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Hygrocybe mucronella (Fr.) P. Karst.

Article received 15 June 2024, accepted 7 September 2024

Inocybe floccipes in bosco Nordio

(English version on page 5)

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Parole chiave:

Basidiomycota

Agaricales

Inocybaceae

Mediterraneo

Abstract Riassunto: Continuando la catalogazione della micoflora del bosco Nordio (Venezia, Italia), gli autori presentano una raccolta di *Inocybe floccipes*. La documentazione è corredata da note descrittive e fotografie a colori dei basidiomi e dei principali microcaratteri. Una sequenza ITS dà supporto molecolare alla corretta identificazione.

INTRODUZIONE

L'identificazione di questa raccolta non è stata agevole in quanto la specie non è presente nella monografia di Bon (1997). Seguendo questa chiave si giunge, come migliore approssimazione, a *Inocybe pusio* f. *elegans* Reumaux nom. inval. (successivamente validato in *I. elegans* Reumaux) che però Bandini *et al.* (2021), con revisione morfologica del *typus*, riducono a sinonimia con *I. griseolilacina* J.E. Lange, caratterizzata da caulocistidi presenti solo all'estremo apice del gambo. È stata pertanto necessaria una ricerca bibliografica della letteratura più recente per giungere all'identificazione come *I. floccipes*. Una verifica della sequenza ITS ne ha fornito la conferma molecolare.

MATERIALI E METODI

il basidioma è stato fotografato sul luogo e al momento della raccolta; i caratteri di microscopia sono stati rilevati su materiale essiccato, rigonfiato con ammoniaca 3% e colorato con rosso Congo. Fotografie di P. Voto.





TASSONOMIA

Inocybe floccipes (Esteve-Rav. & Fouchier) Esteve-Rav. & Bizio
Fungi Iberici 2: 20 (2022)

Basionimo: *Inocybe pusio* var. *floccipes* Esteve-Rav. & Fouchier. *Cryptog. Mycol.* 25 (2): 108. 2004

Caratteri macroscopici

Cappello (esaminato solo un esemplare maturo) 34 mm, convesso, margine non spianato; cuticola di colore bruno con sfumatura lilla o purpurea, in centro unita, in zona mediana con screpolature o squamule adnate, al margine con fibrille radiali separate (rimose); velo non osservato.

Lamelle 40, intervallate da 3 lamellule, smarginate-annesse, un po' intervenose-anastomosate, di colore grigio chiaro con lieve sfumatura lilla o olivaceo-grigiastro chiaro; filo scarsamente più pallido, ad andamento ventricoso verso il gambo oppure con doppio ventre o irregolare.

Gambo 40 × 6 mm, ingrossato fino a 8 mm un po' prima della base arrotondata, di colore lilla, molto più pallido verso la base dove è anche vagamente giallastro, leggermente imbrunente per manipolazione verso la base; tutto striato-fibrilloso, tutto minutamente pruinoso.

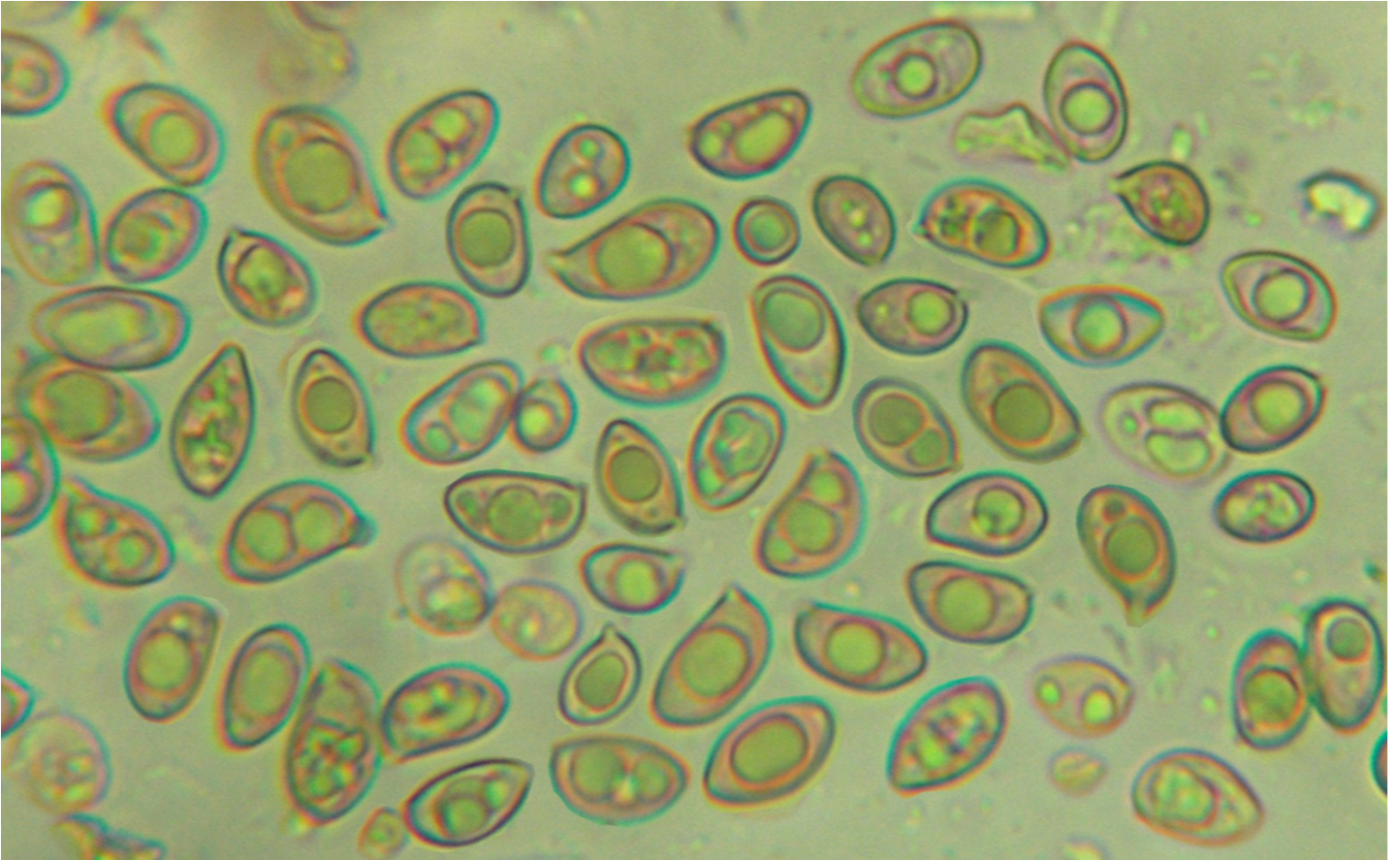
Carne biancastra, con sfumatura lilla verso il cortex; odore debole, sgradevole.

Caratteri microscopici

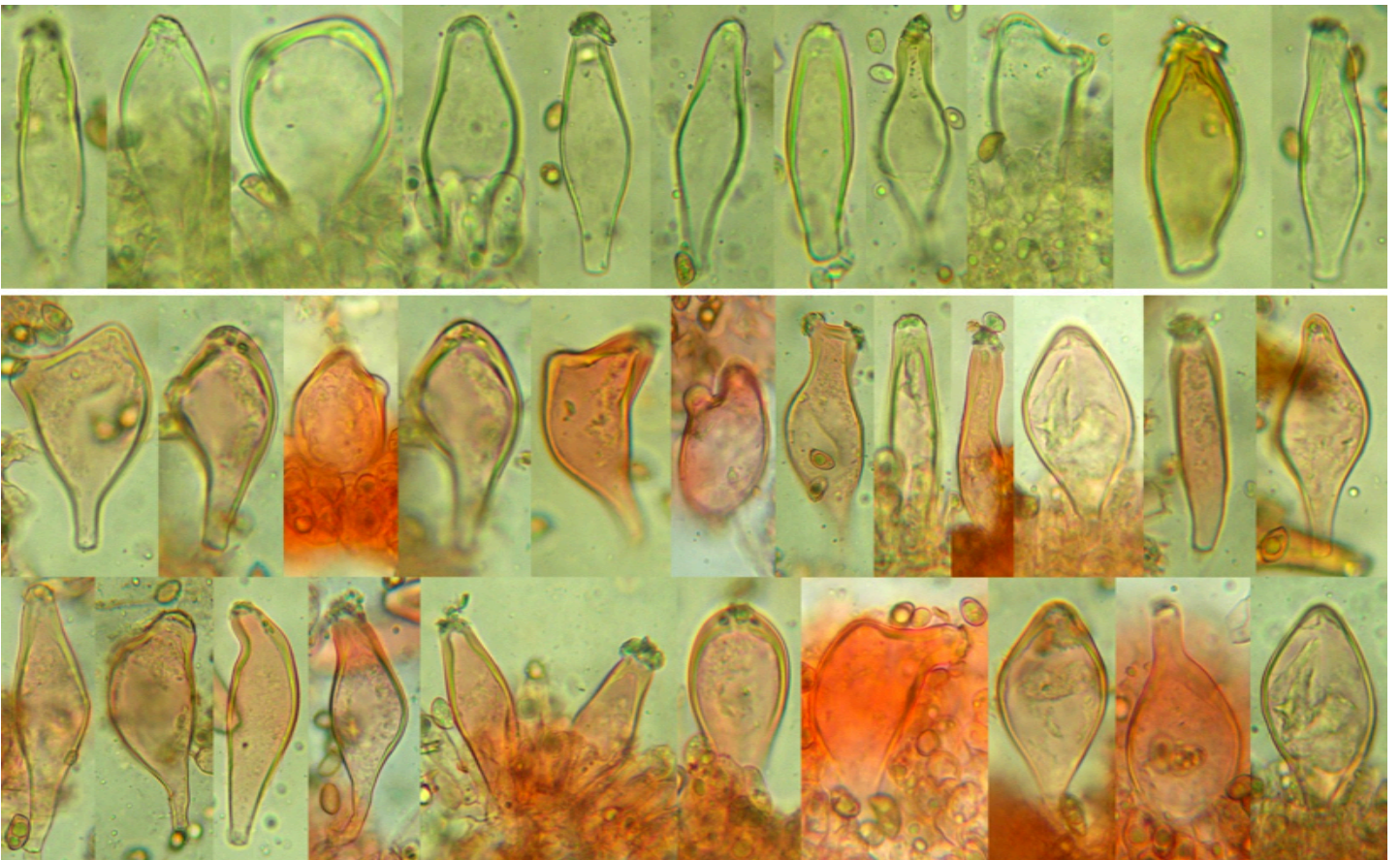
Basidiospore 7.7 – 10.5 (11.4) × 5.1 – 5.9 (6.7) μm, Q = 1.51 – 1.79 (2.07), in vista frontale ellittiche, apice ottuso o a volte sub ogivale, in vista laterale per lo più amigdaliformi o con depressione suprailare, apice ottuso o a volte ogivale, lisce, senza poro germinativo.

Basidi 4-sporici.

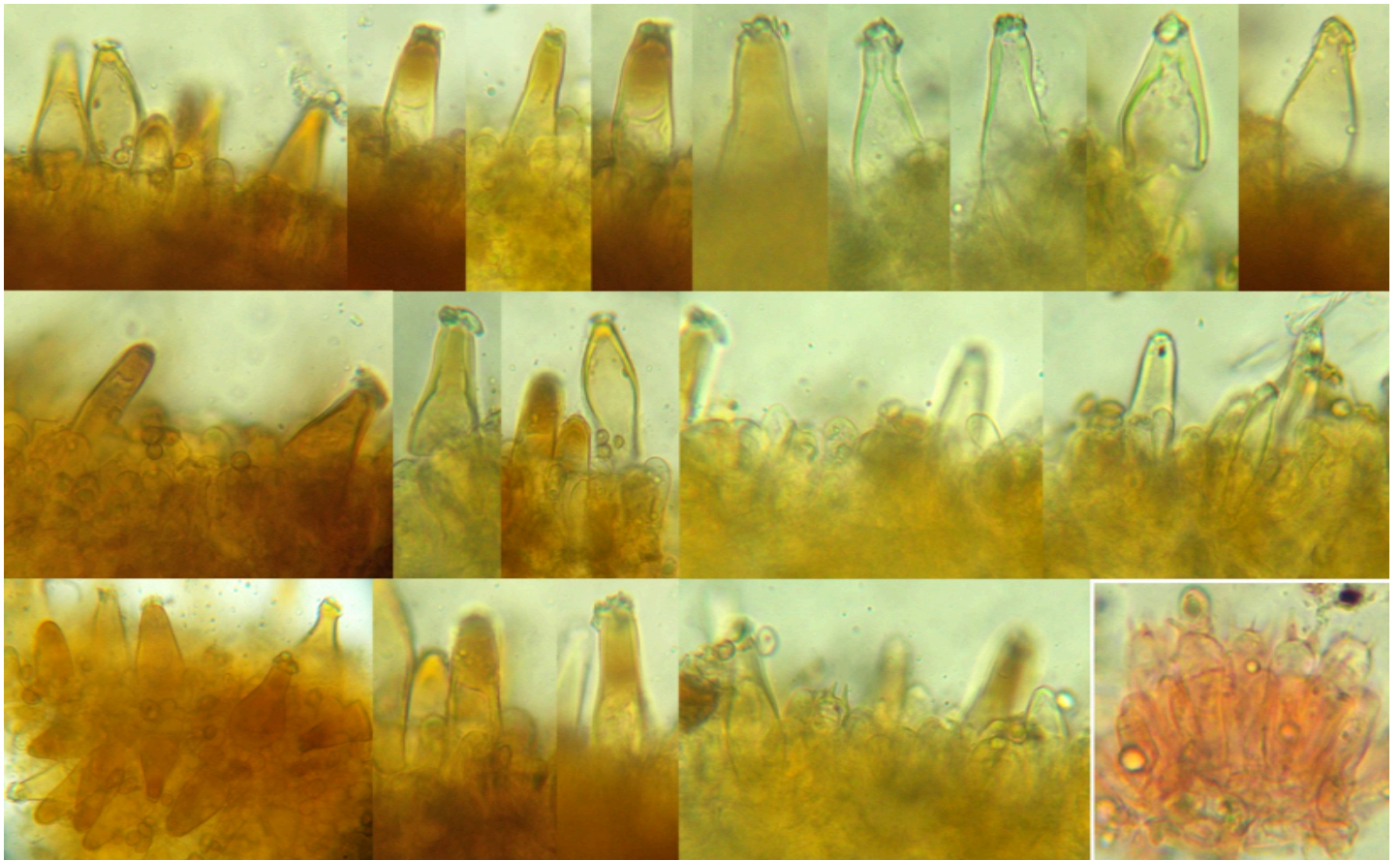
Pleurocistidi 27 – 82 × (8) 12– 25 (31) μm, ventricosi, ventricosi-mucronati, fusiformi-ventricosi, claviformi, fusiformi-cilindranei, utriformi; apice cristallifero, occasionalmente bifido; parete ispessita fino a 3.0 (4.5) μm verso l'apice, di colore debolmente verdastro-giallastro in ammoniacca; numerosi.



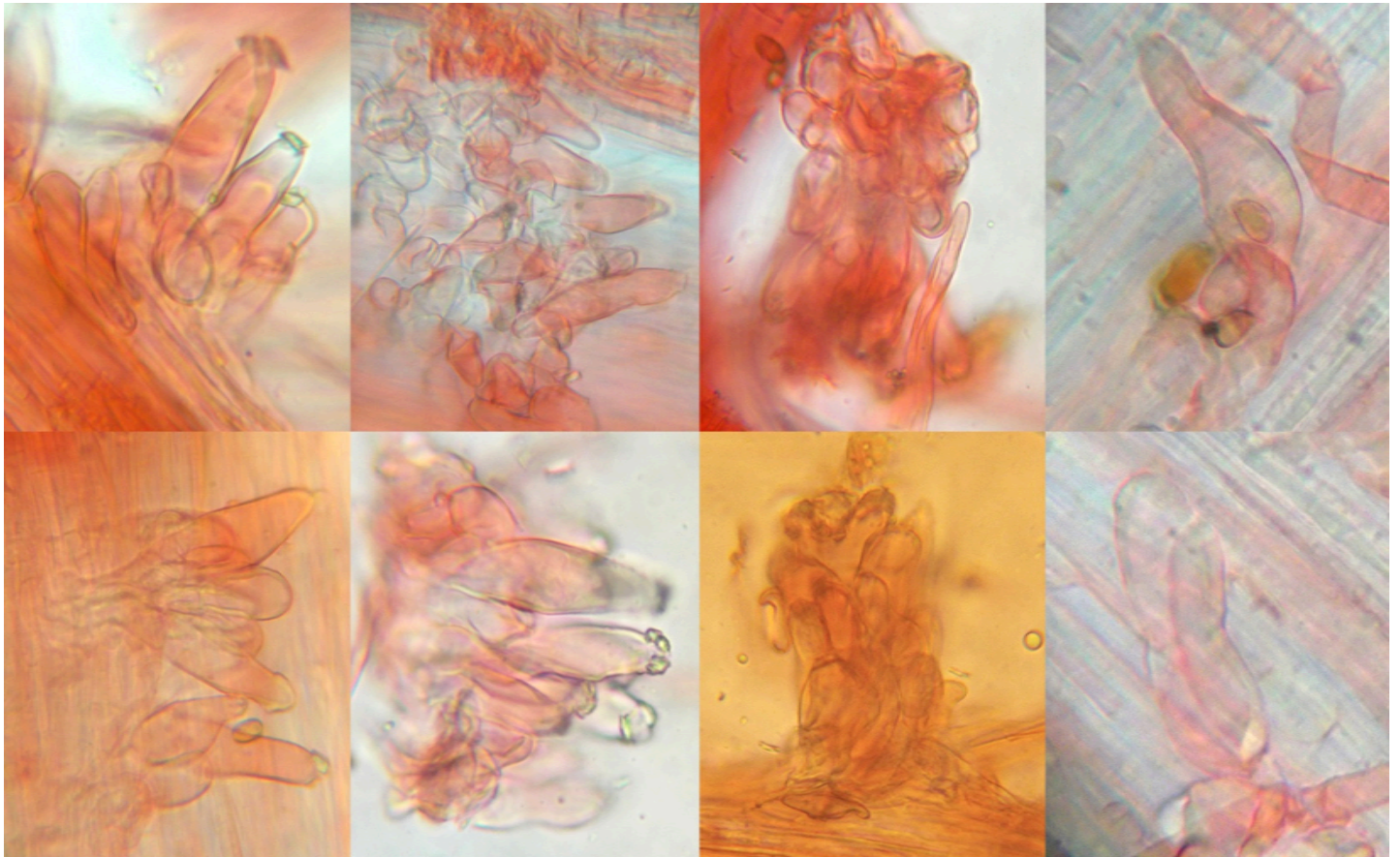
Spore in rosso Congo / spores in Congo red



Pleurocistidi: sopra in ammoniaca, sotto in rosso Congo /
pleurocystidia: above in ammonia, below in Congo red



Cheilocistidi, ialini e necropigmentati, e paracistidi in ammoniaca. In basso a dx: basidi in rosso Congo / Hyaline and necropigmented cheilocystidia, and paracystidia in ammonia. Bottom right: basidia in Congo red



Caulocistidi in rosso Congo / caulocystidia in Congo red

Cheilocistidi simili ai pleurocistidi, frammisti a paracistidi e qualche basidio, in tratti del filo con evidente necropigmento bruno-giallastro o anche più scuro.

Caulocistidi simili ai pleurocistidi, in ciuffi, misti a paracistidi, a volte con aspetto agglutinato, numerosi nel terzo apicale, diradati da metà gambo in basso.

Giunti a fibbia presenti.

Raccolta esaminata e Habitat: Italia, Veneto, Venezia, S. Anna di Chioggia, bosco Nordio; solitario, nell'humus di lecci (*Quercus ilex*) su suolo fondamentalmente calcareo, 1 dicembre 2023, *legit* P. Voto, PAD H0062318, GenBank PV138015 (ITS).

COMMENTI

La presenza di colori lilla, netti sul gambo, colloca *Inocybe floccipes* in *Inocybe* sez. *Lilacinae* Heim (Bon 1997). Le lamelle invece possono manifestare solo una sfumatura lilla oppure essere semplicemente grigiastre (con sfumatura ocracea nel *typus*, con tono olivaceo in questa raccolta); questo dualismo è stato verificato anche nella nostra raccolta.

La distribuzione dei caulocistidi sembra essere poi il dato morfologico più rilevante.

Tra le specie dove i caulocistidi sono del tutto privi, o presenti solo all'estremo apice, a ridosso delle lamelle, si annoverano *I. obscura* Gillet, *I. griseolilacina* J.E. Lange e diverse altre, sia descritte da tempo sia di recente descrizione.

Col gambo caulocistidiato nella porzione apicale ci sono le specie ruotanti intorno a *I. pusio* P. Karst.

Con i caulocistidi discendenti almeno fino a due terzi del gambo, combinazione non contemplata in Bon (1997), sembra esserci invece la sola *I. floccipes*, descritta nel 2004.

Per quanto attiene alla sua distribuzione ecologico-geografica, l'espressione usata da Esteve-Raventós & Fouchier (2004): '*in humus of continental or thermophilous Fagaceae forests (Castanea saliva, Fagus sylvatica, Quercus spp.), mainly in calcareous soils*', basata su numerose raccolte da Francia, Portogallo e Spagna, corrisponde appieno a quello della nostra raccolta italiana.

La nostra impressione è questa specie, una volta collocata in una chiave di determinazione su base morfologica, dovrebbe risultare di agevole identificazione.

Filogeneticamente, il nostro materiale mostra una percentuale d'identità ITS molto alta, più del 99.50 %, con varie raccolte presenti in GenBank sub nomen *I. floccipes*, incluso il *typus* (AH 30626).

BIBLIOGRAFIA / REFERENCES

Bandini D, Oertel B, Eberhardt U (2021) A fresh outlook on the smooth-spored species of *Inocybe*: type studies and 18 new species. *Mycological Progress* **20**:1019–1114

<https://doi.org/10.1007/s11557-021-01712-w>

Bon M (1997) Clé monographique du genre *Inocybe* (Fr.) Fr. [2ème partie: sous-genre *Inocybe* = *Inocybium* (Earle) Sing.]. *Documents Mycologiques* **28**(108):1–77

Esteve-Raventós F, Fouchier F (2004) *Inocybe pusio* var. *floccipes* var. nov. and some observations on the variability in this species. *Cryptogamie Mycologie* **25**(2):107–114

Inocybe floccipes in the Nordio forest

Key words:

Basidiomycota
Agaricales
Inocybaceae
Mediterranean

Abstract: Continuing the cataloging of the mycoflora of the Nordio forest (Venice, Italy), the authors describe a collection of *Inocybe floccipes*. The report is accompanied by descriptive notes and color photographs of the basidiomes and the main microcharacters. An ITS sequence gives molecular support for the correct identification.

INTRODUCTION

The identification of this collection was not easy as the species is not present in Bon's (1997) monograph. Following this key we arrive, as a best approximation, at *Inocybe pusio* f. *elegans* Reumaux nom. inval. (subsequently validated in *I. elegans* Reumaux) which however Bandini et al. (2021), with morphological revision of the typus, reduce to synonymy with *I. griseolilacina* J.E. Lange, characterized by presence of caulocystidia only at the extreme apex of the stem. A search of the most recent literature was therefore necessary to identify it as *I. floccipes*. A verification of the ITS sequence provided molecular confirmation.

MATERIALS AND METHODS

The basidiome was photographed at the location and time of collection; the microcharacters were observed on dried material, rehydrated with 3% ammonia and stained with Congo red. All images by P. Voto.

TAXONOMY

Inocybe floccipes (Esteve-Rav. & Fouchier) Esteve-Rav. & Bizio
Fungi Iberici 2: 20 (2022)

Basionym: *Inocybe pusio* var. *floccipes* Esteve-Rav. & Fouchier. *Cryptog. Mycol.* 25 (2): 108. 2004

Macroscopic characters

Pileus (only one mature specimen examined) 34 mm, convex, margin not appanate; cuticle brown with a lilac or purplish shade, unbroken in the centre, with cracks or adnate squamules in the median zone, with separate radial fibrils (rimose) at the margin; veil not observed.

Lamellae 40, interspersed with 3 lamellulae, emarginate-adnexed, slightly intervenose-anastomosed, light gray with a slight lilac shade or light olivaceous-greyish; edge slightly paler, ventricose towards the stem to doubly ventricose or irregular.

Stipe 40 × 6 mm, enlarged up to 8 mm a little before the rounded base, lilac, much paler towards the base where it is also vaguely yellowish, slightly darkening due to manipulation towards the base; all striate-fibrillous, all minutely pruinose.

Context whitish, with lilac shade towards the cortex; smell weak, disagreeable.

Microscopic characters

Basidiospores 7.7 – 10.5 (11.4) × 5.1 – 5.9 (6.7) μm, Q = 1.51 – 1.79 (2.07), in front view elliptic, apex obtuse to sometimes sub ogival, in side view mostly amygdaliform or with suprahilar depression, apex obtuse to sometimes ogival, smooth, without germ pore.

Basidia 4-spored.

Pleurocystidia 27 – 82 × (8) 12– 25 (31) μm, ventricose, mucronate-ventricose, fusiform-ventricose, claviform, fusiform-cylindrical, utriform; apex crystalliferous, occasionally bifid; wall thickened up to 3.0 (4.5) μm toward the apex, weakly greenish-yellowish in ammonia; numerous.

Cheilocystidia similar to the pleurocystidia, mixed with paracystidia and some basidia, in sections of the edge with evident yellowish-brown or even darker necropigment.

Caulocystidia similar to the pleurocystidia, in clusters, mixed with paracystidia, sometimes apparently agglutinate, numerous in the apical third, thinned from mid-stem down.

Clamp connections present.

Collection examined and Habitat: Italy, Veneto, Venice, S. Anna di Chioggia, Nordio forest; solitary, in holm oak (*Quercus ilex*) humus on calcareous soil, 1 December 2023, *legit* P. Voto, PAD H0062318, GenBank PV138015 (ITS).

NOTES

The presence of lilac colors, distinct on the stem, locates *Inocybe floccipes* in *Inocybe* sec. *Lilacinae* Heim (Bon 1997). The gills, on the other hand, can only show a lilac shade or be simply greyish (with an ochraceous shade in the typus, with an olivaceous tone in this collection); this dualism was also verified in our collection.

The next most relevant morphological datum seems to be the distribution of the caulocystidia.

Among the species where the caulocystidia are completely absent, or present only at the extreme apex, close to the lamellae, are *I. obscura* Gillet, *I. griseolilacina* J.E. Lange and several others, some described for some time, some recently.

With a caulocystidiate stipe in the apical portion there are the species revolving around *I. pusio* P. Karst.

With the caulocystidia descending at least up to two thirds of the stem, a combination not contemplated in Bon (1997), there seems to be only *I. floccipes*, described in 2004

As regards its ecological-geographical distribution, the expression used by Esteve-Raventós & Fouchier (2004): 'in humus of continental or thermophilous Fagaceae forests (*Castanea saliva*, *Fagus sylvatica*, *Quercus spp.*), mainly in calcareous soils', based on numerous collections from France, Portugal and Spain, fully corresponds to the one of our Italian find.

Our impressions that this species, once included in a morphology-based identification key, should be easy to identify.

Phylogenetically, our material shows a very high ITS identity percentage, more than 99.50 %, with several collections in GenBank sub nomen *I. floccipes*, inclusive of the type (AH 30626).

Article received 26 April 2024, accepted 15 June 2024

***Inocybe flavobrunnescens* in provincia di Verona**

(English version on page 13)

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Parole chiave:

Agaricomycetes

Agaricales

Inocybaceae

Riassunto: Si descrive una raccolta di *Inocybe flavobrunnescens* da Grezzana (VR) con dati e immagini dei suoi caratteri morfologici più salienti. La generazione di una sequenza ITS fornisce una conferma molecolare alla sua corretta identificazione.**INTRODUZIONE**

I caratteri morfologici più rilevanti di questa raccolta sono relativi alle spore (a contorno gibboso) e al gambo (base con bulbo marginato, colore privo di evidenti tonalità rosate, pruinosità diffusa su tutta la lunghezza); essi sono chiari indizi che si tratta di una specie di *Inocybe* (Fr.) Fr. della sezione *Marginatae* Kühner, sottosezione *Praetervisae* Bon. Più arduo è stato districarsi tra le numerose specie di questa sezione, dove l'habitus non esile dei carpofori e il rivestimento decisamente poco ornamentato del cappello portavano, all'interno della stirpe *Praetervisae*, a confrontare la raccolta con un gruppo di specie, sovente di recente descrizione, ruotanti intorno all'eponima *I. praetervisae* Quél. (Bon 1998).

MATERIALI E METODI

Le foto dei carpofori sul campo sono state scattate con una fotocamera Canon eos 650. Le strutture microscopiche sono state studiate principalmente su materiale fresco. Le osservazioni sono state fatte usando un microscopio e telecamera Orma Eurotek usando obiettivi in campo chiaro con ingrandimenti 10 ×, 20 ×, 40 ×, 60 × e 100 × (a immersione in olio) anacroplanari con focale all'infinito. Le osservazioni microscopiche sono state eseguite usando i seguenti reattivi: rosso Congo anionico per la pileipellis, tampone alla glicerina (L4) per le spore, una soluzione di rosso Congo anionico al 60% in composizione con Floxina anionica al 40% per le sezioni lamellari. Le misurazioni degli elementi di microscopia è stata eseguita usando il programma Mycomètre 2.02 (Fannechère 2011), il numero 'n' tra parentesi rappresenta il numero di misurazioni eseguite.

Tutte le foto sono di D. Sartori.

TASSONOMIA***Inocybe flavobrunnescens*** Esteve-Rav., G. Moreno & Bizio*Mycological Progress* 14 (4/14): 5 (2015)**Caratteri macroscopici**

Cappello 10 – 30 mm di diametro, inizialmente campanulato poi quasi piano, sovente con un umbone centrale ottuso e basso, margine a volte un po' ondulato e riflesso, non igrofano, non striato; cuticola ricoperta da fibrille radiali innate, di colore da bruno a bruno chiaro con sfumature giallo-aranciate, al centro più scura.

Lamelle poco fitte, quasi libere al gambo, ventricose; di colore bianco-crema con riflessi giallastri, tendenti a imbrunire con l'età.

Gambo 25 – 50 × 4 – 8 mm, cilindrico, apice rastremato, base con bulbo anche molto marginato; superficie interamente molto pruinoso, di colore bianco tendente ad imbrunire con l'età.

Carne bianca con riflessi brunastri sotto la cuticola; odore e sapore leggermente di legno o terriccio.



Caratteri microscopici

Basidiospore (n = 64) (8.12) 9.19 – 11.95 (13.43) × (5.28) 6.63 – 8.96 (10.87) μm, in media 10.74 × 7.82 μm, Q = (0.91) 1.17 – 1.71 (2.24), in media 1.35, subisodiametriche, con pochi angoli (per lo più 4 – 8) e questi sovente poco e bassamente nodulosi o del tutto curvi, a volte semplicemente poligonali come nel genere *Entoloma*; di colore brunastro chiaro; poro non visibile.

Basidi 29.21 – 39.20 × 9.22 – 13.48 μm, 4-sporici con sterigmi lunghi fino a 7.32 μm, alcuni 1-/2-sporici con sterigmi lunghi fino a 15.37 μm.

Pleurocistidi (n=70) (43.63) 51.36 – 70.62 (78.64) × (8.83) 12.63 – 17.94 (19.68) μm, in media 61.17 × 15.22 μm, Q = (2.64) 3.39 – 5.10 (6.09), in media 4.00; per lo più esili e poco ventricosi: da strettamente utriformi a lageniformi, alcuni fusiformi o subcilindracei, apice ottuso; parete di spessore (0.75) 1.46 – 2.12 μm verso l'apice, scarsamente pigmentata in ammoniacca; apice abbondantemente cristallifero.

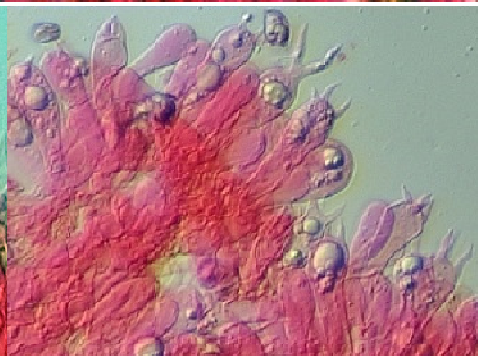
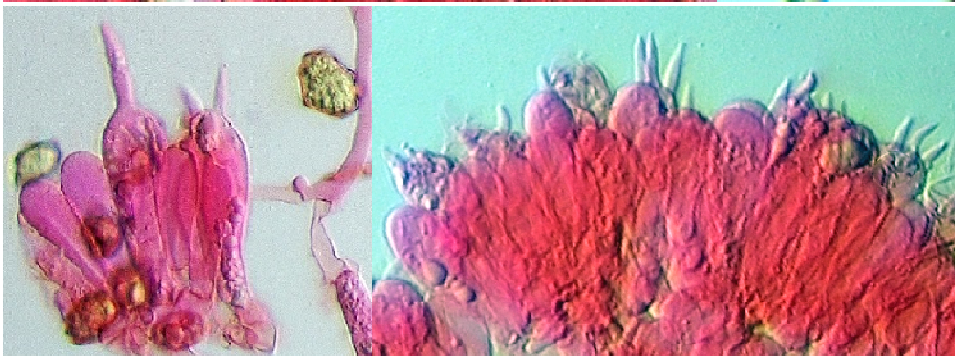
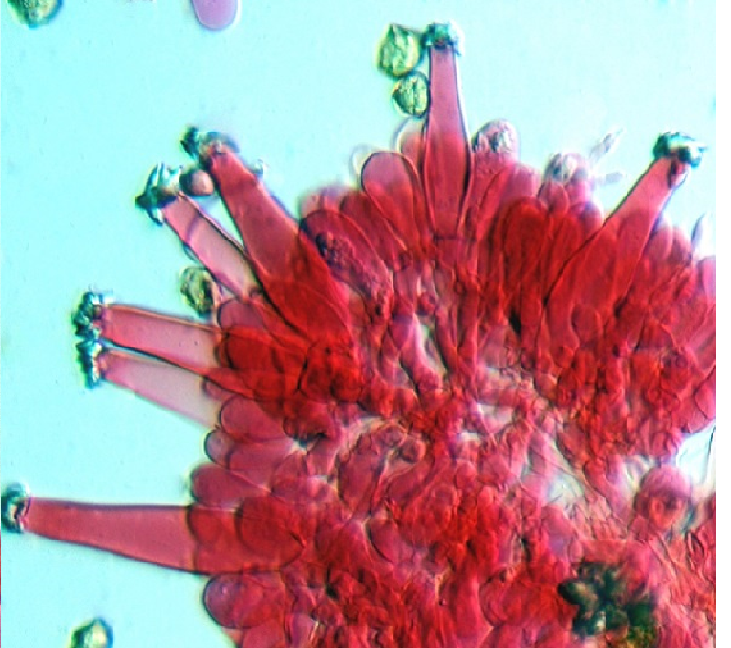
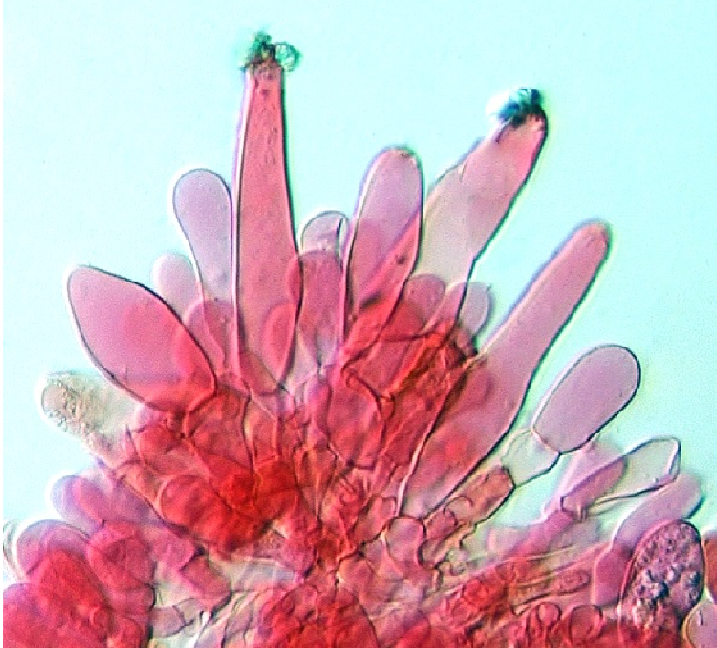
Cheilocistidi simili ai pleurocistidi, frammisti a numerosi paracistidi grandi fino a 26.3 × 10.9 (12.5) μm e sovente catenulati alla base con 1 – 2 (3) setti.

Pileipellis composta di una ixocutis di elementi settati e fibbiati, con pigmento incrostante e anche un po' zebrante.

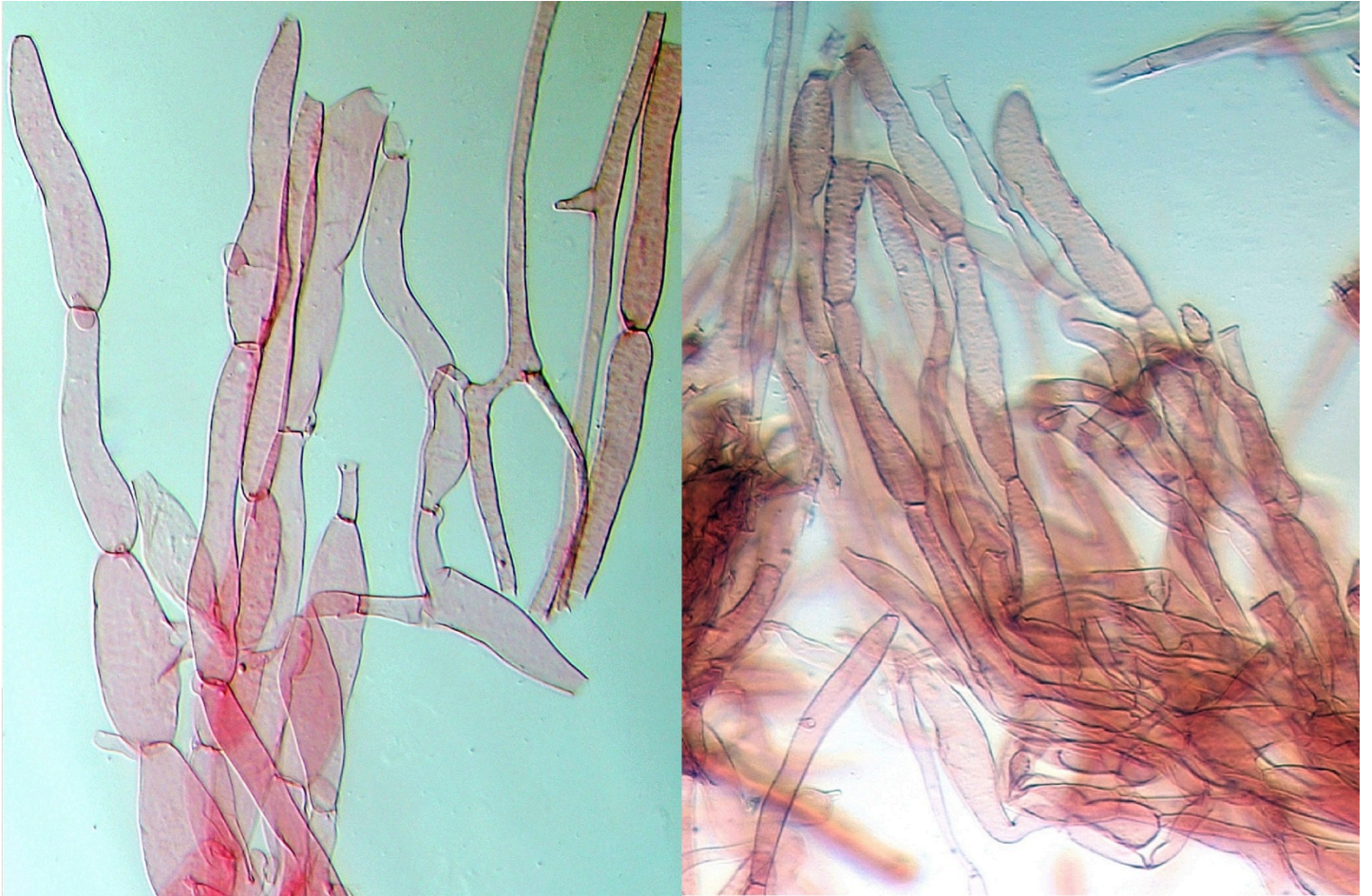
Caulocistidi (n=26) (42.34) 46.81 – 65.63 (67.05) × (11.97) 12.37 – 18.82 (20.75) μm, in media 57.06 × 14.13 μm, Q = (2.62) 2.89 – 4.70 (5.23), in media 3.95, simili ai pleurocistidi e frammisti a numerosi piccoli paracaulocistidi; presenti su tutto il gambo.

Giunti a fibbia presenti.

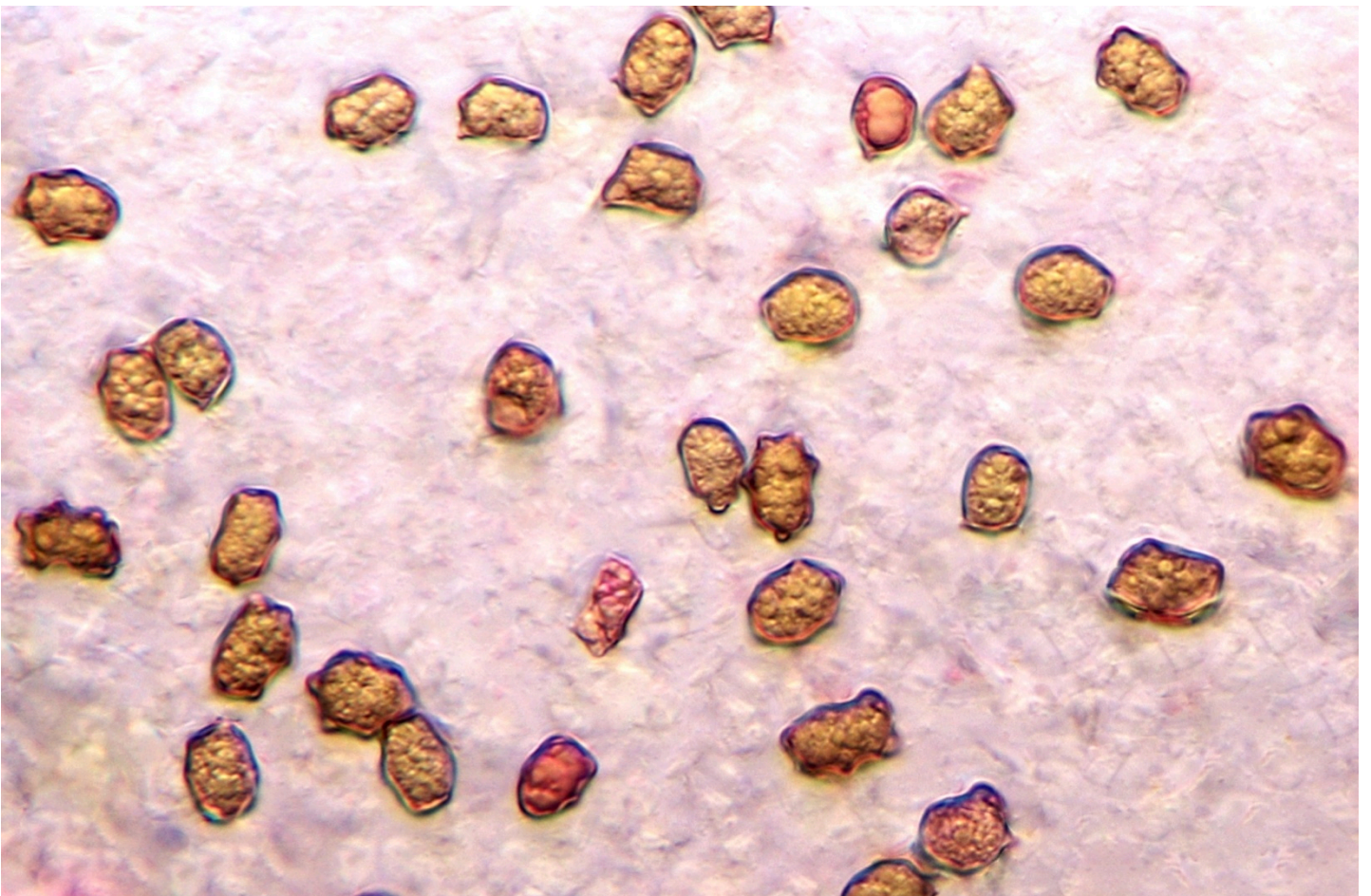
Raccolta esaminata e Habitat: Italia, Veneto, Verona, Grezzana, gregaria in un'aiuola urbana con tigli (*Tilia cordata*), 6 dicembre 2023, *legit* D. Sartori, PAD H0062121, GenBank ITS PQ047968.



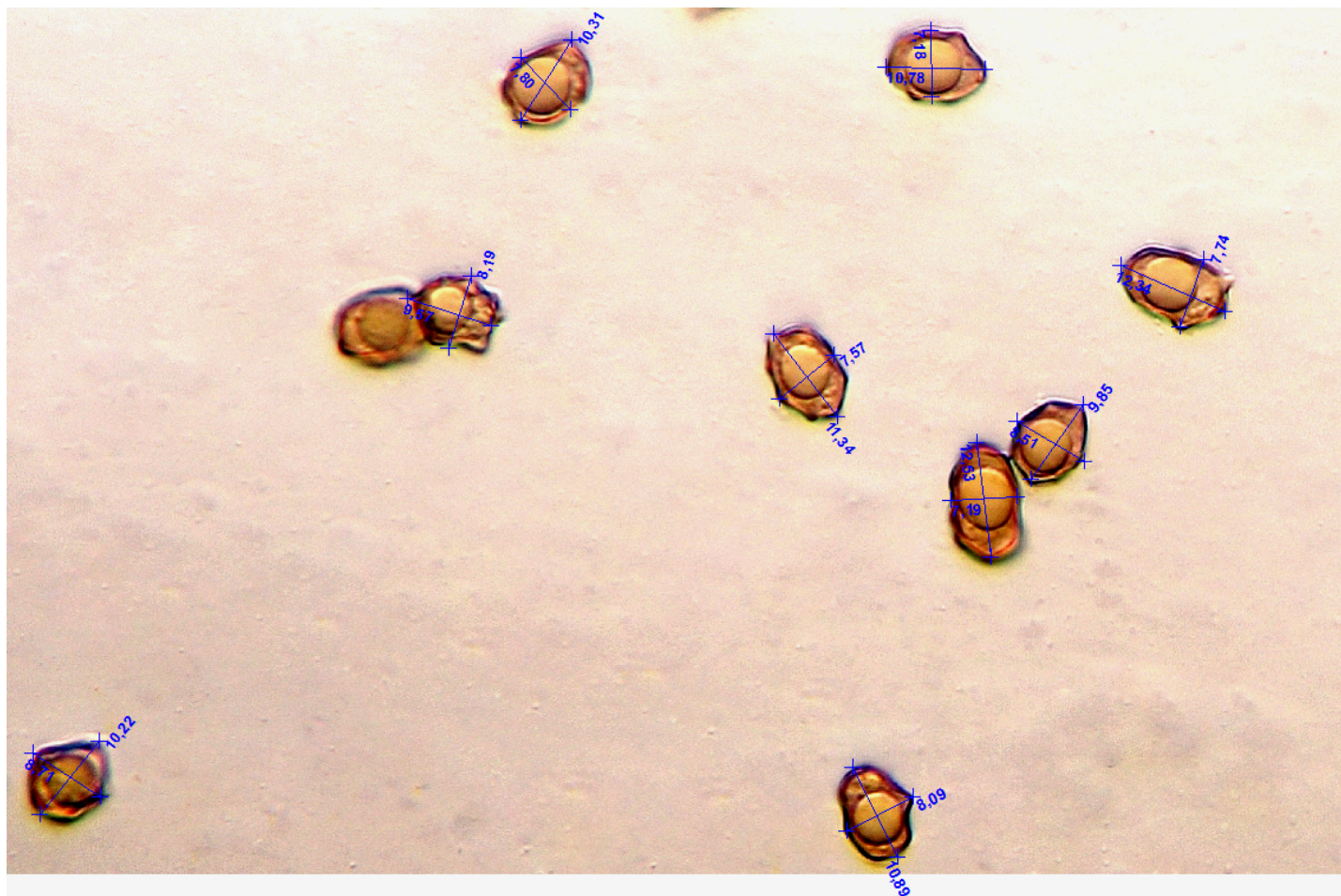
In alto: cheilocistidi; in basso: imenio / top: cheilocystidia; below: hymenium



Pileipellis



Spore / spores



Spore con misurazione / spores with measurements

COMMENTI

Il cappello privo di ornamentazioni particolari; il gambo robusto, imbrunente e privo di evidenti toni rosati, bulboso marginato e tutto pruinoso di caulocistidi; i cistidi imeniali metuloidi e muricati; e le spore nodulose inquadrano *Inocybe flavobrunnea* nella stirpe *Praetervisa* che comprende sia 'vecchie' specie (vedi Bon 1998), sia diverse specie di recente descrizione che, per caratteristiche morfologiche, sono ascrivibili ad essa.

La dimensione delle spore, la loro nodulosità, che è generalmente scarsa (noduli molto bassi) o, sovente, addirittura assente (angoli arrotondati), e l'habitat, segnalato finora solo nell'area mediterranea termofila / mesofila (Italia, Portogallo, Spagna) tra latifoglie (*Quercus ilex*, *Platanus acerifolia*, *Laurus nobilis*, *Populus sp.*, *Ulmus minor*, *Tilia cordata*), sono ulteriori elementi tassonomici che la separano dalle specie di questo stirpe.

Evidenziamo che la nostra raccolta mostra un quoziente sporale leggermente più alto rispetto a quanto indicato nella descrizione originale (1.1 – 1.4, in media 1.25) e colori pileici un po' più scuri.

Il gambo tendente a imbrunire non sembra essere un elemento di rilievo dato che è condiviso da diverse altre specie nel gruppo di *I. praetervisa* (Kühner 1933; Kühner & Romagnesi 1953; Esteve-Raventós *et al.* 2015).

Inocybe blandula Bandini, B. Oertel & U. Eberh., *I. urbana* Alessio ex Franchi, M. Marchetti & Papetti, *I. phaeocystidiosa* Esteve-Rav., G. Moreno & Bon, *I. praetervisa* QuéL., *I. praetervisoides* Esteve-Rav., G. Moreno & Olariaga, *I. vaurasii* Esteve-Rav., E. Larss. & Pancorbo, e *I. xanthomelas* Boursier & Kühner sono facilmente separabili per avere spore con molti (almeno 7 o molti di più) noduli costituiti da gibbosità nette.

Inocybe krieglsteineri Fernández Sas. ha spore più piccole e caulocistidi molto più allungati, sovente oltre 100 μm (Costa Lago 2020; Pancorbo *et al.* 2015).

Inocybe antoniniana E. Sesli, Bandini & Krisai ha noduli sporiali non molto netti ma più numerosi (7-10), dimensione sporale minore (7.1 – 9.8 \times 5.7 – 8.7 μm) e sembra ecologicamente legata a *Fagus sp.* (Austria, Germania, Turchia).

Inocybe caprimulgi Vauras & E. Larss. condivide alcuni caratteri ma è una specie boreale con habitat su suolo sabbioso con *Pinus sylvestris* e *Betula*.

Inocybe hirculus Vauras, filogeneticamente non molto distante, ha pure il gambo interamente pruinoso ma non bulboso marginato, che lo colloca nella sez. *Petiginosae* Heim, e ha ecologia igrofila, connessa a *Betula* e *Salix* (Bon 1998).

Con il gambo colorato non solo di toni brunastri ma solitamente anche con componente ocracea-rossastra o carnicina (Subsez. *Oblectabiles* Bon), segnaliamo un confronto anche con *Inocybe asterospora* Quél. che ci è nota da diverse raccolte della provincia; questa specie però si differenzia anche e vistosamente per il profilo sporale marcatamente stellato.

La sequenza ITS della nostra raccolta ha una identità del 99.66% con quella del tipo, AH 29883, e del 99.83% con quella di uno dei paratipi, AH 40466.

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Inocybe flavobrunnescens in provincia di Verona

Key words:

Agaricomycetes
Agaricales
Inocybaceae

Abstract: A collection of *Inocybe flavobrunnescens* from Grezzana (VR) is described with data and images of its most salient morphological characters. The generation of an ITS sequence provides molecular confirmation of its correct identification.

INTRODUCTION

The most relevant morphological characters of this collection are related to the spores (with a gibbous outline) and the stipe (base with a margined bulb, color without evident pink hues, widespread pruinosity along the entire length); they are clear indications that it is a species of *Inocybe* (Fr.) Fr., section *Marginatae* Kühner, subsection *Praetervisae* Bon. It was more difficult to disentangle the numerous species of this section, where the not slender habitus of the basidiomes and the decidedly little ornamented covering of the pileus led, within the stirps *Praetervisae*, to compare the collection with a group of species, often recently described, revolving around the eponymous *I. praetervisae* Quél. (Bon 1998).

MATERIALS AND METHODS

Photos of carpophores in the field were taken with a Canon eos 650 camera. Microscopic structures were studied mainly on fresh material. Observations were made using an Orma Eurotek microscope and camera

using infinity-corrected bright-field objectives with anacroplanar 10×, 20×, 40×, 60× and 100× (with oil immersion) magnifications. Microscopic observations were performed using the following reagents: anionic Congo red for the pileipellis, glycerin buffer (L4) for the spores, a mixture of 60% anionic Congo red and 40% anionic Phloxin for the lamellae sections. The measurements of elements of microscopy were performed using the Mycomètre 2.02 program (Fannechère 2011), the number 'n' in brackets represents the number of measurements performed.

All images are by D. Sartori.

TAXONOMY

Inocybe flavobrunnescens Esteve-Rav., G. Moreno & Bizio
Mycological Progress 14 (4/14): 5 (2015)

Macroscopic characters

Pileus 10 – 30 mm broad, at start campanulate then almost applanate, often with a central obtuse low umbo, margin sometimes somewhat undulate and reflexed, not hygrophane, not striate; cuticle covered with radial innate fibrils, brown to light brown with yellow-orangish shades, darker at centre.

Lamellae little crowded, almost free, ventricose; cream-white with yellowish shades, turning brownish with age. *Stipe* 25 – 50 × 4 – 8 mm, cylindric, apex tapered, base with an often very marginated bulb; surface entirely very pruinose, white and turning brownish with age.

Context white with con brownish shades in cortex; smell and taste slightly woody or of soil.

Microscopic characters

Basidiospores (n = 64) (8.12) 9.19 – 11.95 (13.43) × (5.28) 6.63 – 8.96 (10.87) μm, on average 10.74 × 7.82 μm, Q = (0.91) 1.17 – 1.71 (2.24), on average 1.35, subisodiametric, with few angles (mostly 4 – 8) and these often slightly and lowly nodulose or at all curved, sometimes merely polygonal as in the genus *Entoloma*; light brownish; germ pore not visible.

Basidia 29.21 – 39.20 × 9.22 – 13.48 μm, 4-spored with up to 7.32 μm long sterigmata, sometimes 1-/2-spored with up to 15.37 μm long sterigmata.

Pleurocystidia (n=70) (43.63) 51.36 – 70.62 (78.64) × (8.83) 12.63 – 17.94 (19.68) μm, on average 61.17 × 15.22 μm, Q = (2.64) 3.39 – 5.10 (6.09), on average 4.00; mostly slender and little ventricose: narrowly utriform to lageniform, sometimes fusiform or subcylindrical, apex obtuse; walls (0.75) 1.46 – 2.12 μm thickened toward the apex, scarcely pigmented in ammonia; apex abundantly crystalliferous.

Cheilocystidia similar to the pleurocystidia, intermixed with numerous paracystidia up to 26.3 × 10.9 (12.5) μm large and often catenulate at base with 1 – 2 (3) septa.

Pileipellis composed of an ixocutis of septate and clamped elements, pigment incrusting and also a little zebra-like.

Caulocystidia (n=26) (42.34) 46.81 – 65.63 (67.05) × (11.97) 12.37 – 18.82 (20.75) μm, on average 57.06 × 14.13 μm, Q = (2.62) 2.89 – 4.70 (5.23), on average 3.95, similar to the pleurocystidia, intermixed with numerous small paracaulocystidia; present all over the stipe.

Clamp connections present.

Collection examined and Habitat: Italy, Veneto, Verona, Grezzana, gregarious in an urban flowerbed with lime trees (*Tilia cordata*), 6 December 2023, *legit* D. Sartori, PAD H0062121, GenBank ITS PQ047968.

NOTES

The pileus devoid of particular ornamentation, the robust stipe which is darkening, devoid of evident pink tones, bulbous marginate at base and entirely pruinose with caulocystidia, metuloid and muricate hymenial cystidia, and nodulose spores place *Inocybe flavobrunnea* in the stirps *Praetervisa* which comprises both 'old' species (see Bon 1998) and various recently described species which, due to their morphological characteristics, can be ascribed to it.

The spore size, their nodulosity, which is generally poor (very low nodules) or, often, even absent (rounded angles), and the habitat, reported so far only in the thermophilic / mesophilic Mediterranean area (Italy, Portugal, Spain) among broad-leaved trees (*Quercus ilex*, *Platanus acerifolia*, *Laurus nobilis*, *Populus sp.*, *Ulmus minor*, *Tilia cordata*), are further taxonomic elements separating it from the species of this stirps.

We highlight that our collection shows a slightly higher spore quotient than indicated in the original description (1.1 – 1.4, on average 1.25) and slightly darker pileus colours.

The browning stipe does not appear to be an important element as it is shared by several other species in the *Inocybe praetervisa* group (Kühner 1933; Kühner & Romagnesi 1953; Esteve-Raventós *et al.* 2015).

Inocybe blandula Bandini, B. Oertel & U. Eberh., *I. urbana* Alessio ex Franchi, M. Marchetti & Papetti, *I. phaeocystidiosa* Esteve-Rav., G. Moreno & Bon, *I. praetervisa* Quél., *I. praetervisoides* Esteve -Rav., G. Moreno & Olariaga, *I. vaurasii* Esteve-Rav., E. Larss. & Pancorbo, and *I. xanthomelas* Boursier & Kühner are easily separable by having spores with many (at least 7 or many more) nodules consisting of distinct humps.

Inocybe krieglsteineri Fernández Sas. has smaller spores and much more elongated caulocystidia, often over 100 µm Costa Lago 2020; Pancorbo *et al.* 2015).

Inocybe antoniniana E. Sesli, Bandini & Krisai has spore nodules that are not very distinct but more numerous (7-10), smaller spore size (7.1 – 9.8 × 5.7 – 8.7 µm) and seems ecologically linked to *Fagus sp.* (Austria, Germany, Türkiye).

Inocybe caprimulgi Vauras & E. Larss. shares some characters but is a boreal species with habitat on sandy soil with *Pinus sylvestris* and *Betula*.

Inocybe hirculus Vauras, phylogenetically not very distant, also has an entirely pruinose but not bulbous margined stipe, which places it in sect. *Petiginosae* Heim, and has hygrophilous ecology, connected to *Betula* and *Salix* (Bon 1998).

With the stipe pigmented not only in brownish tones but usually also with ochraceous-reddish or incarnate shades (Subsez. *Oblectabiles* Bon), we also made a comparison with *Inocybe asterospora* Quél. which is known to us from various collections in the province; this species, however, also differs noticeably in its markedly stellate spore profile.

The ITS sequence of our collection has 99.66% identity with that of the type, AH 29883, and 99.83% with that of one of the paratypes, AH 40466.

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Hemimycena gracilis in Bosnia and Herzegovina

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Key words:

Agaricales,
Tricholomataceae

Abstract: A collection of *Hemimycena gracilis* is reported from the Bosnian region with a morphology-based description and photographs of basidiomes *in situ* and most relevant microcharacters.

INTRODUCTION

This interesting collection posed some difficulty in the identification process as two species seemed equally possible candidates. Since there apparently seemed to be a conflict between the keys of the two papers we used for reference, Antonín & Noordeloos (2004) and Malysheva & Morozova (2009), we finally decided to follow Antonín & Noordeloos (2004). As far as we know, this is the first report from the Balkans.

MATERIALS AND METHODS

The basidiomes were photographed in habitat; the micro characters were studied on fresh material in Congo red. All images are by D. Trivič.

TAXONOMY

Hemimycena gracilis (Quéél.) Singer
Annales Mycologici **41**(1/3): 121 (1943)





Macroscopic characters

Pileus 2 – 3 mm broad, convex, distinctly umbonate in some specimens, margin at first inflexed and finally applanate, white then possibly greyish toward centre.

Lamellae distant, 10 – 11, sometimes intermixed with 1 lamellula, well-developed, adnate then subdecurrent, weakly arcuate, white; edge concolorous.

Stipe 4 – 12 × 0.2 – 0.6 mm, at first somewhat swollen at base and tapering toward apex, then cylindrical, white, pubescent, base naked or surrounded by a white mycelial felt on the substrate.

Context not analyzed.

Microscopic characters

Basidiospores 8.0 – 11.0 × 2.5 – 3.3 μm, oblong to narrowly amygdaliform in side view, apex somewhat tapering, thin-walled, hyaline, not amyloid.

Basidia 18 – 22 × 5 – 7 μm, clavate, 4-spored.

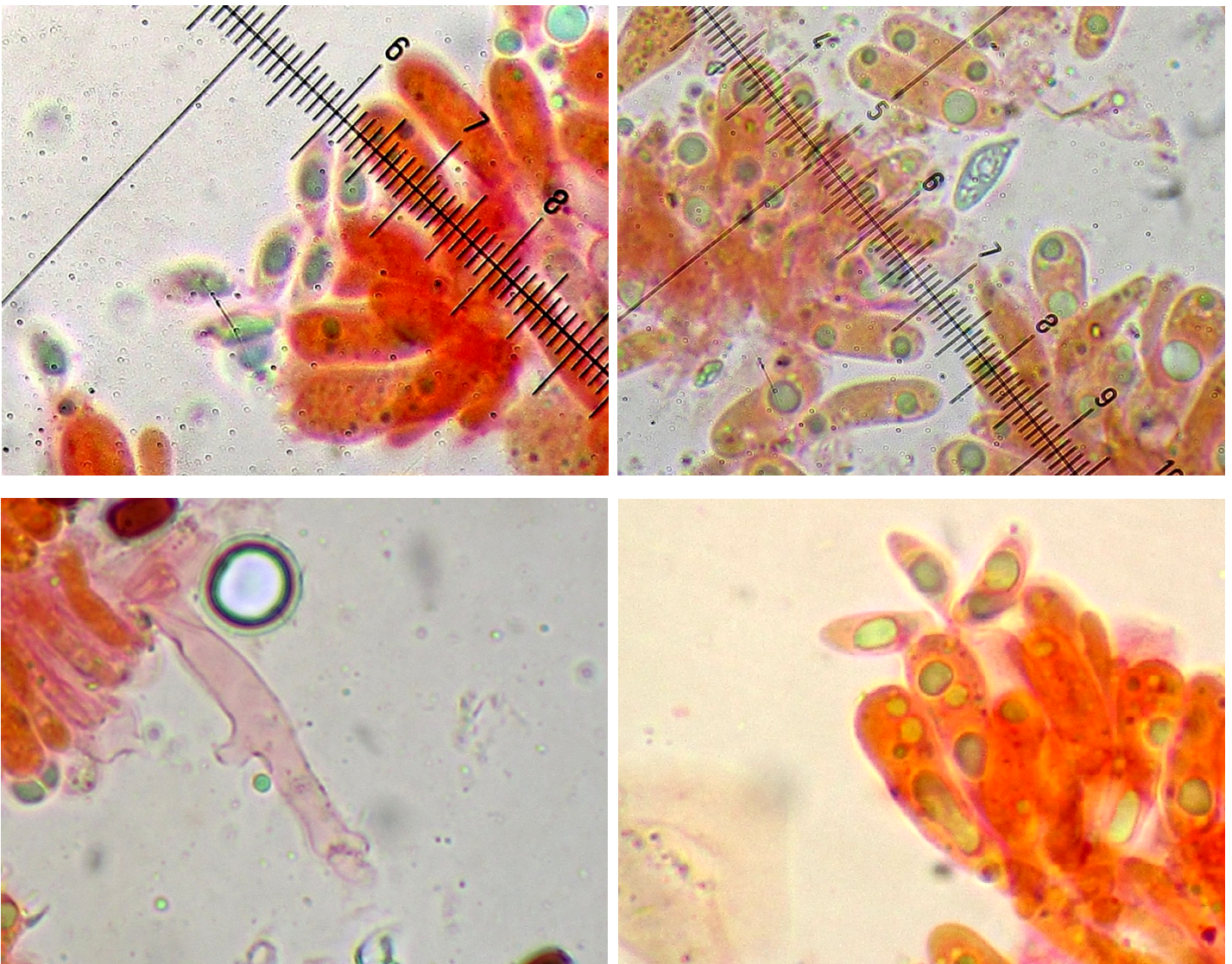
Cheilocystidia 11 – 22 × 3 – 5 μm, (irregularly) cylindraceous to narrowly utriform, apex often swollen, sometimes weakly thick-walled. *Pleurocystidia* not found.

Pileipellis composed of a cutis with short to long, slender, irregularly cylindrical diverticula.

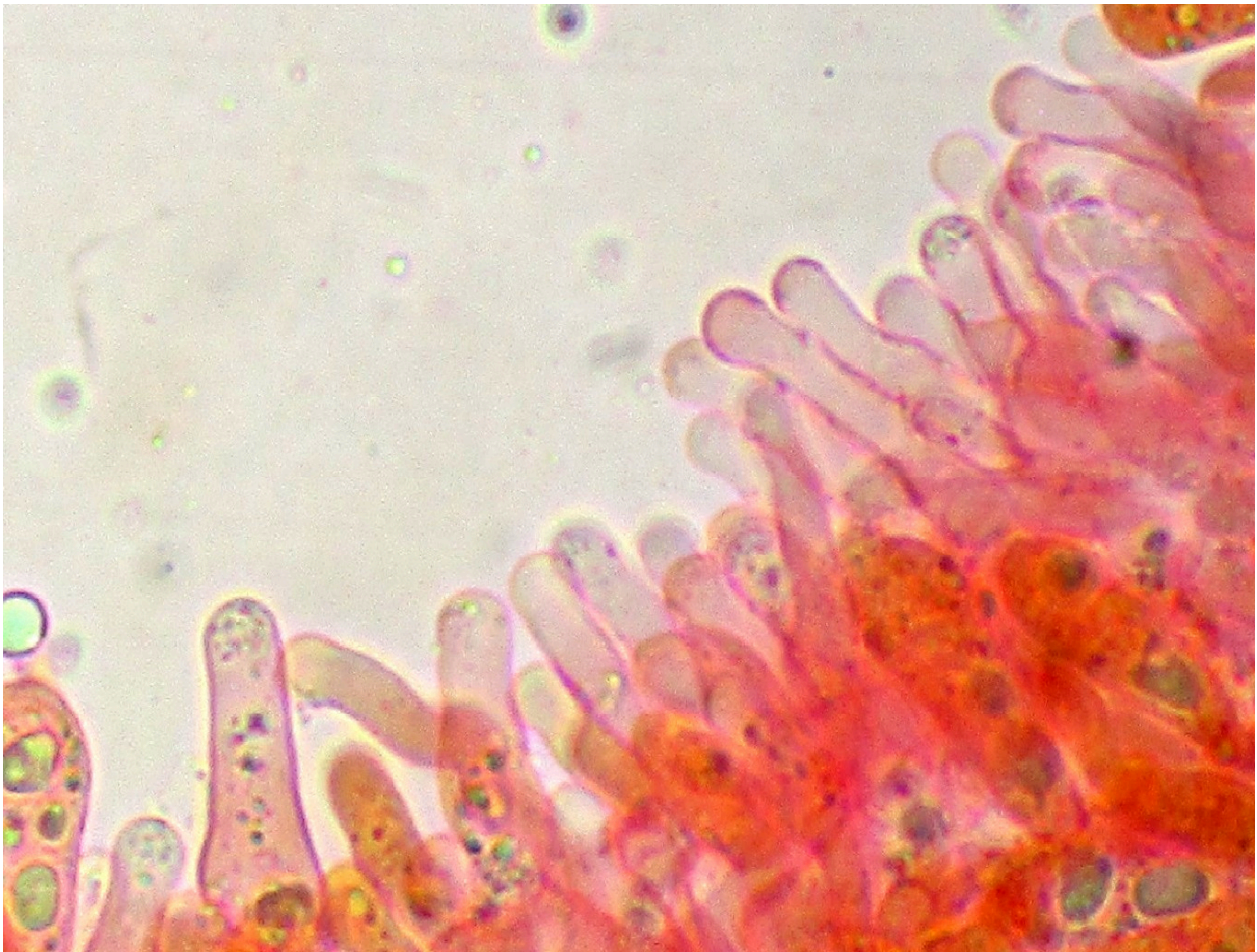
Caulopellis similar to the pileipellis.

Caulocystidia somewhat flexuously cylindrical, not tapering at apex.

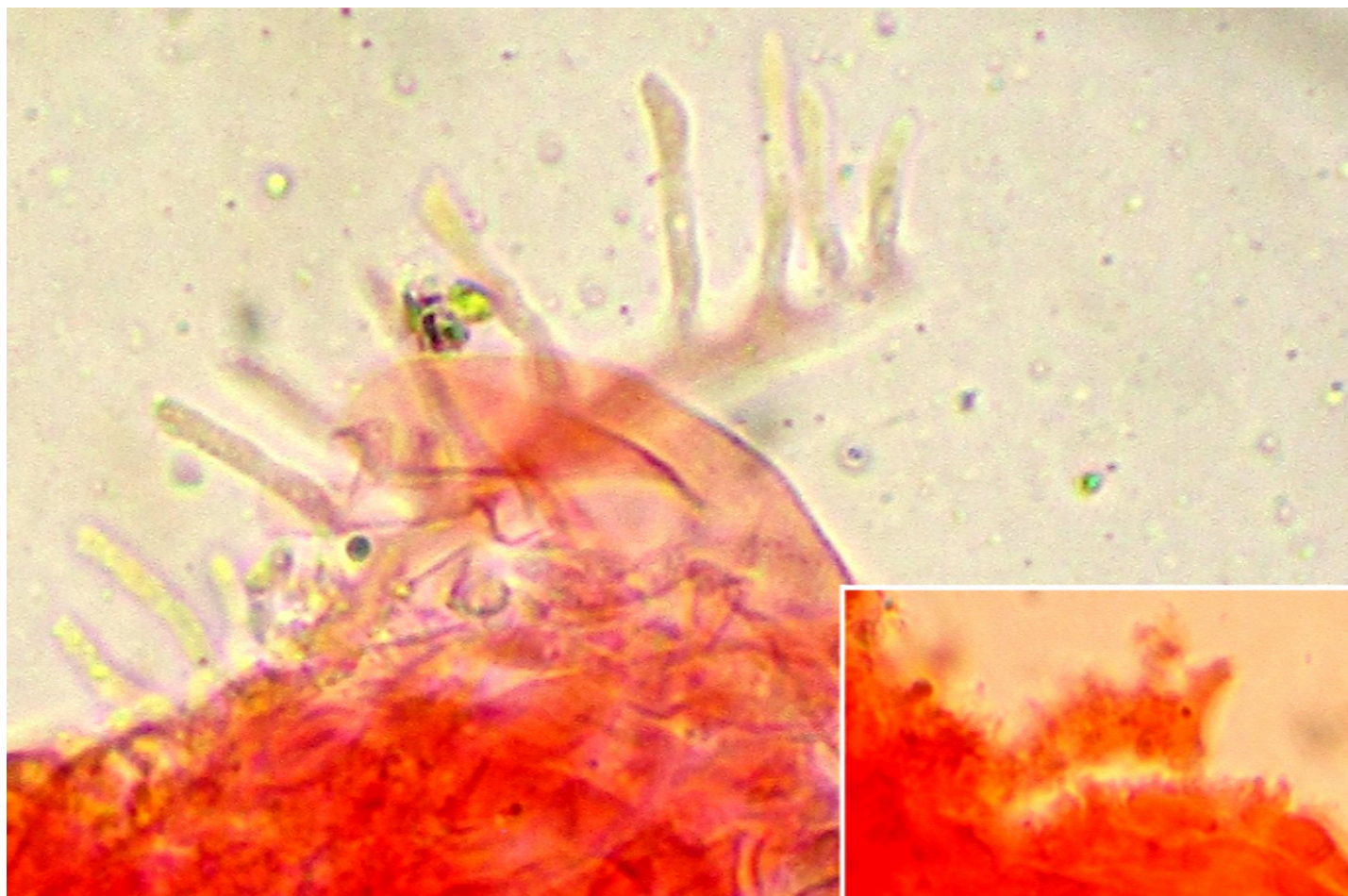
Clamp connections present.



Above: spores; bottom left: a clamp connection, bottom right: basidia



Above: cheilocystidia; below: caulocystidia



Pileipellis and pileocystidia

Collection examined and habitat: Bosnia and Herzegovina, Banja Luka, Prijedor, along the bank of the river Sana, gregarious on small debris of *Salix* sp. among rotting stalks and leaves of *Sparganium erectum*, 28 July 2024, legit D. Trivič, in pers. herb. Basidiomes of the minute ascomycetes *Orbilina sarraziniana* Boud. were present on the same debris together with *H. gracilis* and are visible in the first image.

NOTES

Because it lacks fusoid to capitate pileocystidia and awl-shaped to flabelliform or setiform caulocystidia, and because it has oblong spores this Bosnian collection falls inside key four in the monograph by Antonín & Noordeloos (2004). A purely white cuticle made of a diverticulate cutis, well-developed lamellae, clamped and 4-spored basidia, long and narrow spores are the other essential morphological characters featured by *Hemimycena gracilis*.

This species was also described in the past by the ambiguous name *Hemimycena pithya* (Breitenbach & Kränzlin 1991) and was also known from North America by the posterior synonym *Hemimycena immaculata* (Peck) Watling. *Omphalia tenuispora* Velen. is another synonymized old name (Antonín & Noordeloos 2004).

Searching the literature for modern descriptions of *Hemimycena gracilis*, we found one from Spain in Merino Alcántara (2017). Other older descriptions are reported in Antonín & Noordeloos (2004).

Hemimycena gracilis is keyed out beside *Hemimycena persimilis* (Redhead) Antonín & Noordel in both papers we used for the identification process: Antonín & Noordeloos (2004) and Malysheva & Morozova (2009).

It seems no relevant difference in spore size can be adopted for the distinction between these two taxa (see the variability in spore size reported by Antonín & Noordeloos 2004 in the notes to *H. gracilis*) although, on the contrary, Malysheva & Morozova (2009) distinguish them precisely on a different spore size.

Antonín & Noordeloos (2004, dichotomous step) distinguish them by rather broad, clavate-diverticulate pileocystidia of *H. persimilis* versus slender, (sub) lageniform to subutriform pileocystidia of *H. gracilis*. In our collection pileo- and caulocystidia are distinctly slender.

We note that Antonín & Noordeloos (2004), while not giving them any taxonomic relevance in the key dichotomy, mention a slight wall thickening of the cheilocystidia of *Hemimycena gracilis*, not reported for *H. persimilis*, and the presence of pleurocystidia in the latter, not cited for the former. In our material we observed some slight wall thickening at the apex of cheilocystidia and could not find any pleurocystidia.

We note also that, though giving no mention to it, Antonín & Noordeloos (2004: fig. 32) draw an occasional 'cap' surmounting the apex of a cheilocystidium; we found and photographed what appears to be a mucilaginous cap at the top of a caulocystidium and occasional congophilic inclusions at the apex of some cheilocystidia.

The common *Hemimycena candida* (Bres.) Singer grows on stems of *Symphytum officinale* and has different, often apically tapering cheilo-, pileo- and caulocystidia.

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Coprinopsis xantholepis in Bosnia and Herzegovina

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Key words:

Agaricales,
Tricholomataceae

Abstract: A collection of *Coprinopsis xantholepis* is reported from the Bosnian region with a morphology-based description and photographs of basidiomes *in situ* and most relevant microcharacters.

INTRODUCTION

Coprinopsis xantholepis is a European species distinguished by a set of morphological characters that make its identification easy (Voto 2024); however, this collection is reported and documented due to the fact that it seems that there are not many iconographies and full descriptions in the literature and on the internet about it.

As far as we know, this is the first report from the Balkans.

MATERIALS AND METHODS

The basidiomes were photographed in habitat; the micro characters were studied on fresh material in Congo red.

TAXONOMY

Coprinopsis xantholepis (P.D. Orton) Redhead, Vilgalys & Moncalvo
Taxon 50(1): 232

Basionym: *Coprinus xantholepis* P.D. Orton, Notes from the Royal Botanic Garden Edinburgh 32: 150 (1972)







Macroscopic characters

Pileus up to 6 mm high and 2 – 4 mm broad when still closed, up to 11 mm broad when expanded; at first narrowly ovoid then, while the margin opens, ellipsoid then cylindrical then campanulate, finally campanulate-convex with revolute margin; striate-sulcate up to a smooth discal area, not deliquescent; at first pure white, with age grey-brown with a pale ochraceous grey discal area; veil of white felty floccules turning brownish-yellowish.

Lamellae crowded, free, white then grey, finally black, deliquescing, edge concolorous.

Stipe 15 – 20 × 1 – 1.5 mm, cylindrical or somewhat swollen at base; white, turning (brownish) grey with age; veil of white felty floccules more conspicuous and turning brownish-yellowish at base.

Context not examined.



Microscopic characters

Basidiospores 6.0 – 7.5 × 4.5 – 5.5 μm, subglobose to pruniform or broadly ellipsoid or shortly ovoid, thick-walled, reddish brown; germ pore central, distinct.

Basidia 4-spored.

Pleurocystidia 80 – 100 × 31 – 52 μm, ellipsoid, apex rounded to tapering or mucronate.

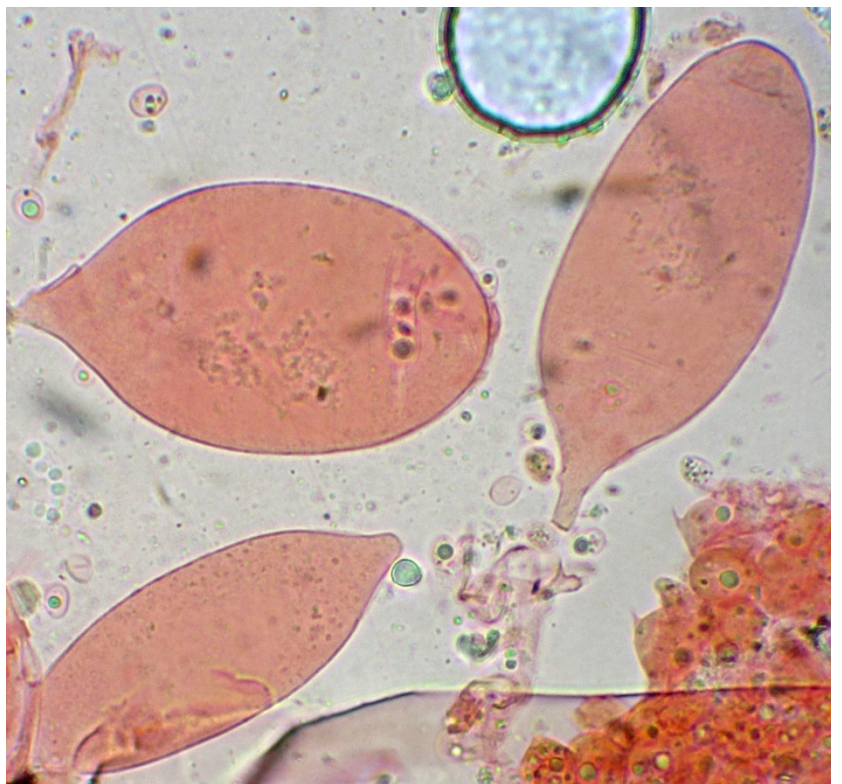
Cheilocystidia similar to *pleurocystidia*.

Pileipellis composed of a cutis.

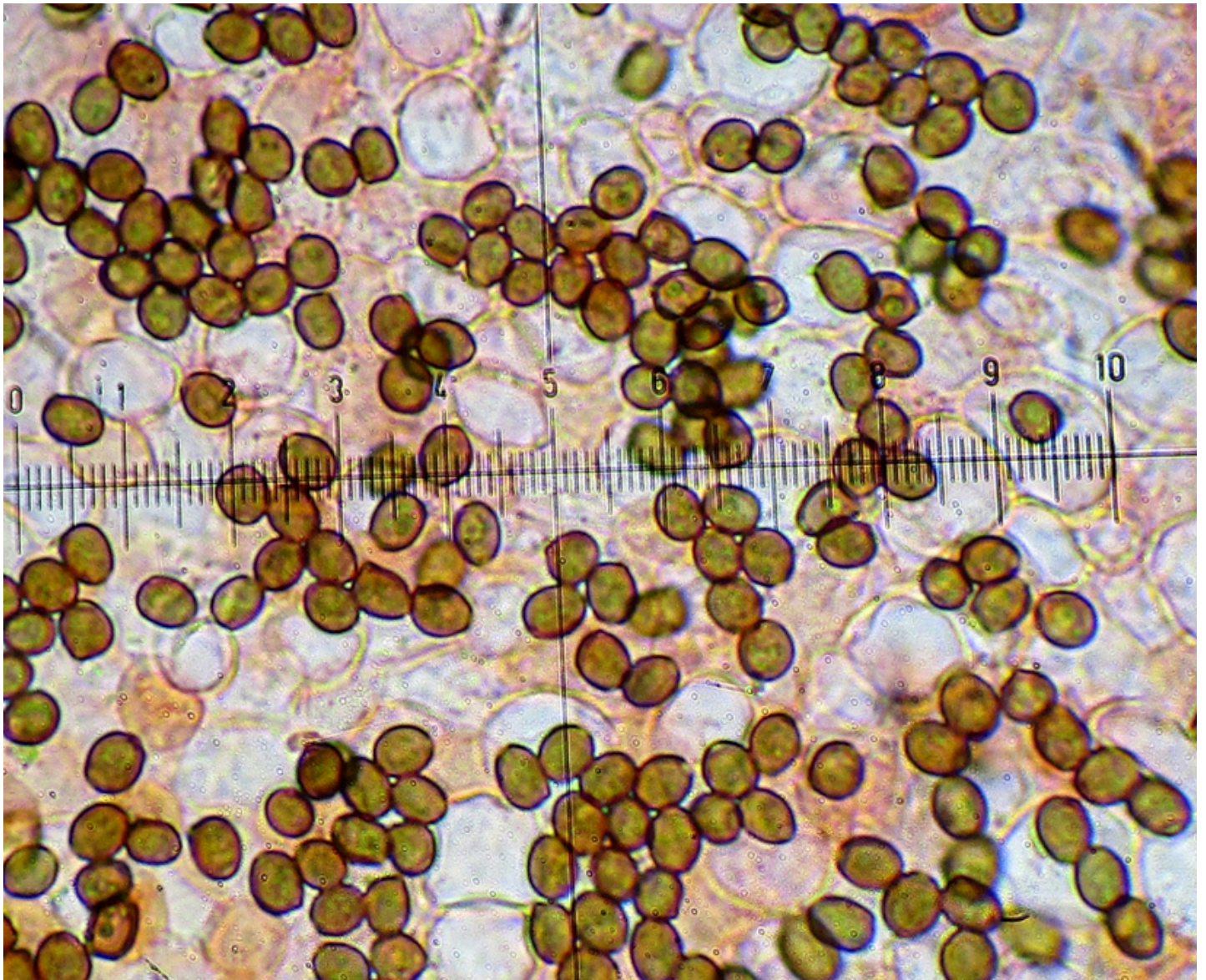
Veil on pileus made of flexuous, branching, nodulose to diverticulate, pigmented thick-walled elements.

Clamp connections present.

Collection examined and habitat: Bosnia and Herzegovina, Banja Luka, Prijedor, gregarious on debris of *Juncus* sp, 23 September 2024, legit D. Trivič, in pers. herb.



Pleurocystidia



Spores (micrometric scale = 1.0 μm)

NOTES

In *Coprinopsis* sect. *Coprinopsis* P. Karst., characterized by branching and diverticulate veil hyphae, *Coprinopsis xantholepis* can be identified by small (5.0 – 7.2 \times 4.5 – 6.2 μm) and subglobose (average Q 1.1-1.2) spores, small basidiomes, a yellowish veil composed of thick-walled hyphae, and habitat connected to herbaceous plants.

C. herinkii (Pilát & Svrček) Redhead, Vilgalys & Moncalvo is generally not much different; however, it features slenderer pleurocystidia, even more globose spores (Q 0.95 – 1.1) and a white veil without yellowish tints.

C. argentea (P.D. Orton) Redhead, Vilgalys & Moncalvo has lentiform spores which are maize-kernel shaped in front view and thin-walled veil hyphae.

Outside of Europe, *C. caribaea* (Pegler) Redhead, Vilgalys & Moncalvo, from the Caribbean area, is characterized by large basidiomes; *C. caesia* Schünemann & R.M.Silveira, from Brazil, is distinguished by a greyish-bluish pileus and habitat connected to leaves of Araucaria tree in moist wood; *C. burkii* (A.H. Sm.) Redhead, Vilgalys & Moncalvo, from USA, is differentiated by a white veil of hyaline hyphae.

C. xantholepis is treated as a synonym of *Coprinopsis phaeospora* (P. Karst.) P. Karst. in some old descriptions but this synonymy is now rejected starting from Uljé & Noordeloos (1997) who demonstrated the morphological differences between them. Ruiz Mateo (2013) describes a Spanish collection of *C. xantholepis* and carries out an in-depth bibliographic research.



Veil on pileus

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https://www.ameronlus.it/chiavi_micologia.php

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Novelties in the Family Psathyrellaceae. Part VII. New combination and new synonym proposals

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Key words:

Agaricomycetidae

Agaricales

type molecular revision

ITS sequences

Abstract: ITS sequences of the holotypes of some American Smith's species housed at the herbarium MICH were generated. Basing on the results obtained, *Coprinus subpurpureus* corresponds to the European Lange's collections; *P. inflatocystis* is sister to psathyrelloid species of the genus *Coprinopsis* therefore the new combination *Coprinopsis inflatocystis* is proposed; *Psathyrella sharonensis* is conspecific with *P. cernuum*. Finally, morphological comments on *P. submaculata* are added.

Coprinus subpurpureus A.H. Sm.

Mycologia 40(6): 684 (1948)

Material sequenced: A. H. Smith 26158 (MICH 10265), holotype; USA, Michigan, Cheboygan Co., Colonial Point, Burt Lake, 31 July 1947, in wet places in high woods among oak, beech, and maple; GenBank ITS1 PV015139, ITS2 PV015141.

Current name: *Tulosesus subpurpureus* (A.H. Sm.) D. Wächt. & A. Melzer, *Mycol. Progr.* 19(11): 1213 (2020).

NOTES

We could not obtain a full ITS sequence therefore we generated two single sequences of the ITS1 (PV015139) and ITS2 (PV015141) regions. These American sequences match those generated from Lange's European collections and offer a molecular support to the conspecificity of the collections from both continents.

Psathyrella inflatocystis A.H. Sm.

Memoirs of the New York Botanical Garden 24: 298 (1972)

Material sequenced: L. R. Hesler 21319 (MICH 11954), holotype; USA, Tennessee, Sevier Co., Great Smoky Mountains National Park, Chimneys, near Fort Harry, 6 May 1954, on deep humus and soil in hemlock woods; GenBank ITS PV017465.

NOTES

The ITS sequence of this material is sister to the psathyrelloid taxa of the genus *Coprinopsis* P. Karst.

Smith (1972) had noted a 'faintly fibrillose' appearance of the pileus but described the pileipellis as only composed of 'a layer of vesiculose cells 2-4 deep'. At the time this character was known of some other psathyrelloid taxa, such as *Psathyrella melanthina* (Fr.) Kits van Wav. and *P. marcescibilis* (Britzelm.) Singer [currently *Coprinopsis melanthina* (Fr.) Örstadius & E. Larss. and *C. marcescibilis* (Britzelm.) Örstadius & E. Larss, respectively], without suggesting a connection with coprinoid taxa with a filamentous pileipellis.

Blasting the type sequence the best match with respect to vouchers of described species is with the types of *Coprinopsis uliginicola* (McKnight & A.H. Sm.) Örstadius & E. Larss. (91.96% identity), known from North America, and with *C. jilinensis* G. Rao, H.N. Zhao, B. Zhang & Y. Li (95.60% identity), known from China.

In contrast, we found strong molecular identities, between 98.96% and 100.00%, with a number of unidentified vouchers originating from the USA (Indiana and Ohio), six of which can be viewed at the following sites:

- *Coprinopsis* sp. 'IN02', voucher S.D. Russell MycoMap 7901, GB ON059454, <https://mycomap.com/gallery/album/6238-coprinopsis-sp-in02-7901-album/>;
- *Coprinopsis* sp. 'IN02', voucher S.D. Russell iNaturalist 98387800, GB OM987347, <https://www.inaturalist.org/observations/98387800>;
- *Coprinopsis* sp. 'IN02', voucher S.D. Russell iNaturalist 27756266, GB ON059460, <https://www.inaturalist.org/observations/27756266>;
- *Coprinopsis* sp. 'IN02', voucher OMDL K. Canan iNaturalist # 188596343, GB PP156401, <https://www.inaturalist.org/observations/188596343>;
- *Coprinopsis* sp. 'IN02', voucher S.D. Russell iNaturalist 25260242, GB ON059476, <https://www.inaturalist.org/observations/25260242>;
- *Coprinopsis* sp. 'IN02', vouchers S.D. Russell iNaturalist 17834367, GB ON059479, <https://www.inaturalist.org/observations/17834367>.

These web pages show photographs of the basidiomes and provide good colour iconographic documentation of the macrocharacters of the species.

Coprinopsis inflatocystis (A.H. Sm.) Voto & Angelini, *comb. nov.* [MB 857638]

Basionym: *Psathyrella inflatocystis* A.H. Sm., *Memoirs of the New York Botanical Garden* **24**: 298 (1972)

From Smith's (1972) description of *Psathyrella inflatocystis* and the images cited above, we note that this species has the general appearance of the common *Coprinopsis melanthina* from which differs in the white fibrils and squamules on pileus and stipe (compared to usually brown, blackish brown, grey), rare to scattered pleurocystidia (compared to completely absent), and an indistinct spore germ pore (compared to completely absent). The spore range is practically the same.

Psathyrella sharonensis A.H. Sm.

Memoirs of the New York Botanical Garden **24**: 258 (1972)

Material sequenced: A. H. Smith 64638 (MICH 12051), holotype; USA, Michigan, Washtenaw Co., Sharon Hollow, 11 October 1961, on hardwood log; GenBank ITS PV017466.

NOTES

The ITS sequence of the type material is identical to various sequences of *Homophron cernuum* (Vahl) Örstadius & E. Larss. and therefore *Psathyrella sharonensis* must be treated as a superfluous synonym of this *Homophron* species.

Smith (1972) treats both *Psathyrella sharonensis* and *P. cernua* (Fries) Moser in *Psathyrella* subgen. *Homophron* sect. *Cystidiosae* A.H. Sm. His dichotomous key separates them with the fork 'Pileus developing pinkish tints when faded; spores ovate to angular-ovate in front view' for *P. sharonensis*; 'Not as above' for other taxa including *P. cernua* (Fries) Moser [currently *H. cernuum*] and *P. submaculata* (G.F. Atk.) A.H. Sm. (see below for further comments on this taxon). However, *Homophron cernuum* can show pinkish shades on fading and Smith (1972) himself describes it with a discoloring pileus 'sometimes tinged pinkish'.

Furthermore, he reported the spore size as 6 – 7 × 3.5 – 4 µm for *P. sharonensis* and 7 – 9 × 4 – 4.5 µm for *H. cernuum* but, based on several European collections and descriptions (for instance Ludwig 2007; Muñoz & Caballero 2013, Örstadius & Knudsen 2012), we know that the spore size of *H. cernuum* falls in the range 6 – 9 × 3.5 – 5 µm. Our molecular result demonstrates that *P. sharonensis* only represents a collection of *H. cernuum* with the spore size in the lowest expected range and not an autonomous species.

Psathyrella submaculata (G.F. Atk.) A.H. Sm. is another species that Smith (1972) treats in *Psathyrella* subgen. *Homophron* sect. *Cystidiosae*. and that he only separates from *H. cernuum* by smaller spores ($6 - 7 \times 3.5 - 4.5 \mu\text{m}$).

Voto (2020a) transferred this species to *Homophron* and included it in his key (Voto 2020b) also basing its separation from *H. cernuum* on its smaller spores. However, Smith's (1972) description of *P. submaculata* is almost identical with that of *P. sharonensis*, including the spore size and the pinkish ('pinkish buff') shades on fading. Since there is no relevant difference between *H. cernuum* and *P. submaculata*, we propose to treat *P. submaculata*, likewise *P. sharonensis*, as another superfluous synonym of *Homophron cernuum*.

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Entoloma ammophilum in the Nordio forest

(versione italiana a pag. 36)

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Key words:

Basidiomycota
Agaricales
Entolomataceae

Abstract: *Entoloma ammophilum* is documented from the Nordio forest, probably the first report from Italy. The collection is described and illustrated with colour pictures of the main macro- and microcharacters, and compared with the closest taxa.

INTRODUCTION

The Nordio forest is a protected wooded area grown on ancient dunes (relict dunes) and having a calcareous sandy substrate. It is mainly composed of an ash-ilex grove formation (*Fraxino ornii-Quercion ilicis*) but also includes alternative environments such as ponds, grassy or mossy meadows and pure sandy areas.

In the last mentioned habitat an *Entoloma* species was found which superficially reminded *E. perasprellum* Corriol, Dima, O.V. Morozova, J.B. Jordal & Noordel.

The analysis of the microanatomy and a search in the modern literature, which has added a relevant number of new species in this genus, revealed that its correct identification is *Entoloma ammophilum*.



Entoloma ammophilum, Nordio forest (Italy), 01/12/2023.

C. Cingarlini



Details of the basidiomes during the discoloration / Dettagli dei basidiomi durante lo sbiadimento P. Voto

MATERIALS AND METHODS

The macromorphological description and photographs of the basidiomes were taken on fresh samples. Micro characters were studied and photographed both on fresh and dried material. Pictures of microcharacters by A.R. were taken from fresh material observed in 50% water and 50% Congo red solution and photographed using the phase contrast technique; those by P.V. were taken from dried specimens rehydrated with 5% KOH and then stained with Congo red.

TAXONOMY

Entoloma ammophilum G.M. Jansen, Dima, Noordel. & Vila
Persoonia 46: 443 (2021)

Macroscopic characters

Pileus: 22 – 32 mm, convex with a broad low umbo and a marked depression at the centre of the umbo, margin somewhat undulate and sulcate, tending to be radially lacerate with age; minutely squamulose in the inner half, striate almost up to centre; black-blue on the umbo and in the depressed centre, dark purplish brown around the umbo, ochraceous brown in the median zone, beige to greyish in the margin, striae dark brown, discoloring but not hygrophanous.

Lamellae: approx. 25 with 1 – 3 (5) lamellulae, narrowly adnexed, ventricose, thin, whitish then pale pinkish avellaneous; edge in part flexuous, white or brownish dotted and then minutely fimbriate.

Stipe: 40 – 50 × 2 – 2.4 mm, little flared upwards (2.4 – 2.8 mm), swollen towards the base (4 – 6 mm), little twisted; glabrous or imperceptibly striate lengthwise; dark blue to blackish blue, discoloring from the top through purplish brown to brown, base whitish to pale greyish blue.

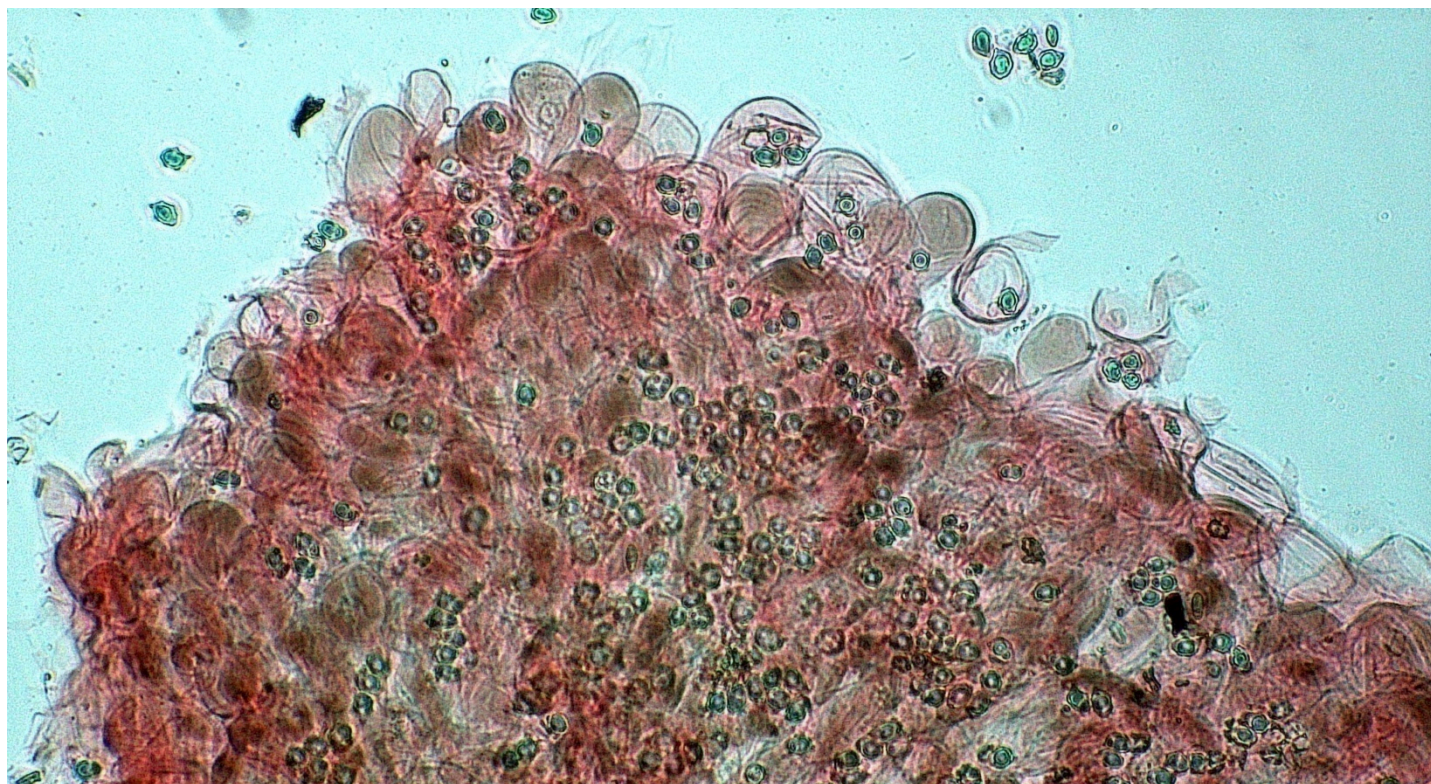
Context: concolorous, dark greyish brown with purplish tints, when observed during discoloration.

Microscopic characters

Basidiospores (two measurements, from gills and from spore powder): 7.7 – 11.4 (11.5) × 6.5 – 8.3 (9.2) μm, on average 9.7 – 10.2 × 7.2 – 7.6 μm, Q 1.11 – 1.56, on average 1.33 – 1.34; with 6 (8) angles partly nodulose, pink.

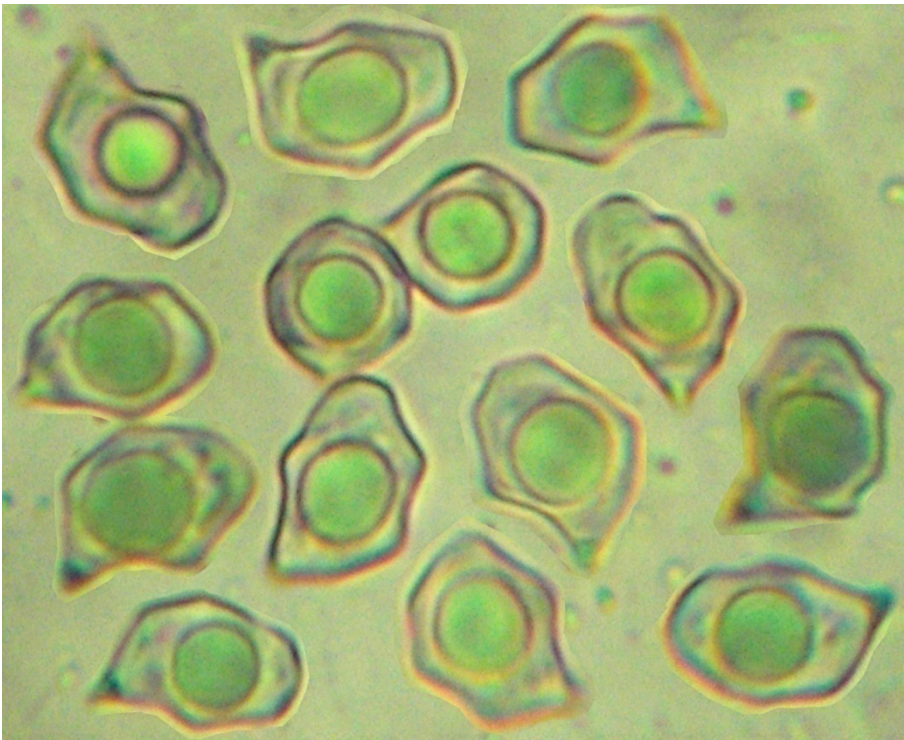
Basidia: 28 – 32 × 10 – 12 μm, cylindraceous-claviform.

Pleurocystidia: absent.

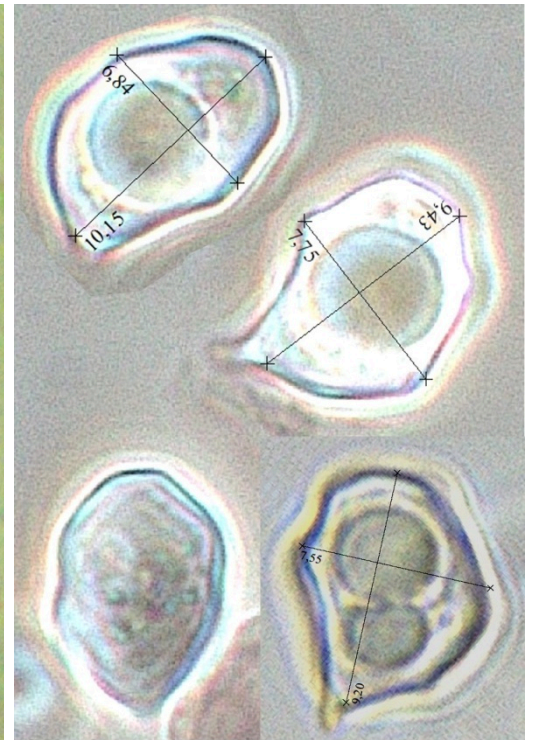


Pileipellis at centre of pileus / pileipellis al disco

A. Rossi

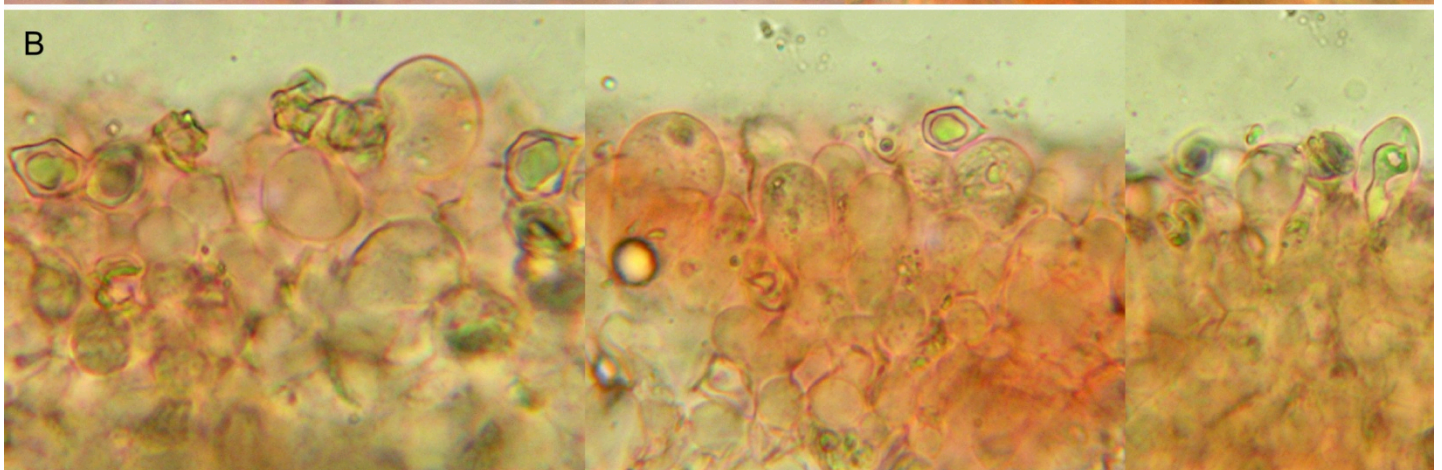
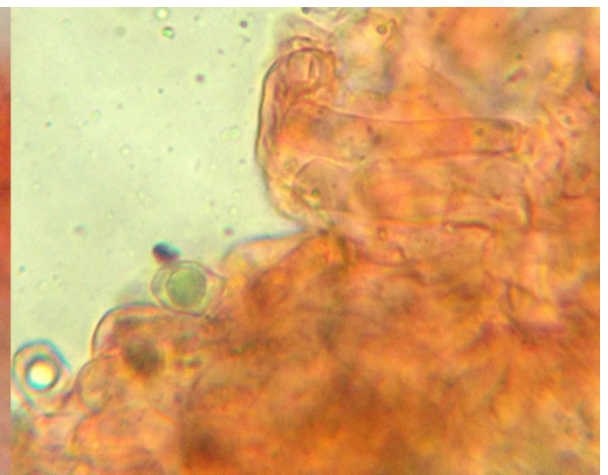
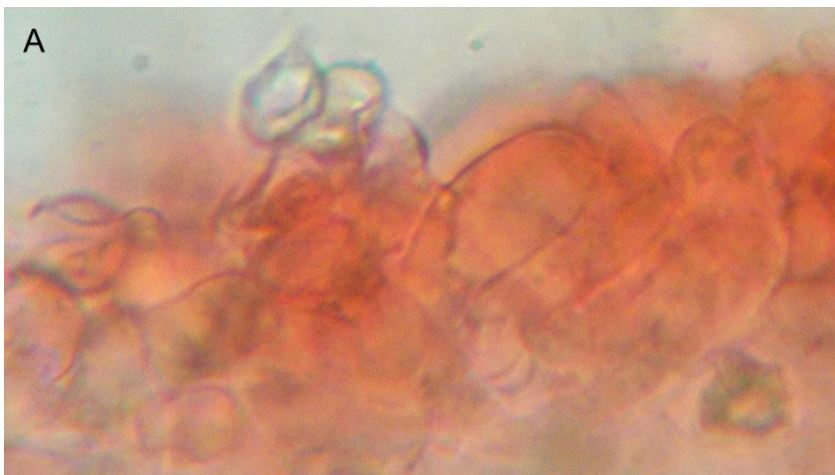


Spores / spore



P. Voto Spores / spore

A. Rossi



Gill edge. A) with terminal elements of trama B) with basidia and basidiola /
Filo lamellare. A) con elementi terminali della trama B) con basidi e basidioli

P. Voto

Gill edge: sterile with repeat to rarely emerging terminal elements of trama or fertile with basidia and basidiola.
Pigment of hymenial trama and pileipellis: intracellular.
Clamp connections: absent; oblique to lateral septa present.

Habitat and collection examined: gregarious on sandy soil near a pond; Italy, Veneto, Venezia, S. Anna di Chioggia, Nordio forest, 1 December 2023, *legit members of Gruppo micologico naturalistico DLF Verona*, PAD H0062319.

NOTES

Entoloma ammophilum was described in Crous *et al.* (2022) from sandy soils in the Netherlands, in a moist dune valley, and Spain, by a riverbank. A Scottish collection, represented with pictures of basidiomes on the web (<https://ecuador.inaturalist.org/observations/240851234>) and supported by an ITS sequence, is reported close by a watercourse near the sea. Our collection also comes from sandy soil near a pond. The combination of a sandy substrate and a humid environment seems to be a strong specific character of this species.

The pileus is characterized by a practically black colour in and around the central depression, while the margin is distinctly lighter in colour. The stipe is described as '*bicolored, steel-blue in lower part, brown above*' in the protolog but this description evidently refers to stipes already in the discoloration process. The basidiomes of our collection were found still fresh in a period of humid weather and a dark blue colour covered the entire length of the stipe; after the collection, we observed a discoloration beginning from the top with the colour changing through purplish brown to brown.

In the protolog the gill edge is defined '*fertile, cystidia absent*'. Also in our collection we have found the edge generally fertile and devoid of true cheilocystidia but in some cases we have found it sterile and covered with repent to little emergent terminal elements of the trama.

Noordeloos, Morozova, Dima, *et al.* (2022) included this species in the sub key 4.3 which is accessed from the main key 4 through the dichotomous point '*Pileus initially with brownish, pinkish, yellowish, greenish, ochre, cream, whitish colours*'. However, due to the distinct bluish black colour of the centre of the pileus, we believe that this species should also be included in the sub key 4.1 accessed through the dichotomous point '*Pileus initially with bluish, violaceous, dark greyish or blackish colours*'.

The closest match in sub key 4.3 is *Entoloma riparium* Vila, Marulli & Battistin, distinguished by a more tomentose to squamulose pileus and a grey-brown to brown stipe; moreover the pileus is not umbilicate or occasionally scarcely umbilicate and the whole basidiome lacks blue tints. The gill edge is fertile or brown fimbriate and sterile although devoid of true cheilocystidia. Although this species has been reported both in a riparian forest and in sandy soil, its habitat appears different from that of *E. ammophilum*.

No relevant match seems to be found in sub key 4.1 where we can mention *Entoloma nigriviolaceum* (P.D. Orton) Hesler and *E. brunneicoeruleum* O.V. Morozova, Noordel., Brandrud, J.B. Jordal & Dima, distinguished by significantly larger spores, and *E. atrocoeruleum* Noordel., distinguished by the innately to densely fibrillose-striate stipe.

Entoloma perasprellum, hypothesized in the field for its habit, differs in having a white context and a sterile gill edge covered with cylindraceous to clavate (of the '*poliopus*-type'), usually brownish pigmented cheilocystidia.

ACKNOWLEDGMENTS

We are thankful to Claudio Cingarlino (Gruppo micologico naturalistico DLF Verona) for permission of using his collection and photograph.

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***Entoloma ammophilum* nel bosco Nordio**

Parole chiave:

Basidiomycota
Agaricales
Entolomataceae

Riassunto: Si documenta un ritrovamento di *Entoloma ammophilum* dal bosco Nordio, probabilmente la prima segnalazione per l'Italia. La raccolta è descritta e illustrata con immagini a colori dei principali macro- e microcaratteri, e confrontata con i taxa vicini.

INTRODUZIONE

Il bosco Nordio è un'area boschiva protetta cresciuta su dune fossili con un substrato sabbioso calcareo. Esso è principalmente caratterizzato da una formazione orno-lecceta (*Fraxino orni-Quercion ilicis*) ma include anche ambienti alternativi quali laghetti, prati erbosi o muschiosi e aree di sabbia pura.

Nell'ultimo habitat citato è stata trovata una specie di *Entoloma* che superficialmente richiama *E. perasprellum* Corriol, Dima, O.V. Morozova, J.B. Jordal & Noordel.

L'analisi della microanatomia e una ricerca nella letteratura moderna, che ha aggiunto un numero rilevante di nuove specie in questo genere, ha rivelato che la sua corretta identificazione è *Entoloma ammophilum*.

MATERIALI E METODI

La descrizione macromorfologica e le fotografie dei basidiomi sono state fatte su campioni freschi. I caratteri microscopici sono stati studiati e fotografati sia su materiale fresco che essiccato. Le immagini dei microcaratteri di A.R. provengono da materiale fresco osservato in una soluzione al 50% acqua e 50% rosso Congo and fotografato usando la tecnica del contrasto di fase; quelle di P.V. provengono da materiale essiccato reidratato con KOH al 5% e poi colorato con rosso Congo.

TASSONOMIA

Entoloma ammophilum G.M. Jansen, Dima, Noordel. & Vila
Persoonia **46**: 443 (2021)

Caratteri macroscopici

Cappello: 22 – 32 mm, convesso con un ampio umbone basso e una marcata depressione al centro dell'umbone, margine un po' ondulato e subsolcato, tendente alla lacerazione radiale con l'età; minutamente squamuloso nella metà centrale, striato quasi fino al centro; blu-nero sull'umbone e nella depressione centrale, bruno purpureo scuro intorno all'umbone, bruno ocraceo nella zona mediana, da beige a grigiastro al margine, strie di colore bruno scuro, sbiadente ma non igrofano.

Lamelle: ca. 25 con 1 – 3 (5) lamellule, strettamente annesse, ventricose, sottili, biancastre poi nocciola rosastre pallide; filo in parte flessuoso, bianco o punteggiato di brunastro e allora minutamente fimbriato.

Gambo: 40 – 50 × 2 – 2.4 mm, leggermente svasato verso l'apice (2.4 – 2.8 mm), rigonfio verso la base (4 – 6 mm), un po' ritorto; glabro o impercettibilmente striato verticalmente; da blu scuro a blu nerastro, sbiadente dall'apice al bruno purpureo e poi al bruno, base da biancastra a blu grigiasta pallida.

Carne: concolore, bruna grigiasta scura con sfumatura purpurea quando osservata durante lo sbiadimento.

Caratteri microscopici

Basidiospore (due misurazioni, dalle lamelle e dalla polvere sporale): 7.7 – 11.4 (11.5) × 6.5 – 8.3 (9.2) μm, in media 9.7 – 10.2 × 7.2 – 7.6 μm, Q 1.11 – 1.56, in media 1.33 – 1.34; con 6 (8) angoli parzialmente nodulosi, rosa.

Basidi: 28 – 32 × 10 – 12 μm, cilindracei-claviformi.

Pleurocistidi: assenti.

Filo lamellare: sterile con elementi terminali della trama coricati o raramente emergenti o fertile con basidi e basidioli.

Pigmento della trama imeniale e della pileipellis: intracellulare.

Giunti a fibbia: assenti; setti obliqui o laterali presenti.

Habitat e raccolta esaminata: gregari, su suolo sabbioso presso un laghetto; Italia, Veneto, Venezia, S. Anna di Chioggia, bosco Nordio, 1 dicembre 2023, *legit soci del Gruppo micologico naturalistico DLF Verona*, PAD H0062319.

NOTE

Entoloma ammophilum è stato descritto in Crous *et al.* (2022) da suoli sabbiosi in Olanda, in una valle dunale umida, e in Spagna, presso una riva fluviale. Una raccolta scozzese, rappresentata con immagini di basidiomi in internet (<https://ecuador.inaturalist.org/observations/240851234>) e supportata da una sequenza ITS, viene segnalata presso un corso d'acqua in prossimità del mare. Anche la nostra raccolta proviene da un suolo sabbioso nei pressi di uno stagno. L'abbinamento di un substrato sabbioso e un ambiente umido sembra essere un forte carattere specifico di questa specie.

Il cappello è caratterizzato da un colore praticamente nero dentro e intorno alla depressione centrale, mentre il margine è distintamente più chiaro. Il gambo è descritto come '*bicolore, blu acciaio inferiormente, bruno superiormente*' (traduzione degli autori) nel protologo ma questa descrizione evidentemente si riferisce a gambi già in fase di sbiadimento. I basidiomi della nostra raccolta sono stati trovati ancora freschi in un periodo di tempo umido e un deciso colore blu scuro ricopriva l'intera lunghezza del gambo; successivamente alla raccolta, si è osservato uno sbiadimento a partire dall'apice con il colore che è passato a toni bruni violacei e poi bruni.

Nel protologo il filo lamellare è definito '*fertile, cistidi assenti*' (traduzione degli autori). Anche nella nostra raccolta abbiamo trovato il filo lamellare generalmente fertile e privo di veri cheilocistidi ma in alcuni casi lo abbiamo trovato sterile e ricoperto di elementi terminali della trama da coricati a subemergenti.

Noordeloos, Morozova, Dima, *et al.* (2022) includono questa specie nella sub chiave 4.3 cui si accede dalla chiave principale 4 attraverso il punto dicotomico '*Cappello inizialmente con colori brunastri, rosastri, giallastri, verdastri, ocra, crema, biancastri*' (traduzione degli autori). Tuttavia, per via del distinto colore nero bluastrato del centro pileico, pensiamo che questa specie dovrebbe essere richiamata anche nella sub chiave 4.1 cui si accede attraverso il punto dicotomico '*Cappello inizialmente con colori bluastrati, violacei, grigiastri scuri o nerastri*' (traduzione degli autori).

Il confronto migliore nella sub key 4.3 è con *Entoloma riparium* Vila, Marulli & Battistin, che si distingue per un cappello più tomentoso o squamuloso e un gambo grigio-bruno o bruno; inoltre il cappello non è ombelicato o occasionalmente scarsamente ombelicato e l'intero basidioma è privo di tinte blu. Il filo lamellare è fertile oppure bruno fimbriato e sterile ma privo di veri cheilocistidi. Sebbene questa specie sia stata segnalata sia in una foresta ripariale che in suolo sabbioso, il suo habitat sembra diverso da quello di *E. ammophilum*.

Nessun confronto rilevante sembra invece trovarsi nella sub key 4.1 dove si possono citare *Entoloma nigriviolaceum* (P.D. Orton) Hesler e *E. brunneicoeruleum* O.V. Morozova, Noordel., Brandrud, J.B. Jordal & Dima, distinti per le spore distintamente più grandi, e *E. atrocoeruleum* Noordel., distinto per il gambo con evidenti fibrille-striature dense o innate.

E. perasprellum, ipotizzato sul campo per l'aspetto morfologico, si differenzia per avere la carne bianca e il filo lamellare sterile, ricoperto di cistidi cilindracei o clavati (del tipo '*poliopus*'), solitamente brunastri.

RINGRAZIAMENTI

Siamo grati a Claudio Cingarlini (Gruppo micologico naturalistico DLF Verona) per il permesso di utilizzare la sua raccolta e la sua fotografia.

Third report of coprinoid fungi (Psathyrellaceae, Agaricales) in the Dominican Republic with notes on *Coprinopsis clastophylla*, rhacophylloid taxa and the *Coprinopsis afronivea* complex

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Key words

Basidiomycetes

Taxonomy

Phylogeny

Neotropics

Caribbean

Anamorph

Teleomorph

Abstract: New combined morphological and phylogenetic studies in coprinoid fungi from the Caribbean have revealed some interesting novelties in the genus *Coprinopsis*. New reports from the Dominican Republic in this article include *Coprinopsis flamboyani* sp. nov. belonging to the *Coprinopsis alnivora* complex and having teleomorphic and anamorphic states. Comments on dimorphic species of *Coprinopsis* and *Rhacophyllus lilacinus* are included, demonstrating that *Coprinopsis clastophylla* must be considered a synonym of *Coprinopsis sclerotiger* and that dimorphism in the genus *Coprinopsis* is more developed than previously thought, spanning more than one section. Also newly reported from the Dominican Republic are *Coprinopsis variispora* sp. nov., and *Coprinopsis caribaeonivea* sp. nov. (the latter previously reported as a *nomen provisorium*) both belonging to the *Coprinopsis nivea* complex. Also reported herein is the first record of *Coprinopsis calospora* from the Dominican Republic. In addition to those Dominican species, *Coprinopsis sinonivea* sp. nov. is formally described from Chinese collections previously identified as *Coprinopsis nivea*.

INTRODUCTION

Following on from Angelini, Voto & Alvarado (2023) and Voto & Angelini (2024), this third report of coprinoid taxa of the Dominican Republic adds more knowledge with the formal description and naming of three new species of *Coprinopsis* P. Karst.

Coprinopsis flamboyani sp. nov. belongs to the complex of *Coprinopsis alnivora* (Bogart) Voto in *Coprinopsis* sect. *Coprinopsis*, characterized by a filamentous veil of forked to nodulose hyphae. *Coprinopsis variispora* sp. nov. and *Coprinopsis caribaeonivea* sp. nov. belong to the complex of *Coprinopsis nivea* (Pers.) Redhead, Vilgalys & Moncalvo in *Coprinopsis* sect. *Niveae* (Citérin) D.J. Schaf., characterized by a globose veil and smooth spores. This report also presents the first confirmation in the Dominican Republic of *Coprinopsis calospora* (Bas & Uljé) Redhead, Vilgalys & Moncalvo, belonging to *Coprinopsis* sect. *Lanatulae* (Fr.) D.J. Schaf. s.l. (phylogenetically to *C.* sect. *Cinereae* D. Wächt. & A. Melzer), characterized by a filamentous veil of smooth hyphae.

The morphological and phylogenetic comparison, between our Dominican collections and species already described in some cases did not seem to outline a clear line of convergence or divergence, especially when it came to evaluating whether the geographic isolation in some areas may have favoured the speciation or simply the production of local forms.

For example, in the case of our voucher ANGE1831, previously published as *Coprinopsis nivea* (Voto & Angelini 2024), despite the phylogenetic analysis nests it (sequence PP349937) in a separate branch (Fig. 2), due to the fact that we could not find relevant morphological differences with the sister species *C. nivea*, we maintain a conservative approach considering it a local breed falling within the intraspecific variability of *C. nivea*. For

considering this voucher a new cryptic sister species, broader molecular analyses on more collections will be necessary.

On the contrary in some other cases we encountered stronger convincing evidence. For example, *C. variispora* sp. nov. and *C. flamboyani* sp. nov. are phylogenetically well supported and also morphologically different from the closest species. Similarly, our collection of *C. calospora* matches the type material on both a morphological and molecular basis.

In the case of *C. caribaeonivea* sp. nov., previously published in Angelini, Voto & Alvarado (2023) as *nom. prov.*, following a morphological re-examination and the results of the new phylogenetic analysis (Fig. 2), we consider it to be an autonomous taxon distinct from *Coprinopsis afronivea* Desjardin & B.A. Perry.

The description of *C. flamboyani* sp. nov. is of particular significance because it is shown to be a dimorphic species that possesses both a teleomorphic state (typically coprinoid) and an anamorphic state (of the rhacophylloid type). This characteristic has directed us towards an analysis of *Coprinopsis clastophylla* (Maniotis) Redhead, Vilgalys & Moncalvo, described in both states, and *Coprinopsis lilacina* (Berk. & Broome) Redhead, described only in the rhacophylloid state. The specification that the anamorphic stage treated in this paper is of the rhacophylloid type is due to the fact that another kind of anamorph stage, of a conidiogenous morph, is also known in the family Psathyrellaceae [see the anamorph genus *Hormographiella* Guarro & Gené having teleomorphic stages in *Coprinellus* P. Karst. and *Coprinopsis* (Cáceres *et al.* 2006; Stalpers *et al.* 2021; Surmont *et al.* 2022)].

In the case of *C. clastophylla* we confirm a clear phylogenetic separation from our *C. flamboyani*. We also demonstrate that *C. clastophylla* is synonymous with *Coprinopsis sclerotiger* (Watling) Redhead, Vilgalys & Moncalvo (Fig. 3) and, consequently, that it belongs to a different section [*Coprinopsis* sect. *Narcoticae* (Uljé & Noordel.) D.J. Schaf.] to *C. flamboyani* (*Coprinopsis* sect. *Coprinopsis*). This, in turn, leads us to postulate that several *Coprinopsis* species may have a dimorphic (coprinoid-rhacophylloid) condition. Therefore, we contend that, in the absence of a simultaneous collection of both morphs for morphological and molecular comparison all collections identified as *Rhacophyllus lilacinus* Berk. & Broome (basonym of *C. lilacina*) must be considered unidentifiable. Until sequences from the holotype of *R. lilacinus* or a neotype from the *locus typicus* (Sri Lanka) are available, the taxon must be treated as a *nomen collectivum* and the description of more new *Coprinopsis* species with a dimorphic state must be considered inevitable.

MATERIALS AND METHODS

Samples analyzed

Morphological and molecular analyses were attempted on a total of 6 *Coprinopsis* samples from the Dominican Republic. They are deposited in the herbaria of the Jardín Botánico Nacional Dr. Rafael M. Moscoso, Santo Domingo, Dominican Republic (herbarium code JBSD) and of the Padova Botanical Garden at the University of Padova, Italy (herbarium code PAD). All additional sequences used in the phylogenetic analyses were retrieved from GenBank excluding one from UNITE. The analysis is divided into three phylograms, while all samples analysed are collectively listed in Table 1.

Morphology

As in Angelini, Voto & Alvarado (2023), with photographs in habitat by C. Angelini, and microscopy and imagery by P. Voto. When spores are three-dimensional their measurement is expressed as length × width in front view × width in side view; similarly, the ratio length/width (quotient, Q) is expressed as quotient in front view × quotient in side view.

Phylogeny

DNA extraction, amplification and sequencing

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, and EF1-983F, EF1-1567R and EF1- 2218R (Rehner & Buckley 2005) for the translation elongation factor 1a (*tef1*)

gene. 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.

Phylogenetic analysis

Three different datasets of ITS rDNA sequences were built and analyzed separately: 1) *Coprinopsis* sect. *Cinereae*, 2) *Coprinopsis* sect. *Niveae*, and 3) *Coprinopsis* sects. *Coprinopsis* and *Narcoticae*. BLASTn (Altschul *et al.* 1990) was used to select the most closely related sequences from the International Nucleotide Sequence Database Collaboration public database (INSDC, Arita *et al.* 2021) and Unite (Nilsson *et al.* 2018). The sequences retrieved are listed in Table 1. 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. Aligned loci were loaded in MrBayes 3.2.6 (Ronquist *et al.* 2012), where a Bayesian analysis was performed (single partition, 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 0.22 M (*Coprinopsis* sect. *Cinereae*), 0.15 M (*Coprinopsis* sect. *Niveae*) and 0.94 M (*Coprinopsis* sects. *Coprinopsis* and *Narcoticae*) generations. Finally, a full search for the best-scoring maximum likelihood tree was performed in RAxML 8.2.12 (Stamatakis 2014) using the standard search algorithm (same partitions, GTRGAMMAI model, 2000 bootstrap replications). The significance threshold was set above 0.95 for posterior probability (PP) and 70% bootstrap proportions (BP).

RESULTS

Phylogeny

The analysis of ITS rDNA sequences of *Coprinopsis* sect. *Cinereae* (Fig. 1) showed seven major clades: *C. afrocinerea*, *C. annulopora*, *C. calospora*, *C. cinerea*, *C. neocinerea* and two undetermined clades. One of the samples analyzed in the present work, ANGE1704, is significantly similar to those identified as *C. calospora* in public databases, including the type. On the basis of genetic results available, this is therefore the most suitable name for this sample.

The analysis of ITS data of *Coprinopsis* sect. *Niveae* (Fig. 2) showed a great variability, with significant structures inside *C. nivea* and *C. afronivea*. One of the samples analyzed in the present work (ANGE 1831, sequence PP349937) is subsignificantly related to *C. nivea*, maybe representing a deviant lineage of this species, while *C. pseudonivea*, *C. igarashi* and a *species nova* (paper in progress, pers. comm. from the author) are less significantly related to it. An infraspecific differentiation seems to occur in the *C. afronivea* complex wherein the two clades represented by the new taxa *C. caribaeonivea* and *C. sinonivea* show varying degrees of significant relationship with each other and with *C. afronivea*. The new taxon *C. variispora* could prudentially be considered sister to this group.

Finally, the analysis of ITS rDNA sequences of *Coprinopsis* sects. *Coprinopsis* and *Narcoticae* (Fig. 3) showed that the teleomorphic and anamorphic samples of *C. flamboyani* are genetically identical. Both form a significantly distinct clade related to *C. alnivora*, *C. palaciosii*, and multiple samples identified as *C. clastophylla*. However, the holotype of *C. clastophylla* (CBS:470.73) belongs to *Coprinopsis* sect. *Narcoticae*, being apparently conspecific with several collections identified as *C. sclerotiger* and *C. lilacina*. As a result, the samples identified as *C. clastophylla* in *Coprinopsis* sect. *Coprinopsis* must belong to a different species. The actual taxonomic status of these clades and the species names proposed for some of them should be revisited with the aid of additional information (sequences from other loci or even genomic data). The pair comparison between the *tef1* sequence obtained from *C. flamboyani* and those of *C. palaciosii* (PP907119 and PP910696), of unpublished homologous sequences of N.L. Bougher BOU911 and N.L. Bougher NLB 1393 (a new species in publication), and of M.D. Barrett F214/10 and PERTH:08733635 (a new species in publication) revealed an average 94.68% similarity. Between these clades mutations are present in both exons and introns without intraspecific variation. As a result, these lineages are independent species.

Table 1. Compliant with the subdivision of the analysis into three separate phylograms, all samples analysed in this study are listed first by section and then in alphabetic order. Species treated in this study are written in bold. The letters T and P in bold after a species name stand for Type and Paratype respectively. The origin of the vouchers is reported in the phylograms.

Section	species	voucher	ITS
<i>Cinereae</i>	<i>C. afrocinerea</i> T	CNF1/583	NR_159796
<i>Cinereae</i>	<i>C. annulopora</i> T	Enderle 3071987	NR_158291
<i>Cinereae</i>	<i>C. calospora</i> T	Bas8795a	JX118675
<i>Cinereae</i>	<i>C. calospora</i> T	CBS 612.89	MH862284
<i>Cinereae</i>	<i>C. calospora</i> T	CBS 612.90	MH873965
<i>Cinereae</i>	<i>C. calospora</i> T	CBS 612.91	NR_154762
<i>Cinereae</i>	<i>C. calospora</i>	JBSD130796 (ANGE1704)	PQ998501
<i>Cinereae</i>	<i>C. calospora</i>	iNaturalist # 129888756	OP470607
<i>Cinereae</i>	<i>C. cinerea</i>	O27	KX610168
<i>Cinereae</i>	<i>C. cinerea</i>	NBRC100011	AB097563
<i>Cinereae</i>	<i>C. cinerea</i>	NBRC30628	AB097562
<i>Cinereae</i>	<i>C. cinerea</i>	Gr159	FJ904826
<i>Cinereae</i>	<i>C. cinerea</i>	CNRMA/F 07-32	GQ131575
<i>Cinereae</i>	<i>C. cinerea</i>	HN08	JQ796875
<i>Cinereae</i>	<i>C. cinerea</i>	KACC49356	AF345819
<i>Cinereae</i>	<i>C. cinerea</i>	BM-FB37260	LC105653
<i>Cinereae</i>	<i>C. cinerea</i>	LVPEI.H726 10	JX868672
<i>Cinereae</i>	<i>C. cinerea</i>	NCCPF:660001	MG547964
<i>Cinereae</i>	<i>C. cinerea</i>	LA2	KU844325
<i>Cinereae</i>	<i>C. cinerea</i>	C2	KX468975
<i>Cinereae</i>	<i>C. cinerea</i>	C3	PP989445
<i>Cinereae</i>	<i>C. cinerea</i>	A2S3-5	KJ780765
<i>Cinereae</i>	<i>C. cinerea</i>	UTHSCSA DI 14-207	KM272006
<i>Cinereae</i>	<i>C. aff. cinerea</i>	SZMC-NL-0799	HQ847019
<i>Cinereae</i>	<i>C. neocinerea</i> T	CBM-FB39575	LC107784
<i>Cinereae</i>	<i>C. sp.</i>	YM71	FJ548835
<i>Cinereae</i>	uncultured	MAT-FV1-4	JX436235
<i>Cinereae</i>	uncultured	R3M5c31P	EU144583
<i>Coprinopsis</i>	<i>C. alnivora</i>	WTU-F-018318	MK169326
<i>Coprinopsis</i>	<i>C. alnivora</i>	WU 41009	MT828909
<i>Coprinopsis</i>	<i>C. alnivora</i>	SNMH529	MZ364343
<i>Coprinopsis</i>	<i>C. alnivora</i>	WU 43426	MZ407758
<i>Coprinopsis</i>	<i>C. alnivora</i>	HFRG_RW220928_1	OQ133586
<i>Coprinopsis</i>	<i>C. brunneofibrillosa</i>	Pegler2704	JX118664
<i>Coprinopsis</i>	<i>C. clastophylla</i>	FLAS-F-60004	KY654717
<i>Coprinopsis</i>	<i>C. clastophylla</i>	JZ41	MG719298
<i>Coprinopsis</i>	<i>C. clastophylla</i>	M. van der Walt:VDW1581	MT304660
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	N.L Bougher BOU911	MT537037
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	N.L. Bougher NLB 1393	MT537072
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	M.D. Barrett F214/10	PV090787
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	M.D. Barrett F86/06	PV090786
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	PERTH:08733635	PV090788
<i>Coprinopsis</i>	<i>C. aff. clastophylla</i>	MEL 2382611	KP012971
<i>Coprinopsis</i>	<i>C. cf. clastophylla</i>	iNat93090585	OP651758

Section	species	voucher	ITS
<i>Coprinopsis</i>	<i>C. episcopalis</i>	SZMC-NL-3032	FN396118
<i>Coprinopsis</i>	<i>C. friesii</i>	AM954	MK072829
<i>Coprinopsis</i>	<i>C. gonophylla</i>	ST-R-9	KU258651
<i>Coprinopsis</i>	<i>C. palaciosii</i> P	AH:49300	PP907119
<i>Coprinopsis</i>	<i>C. palaciosii</i> T	AH:49301	PP907120
<i>Coprinopsis</i>	<i>C. phaeopunctata</i> T	AH18881	HQ847042
<i>Coprinopsis</i>	<i>C. pseudofriesii</i>	SZMC-NL-2631	HQ847016
<i>Coprinopsis</i>	<i>C. rhombisporoides</i> T	BR DDCOFRI	NR_191198
<i>Coprinopsis</i>	<i>C. sclerotiorum</i>	SZMC-NL-0564	HQ847039
<i>Coprinopsis</i>	<i>C. flamboyani</i> T	JBSD130794 (ANGE1942)	PQ998502
<i>Coprinopsis</i>	<i>C. flamboyani</i> P	JBSD130795 (ANGE1943)	PQ998503
<i>Coprinopsis</i>	<i>C. sp.</i>	Vega512	EF687929
<i>Coprinopsis</i>	<i>C. sp.</i>	HG-5-1	KF438021
<i>Coprinopsis</i>	<i>C. sp.</i>	S.L 16	KF578439
<i>Coprinopsis</i>	<i>C. sp.</i>	ARF-4598	OP580268
<i>Coprinopsis</i>	<i>C. sp.</i>	S.D. Russell ONT iNaturalist # 130014767	OP643316
<i>Coprinopsis</i>	<i>C. alcobae</i> (as <i>Coprinus alcobae</i>)	SZMC-NL-0767	HQ847037
<i>Coprinopsis</i>	<i>C. sp.</i> (as <i>Coprinus comatus</i>)	KACC49373	AF345823
<i>Coprinopsis</i>	<i>C. spilospora</i>	15273	JF907840
<i>Coprinopsis</i>	<i>C. subdomesticus</i> T	Murrill459	HQ847038
<i>Coprinopsis</i>	<i>C. urticicola</i>	SZMC-NL-0170	HQ847015
<i>Coprinopsis</i>	<i>C. urticicola</i>	42108111MF0003	OQ174488
<i>Coprinopsis</i>	<i>C. vermiculifer</i>	CBS132.46	GQ249279
<i>Coprinopsis</i>	uncultured	BF-OTU86	AM901943
<i>Coprinopsis</i>	uncultured	HATFD14-17	KU712516
<i>Narcoticae</i>	<i>C. clastophylla</i>	isolate 2	EU375239
<i>Narcoticae</i>	<i>C. clastophylla</i>	isolate 3	EU375240
<i>Narcoticae</i>	<i>C. clastophylla</i>	isolate 4	EU375241
<i>Narcoticae</i>	<i>C. clastophylla</i> T	CBS 473.70	NR_154756
<i>Narcoticae</i>	<i>C. clastophylla</i>	HFRG_SR240526_1_FRDBI_36793323	PP992751
<i>Narcoticae</i>	<i>C. clastophylla</i>	OMDL K. CananiNaturalist # 223263258	PQ678643
<i>Narcoticae</i>	<i>C. foetidella</i>	SZMC-NL-3187	HQ847014
<i>Narcoticae</i>	<i>C. laanii</i>	CBS:476.70	GQ249276
<i>Narcoticae</i>	<i>C. laanii</i>	AJ1896	OR269905
<i>Narcoticae</i>	<i>C. lilacina</i>	I_16_B2	PQ114346
<i>Narcoticae</i>	<i>C. lilacina</i>	II_10_A3	PQ114347
<i>Narcoticae</i>	<i>C. lilacina</i>	II_23_A8	PQ114348
<i>Narcoticae</i>	<i>C. martinii</i>	O50524	GU234126
<i>Narcoticae</i>	<i>C. narcotica</i>	SZMC:NL:2342	FM163180
<i>Narcoticae</i>	<i>C. narcotica</i>	CBS:171.39	MH855976
<i>Narcoticae</i>	<i>C. sclerotiger</i>	CBS:596.80	GQ249277
<i>Narcoticae</i>	<i>C. sclerotiger</i>	TEP19c	KR869759
<i>Narcoticae</i>	<i>C. sclerotiger</i>	UT-Co3	MF161091
<i>Narcoticae</i>	<i>C. sclerotiger</i>	25P1	MZ413261

Section	species	voucher	ITS
<i>Narcoticae</i>	<i>C. sclerotiger</i>	FLAS-F-68796	OM672956
<i>Narcoticae</i>	<i>C. semitalis</i>	CBS:291.77	GQ249278
<i>Narcoticae</i>	<i>C. sp.</i>	CBM-FB-42015	LC425103
<i>Narcoticae</i>	<i>C. sp.</i> (as <i>Coprinus sp.</i>)	O73607	GU234153
<i>Narcoticae</i>	<i>C. stercorea</i>	SFSU MRK37	AY461839
<i>Narcoticae</i>	<i>C. stercorea</i>	SFSU DEH2074A	AY461828
<i>Narcoticae</i>	<i>C. stercorea</i>	CBS 470.70	FJ386439
<i>Narcoticae</i>	<i>C. stercorea</i>	SZMC-NL-2343	FM878028
<i>Narcoticae</i>	<i>C. sp.</i> (as <i>Gymnopus alkalivirens</i>)	GG85	GU234034
<i>Narcoticae</i>	<i>C. trispora</i>	MR180722	MN227299
<i>Narcoticae</i>	uncultured	MBP53-36	FJ237086
<i>Narcoticae</i>	uncultured	BF-OTU683	FR682426
<i>Narcoticae</i>	uncultured	LX042233-122-012-C10	GQ999406
<i>Narcoticae</i>	uncultured	LX042233-122-012-F01	GU054169
<i>Narcoticae</i>	uncultured	112_NA9_P32_M23	KC966135
<i>Narcoticae</i>	uncultured	15y-10	KU534610
<i>Narcoticae</i>	uncultured	15y-137	KU534729
<i>Narcoticae</i>	uncultured	consensus02974	OU941681
<i>Niveae</i>	<i>C. afronivea</i> T	SFSU BAP 619	NR_148105
<i>Niveae</i>	<i>C. caribaeonivea</i> T	JBSD130971 (ANGE1390)	OQ275140
<i>Niveae</i>	<i>C. igarashi</i> T	CBM-FB39186	AB854626
<i>Niveae</i>	<i>C. igarashi</i> P	CBM-FB38829	AB854625
<i>Niveae</i>	<i>C. nivea</i>	ANGE1831	PP349937
<i>Niveae</i>	<i>C. nivea</i>	SZMC-NL-0847	HQ847032
<i>Niveae</i>	<i>C. nivea</i>	TUF118721	UDB019531
<i>Niveae</i>	<i>C. nivea</i>	LO27613	MT889691
<i>Niveae</i>	<i>C. nivea</i>	4585	JF907848
<i>Niveae</i>	<i>C. nivea</i>	iNAT:18020138	OM212924
<i>Niveae</i>	<i>C. nivea</i>	iNAT:6625315	OM212943
<i>Niveae</i>	<i>C. nivea</i>	DM113-40512	OM212954
<i>Niveae</i>	<i>C. pseudonivea</i>	SZMC-NL-2340	FM163181
<i>Niveae</i>	<i>C. sinonivea</i> T (as <i>C. afronivea</i>)	HMJAU46372	MW822049
<i>Niveae</i>	<i>C. sinonivea</i> P (as <i>C. afronivea</i>)	HMJAU46459	OL355163
<i>Niveae</i>	<i>C. sp.</i>	337914	OK649901
<i>Niveae</i>	<i>C. sp. nov.</i> (paper in progress)	CBM-FB42007	LC259498
<i>Niveae</i>	<i>C. sp. nov.</i> (paper in progress)	CBM-FB41367	LC259499
<i>Niveae</i>	<i>C. variispora</i> T	JBSD13798 (ANGE1712)	PQ998504

Figure 1. A 50% ITS rDNA majority rule consensus phylogram of *Coprinopsis* section *Cinereae* (with *C. rhombisporoides* from *C. sect. Coprinopsis* as outgroup) obtained using MrBayes from 1650 sampled trees. Nodes were annotated if they were supported by ≥ 0.95 Bayesian posterior probability (left) or $\geq 70\%$ maximum likelihood bootstrap proportions (right). Nonsignificant support values are exceptionally represented inside parentheses. Sequences newly generated in this study are in red. The letter T in bold after a species name stands for Type.

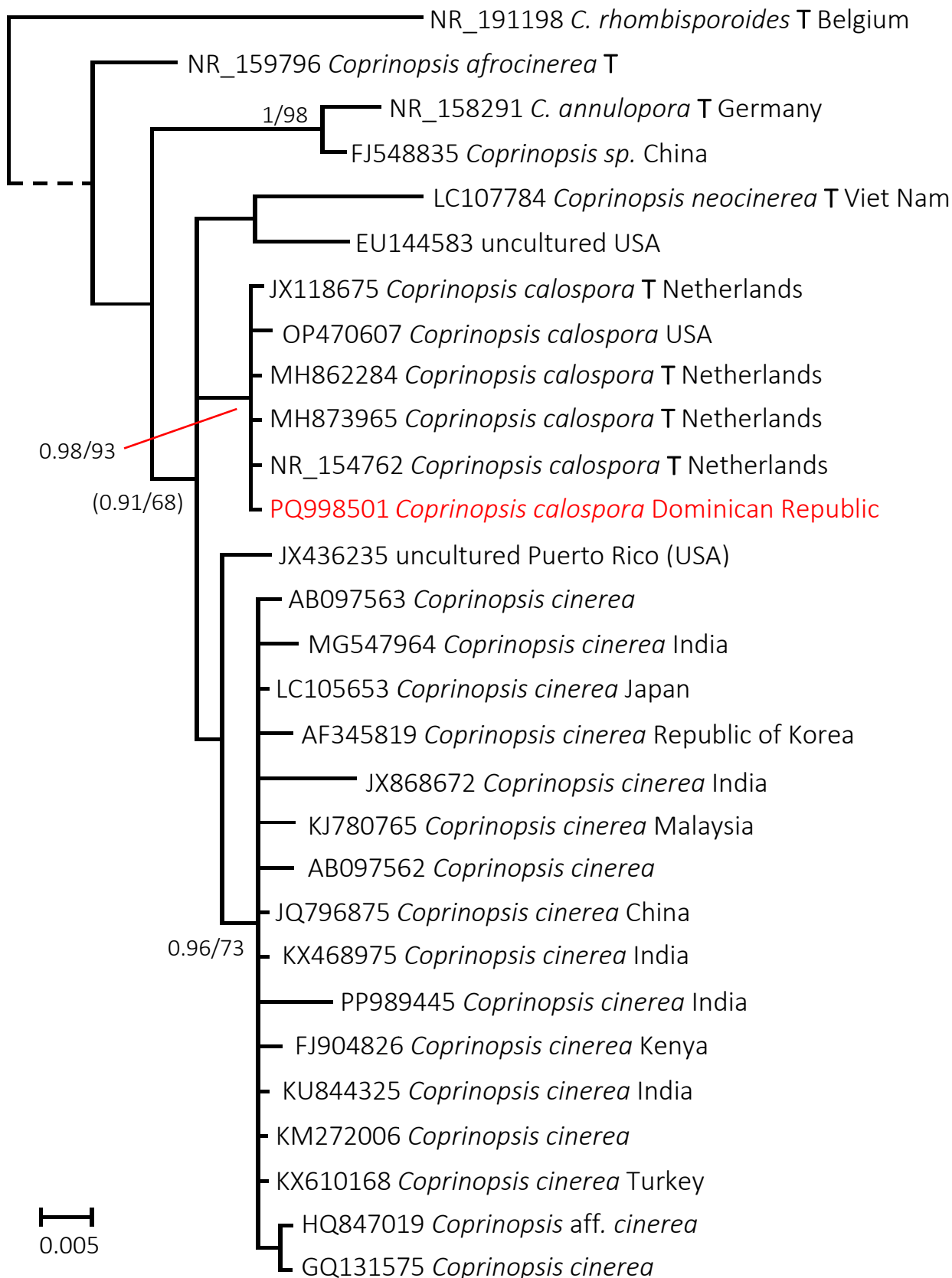


Figure 2. A 50% ITS rDNA majority rule consensus phylogram of the *Coprinopsis afronivea* and *C. nivea* complexes inside *Coprinopsis* section *Niveae* (with *C. rhombisporoides* from *C. sect. Coprinopsis* as outgroup) obtained using MrBayes from 1125 sampled trees. Nodes were annotated if they were supported by ≥ 0.95 Bayesian posterior probability (left) or $\geq 70\%$ maximum likelihood bootstrap proportions (right). Nonsignificant support values are exceptionally represented inside parentheses. Sequences newly generated and species names treated in this study are in red. The letters T and P in bold after a species name stand for Type and Paratype respectively.

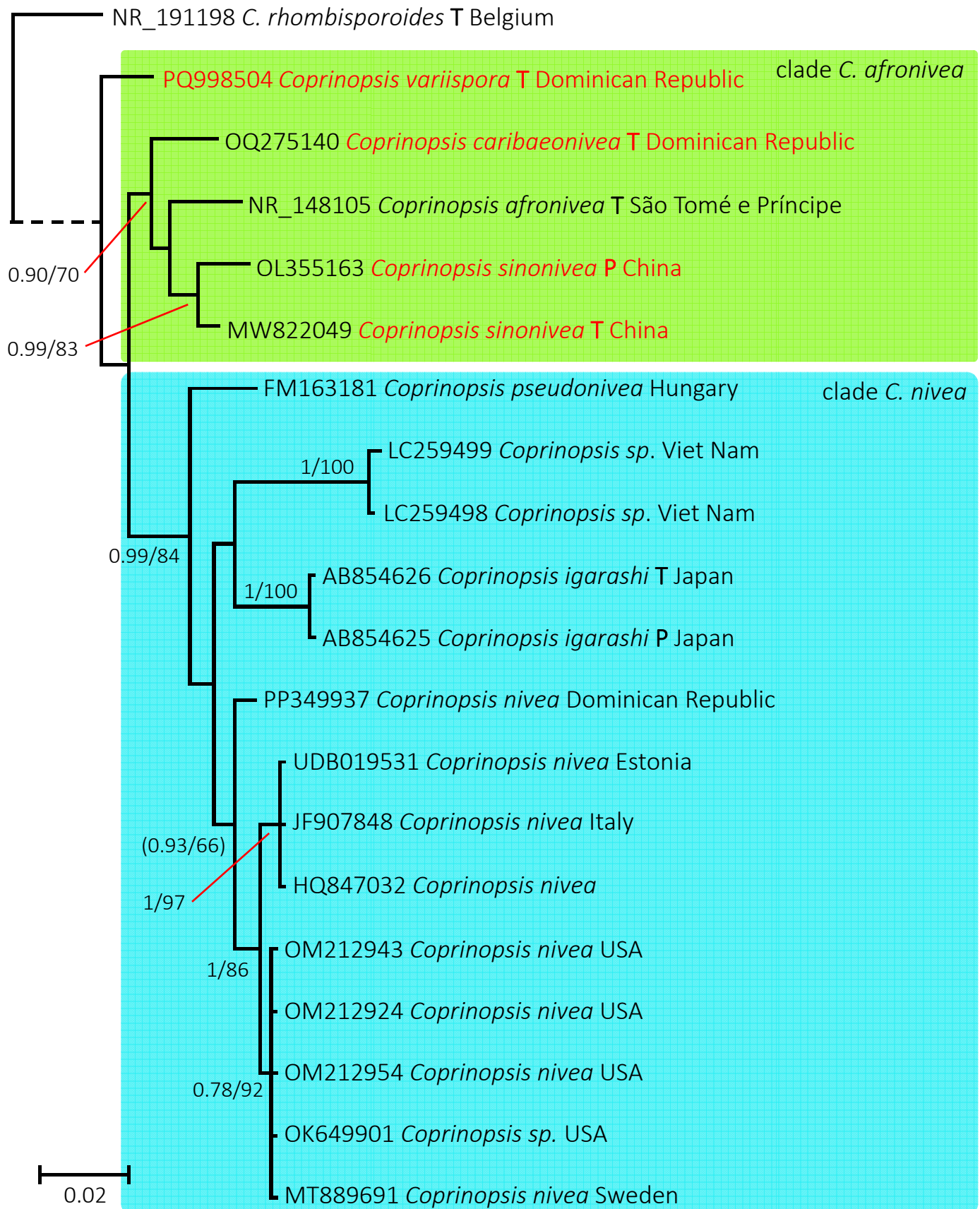


Figure 3. A 50% ITS rDNA majority rule consensus phylogram of *Coprinopsis* sections *Coprinopsis* and *Narcoticae* (with *C. nivea* from *C. sect. Niveae* as outgroup) obtained using MrBayes from 7050 sampled trees. Nodes were annotated if they were supported by ≥ 0.95 Bayesian posterior probability (left) or $\geq 70\%$ maximum likelihood bootstrap proportions (right). Nonsignificant support values are exceptionally represented inside parentheses. Sequences newly generated in this study or still unpublished are in red. The letters T and P in bold after a species name stand for Type and Paratype respectively.



Taxonomy***Coprinopsis flamboyani* Voto & Angelini sp. nov. [MycoBank 857603]**

Typus. Dominican Republic, Puerto Plata, Sosúa, Playa, gregarious and moderately caespitose on the bark of a standing dead flamboyant tree trunk (*Delonix regia*), 18 December 2023, legit C. Angelini ANGE1942 (Holotype: JBSD 130794); GenBank PQ998502 - ITS, PV101184 - tef1.

Etymology. The name refers to the tree *Delonix regia*, widely diffused and appreciated for the bright colours of its flowers in the Dominican Republic where it is popularly called flamboyant.

Description of the teleomorphic state (collection number ANGE1942) [Fig. 4-10]



Fig. 4: *Coprinopsis flamboyani* ANGE1942, Holotype - coprinoid state

Macroscopic characters

Pileus when young 10 – 22 mm high, 8 – 20 mm broad, cylindrical to sub conical, then conical to narrowly conical-campanulate, finally approx. up to 35 mm broad, through broadly conical to umbonate-applanate with margin rolled upward and deeply radially lacerate; white to whitish, discoloring beige-alutaceous and lastly taking on a marked grey-lilac necropigment. Veil of fibrillose patches divided in two layers: upper layer grey and covering all pileus in button stage, then lilaceous-brownish grey, discoloring to ochre-brown, very fugacious; lower layer white and immutable, persistent.

Lamellae free, crowded; white, then though the maturation of the spores from grey to blackish; edge white; slowly deliquescing.

Stipe 22 – 50 × 4 – 5 mm, equal or progressively tapering to 1.7 – 3 mm broad at apex, base equal, often with a volva-like line at the point of detachment of the opening pileus; whitish, covered by two-layered fibrils pigmented like the veil on the pileus; hollow.

Context very thin from margin to centre of pileus; white in the stipe, greyish at the pileus centre.



Fig. 5 (top) and 6 (bottom): *Coprinopsis flamboyani* ANGE1942, Holotype - coprinoid state



Fig. 7 (top) and 8 (bottom): *Coprinopsis flamboyani* ANGE1942, Holotype - coprinoid state

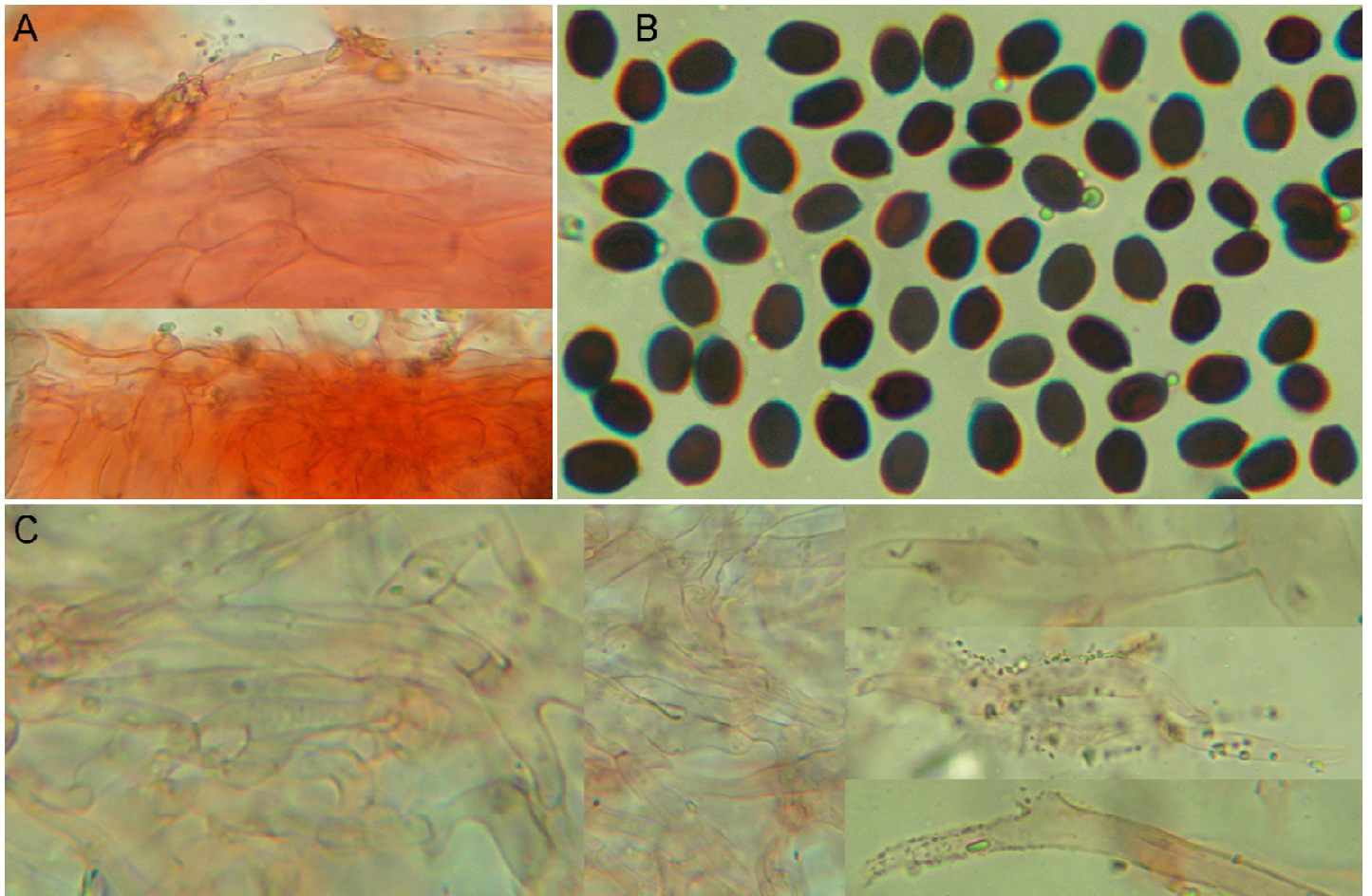


Fig. 9: *Coprinopsis flamboyani*. A) pileipellis in Congo red; B) spores in water; C) veil hyphae in Congo red

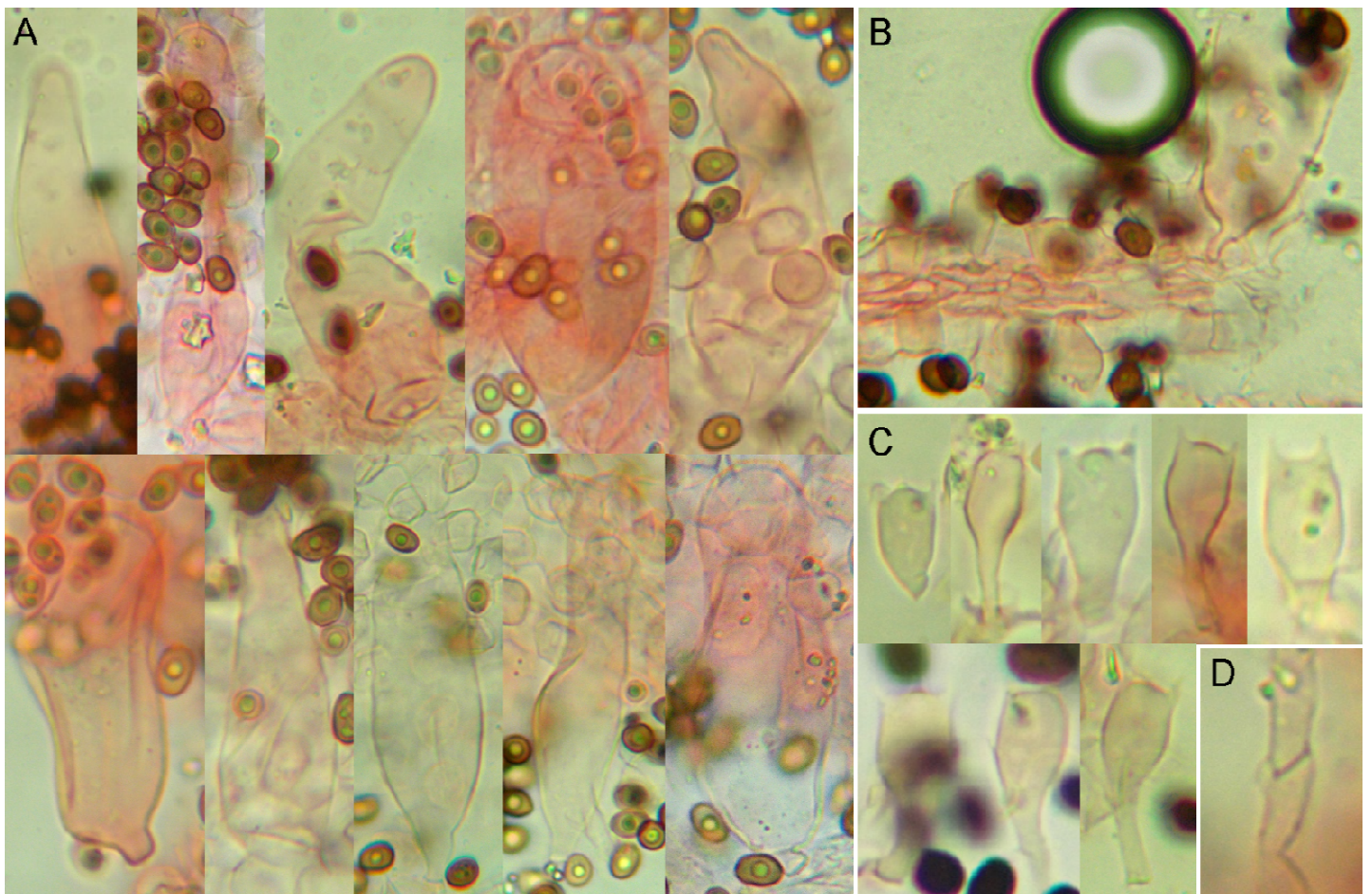


Fig. 10: *Coprinopsis flamboyani*. A) pleurocystidia; B) hymenium; C) basidia; D) a clamp. All images in Congo red

Microscopic characters

Basidiospores [33/1/1]: (5.4) 6.5 – 8.0 (9.0) × (4.2) 4.5 – 5.3 (5.8) μm , on average 7.3 × 5.0 μm , Q = (1.15) 1.30 – 1.50 (1.60), on average 1.4, smooth; in front view elliptic to narrowly/broadly oval or subglobose, sometimes slightly asymmetric, base mostly broadly rounded, apex not papillate; in side view mostly elliptic to adaxially flattened; blackish brown in water and in 5% KOH; germ pore 1.7 – 2.2 μm broad, truncate, central.

Basidia 7.5 – 30.0 × 7.5 – 8.0 (10.0) μm ; of three types: sessile to shortly clavate, narrowly clavate, cylindric to subululiform; 4-spored, surrounded by 4 – 6 hymenophysalides.

Pleurocystidia 42 – 86 × 16 – 30 μm , ellipsoid to utriform or obconical, sometimes strangled in the middle, apex obtuse to broadly rounded; smooth, thin-walled.

Cheilocystidia 40 – 55 × 21 – 30 μm , similar to the pleurocystidia.

Pileipellis a very thin cutis of filamentous hyphae; subpellis of ellipsoid to subglobose elements.

Veil lower layer composed of 3 – 12 μm broad, forked, nodulose, sometimes anastomosed, thin-walled hyphae; pigment incrustated.

Caulopellis a cutis composed of 2 – 8 μm broad hyphae with a heavy incrustated pigment.

Clamp connections commonly present.

Description of the anamorphic (rhacophylloid) state (collection ANGE1943) [Fig. 11-16]



Fig. 11: *Coprinopsis flamboyani* ANGE1943, Paratype - rhacophylloid state

Macroscopic characters

Pileus primordia ovoid to ellipsoid and completely covered by the same veil as described for the agaricoid state; then from oblong to narrowly and obtusely conic, sometimes bent toward the apex, with the margin inflexed and starting to be radially lacerate, in this phase 5 – 15 mm high and 2 – 9 mm broad; finally more opened or uplifted at margin and deeply radially lacerate like narrow tongues starting from the centre; cuticle pure violet to red-violet or more greyish, striate.



Fig. 12: *Coprinopsis flamboyani* ANGE1943, Paratype - rhacophylloid state



Fig. 13 (top) and 14 (bottom): *Coprinopsis flamboyani* ANGE1943, Paratype - rhacophylloid state



Fig. 15: *Coprinopsis flamboyani* ANGE1943, Paratype - rhacophylloid state

Fertile zone composed of gills. Gills crowded not ventricose, violet, smooth at the beginning and then cracked in several small irregular cells (referred to as ‘bulbils’ or ‘loculoments’), not deliquescing but loculoments in age disaggregating and falling apart; edge concolorous.

Stipe 4 – 23 × 0.7 – 2.3 mm, central, equal or progressively tapering toward apex, base equal to often somewhat swollen; surface white, covered with fugacious fibrils, with a mycelial matt at the base, no volva-like line noted.

Microscopic characters

Loculoments: irregularly shaped, in exsiccata avellaneous with a pinkish-lilac shade, composed of strongly packed cells (‘loculospores’). *Loculospores*: 7.0 – 12.5 (13.0) × 6.7 – 8.0 (11.0) μm, mostly irregularly polygonal. *Cystidia*: absent. *Pileipellis*, *caulopellis* and *veil*: as in the teleomorph state. Some gelification was noted in the pileal and stipital tissues. *Clamp connections*: present but rare.

Additional material examined: on the same tree trunk of the type collection and close to it, same habit, same date, legit *C. Angelini* ANGE1943 (JBSD130795), containing only anamorphic carpophores; GenBank PQ998503 - ITS. *Ibidem*, 16 December 2023, legit *C. Angelini* ANGE1900 (PADH0062320), containing both teleomorphic and anamorphic carpophores.

Notes

Coprinopsis flamboyani has forked to nodulose veil hyphae and, on that basis, belongs to *Coprinopsis* sect. *Coprinopsis*. The main diagnostic characters of *C. flamboyani* include smooth and two-dimensional spores of an average size, a two-layered veil, a volva-like zone often present on the lower portion of the stipe, and a woody habitat in the Neotropics.

Due to the presence of an anamorphic state, *C. flamboyani* reminds the only other congeneric dimorphic species so far known, *C. clastophylla*.

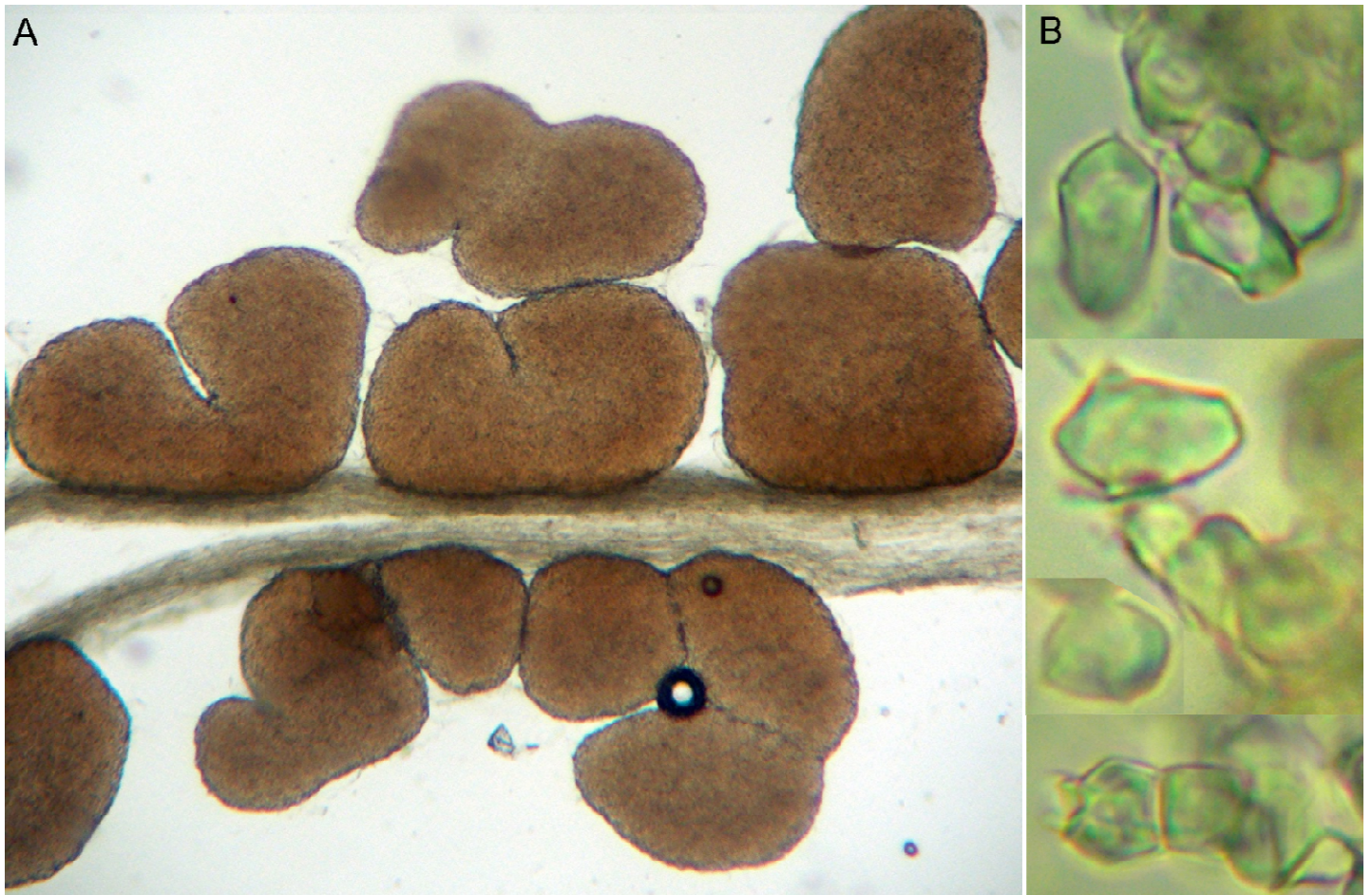


Fig. 16: *Coprinopsis flamboyani* - rhacophylloid state. A) loculoments in water; B) loculospores in water

However, *C. clastophylla* has two main problematic taxonomic issues. First, Maniotis (1964) described it as the teleomorph state of *R. lilacinus* but, actually, this author obtained its coprinoid basidiomes from a culture of a North American rhacophylloid material that he only assumed to be conspecific with the ancient, still unsequenced, original Sri Lankan anamorphic material of *R. lilacinus* (Berkeley & Broome 1871). Secondly, we have found that the ITS sequence NR_154756 (voucher CBS:473.70) obtained from the culture material of the type of *Coprinus clastophyllus* Maniotis (basionym of *C. clastophylla*) is similar to those of several vouchers identified as *C. sclerotiger* (Fig. 3) and, therefore, *C. clastophylla* must be considered conspecific with this species. However, *Coprinus clastophyllus* was described with a filamentous and forked to nodulose veil (typical of *Coprinopsis* sect. *Coprinopsis*) and smooth spores while *C. sclerotiger* belongs to *Coprinopsis* sect. *Narcoticae* (Uljé & Noordel.) D.J. Schaf. whose members are characterized by warty globose veil cells and a myxosporium coating the spores. Two of these differences may be explained taking into account that *C. sclerotiger* has a smooth, easily unperceivable myxosporium [for instance, when observed in water (Cacialli, Caroti & Doveri 1999)]; while the warty to forked veil hyphae detected by Maniotis (1964) on his material may correspond to the connecting cells of the globose veil. Conversely, the absence of reports of warty globose veil cells remains unexplained.

The two basionymic names, *Coprinus clastophyllus* and *Coprinus sclerotiger* Watling, were both combined in *Coprinopsis* by Redhead, Vilgalys, Moncalvo *et al.* (2001). Due to the aforementioned taxonomic ambiguities of *Coprinus clastophyllus*, we propose that *Coprinopsis sclerotiger* be treated as the prior name.

Our discovery of another dimorphic *Coprinopsis* species morphologically and phylogenetically different from *C. clastophylla* leads us to believe that there is a well-founded possibility that some other species have the same dimorphism and that the various reports of anamorphic collections from all over the world identified as *Rhacophyllus lilacinus* based on morphological characters alone, may represent multiple different species.

These reports of *R. lilacinus* can be divided into two groups. Those that originated from the Indian and South East Asian area have a good possibility to be conspecific with the true *R. lilacinus* which was described from Sri Lanka. Some examples of reports belonging to this group are Pegler (1986), from Sri Lanka (treating two very old

collections, the holotypical one dated 1868 and one by Petch dated 1916); Petch (1926), from Sri Lanka (as Ceylon); Vrinda, Pradeep & Varghese (2012), from India; and Patouillard (1913), from Northern Vietnam.

The second group from outside of that area contains reports from North Africa such as Patouillard (1901), Tunisia, and Malençon & Bertault (1970), Morocco (it could be useful to compare these two collections with the recently described *Coprinopsis palaciosii* A. Ruiz, G. Moreno & P. Alvarado from Spain); from the Caribbean by Patouillard (1901), Guadeloupe [in this case a dried agaricoid specimen was also observed but the author only reports his general morphological impression that it resembles '*Psathyra gyroflexa*' (this material could correspond to *C. flamboyani*)]; from East Europe by Gorovoy (1977), Ukraine (as *Zerovaemyces copriniformis* Gorovij, a genus recognized as a synonym of *Rhacophyllus* by Redhead *et al.* 2001). Since none of the aforementioned reports are described with both morphs (to allow a morphological comparison between the teleomorphic basidiomes) and as long as no phylogenetic data are available on them, it is not currently possible to evaluate which teleomorphic state they, including the original *R. lilacinus*, are associated with nor to predict how many coprinoid species may possess a dimorphic state. The scope of further investigations may need to be broadened in view of the confirmation herein of dimorphic *Coprinopsis* species representing more than one section of the genus.

***Coprinopsis caribaeonivea* Voto & Angelini sp. nov.** [MycoBank 857604] [Fig. 17-18]

Typus. Dominican Republic, Puerto Plata, Sosúa, Playa, gregarious, on a strongly rotten fallen trunk of deciduous tree in a coastal forest, 8 November 2019, *legit C. Angelini ANGE1390* (Holotype: JBSD 130971); GenBank OQ275140 - ITS.

Etymology. The name refers to the Caribbean geographic location and to the likeness with *C. nivea*.

The images and the description are taken from Angelini, Voto & Alvarado (2023)

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, Q = (1.34) 1.44 – 1.65 (1.79) × (1.50) 1.59 – 1.86 (2.03), on average 1.55 × 1.74, smooth; in front view more or less oval and angular (pentagonal, hexagonal, rarely rhomboid-mitriform and then sometimes asymmetric), sometimes oblong or elliptic, base triangular to rounded, apex not papillate; 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, subglobose (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 septa in the stipe tissue.



Fig. 17: *Coprinopsis caribaeonivea* ANGE1390, Holotype

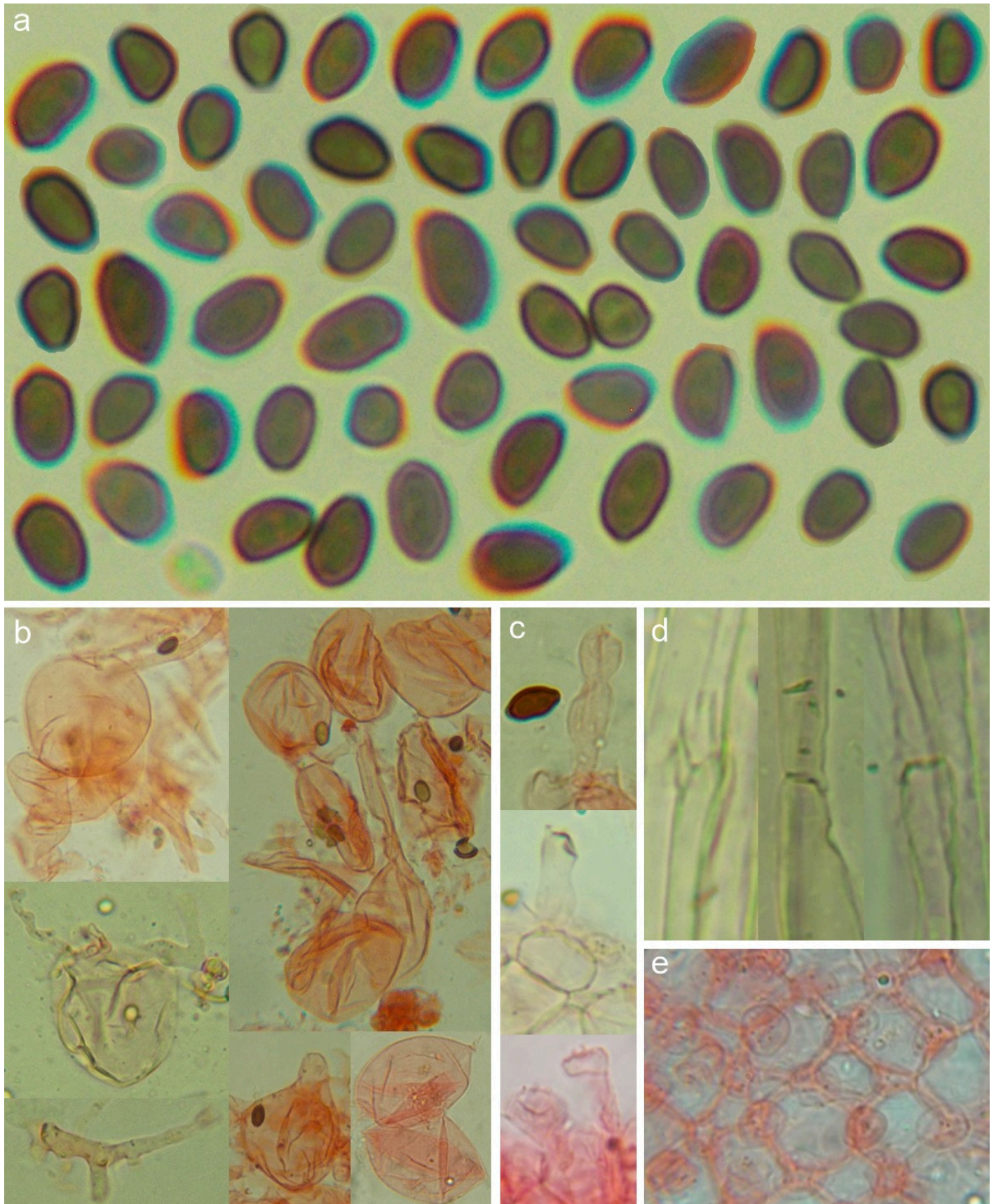


Fig. 18 *Coprinopsis caribaeonivea*: a) basidiospores, b) veil cells, c) basidia, d) clamp connections, e) hymenophysalides. Image a) in KOH, images b-e) in Congo red

Notes

The main diagnostic features of *Coprinopsis caribaeonivea* are smooth cellular veil elements; absence of pleurocystidia; clavate to ululiform basidia; very small, partly angular to irregular spores which are differently shaped in front and side views but only weakly three-dimensional; and a lignicolous habitat in the Neotropics.

Phylogenetically it belongs to a cluster of species gathered in the subclade *C. afronivea* (see Fig. 2). All the species in that clade are characterized by three-dimensional spores or, when the widths in the two views barely differ, by the distinct difference in shape which is more or less angular or mitriform in front view and simply flattened-elliptic or subphaseoliform to subamygdaliform in side view.

Notwithstanding distinctly different spores and low identity percentages compared to the closest vouchers in GenBank (all identified as *C. afronivea*, including the type), Angelini, Voto & Alvarado (2023) had preferred a cautious approach to this collection. With the new phylogenetic analysis developed in this paper it has warranted treatment as an autonomous species. More detailed observations can be found below, in the notes to *C. variispora* *sp. nov.*

***Coprinopsis variispora* Voto & Angelini *sp. nov.* [MycoBank 857605] [Fig. 19-21]**

Typus. Dominican Republic, Puerto Plata, Sosúa, Puerto Chiquito, gregarious on a very rotten fallen trunk of a deciduous tree, 5 February 2022, *legit C. Angelini ANGE1712* (Holotype: JBSD 13798); GenBank PQ998504 - ITS.

Etymology. The name refers to the characteristic of the spores of being variously shaped in front view.

Macroscopic characters

Pileus 14 – 15 mm broad, paraboloid then conical; scarcely striate; 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.

Lamellae subfree to adnexed, moderately close, with lamellulae; grey then blackish; deliquescing.

Stipe 38.0 – 65.0 × 1.5 – 1.7 mm in the median part, tapering to 1.2 mm at apex and to 1.3 – 1.4 mm at base; light grey; covered with abundant white flocci of veil more coarse from the median part downwards where, coupled with the grossly flocci appendiculate from the pileus margin, they give the impression of a fragmented diffuse annular zone.

Context almost inexistent in the pileus, with the gills almost directly attached below the pileipellis and the hymenial mat between gills thinly separated from the pileipellis.



Fig. 19: *Coprinopsis variispora* ANGE1712, Holotype

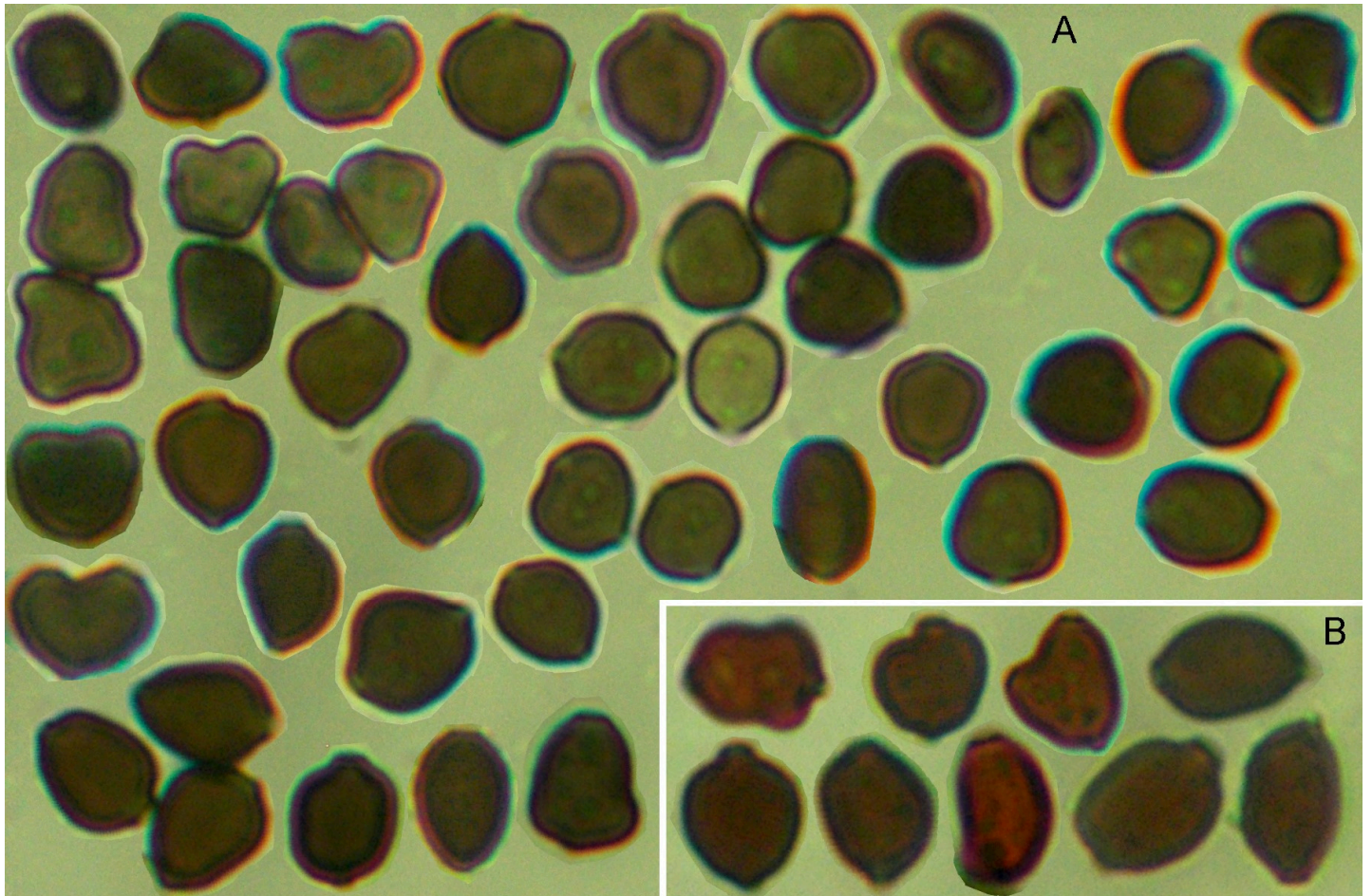


Fig. 20: *Coprinopsis variispora*. Basidiospores. A) in 5% KOH; B) in Congo red

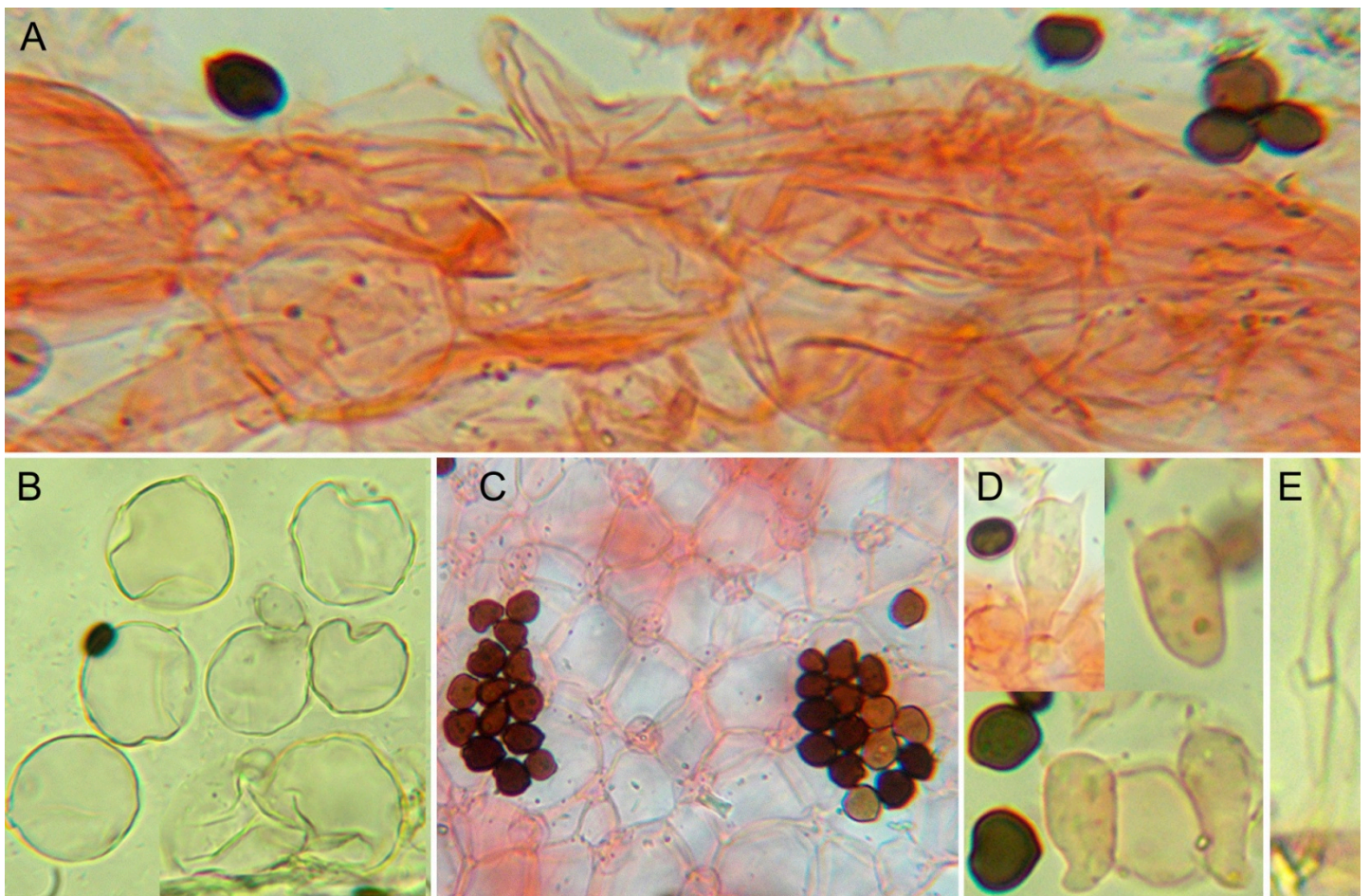


Fig. 21: *Coprinopsis variispora*. A) pileipellis; B) Veil cells; C) hymenophysalides; D) basidia; E) clamp. In Congo red

Microscopic characters

Basidiospores [70/2/2] (7.5) 8.0 – 9.0 (9.6) × (5.5) 6.5 – 8.0 (9.0) × 5.0 – 5.5 μm, Q = (0.83) 1.04 – 1.25 (1.36) × 1.45 – 1.73, in front view hexagonal, oval-hexagonal, oval-pentagonal, oval- subtriangular, mitriform, often asymmetric or deformed, occasionally with median constriction, base broadly rounded to broadly triangular or sometimes (sub) truncate, in side view oblong to elliptic, not or rarely angular, apex not or only slightly protruding; in water dark brown with a more or less appreciable reddish tint, in 5% KOH dark grey-brown; germ pore 1.0 – 1.5 μm broad.

Basidia 14.5 – 22.0 × 8.0 – 10.5 μm, short to long clavate, 4-spored, peduncle absent to slenderly elongate or stocky; surrounded by 3 – 5 hymenophysalides.

Pleurocystidia not found.

Cheilocystidia not observable because of the deliquesced gill edge.

Pileipellis made of a thin layer of about a couple of hyphae 2.5 – 5.0 μm broad; subpellis of swollen repent cells.

Veil (examined on pileus) of smooth, hyaline to slightly pigmented, thin- to slightly thick-walled, globose to subglobose cells (12) 15 – 30 × (9) 14 – 28 μm.

Clamp connections present.

Notes

Coprinopsis variispora shares similar morphological characteristics to those of *C. afronivea* and *C. caribaeonivea* as well as two Chinese vouchers, HMJAU46372 and HMJAU46459 (in GenBank as *C. afronivea*), described in Zhu, Huang & Bau (2022) and nested beside *C. afronivea* in the phylogram (Fig. 2). These Chinese collections are recognized here as *Coprinopsis sinonivea* sp. nov. All BLAST cross-comparisons with each other of these four taxa show low, 95.66% to 97.14%, pairwise similarities.

Morphologically, these four species are characterized by a veil of globose cells smooth or with encrustations easily dissolving in hydrochloric acid (HCl) and by spores without a myxosporium (the combination of these two characters are univocally typical of *Coprinopsis* sect. *Niveae*). Moreover, these species share lentiform (or differently shaped in front and side views if weakly lentiform) spores 5 – 9 μm long, 4-spored basidia, absence of pleurocystidia, and presence of clamp connections. A fifth species, *Coprinopsis iocularis* (Uljé) La Chiusa & Boffelli, known from Europe, shares all the same morphological parameters but, since there is no sequence of it in the genetic databases yet, its relation with the aforementioned non-European species is unknown.

The following key extracted from Voto (2024) best highlights the main reciprocal morphological differences among them.

1) Spores hexagonal and often constricted in the middle, apex papillate, 5.9 – 9.0 × 4.8 – 6.0 × 4.0 – 4.5 μm, Q in front view 1.05-1.5; cheilocystidia utriform to clavate; habitat on lawn. Distribution: Europe

C. iocularis

1) Spores not or rarely constricted in the middle; habitat on wood or litter. Distribution: not in Europe ... **2**

2) Spores on average smaller than 8.0 × 6.5 μm, not papillate; basidia clavate to (utriform-) ululiform ... **3**

2) Spores on average larger than 8.0 × 6.5 μm, at least in part papillate; basidia only clavate ... **4**

3) Spores 6.1 – 7.8 long, up to 6.6 μm broad and suboval (-triangular) in front view, subamygdaliform to subelliptic in side view; cheilocystidia rare, subglobose to broadly clavate. Distribution: east China

C. sinonivea

3) Spores (4.5) 5.1 – 6.7 (7.7) × (3.0) 3.3 – 4.3 (5.0) × 3.0 – 3.8 μm, oval, pentagonal, hexagonal, some rhomboid - mitriform or asymmetric; cheilocystidia not described. Distribution: Central America (Caribbean)

C. caribaeonivea

4) Spores (7.5) 8.0 – 9.0 (9.6) × (5.5) 6.5 – 8.0 (9.0) × 5.0-5.5 μm, Q in front view (0.83) 1.04 – 1.25 (1.36), hexagonal to oval-hexagonal/-pentagonal/-subtriangular or mitriform, often asymmetric to strongly deformed; cheilocystidia not described. Distribution: Central America (Caribbean)

C. variispora

4) Spores 8.5 – 9.6 × 6.4 – 7.0 × 5.5 – 6.2 μm, Q in front view presumably higher than 1.2, subhexagonal to mitriform, not or rarely deformed; cheilocystidia globose to broadly clavate. Distribution: Central Africa

C. afronivea

***Coprinopsis sinonivea* Voto sp. nov.** [MycoBank 857606]

Typus. China, Jilin, Jilin Agricultural University, scattered on litter, 22 July 2017, *legit* M. Huang, Holotype: HMJAU 46372; GenBank: MW822049 - ITS, OL376316 LSU.

Paratype. China, Liaoning, Benxi City, Wunu Mountain, 1 September 2018, *legit* M. Huang, HMJAU46459, GenBank: OL355163 - ITS, OL376336 LSU.

Etymology. The name refers to the Chinese geographic location and to the likeness with *C. nivea*.

Macroscopic characters

Basidiomes small to very small.

Pileus subcampanulate to subconical when young, hemisphaerical when mature, not striate, pale grey; veil of dense pale grey to brownish grey squamules on the pileus and fringed curtained remains at the margin.

Lamellae crowded, with lamellulae; greyish white then dark grey.

Stipe grey to brown-grey; covered with powdery to flocculose scales of veil.

Context white, extremely thin.

Microscopic characters

Basidiospores 6.1 – 7.8 µm long, sub lenticular, up to 6.6 µm broad in front view; in front view suboval to oval-triangular, in side view subamygdaliform; reddish brown to dark brown; germ pore central.

Basidia dimorphic, clavate to ululiform, 4-spored; surrounded by 3-5 hymenophysalides.

Pleurocystidia not found.

Cheilocystidia subglobose to broadly clavate; rare.

Pileipellis a cutis.

Veil composed of smooth globose cells and hyphal elements in the marginal fringes; pigment pale yellowish brown to sub hyaline.

Notes

The above description was extracted and translated from Chinese from Zhu, Huang & Bau (2022) which also contains a figure (no. 2, F to H) showing basidiomes, and a figure (no. 7) of the main microscopic characters. These authors report two sequenced vouchers, HMJAU46372 and HMJAU46459, and three more unsequenced collections (HMJAU59030, HMJAU59031, HMJAU59032); although noticing an evident difference in the spore size, they identify these collections as *C. afronivea*. *Coprinopsis sinonivea* is well characterized by its main characters which distinguish it from the sister taxa of the *C. afronivea* complex. However, a more detailed description is required to fully characterise this species.

***Coprinopsis calospora* (Bas & Uljé) Redhead, Vilgalys & Moncalvo (Fig. 22-25)**

Taxon 50(1): 226 (2001)

Microscopic characters

Pileus when still closed up to 1.8 mm high and 0.8 – 1.8 mm broad, ellipsoid, when mature 35 – 45 mm broad, convex with revolute margin; grey; wholly covered with abundant, white, elongate-triangular squamules of veil with more or less upturned tips persisting in mature specimens.

Lamellae free, close, narrow; pale grey before blackening; deliquescent; some lamellulae present.

Stipe 57.5 – 60.0 × 3.1 – 3.3 mm broad towards base, tapering to 2.25 – 2.50 mm at apex; white; covered with abundant white flocci of veil which are more conspicuous in the lower half.

Microscopic characters

Basidiospores [30/1/1] 7.6 – 10.0 (12.7) × 6.0 – 7.2 (9.3) µm with ornamentation, Q (1.21) 1.37 – 1.51 (1.55), in front view elliptic to sometimes oval, in side view amygdaliform and sometimes with a smooth trait above the apiculus, base more or less conical in both views, apex protruding and terminating in an up to 2.3 µm broad truncate germ pore; surface ornamented with coarse obtusely conical warts; blackish in water.

Basidia 14.0 – 22.0 × 7.5 – 9.5 µm, clavate to short clavate, and utriform to sub ululiform, 4-spored, surrounded by (3) 4 – 5 (6) hymenophysalides.



Fig. 22: *Coprinopsis calospora* ANGE1704

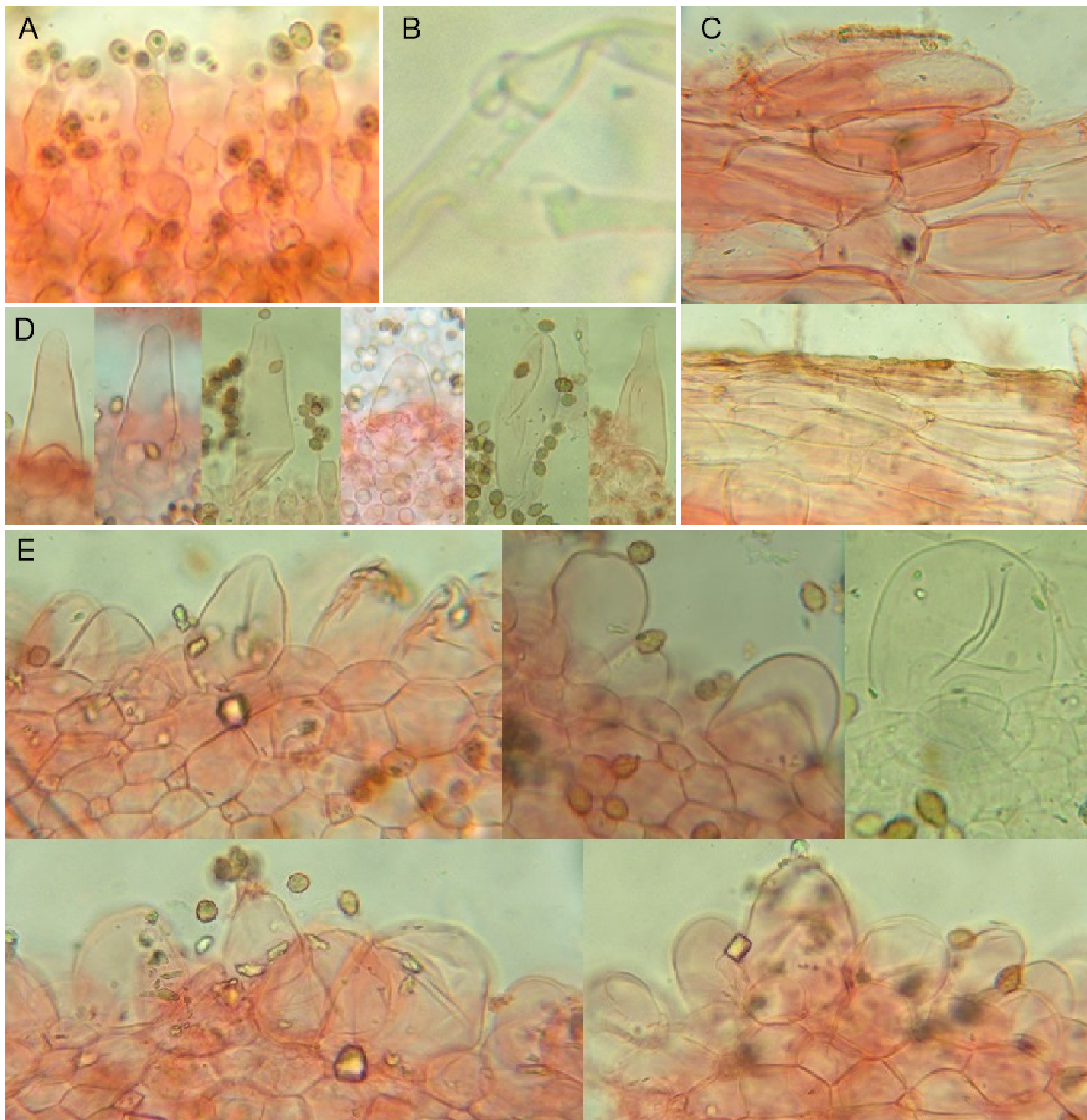


Fig. 23: *Coprinopsis calospora*. A) basidia; B) clamp connections; C) pileipellis; D) pleurocystidia ; E) cheilocystidia. All images in Congo red

Pleurocystidia 50 – 95 × 22 – 33 μm, obconical to lageniform or ovoid, scattered.

Cheilocystidia 14 – 52 × 14 – 39 μm, ellipsoid to subglobose or pruniform; sometimes incrustated at apex, numerous.

Pileipellis a cutis externally composed of 4 – 8 μm broad hyphae and with a conspicuous parietal incrusting pigment.

Veil composed of septate, elongate, 5 – 15 μm broad hyphae with last element tapering; septa not or scarcely tapering.

Caulopellis (immature specimen examined) an approx. 50 μm broad outer layer composed of aeriferous hyphae 3 – 15 μm broad, forked to diverticulate or nodulose, septate, smooth, hyaline (remembering the veil cells of species in *Coprinopsis* sect. *Coprinopsis*), remains of these hyphae also found on the gill edge.

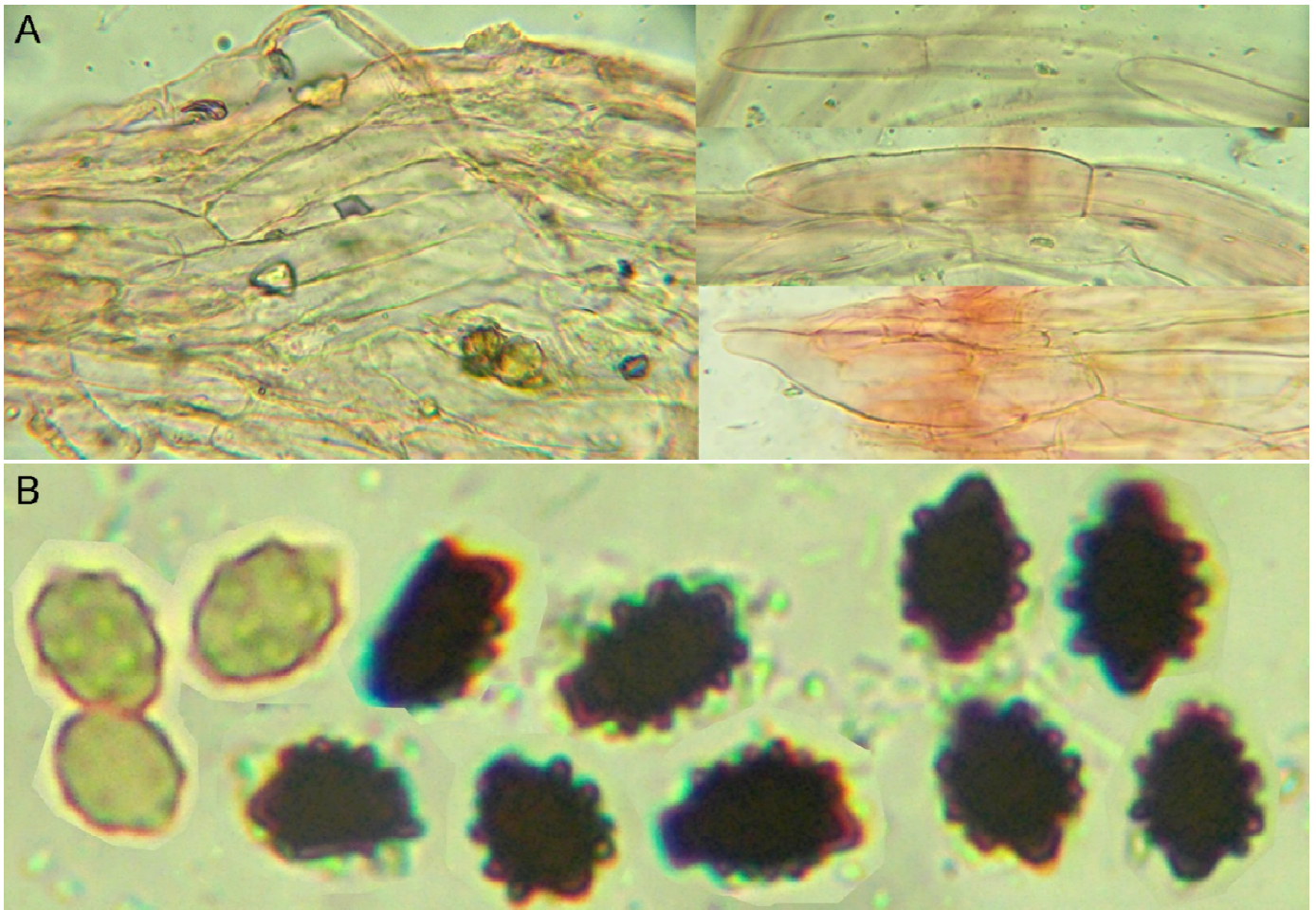


Fig. 24: *Coprinopsis calospora*. A) veil hyphae in Congo red; B) spores in water

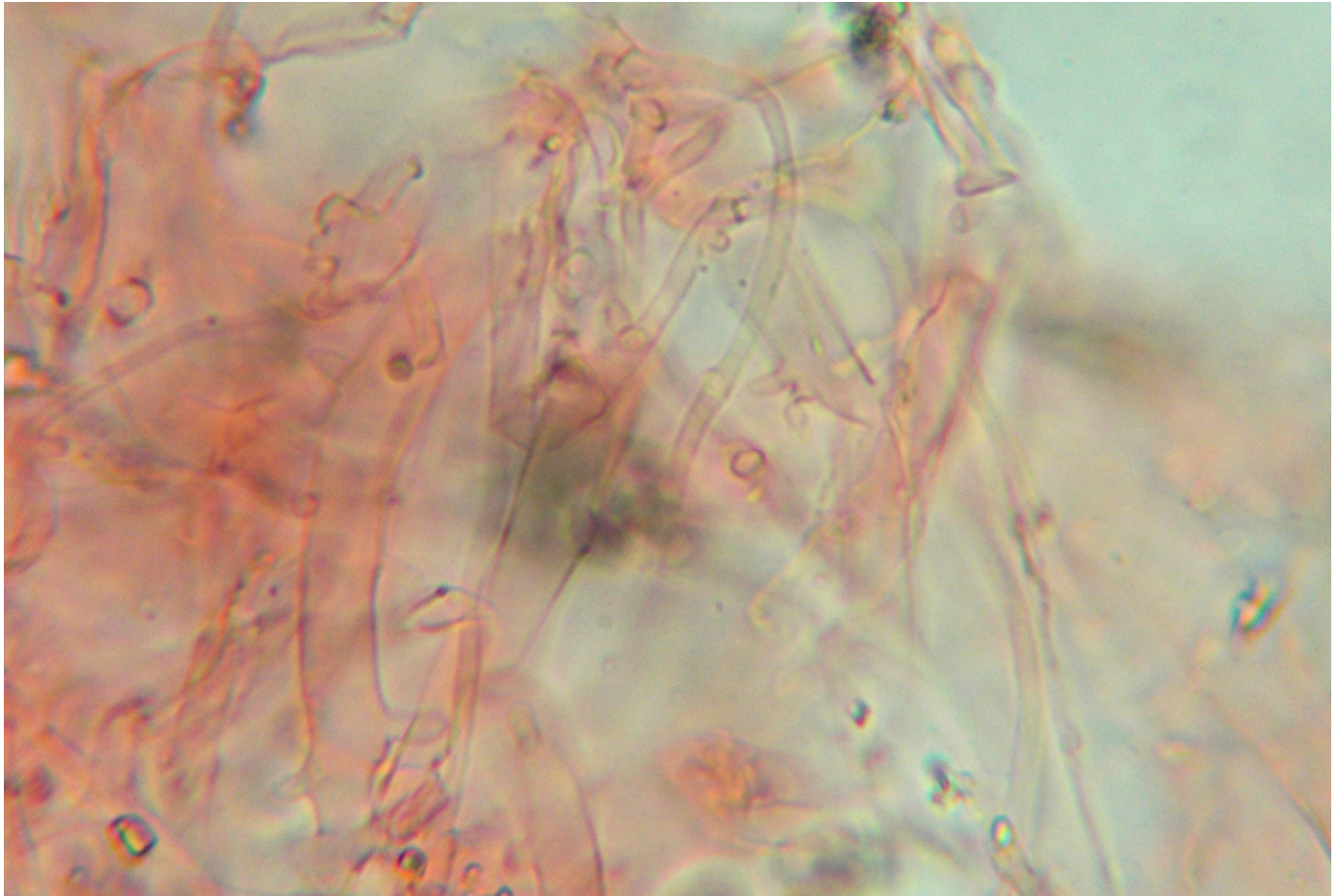


Fig. 25: *Coprinopsis calospora*. Hyphae of the stipe surface in Congo red

Stipe context composed of thick-walled hyphae; pigment strongly intraparietal and epiparietal (hyphae almost appearing minutely warty).

Clamp connections present everywhere.

Habitat and collection examined: gregarious and caespitose on a rotting wood building plank, Dominican Republic, Puerto Plata, Sosúa, Puerto Chiquito, 11 January 2022, *legit C. Angelini ANGE1704* (JBSD130796); GenBank PQ998501 - ITS.

Notes

The morphology of the Dominican collection conforms well to the original diagnosis of *Coprinopsis calospora*. The spore measurements reported in the protologue for *C. calospora* (Uljé & Bas (1993) did not take into account the considerable size of the warts. Consequently, the spore breadth reported (4.6 – 5.8 µm, on average 5.0 – 5.4 µm, Q = 1.35 – 1.75, on average 1.60) is narrower than for the Dominican collection.

Currently, there are only two other known species of *Coprinopsis* worldwide characterized by a filamentous veil of smooth hyphae and by ornamented spores (*Coprinopsis* sect. *Narcoticae*). *Coprinopsis insignis* (Peck) Redhead, Vilgalys & Moncalvo, from temperate areas of North America, Asia and Europe, and *Coprinopsis karwinicola* (Grgur.) J.A. Simpson & Grgur. from South Australia. Those species differ from *C. calospora* phylogenetically, and by having spores longer than 10 µm.

Since its first description from the Netherlands at the base of a *Yucca* plant growing in an indoor flowerpot (Uljé & Bas 1993), the natural geographical and climatic distribution of *C. calospora* has remained dubious. Uljé & Noordeloos (1999) suspected that the *locus typicus* was adventitious and that the species belonged to warmer regions than the Netherlands.

To date, we are unaware of any other described and verified collection of this species, apart from an ITS-sequenced collection on the iNaturalist website (see ref.), voucher 129888756. This voucher lacks morphological data, except for photos of the basidiomes in a natural woody habitat with leaves and needles from a temperate region of North America (Indiana, USA). This record may imply spontaneous diffusion in boreal temperate areas. The ITS sequence of this voucher, OP470607, is 99.85% identical to the type sequences generated by Nagy *et al.* (2013).

Our Dominican collection grew on rotten wooden construction planks probably imported from USA. Therefore, our collection cannot definitively support the presence of *C. calospora* in tropical areas. In fact, at the current state of knowledge, only its diffusion in temperate areas is documented with certainty and a possible connection with warm climates or wet habitats, unless adventitious, remains unconfirmed.

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