



***Fayodia gallaecicoloniana* sp. nov. (Agaricales, Basidiomycota), from Galicia, Spain**

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Abstract

Fayodia gallaecicoloniana, collected under *Pinus patula*, is illustrated and described as a new species from Galicia (Spain) based on morphological data. A comparison with its morphologically closely related taxa is also given.

Key words – Basidiomycota – Biodiversity – Europe – Taxonomy – *Tricholomataceae*

Introduction

Fayodia Kühner is a small genus in the phylogenetically defined family *Tricholomataceae* (Agaricales) with a world-wide distribution but all the taxa are described from temperate regions. According to Index Fungorum (2020), 12 taxa have been reported up to date (10 species and 2 variety). The genus *Fayodia* is characterized by omphalinoid, mycenoid or collybioid habit, pileus brown, dark greyish brown to white, glabrous, lamellae adnate to decurrent, whitish to greyish, stipe central, flexuous, context inamyloid, with or without clamps, basidiospores globose, subglobose, ellipsoid, oblong to cylindrical, hyaline, with a complex wall structure composed of an inner, amyloid or pseudoamyloid, ornamented (echinulate-verruculose) layer overlain by a smooth, perispore layer, basidia 2-spored or 4-spored, lamella-edge fertile, cheilocystidia and pleurocystidia absent or present, hymenophoral trama regular, pileipellis an epicutis or ixocutis of repent or semierect hyphae and lignicolous or terrestrial habitat (Pegler 1983, Bon 1997).

During the study of the mycota of the Pontevedra municipality, an unidentified species of *Fayodia* was collected growing under a *Pinus patula* Schiede ex Schltdl. et Cham. plantation. An extensively reviewing of the European and extra-European species of this genus (Favre 1948, Horak 1962, Stevenson 1964, Singer 1965, 1969, Singer & Clemençon 1971, Bigelow 1979, Pegler 1983, Raithelhuber 1983, 1987, 2004, Bon 1997, Antonín 2004, Antonín & Nooordeloos 2004) confirmed that no other published species matched the particular combination of macroscopic and microscopic characteristics. Therefore, a new species for science is proposed in this contribution: *Fayodia gallaecicoloniana*.

Materials & methods

Morphological analysis

The specimens were collected, documented and preserved using standard protocols. Morphological descriptions are based on the study of the fresh material. Microscopic observations

were recorded on fresh and/or dried material with standard methods (Noordeloos 1992, 2004), using sections mounted in water or in a solution of 1% Congo Red in water after a short pre-treatment in a 5% potassium hydroxide solution, in Melzer's reagent or in 10 % NH₄OH. Basidiospores measurements (length, width, Q (quotient length/width), Q_m = average quotient, excluding ornamentation) were taken for 30 basidiospores on spore-print. Extreme values have been noted between brackets when they represented no more than 10 % of the measurements. Microscopic structures were drawn with help of a drawing tube. Author citations follow the IPNI Authors Website (<http://www.ipni.org/ipni/authorsearchpage.do>) and the Index Fungorum Authors of Fungal Names Website (<http://www.indexfungorum.org/authorsoffungalnames.htm>). The new species name was deposited in MycoBank (<http://www.mycobank.org/DefaultPage.aspx>) while faces of fungi number was registered as described in Jayasiri et al. (2015). The collected and studied material has been deposited in the mycological herbarium LOU-Fungi (Centro de Investigación Forestal de Lourizán, Consellería de Medio Rural, Pontevedra, Spain).

Results

Taxonomy

Fayodia gallaecicoloniana Blanco-Dios, sp. nov.

Figs 1–3

MycoBank number: MB 815581; Facesoffungi number: FoF 09621

Etymology – *gallaecicoloniana*, dedicated to the Galician sailor Cristóbal Colón, discoverer of America.

Habitus collybioideus. Pileus 9.5–15 mm latus, ab hemisphaericus ad convexus, truncatus, umbilicatus, ochraceus, fibrillosus. Lamellae latae, emarginatae, ab albidae ad cremeae. Lamellulae praesentes. Stipes 17.5–24 mm longus, 1–4 mm latus, subcylindraceus, ab albidus-cremeus ab ochraceus-brunneus. Caro tenuis, ab albida ad brunneo-grisea, inmutabile exposita. Odor initio cucumis et cumarinus, denique farinosus et anisatus. Sapor amarus et, ad finem, farinaceus. Sporae 7.5–10.5 (12) × (4.5) 5.5–6.5 (7.5) μm, Q = 1.3-1.6 (1.8), Q_m= 1.51, ellipsoidae, raras oblongae, hyalinae, amyloidae, spinulae acutae parce obvis exornatae. Basidia 22–45 × 8.5–12 μm, tetrasporigera, clavata vel subfusiformia, fibulata. Acies lamellarum heterogenea. Queilocystidia 12.5–36.5 × 3–11.5 μm, flexuosa, subflexuosa ramosa, subclaviformia, subcylindracea, subfusiformia, subsphaeropedunculata vel utriformia. Pleurocystidia 19–37 × 3.5–15 μm, claviformia, lata claviformia, cylindracea, irregulariter cylindracea, rostrata, sphaeropedunculata, irregulariter utriform vel utriform. Pileipellis ex hyphis cylindraceis cutem formantibus 2–16 μm latis, pigmentum minute incrustans et/vel intracellularis. Caulocystidia 12–37 × 4.5–12 μm, claviformia, irregulariter fusiformia vel subcylindracea ramosa. Fibulae praesentes. In *Pinus patula* nemoris crescens.

Holotype – Spain, Pontevedra, Pontevedra, Lourizán, on *Pinus patula* needle litter, on granitic soil, 27 December 2015, J.B. Blanco-Dios (LOU-Fungi 21051).

Basidiomata collybioid. Pileus 9.5–15 mm broad, hemispherical to convex, truncate, umbilicate, hygrophanous, dull, ochre, dark ochre or brown pale at center, translucently striate almost to the middle, then pale ochre and not striate when dry, silky aspect, covered with fine fibrils, denser in the center. Lamellae broad, emarginate, subdistant, slightly intervenose, whitish to cream, edge concolourous and undulate; lamellulae present. Stipe 17.5–24 × 1-4 mm, slender, long, flexuous, slightly fistulose, fragile, glabrous, whitish to cream in the upper (finely whitish furfuraceous closest to the pileus), ochre to pale brown on the bottom. Context very thin, 0.5–1 mm thick at the pileus, whitish on the pileus and upper half of the stipe, brownish-gray on the rest, inmutable when exposed. Smell first of cucumber and coumarin, then fresh flour and aniseed. Bitter and lingering taste and strong farinaceous aftertaste. Basidiospore print whitish.

Basidiospores 7.5–10.5 (12) × (4.5) 5.5–6.5 (7.5) μm, Q = 1.3-1.6 (1.8), Q_m = 1.51 (n=30), ellipsoid, rarely oblong, with an obtuse apiculus, distinctly of two layers: echinulate-verruculose epispore and smooth perispore; verruculae 0.4–0.8 μm high, hyaline in KOH. Basidia 22–45 × 8.5–

12 µm, 4-spored, clavate or subfusoid, clamped, sterigmata up to 8 µm long. Cheilocystidia scattered, 12.5–36.5 × 3–11.5 µm, flexuous, subflexuous branched, subclavate, subcylindrical, subfusiform, subsphaeropedunculate or utriform, thin-walled, hyaline. Pleurocystidia sparse, 19–37 × 3.5–15 µm, clavate, broadly clavate, cylindrical, irregular cylindrical, rostrate, sphaeropedunculate, irregular utriform or utriform, thin-walled, hyaline. Hymenophoral trama regular, composed of cylindrical or subcylindrical, thin-walled, smooth or incrustated hyphae, 2–17 µm wide. Pileipellis a cutis made up of cylindrical, subcylindrical to slightly fusoid, thin-walled hyphae, 2–16 µm wide, smooth, minutely incrustated and/or intracellular pigment, greyish, ochre-brown, ochre-greyish, pale ochre, ochre greenish in NH₄OH, pale yellowish-brownish in KOH; with adpressed to suberect clavate, broadly clavate, ovoid, sphaeropedunculate, globose or subglobose terminal cells, 13–32 × 9–17 µm wide. Hyphae of subpileipellis composed of clavate, cylindrical, ellipsoid, fusoid or subglobose, minutely incrustated, thin-walled to thick-walled, 1–21 µm wide cells. Stipitipellis a cutis of parallel or subparallel, cylindrical, subcylindrical to slightly fusoid, thin- to thick-walled, smooth to minutely incrustated, 1.5–15 µm wide hyphae, pale yellowish in KOH. Caulocystidia scattered, 12–37 × 4.5–12 µm, adpressed to erect, clavate, irregular fusiform or subcylindrical branched. Clamp-connections present in all tissues. Chemical reactions: no part of tissue dextrinoid or amyloid. Basidiospores with amyloid epispore and pseudoamyloid perispore.

Known distribution – So far only known from the type locality in Pontevedra (Spain).

Material examined – Spain, Pontevedra: Pontevedra, Lourizán, 29TNG2795, 50 m, on *Pinus patula* needle litter, on granitic soil, 27 December 2015, J.B. Blanco-Dios (LOU-Fungi 21051, holotype).



Fig. 1 – Basidiomata of *Fayodia gallaecicoloniana* in the field (LOU-Fungi 21051, holotype).



Fig. 2 – Longitudinal basidiomata sections of *Fayodia gallaecicoloniana* (LOU-Fungi 21051, holotype).

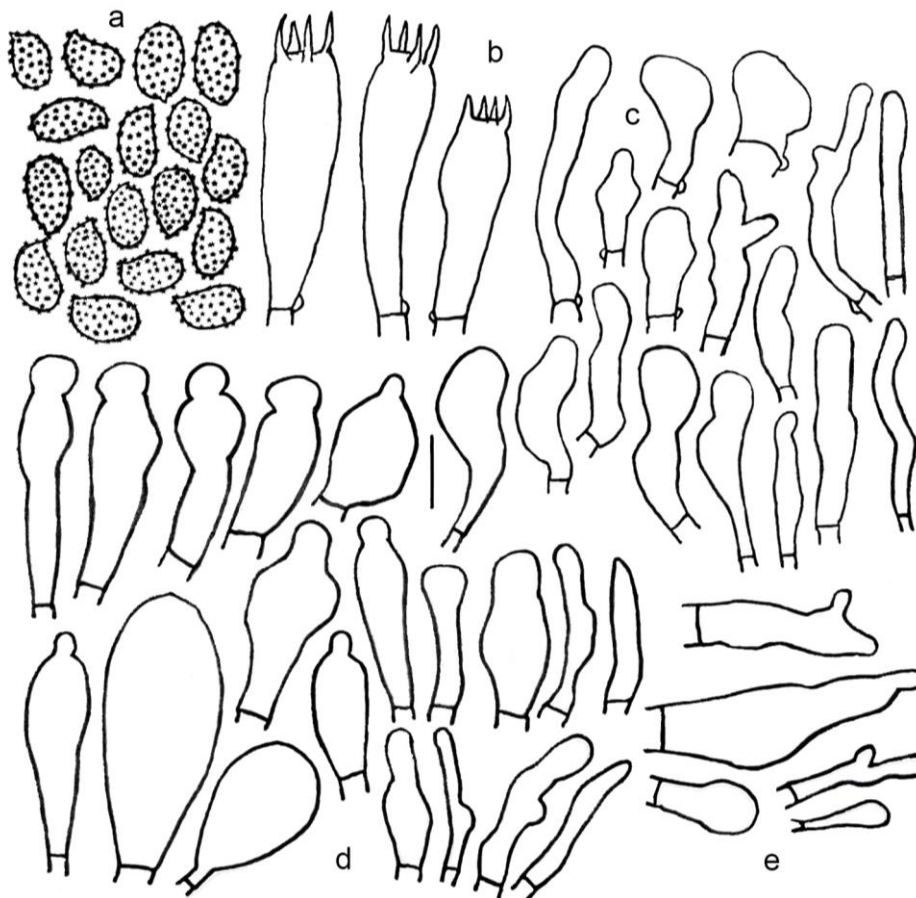


Fig. 3 – *Fayodia gallaecicoloniana* (LOU-Fungi 21051, holotype). a Basidiospores. b Basidia. c Cheilocystidia. d Pleurocystidia. e Caulocystidia. Scale bar = 10 μ m.

Notes – This new species is unique with respect to the other known *Fayodia* species and can be distinguished from other taxa with 4-spored basidia and not globose and/or subglobose basidiospores by the following combination of features: (i) smell first of cucumber and coumarin, then fresh flour and aniseed, (ii) bitter and lingering taste and strong farinaceous aftertaste, (iii) basidiospores size (7.5–10.5 × 5.5–6.5 µm, Q = 1.3-1.6), ellipsoid, rarely oblong, (iv) versiform cheilocystidia and pleurocystidia (v) caulocystidia clavate, irregular fusiform or subcylindrical branched and (vi) specific substrata (*Pinus patula* needle litter).

All the European taxa known so far (*Fayodia anthracobia* (J. Favre) Knudsen (included var. *bisphaerigerella* (M. Lange) Antonín & Noordel.), *F. bisphaerigera* (J.E.Lange) Singer (included var. *longicystis* J. Favre) and *F. campanella* E. Horak) present globose or subglobose basidiospores and bisporic basidia, while the extra-European species (except *F. alutacea* H.E. Bigelow and *F. fallax* Raithelh.) show basidiospores with another shape and tetrasporic basidia. For this reason, we believe that it is possible that *Fayodia gallaecicoloniana* was introduced in Spain with the plantation of *Pinus patula*, an american pine (native to Mexico), cultivated in Europe and in other parts of the world for the forest and ornamental interest.

Therefore, the closest taxa to *F. gallaecicoloniana* are five extra-European species with tetrasporic basidia: *Fayodia albidula* (Pat.) Pegler, *F. deusta* Singer & Cléménçon, *F. tenuisperma* Singer and *F. tetrasphaerigera* Singer, described from America, and *F. granulospora* G. Stev., described from New Zealand. *F. albidula* differs particularly from *F. gallaecicoloniana* by having white most of the pileus, stipe white, smell and taste none and larger basidiospores (10–12.5 × 6.5–8.5 µm), obovoid to broadly ellipsoid, inamyloid, cheilocystidia subcylindric to slightly clavate, with an obtusely rounded apex and habitat on rotting *Sloanea* branches (Pegler 1983); *F. deusta* is characterized by lamellae gray, stipe dark-brown, taste smooth, narrower basidiospores (7–10.3 × 3–4.7 µm), cylindrical to amygdaliform, cheilocystidia subcylindrical, hyphae clampless and habitat on burnt trunk (Singer & Cléménçon 1971); *F. tenuisperma* is different by having a pileus and stipe dark gray, lamellae grayish, odor and taste non distinctive, smaller basidiospores (6.7–8 × 3–3.5 µm), oblong, smaller basidia (15–19 × 4–5 µm), cheilocystidia and caulocystidia subulato-subampullaceous and habitat on wood, caespitosus (Singer 1969); *F. tetrasphaerigera* is distinguished by pileus and lamellae gray, stipe grayish, smell and taste none, globose or slightly ellipsoid basidiospores (6.8–9 × 6.8–7.3 µm) and cheilo- and pleurocystidia clavate or clavate-ventricosus and mucronatus (Singer 1965) and, finally, *F. granulospora* differs especially by having a pileus campanulate, lamellae pale gray with waxy white coating, smell unpleasant, taste non distinctive, much larger basidiospores (11–15 × 7–8 µm), ellipsoid to oblong, non-amyloid or very weakly amyloid and habitat in newly-made lawn (Stevenson 1964).

Key to the world-wide species of *Fayodia*

1. Basidia 2-spored and basidiospores globose and/or subglobose 2
- 1°. Basidia 4-spored 6
2. Clamps absent (includes var. *bisphaerigerella* (M. Lange) Antonín & Noordel.)
..... *F. anthracobia* (J. Favre) Knudsen
- 2°. Clamps present 3
3. Basidiospores up to 7.5 µm long *F. fallax* Raithelh.
- 3°. Basidiospores > 7.5 µm long 4
4. Basidiospores with wall three layered, in mixed woods *F. alutacea* H.E. Bigelow
- 4°. Basidiospores with wall two layered 5
5. Omphalinoid or infundibuliform carpophores, in hardwood forests or peatbog (includes var. *longicystis* J. Favre) *F. bisphaerigera* (J.E. Lange) Singer
- 5°. Mycenoid more or less campanulate carpophores, in coniferous forests .. *F. campanella* E. Horak
6. Basidiospores 6.8–9 × 6.8–7.3 µm, most globose *F. tetrasphaerigera* Singer
- 6°. Basidiospores with another shape 7
7. Basidiospores up to 10.5 µm long and 6.5 µm broad 8

- 7°. Basidiospores > 10.5 µm long and 6.5 µm broad..... 10
 8. Basidiospores 6.7–8 × 3–3.5 µm, oblong *F. tenuisperma* Singer
 8°. Basidiospores with another shape 9
 9. Basidiospores 7–10.3 × 3–4.7 µm, cylindrical to amygdaliform *F. deusta* Singer & Cléménçon
 9°. Basidiospores 7.5–10.5 × 5.5–6.5 µm, ellipsoid *F. gallaecicoloniana* Blanco-Dios
 10. Basidiospores 10–12.5 × 6.5–8.5 µm, obovoid to broadly ellipsoid *F. albidula* (Pat.) Pegler
 10°. Basidiospores 11–15 × 7–8 µm, ellipsoid to oblong *F. granulospora* G. Stev.

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