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A new species of *Nectria* on *Mauritia flexuosa* (Arecaceae) in Ecuador and a key to *Nectria* and allied genera on palms

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A new species of *Nectria*, *N. palmicola* on rachides of *Mauritia flexuosa*, is described from Ecuador. It is compared with the similar species, *N. calami* and *N. pseudopezizia*. *Nectria palmicola* is illustrated with light and SEM micrographs and line diagrams. A key and host index to species of *Nectria* and allied genera on palms is given.

Key Words——*Bionectria*; Hypocreaceae; *Nectria*; palmicolous fungi; systematics.

In a study of the fungi associated with palms in pristine rainforest near Cuyabeno, Ecuador, we collected a *Nectria*-like species with phragmosporous ascospores from rachides of *Mauritia flexuosa*. The ascospores were cylindrical, 3(-6)-septate and spinulose. This species is a member of the *Nectria ochroleuca* group (=*Bionectria* sensu Samuels, 1996). This group is characterised by having ascomata seated either directly on the substrate or on the surface of stromata that were first conidial. Ascospores are bicellular, hyaline and either warted, striate or smooth (Samuels, 1996). In *Nectria ochroleuca* (Schw.) Berk. ascomata are bright orange, smooth-walled and on wood. Only two species of *Bionectria* Speg., are however, formerly included in the genus (Rossman et al., 1993). Because *Bionectria* is not yet clearly defined and because ascospores are mostly 2-celled it would be premature to describe this species in *Bionectria*. It is therefore, described as *Nectria palmicola* sp. nov., using *Nectria* in its wide sense.

Materials and Methods

All measurements given were made in water. SEM procedures follow Hyde and Jones (1989).

Results and Discussion

Nectria palmicola Goh & K. D. Hyde, sp. nov. Figs. 1-21

Ascomata 280-400 μm alta, 280-450 μm diam, subglobosa, superficialia, ad stroma minutum insidentia, pallide luteosa vel aurantia, KOH(−), solitaria vel sparse gregaria. Asci 55-90×18-25 μm, 8-spori, unitunicati, late fusoidei. Ascosporae 32-88×2.5-5 μm, fasciculatae, cylindro-fusoideae, rectae vel leviter curvatae, 3(-6)-septatae, hyalinae, spinulosae.

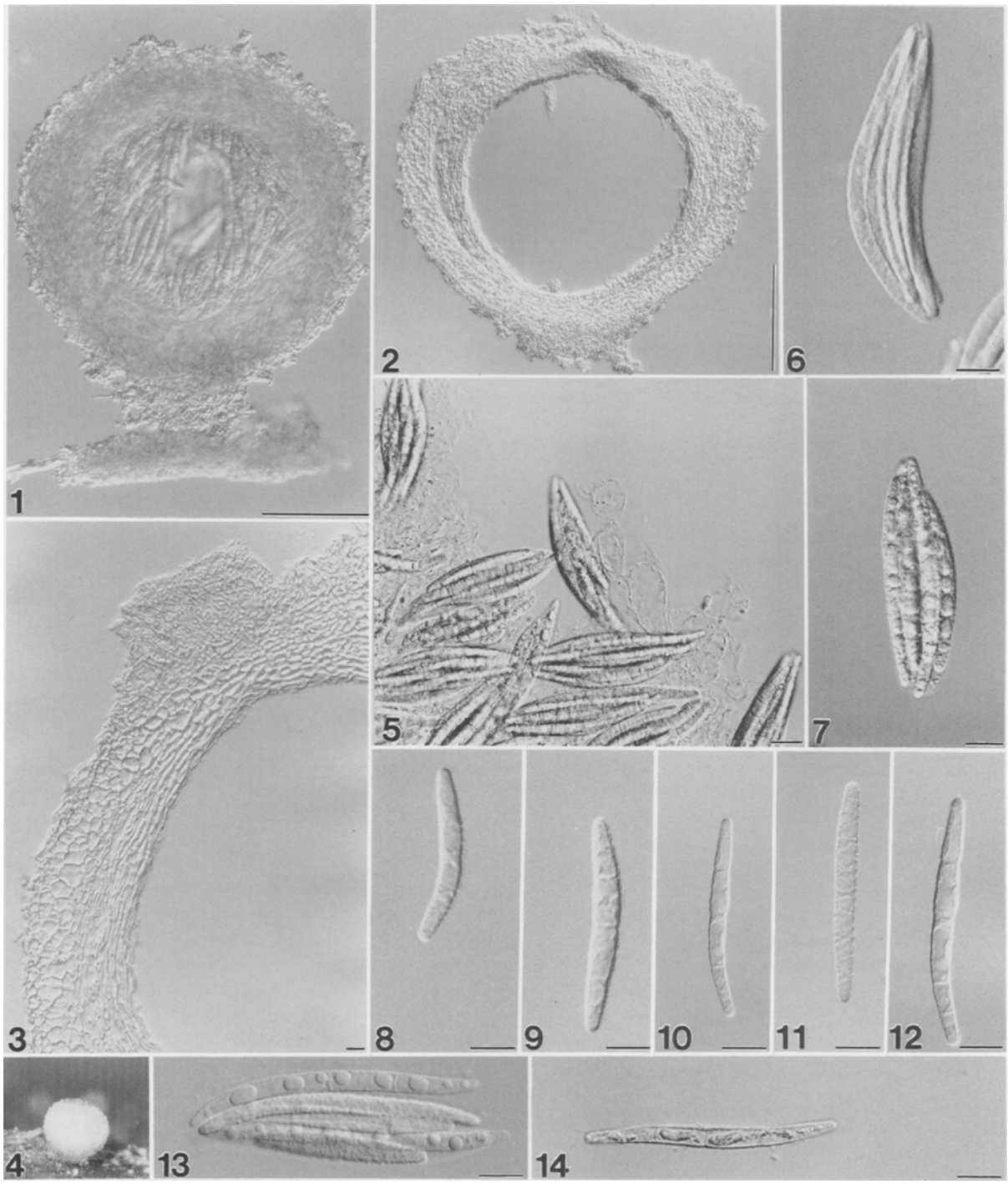
Holotypus. Ecuador, Oriente, Napo Province, Rio Cuyabeno, Cuyabeno rainforest, on dead rachis of *Mauritia flexuosa*, Aug. 1993, K. D. Hyde E139 (HKU (M) 2183, isotype at the Biology Department, Catholic University, Quito, Ecuador).

Ascomata 280-400 μm high, 280-450 μm in diam, subglobose, cup-shaped when dry, with a slightly flattened apex and concolorous ostiolar area, ca 200 μm in diam, surface roughened, superficial on a minute basal stroma, superficial on the substrate, pale luteous to orange, not darkening in KOH, solitary to sparsely aggregated. Ostiolum ca 35 μm in diam, periphysate, depressed. Peridium ca 60 μm wide, of three regions: outer region ca 25 μm wide, yellowish, of thick-walled textura angularis, individual cells ca 3-7 μm in diam, outermost cells smaller, slightly flattened, 5-10×3-5 μm; middle region ca 35 μm wide, composed of flattened subhyaline cells ca 10-15×2 μm; inner region an undulating layer. Basal stroma 25-75 μm high, 100-180 μm in diam, composed of textura intricata. Sterile filaments not observed among mature asci. Asci 55-90×18-25 μm, 8-spored, broadly fusoid, apically rounded, without specialized apical apparatus, lining the base and sides of the ascomata. Ascospores 32-88×2.5-5 μm, fasciculate, cylindro-fusoid with rounded ends, guttulate, straight to slightly curved, 3(-4, 5, 6)-septate, hyaline, spinulose.

Known hosts: *Mauritia flexuosa*.

Known distribution: Ecuador.

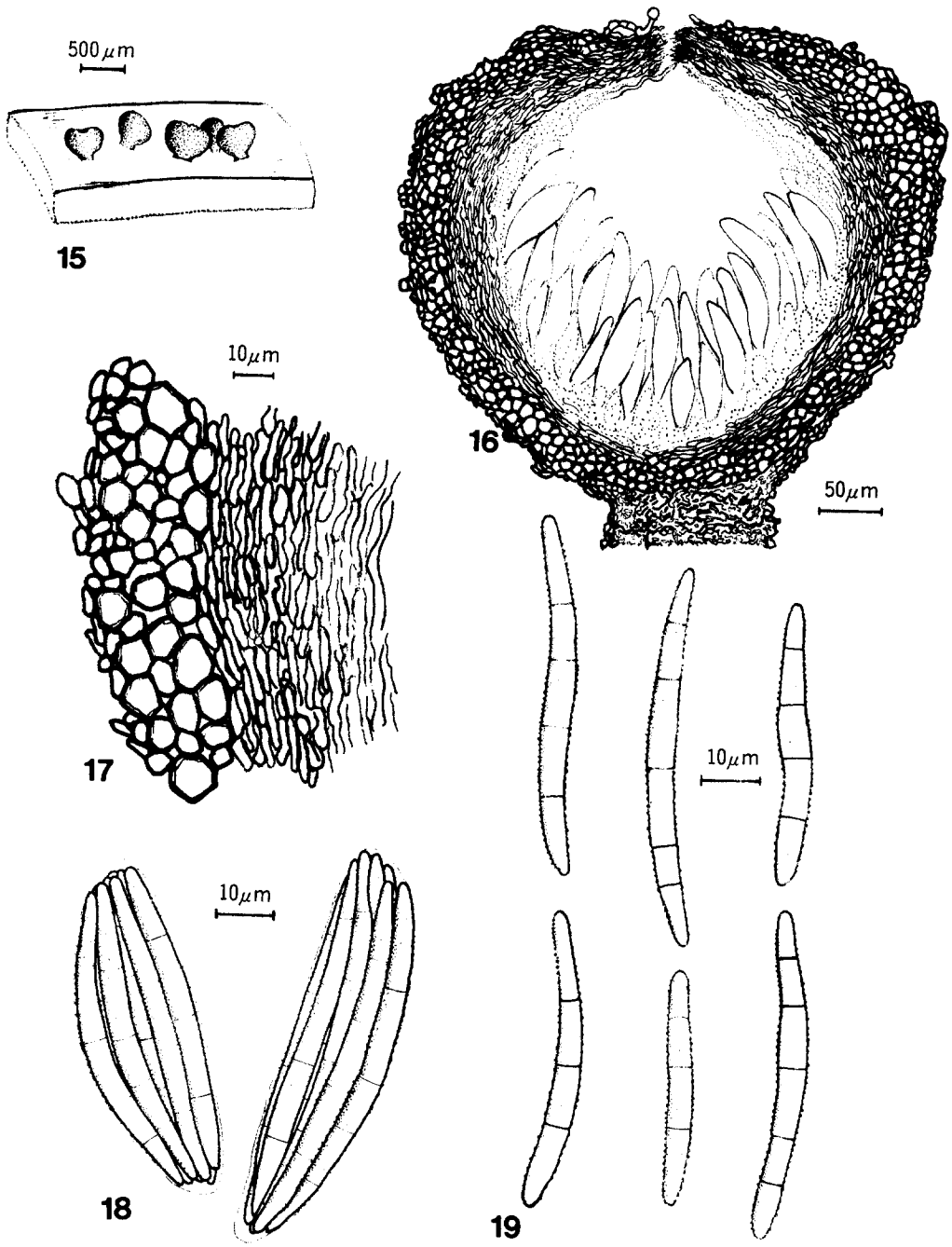
The phragmosporous species of *Nectria* (Fr.) Fr. and related genera were monographed by Rossman (1983) who redescribed *Nectria* in a broad sense, embracing species with one-septate, two-or more septate, or muriform ascospores. *Ophionectria* Sacc. was restricted to the type species *O. trichospora* (Berk. & Broome) Sacc. (Rossman, 1977), while *Calonectria* De Not. was narrowly circumscribed to include species with a *Cylindrocladium* Morgan anamorph and a specific ascospore shape and ascoma wall structure (Rossman, 1979). Many spe-



Figs. 1-14. *Nectria palmicola*.
1, 2. Vertical sections of ascomata, off centre. Note the basal stroma. 3. Peridium composed of two regions: outer region composed of thick-walled textura angularis, outermost cells smaller, slightly flattened; inner region composed of flattened subhyaline cells. 4. Appearance of ascomata on host surface. 5-7. Asci. 8-14. Ascospores. Scale bars, 1, 2=100 μm; 3=10 μm; 4=1 mm; 5-14=10 μm.

cies previously described as species of *Ophionectria* and *Calonectria* were redisposed in *Nectria*.

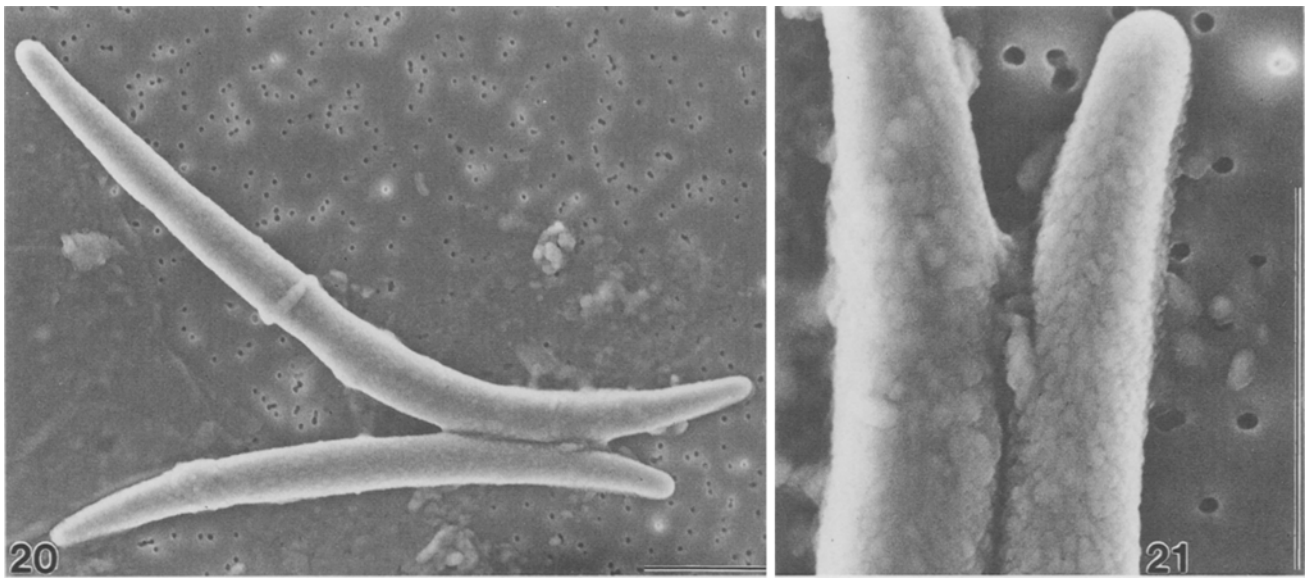
Nectria palmicola is morphologically similar to *N. calami* (Henn. & E. Nyman) Rossman and *N. pseudopeziza* (Desm.) Rossman (Rossman, 1983; Samuels, 1988a; Samuels and Brayford, 1993), however, it has narrower and longer ascospores than *N. calami* and lacks orange oily globules between the cells of the peridium that are seen in squash mounts of ascomata of this species. It differs from *N. pseudopeziza*, which has apically trun-



Figs. 15–19. *Nectria palmicola*. Diagrammatic representation.
15. Habit arrangement of ascomata. 16. Vertical section of ascomata through the ostiolar opening. 17. Peridium composed of three regions: outer region composed of thick-walled textura angularis, outermost cells smaller, slightly flattened; middle region composed of flattened subhyaline cells, inner region an undulating layer. 18. Asci. 19. Ascospores.

cate, clavate asci, narrower ascospores and a differing peridium anatomy. The ascomata are also not born on a minute basal stroma in *N. pseudopeziza*. We were unable to establish the anamorph of this species. A synopsis of these species is given in Table 1.

Nectria-like species with phragmospores from palms were originally described in *Calonectria* (4 species) and *Ophionectria* (3 species). Most of these have been appraised by Rossman (1977) and have been combined with or transferred to other genera. *Ophionectria trichospora* var. *rufula* Penz. & Sacc. was transferred to *Lasiosphaeria rufula* (Penz. & Sacc.) Rossman, *O. palmarum* Torrend was treated as *Tubeufia palmarum* (Torrend) Samuels, Rossman & E. Müll. and *O. calamicola* Henn. & E. Nyman, which has not been studied recently, was regarded as a doubtful species. *Calonectria calami* Henn. & E. Nyman was transferred to *Nectria calami*; *C. dolichospora* Sacc. & Trotter was considered a synonym



Figs. 20–21. *Nectria palmicola*. SEM.
20. Ascospores. 21. Apical region of ascospores with spinulose ornamentation. Scale bars = 10 μm.

Table 1. Synopsis of *Nectria palmicola, N. calami* and *N. pseudopeziza*.

	N. palmicola	*N. calami* [a]	*N. pseudopeziza* [a]
Ascomata	Born on a minute basal stroma	Born on a subiculum of thin-walled hyphae	Born directly on the substrate
Asci	55–90 × 18–25 μm, broadly fusoid, apically rounded	47–63 × 8–12 μm, narrowly clavate, apically rounded	65–90 × 12–17 μm, clavate, often apically truncate
Ascospores	32–88 × 2.5–5 μm, fasciculate, cylindro-fusoid with rounded ends, 3(–6)-septate, spinulose	24–38 × 4–5.5 μm, obliquely uniseriate, fusiform with narrowly rounded ends, (3–5–) 7–9-septate, smooth or faintly striate	(35–)40–60(–75) × (4–)5–7(–7.5) μm, irregularly multiseriate, fusiform with rounded ends, 5–7(–8)-septate, smooth or rarely finely spinulose
Distribution	Ecuador	Temperate to subtropical	Pantropical

[a]Data from Rossman (1983).

Table 2. *Calonectria, Nectria, Nectriopsis* and allied genera on palms.

Host	Species	Host	Species
Arecaceae	*Nectria calami*	*Cocos*	*Nectria calami*
	N. chaetopsinae-polyblastiae		*N. diploa*
	N. dolichospora		*N. kera*
	N. discophora	*Euterpe*	*Nectria suffulta*
	N. gracilipes	*Howeia*	*Calonectria spathophylli*
	N. grammicospora	*Mauritia*	*Nectria palmicola*
	N. ochroleuca		*Nectria mauritiicola*
	N. cf. *pertusa*	*Rhopalostylidis*	*Nectria byssophila*
	Nectriopsis epimyces		*N. chaetopsinae-penicillatae*
	N. lilliputia		*N. erubescens*
Archontophoenix	*Nectria erubescens*		*N. macrarenula*
	N. suffulta		*N. pseudoflavoviridis*
Calamus	*Nectria calami*		*Nectriopsis squamulosa*
Chamaedorea	*Calonectria kyotensis*	*Sabal*	*Nectria calami*

of *C. macrospora* Rick, which is a later homonym of *C. macrospora* Sacc. & Speg.; and *C. ferruginea* Rehm was regarded as a synonym of the lichenized *Porina limbulata* (Krempel) Vainio. *Calonectra spathiphylli* El-Gholl, J. Y. Uchida, Alfenas, T. S. Schub., Alfieri & Chase was described recently from leaves of *Howeia forsteriana*

from Florida (El-Gholl et al., 1992). In this species the ascospores were wider than those of *N. palmicola* and 1-3-septate.

Six species of *Nectria*, i.e. *N. botryosa* Henn., *N. calamicola* Henn. & E. Nyman, *N. chaetopsinae-polyblastiae* Samuels, *N. kera* Subramanian & Bhat, *N. pseudoflavoviridis* Lowen & Samuels, *N. suffulta* Berk. & Curtis, three species of *Nectriella*, i.e. *N. chamaeropis* Oudem., *N. jaczewskii* Girzitska, *N. ptychospermatis* Rehm, and one species of *Nectriopsis*, i.e. *Nectriopsis lilliputia* Samuels have been described from palms. A key to these, other *Nectria* species, and species of *Nectria*-like genera recorded from palms and a host list is given (Table 2). This key and table excludes species that have not been treated recently, i.e. since 1970.

Key to species of *Nectria* and allied genera from palms

1. Ascomata small, yellow, peridium less than 15 μm wide, a single region of cells, ascospores smooth, hyaline, some occurring on ascomycetes, often on *Nectria* 2
1. Ascomata larger, yellow or orange to red, peridium wider than 20 μm, of two cell types, ascospores smooth or ornamented, brown or hyaline, on stromatic ascomycetes but not on Hypocreales 4
2. Ascospores (10-)10.5-13(-16.2) × (2-)2.3-3(-3.5) μm ..... *Nectriopsis epimyces* Samuels (Samuels, 1988b)
2. Ascospores mostly shorter than 10 μm 3
3. Surface of ascomata obscured by white to golden hyphae, ascospores oblong, (6-)7.5-10.3(-14) × 1.5-2.3(-3) μm ..... *Nectriopsis squamulosa* (Ellis) Samuels (Samuels, 1988b)
3. Surface not obscured by white to golden hyphae, ascospores ellipsoidal, (7.2-)7.9-9.2(-10) × 3 μm ..... *Nectriopsis lilliputia* (Samuels, 1988b)
4. Ascospores didymosporous; anamorph not a *Cylindrocladium* species 5
4. Ascospores phragmosporous; 4 didymosporous, anamorph a *Cylindrocladium* species 17
5. Ascospores smooth, hyaline 6
5. Ascospores ornamented, hyaline or light brown 8
6. Ascospores shorter than 18 μm 7
6. Ascospores (24-)27-31(-35) × (5-)7-9 μm ..... *Nectria dolichospora* Penz. & Sacc. (Samuels, 1976)
7. Ascospores (7.5-)11.2-14.8(-16) × 3-3.5 μm, ... *Nectria chaetopsinae-polyblastiae* (Samuels, 1985)
7. Ascospores (11-)11.3-15.5(-17) × (2.2-)3-4(-4.5) μm, colourless, smooth ..... *Nectria* cf. *pertusa* Pat. (Samuels et al., 1990), (Also compare with *Nectria ochroleuca* and *Nectria suffulta*)
8. Ascospores spinulose 9
8. Ascospores striate, verrucose or tuberculate 11
9. Ascospores mostly wider than 4 μm 10
9. Ascospores (8-)10-12(-15) × 3-4 μm ..... *Nectria ochroleuca* (Samuels, 1976)
10. Ascospores (10-)11.5-17(-20) × (4-)5-7.5(-9) μm, light brown ..... *Nectria discophora* (Mont.) Mont. (Samuels et al., 1990)
10. Ascospores (10-)11.8-15.5(-16.5) × (4-)4.5-5.5(-6.5) μm, hyaline ..... *Nectria gracilipes* (Tul. & C. Tul.) Wollenw. (Samuels et al., 1990)
11. Ascospores (11-)14-18.5(-25) × (5-)7-8.5(-11.2) μm, pale brown, wall thick and roughened-tuberculate ..... *Nectria mauritiicola* (Henn.) Seifert & Samuels (Samuels et al., 1990)
11. Ascospores verrucose or striate 12
12. Ascospores verrucose 13
12. Ascospores striate 14
13. Ascospores (12-)13-16.3(-17) × (5.5-)5.8-7.4(-8) μm, colourless to yellow-brown, verruculose to verrucose ..... *Nectria pseudoflavoviridis* (Samuels et al., 1991)
13. Ascospores 18-24 × 6.5-9 μm, hyaline, verrucose ..... *Nectria kera* (Subramanian and Bhat, 1984)
14. Ascospores mostly shorter than 18 μm 15
14. Ascospores mostly longer than 18 μm 16
15. Ascospores (10-)12-17(-22) × 4-5 μm, smooth or striate ..... *Nectria suffulta* (Samuels, 1976)
15. Ascospores (10-)11-13.5(-16) × (4-)4.5-5(-5.5) μm, finely striate, colourless ..... *Nectria grammicospora* Ferd. & Winge (Samuels, 1988b)
16. Ascospores (22-)23.5-30(-37.8) × (4.4-)5.6-7.3(-9) μm, pale tan in mass, colourless by transmitted light, ellipsoidal to fusiform, with full length striations ..... *Nectria macrarenula* Samuels (Samuels et al., 1990), (Also compare with *N. dolichospora*.)
16. Ascospores (19-)24.8-41.9(-48) × (5.5-)5.8-9.8(-11) μm, hyaline, fusiform, with incomplete ridge-like striations ..... *Nectria chaetopsinae-penicillatae* Samuels (Samuels, 1985)
17. On scale insects (on palms) ..... *Nectria diploa* Berk. (Rossman, 1983)
17. Not on scale insects 18
18. On mosses or lichens (on palms) ..... *Nectria byssophila* Rossman (Rossman, 1983)
18. Not on mosses or lichens 19

19. Ascospores 3-septate, 18-29 × 4-6 μm ..... *Nectria erubescens* (Desm.) W. Philipps & Plowr. (Rossman, 1983)
19. Ascospores with more than 3 septa 20
20. Ascospores with orange, oily droplets in the middle wall region, ascospores 24-35 × 4-4.5 μm, 7-9-septate, smooth or faintly striate ..... *Nectria calami* (Rossman, 1983)
20. Ascomata lacking orange, oily droplets in wall, ascospores spinulose or smooth 21
21. Ascospores smooth 22
21. Ascospores 32-88 × 2.5-5 μm, 3(-6) septate, spinulose ..... *Nectria palmicola*
22. Ascospores 16.8-72.3 × 3-7.4 μm, 1-3-septate, smooth ..... *Calonectria spathiphylli* (El-Gholl et al., 1992)
22. Ascospores (18-)30-42(-52) × 4-8 μm, 1-septate, smooth ..... *Calonectria kyotensis* Terashita (Rossman, 1983)

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