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(Article begins on next page)

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Gamundia nivea sp. nov. (Basidiomycota, Agaricomycetes) from central Europe (France)

Authors

E. Musumeci, M. Contu, A. Vizzini

Abstract

The new species *Gamundia nivea* is described from an *Abies alba* wood in France. The main features of the new species are: small size, white colour of the whole basidioma, broadly ellipsoid to ellipso-ovoid, echinulate basidiospores and very wide cystidia. A full macro- and micro-morphological description, a photograph of fresh basidiomata and line-drawings of relevant micro-morphological features are presented, together with a taxonomical discussion on the differences between the new species and its closest allies.

The small genus *Gamundia* Raithelh., segregated from *Fayodia* Kühner sensu Singer (1975) by Raithelhuber (1979) and typified by *Rhodocybe striatula*Kühner (1928), belongs to the fayodioid clade sensu Moncalvo et al. (2002) of the Agaricales, together with *Fayodia*, *Caulorhiza* Lennox, *Conchomyces* Overeem and *Myxomphalia* Hora. The genus, rather homogeneous and with a distribution mostly in Europe, encompasses white-spored, lamellate saprotrophic fungi with thin-walled, non-amyloid, echinulate spores, large cheilo- and pleurocystidia and a pileipellis made up of a cutis that may have a gelatinized suprapellis (Antonín and Noordeloos 2004). The very closely related genus *Fayodia* is distinguished by the two-layered spore wall consisting of a non-amyloid, echinulate-verruculose epispore and a smooth amyloid perispore, and by a never gelatinised pileipellis (Bigelow 1979, 1983, Antonín and Noordeloos 2004).

While exploring the mycologically still poorly known site of Liebenweiler, in northern France, in a conifer wood dominated by *Abies alba* Mill., a striking acicolous species belonging to *Gamundia* was collected, for which, owing to its very peculiar macro- and micro-morphological features, no name turned out to be available. Below, the species is described as new to science.

Material and methods

The description of macro- and micro-scopical features are drawn from notes taken on fresh material. The observations of microscopic features were made on fresh material mounted in 3% KOH, Melzer's reagent and Cresyl blue; Toludine blue and Congo red were utilized to highlight gelatinized hyphae. Spore size is expressed both as a range and a mean value based on 90 randomly chosen spores from three basidiomes. In the microscopic descriptions, Qm denotes the average ratio of length and width of the spores. 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>. All the material examined is housed at TO. The description of the new species was deposited in MycoBank <http://www.mycobank.org/DefaultPage.aspx> with the number MB 516526.

Gamundia nivea Musumeci, Vizzini et Contu sp. nov. (Fig. 1–2)

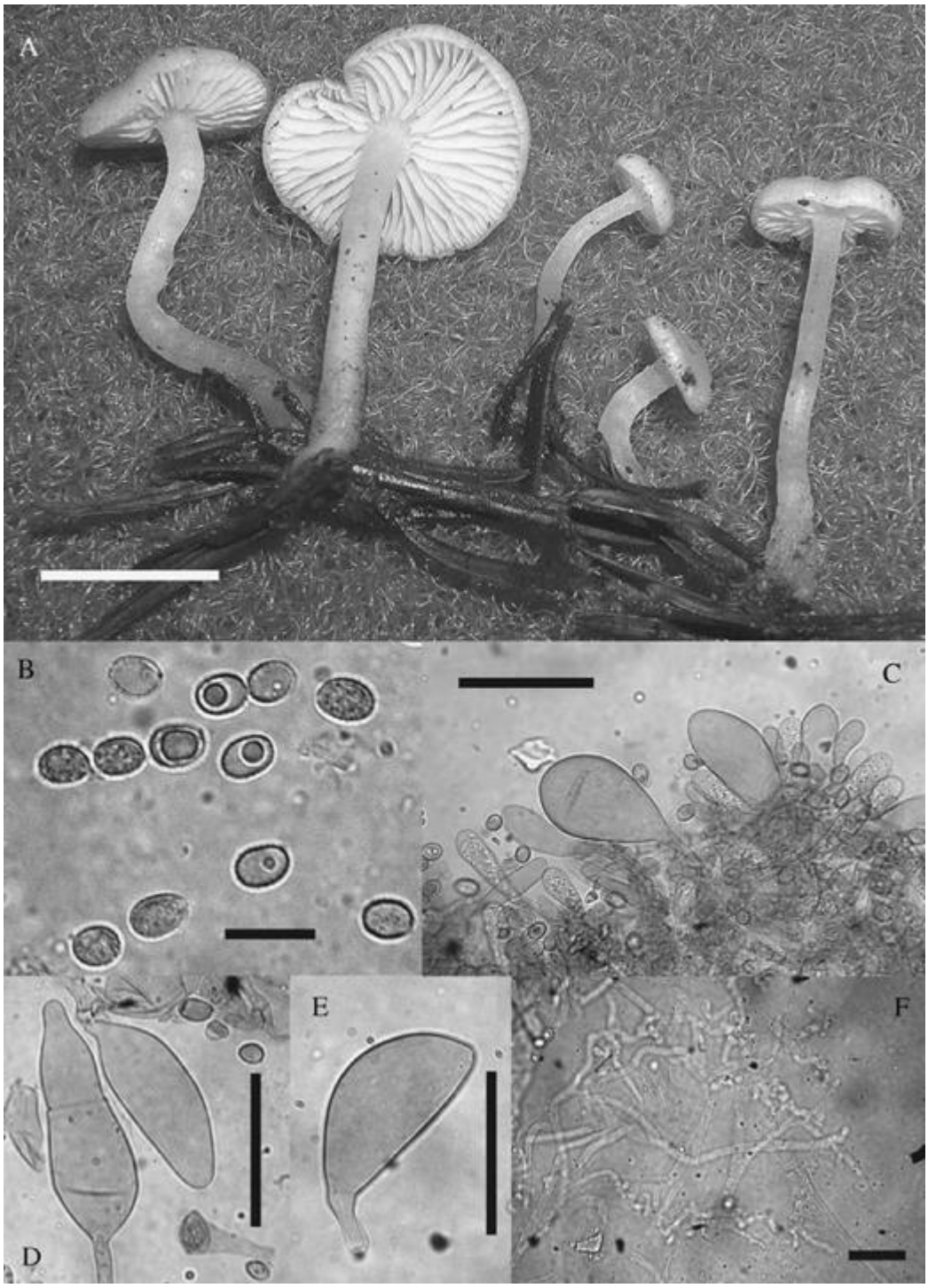

Figure 1. Gamundia nivea *sp. nov. (A) basidiomes (scale bar=10 mm), (B) spores (scale bar=10 µm), (C) and (D) cheilocystidia (scale bar=40 µm), (E) pleurocystidium (scale bar=40 µm), (F) coralloid hyphae of the pileipellis (scale bar=20 µm).*

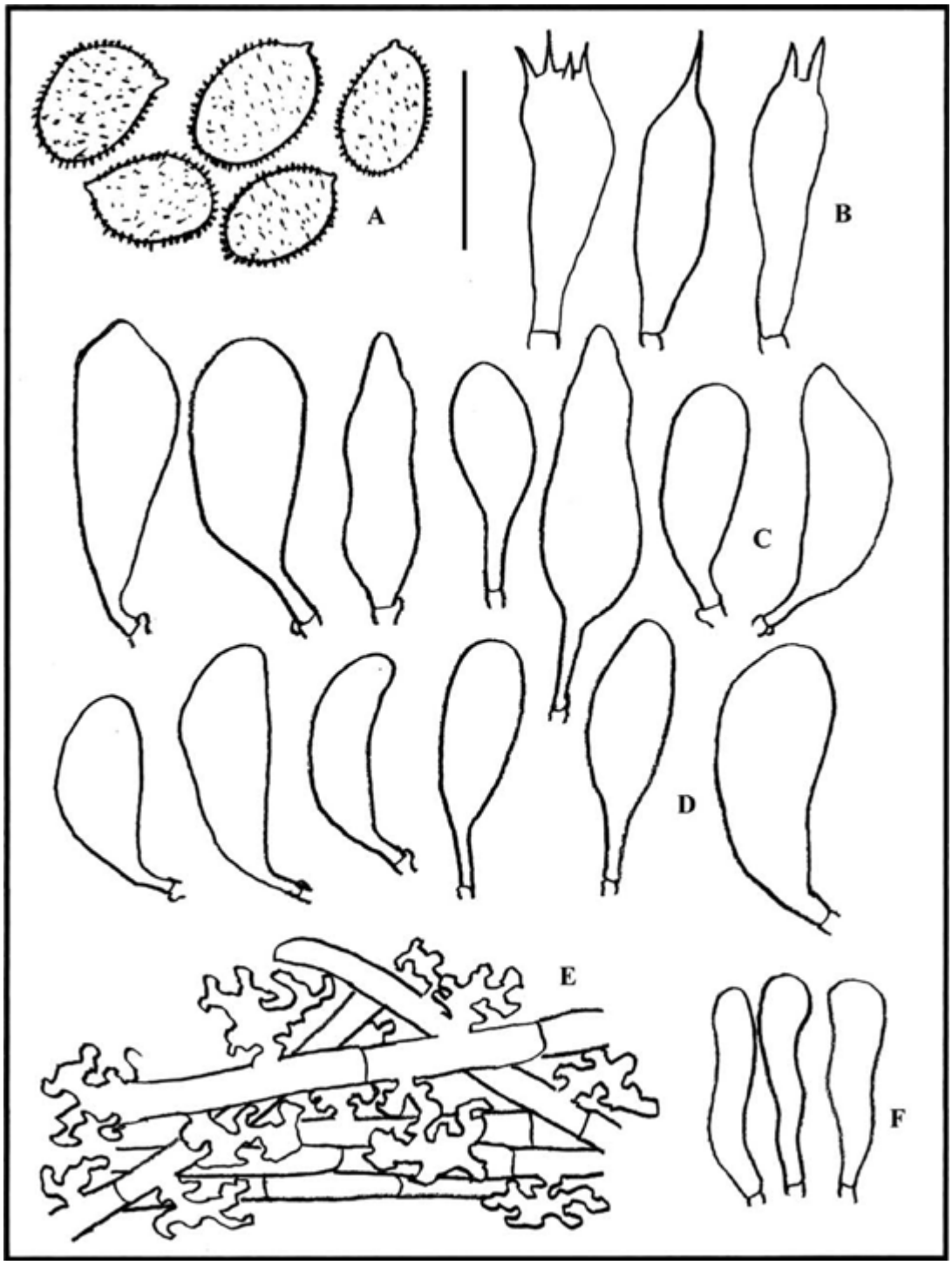

Figure 2. Gamundia nivea *sp. nov. (A) spores (scale bar=10 µm), (B) basidia (scale bar=20 µm), (C) cheilocystidia (scale bar=40 µm), (D) pleurocystidia (scale bar=40 µm), (E) coralloid hyphae of the pileipellis (scale bar=30 µm), (F) caulocystidia (scale bar=40 µm).*

Pileus 10–15 mm, parce carnosus, in juventute convexus et papillato-umbonatus deinde convexo-explanatus, interdum in medio leviter depressus, striatus, albo-niveus, pruina alba obtectus. Lamellae haud confertae, uncinato-adnatae vel adnato-adnexae vel situato-emarginatae, albae. Stipes 15–35×1–5 (7) mm, cylindraceus vel subclavatus, omnino albo-pruinosus, pileo concolor. Caro parce conspicua, tenuis, alba, immutabilis; odor pelargonicus; sapor mitis. Sporae 5.5–7.0×4.5–5.5 µm, hyalinae, inamyloideae, ellipsoideae vel ellipso-ovoideae, spinulis acutis parce obviis exornatae, parietibus leviter incrassatis. Basidia 23–35×9–10 µm, plerumque tetraspora,

subclavata vel subutriformia, fibulata. Cheilocystidia 32–80×11–25 µm, numerosa, versiformia, subfusiformia, sphaeropedunculata, subutriformia vel clavo-pedunculata, saepe lateraliter depressa, hyalina, tenuitunicata, haud incrustata. Pleurocystidia 34–70×13–25 µm, haud abundantia, plerumque clavo-pedunculata atque lateraliter depressa, raro subfusiformia vel sphaeropedunculata, hyalina, tenuitunicata, haud incrustata. Pilei cutis ex hyphis cylindricis repentibus vel erectis 2–7 µm latis constituta; hyphae superficiales coralloideae presentes; suprapellis leviter gelata. Caulocystidia numerosa, clavata vel utriformia, hyalina, tenuitunicata. Fibulae numerosae.

Type: Gallia, Liebenswiler, 14 Nov 2009, E. Musumeci (holotype TO HG1977).

Pileus 10–15 mm in diameter, not very fleshy, at first persistently convex, becoming plano-convex, sometimes depressed to sub-umbilicate, in young stages with a shallow, obtuse umbo, slightly lubricous, hardly hygrophanous, snow-white and translucid-striate, sometimes with yellowish tinges in aged basidiomata, silky, opaque, striate at the margin when moist. Lamellae intermixed with some lamellulae, thin, sub-distant, sinuous-emarginate, uncinate-adnate to adnate-adnexed, white, edge concolorous and minutely white fimbriate. Stipe 15–35×1–5 (7) mm, tubular, cylindric to subclavate, mostly subclavate, pruinose, white, concolorous with the pileus. Context thin, white, unchanging. Smell fruity or like *Pelargonium*. Taste mild. Spore print white. Spores 5.5–7.0×4.5–5.5 µm (excluding ornamentation), on average 6.0×4.8 µm, Qm=1.24, broadly ellipsoid to ellipsoid or ellipso-ovoid, hyaline, thick-walled, inamyloid, minutely warty-echinulate (echinulae 0.2–0.4 mm long), with an obtuse apiculus. Basidia 23–35×9–10 mm, mostly tetrasporic, rarely bisporic or monosporic, subclaviform to subutriform. Hymenophoral trama regular, made up of hyaline, non-gelatinized hyphae, metachromatic in Cresyl blue. Cheilocystidia 32–80×11–25 µm, numerous, very variable, but mostly sub-fusiform, sphaeropedunculate, sub-utriform or clavate-pedunculate, often with a lateral depression, hyaline, thin-walled, not encrusted, often pedicellate. Pleurocystidia 34–70×13–25 µm, not abundant, mostly clavate-pedicellate to sub-fusiform with the same lateral depression often observed in the cheilocystidia, hyaline, thin-walled, not encrusted. Pileipellis a thin ixocutis of hyaline, cylindrical, gelatinized, thin-walled and mostly radially-arranged hyphae, 2–7 µm wide, not encrusted, which often can be sub-erect in some portions; these hyphae are intermixed with diverticulate, coralloid hyphae with lateral projections which have an almost anticlinal orientation. Subpellis and pileus trama well differentiated, made up of broader, 6–22 µm wide hyphae, which are hyaline, cylindrical, non-encrusted and non-gelatinized, and have a radial arrangement. Stipitipellis a cutis of hyaline, cylindrical, parallel, non-gelatinized hyphae. Caulocystidia abundant, clavate or ventricose, hyaline, thin-walled, similar to cheilocystidia. Thromboplerous hyphae (oleiferous hyphae sensu Clémençon 2004) rare. Clamp connections very common everywhere.

Habitat, distribution and etymology

Terrestrial, in small groups on *Abies alba* needle litter, on basic-argillaceous soil, 445 m a.s.l. So far known only from the type locality. The choice of the specific epithet, derived from the Latin adjective *niveus* (snow-white), is meant to emphasize the overall snow-white colour of the new species.

Similar species

Bon (1997), in his key to the European species of the genus, recognized only two species, viz. *G. pseudoclusilis* (Joss. & Konrad) Raithelh. and *G. leucophylla* (Fr.) H. E., with two infraspecific taxa, viz. var. *arctica* (Gulden) Bon and var. *xerophila* (Luthi & Röllin) Bon. However, later, in a paper with Röllin (Bon and Röllin 1999), he described the new species *Gamundia lonatii* and

acknowledged *Gamundia hygrocyboides* (described by Lonati 1996 as *Fayodia hygrocyboides*). In the most recent monographic treatment of the European species by Antonín and Noordeloos (2004), four species, viz. *G. striatula* (Kühner) Raithelh., *G. lonatii* Bon & Röllin, *G. hygrocyboides* (Lonati) Bon and *G. arctica* (Gulden) E. Ludw. are accepted. Horak (2005), in his flora of European *Agaricales*, recognizes only one species, viz. *G. striatula*. In the last edition of the 'Dictionary of the fungi' (Kirk et al. 2008), six *Gamundia* species are recognized.

On the basis of our field experience of this genus, we are convinced that the more exhaustive critical treatment of the European species is that by Moreau (2004), in which the taxa *G. striatula* s. s., *G. pseudoclusilis*, *G. hygrocyboides*, *G. leucophylla*, G. *lonatii*, *G. xerophila* and *G. arctica* are recognized as species in their own right. We share this point of view because we have been able to collect and carefully study a number of collections fitting very well the protologues of each of the taxa listed above, including the type collection of *Fayodia arctica* Gulden.

Moreover, we share Moreau's opinon that '*Clitocybe*'*pseudoclusilis* sensu Malençon and Bertault (1975), is different from the true '*Collybia*'*pseudoclusilis* (Josserand and Konrad 1931) and that '*Rhodocybe striatula*' (Kühner 1928) in its original sense is a species whose pileipellis is not gelatinised and accordingly cannot be the same as any of the various collections described under the name '*pseudoclusilis*' thus far. See also Lonati (1988) and Grilli (in Lanzoni et al. 1999) who share this opinion on *C. pseudoclusilis* sensu Malençon and Bertault.

After studying a good number of collections over the years referable to the genus *Gamundia*, from both central and southern Europe, we have reached the conclusion that the most relevant features suitable for interspecific distinction in the genus are: 1) size and shape of cystidia, 2) presence or absence of a gelatinised suprapellis, and 2) basidiome colours. Other features, such as spore size and ornamentation, smell and taste, and lamellar morphology appear to be less useful because they may vary even within a single collection. By using shape and size of cystidia, which likely are the most relevant micro-morphological features, we have been able to distinguish two different groups of species in *Gamundia*, viz. one including species with cystidia not exceeding 15 µm in width, with *G. striatula*, *G. arctica*, *G. pseudoclusilis*, *G. leucophylla*, *G. hygrocyboides* and '*Clitocybe pseudoclusilis*' sensu Malençon and Bertault, and the other consisting only of *G. lonatii*, whose cystidia are wider and easily reaching 20 µm in width. Because of its broad cystidia, easily reaching 20 µm and more in width, the new species described above belongs to the second of the two informal groups, and consequently, is comparable only with *G. lonatii*. This latter species is easily distinguished by the larger pileus (15–40 mm in diameter) from the very beginning deeply umbilicate, the much darker hues of the whole basidiome (fuliginous–brown), the different taste and smell (inocyboid, distinctly farinaceous–spermatic), the shorter [30–50 (60) µm] and exclusively obtuse cheilocystidia, and the longer spores (6.0–8.0 µm) with a Qm=1.5 (Lonati 1996, Antonín and Noordeloos 2004).

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