It also lacks the subiculum of *Rosellinia*.

*Astrocystis nypae* is characterised by small ascospores combined with the shape and size of the apical apparatus and the lack of a mucilaginous sheath or appendages on the ascospores. The ascospores of *A. nypae* are much smaller than those of any of the accepted species, being most similar to *A. bambusae* (Henn.) Læsøe and Spooner (10.5-15 × 4-6 μm). There is little difference in gross ascus morphology within the genus. The apical ring of *A. nypae* however, is distinctive.
as the apical rings of the accepted species are apically flared, with the exception of *A. cocoës*. The apical apparatus of *A. cocoës* (2.5-3.8 × 2.5-3.1 μm) is much larger than that of *A. nypae*. *Astrocystis hughesii* Læssøe and Spooner, *A. rachidis* J. Fröhl. and K.D. Hyde and *A. smilacicola* (Schwein. in Fr.:Fr.) Læssøe and Spooner are the only taxa additional to *A. nypae* that lack both a hyaline sheath and any appendages on the ascospores. This however, is the only similarity that exists between the three taxa. *Astrocystis cocoës* is the most similar to *A. nypae* in gross morphology and it also occurs on members of *Palmae*. The ascospores of *A. cocoës* are also inequilateral, but are broadly fusiform with beaked ends and larger (15-21 × 6.5-8.5 μm), quite distinct from *A. nypae*.

Of the remaining five taxa that Læssøe and Spooner (1994) provisionally placed in *Astrocystis*, *Hypoxylon culmorum* has been transferred to *Kretzschmariella culmorum* (Cooke) Y.-M. Ju and Rogers (Ju and Rogers, 1994), and *Hypoxylon* 'kurzianum' Currey has been synonymised with *A. bambusae* (Ju and Rogers, 1996, as *Rosellinia bambusae* Henn.). The remaining taxa are of uncertain taxonomy and differ substantially from *A. nypae*.

Of three species described on *Pandanus* from Mauritius (Dulymamode et al., 1998), *A. fimbrata* possesses a conical mucous appendage, while *A. rarissima* and *A. cepiformis* differ primarily on ascospore morphology. *Astrocystis nypae* also differs from these three taxa on stromatic characters (Dulymamode et al., 1998).


(Figs. 35-48)

*Stromata* with 1-2 ascomata, clustered, with vertical sides and subconical apex, 1200-1500 μm diam., ca.1000 μm high, outer carbonised ectostroma forming a discoid base; with relatively conspicuous papillate ostiole, with a ± raised annulate area, ascomata 700-900 μm diam. × 600 μm high, pyriform. *Peridium* to 20 μm wide, composed of several layers of light brown-walled flattened cells, hyaline inwardly. *Asci* and paraphyses forming from the base and sides of the ascomata. *Paraphyses* to 5 μm diam. hypha-like, remotely septate and irregular. *Asci* 8-spored, spore bearing part cylindrical, 86-96 × 8-9 μm, stipe tapering, 33-52 μm long, apically rounded with a discoid, subapical J+ ring, 1.6 μm high, 2.4-2.8 μm diam. *Ascospores* 12.5-15 × 6.5-7.5 (-8.5) μm, overlapping uniseriate, dark reddish-brown, subopaque, (slightly) inequilaterally ellipsoidal, germ slit on flattened side, full length, a thin mucilaginous sheath noted on some ascospores, appendages not observed.

*Anamorph*: Unknown.
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**Known distribution:** Bermuda.

**Known palm hosts:** Unidentified palm.

**Material examined:** BERMUDA, Warwick, Fruitlands, on fallen palm petiole, 1 August 1921, H.H. Whetzel, Bermuda fungi 106 [FH and K, isotypes].

**Notes:** This specimen is undoubtedly *A. palmarum*. For a discussion on affinities see Læssøe and Spooner (1994). See also notes under *A. rudis*.


**Stromata** with 1-2 ascomata, clustered, with vertical sides and subconical apex, 520-1000 µm diam. 280-500 µm high, outer carbonised ectostroma forming a +/- discoid base (up to 2000 µm diam.), many surrounded by a superficial white mycelium, with relatively inconspicuous papillate ostiole; in section to 40 µm wide, composed of black-walled globose cells interspersed with *textura intricata*; ascomata c. 400 µm diam. **Peridium** to 30 µm wide, composed of brown-walled elongate globose cells and *textura intricata*. **Paraphyses** to 5 µm at the base, hypha-like, septate, irregular and tapering. **Asci** 8-spored, spore bearing part cylindrical, 44-70 × 4-5 µm, stipe tapering, up to 60 µm long, apically rounded, with a stopper-shaped, subapical, J+ ring, 1-2.5 µm high, 2-2.5 µm diam. **Ascospores** 6.25-10 × 2.5-4 µm, overlapping uniseriate, brown, subopaque, ellipsoidal, germ slit c. 4/5 total length, no thin mucilaginous sheath noted on any ascospores, appendages not observed.

**Anamorph:** Unknown.

**Known distribution:** Australia, Ecuador, Malaysia, Philippines, Papua New Guinea.

**Known hosts:** Astrocaryum, Calamus, Elaeis, Korthalsia, Mauritia, Pinanga, Phytelephas.

**Material examined:** AUSTRALIA, north Queensland, Kuranda, Top of the Range, on *Calamus* submerged in a freshwater stream, July 1992, K.D. Hyde [HKU(M) 1553]; ECUADOR, Oriente, Napo Province, Reserva de Produccion Faunistica Cuyabeno, Rio Cuyabeno, rain forest near the Laguna Grande, *Camangucho*, Path 5, 00° 00'N 76° 10'W, Botanists Plot, Path A, Camangucho, on dead rachis of *Astrocaryum* sp., August 1993, K.D. Hyde [HKU(M) 2704, and Biology Department, Catholic University, Quito, Ecuador]; on dead rachis of *Mauritia flexuosa*, August 1993, K.D. Hyde, [HKU(M) 2722]; *ibid.*, J. Fröhlich [HKU(M) 7921, and Biology Department, Catholic University, Quito, Ecuador]; “Saladero trail”, on dead rachis of *Phytelephas* sp., August 1993, K.D. Hyde [HKU(M) 3345, and Biology Department, Catholic University, Quito, Ecuador]; MALAYSIA, Negara Sembilang, Pasoh Forest Reserve, on dead rachis of *Pinanga* sp., October 1991, K.D. Hyde [HKU(M) 10384]; on undetermined palm, October 1991, K.D. Hyde [HKU(M) 1565]; on dead rachis of *Elaeis guineensis*, November 1992, K.D. Hyde [HKU(M) 1641]; PHILIPPINES, Mindanao, Bukidnon, Impalatuao Forest Reserve, on dead palm rachis, December 1993, K.D. Hyde [HKU(M) 1879]; PAPUA NEW GUINEA, Green River, on dead trunk of *Korthalsia brassii*, May 1992, K.D. Hyde [HKU(M) 1384a]; TAHIITI, Motu, Papeete, on rachis of *Cocos nucifera*, M. Seurat [FH, holotype].
Notes: *Astrocystis rachidis* was formerly in *Rosellinia* and was recently transferred by Fröhlich and Hyde (2000) which also contains a discussion of the species. In most specimens a distinct carbonaceous disc was present around the base of the ascomata (Fig. 56), although in HKU(M) 10384 the ascomata are surrounded by basal tooth-like flanges of the host. In HKU(M) 1565 the ascomata (1000-1500 μm) and ascal ring (2 × 2 μm) is larger than in all other specimens, but was otherwise similar, and is here considered to be of the same species. There is a wide variation in stroma size between collections of this species.

*Astrocystis rudis* G.J.D. Smith and K.D. Hyde, sp. nov. (Figs. 60-69)

*Astrocystis cocoes* (Henn.) Læssøe and Spooner similis sed ascosporae 10-12.5 × 5-6.7 μm et nonappendiculatae differt.

**Etymology:** In reference to the remoteness of the type locality, a peat swamp.

*Stromata* with 1-2 ascomata, with vertical sides and subconical apex, 650-1000 μm diam. 500-750 μm high, outer carbonised ectostroma forming a +/- discoid base (up to 1750 μm diam.), with papillate ostiole conspicuous or not; in section to 40 μm wide, composed of brown-walled globose cells interspersed with textura intricata; ascomata c. 400 μm diam. *Peridium* to 37 μm wide, composed of brown-walled elongate globose cells and textura intricata. *Paraphyses* to 5 μm at the base, hypha-like, septate, irregular and tapering. *Asci* 8-spored, spore bearing part cylindrical, 68-83 × 7.5-10 μm, stipe tapering, 20-36 μm long, apically rounded, with a stopper-shaped, subapical, J+ ring, 1.2-1.9 μm high, 2.5-2.8 μm diam. *Ascospores* 10-12.5 × 5-6.7 μm, overlapping uniseriate, brown, ellipsoidal, slightly inequilateral or not, germ slit full length, thin mucilaginous sheath around ascospores, appendages not observed.

**Anamorph:** Unknown.

**Known distribution:** Papua New Guinea.

**Known palm hosts:** Korthalsia brassii.

**Material examined:** PAPUA NEW GUINEA, Green River, on dead trunk of *Korthalsia brassii*, May 1992, K.D. Hyde [HKU(M) 1383, here designated the *holotype*].

Notes: This species is well placed in *Astrocystis* due to the possession of a small J+ apical ring with sides tapering to the base, a short tapering ascal stipe, and a carbonised stromatal discoid base. It also lacks the subiculum of *Rosellinia*.

*Astrocystis rudis* is distinguished from other species of the genus by ascospore size in combination with the ascospores possessing a thin mucilaginous sheath, and the size and morphology of the ascus apical ring. The apical ring of *A. rudis* is apically flared (see discussion for *A. nypae*), separating it from *A. cocoes* and *A. nypae*. Other characters also separate *A. rudis* from *A. cocoes* and *A. nypae*, notably the combination of ascospore size and having a mucilaginous sheath while lacking any appendages (see Table 1). The remaining taxa of *Astrocystis* from palms feature apically flared apical rings. Of these species, *A.
<table>
<thead>
<tr>
<th></th>
<th>A. cocoes</th>
<th>A. nypae</th>
<th>A. palmarum</th>
<th>A. ritchidis</th>
<th>A. rudis</th>
<th>A. selangoriensis</th>
<th>G. genetropospora</th>
<th>N. saladeranus</th>
<th>S. moelleri</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stromata</strong></td>
<td>1 ascomata, +/- discoid base, conical</td>
<td>1-2 ascomata, discoid base, mammiform</td>
<td>1-2 ascomata, +/- discoid base, mammiform</td>
<td>1-2 ascomata, +/- discoid base, mammiform</td>
<td>1-2 ascomata, +/- discoid base, mammiform</td>
<td>1-4 ascomata, no discoid base, conical or mammiform</td>
<td>1-many ascomata, +/- discoid base, many ascomata</td>
<td>1-2 ascomata, +/- discoid base, globose to mammiform</td>
<td></td>
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<tr>
<td><strong>Ascal ring</strong></td>
<td>Stopper-shaped, 2.5-3.1 x 2.5-3.1 µm</td>
<td>Stopper-shaped, 0.8-3.1 x 2.5-3.1 µm</td>
<td>Discoid, 1.6 x 2.4-2.8 µm</td>
<td>Stopper-shaped, 1.2-1.8 x 2.5-3.1 µm</td>
<td>Stopper-shaped, 3.5-4 x 4-4.5 µm</td>
<td>Stopper-shaped, 5-7 x 2.5-3 µm</td>
<td>Vase-shaped, 5-6 x 3-4 µm</td>
<td>Stopper-shaped, 3.5-4 x 2.5-3 µm</td>
<td></td>
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<tr>
<td><strong>Ascospores</strong></td>
<td>13-17.5 x 5-6.25 µm</td>
<td>8.4-9.6 x 3.3-4.5 µm</td>
<td>12.5-15 x 6.25-10 µm</td>
<td>10-12.5 x 5-6.7 µm</td>
<td>15-19 x 7.5-9 µm</td>
<td>23-33 x 4.5-7 µm</td>
<td>16-21 x 6.7-5 µm</td>
<td>15-18 x 7.8-8 µm</td>
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<tr>
<td><strong>Sheaths or appendages</strong></td>
<td>No sheath</td>
<td>Thin sheath</td>
<td>Thin sheath</td>
<td>Thin sheath</td>
<td>Minute germ pore</td>
<td>Thin sheath, small polar caps</td>
<td>No sheath, small polar appendages</td>
<td>Thin sheath, polar pads</td>
<td></td>
</tr>
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</table>
*Astrocystis selangorensis* G.J.D. Smith and K.D. Hyde, sp. nov.  

*Astrocystis cocoës* (Henn.) Læssøe and Spooner similis sed ascosporae 15-19 × 7.5-9 μm et nonappendiculatae differt.

**Etymology:** In reference to the type locality, Kuala Selangor.

**Stromata** erumpent, with 1 ascoma, solitary or clustered, black, semiglobose, 560-700 μm diam. 400-560 μm high, roughened, outer soft-walled ectostroma, to 40 μm wide comprising black-walled globose cells, without a discoid base, with conspicuous light-brown, papillate ostiole, ascomata 500 μm diam. **Peridium** comprising an inner layer, to 30 μm thick, composed of light-brown flattened cells, and a central layer to 30 μm wide, comprising light-brown **textura intricata**, fusing outwardly with the blackened stroma. **Paraphyses** to 10 μm at the base, hypha-like, filamentous, branching, septate and irregular. **Asci** 8-spored, spore bearing part cylindrical, 100-120 × 10-13 μm, stipe short and tapering, to 50 μm long, apically rounded, with a stopper-shaped subapical J+ ring, 3.5-4 μm high, 4-4.5 μm diam. **Ascospores** 15-19 × 7.5-9 μm, uniseriate or overlapping uniseriate, light-brown to dark reddish-brown, inequilaterally ellipsoidal, slightly convex on flattened side, a minute hyaline germ pore at one end, germ slit full length on flattened side.

**Anamorph:** Unknown.

**Known distribution:** Malaysia.

**Known hosts:** Nypa.

**Material examined:** MALAYSIA. Kuala Selangor, on dead intertidal rachis of *Nypa fruticans*, November 1991, K.D. Hyde [HKU(M) 1625a, here designated the **holotype**].

**Notes:** *Astrocystis selangorensis* could be included in *Rosellinia*, as it has soft-walled stromata and when cut has an inner whitish region. However, the rest of the characters are indicative of *Astrocystis* and is therefore included in this genus. *Astrocystis selangorensis* is most similar to other species occurring on palms, namely *A. cocoës*, *A. mypse*, *A. palmarum* and *A. rachidis* (Læssøe and Spooner, 1994; Dulymanode *et al.*, 1998; Fröhlich and Hyde, 2000).

Ascospore morphology is a distinctive feature of *A. selangorensis*, the combination of the hyaline germ pore at one end and being convex distinguish it
Figs. 70-73. Micrographs of *Astrocystis selangorensis* (from holotype). 70. Stromata on host surface. 71-73. Sections of stroma. Bars: 70 = 100 μm; 72 = 50 μm; 71, 73 = 10 μm.

from other palm species. The apical ring of *A. selangorensis* is substantially larger than other species from palm, while the ascospores are similar in size only with *A. cocoës*. Yet the ascospores of *A. cocoës* possess both a thin hyaline sheath and appendages. Differences between the palm inhabiting species of *Astrocystis* are summarised in Table 1.

*Biscogniauxia* Kuntze, Revisio Generum Plantarum II: 398 (1891).
For a diagnosis of this genus and a key to species see Ju et al. (1998).
Type species: *Biscogniauxia nummularia* (Bull.:Fr.) Kuntze.
Anamorph: *Nodulisporium.*
Habitat: Parasitic on dicotyledonous angiosperms.
Distribution: Cosmopolitan.

Biscogniauxia has recently been monographed by Ju et al. (1998). The genus is defined by possession of a bipartite stroma; *Periconiella*-like anamorphs in most species; mostly internal carbonaceous locules enclosing perithecia; and short stiped asci with a J+ apical apparatus that is variously shaped, but broader than high. The genus is further defined by usually having non-ornamented, dark ascospores with a conspicuous germ slit, and in having stromata that do not produce KOH-extractable pigments (Ju et al., 1998).

No species of *Biscogniauxia* were found on palms in this study. There is one record of *B. capnodes* (Berk.) Y.-M., Ju and J.D. Rogers on *Latania* Comm. from Münster, Germany (Ju et al., 1998).

For a diagnosis of this genus see Fröhlich and Hyde (2000).
*Type species: Cyanopulvis australiensis* J. Fröh. and K.D. Hyde.
*Anamorph: Unknown.*
*Habitat: Saprobic on *Calamus* species.*
*Distribution: North Queensland, Australia.*

*Cyanopulvis* was recently erected by Fröhlich and Hyde (2000), and the genus contains only one species, *C. australiensis*. The genus is characterised by gregarious, well-developed, dark stromata, with stellate ectostroma, that lack a subiculum, but are covered with a thin dusting of whitish-blue powder; asci with short stipes, and massive, urn shaped, J+ apical rings; and brown, navicular ascospores, with straight full length germ slit, covered with a mucilaginous sheath and possessing pad-like polar appendages (Fröhlich and Hyde, 2000).

No further specimens of *Cyanopulvis* were encountered in this study. *Cyanopulvis* is only known from palm hosts, with two records from *Calamus australis* and one record from an unidentified *Calamus* species, all from North Queensland, Australia (Fröhlich and Hyde, 2000).

*Guestia* G.J.D. Smith and K.D. Hyde, gen. nov.
*Species typica: Guestia gonetropospora* G.J.D. Smith and K.D. Hyde.
*Etymology.* In recognition of Australian plant pathologist and mycologist David Guest, for his active role in promoting mycology and training young mycologists in Australia and South-east Asia.

*Pseudostromata* with 1-4 ascomata, solitary or clustered, conical or hemispherical, black, without a discoid base, stromatic wall layer thin and
patchy, composed of host cells filled with compact blackened fungal hyphae; ascomata erumpent and covered with remains of host, or with papillate ostiole only protruding through star-shaped cracks on the host surface, hemispherical, with wart-like ornamentation. **Peridium** composed of brown-walled elongate globose cells inwardly and brown-walled textura intricata towards the outside. **Paraphyses** hypha-like, septate, flexulose, tapering and embedded in a gelatinous matrix. **Asci** 8-spored, spore bearing part cylindrical, stipe tapering, apically rounded, with a vase-shaped, subapical, J+ ring. **Ascospores** 1-2-seriate, dark-brown, inequilaterally fusiform, straight or curved, germ slit on flattened side.

**Type species:** Guestia gonetropospora G.J.D. Smith and K.D. Hyde

*Guestia* is introduced to accommodate a single specimen and species, *G. gonetropospora*. The genus is characterised by pseudo stromata of one to four black ascomata, with a thin and patchy wall layer; 8-spored, unitunicate asci with amyloid apical rings, and dark, inequilateral ascospores with a germ slit. This combination of characters leads the authors to place this genus within the *Xylariaceae*.

Of the genera of the *Xylariaceae*, *Guestia* is superficially most similar to *Anthostomella sensu* Lu and Hyde (2000), due mainly to appearance on the substrate, although the paraphyses and peridium of both genera are similar. The stroma of *Anthostomella* is generally reduced to a clypeus that, in the type species, is pseudostromatic, and the ascomata are usually immersed or semi-immersed (Lu and Hyde, 2000). *Guestia*, however, has a relatively well developed pseudostroma surrounding the ascomata, and it is also erumpent through the host tissue. Microscopic characters further separate *Anthostomella* from *Guestia*. The ascospores of *Anthostomella* are generally ellipsoidal or inequilateral-ellipsoidal, the ascus stipes short, and the apical ring is usually discoid or stopper-shaped (Lu and Hyde, 2000), while *Guestia* has inequilaterally-fusiform ascospores, long ascus stipes and a highly distinctive vase-shaped apical ring.

Other genera that are somewhat similar to *Guestia* include *Astrocystis*, *Halorosellinia* and *Rosellinia* (Ju and Rogers, 1990; Læsøe and Spooner, 1994; Whalley *et al*., 2000). *Astrocystis* species generally have a small, stopper-shaped apical ring, markedly different from that of *Guestia*. In addition, species of *Astrocystis*, with the exception of *A. cocoës*, have ellipsoidal or inequilateral-ellipsoidal ascospores that are much shorter than those of *Guestia*. The ascal stipe of *Guestia* is long, like that of *Rosellinia*, while *Astrocystis* species have short ascal stipes. The vase-shaped apical ring of *Guestia* is similar to those of *Rosellinia*, except that it is much longer than wide and tapers at the bottom. Both *Astrocystis* and *Rosellinia* are further
distinguished from *Guestia* as they have a full stroma, not the pseudostroma of *Guestia* (Petrini, 1992; Læssøe and Spooner, 1994). *Halorosellinia* is similar to *Guestia* in possessing a pseudostroma but it is not erumpent as with *Guestia* (Whalley *et al.*, 2000). Other characters of the two genera only serve to separate them further; *Halorosellinia* has a peridium of *textura porrecta*, non-flexulose paraphyses, a barrel-shaped apical ring (like *Rosellinia*) and inequilaterally ellipsoid ascospores, all unlike *Guestia* (Whalley *et al.*, 2000).

*Guestia gonetropospora* G.J.D. Smith and K.D. Hyde, sp. nov. (Figs. 82-96)

*Pseudostromata* 700-840 µm diam. 420 µm alta, solitaria vel gregaria, conica vel hemispherica, nigra, 1-4 ascomata praedita; ascomata c. 600 µm diam. erumpentes, hemispherica, tuberculata, paraphysaticum. *Asci* 105-130 ± 7.5-12 µm, 8-spori, pedicelati, apparatu apicale praediti. *Ascosporae* 23-33 × 4.5-7 µm, 1-2-seriatae, atro brunnea, inequilateral-fusiformes, laevas vel curvatae.

*Species typica:* *Guestia gonetropospora* G.J.D. Smith and K.D. Hyde

*Etymology:* In reference to the tropical origin of the type specimen.

*Pseudostromata* with 1-4 ascomata, solitary or clustered, conical or hemispherical, black, 700-840 µm diam. 420 µm high, without a discoid base, psuedostromatic wall layer thin and patchy, composed of host cells filled with compact blackened fungal hyphae; ascomata c. 600 µm diam. erumpent and covered with remains of host, or with papillate ostiole only protruding through star-shaped cracks on the host surface, hemispherical, with wart-like ornamentation. *Peridium* to 60 µm wide, composed of brown-walled elongate globose cells inwardly and brown-walled *textura intricata* towards the outside. *Paraphyses* to 6 µm at the base, hypha-like, septate, flexulose, tapering and embedded in a gelatinous matrix. *Asci* 8-spored, spore bearing part cylindrical, 105-130 × 7.5-12 µm, stipe tapering, up to 60 µm long, apically rounded, with a vase-shaped, subapical, J+ ring, 5-7 µm high, 2.5-3 µm diam. *Ascospores* 23-33 × 4.5-7 µm, 1-2-seriate, dark-brown, inequilaterally fusiform, straight or curved, germ slit on flattened side, full length, with a thin mucilaginous sheath, and small polar appendages.

*Anamorph:* unknown.

*Known distribution:* Ecuador.

*Known hosts:* *Mauritia flexuosa*.

*Material examined:* ECUADOR, Oriente, Napo Province, Río Cuyabeno, Cuyabeno rain forest, 00°00'N 76°10'W, Botanists Plot, Path A, Camangucho, on dead rachis of *Mauritia flexuosa*, August 1993, K.D. Hyde E136 [HKU(M) 3347, here designated the holotype, isotype at the Biology Department, Catholic University, Quito, Ecuador].

*Guestia gonetropospora* is distinguished by the possession of an erumpent pseudostroma; cylindrical asci with short tapering stipes, and a large vase-shaped, J+ apical ring that tapers at the bottom; and dark, inequilaterally fusiform ascospores, with a full length germ slit on flattened side, surrounded by a thin
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Figs. 82-96. Micrographs of *Guestii gonetropospora* (from holotype). 82. Stromata on host surface. 83, 84. Section of stroma. 85-89. Asci. 91-96. Ascospores. Bars: 82 = 500 µm; 83 = 100 µm; 84-96 = 10 µm.

mucilaginous sheath, and with small polar appendages. The combination of these characters places the specimen firmly in the *Xylariaceae*, yet precludes it from existing genera. Only one collection of *G. gonetropospora* has been made, from Ecuador.

**Hypoxylon** Bull., Histoire des champignons de la France 1: 168 (1791); *non* Mentzel *ex* Adans. (1763) (nom. cons.).

_Type species:* Hypoxylon fragiforme (Pers.:Fr.) J. Kickx fil.

_Anamorph:* Nodulisporium.

_Habitat:* Endophytic, saprobic, or parasitic on various plants.

_Distribution:* Cosmopolitan.

Species of *Hypoxylon sensu stricto* (Læssøe, 1994, Van der Gucht, 1995, Ju and Rogers, 1996) develop superficial stromata with immersed ascomata. The surface or context contains bright or dark coloured granules and have KOH-extractable pigments, and somewhat brown ascospores that have germ slits on the convex side and normally a loosening perispore. The ascus apical apparatus is typically amyloid, broader than high. Anamorphs are referable to the form genus *Nodulisporium*, with four subtypes based on the complexity of branching (Ju and Rogers, 1996). Since the world monograph of *Hypoxylon* (Miller, 1961) generic concepts have developed, to the current understanding provided by Ju and Rogers (1996), and many species accepted by Miller have been transferred to other genera. Of these most have been disposed in *Biscogniauxia*, *Camillea* (Læssøe *et al.*, 1989) and *Nemania* (Pouzar, 1985a,b). All three genera have stromata that lack the bright granules and KOH-extractable pigments in *Hypoxylon*. The latter two differ in anamorph morphology, *Camillea* possessing Xylocladium anamorphs, and *Nemania* with Geniculosporium anamorphs.

*Hypoxylon* is a cosmopolitan genus in the *Xylariaceae* for which Ju and Rogers (1996) have accepted 118 species with 11 subspecies. It has the highest number of species recorded in the tropics and subtropics and can live as an endophyte, pathogen, and/or saprobe (Ju and Rogers, 1996). The taxon has been defined and redefined many times in the literature, and the circumscription accepted here is that suggested by Ju and Rogers (1996). The taxon has been divided into two sections, *Hypoxylon* and *Annullata*, according to characters of the stroma, the position of the ostiole, and the ornamentation of the perispore.
Hypoxylon can be distinguished from similar genera in the Xylariaceae through its anamorph and the structure of its stromata. Nemania and Kretzschmaria have Geniculosporium-like anamorphs, Biscogniauxia and Camellia have bipartite stromata (Hypoxylon’s is unipartite), Daldinia stromata has concentric rings and Rhopalostroma has stipitate stromata, while the stromata of Hypoxylon species are usually broader than they are tall (Ju and Rogers, 1996). Most of the species within these genera lack bright stromatal granules.

For an emended diagnosis see Van der Gucht (1995) and Ju and Rogers (1996).

Key to taxa of Hypoxylon treated

1. Stromatal pigments greenish-olivaceous or dull green in KOH..........................2
2. Stromatal pigments orange to yellow in KOH, ascospores (20-25 × 8-9 µm) elongated citriform with pinched ends, full length germ slit ..................H. rubellum

2. Ascospores (7-9 × 3-4 µm) inequilateral ellipsoid, full length germ slit on convex side..............
   ......................................................................................................................................H. moriforme

2. Ascospores (5-7 × 2-3 µm) inequilateral ellipsoid, full length germ slit on flattened side...........
   ......................................................................................................................................H. stygium

Species recorded from palms

Material examined: REUNION: Bourbon Island, on palm trunks, 1801-1802, Bory (PC, lectotype of Sphaeria arecaria).
This is probably conspecific with Biscogniauxia divergens var macrospora (Theiss.) Whalley and Læssøe, which has been synonymised with B. philippinensis (Ricker) Whalley and Læssøe (Ju et al., 1998). For a description and illustrations of these fungi see Miller (1961).

Hypoxylon cocoinum Cooke, Grevillea 11: 76 (1882).
Material examined: MALAYSIA, Malacca, Taujong, on dead wood of Cocos nucifera, July 1866 (K, holotype).
This is not a Hypoxylon as it has bitunicate asci and can probably be referred to Pyrenula (Harris, 1989; Hyde, 1997; Upreti 1998).

Hypoxylon coryphae Rehm, Philippine Journal of Science, Section C, Botany 8: 400 (1913).
Material examined: PHILIPPINES, Luzon, Laguna, Los Baños, on dead petioles of Corypha elata, January 1913, Baker 766 [S, holotype].
Rehm (1913) described the ascospores of this species as hyaline or subfuscicidulae, hardly mature, and with 6-8 ascomata in each stroma. The taxon was removed from Hypoxylon by Miller (1961) and made synonymous with Xylaria frustulosa Berk. and M.A. Curtis (as Penzigia fructulosa (Berk. and M.A. Curtis) J.H. Miller).

**Hypoxylon deciduum** Berk. and Broome, Journal of the Linnean Society, Botany 14: 120 (1873).

*Material examined:* SRI LANKA, Central Province, on an unidentified palm, December 1868, G.H.K. Thwaites 172 [K, holotype].

This is a synonym of Catabotrys deciduum (Berk. and Broome) Seaver and Waterson (Seaver and Waterson, 1946), a monotypic genus in the Catabotrydaceae (Hyde and Cannon, 1999).

**Hypoxylon desmonci** Rehm, Hedwigia 40: 142 (1901).

*Type:* BRAZIL: Rio de Janeiro, on leaves of Desmunci littoralis, Ule.

Miller (1961) considered this species to be Dothidina palmicola (Speg.) Theiss. and Syd., while von Arx and Muller (1954) considered it to be synonymous with Coccostroma palmicola (Speg.) Arx and E. Mull. Both names are synonymous with Coccostromopsis palmicola (Speg.) K.D. Hyde and P. Cannon (Hyde and Cannon, 1999).

**Hypoxylon folicola** J.H. Miller, Mycologia 32: 181 (1940).

*Material examined:* BRAZIL, Minas Gerais, Teixeras, Viposa, on palm leaf, 17 October 1929, A.S. Muller [GA 2390-1, syntypes of H. folicola].

Material is depauperate lacking asci and ascospores. The stromata however, which are superficial on palm leaves, resemble those of Coccostromopsis diplothemii (Rehm.) K.D. Hyde and P. Cannon (Hyde and Cannon, 1999). Chardon et al., (1940) describe the ascospores as oblong to navicular, dilute to dark brown and 16-20 μm, which are within the range of C. diplothemii and therefore Hypoxylon folicola is probably synonymous with Coccostromopsis diplothemii (Hyde and Cannon, 1999). Viegas (1961) recorded this on Attalea sp. from South America. Ju and Rogers (1996) regard this as a synonym of Hypoxylon palmigena Berk. and M.A. Curtis which is itself also a synonym of Coccostromopsis diplothemii (Rehm) K.D. Hyde and P. Cannon.


*Material examined:* PHILIPPINES, Luzon, Laguna, Los Baños, Mt Makiling, on rattan of Calamus sp., 25 April 1914, C.F. Baker, Fungi Malaya 169 [S, holotype of Nummularia fragillima].
The taxonomic position is uncertain (Ju and Rogers, 1996). Miller (1961) placed this taxon in *Hypoxylon* section *Applanata*. Type material is in poor condition and comprises pieces of rattan with black shiny oval stromata. Only ascospores can be located within these stromata and these are cognac brown and 26.5-33.5 × 8-9.6 × 4-6 μm. Ju and Rogers (1996) state that these ascospores are of the type more commonly found in the *Xylarioideae* than in the *Hypoxyloideae*. Because this specimen is in poor condition the species must be considered as doubtful until fresh material is obtained.

*Hypoxylon mauritanicum* (Durieu and Mont.) Mont., *Sylloge Generum Specierumque Cryptogamarum*: 211 (1856).

- **Material examined**: Algeria, Durieu [PC, holotype].

  Miller (1961) considered this to be *Penzigia mauritanica*. Material loaned from PC consisted of a single irregular dried black gelatinous mass c. 2 cm diam. No ascospores or asci were found in the specimen. Annotations by Dennis (28 February 1957) indicate he also considered this to be a *Penzigia*. In Patouilliard (1905) the asci are described as 150 × 8 μm, with paraphyses present and ascospores 18-20 × 5-6 μm, uniseriate, brown, navicular and with two guttules. Ju and Rogers (1996) consider this to be a *Xylaria*.


- For synonyms see Ju and Rogers (1996).

  *Stromata* erumpent, with 1-many ascomata, solitary or clustered, mammiform, black, to 20 mm long, 1000 μm high, stroma wall to 150 μm thick, composed of dark-brown-walled, *textura globosa* and *textura intricata*, with an outer amorphous layer, carbonised, with KOH-extractable pigment greenish-olivaceous, surface smooth, apex flattened, annulate, with a relatively inconspicuous papillate ostiole; ascomata ca. 500 μm diam. *Peridium* to 20 μm wide, composed of several layers of light-brown walled flattened cells, fusing with the stroma at the outside. *Paraphyses* to 4 μm, hypha-like, septate, irregular, tapering, embedded in a gelatinous matrix. *Asci* 8-spored, spore bearing part cylindrical, 60-80 × 4.5-6.5 μm, stipe tapering, up to 60 μm long, apically rounded, with a cylindrical, subapical, discoid J+ ring, 0.8-1 μm high, 2-2.5 μm diam. *Ascospores* 7-9 × 3-4 μm, uniseriate, brown, inequilaterally ellipsoidal, germ slit on convex side, full length, no mucilaginous sheath or appendages observed, but with a swelling on the flattened side.

  *Anamorph*: Nodulisporium-like (Ju and Rogers 1996).

  *Known distribution*: Cosmopolitan.

  *Known palm hosts*: Calamus.

Material examined: PHILIPPINES, Mindanao, Bukidnon, Impalutao Forest Reserve, on dead palm rachis, December 1993, K.D. Hyde [HKU(M) 1855]; ibid., K.D. Hyde [HKU(M) 1905].


Material examined: Cuba, on palm leaf; C. Wright 832 [no. 488] (K, lectotype of H. palmigena).

Miller (1961) gives this as a possible earlier name for Hypoxylon folicola J.H. Miller. However, he reported the specimens to be old and disintegrated and could not be sure of the identity. Theissen and Sydow (1915) transferred this species to Coccostroma palmigenum (Berk. and M.A. Curtis) Theiss. and Syd. as it had hyaline ascospores.

Good material of this species has been found and examined and reveals that it is better placed as a synonym of Coccostromopsis diplothemii (Hyde and Cannon, 1999). See also the discussion of H. folicola.


Stromata pulvinate, ascomata outline very evident, context with orange to yellow pigments in KOH. Ascospores 20-25 × 8-9 \mu m, elongated citriform with pinched ends, germ slit full length, fragments of rather thin perispore present.
Anamorph: Unknown.

Known distribution on palms: Australia, French Guiana, Indonesia.

Known palm host: Calamus.

Material examined: AUSTRALIA, north Queensland, Palmerston, Palmerston National Park, Tchupalla Falls, on dead rattan of Calamus caryotoides, April 1995, J. Fröhlich and R. Huwer [HKU(M) 7847]; INDONESIA, Java, Cibodas, on palm petiole [determined J. Dransfield, originally reported from “culmis purtridis”] O. Penzig 349 [PAD, holotype].

This Australian collection keys out to Hypoxylon rubellum, which is characterised by stromata filled with orange-red granules and ascospores with a narrow network of upraised veins on the ascospore wall (Ju and Rogers, 1996). Hypoxylon rubellum would appear to prefer monocotyledonous hosts, but is not restricted to palms. To our knowledge, this is the first report of the taxon in Australia.

Rogers et al. (1987) reported this species on indeterminate palm material from North Sulawesi. They also studied the type and found characteristic shallow parts on the ascospores by using SEM. They also observed an unusual germ slit. This species is unique among Hypoxylon species in having pits on the ascospores (Ju and Rogers, 1996).


This species was collected on palm in North Sulawesi (Rogers et al., 1987). It has been well described by Miller (1961) and Ju and Rogers (1996).


Type species: Nemania serpens (Pers.:Fr.) Gray.

Anamorph: Geniculosporium.

Habitat: Endophytic, saprobic, or parasitic on various plants.

Distribution: Cosmopolitan.

Nemania was emended and reinstated by Pouzar (1985a) to account for the Hypoxylon serpens-complex of Hypoxylon subsection Prinocinerea of Miller (1961), that had long been though too broad and to contain a heterogeneous assembly of taxa (Petrini and Rogers, 1986; Læssøe and Spooner, 1994).

As emended by Pouzar (1985a,b), species of Nemania develop superficial stromata, lacking both a subiculum and bright pigments that are soluble in KOH, and also possess a J+ rectangular apical ring that is higher than it is broad. The apical ring is more similar to those of Kretzschmaria and Xylaria than those of Hypoxylon. Nemania is further defined by the possession of Geniculosporium anamorphs (Pouzar, 1985a), a feature shared with some Anthostomella taxa, Rosellinia and Xylaria, amongst other genera (Læssøe, 1994; Ju and Rogers, 1996). As such, the generic affinities of Nemania are thought to be closer to the
Xyliaria-like genera of the Xylariaceae, than to the Hypoxylon-like genera (Pouzar, 1985a, b; Petrini and Rogers, 1986; Læsøe and Spooner, 1994).

**Key to taxa of Nemania treated**

1. Ascospores without appendages ..........................................................  \( N. \) *maculosa*
2. Ascospores with appendages .................................................................  \( N. \) *nummularioides*

1. Ascospores (10-15 × 5-6.5 μm) inequilateral, with full length germ slit surrounded by a thin mucilaginous sheath............................................. \( N. \) *bipapillata*
2. Ascospores greater than 15 μm long ........................................................................... \( N. \) *saladerana*

3. Ascospores (17-31 × 7-9.5 μm) ellipsoid to fusoid to inequilateral, with full length germ slit...... \( N. \) *nummularioides*
3. Ascospores (16-21 × 6-7.5 μm) inequilaterally ellipsoid, with germ slit less than full length........... \( N. \) *saladerana*

**Species recorded from palms**

(Figs. 103-109)

For synonyms see Ju and Rogers (1999).

**Stromata** erumpent, with 1-many ascomata, solitary or clustered, irregularly conical or hemispherical, dark-brown, to 5 mm diam. 840 μm high, stromatic wall layer to 50 μm thick, composed of strongly pigmented brown, and strongly carbonised irregularly globose cells; surface tuberculate, with host adhering to and part of upper part of stroma, with a raised annulate area and conspicuous ostiole; ascomata c. 500 μm diam. hemispherical. **Peridium** to 14 μm thick, composed of pale brown flattened cells. **Paraphyses** to 5 μm at the base, hyphalike, filamentous, septate, irregular, tapering, embedded in a gelatinous matrix. **Asci** 8-spored, spore bearing part cylindrical, 70-90 × 6-8 μm, stipe tapering, to 90 μm long, apically rounded with a stopper-shaped, subapical J+ ring, 2.5-3 μm high, 2-2.5 μm diam. **Ascospores** 10-15 × 5-6.5 μm, overlapping uniseriate, dark reddish-brown, inequilateral, germ slit on flattened side, full length, surrounded by a thin mucilaginous sheath and inconspicuous polar pad-like appendages.

**Anamorph:** *Geniculosporium*.

**Known distribution:** Australia, Brunei, Europe, Mauritius, North America, Papua New Guinea and South America.

**Known palm hosts:** *Arenga*.

Material examined: BRUNEI, Temburong, Kuala Belalong, Rainforest Field Studies Centre, on dead rachis of *Arenga acutifolia*, July 1993, K.D. Hyde [HKU(M) 1707].

*Nemania bipapillata* has been well described by Van der Gucht (1995), and the authors do not hesitate in placing this specimen in the species.

Nemania maculosa (J.D. Rogers, Callan and Samuels) G.J.D. Smith and K.D. Hyde, comb. nov.

= Hypoxylon maculosum J.D. Rogers, Callan and Samuels, Mycotaxon 29: 12 (1987).

Stromata containing numerous ascomata, applanate to somewhat pulvinate, erumpent, dull black mottled with white, 1000 μm high, with umbilicate, inconspicuous, papillate ostiole; ascomata, 400-6000 μm diam. 400-650 μm high. Peridium to 20 μm wide, composed of light-brown-walled compressed cells, fusing outwardly with the stroma. Paraphyses hypha-like, septate, irregular, tapering, not embedded in a gelatinous matrix. Asci 8-spored, spore bearing part cylindrical, 130-160 × 10-14 μm, stalk tapering, to 60 μm, apically rounded with an um-shaped, subapical J+ ring, 5-7 μm high, 4-5 μm high. Ascospores (17.5-) 20.5-30 × (5-)6.5-8(-10.3) μm, 1-2-seriate, light brown to brown, inequilaterally ellipsoid to somewhat allantoid, germ slit less than full length.

Anamorph: Unknown.

Known distribution: North Sulawesi, Indonesia.
Known palm host: Livistona.

Material examined: INDONESIA, North Sulawesi, Dumoga-Bone National Park, at the confluence of the Toraut and Tumpah Rivers, vic. Project Wallace Base Camp, 0°34'N, 123°57'E; elev. 211 m, on rachis of Livistona sp., Samuels 1991, September to November 1985 [NY, isotype].

This specimen resembles Hypoxylon section Applanata sensu Miller (1961) that would normally suggest it is a species of Biscogniauxia, but the ascal plug is highly unusual. Nemania and Kretzschmariella are other possibilities. Ju and Rogers (1996) believe this to be a Nemania and it is formerly transferred here.


Stromata confluent, cinerous, cracking, very hard, erumpent, through outermost cuticle, with a loose, more or less well developed stromatic margin, containing 1-20(-30) ascomata, outlines hardly or just visible, seated directly on the substrate (no basal stroma) with a very loose, fluffy, white context between ascomata. Asci not seen. Ascospores 17-22.5 × 7-9.5 μm.

Anamorph: Unknown.

Known distribution on palms: Indonesia, Peru.

Known palm host: Iriartia.

Material examined: PERU: Dept. Loreto, Iquitos, Yanomono, ca. 50 km downstream Rio Amazonas above Rio Napo, on dead stilt roots of Iriartia deltoidea, 12 July 1987, T. Læssee P-281 [K].

Miller (1961) described this fungus but did not provide any details regarding ascospore germ slits or asci. A collection of this fungus, differing from that described by Miller (1961), has been reported (as H. nummularioides) from a probable palm in North Sulawesi (Rogers et al., 1987). Rogers et al. (1987) described N. nummularioides with larger ascospores (25-31 × 7-9 μm), sometimes with flaring secondary appendages and a full length germ slit. The ascus spore bearing parts were 160-200 × 11-16 μm, with 20-30 μm long stipes and a J+ apical ring 8 μm high and 5 μm in diameter. Ju and Rogers (1996) believe this to be a Nemania and it is formerly transferred here. Nummularia reyesiana Rehm is also a synonym (Ju and Rogers, 1996).

Nemania saladerana G.J.D. Smith and K.D. Hyde, sp. nov. (Figs. 111-116)

Nemania aenea (Nitschke) Pouzar similis sed ascosporae 16-21 × 6-7.5 μm et appendiculatae, formae et rima germinativa differt.

Etymology: In reference to the “Saladén trail” where the type specimen was collected.

Stromata superficial, with 1-many ascomata, solitary or clustered, mammiform with subconical apex when single, otherwise effused pulvinate, grey-brown darkened around ostiole, to 10 mm long, 420 μm high, lacking a discoid base, stromatic wall to 160 μm thick, composed of dark-brown walled,
textura globosa and textura intricata, carbonised, surface smooth, with conspicuous perithecial mounds, and relatively inconspicuous papillate ostioles; ascomata 700 µm diam. Peridium to 16 µm wide, composed of several layers of light brown-walled flattened cells, fusing with the stroma at the outside. Paraphyses up to 13 µm at the base, hypha-like, remotely septate, irregular, tapering, embedded in a gelatinous matrix. Asci 8-spored, spore bearing part cylindrical, 100-120 × 7.9 µm, stipe tapering, up to 70 µm long, apically rounded, with a barrel-shaped, subapical, J+ ring, 5-6 µm high, 3-4 µm diam. Ascospores 16-21 × 6-7.5 µm, 1-2-seriate, golden-olive to brown, inequilaterally ellipsoidal, germ slit mostly on flattened side, straight, central (8-10 µm long), with a somewhat darkened border, 1/2-2/5 of ascospore length, no thin mucilaginous sheath noted on any ascospores, but small polar appendages observed.

Anamorph: Unknown.

Known distribution: Ecuador.

Known palm hosts: Astrocaryum.

Material examined: ECUADOR, Cuyabeno, Rio Cuyabeno, “Saladera trail” on dead rachis of Astrocaryum sp., August 1993, K.D. Hyde E149 [HKU(M) 3348, here designated the holotype].

This species fits well in Nemania due to the pulvinate, superficial and multiperithecial stromata, the large barrel-shaped J+ apical ring, the long tapering ascus stipe and the lack of a hyaline sheath surrounding the ascospores (Pouzar, 1985a; Petrini, 1992). Nemania saladerana is distinguished from other species in the genus by a combination of ascospore size, possession of polar appendages on the ascospores and stromatal morphology. The ascospores of N. saladerana are within the size range of N. aenea (Nitschke) Pouzar (13-21 × 5.2-7 µm), but in N. aenea they lack polar appendages, are elongately ellipsoid to allantoid with a straight germ slit that is not present in all ascospores and is only 1/4 to 1/2 of ascospore length (Pouzar, 1985b). The apical ring of N. aenea is also in the same size range (3.5-5.5 µm high, 3-4 µm diam.) of N. saladerana, but its apical ring is cylindrical and taper downwards, i.e. not barrel-shaped (Pouzar, 1985b). The stromata of N. aenea are also flattened while those of N. saladerana are pulvinate (Pouzar, 1985b). Other large spored species of Nemania have less in common with N. saladerana. Nemania gwyneddii (Whalley, R.L. Edwards and S.M. Francis) Pouzar differs from N. saladerana in having larger ascospores (19-29 × 7-9.5 µm) that are somewhat curved or allantoid and lack polar appendages (Whalley et al., 1983, as Hypoxylon gwyneddii). Although Nemania nummularioides also possesses ascospore appendages, differences in ascospore, ascus and apical ring size, presence of a full length germ slit, and stromatal morphology clearly distinguish it from N. saladerana (Miller, 1961; Rogers et al., 1987). Nemania serpens var. macrospera (J.H. Mill.) Pouzar differs from N. serpens in having
larger ascospores (13-22 × 5-8 μm) and asci (spore bearing part 90-100 × 35-55 μm, stipe 35-55 μm) (Miller, 1961; Petrini and Rogers, 1986). The ascospore sizes are similar to those of *N. saladerana* but the germ slit of *N. serpens* var. *macrospora* is much less than 1/2 ascospore length, ascospores lack appendages and stromatal characters also differ (Miller, 1961; Petrini and Rogers, 1986). Ju and Rogers (1999) described an unnamed species of *Nemania* (*Nemania* sp. 80082010) with ascospores 17-22 × 6-7 μm, however, ascospores lack appendages and have a short germ slit on the convex side. The perithecial mounds of this species are inconspicuous, differing from *N. saladerana*.

*Rosellinia* De Not., Giornale Botanico Italiano 1: 334 (1844).

Type species: *Rosellinia aquila* (Fr.: Fr) De Not.

Anamorph: *Dematophora* and *Geniculosporium*.

Habitat: Endophytic, parasitic or saprobic on various plants.

Distribution: Cosmopolitan.

Differences between *Astrocystis* and *Rosellinia* are discussed earlier by the authors. This genus was treated in part by Petrini (1992), but no comprehensive monograph exists.
Species recorded from palms

**Rosellinia ambigens** Sacc., Bulletino dell' orto Botanico della regia Universita Napoli 6: 43 (1918).

*Material examined* SINGAPORE, Botanical Gardens, on pinnae of *Daemonorops* sp., October 1917, C.F. Baker 5395 (PAD, holotype).

A row of black erumpent ascomata cover the surface of the palm leaves loaned from PAD, but these lack contents and therefore it is not possible to conclude the identity of the specimen. On the original package ascospores are drawn as brown, unicellular and 9-10 × 4.5-5 μm. This may be an earlier collection of *Astrocystis rachidis*, but because the material is in poor condition the species is considered doubtful.


Ascospores in this species are 21-28 × 8-10 μm, dark reddish-brown, inequilaterally fusiform, with both ends beaked, full length germ-slit on flattened side and with no mucilage. Ascomata develop on a orange-brown hyphal mat and are 750-1000 μm diam., black, globose, papillate and brittle. However, in the two specimens loaned from FH the specimens were depauperate.

**Rosellinia calami** Henn., Hedwigia 42: 79 (1903).

Hennings (1903) described *R. calami* with brown oblong-ellipsoidal ascospores, 7-9 × 3.5 μm. We have been unable to locate material of this taxon which is not available at B, K or S.

**Rosellinia cocoës** Henn., Hedwigia 47: 256 (1908).

See *Astrocystis cocoës* (Henn.) Læssæe and Spooner.

**Rosellinia diderma** (Schwein.) Ellis and Everh., North American Pyrenomycetes: 175 (1892).

*Material examined*: BERMUDA: Warwick, Fruitland, on fallen petioles of palms, 1 August 1921, Whetzel [CUP 11922].

Two specimens loaned from CUP were *Astrocystis palmarum*. The collection details are identical to the type of *A. palmarum* and they probably represent isotypes.

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*Material examined:* TANZANIA, Kigowa, on dead rachis of *Elaeis guineensis*, 23 March 1964, K. Pirozynski [IMI 107137b].

The holotype is no longer available. Pirozynski (1972) reports this taxon from *Elaeis*, but we could not locate any intact ascomata on IMI 107137b.

**Rosellinia euterpes** Rehm, Hedwigia 44: 3 (1905).

*Material examined:* BRAZIL: Blumenau, on Euterpe sp., 1888, E. Ule 839 [S, holotype].

The black carbonaceous erumpent ascomata of *R. euterpes* develop on a white subiculum. Unfortunately, this specimen is in poor condition, lacking asci or ascospores and it is not possible to establish its true identity. Rehm (1905) gave a brief description with no details of asci or ascospores. This species should be considered as doubtful.


*Type:* INDIA, Lakshadweep, Kavaratti Island, on pericarps of *Cocos nucifera*, 2 January 1988, V.D. Ranade [AMH 7601, holotype not seen].

Despite several requests it has been impossible to locate the type of this species. It must therefore be considered as doubtful.

**Rosellinia lamprostoma** Syd. and P. Syd., Philippine Journal of Science 8: 273 (1913).

This species has been recorded on *Daemonorops* sp. by Rehm (1916). We could not locate the specimen. A description of this fungus can be found in Ju and Rogers (1999).

**Rosellinia marginatoclypeata** Penz. and Sacc., Malpighia 11: 393 (1897).

*Material examined:* INDONESIA, Java, Depok, in dead palm rachis, 11 December 1896 [PAD, holotype].

This type specimen is in poor condition and it is not possible to establish its true identity. It may be *Anthostomella lucens* Sacc. (Hyde 1996), as evident from the description, diagram and annotations provided by Penzig and Saccardo (1897). It is considered doubtful.

**Rosellinia sanctacruciana** Ferd. and Wingess, Botanisk Tidsskrift 29: 16 (1908).

See *Astrocystis cocoës*.

**Rosellinia sepulta** (Berk. and M.A. Curtis) Sacc., Syloge Fungorum 1: 256 (1882).

*Material examined:* CUBA, on stem of palm, C. Wright n. 845 [K, holotype].

Type material is covered in a dark-brown hyphal mat, accommodating a small number of black, globose, papillate ascomata. Asci are long cylindrical and
unitunicate with a thickening at the apex, containing long cylindrical, c. 6-septate, hyaline ascospores.

This does not belong in the Xylariaceae, and is probably better assigned to the Lasiosphaeriaceae.

**Stilbohypoxylon** Henn., Hedwigia 41: 16 (1902), non Theiss.

*Type species: Stilbohypoxylon moelleri* Henn.

*Anamorph: Geniculosporium-like.*

*Habitat:* Saprobic on various plants.

*Distribution:* Africa, Australia, China, Malaysia, Philippines, Puerto Rico, South America, Taiwan.

*Stilbohypoxylon* was introduced by Hennings (1902) to accommodate a single lignicolous species from Brazil. The type material based on the literature is immature, possessing immature asci and no ascospores, but with a prominent stilboid anamorph present (Læssøe and Spooner, 1994). Höhnel (1910) studied the type and found it to be “poor” and “completely immature”. He further stated that two species were involved. He concluded that the genus should be rejected. Martin (1967) proposed the invalid combination *Kretzschmaria* sect. *Stilbohypoxylon* (Höhn.) Martin. A second species *S. rehmii* Theiss. was described by Theissen (1908).

Very recently, material believed to be the holotype of *S. moelleri* was re-examined and a case made for preserving *Stilbohypoxylon* as a genus (Rogers and Ju, 1997). The holotype of *S. rehmii* Thiess. was also re-examined, but this was found to contain a *Xylaria* species. The original description of *S. moelleri* did not include ascospore measurements. Rogers and Ju (1997) have deposited an epitype of the species, and provided ascospore measurements which reveal that many genuine *Stilbohypoxylon* collections which were placed in *S. rehmii* actually belong in *S. moelleri*.

*Stilbohypoxylon* now contains three species (*S. moelleri*, *S. samuelsii* J.D. Rogers and Y.-M. Ju and *S. quisquiliarum* (Mont.) J.D. Rogers and Y.-M. Ju), all of which have superficial, spherical stromata, with a smooth or delicately wrinkled surface which is usually overlain with yellow, greenish yellow or ochraceous scales at an early stage, unitunicate asci with a large, amyloid apical ring which is greater in height than breadth, and brown, unicellular ascospores with a straight or sigmoid germ slit (Rogers and Ju 1997). Rogers and Ju (1997) also emphasise the frequent presence of a synnematous anamorph on the outside of the stromata, although this was not observed on the collections made during the present study.

*Species recorded from palms*
**Stilbohypoxylon moelleri** Henn., Hedwigia 41: 16 (1902).

This species has been well described by Rogers and Ju (1997).

**Anamorph:** Geniculosporium-like (Rogers and Ju, 1997).

**Known distribution:** Australia, Brazil, Ecuador, French Guiana, Grenada, Philippines, Puerto Rico.

**Known palm hosts:** Astrocaryum, Elaeis, Euterpe, Iriartia, Jessenia, Mauritia, Oraniopsis, Phytelephas, Prestoea and unidentified palms.


These are the first reports of *S. moelleri* from a host which could be identified, and is also the first collection from Australia.

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**References**


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