

First report of coprinoid fungi (*Psathyrellaceae*, *Agaricales*) in the Dominican Republic

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Abstract: Five coprinoid species in the family *Psathyrellaceae* are reported for the first time in Dominican Republic. A detailed phenotypic description and a phylogenetic tree based on their ITS rDNA sequences are provided. *Coprinopsis fusisperma* sp. nov., characterized by fusiform and amygdaliform spores, is described for the first time. *C. mexicana* is redescribed providing the first molecular data of this species. The provisional name '*Coprinopsis caribaeoniveda*' is employed for a collection phylogenetically close to the African *C. afronivea* but having different spores. *Coprinopsis minuta* and *Coprinellus aureogranulatus* are reported for the first time in the Caribbean and Central America.

INTRODUCTION

Because of the ephemeral nature and small habit of many coprinoid species, collecting and studying them is usually very difficult. As a result, many coprinoid taxa present in Dominican Republic remain largely understudied. The present work represents a first step to document and classify these species in this country.

Most coprinoid collections found belong to *Coprinopsis* P. Karst., a genus present in very different climates worldwide. About 195 different taxa of *Coprinopsis* are reported in the online world key by Voto (2023).

One of the species described in the present work belongs to *Coprinellus* P. Karst., another cosmopolite genus with about 104 species (Voto 2023).

These two genera are well separated phylogenetically (Nagy, Vágvölgyi & Papp 2012) and they are mainly differentiated by the nature of the pileipellis: hyphal in the former, cellular in the latter.

For a detailed description of the climatic characteristics and main vegetation types of the Dominican Republic see Fernandez (2007), Angelini & Losi (2013) and Parra *et al.* (2018).

MATERIALS AND METHODS

Morphology

Fresh basidiomes were photographed in situ by C. Angelini using a digital camera Nikon Coolpix 8400 and immediately dried. Microscopic characters were studied and described by P. Voto after reviving dried collections with 10% NH₄OH or 30% NH₄OH and using Congo red as mounting medium for imaging.

The abbreviation [n/m/p] indicates 'n' basidiospores measured from 'm' basidiomata of 'p' collections. Basidiospore dimensions were recorded as (a) b – c (d), where a = absolute minimum value, range b – c contains at least 90% of the calculated values, and d = absolute maximum value; Q indicates individual spore length to width ratios. In the spore description the terms elliptical and oval refer to the shape in bidimensional view (front view and side view), the terms ellipsoid and ovoid refer to the shape in tridimensional view. In most samples, cystidia from the lamellar edge could not be studied because of deliquescence.

Fungal species names with authorities follow Index Fungorum (2022) and MycoBank (2022).

Collections will be deposited in the herbaria VER (Museo Civico di Storia Naturale di Verona, Verona, Italy,) and JBSD (Jardín Botánico Nacional Dr. Rafael M. Moscoso, Dominican Republic, Santo Domingo).

Molecular analyses

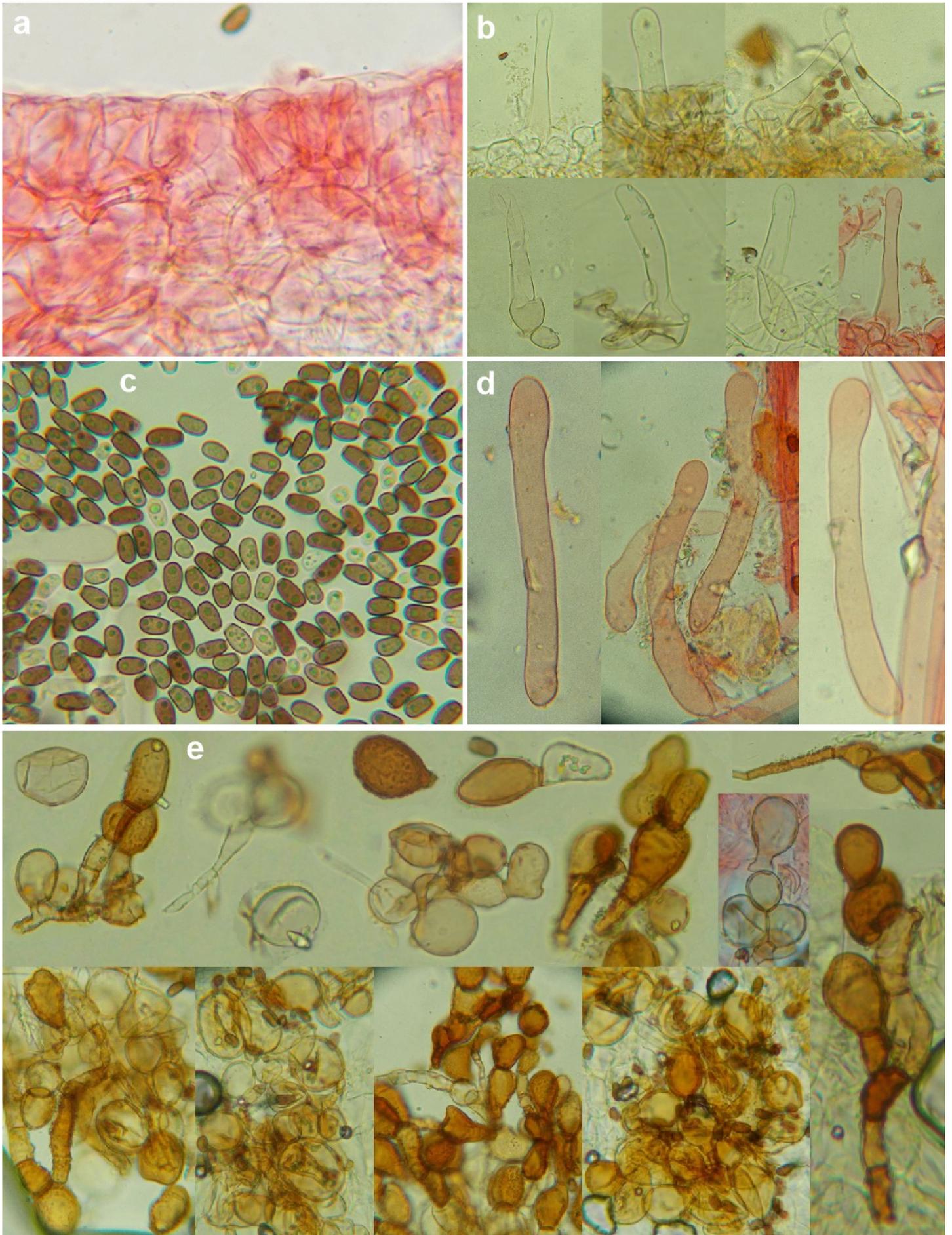
Total DNA was extracted from dry specimens employing a modified protocol based on Murray & Thompson (1980). PCR reactions (Mullis & Faloona 1987) included 35 cycles with an annealing temperature of 54 °C. The primers ITS1F and ITS4 (White et al. 1990; Gardes & Bruns 1993) were employed to amplify the ITS rDNA region. PCR products were checked in 1% agarose gels, and amplicons were sequenced with one or both PCR primers. Sequences were corrected to remove reading errors in chromatograms. BLASTn (Altschul *et al.* 1990) was used to select the most closely related sequences (Tab. 8) from the International Nucleotide Sequence Database Collaboration public database (INSDC, Arita *et al.* 2021). Sequences first were aligned in MEGA 5.0 (Tamura *et al.* 2011) with its Clustal W application and then realigned manually as needed to establish positional homology. The resulting alignment was loaded in MrBayes 3.2.6 (Ronquist *et al.* 2012), where a Bayesian analysis was performed (GTRG+I model, two simultaneous runs, four chains, temperature set to 0.2, sampling every 100th generation) until the average split frequencies between the simultaneous runs fell below 0.01 after 0.87 M generations. Finally, a full search for the best-scoring maximum likelihood tree (Fig. 1) was performed in RAxML 8.2.12 (Stamatakis 2014) using the standard search algorithm (same partitions, GTRCAT model, 2000 bootstrap replications). The significance threshold was set above 0.95 for posterior probability (PP) and 70% bootstrap proportions (BP).

TAXONOMY

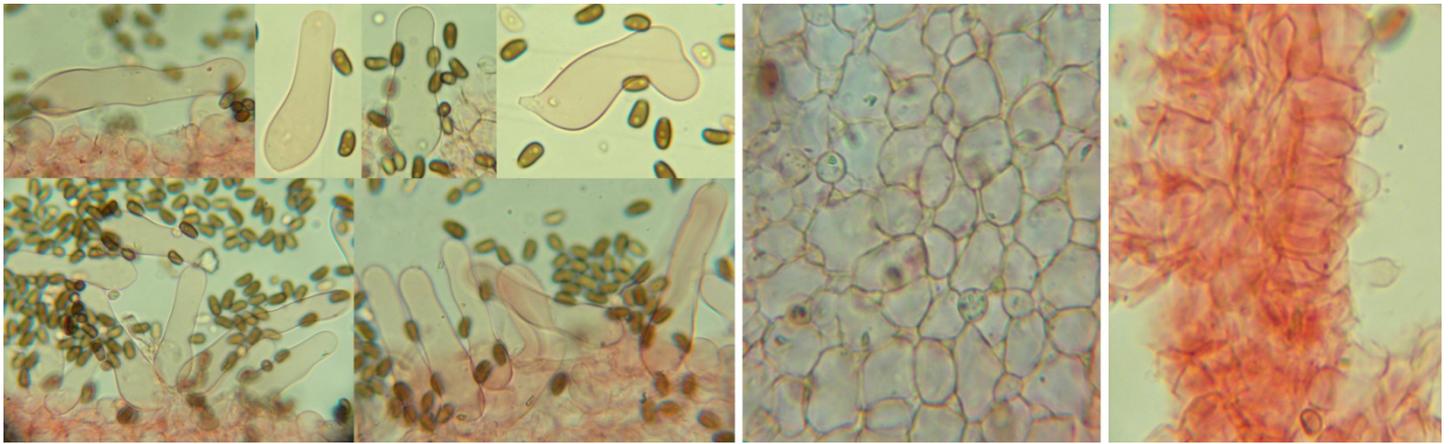
Coprinellus aureoconulatus (Uljé & Aptroot) Redhead, Vilgalys & Moncalvo [Tab. 1-2]
Taxon 50(1): 232 (2001)







Tab. 1 *Coprinellus aureocongruatus*: a) pileipellis (Congo red), b) pileocystidia (right below Congo red, elsewhere ammonia), c) basidiospores (Congo red), d) caulocystidia (Congo red), e) veil cells (inner box Congo red, elsewhere ammonia)



Tab. 2 *Coprinellus aureocongruatus* left to right: cheilocystidia, hymenophysalides, basidia (Congo red)

Macroscopic characters

Pileus: 35 – 47 mm broad, first ellipsoid to oblong, applanate with a depressed centre when mature, margin straight and uplifted, plicate to disc; light brown to brownish orange or peach in colour, sometimes reddish brown to dull red, fading to greyish tones outside the center; with a veil of erect dark flocks over the entire pileus surface when young, later found only at the centre.

Lamellae: not too crowded (approx. 25 – 30 elements with 1 (2) tiers of lamellulae), lilaceous pink to dark lilaceous pink when mature, not deliquescent.

Stipe: 50 – 95 mm long, 1.8 – 3 mm thick towards the base, 1.7 – 2 mm thick towards the apex, white, floccose all over its surface when young then minutely flocculose.

Context: not studied.

Microscopic characters

Basidiospores [88/2/1]: (6.3) 7.7 – 9.2 (9.8) × (3.8) 4.4 – 4.9 (5.4) μm, on average 8.4 × 4.7 μm, Q = (1.45) 1.63 – 1.97 (2.10), on average 1.80; in face view oblong to elliptic or sometimes suboval, base broadly rounded to subtruncate, in side view subphaseoliform to sometimes phaseoliform or adaxially flattened; reddish brown in water; germ pore 1.1 – 1.8 μm broad, central, convex in alkali.

Basidia: 17.0 – 24.0 × 6.0 – 9.5 μm, (sub) utriform to clavate-pedicellate, 4-spored, surrounded by 3 – 4 hymenophysalides.

Pleurocystidia: not found.

Cheilocystidia: (37) 42 – 87 (100) × 12 – 22 μm (at the ventricose base), utriform to utriform-clavate, utriform-subcapitate or narrowly ululiform, sometimes flexuous, hyaline.

Pileipellis: composed of a main paradermic layer of erect, ovoid to ellipsoid or subcylindrical elements, 19.0 – 25.0 × 13.0 – 16.5 μm, mostly lacking a stalk.

Pileocystidia: 60 – 110 × 16 – 18 μm (10 – 12 μm thick at the apex), slender, utriform-clavate to utriform, with a low ventricose base and a long neck; walls up to 1 μm thick, ochraceous-orangish, smooth; present on the entire pileus surface.

Veil elements: composed of somewhat slender, elongate and often forked hyphae terminating in concatenated, roundish to bulky cylindrical or ellipsoid cells approx. 12 – 25 × 13 – 20 μm; both kinds of elements can be either smooth, hyaline and thin-walled or incrusted, thick-walled and reddish-brown to ochraceous-avellaneous (orange-brown to rusty brown in mass).

Caulocystidia: 75 – 165 × 13 – 17 μm, similar to cheilocystidia but narrower at the ventricose base, narrowly utriform-clavate to narrowly ululiform or almost cylindrical, sometimes flexuous, rarely distinctly utriform-capitate, smooth.

Clamp connections: absent.

Habitat and collection examined: gregarious, on fallen branches in an anthropized moist riparian deciduous forest; Dominican Republic, Puerto Plata, Sosúa, Puerto Chiquito, 6.IV.2020, C. Angelini ANGE1260, VER fu25, GenBank OQ275139 - ITS.

NOTES

Coprinellus aureogranulatus is the only species of *Coprinellus* that we report from the Dominican Republic.

It belongs in sect. *Coprinellus*, characterized by the presence of pileocystidia, together with a number of species distinguished for having the veil composed of mainly diverticulate or ellipsoid to cylindrical elements.

Among them, only *C. aureogranulatus* and *C. andreorum* Sammut & Karich have phaseoliform spores, but the latter differs by having forked caulocystidia and numerous large pleurocystidia.

The samples collected in the Dominican Republic differ from the protologue of *C. aureogranulatus* in the color of the gills reported by Uljé & Aptroot (1998) to evolve from white to yellow brown, dark brown and finally black, while the specimens studied in the present work have pink to dark lilaceous pink gills when mature. However, in Desjardin & Perry (2016) gills color is similar to that of our finding.

The ITS rDNA sequence obtained from collection ANGE1260 has a very high similarity (> 99.00%) with that of the paratype of *C. aureogranulatus* (voucher CBS973.95, GenBank accession GQ249274) and several other vouchers identified with this name.

This is the first report of *C. aureogranulatus* from the Caribbean confirming that this species is present in tropical regions all around the world, having been found also in Oceania (Uljé & Aptroot 1998), central Africa (Desjardin & Perry 2016) and South-East Asia (Huang & Bau 2018).

Coprinopsis caribaeonivea nom. prov. [Tab. 3]

Macroscopic characters

Pileus: 11.3 – 13.5 mm broad, at first paraboloid, then convex, light grey; veil first woolly to floccose, white, abundantly covering the pileus and appendiculate from the margin, later reduced to a powdery-flocculose cover on the pileus, more tenacious at the margin, not or scarcely fading to pale yellowish grey in the pileus center.

Lamellae: free, moderately crowded (approx. 20), with 1 – 3 lamellulae; first pale grey, finally blackish; deliquescing.

Stipe: 16 – 54 × 1.4 – 2.4 mm at the base, cylindrical or slightly tapering upwards (0.9 – 1.5 mm thick at the top), white; with a veil at the basal half similar to that on the pileus.

Context: almost inexistent in the pileus, with the gills almost directly attached below the pileipellis.

Microscopic characters

Basidiospores [88/2/1]: (4.5) 5.1 – 6.7 (7.7) × (3.0) 3.3 – 4.3 (5.0) × 3.0 – 3.8 μm, on average 5.75 × 3.72 × 3.40 μm, general Q = (1.23) 1.4 – 1.7 (1.9), on average 1.55, smooth; in front view more or less oval and angular (pentagonal, hexagonal, rarely rhomboid-mitiform and then sometimes asymmetric), sometimes oblong or elliptic, base triangular to rounded; in side view slightly narrower, subphaseoliform to subphaseoliform-subamygdaliform or subelliptic; brown with a reddish shade in water, greyish brown in KOH; germ pore 0.7 – 1.3 μm broad, central.

Basidia: 8.0 – 20.0 × 5.0 – 6.5 μm, claviform to ululiform, 4-spored, surrounded by 4 – 5 hymenophysalides.

Pleurocystidia: not found.

Cheilocystidia: not observable (gill edge already consumed by deliquescence).

Pileipellis: a very thin and difficult to observe cutis composed of 2.5 – 7.5 μm broad filamentous, smooth hyphae.

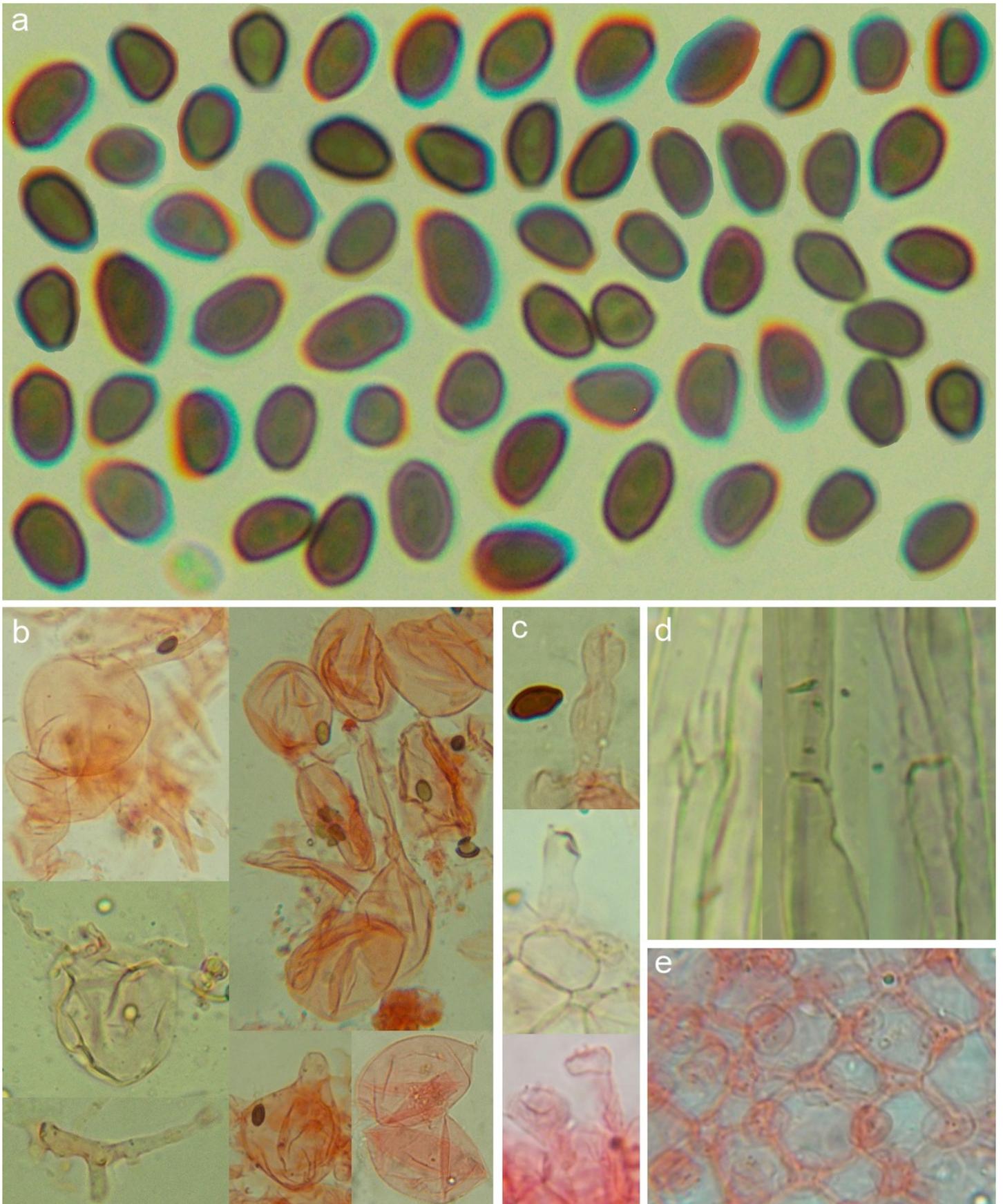
Veil: composed of abundant, roundish (40 – 50 × 30 – 40 μm) to ellipsoid (25 – 45 × 10 – 27 μm), thin-walled elements intermixed with some elongate, sometimes branched hyphae 3 – 5 μm broad.

Caulocystidia: not found.

Clamp connections: found on some stem septa.

Habitat and collection examined: gregarious, on a strongly rotten fallen trunk of deciduous tree in a coastal forest; Dominican Republic, Puerto Plata, Sosúa, Playa, 8.XI.2019, C. Angelini ANGE1390, JBSD130971, GenBank OQ275140 - ITS.





Tab. 3 *Coprinopsis caribaeonivea*: **a**) basidiospores (KOH), **b**) veil cells (Congo red), **c**) basidia (Congo red), **d**) clamp connections (Congo red), **e**) hymenophysalides (Congo red)

NOTES

In accordance with its smooth cellular veil elements this collection is phylogenetically nested inside sect. *Niveae* (Citérin) D.J. Schaf. The main diagnostic features (notwithstanding the missing description of

cheilocystidia) are its lignicolous habitat in the Neotropics, the absence of pleurocystidia, and its small, partly angular to irregular spores which are differently shaped in front and side views but not lenticular.

According to the morphology-based key by Voto (2023) the taxa most closely resembling *C. caribaeonivea* have larger, or at least longer, spores. *Coprinopsis ramosocystidiata* (Bender) La Chiusa & Boffelli, from Europe, and *C. dendrocystota* Voto, from North America, have also a smaller habit and diverticulate to dendroid cheilo- and caulocystidia; *C. laciniatiloma* Voto is a non-deliquestent taxon from North American conifer forests; *C. candidata* (Uljé) Gminder & T. Böhning, *C. coniohpora* (Romagn.) Redhead, Vilgalys & Moncalvo and *C. cortinata* (J.E. Lange) Gminder are only known from the temperate region of Europe.

Phylogenetically, the closest taxon is *C. afronivea* Desjardin & B.A. Perry (ITS rDNA 96.9% similar to *C. caribaeonivea*), described from specimens found in the Republic of São Tomé and Príncipe fruiting on debris and epigeous roots of baobab. Both species share a similar general habit and the absence of pleurocystidia, but differ in spore size. In *C. afronivea* these are 8.5 – 9.6 μm long and distinctly lenticular: mitriform to oval or hexagonal and 6.4 – 7.0 μm broad in face view, elliptic to amygdaliform and 5.5 – 6.2 μm broad in side view.

Even though spore shape and dimensions seem a reliable diagnostic feature, we lack enough data to conclude if *C. caribaeonivea* nom. prov. actually represents a significantly distinct clade from *C. afronivea* or not. Zhu, Huang & Bau (2022) studied two Chinese collections, identified as *C. afronivea* (HMJAU46459 and HMJAU46372), which nest in the same clade with the African and Caribbean samples. The spores in their collections are bidimensional and intermediate, 6.1 – 7.8 \times 4.4 – 6.6 μm , in size. Therefore, additional samples of *C. caribaeonivea* and *C. afronivea* (from Africa and Asia) need to be analyzed to know if the phylogenetic structure observed is due to intrinsic reproductive barriers or else all collections belong to a single species with geographical variability.

Coprinopsis fusisperma Voto & Angelini sp. nov. [MB 847749] [Tab. 4]



Typus: Dominican Republic, Puerto Plata, Sosúa, cemetery, 26.III.2020, C. Angelini ANGE1158, JBSD 130970, GenBank OQ275141 - ITS.

Etymology. The name refers to the fusiform shape of the spores.

Diagnosis / Description

Macroscopic characters

Pileus: (young specimens not observed) 20 – 40 mm, campanulate at mid development, later lowly convex with the margin bent downwards, finally flattened with a straight margin, deeply plicate to the discal area; disc grey to brownish grey or purplish grey, elsewhere pale grey to pale brownish grey or pale greyish-yellowish brown; covered by scarce pale remnants of veil.

Lamellae: free, crowded, with 0-2 lamellulae, grey to lilac grey when mature; deliquescent.

Stipe: 35 – 100 × 2.5 – 5.5 mm at the base, tapering upwards to 1.3 – 2.1 mm at the apex, white, covered with adnexed white fibrils.

Context: not observed.

Microscopic characters

Basidiospores [43/2/1]: (8.1) 8.5 – 9.7 (10.5) × (4.4) 4.7 – 5.5 (6.5) μm , on average 9.1 × 5.1 μm , Q = (1.3) 1.7 – 1.9 (2.1), on average 1.79, smooth; in face view fusiform, sometimes fusiform-subangular or broadly elliptic, base tapering; in side view narrowly amygdaliform, sometimes amygdaliform; dark reddish brown in water and in ammonia; germ pore approx. 1.5 μm broad, central.

Basidia: 16.0 – 26.0 × 6.0 – 7.5 (8.0) μm , mostly elongate clavate to pedicellate-capitate, also shortly clavate to cylindrical, 4-spored, surrounded by 4 – 5 large hymenophysalides.

Cheilocystidia: not observable (gill edge already consumed by deliquescence). *Pleurocystidia*: not found.

Pileipellis: composed of a narrow cutis of 3.5 – 5.0 μm broad hyphae; subpellis and context of wider elements, up to 25 μm broad.

Veil (observed in the center of the pileus): mainly composed of unbranched, chained filamentous hyphae mostly constricted at the septa, approx. (20) 25 – 85 (100) × 10 – 15 (20) μm towards the end of the chain, with the last elements usually tapering at the tip; some short to long, ellipsoid elements up to 40 μm broad are also present; walls 0-1 μm thick, with intraparietal pigment that looks (yellowish-) orangish when observed on isolated cell, but ochraceous brown in mass.

Clamp connections: numerous.

Habitat: gregarious, terricolous on litter in a coastal deciduous forest.

NOTES

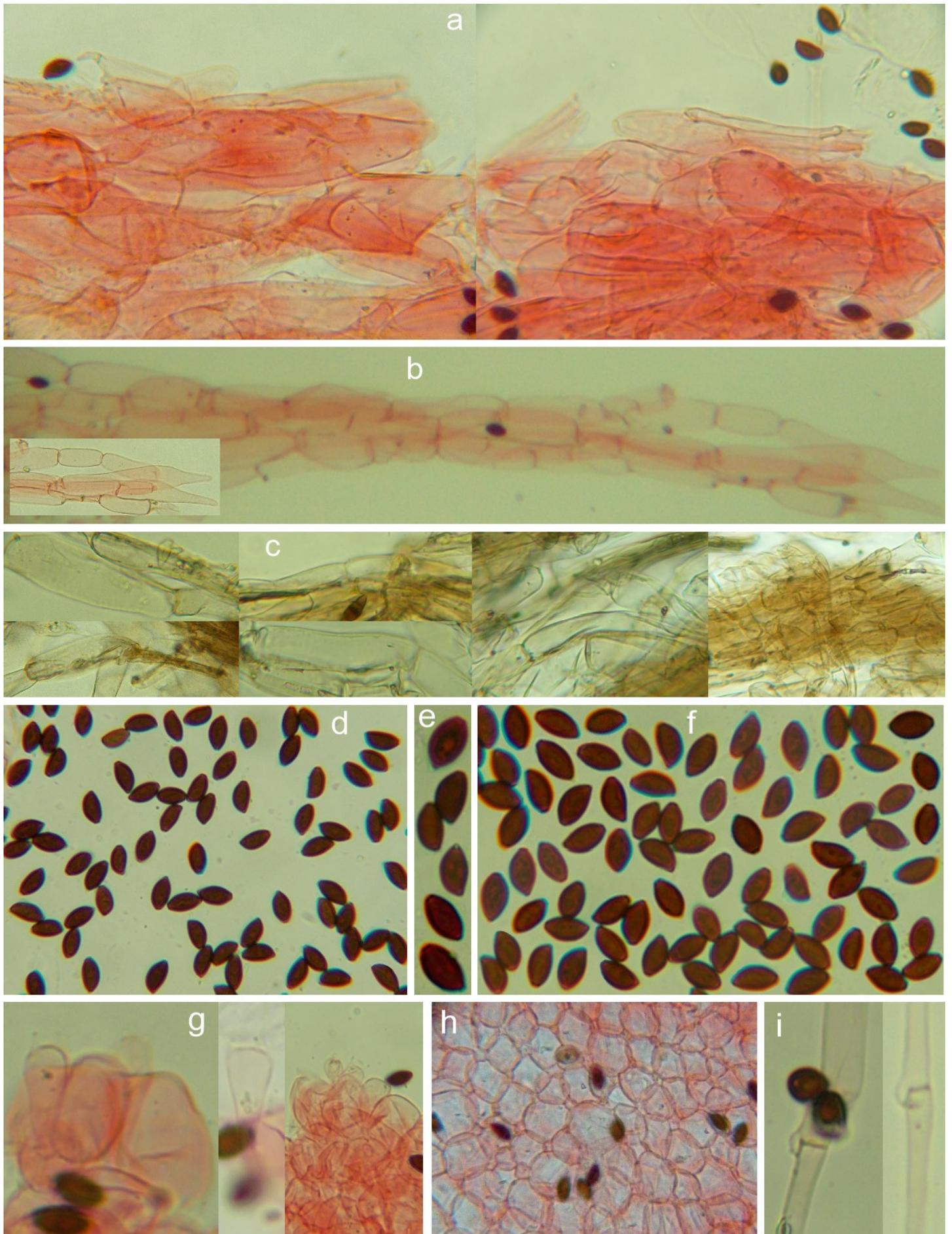
This new deliquescent species of *Coprinopsis* fits in the classical morphology-based sect. *Lanatulae* (Fr.) D.J. Schaf. characterized by a not minute habit, small, fusiform in front view and amygdaliform in side view, smooth spores, absent pleurocystidia, and veil hyphae with intraparietal pigment.

The following three species of this section are morphologically the most similar to *C. fusisperma*.

C. macropus (Berk. & Broome) Redhead, Vilgalys & Moncalvo is more robust and has a striate, not sulcate, pileus; *C. babosiae* L. Nagy, Vágvölgyi & Papp is a minute species from temperate Europe with broader spores and a lower spore quotient; *C. jamaicensis* (Murrill) Redhead, Vilgalys & Moncalvo has larger pleurocystidia, lacks clamps, and has smaller spores.

The following separate comment needs be made for *C. cinerea* (Schaeff.) Redhead, Vilgalys & Moncalvo due to misidentifications found in GenBank.

Coprinopsis cinerea is a cosmopolite taxon producing pleurocystidia, a not plicate pileus, a clavate to bulbous or rooting stipe base, and broader spores with a lower Q. Notwithstanding these differences we have found that the ITS sequence of our collection is somewhat similar (97.6% to 97.9% identity) and might eventually be conspecific with some vouchers entered in GenBank under the name *C. cinerea* or *C. cf. cinerea*: KY783720 and KY783721 from Sudan and MH497221 from Puerto Rico. Another possibly conspecific GenBank voucher is OP580257 from Florida (USA) as *Coprinopsis* sp.



Tab. 4 *Coprinopsis fusisperma*: a) pileipellis (Congo red), b) veil cells (Congo red), c) veil cells (ammonia), d) basidiospores (Congo red), e) basidiospores (water), f) basidiospores (ammonia), g) basidia (Congo red), h) hymenophyalides (Congo red), i) clamp connections in hymenium (Congo red)

Coprinopsis mexicana (Murrill) Redhead, Vilgalys & Moncalvo [Tab. 5-6]

Taxon 50(1): 229 (2001) [Tab. 5-6]

**Macroscopic characters**

Pileus (fully expanded specimens not observed): up to 17.5 mm broad, initially broadly ovoid, campanulate while expanding; first purplish with darker spot-like incrustations, later changing to vivid colours of salmon or orangish, then dull greyish purple to pinkish brown, with a dull salmon center and a pale avellaneous periphery; cuticle usually cracking in large patches at the centre and in a radial way at the margin, showing a white subcuticular flesh; veil of fugacious, small, white tufts and radial fibrils.

Lamellae: very crowded, with lamellulae, free, first white, black when mature, edge whitish.

Stipe: up to 30.0 × 4.3 mm in the thickest middle part (corresponding to the annular zone), annulate, fusiform, tapering towards the apex and the base;

orangish to salmon in the upper half, in the lower half pale and covered by a white adnate veil when young, base with a smooth white mycelium.

Annulus: membranous, narrow, orangish to salmon at the upper surface, at the lower surface scarcely fringed with white remnants of the general veil.



Context: not observed.

Microscopic characters

Basidiospores [62/2/1]: (3.7) 4.1 – 5.0 × 3.0 – 3.5 (3.8) μm, on average 4.55 × 3.32 μm, Q = (1.1) 1.2 – 1.5 (1.6), on average 1.37, smooth; in front view elliptic to suboval, in side view adaxially flattened to amygdaliform; argillaceous in water and ammonia, with a purplish thickened wall; germ pore central, 0.7 – 1.0 μm.

Basidia: trimorphic, 1) shortly clavate, stalkless, 2) pedicellate-clavate, 3) utriform-ululiform; the first shape 10.0 × 6.0 μm, the second and third shape 12.0 – 22.0 × 5.2 – 7.2 μm; 4-spored; surrounded by 4 (5) hymenophysalides up to 12 (15) μm broad.

Pleurocystidia: (25) 30 – 75 × 12 – 21 (26) μm, fusiform to cylindrical, ellipsoid-cylindrical, elongate utriform or ellipsoid, apex obtuse; hyaline, sometimes slightly thick-walled.

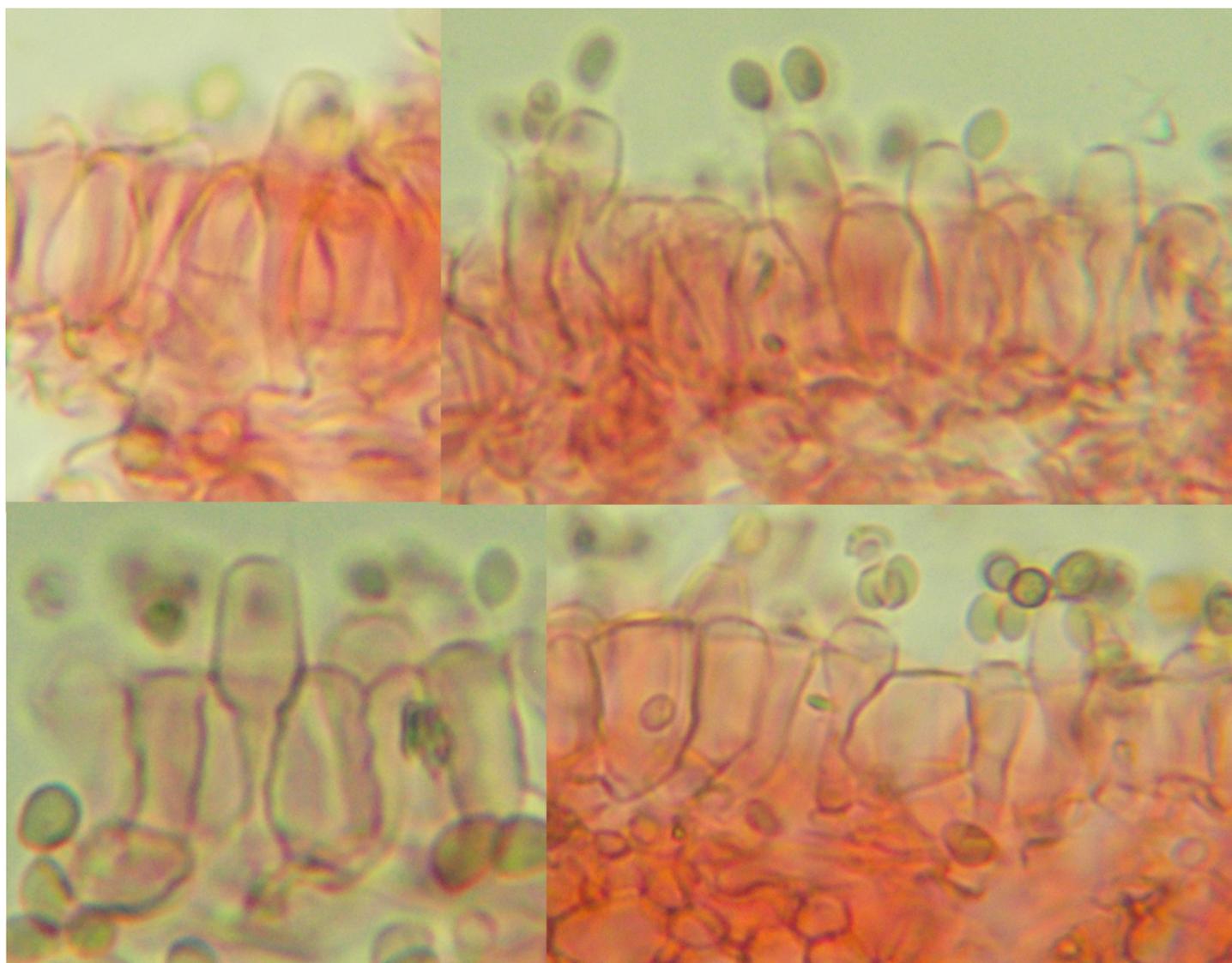
Cheilocystidia: not observable (gill edge already consumed by deliquescence).

Pileipellis: composed of 1) a narrow suprapellis composed of hyphae 2.0 – 5.5 μm broad, heavily covered with (yellowish-) orangish to salmon brown incrustations, and 2) a broad subpellis composed of ellipsoid (e.g. 38 × 18 μm) to roundish or claviform and occasionally in vertical position (approx. 18 – 37 × 15 – 32 μm) smooth, hyaline elements.

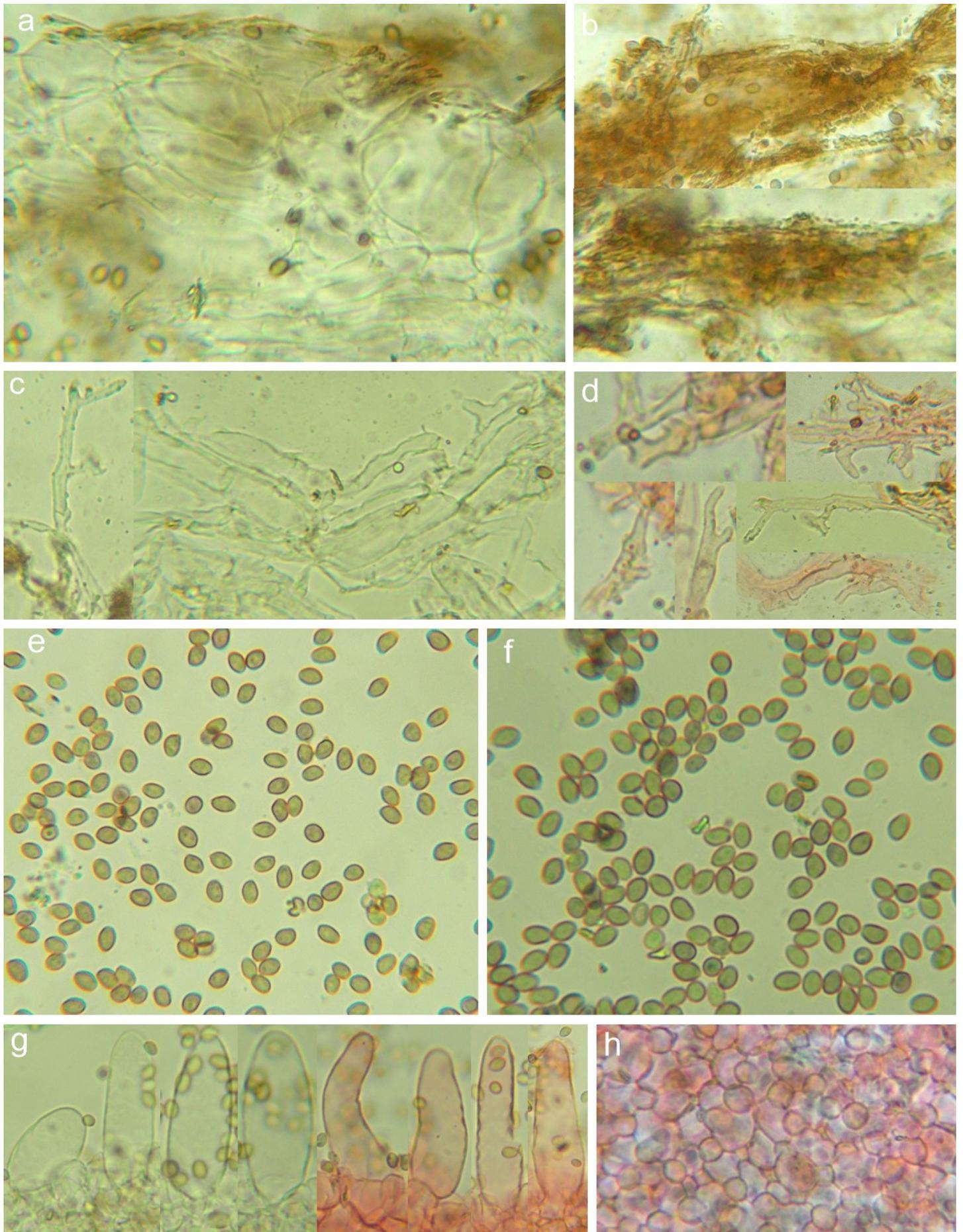
Veil on the pileus: not found.

Veil on the inferior side of the annulus: composed of hyaline, obtusely nodulose to diverticulate, smooth hyphae up to 7 μm broad.

Clamp connections: present.



Tab. 5 *Coprinopsis mexicana*: basidia (Congo red)



Tab. 6 *Coprinopsis mexicana*: **a)** pileipellis (water), **b)** pileipellis (ammonia), **c)** veil cells (ammonia), **d)** veil cells (Congo red), **e)** spores (water), **f)** basidiospores (ammonia), **g)** pleurocystidia (left ammonia, right Congo red), **h)** hymenophysalides (Congo red)

Habitat and collection examined: gregarious to caespitose, on a stump of a deciduous tree (almond tree?); Dominican Republic, Puerto Plata, Sosúa, Playa, 22.III.2020, C. Angelini ANGE1182, VER fu23, GenBank OQ275142 - ITS.

NOTES

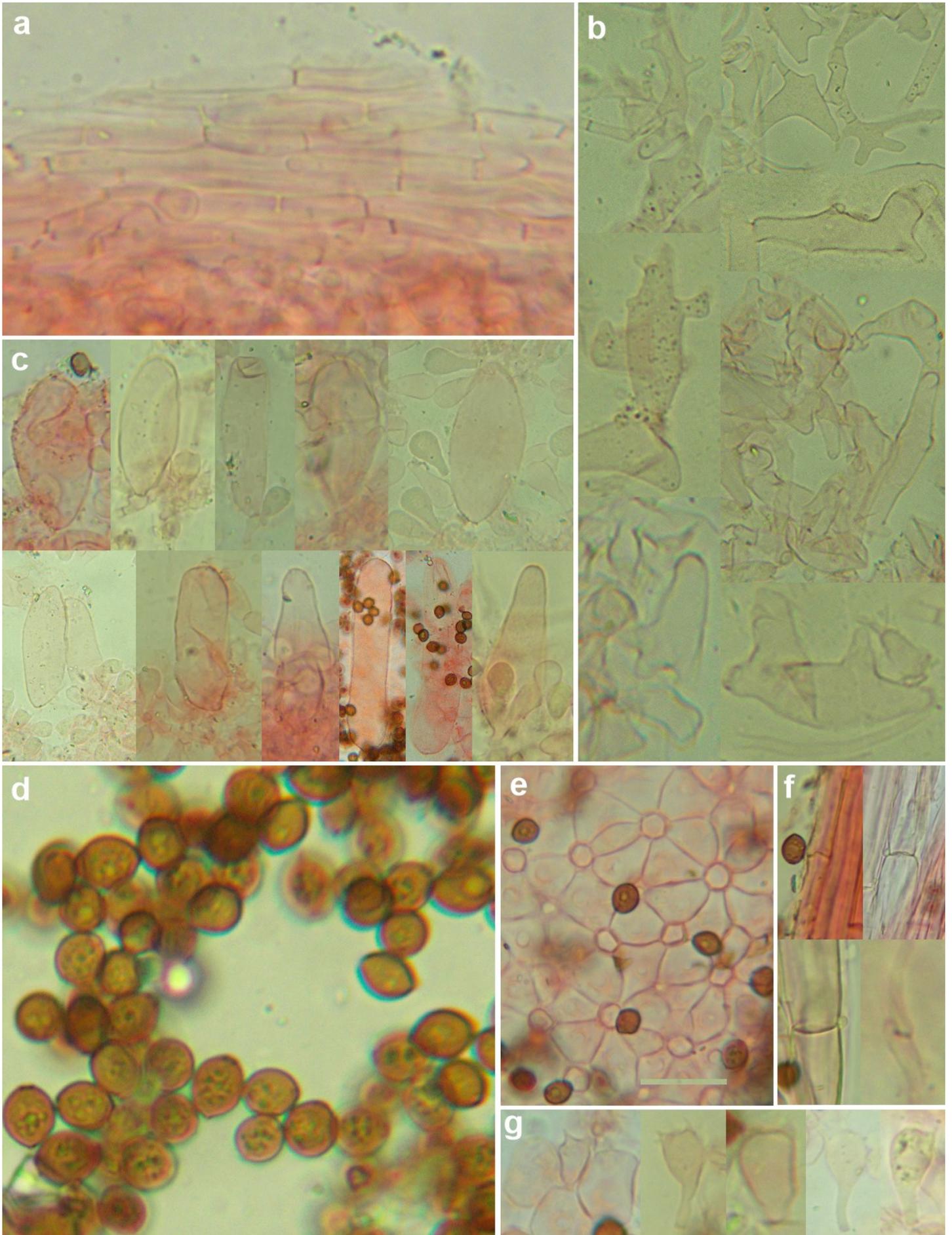
On the basis of the nodulose to diverticulate hyphae of its veil, this taxon belongs to the classical morphology-based sect. *Coprinopsis*. The unusual colors of the pileus and velar structures make this species easily recognizable already on the field, a diagnosis that can be further confirmed in micro morphology with its very small spores.

Two pictures of voucher ANGE1182 are already available on the website of C. Angelini (www.neotropicalfungi.com); the present report adds new images, a morphological description, and an ITS sequence which represents the first ever DNA data of this taxon.

Coprinopsis mexicana seems to be widespread in the American Neotropical region, being found in Mexico (holotype, Murrill 1918), Trinidad (Pegler 1983), and apparently also in Bolivia (<https://mushroomobserver.org/observations/279471>), Peru (https://commons.wikimedia.org/wiki/File:Coprinopsis_mexicana_402908.jpg) and Ecuador (<https://ecuador.inaturalist.org/taxa/552923-Coprinopsis-mexicana>).

Coprinopsis minuta K. G. G. Ganga, Manim. & K. P. D. Latha [Tab. 7]
Phytotaxa 575 (2):151 (2022)





Tab. 7 *Coprinopsis minuta*: a) pileipellis (Congo red), b) veil cells (KOH and Congo red), c) pleurocystidia (Congo red), d) basidiospores (ammonia), e) hymenophysalides (Congo red), f) clamp connections (Congo red), g) basidia (Congo red)

Macroscopic characters

Pileus: oblong-ellipsoid when young (closed) 4 – 7 mm high and 2.8 – 4.7 mm broad, then oblong-paraboloid, and campanulate; white; entirely covered by a white veil soon broken in adnate floccules turning (brownish-) grey at the centre; when mature 10 – 14 mm broad, flattened, sometimes with a small umbo, somewhat radially split, weakly sulcate-striate; whitish-greyish; veil floccules thinning out and vanishing except at the center; when old it presents a straight or revolute, and deliquescing margin.

Lamellae: free, crowded, narrow, whitish, finally black, deliquescing.

Stipe: first up to approx. 1.4 mm broad at the base, obclavate; when mature approx. 1.0 – 17.0 × 0.7 – 1.0 mm, uniformly slender, not rigid, flexuous to bent; white, minutely flocculose, base with mycelial felt.

Context: not observed.

Microscopic characters

Basidiospores [70/2/1]: (6.1) 6.5 – 8.4 (8.6) × (5.3) 5.7 – 7.0 (8.0) μm , on average 7.60 × 6.40 μm , Q = (1.0)1.1 – 1.3 (1.4), on average 1.19, marginally narrower in side view; smooth; in front view subglobose to broadly elliptic, in side view broadly rounded on dorsal side; light brown sometimes with a reddish hint in water and ammonia; germ pore approx. 1.4 – 1.7 μm .

Basidia: dimorphic, 1) shortly clavate, 12.5 – 16.0 × 7.0 – 8.0 (9.5) μm , 2) long pedicellate-clavate, 17.0 – 23.0 × 7.7 – 9.5 μm ; 4-spored; hymenophysalides not developed in the immature hymenium, conspicuous and 5 to 7 around mature basidia.

Pleurocystidia: approx. 30 – 124 × 15 – 27 μm , ellipsoid to utriform, cylindrical, cylindrical-subululiform or cylindrical-claviform, rarely with a mucronate or tapering apex.

Cheilocystidia: (difficult to detect because of deliquescence) similar to but smaller than pleurocystidia and also largely clavate (e.g. 33 × 22 μm).

Pileipellis: an approx. 50 μm broad layer of cutis composed of 3 – 5 (7) μm broad, hyaline, often shortly septate hyphae.

Veil: (difficult to find on dried material) on closed pilei composed of 4 – 9 μm broad, cylindrical to ellipsoid, nodulose to diverticulate hyphae, thin-walled, glabrous, sometimes with granular contents.

Clamp connections: septa in hymenium and stipe in part oblique to lateral or forked; rarely and only after long search some apparently true clamps found in the stipe and only one in the hymenium (bottom right in Tab. 7 Fig. f).

Habitat and collection examined: gregarious, on fallen branches of an Almácigo tree (*Bursera simaruba*) in a coastal deciduous forest; Dominican Republic, Puerto Plata, Sosúa, cemetery, 25.II.2020, C. Angelini ANGE1154, VER fu24, GenBank OQ275143 - ITS.

NOTES

The ITS rDNA sequence obtained from our material is very similar to that of the holotype of *C. minuta*, a species recently described from India. Morphologically our specimens are somewhat larger and less veiled. The only relevant difference is that we could document the presence of large, elongate pleurocystidia while in the original description these were described as unusually small and lobed.

Coprinopsis minuta differs from most other species of *Coprinopsis* with diverticulate to branching veil hyphae, by its medium-sized, mostly bidimensional, roundish, smooth spores and more or less thin-walled veil hyphae.

Coprinopsis neotropica (Redhead & Pegler) Redhead, Vilgalys & Moncalvo (a combination for the nom. nov. *Coprinus neotropicus* Redhead & Pegler, based on *Coprinus brassicae* sensu Dennis) is typified by a collection found in Venezuela fruiting on dead culms and leaves of bamboo at 2000 m a.s.l. in a cloud forest (an evergreen moist tropical forest).

Dennis (1961) described it rather superficially as he thought he had collected *Coprinus brassicae*, a common species from temperate regions of North America and Europe (Peck 1890; Kauffman 1918; Romagnesi 1952) lately reduced to synonymy with *C. urticicola* (Berk. & Broome) Redhead, Vilgalys & Moncalvo by Pilát & Svrcek (1967). However, Dennis (1961, figure 75) depicts two small pilei (one young and subglobose, the other mature

and campanulate), ovoid to submitriform or subglobose spores, some diverticulate veil hyphae and an oblong pleurocystidium.

Redhead and Pegler (in Redhead & Traquair 1981) describe the spores as ovoid to ellipsoid, $8.0 - 9.5 \times 6.5 - 7.5 \mu\text{m}$, but in figure 53 they depict them mostly subglobose.

Altogether, the morphological data of *C. neotropica* agree with those observed in our material and the Indian collection.

A sequence in public databases (*Coprinopsis* sp. MH488965) obtained from an unidentified sample found in Puerto Rico by Kurt Miller on well decayed hardwood seems very similar to those of *C. minuta*, probably conspecific (pictures of the basidiomes can be viewed in <https://mushroomobserver.org/observations/315362>).

Other sequences in GenBank probably coming from specimens of *C. minuta* come from China (OP237110), Colombia (HQ248225), Thailand (MW260270) and Viet Nam (MW299046) suggesting that *C. minuta* is probably a widespread species in the American and Asian Neotropical regions.

Coprinopsis paleotropica (Redhead & Pegler) Redhead, Vilgalys & Moncalvo is also very similar to *C. minuta*. It was established as a nom. nov. for an interpretation of *C. urticicola* by Pegler (1977) based on samples found on twigs in Kenya. As in the case of *C. neotropica*, Redhead and Pegler (in Redhead & Traquair 1981) describe the spores as ovoid but in figure 52 they depict them subglobose to broadly elliptic in front view. However, in this case, they report different measures between the front and side views: $6.1 - 8 \times 5.8 - 6.7 \times 4.5 - 5 \mu\text{m}$.

Sequencing of the types of *C. neotropica* and *P. paleotropica*, which are still missing, should clarify how they relate phylogenetically to each other and to *C. minuta*. On account of the absence of this phylogenetic support, we refrain from proposing in the present work the synonymy between these three taxa which, however, we believe to be probable.

Coprinopsis urticicola (Berk. & Broome) Redhead, Vilgalys & Moncalvo is another clampless widely distributed species with few morphological differences. It has generally narrower, ellipsoid to ovoid spores ($Q = 1.1 - 1.75$, on average $1.25 - 1.55$) sometimes with a sub conical base. It is common in temperate areas but, to our knowledge, it has not been reported yet from the American Neotropics. All ITS rDNA sequences in GenBank from specimens identified as *C. urticicola* have a similarity lower than 97% with that obtained from our collection of *C. minuta* (ANGE1154) so as to appear to be significantly different in the phylogenetic analysis.

Finally, *C. alnivora* (Bogart) Voto, a species of temperate areas (North America and Europe), has a very larger habit with distinct velar stipital remnants and conspicuous clamps, and *C. pseudofriesii* (Pilát & Svrček) Redhead, Vilgalys & Moncalvo, a European taxon, has a slightly stouter habit (stipe up to $60 \times 1 - 2 \text{ mm}$), yellow and partly sub thickened veil hyphae, and somewhat slenderer spores [$Q = (1.05) 1.15 - 1.55$, on average $1.25 - 1.40$].

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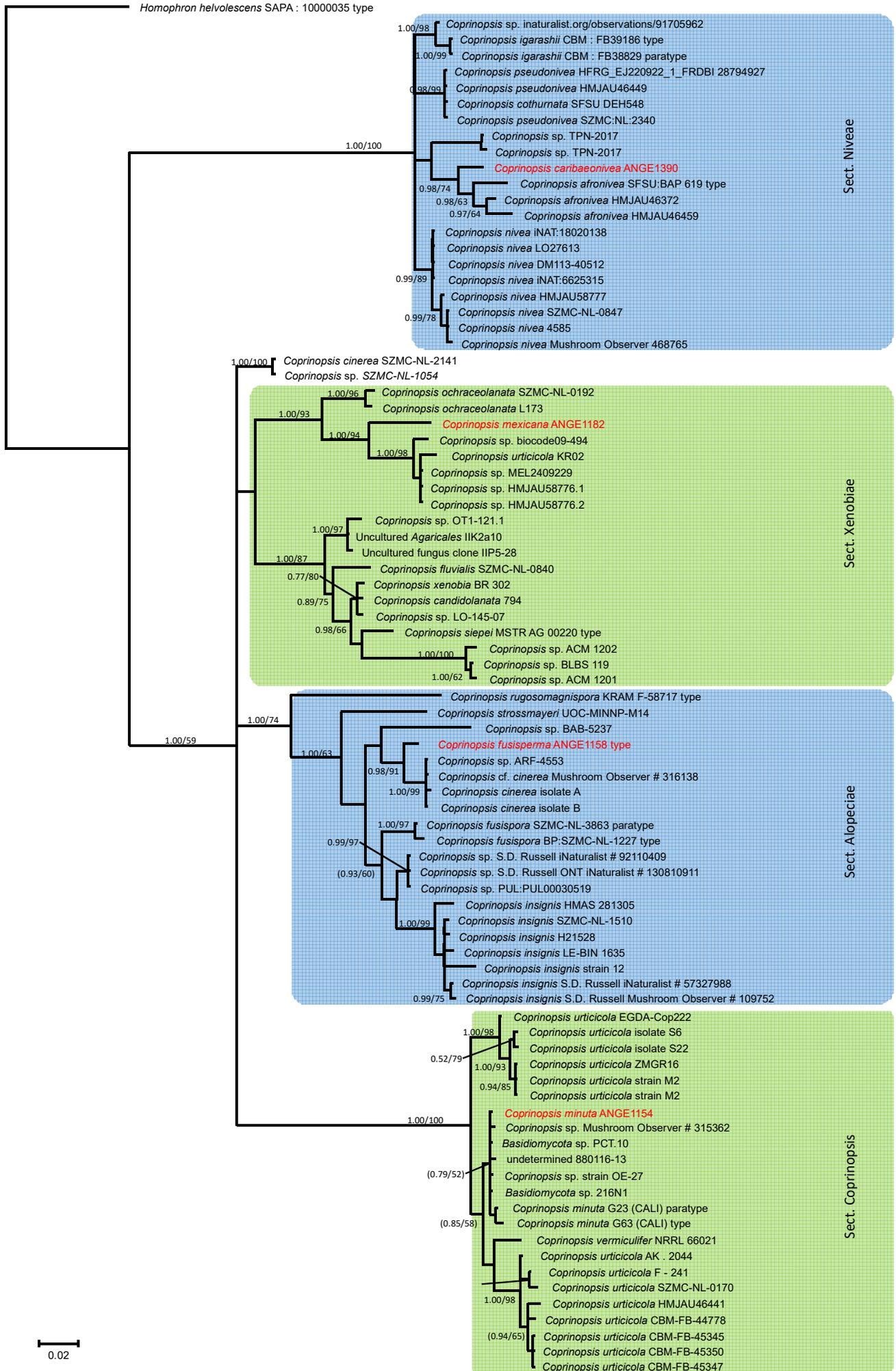
| Species | Collection ID / origin | ITS |
|--|---|----------|
| <i>Basidiomycota</i> sp. | PCT.10 / Colombia | HQ248225 |
| <i>Basidiomycota</i> sp. | 216N1 / China | OP237110 |
| <i>Coprinopsis afronivea</i> Desjardin & B.A. Perry | SFSU:BAP 619 type / São Tomé and Príncipe | NR148105 |
| <i>C. afronivea</i> | HMJAU46459 / China | OL355163 |
| <i>C. afronivea</i> | HMJAU46372 / China | MW822049 |
| <i>C. candidolanata</i> (Doveri & Uljé) Keirle, Hemmes & Desjardin | 794 / Italy | JF907837 |
| <i>C. caribaeonivea</i> nom. prov. | ANGE1390 type / Dominican republic | OQ275140 |

| | | |
|--|---|----------|
| <i>C. cinerea</i> (Schaeff.) Redhead, Vilgalys & Moncalvo | SZMC-NL-2141 | FN396149 |
| <i>C. cinerea</i> | isolate A / Sudan | KY783720 |
| <i>C. cinerea</i> | isolate B / Sudan | KY783721 |
| <i>C. cf. cinerea</i> | Mushroom Observer # 316138 / Puerto Rico | MH497221 |
| <i>C. fluviialis</i> (Lancon. & Uljé) Redhead, Vilgalys & Moncalvo | SZMC-NL-0840 | HQ847011 |
| <i>C. fusisperma</i> Voto & Angelini | ANGE1158 type / Dominican republic | OQ275141 |
| <i>C. fusispora</i> L. Nagy, Vágvölgyi and Papp | SZMC-NL-3863 paratype / Hungary | JX118742 |
| <i>C. fusispora</i> | BP : SZMC-NL-1227 type / Hungary | NR148068 |
| <i>C. igarashii</i> Fukiharuru & Kim. Shimizu | CBM : FB39186 type / Japan | AB854626 |
| <i>C. igarashii</i> | CBM : FB38829 paratype / Japan | AB854625 |
| <i>C. insignis</i> (Peck) Redhead, Vilgalys & Moncalvo | HMAS 281305 | MK966570 |
| <i>C. insignis</i> | SZMC-NL-1510 | JX118738 |
| <i>C. insignis</i> | H21528 / Tunisia | KU973838 |
| <i>C. insignis</i> | LE-BIN 1635 / Russian Federation | MG722731 |
| <i>C. insignis</i> | strain 12 / Iran | MH259868 |
| <i>C. insignis</i> | S.D. Russell iNaturalist # 57327988 / USA | OM473917 |
| <i>C. insignis</i> | S.D. Russell Mushroom Observer # 109752 / USA | OM747742 |
| <i>C. mexicana</i> (Murrill) Redhead, Vilgalys & Moncalvo | ANGE1182 / Dominican Republic | OQ275142 |
| <i>C. minuta</i> K. G. G. Ganga, Manim. & K. P. D. Latha | G63 (CALI) type / India | OP549280 |
| <i>C. minuta</i> | G23 (CALI) paratype / India | OP549038 |
| <i>C. minuta</i> | ANGE1154 / Dominican Republic | OQ275143 |
| <i>C. nivea</i> (Pers.) Redhead, Vilgalys & Moncalvo | iNAT:18020138 / USA | OM212924 |
| <i>C. nivea</i> | iNAT:6625315 / USA | OM212943 |
| <i>C. nivea</i> | HMJAU58777 / China | MZ220450 |
| <i>C. nivea</i> | LO27613 / Sweden | MT889691 |
| <i>C. nivea</i> | DM113-40512 / USA | OM212954 |
| <i>C. nivea</i> | SZMC-NL-0847 | HQ847032 |
| <i>C. nivea</i> | 4585 / Italy | JF907848 |
| <i>C. nivea</i> | Mushroom Observer 468765 /USA | OM039437 |
| <i>C. pseudonivea</i> (Bender & Uljé) Redhead, Vilgalys & Moncalvo | HFRG_EJ220922_1_FRDBI 28794927 / Japan | OQ133583 |
| <i>C. pseudonivea</i> | HMJAU46449 / China | MW822599 |
| <i>C. pseudonivea</i> | SZMC:NL:2340 / Hungary | FM163181 |
| <i>C. rugosomagnispora</i> Gierczyk, Pietras, Piątek, Gryc, Czerniawski & Rodriguez-Flakus | KRAM F-58717 type / Poland | KX276859 |
| <i>C. siepei</i> Bender, Wächter & A. Melzer | MSTR AG 00220 type / Germany | MT906480 |
| <i>C. sp.</i> | LO-145-07 | JX118689 |
| <i>C. sp.</i> | inaturalist.org/observations/91705962 / USA | OM348539 |
| <i>C. sp.</i> | TPN-2017 / Viet Nam | LC259498 |
| <i>C. sp.</i> | TPN-2017 / Viet Nam | LC259499 |
| <i>C. sp.</i> | SZMC-NL-1054 | JX118739 |

| | | |
|---|--|-----------|
| <i>C. sp.</i> | biocode09-494 / French Polynesia | MZ997248 |
| <i>C. sp.</i> | BAB-5237 / India | KT186181 |
| <i>C. sp.</i> | ACM 1202 / Brazil | MK843964 |
| <i>C. sp.</i> | MEL2409229 / Australia | MZ997387 |
| <i>C. sp.</i> | HMJAU58776.1 / China | MZ227139 |
| <i>C. sp.</i> | HMJAU58776.2 / China | MZ227140 |
| <i>C. sp.</i> | OT1-121.1 / PortugalT | KT804059 |
| <i>C. sp.</i> | ARF-4553 / USA | OP580257 |
| <i>C. sp.</i> | S.D. Russell iNaturalist # 92110409 / USA | OM972417 |
| <i>C. sp.</i> | S.D. Russell ONT iNaturalist # 130810911 / USA | OP643425 |
| <i>C. sp.</i> | PUL : PUL00030519 / USA | ON059449 |
| <i>C. sp.</i> | Mushroom Observer # 315362 / Puerto Rico | MH488965 |
| <i>C. sp.</i> | strain OE-27 / Thailand | MW260270 |
| <i>C. strossmayeri</i> (Schulzer) Redhead, Vilgalys & Moncalvo | UOC-MINNP-M14 / Sri Lanka | KP776993 |
| <i>C. urticicola</i> (Berk. & Broome) Redhead, Vilgalys & Moncalvo | AK . 2044 / Turkey | MH748639 |
| <i>C. urticicola</i> | F - 241 / China | OM670136 |
| <i>C. urticicola</i> | SZMC-NL-0170 | HQ847015 |
| <i>C. urticicola</i> | HMJAU46441 / China | OL396582 |
| <i>C. urticicola</i> | CBM-FB-44778 / Japan | MZ707768 |
| <i>C. urticicola</i> | CBM-FB-45345 / Japan | OK444086 |
| <i>C. urticicola</i> | CBM-FB-45350 / Japan | OK444087 |
| <i>C. urticicola</i> | CBM-FB-45347 / Japan | OK444088 |
| <i>C. urticicola</i> | KR02 / India | MN368600 |
| <i>C. urticicola</i> | EGDA-Cop222 / Egypt | MW915588 |
| <i>C. urticicola</i> | isolate S6 / Mexico | MN944532 |
| <i>C. urticicola</i> | isolate S22 / Mexico | MN944533 |
| <i>C. urticicola</i> | ZMGR16 / China | MT446068 |
| <i>C. urticicola</i> | strain M2 / Iran | MH300678 |
| <i>C. urticicola</i> | strain M2 / Iran | MH300615 |
| <i>C. vermiculifer</i> (Joss. ex Dennis) Redhead, Vilgalys & Moncalvo | NRRL 66021 / USA | KM056335 |
| <i>C. xenobia</i> (P.D. Orton) Redhead, Vilgalys & Moncalvo | BR 302 | KF178382 |
| <i>Homophron helvollescens</i> (S. Imai) Beker & U. Eberh. | SAPA : 10000035 type / Japan | NR_175751 |
| Uncultured fungus clone | IIP5-28 / Austria | EU516705 |
| Uncultured <i>Agaricaceae</i> | IIK2a10 / Austria | EF635638 |
| Undetermined | isolate 880116-13 / Viet Nam | MW299046 |

Tab. 8. Fungal taxa, Voucher numbers and GenBank accession numbers of the sequences used in the phylogenetic analyses of ITS. In bold style the taxa described in this paper.

Fig. 1 (below). A 50% majority rule ITS rDNA consensus phylogram of selected sections of genus *Coprinopsis* (with *Homophron helvollescens* as outgroup) obtained using MrBayes from 6525 sampled trees. Nodes were annotated if they were supported by ≥ 0.95 Bayesian posterior probability (left) or $\geq 70\%$ maximum likelihood bootstrap proportions (right). Non-significant support values are exceptionally represented inside parentheses. Sequences newly generated in this study are in bold.



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