

**GYALIDEOPSIS COCHLEARIFER, A NEW
PANTROPICAL, COMMENSALISTIC SPECIES ON
FOLIICOLOUS GOMPHILLACEAE**

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Abstract: *Gyalideopsis cochlearifer* Lücking & Sérus. sp. nov. is a new, pantropical, commensalistic species restricted to foliicolous representatives of certain genera in the *Gomphillaceae*. It produces black spathulate hyphophores and small black apothecia.

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Introduction

Lücking (1997: 30), in a recent contribution to the taxonomy and ecology of the foliicolous *Gomphillaceae* from Costa Rica, mentioned a species of *Aulaxina* with small black apothecia and 1-septate ascospores that seemed to be a 'parasymbiont' growing on sterile thalli of *Echinoplaca*, and long and black hyphophores of an undescribed type on thalli of *Calenia* and *Echinoplaca* (Lücking 1997: 76). Foliicolous specimens of *Gomphillaceae* with this type of hyphophore were known to E. Sérusiaux in material from the West Indies, Africa and Papua New Guinea, and left in the herbarium as belonging to an unidentified 'parasitic *Gomphillaceae*'.

A thorough study of all available specimens shows that the *Aulaxina*-like apothecia and the hyphophores belong to a single species, known from all tropical regions and growing as a commensalist on the foliicolous thalli of certain genera of the *Gomphillaceae*. It is new to science and is here described in the genus *Gyalideopsis* Vězda. There is little doubt that this genus forms the evolutionary base of the family, and further research is needed in this family to establish sound generic delimitation. Meanwhile, the assignment of this new, commensalistic species to the genus *Gyalideopsis* is the most appropriate choice.

Materials and Methods

The material was examined in tap water, Lugol's iodine solution, lactophenol cotton-blue (LCB) and in ammoniacal erythrosin. The measurements and other anatomical details always refer to water mounts. Air-dried herbarium material for study with the scanning electron microscope (SEM) was prepared by the critical drying method.

***Gyalideopsis cochlearifer* Lücking & Sérus. sp. nov.**

Species *Gyalideopsis* in thallis aliorum generum familiae *Gomphillacearum* crescens; apothecia rara, minutissima et nigricantia, cum ascosporis 1-septatis, $7-8 \times 2-2.5 \mu\text{m}$; hyphophori plerumque

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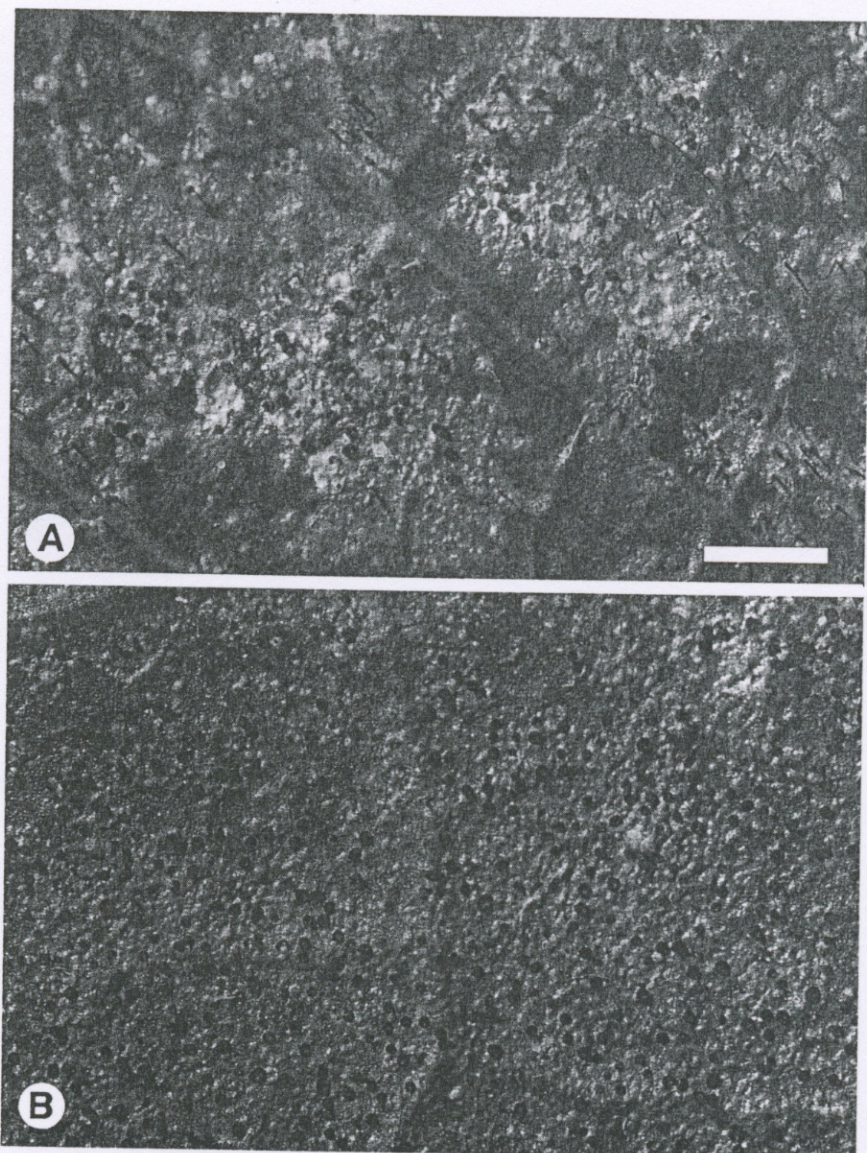


FIG. 1. *Gyalideopsis cochlearifer*, with apothecia and a few hyphophores of the 'slender' type, general habit: A, holotype; B, Peru, R. Santesson & G. Thor (hb. Lücking). Scale = 1 mm.

numerosi, nigri et filiformes cum apicali et laterali squamula conidiarum filiformium massulam obtegenti.

Typus: Costa Rica: *Heredia*: La Selva Biological Station, 10°26'N, 84°03'W, tropical lowland rain forest zone, alt. 50 m, on foliicolous thalli of *Calenia triseptata* and *Echinoplaca* sp. in undergrowth of forest margin along SHO-trail, vii 1997, R. Lücking 97-1347 (ULM—holotypus).

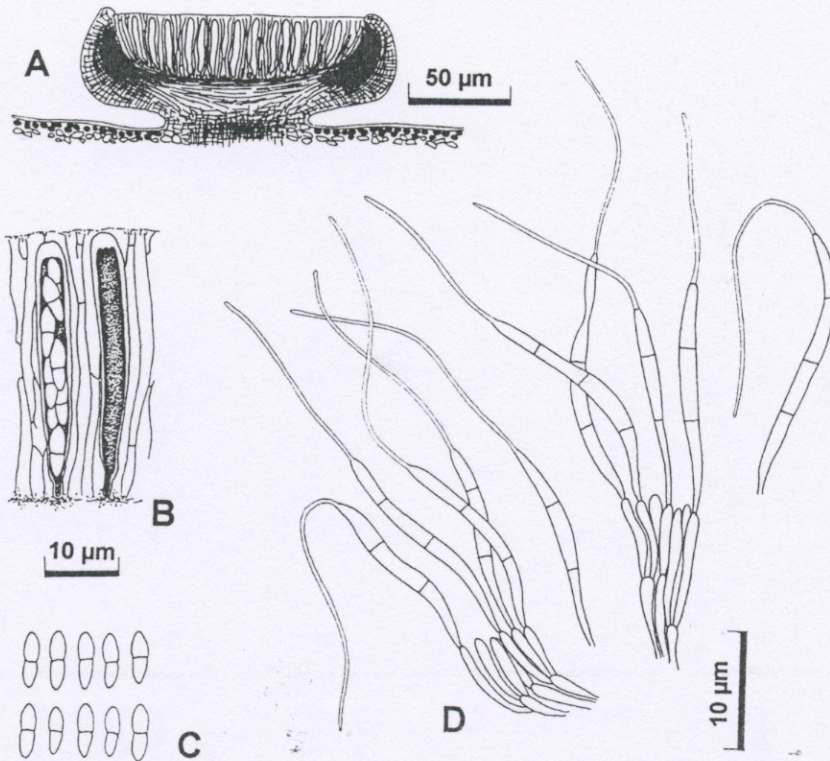
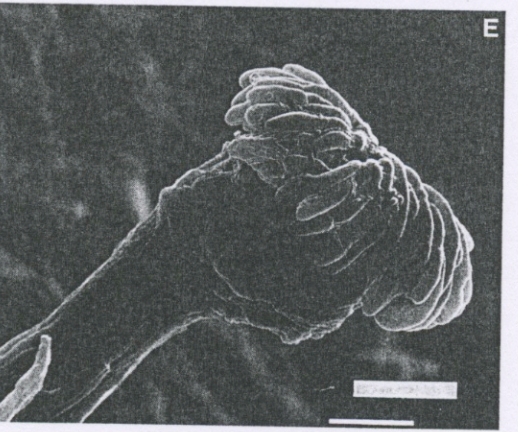
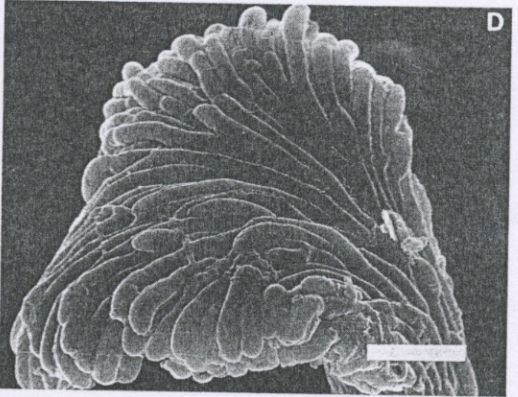
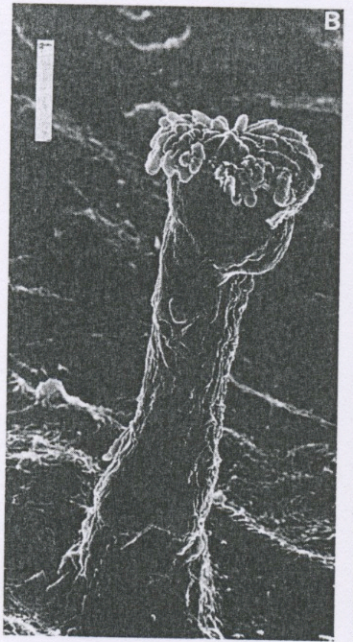
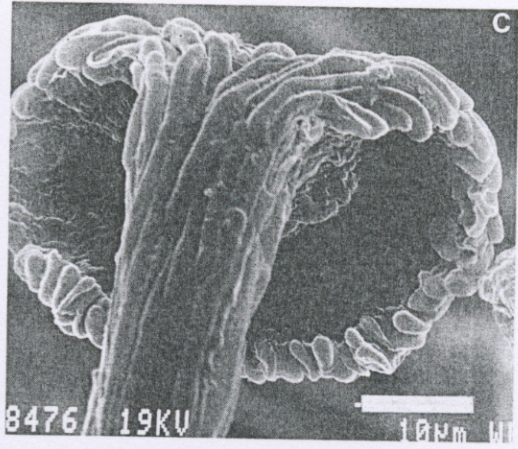


FIG. 2. *Gyalideopsis cochlearifer*: A, section through apothecium; B, asci and paraphyses; C, ascospores; D, conidia. A–C: holotype, D: Papua New Guinea, Sérusiaux 15702b.

Thallus absent. *Hyphophores* usually present (and the best way to detect the species), commensalistically overgrowing the thallus of foliicolous representatives of the genera *Calenia*, *Echinoplaca* and *Tricharia* on which they are usually regularly distributed or rarely confined to certain parts, not or slightly affecting the health of those thalli, represented by cylindrical black setae, 0.1–0.5 mm long and *c.* 15–25 µm thick [two size classes are present: ‘slender’, 0.4–0.5 mm long, and *c.* 15–20 µm thick; and ‘stout’, 0.1–0.2(–0.3) mm long and 20–25 µm thick], with a fragile and easily removed, ‘half a disc’-like to flabellate expansion laterally developed at their extremities, usually slightly bent downwards and with a recurved margin, composed of dark brown, thick-walled radiating hyphae, sometimes anastomosed laterally, with the end cells slightly larger (up to *c.* 2 µm wide) and with rounded ends, slightly constricted at their septa and slightly spread out like fingers (Fig. 3D). *Conidial ball* usually absent (because of dispersal as a single diaspore), hanging on just under the ‘disc’-like expansion, which thus forms a ‘hat’ over it, compact and containing conidiogenous cells. *Conidiogenous cells* cylindrical to clavate, 5–10 µm long and *c.* 1 µm broad, forming dense pallisadic rows. *Conidia* numerous, cylindrical to very narrowly fusiform, with 2–3 transverse septa,



15–25 × 1–1.5 µm, at their apex provided with a filiform, non-septate appendage 15–20 × 0.5 µm.

Apothecia rare, most usually present on thalli without hyphophores, but if present usually numerous, 70–150 µm diam., c. 50 µm high, rounded, at first immersed in the host thallus but soon erumpent and finally sessile with a constricted base, somewhat urceolate; disc dark blackish brown when dry but becoming translucent when wet, at first covered by 3–4 thin, greyish, triangular lobes but ± exposed or slightly immersed when mature; margin dark blackish brown, in young apothecia usually covered by the thin greyish lobes originally covering the disc, smooth in mature apothecia. *Excipulum* ± prosoplectenchymatous, with typically radiating cell rows, and becoming paraplectenchymatous in the inner and darker parts, 20–30 µm thick; inner parts blackish brown, peripheral parts yellowish brown or colourless at the base, the innermost parts bordering the lateral hymenium usually with an aeruginous tinge. *Hamatecium* of 0.5–1 µm thick, branched and anastomosing paraphyses; hypothecium prosoplectenchymatous, 10–15 µm high, colourless or very slightly greenish yellow in thick sections. *Hymenium* 30–35 µm high, colourless. *Asci* clavate, I and KI–, 30–35 × 6–7 µm, 8-spored. *Ascospores* 1-septate, ± oblong-ellipsoid, the distal end rounded, the proximal end slightly acute, colourless, 7–8 × 2–2.5 µm.

Discussion

Gyalideopsis cochlearifer is clearly commensalistic (sensu Hawksworth 1988: 11) as no damage is observed on the thalli on which it grows. However, when fertile, the numerous apothecia seem to hamper the development of both apothecia and hyphophores of its host. Invaded thalli include foliicolous species of the genera *Calenia* Müll. Arg., mainly *C. phyllogena* (Müll. Arg.) R. Sant. (other species identified include *C. lueckingii* Hartmann and *C. triseptata* Zahlbr.), *Echinoplaca* Fée and *Tricharia* Fée, incl. representatives of *Tricharia* s. str. (the *T. vainioi* R. Sant. aggr.) and of the *T. dilatata* Vězda aggr. It is thus restricted to foliicolous members of the *Gomphillaceae*, a lichenized family widespread in the tropics. Specimens have been found in all large collections of foliicolous lichens on the three tropical continents that are available to us and thus the species can be described as pantropical. The chosen epithet refers to the shape of the upper part of the hyphophores, which resemble a small spoon (*cochlearifer* meaning bearing a small spoon).

All available collections have been referred to a single species, although slight differences can be detected in the size of hyphophores. Indeed, two size

FIG. 3. *Gyalideopsis cochlearifer*, SEM photographs of hyphophores: A, general habit of the 'slender' form, without the conidial ball (Papua New Guinea, Sérusiaux 15800); B, general habit of the 'stout' form, with the compact, conidial ball easily seen under the 'disc'-like expansion (Papua New Guinea, Sérusiaux 15702b); C, detail view of upper part of the stipe and inner part of the 'disc'-like expansion in A; D, detail view of the upper side of the 'disc'-like expansion, 'slender' form (Papua New Guinea, Sérusiaux 15800); E, detail view of the upper part, with the compact, conidial ball easily seen under the 'disc'-like expansion, 'stout' form (Papua New Guinea, Sérusiaux 15702b). Scales: A & B=20 µm [Note the scale difference between A and B]; C–E=10 µm.

classes can be distinguished: one with long and slender hyphophores, reaching 0.5 mm in length (Fig. 3A) and pantropical; the other one with shorter and stouter hyphophores, 0.1–0.2(–0.3) mm long (Fig. 3B) and restricted to the paleotropics. Both hyphophore types occur together in two collections but never on the same thallus: one from the northern coast of Papua New Guinea (Sérusiaux 15702 & 15702b) in which they colonize thalli of *Calenia* or *Echinoplaca*, and one from Congo [ex Zaïre]/Kivu (f. Lambinon 78/269) in which the 'slender' hyphophores are restricted to *Calenia*-like thalli and the 'stout' ones to thalli belonging to the *Tricharia dilatata* aggr. However, we refrain from distinguishing two species as a few intermediates have been found in collections from the three continents, showing that more detailed information is needed before such a decision can be taken. The collection selected as the type collection belongs to the 'slender' form and is the only one to have hyphophores and apothecia.

Two other commensalistic species of *Gomphillaceae* are known, both also referred to *Gyalideopsis*:

Gyalideopsis parvula Hafellner & Vězda, described and so far known only from Costa Rica (Kalb & Vězda 1988: 43–44), produces tiny apothecia with orange-brown to reddish brown margins and ascospores that are at first 1-septate and then 3-septate when mature, reaching 7–10 µm long. The excipular structure is basically prosoplectenchymatous, as in *Gyalideopsis cochlearifer*, *G. rubescens* Vězda and *Tricharia vainioi* R. Sant. Hyphophores are unknown in this species, which invades the thalli of several species of the *Ectolechiaceae* (in the genera *Lasioloma* R. Sant., *Loflammia* Vězda, *Logilvia* Vězda and *Tapellaria* Müll. Arg.; see Lücking 1997: 73) but without causing any damage.

Gyalideopsis epithallina Lücking, also described and known only from Costa Rica (Lücking 1997: 66–67), has pale yellowish green apothecia with 1(–3)-septate ascospores, measuring 6–9 × 2.5 µm. It is able to damage the thallus of its only host, *Gyalideopsis vulgaris* (Müll. Arg.) Lücking. The very young apothecia are covered by very thin, short, triangular lobes, which disappear completely at maturity. Its hyphophores are remarkably similar to those of *G. cochlearifer* and they can be described as follows: *c.* 0.2 mm long, pure black, bristle-like, with a 'disc'-like expansion below the apex but the apex remaining distinct with a short, acute tip appressed to the upper side of the 'disc', the whole hyphophore with a filiform appearance; the 'disc'-like expansion composed of dark brown, thick-walled, radiating hyphae with the end cells being slightly set apart; diahyphal bunch hyaline, composed of a mass of filiform, undifferentiated, 0.5–1 µm thick hyphae, and most probably dispersed as a single diaspore.

Additional specimens examined (all specimens collected by R. Lücking are kept in his own collection and those by E. Sérusiaux are in LG):

With apothecia: Costa Rica: *Heredia:* La Selva Protection Zone (O.T.S.), 10°26'N 84°03'W, tropical lowland forest zone, 50 m, on *Citrus* around the administration building, 1991, R. Lücking 91-4875; *ibid.*, primary lowland forest on CES/LOC/CEN trails, 50–100 m, 1991, R. Lücking 91-4985; *ibid.*, exposed secondary vegetation along SHO trail, 50 m, 1991, R. Lücking 91-2674; *ibid.*, undergrowth of secondary forest along Arboleda, 1997, R. Lücking 97-1682; same as the type, R. Lücking 97-1130. *Cartago:* Jicotea, 9°49'N 83°32'W, *Citrus* trees on finca, 900 m, 1991, R. Lücking 91-1140. *Limon:* Cahuita, 9°44'N 82°50'W, secondary forest (abandoned cacao

plantations), c. 0–50 m, 1992, *R. Lücking* 92-4123.—**Peru San Martin**: Cerro Escalera, 6°25'S 76°40'W, lower montane forest zone, 900–1100 m, undergrowth of forest, 1981, *R. Santesson & G. Thor* (UPS, hb. Lücking).—**Congo [ex Zaïre]**: *Kivu*: Irangi, INRS reserve, on the right side of the Luhoho river, c. 850 m, on leaves of *Scaphopetalum dewevrei* var. *suborophila*, 1978, *J. Lambinon* 78/262 p.p. (LG).

With 'slender' hyphophores and without apothecia: **Costa Rica**: *Heredia*: La Selva Biological Station, 10°26'N 84°03'W, tropical lowland rain forest zone, 50 m, undergrowth of primary forest along CCL-trail, 1997, *R. Lücking* 97-404. *Cartago*: Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), section Florencia, near Turrialaba, 9°53'N 83°41'W, 700–750 m, secondary forest, 1991, *R. Lücking* 91-3700. *Limón*: Braulio Carrillo National Park, section Quebrada Gonzales, 'Botarrama' Trail, 10°21'N 83°55'W, 480 m, primary submontane forest, 1992, *R. Lücking* 92-5139.—**West Indies**: **St Lucia**: Quillesse Forest reserve, 300–350 m, primary forest with *Heliconia* and *Cyathea* near the interpretation centre, 1992, *E. Sérusiaux* s.n.—**Guadeloupe**: *Basse-Terre*: NE of 'La Madeleine', near 'Grand Etang', 400 m, little disturbed forest in a humid depression, 1995, *E. Sérusiaux* s.n.—**Congo [ex Zaïre]**: *Kivu*: Irangi, INRS reserve, on the right side of the Luhoho river, c. 850 m, on leaves of *Pentadesma lebrunii*, 1978, *J. Lambinon* 78/269 p.p. (LG).—**Rwanda**: *Cyangugu*: Nyungwe forest, near the Kamiranzovu, 1950 m, on leaves of *Beilschmiedia*, 1971, *G. Bouxin* 1119 p.p. (LG).—**Papua New Guinea**: *Madang*: bridge over the Gogol river along the road Madang-Lae, 5°20'S 145°43'E, 30 m, outskirts of the rain forest, on leaves of the palm *Arenga microcarpa*, 1987, *J. Lambinon* 87/370 p.p. (LG); *ibid.*, road Madang-Lae, 16 km SW of the bridge over the Gogol river, 5°24'S 145°37'E, 130 m, humid valley in secondary forest, 1987, *J. Lambinon* 87/427 p.p. (LG); *ibid.*, road to Mt Baiteta, Malpaiis, rain forest, on palm leaves, 1989, *J. R. De Sloover* 89/31 (LG); *ibid.*, S side of the Ramu river, Brahman Mission, c. 2–3 km W of the Mission, 5°45'S 145°20'E, 100 m, lowland forest regrowth after selective logging, 1995, *E. Sérusiaux* 15800; *ibid.*, 8–10 km W of the Mission, 5°45'S 145°20'E, 100 m, lowland forest remnants in logging site, 1995, *E. Sérusiaux* 15702. *Central*: Varirata National Park, 9°26'S 147°21'E, c. 800 m, forests remnants along stream, 1995, *E. Sérusiaux* 15471.

With 'stout' hyphophores and without apothecia: **Congo [ex Zaïre]**: *Kivu*: Irangi, INRS reserve, on the right side of the Luhoho river, c. 850 m, on leaves of *Gilbertiodendron dewevrei*, 1978, *J. Lambinon* 78/297 p.p. (LG); *ibid.*, on leaves of *Pentadesma lebrunii*, 1978, *J. Lambinon* 78/269 p.p. (LG); *ibid.*, W side of the Kahuzi range, km 58 of the road Bukavu-Walikale, c. 1850 m, outskirts of a dense forest rich in epiphytes on the slope of a very humid valley, on leaves of *Ficus*, 1978, *J. Lambinon* 78/318 (LG).—**Papua New Guinea**: *Madang*: S side of the Ramu river, Brahman Mission, c. 2–3 km W of the Mission, 5°45'S 145°20'E, 100 m, lowland forest regrowth after selective logging, 1995, *E. Sérusiaux* 15801; *ibid.*, 8–10 km W of the Mission, 5°45'S 145°20'E, 100 m, lowland forest remnants in logging site, 1995, *E. Sérusiaux* 15702b.

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