

## Fungi from palms. XX<sup>1</sup>. The genus *Guignardia*

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Eight species in the genus *Guignardia* from palm hosts are accepted. These species are described and illustrated and a dichotomous key is provided.

Keywords: Ascomycetes, palmae, taxonomy.

Members of the genus *Guignardia* are found in the foliage of gymnosperms, herbaceous dicotyledons and monocotyledons (Hanlin, 1990). Hanlin (1990) reports distinguishing features to include dark-brown, globose or subglobose, ostiolate ascomata, a pseudoparenchymatous centrum, and distinct mucilaginous appendages which occur at one or both ends of the spore. The anamorphs are species of *Phyllosticta* Pers., with a *Leptodothiorella* Höhn. spermatial state. In some species ascospores may be surrounded by a mucilaginous sheath or lack sheaths or appendages altogether (Hyde, pers. obs.).

Fröhlich & Hyde (1995) described *Guignardia candeloflamma* J. Fröhl. & K. D. Hyde from leaf spots on an unidentified palm collected in Irian Jaya and Australia. The first *Guignardia* Viala & Ravaz from palms was described as early as 1914 by Rehm. Ten *Guignardia* names associated with palms have been published since and a single species is known from *Freycinetia* in the Pandanaceae (Rehm, 1913; Saccardo, 1917; von Arx & Müller, 1954; Hino & Katumoto, 1965; Punithalingam, 1974). *Guignardia*-like species from palms may also have been described under *Desmotascus* F. Stev., *Laestadia* Auersw., *Phomatospora* Sacc., *Physalospora* Niessl and *Melanops* Nitschke.

Twenty five *Guignardia* or *Guignardia*-like species have been described from palms and many of these have been examined. Some species in the genera mentioned above were also studied. Eight species are recognised in this paper, while the rest are transferred or synonymised. I suspect that there may be many more undiscovered

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<sup>1</sup> XIX in *Sydowia* 47(1): 38–43.

Tab. 1. – Comparative data of species of *Guignardia* from palms.

	<i>G. arengae</i> Rehm	<i>G. calami</i> (Syd. & P. Syd.) Arx & E. Müll.	<i>G. candeloflamma</i> J. Fröhl. & K. D. Hyde	<i>G. cocoës</i> (Petch) K. D. Hyde	<i>G. cocogena</i> (Cooke) Punith.	<i>G. manokwaria</i> K. D. Hyde	<i>G. migrans</i> (Rehm) K. D. Hyde	<i>G. ryukyuensis</i> I. Hino & Katum.
Hosts	<i>Arenga</i> , unidentified palm	<i>Areca?</i> , <i>Calamus</i> , <i>Caryota?</i> , <i>Cocos</i>	<i>Pinanga</i>	<i>Cocos</i>	<i>Archontophoenix</i> , <i>Cocos</i> , <i>Trachycarpus</i>	<i>Gelubia?</i>	<i>Arenga</i>	<i>Arenga</i>
Habit	Dead leaves or petioles	Living leaf	Spot on living leaf	Leaf spot on living leaves	Leaves	Dead petioles	Leaf spot on living leaves	Living petioles
Ascomata	320–500 µm diam, 65–120 µm high	100 µm diam	50–105 x 22.5–50 µm diam	250–300 µm diam	100–130 µm diam	200 µm diam, 100 µm high	400 µm diam, 100 µm high	350–400 µm diam, 280–350 µm high
Asci	40–100 x 20–28 µm	42–72 x 14–18 µm	91–140 x 17.5–25 µm	75–125 x 20–25 µm	62–100 x 10–12 µm	70–100 x 20–24 µm	54–82 x 22–38 µm	70–85 x 18–23 µm
Ascospores	18–26 x 8–13 µm Roughened wall	15–19 x 7–8 µm Remnants of a mucilaginous sheath	17.5–25 x 7.5–11 µm Pad and candle-flame-shaped appendages	23–26.5 x 9–10 µm Germ pores and remnants of	13–20 x 5–6.5 µm End mucilaginous caps mucilage	22–30 x 8–12 µm Irregular mucilaginous sheath	19–24 x 8.5–12 µm No sheath or appendages	23–28 x 6.5–7 µm No appendages
Distribution	Indonesia, Philippines	Burma, India, Indonesia, Philippines	Australia, Indonesia	Solomon Islands	China, Guyana, Malaysia	Indonesia	Philippines	Japan

species in nature. This paper brings together information available on these *Guignardia* species on palms and the somewhat closely related family Pandanaceae, including new records, with diagnoses, discussions and illustrations. This study is mainly based on herbarium material and all microscopic measurements were made in water. A dichotomous key to the species of *Guignardia* on palms and a table of comparative features (Tab. 1) is provided.

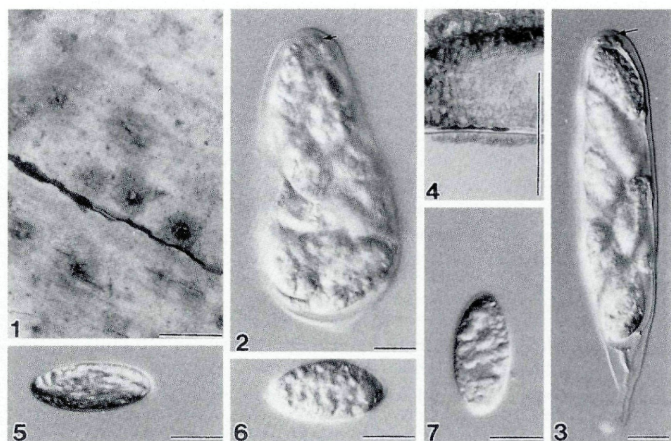
### Key to species of *Guignardia* on palms

1. Ascospores with bipolar germ pores ..... 2
1. Ascospores lacking germ pores..... 3
2. Ascospores 23–26.5  $\mu\text{m}$  long, surrounded by remnants of mucilage, associated with spots on living leaves of *Cocos*.....  
..... *G. cocoës*
2. Ascospores 22–30  $\mu\text{m}$  long, surrounded by a mucilaginous sheath, which is wavy in outline, on dead palm petioles... *G. manokwaria*
3. Ascospores with bipolar appendages..... 4
3. Ascospores surrounded by mucilaginous sheath or lacking sheaths or appendages..... 5
4. Appendages cap-like..... *G. cocogena*
4. Basal appendages pad-like and polar appendages candle-like .....  
..... *C. candeloflamma*
5. Ascospores 15–19  $\mu\text{m}$  long..... *G. calami*
5. Ascospores mostly longer than 19  $\mu\text{m}$  ..... 6
6. Ascospores with a rough wall, on dead leaves..... *G. arengae*
6. Ascospores smooth-walled, on living leaves or petioles ..... 7
7. Ascospores 19–24 x 8.5–12  $\mu\text{m}$ , associated with spots on leaving leaves..... *G. migrans*
7. Ascospores 23–28 x 6.5–7  $\mu\text{m}$ , on living petioles ..... *G. ryukyensis*

### Taxonomy

1. ***Guignardia arengae*** Rehm, Leaft. Phil. Bot. 6: 2195. 1914. – Figs. 1–14.  
= *Melanops arengae* (Rehm) Petr., Ann. Mycol. 32: 391. 1934.

A s c o m a t a developing under slightly raised regions, 520–910  $\mu\text{m}$  diam, which have a darkened outer rim and light-coloured centre, containing a central blackened ostiolar dot (Fig. 1); in vertical section 320–500  $\mu\text{m}$  diam, 65–120  $\mu\text{m}$  high, lenticular or subglobose,



Figs. 1-7. *Guignardia arengae* (from holotype). - 1. Appearance of ascomata on host surface. - 2, 3. Asci. Note the apical ring (arrowed). - 4. Section of ascoma. - 5-7. Ascospores. - Bars, 1 = 1 mm; 4 = 100  $\mu$ m; 2,3, 5-7 = 10  $\mu$ m.

immersed, surrounded by variable stromatic development, with a central ostiole, axis vertical to the host surface (Figs. 4, 8, 10). - Stromata covering ascoma comprising host epidermal cells coloured light-brown by intracellular fungal hyphae (Figs. 4, 8, 10). - Peridium composed of brown-walled *textura globulosa*, inwardly compressed (Figs. 4, 10). - Pseudoparaphyses ca 4  $\mu$ m wide, hypha-like, filamentous, numerous, irregular and branching (Fig. 12). - Asci 40-100 x 20-28  $\mu$ m, 8-spored, ovoid, saccate or clavate, pedicel short, or absent, thick-walled, bitunicate, apically rounded with a J-subapical ring, 5  $\mu$ m high, 2  $\mu$ m diam (fissitunicate dehiscence not seen) (Figs. 2, 3, 9, 11). - Ascospores 18-26 x 8-13  $\mu$ m, 2-3-seriate, ellipsoidal, unicellular, hyaline, thin-walled, roughened (Figs. 5-7, 13, 14).

**Known distribution.** - Indonesia, Philippines.

**Known hosts.** - *Arenga*, indetermined palm.

**Material examined.** - PHILIPPINES: Laguna Province, Los Baños, on dead leaf of *Arenga mindorensis*, Dec. 1913, C. F. Baker No. 2170, S (holotype). - INDONESIA: Irian Jaya, Manokwari, on terrestrial dead palm frond in freshwater swamp, Mar. 1992, K. D. Hyde & N. Raga, KDH 1204a, BRIP 22747. Ibid., KDH 1215, BRIP 22748.



*G. arengae* is closest to *G. calami*, but the former has larger ascospores with a very finely roughened wall. Because this ornamentation is fine it is not visible in the micrographs (Figs. 5-7, 13, 14), but can be seen in material mounted in water using interference contrast microscopy.

The specimens from Irian Jaya (Figs. 8-14) occurred on petioles as compared to leaves and had narrower ascospores ( $18-25 \times 8-9 \mu\text{m}$ , vs.  $21-26 \times 11-13 \mu\text{m}$ ). Ascospores, however, had a roughened wall similar to that observed in *G. arengae* and therefore the fungi are considered to be the same. Pseudoparaphyses were seen in the material from Irian Jaya and were ca  $4 \mu\text{m}$  wide, hypha-like, filamentous, numerous, irregular and branching (Fig. 12). Asci had fissitunicate dehiscence.

2. *Guignardia calami* (Syd. & P. Syd.) Arx & E. Müll., Beitr. Kryptogamenflora Schweiz 11: 55. 1954. – Figs. 15–22.

= *Phyalospora calami* Syd. & P. Syd., Ann. Mycol. 9: 407. 1911.

= *Melanops calami* (Syd. & P. Syd.) Petr., Ann. Mycol. 32: 375. 1934.

= *Phyalospora transversalis* Syd. & P. Syd., Ann. Mycol. 9: 407. 1911.

= *Phyalospora arecae* Höhn., Sber. Akad. Wiss. Wien 121: 383. 1912.

= *Melanops banosensis* Petr., Ann. Mycol. 32: 436. 1934.

= *Guignardia banosensis* (Petr.) Arx & E. Müll., Beitr. Kryptogamenflora Schweiz 11: 57. 1954.

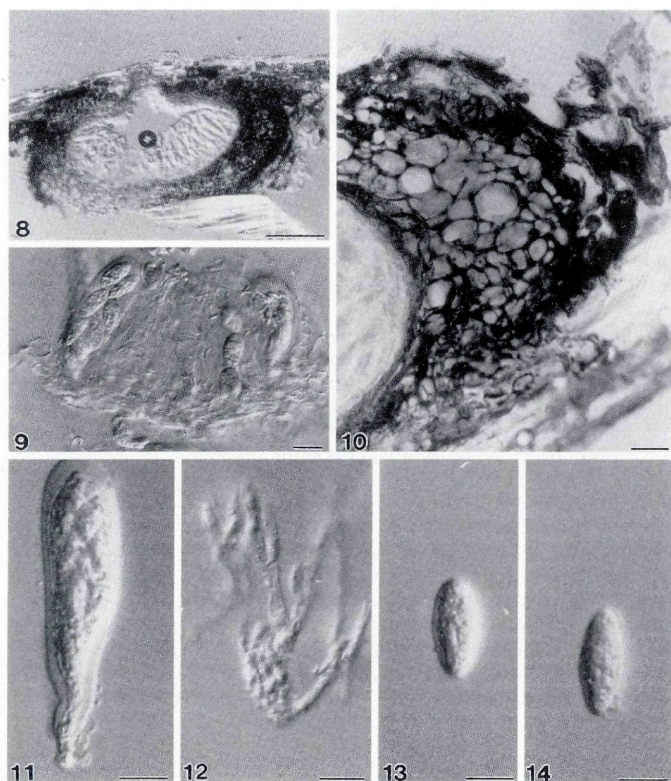
A n a m o r p h . – *Phyllosticta arecae* Höhn.

Leaf spots up to 25 mm long, 8 mm wide, rectangular, outer portion dark-brown, inner portion necrotic and light-brown (Figs. 15, 16). – Ascomata forming under globose raised darkened areas in the leaf spot, solitary or clustered; in vertical section, up to  $100 \mu\text{m}$  diam, globose or subglobose, immersed, with a central ostiole (Fig. 17). – Peridium thin, composed of a few layers of brown angular cells (Fig. 17). – Pseudoparaphyses of short chains of ovoid cells (Fig. 19). – Asci  $42-72 \times 14-18 \mu\text{m}$ , 8-spored, broad-cylindrical to ellipsoidal, short pedunculate, bitunicate, fissitunicate dehiscence not seen, apically rounded with an ocular chamber and subapical ring (Fig. 18). – Ascospores  $15-19 \times 7-8 \mu\text{m}$ , 2-3 seriate, ovoid or somewhat irregularly ovoid, hyaline, unicellular, often surrounded by remnants of a mucilaginous sheath (Figs. 20-22).

Known distribution. – Burma, India, Indonesia, Philippines.

Known hosts. – *Areca?*, *Calamus*, *Caryota?*, *Cocos*.

Material examined. – BURMA: Bilin, on leaves of *Cocos nucifera*, 14 Jan. 1908, E. M. Butler, Herb. Crypt. Ind. Orient. No 1218, S (holotype of *Phyalospora transversalis*). – INDIA: Chittagong, associated with leaf spots of *Calamus*



Figs. 8-14. *Guignardia arengae* (BRIP 22747). - 8, 10. Sections of ascogonia. - 9. Squash of ascogonium contents. - 11. Ascus. - 12. Pseudoparaphyses. - 13, 14. Ascospores. - Bars 8, 9 = 100  $\mu\text{m}$ ; 10-14 = 10  $\mu\text{m}$ .

*tenuis*, 15 Dec. 1907, R. Sen, 1217, S (holotype of *Physalospora calami*). - INDONESIA: Java, Buitenzorg, on leaf of *Areca*, 1907, Höhnelt, FH (holotype of *Physalospora arecae*). - PHILIPPINES: Province Laguna, Los Baños, on leaf of *Caryota* sp., 5 Nov. 1913, M. B. Raimundo, C. F. Baker No. 1988, S (lectotype of *Melanops banosensis*).

*G. calami* is associated with rectangular leaf spots on *Calamus* in India and is easily distinguishable from *G. arengae*, which occurs on

dead leaves of *Arenga* in the Philippines. The ascospores of *G. calami* are smaller (15–19 x 7–8  $\mu\text{m}$  vs. 18–26 x 8–13  $\mu\text{m}$ ) and smooth-walled with mucilage, compared to the roughened wall of the ascospores in *G. arengae*. *Physalospora transversalis* occurs on a different host, *Cocos*, but in other respects is identical to *G. calami* and therefore is considered a synonym. Because *G. calami* is associated with distinctive leaf spots on *Calamus*, the synonymy of *G. banosensis*, which is recorded on 'agbestogera' (leaves of *Caryota* sp.), seems unlikely. The type material of *G. banosensis*, however, is poor and a description of the species cannot be confirmed. For the time being the fungi are treated as conspecific although I suspect this is doubtful. Fresh collections of *G. banosensis* are needed to conclusively solve this problem.

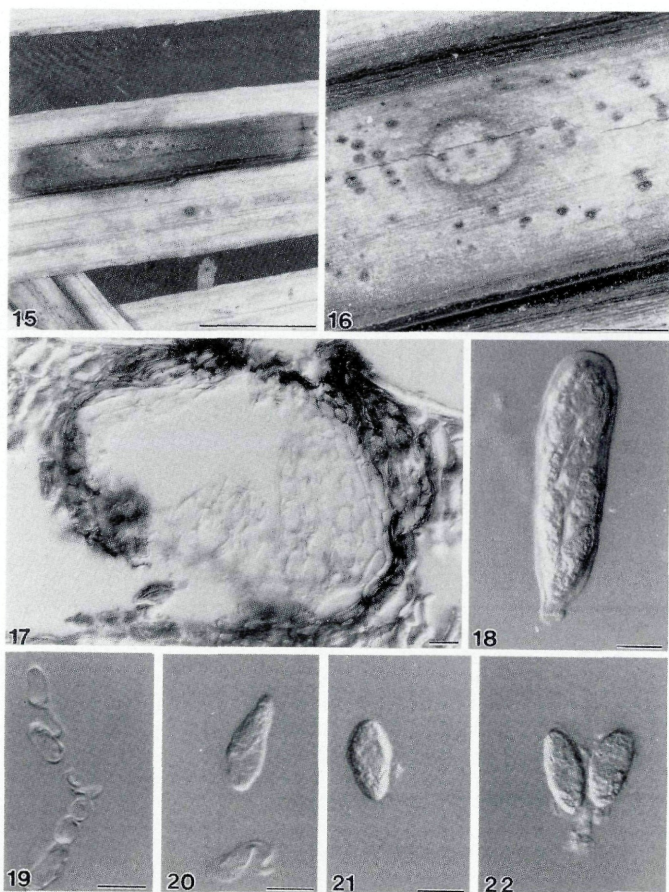
*Physalospora arecae* was synonymised with *Guignardia calami* (von Arx & Müller, 1954). The sample loaned from FH contained two packages, both with leaves of *Areca* sp. with similar spots, 1–2 cm in diam, with a darkened outer margin. I examined numerous leaf spots, but could locate no ascomata with asci or ascospores. From the description provided by Höhnelt (1912) the taxon may be synonymous with *G. calami* and until further material becomes available I prefer to treat it as such.

There are two packages held in S containing material of *Physalospora calami*. One is marked Ser. No. 1217, while the other has no number, although all other details, including the morphology of the taxon are identical. The package No. 1217 has fungal material of higher quality and is chosen as the lectotype. The anamorph of *G. calami* is considered to be *Phyllosticta arecae* Höhn. (von Arx & Müller, 1954), because *P. arecae* is treated as its synonym. Several other synonyms of *P. arecae* are listed by Sivanesan (1984).

3. ***Guignardia candeloflamma*** J. Fröhl. & K. D. Hyde, Mycol. Res. 99: 110. 1995.

Leaf spots 15–45 x 10–22 mm, ellipsoidal, identical on both leaf surfaces, light-brown, with a zonate, medium-brown centre becoming grey with age and a distinct, thin, dark-brown border. – Asc o m a t a 50–105 x 22.5–50  $\mu\text{m}$  ( $\bar{x}$  = 69 x 36  $\mu\text{m}$ , n = 20), immersed, globose to cylindrical, with an eccentric ostiole. – P e r i d i u m 6–13  $\mu\text{m}$  thick, composed of one to three layers of brown, polyhedral or cuboid cells. – S t r o m a t a absent, but the ascomata may appear dark from above due to the dark pigmentation of the cells of the peridium. – C e n t r u m pseudoparenchymatous and composed of small, spherical cells 6–10  $\mu\text{m}$  diam, which form short chains when the centrum breaks or is disrupted. – A s c i 91–140 x 17.5–25  $\mu\text{m}$





Figs. 15–22. *Guignardia calami* (from lectotype). – 15, 16. Leaf spots. – 17. Section of ascoma. – 18. Ascus. – 19. Pseudoparaphyses. – 20–22. Ascospores. – Bars: 15 = 10 mm; 16 = 1 mm; 17–22 = 10  $\mu$ m.

( $\bar{x}$  = 115 x 20  $\mu$ m, n = 50), 8-spored, clavate to pyriform, with a short stalk, bitunicate and with an ocular chamber. – Ascospores 17.5–25 x 7.5–11  $\mu$ m ( $\bar{x}$  = 21 x 9.5  $\mu$ m, n = 50), biseriolate, hyaline, one-celled, ellipsoidal, with a rounded apex and bullet-shaped base, with a

distinct mucilaginous appendage at each end, a  $2.25 \times 10.25 \mu\text{m}$  pad at the apex and a ca  $19.2 \mu\text{m}$  long candle-flame-shaped process at the base.

**Known distribution.** – Australia, Indonesia.

**Known host.** – *Pinanga*.

**Material examined.** – AUSTRALIA: north Queensland, Smithfield, Woodman's Nursery (The Palm Factory), living leaf of an unidentified *Pinanga* sp., Feb. 1992, J. Fröhlich & K. D. Hyde, KDH 1023, BRIP 20472 (holotype). – INDONESIA: Irian Jaya, Marauke, on living leaf of an unidentified palm, Mar. 1992, K. D. Hyde & N. Raga, KDH 1267, BRIP 20398.

*Guignardia candeloflamma* is easily distinguished from other *Guignardia* species on palms by its unique appendages. It was illustrated by Fröhlich & Hyde (1995).

**4. *Guignardia cocoës* (Petch) K. D. Hyde, comb. nov. – Figs. 23–29.**

= *Desmotascus cocoës* Petch, Ann. R. Bot. Gard. Peradeniya 7: 300. 1922.

**Leaf spots** brown, necrotic, with concentric rings of blackened dots. – **Ascomata** developing under raised, slightly darkened areas, occasionally erumpent and cracking the host surface, mostly solitary (Fig. 23); in vertical section  $250\text{--}300 \mu\text{m}$  diam, subglobose, immersed beneath the host cuticle, ostiolate (Fig. 24). – **Peridium** up to  $25 \mu\text{m}$  wide, composed of a few layers of brown-walled angular cells (Fig. 25). – **Pseudoparaphyses** not seen. – **Asci**  $75\text{--}125 \times 20\text{--}25 \mu\text{m}$ , 8-spored, clavate, pedunculate, bitunicate, fissitunicate, apically rounded, with an ocular chamber (Fig. 26). – **Ascospores**  $23\text{--}26.5 \times 9\text{--}10 \mu\text{m}$ , 2–3-seriate, irregularly ellipsoidal, unicellular, hyaline, with apical button-like germ pores and remnants of mucilage (Figs. 27–29).

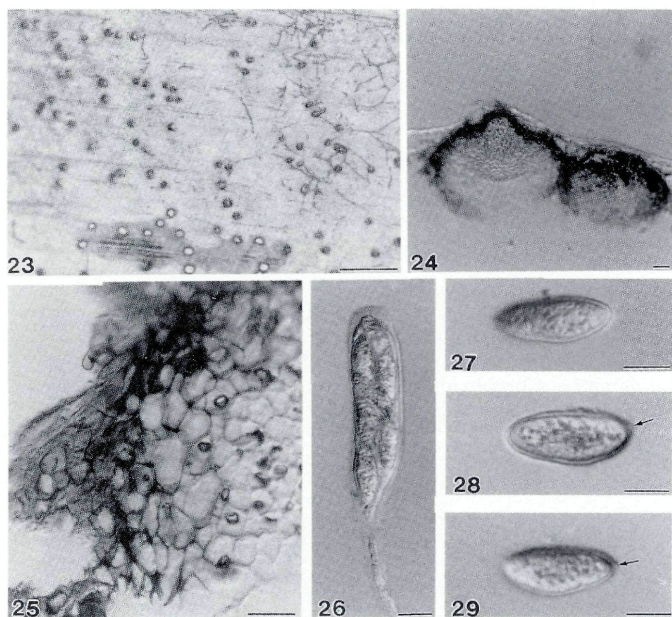
**Known distribution.** – Solomon Islands.

**Known host.** – *Cocos*.

**Material examined.** – SOLOMON ISLANDS: on leaves of *Cocos nucifera*, Jun. 1917, Petch, K (holotype).

This species from palms is distinct from other taxa in several important aspects. Ascospores are longer than in most other species (Tab. 1) and have polar germ pores. It is closest to *G. manokwaria*, which differs in its fusoid-rhomboid ascospores surrounded by a mucilaginous sheath, which is irregular and wavy in outline (Figs. 40–43).





Figs. 23–29. *Desmotascus* (= *Guignardia*) *cocoëns* (from holotype). – 23. Ascomata on leaf. – 24. Section of ascomata. – 25. Peridium. – 26. Ascus. – 27–29. Ascospores. Note the germ pores (arrowed). – Bars: 23 = 1 mm, 24–29 = 10  $\mu$ m.

5. *Guignardia cocogena* (Cooke) Punith., Mycol. Pap. 136: 21. 1974. – Figs. 30–33.

= *Sphaeria cocogena* Cooke, Grevillea 5: 102. 1877.

= *Metasphaeria cocogena* (Cooke) Sacc., Syll. Fung. 2: 172. 1883.

= *Guignardia cocoicola* Punith., Mycol. Pap. 136: 15. 1974.

Anamorph. – *Phyllosticta cocoicola* (Bat.) Sivanesan, The bitunicate ascomycetes and their anamorphs: 169. 1974.

Ascomata developing under slightly raised darkened areas, solitary (Fig. 30); in vertical section 100–130  $\mu$ m diam, globose or subglobose (Fig. 31), with an eccentric neck. – Peridium up to 10  $\mu$ m wide, composed of 3–4 layers of brown-walled angular cells (Fig. 31). – Ascii 62–100 x 10–12  $\mu$ m, 8-spored, clavate, pedunculate, thick-walled, bitunicate, apically rounded, with an ocular chamber

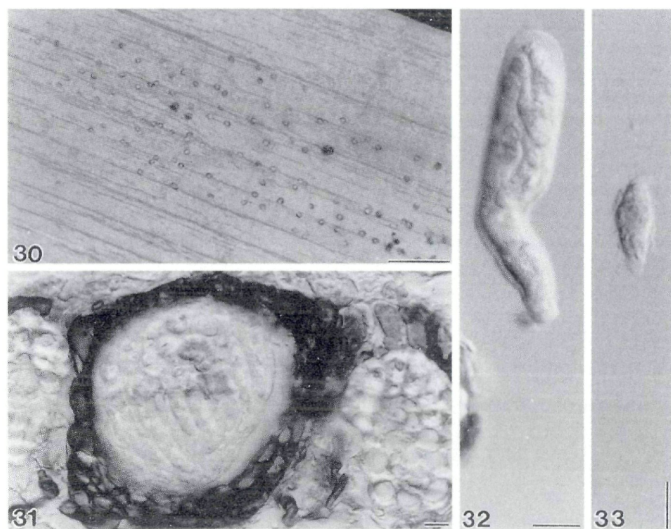
(Fig. 32). – Ascospores  $13\text{--}20 \times 5\text{--}6.5 \mu\text{m}$ , 2–3-seriate, fusiform to ellipsoidal, unicellular, hyaline, wider in the mid-region, ends rounded with mucilaginous caps (Fig. 33).

**Known distribution.** – China, Guyana, Malaysia.

**Known hosts.** – *Archontophoenix*, *Cocos*, *Trachycarpus*.

**Material examined.** – GUYANA: Georgetown (Demerara), on leaves of *Cocos nucifera* L., K (holotype). – MALAYSIA: Sabah, isolated from pinnae of *Cocos nucifera*, 1973, P. S. W. Liu, IMI 166144 (holotype of *G. cocoicola*).

Ascospores of *Guignardia cocogena* and *G. cocoicola* are identical in shape, overlap in size ( $13\text{--}20 \times 5\text{--}6.5 \mu\text{m}$  vs  $13\text{--}16 \times 4\text{--}7 \mu\text{m}$ ) and have similar polar mucilaginous pads. J. Taylor (pers. comm.) has also isolated this taxon as an endophyte from *Trachycarpus fortunei* in China and a saprophyte on *Archontophoenix alexandrae* in Penang, Malaysia. The spore dimensions ( $15\text{--}17.5 \times 5\text{--}6.25 \mu\text{m}$  &  $13.25\text{--}17 \times 6.25\text{--}7 \mu\text{m}$  respectively) form a range between *G. cocogena* and *G. cocoicola* and therefore I consider all these taxa to be conspecific. *G. cocoicola* was isolated from a pinna of *C. nucifera* by



Figs. 30–33. *Guignardia cocogena* (from holotype). – 30. Ascomata on leaf surface. – 31. Section of ascomata. – 32. Ascus. – 33. Ascospore. – Bars: 30 = 1 mm; 31–33 =  $10 \mu\text{m}$ .

Punithalingam (1974) and was probably also an endophyte in that situation.

6. *Guignardia manokwaria* K. D. Hyde, sp. nov. – Figs. 34–43.

Ascomata 200  $\mu\text{m}$  diam, 100  $\mu\text{m}$  alta, conica, immersa. Asci 70–100  $\times$  20–24  $\mu\text{m}$ , 8-spore, clavati, pedunculati, bitunicati, fissitunicati, apparato apicali praediti. Ascospores 22–30  $\times$  8–12  $\mu\text{m}$ , 2–3-seriatae, fusiformes vel fusiformes-rhomboidae, unicellulae, hyalinae, tunica gelatinosa praeditae.

**H o l o t y p u s .** – INDONESIA: Irian Jaya, Manokwari, on rachides of dead *Golubia*?, Mar. 1992, K. D. Hyde & N. Raga, KDH 1206, BRIP 22749.

**E t y m o l o g y .** – In reference to the location Manokwari.

**A s c o m a t a** developing under slightly darkened areas, occasionally erumpent and cracking the host surface, mostly solitary (Fig. 35); in vertical section ca 200  $\mu\text{m}$  diam, 100  $\mu\text{m}$  high, conical, immersed beneath the host cuticle with an erumpent apex, base flattened, with a thin spreading stroma at the periphery of the ascoma (Fig. 34). – **P e r i d i u m** up to 30  $\mu\text{m}$  wide, thin below, composed of dark-brown-walled angular cells at the sides (Fig. 36). At the periphery is a wedge of dark-brown angular cells which extends as a thin line between adjacent ascomata (Fig. 34). – **P s e u d o - p a r a p h y s e s** up to 4  $\mu\text{m}$  diam, hypha-like, filamentous, composed of short cylindrical cells, 8–10  $\times$  4  $\mu\text{m}$  diam (Fig. 39). – **A s c i** 70–100  $\times$  20–24  $\mu\text{m}$ , 8-spored, clavate, pedunculate, bitunicate, fissitunicate, apically rounded with an ocular chamber and faint ring (Figs. 37, 38). – **A s c o s p o r e s** 22–30  $\times$  8–12  $\mu\text{m}$ , 2–3-seriate, fusiform or fusiform-rhomboid, unicellular, hyaline, with apical button-like germ-pores and surrounded by a mucilaginous sheath with an irregular wavy outline (Figs. 40–43).

**K n o w n d i s t r i b u t i o n .** – Indonesia.

**K n o w n h o s t .** – *Golubia*?

**M a t e r i a l e x a m i n e d .** – INDONESIA: Irian Jaya, Manokwari, on rachides of dead *Gelubia*?, Mar. 1992, K. D. Hyde & N. Raga, KDH 1206, BRIP 22749.

This is a new *Guignardia* species from palms, which is distinct from others in several important ascospore characteristics. Ascospores are longer than those of most other species (Tab. 1) and their shape is fusoid-rhomboid. Furthermore they are surrounded by a

mucilaginous sheath which is irregular and wavy in outline, and have apical germ pores (Figs. 40–43).

7. *Guignardia migrans* (Rehm) K. D. Hyde, comb. nov. – Figs. 44–51.

≡ *Phomatospora migrans* Rehm, Leaf. Phil. Bot. 6: 2195. 1914.

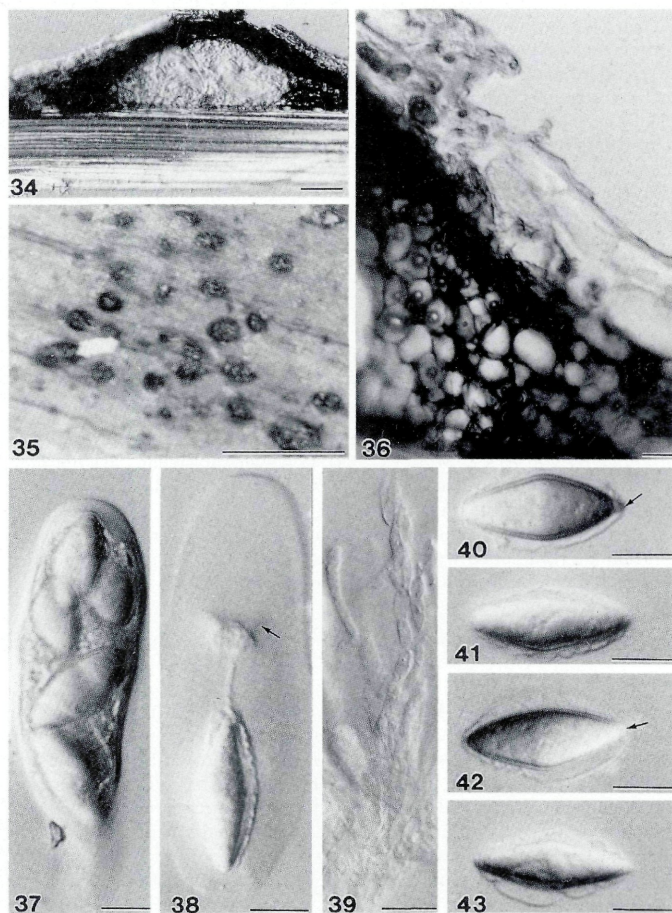
≡ *Catacauma migrans* (Rehm) Höhn., Ann. Mycol. 16: 247. 1918.

Leaf spots up to 3 cm diam, ovoid, composed of concentric rings of light and darker tissue, some with a central necrotic tan region. The leaf tissue of the spot is whitish purple in colour and

Tab. 2. – Remarks on *Guignardia*-like species from palms.

Species	Notes
<i>Catacauma migrans</i>	≡ <i>Guignardia migrans</i>
<i>C. palmicola</i>	Not a <i>Guignardia</i>
<i>C. sabal</i>	Not a <i>Guignardia</i>
<i>C. torrendiella</i>	Not a <i>Guignardia</i>
<i>Desmotascus cocoës</i>	≡ <i>Guignardia cocoës</i>
<i>Guignardia arecae</i>	No type available
<i>G. arengae</i>	Accepted in this paper
<i>G. calami</i>	Accepted in this paper
<i>G. banosensis</i>	≡ <i>Guignardia calami</i>
<i>G. candeloflamma</i>	Accepted in this paper
<i>G. cocoës</i>	Comb. nov. in this paper
<i>G. cocogena</i>	Accepted in this paper
<i>G. cocoicola</i>	≡ <i>Guignardia cocogena</i>
<i>G. freycinetiae</i>	≡ <i>Micronectriopsis freycinetiae</i>
<i>G. manokwaria</i>	New in this paper
<i>G. migrans</i>	Accepted in this paper
<i>G. ryukyensis</i>	Accepted in the paper
<i>Laestadia cocophila</i>	Type lacking mature material
<i>Melanops arengae</i>	≡ <i>Guignardia arengae</i>
<i>M. banosensis</i>	≡ <i>Guignardia calami</i>
<i>M. calami</i>	≡ <i>Guignardia calami</i>
<i>Metasphaeria cocogena</i>	≡ <i>Guignardia cocogena</i>
<i>Phomatospora cylindrotheca</i>	Not a <i>Guignardia</i>
<i>P. pandani</i>	Not a <i>Guignardia</i>
<i>P. migrans</i>	≡ <i>Guignardia migrans</i>
<i>Physalospora arecae</i>	≡ <i>Guignardia calami</i>
<i>P. asbolae</i>	No type available
<i>P. astrocaryi</i>	No type available
<i>P. calami</i>	≡ <i>Guignardia calami</i>
<i>P. cocoës</i>	Type lacking good material
<i>P. pandani</i> Ellis & Everh.	Not a <i>Guignardia</i>
<i>P. pandani</i> Stevens & Pierce	Homonym of <i>Physalospora pandani</i> Ellis & Everh.
<i>P. rhacheophila</i>	Type lacking good material
<i>P. tecta</i>	No type available
<i>P. transversalis</i>	≡ <i>Guignardia calami</i>
<i>Sphaerella cocophylla</i>	Type lacking mature material
<i>Sphaeria asbolae</i>	No type available





Figs. 34-43. *Guignardia manokwaria*. - 34. Section of ascoma. - 35. Ascomata on frond surface. - 36. Peridium. - 37, 38. Asci. Note the subapical ring (arrowed). - 39. Pseudoparaphyses. - 40-43. Ascospores. Note the germ pores (arrowed). - Bars: 35 = 1 mm, 34, 36-43 = 10  $\mu$ m.



darker in the region of the concentric rings of ascomata, the outer leaf tissue is brown in colour (Figs. 44, 45). – *Ascomata* c. 400  $\mu\text{m}$  diam, 100  $\mu\text{m}$  high, forming under slightly raised dark areas with an outer dark ring, cylindrical (Fig. 50), with an eccentric ostiole. – *Peridium* composed of a few layers of pale brown-walled angular cells (Figs. 50, 51). – *Pseudoparaphyses* not seen. – *Asci* 54–82 x 22–38  $\mu\text{m}$ , 8-spored, clavate to ovoid, thick-walled, bitunicate (fissitunicate dehiscence not seen), apically rounded, with an ocular chamber and subapical ring (Figs. 46, 47). – *Ascospores* 19–24 x 8.5–12  $\mu\text{m}$ , 2–3-seriate, ellipsoidal, unicellular, hyaline, smooth-walled, lacking sheaths or appendages (Figs. 48, 49).

*Known distribution.* – Philippines.

*Known host.* – *Arenga*.

*Material examined.* – PHILIPPINES: Laguna Province, Los Baños, on leaves of *Arenga saccharifera*, 8 Jan. 1913, S. Reyes, C.F. Baker No. 1425, S (holotype).

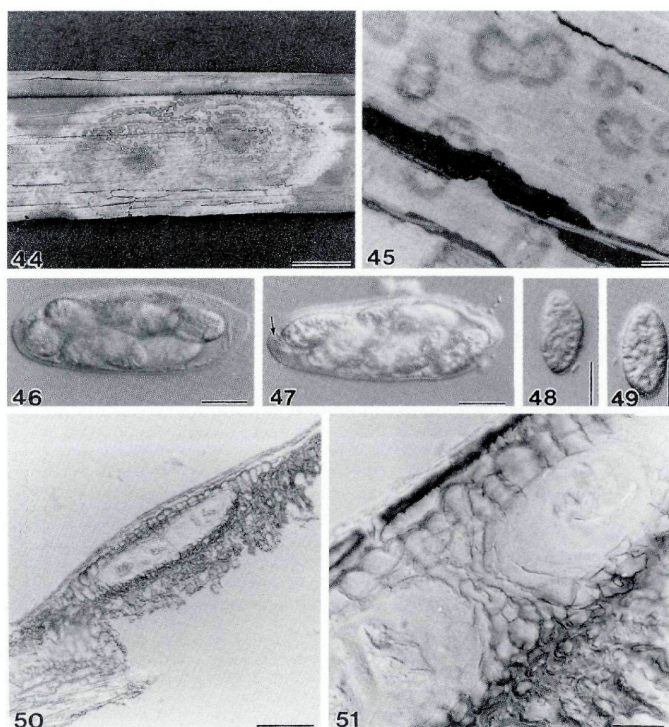
*Phomatospora migrans* was synonymised with *Guignardia arengae* by von Arx & Müller (1954), however the species are distinct. *G. arengae* sporulates on dead leaves of *Arenga*, while *P. migrans* is associated with spots on living leaves of the same host. The ascospores in *P. migrans* are also shorter and narrower than those of *G. arengae* and lack a roughened wall. *P. migrans* shows all of the characteristics of the genus *Guignardia*, therefore a new combination is proposed.

8. *Guignardia ryukyensis* I. Hino & Katumoto, Bull. Fac. Agric. Yamaguti Univ. 16: 608. 1965.

*Ascomata* 350–400  $\mu\text{m}$  diam, 280–350  $\mu\text{m}$  high, subglobose or depressed-globose, immersed, solitary or gregarious. – *Peridium* 25–30  $\mu\text{m}$  wide, composed of a few layers of brown angular cells. – *Asci* 70–85 x 18–23  $\mu\text{m}$ , 8-spored, clavate or cylindrical-clavate, pedunculate, thick-walled, bitunicate (fissitunicate dehiscence not discussed), apically rounded (no details of apical structures noted). – *Ascospores* 23–28 x 6.5–7  $\mu\text{m}$ , 2-seriate, fusoid or oblong-fusoid, unicellular, hyaline, ends rounded or obtuse, without sheaths or appendages.

*Material examined.* – JAPAN: Ins. Taketomi, Ryūkyū, in living petiole of *Arenga engleri* Becc., 5 Apr. 1963, I. Hino, YAM.

In the holotype of *G. ryukyensis* there are three fungi; a *Colletotrichum*-like species, a second coelomycete and what appears



Figs. 44–51. *Guignardia migrans*. – 44, 45. Leaf spot and ascomata. – 46, 47. Asci. Note the apical ring (arrowed). – 48, 49. Ascospores. – 50, 51. Sections of ascomata. – Bars: 44 = 1 mm, 45, 50 = 100  $\mu$ m, 46–49, 51 = 10  $\mu$ m.

to be an immature ascomycete (*Guignardia*?). I dissected several apparently 'mature' ascomata, but could find no ascospores or asci similar to those described for *G. ryukyuensis*. The descriptions and illustrations are therefore taken from Hino & Katumoto (1965) until fresh material can be studied.

*G. ryukyuensis* differs from *G. arengae* in having equally long, but thinner ascospores than *G. arengae* and should be retained as a distinct species.

### Doubtful species

***Guignardia arecae*** Sacc., Atti Accad. Sci. Veneto-Trentina-Istria  
10: 63. 1917.

Type material of this taxon is not available at PAD or K and its location is unknown. Saccardo (1917) described the ascospores as being 12–14.5 x 5.5–6 µm, ellipsoidal to oblong with rounded apices and hyaline and I have no reason to doubt that this is a good, small-spored *Guignardia*. No material, however, can be found and too little is known of this taxon.

***Guignardia freycinetiae*** Rehm, Phil. J. Sci. Sect. C. Bot. 8: 184. 1913.

The location of type material of this taxon is unknown since it is not available at S. From the description of Rehm (1913) it is unlikely to be a *Guignardia*. Höhnelt (1918) introduced the monotypic genus *Micronectriopsis* Höhnelt to accommodate it.

***Laestadia cocophila*** (Cooke) Sacc., Syll. Fung. 1: 431. 1882.

= *Sphaerella cocophylla* Cooke, Grevillea 5: 102. 1877.

Type material borrowed from K contained *Cocos* leaves with patches with small fruiting bodies. None of the fruiting bodies were mature. Saccardo (1882) reported ascospores as being 10 µm long and hyaline and asci as obclavate. This may be a small spored *Guignardia*, but its true identity cannot be established.

Material examined. – GUYANA, Demerara, on leaves of *Cocos nucifera* (K, holotype of *Sphaerella cocophylla* Cooke).

***Physalospora asbolae*** (Berk. & Broome) Cooke, Grevillea 20, 82 (1891).

= *Sphaeria asbolae* Berk. & Broome, Fungi of Ceylon: 307 (1871).

Material is not available at K and therefore the identity of this taxon cannot be determined.

***Physalospora astrocaryi*** Henn., Hedwigia 48: 107. 1908.

From the description provided by Hennings (1908) this is a characteristic *Guignardia* species. *P. astrocaryi* is associated with pallid effuse spots on leaves of *Astrocaryi rostrati*. The ascospores are given as 20–30 x 10–13 µm, fusoid, straight or curved, obtuse, hyaline, with a mucilaginous sheath. Type material of this species deposited at B, however, is no longer available, and therefore its identity is considered doubtful.

***Phyalospora cocoës*** Caballero, An. J. Bot. Madr. 1: 177. 1941.

This species is reported to occur on living leaves of *Cocos australis* Mart. in Spain (Caballero, 1941). The description suggests a *Guignardia* species, although asci are described to be 'incrassati.' I have examined the holotype, but could find no mature ascomata and therefore not enough is known of this fungus to determine its correct identity.

Material examined. - SPAIN: on living leaves of *Cocos australis*, 24 Apr. 1938, Caballero, MA.

***Phyalospora rhacheophila*** Sacc., Att. Accad. Sci. Veneto-Trentina-Istriana. 10: 64. 1917.

From the diagram on the packet, the specimen appears to be a *Guignardia* species with ascospores annotated as 17-19 x 6  $\mu\text{m}$  and asci 55-60 x 8-9  $\mu\text{m}$ . On careful examination of the samples, however, I could find no evidence of the described taxon, only a *Diplodia* and a species of *Phyllosticta*, the latter which may be the anamorph. Not enough is known of this species to treat it further.

Material examined. - PHILIPPINES, Luzon, Laguna, Los Baños, on dead rachis of *Arenga mindorensis*, Dec 1915, C. F. Baker 2747 & 3931 (PAD).

***Phyalospora tecta*** Winter, Hedwigia 24: 29. 1885.

The description of *P. tecta* provided by Saccardo (1891) is characteristic of *Guignardia* and the ascospore size (16-21 x 8-9  $\mu\text{m}$ ) is similar to that of *G. calami*. Type material is unavailable at B and its location is unknown.

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