Studies in the genus *Psathyrella* in Spain. III. *Psathyrella magnispora*, a new species in subsection *lutenses*

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Key Words: Basidiomycota, Agaricales, *Psathyrella magnispora*, description, taxonomy.

Summary: *Psathyrella magnispora sp. nov.*, a new species from subsection *Lutenses* Kits van Wav., collected in Spain, is described and illustrated macro- and microscopically. Besides, it is compared with other species of subection *Lutenses* Kits van Wav., i.e. *P. noli-tangere*, *P. reticulata*, *P. twickelensis*, subsection *Spadiceogriseae* Kits van Wav., i.e. *P. clivensis*, and section *Pennatae* Romagn. emend. Kits van Wav., i.e. *P. fulvescens* var. *brevicystis*.

Zusammenfassung: *Psathyrella magnispora sp. nov.*, eine in Spanien gefundene neue Art aus der Untersektion *Lutenses* Kits van Wav., wird beschrieben, in ihren makro- und mikroskopischen Details (einschlieblich Farbtafel) dargestellt und mit anderen Arten der Untersektion *Lutenses* (*Psathyrella noli-tangere*, *P. reticulata*, *P. twickelensis*), der Untersektion *Spadiceogriseae* Kits van Wav. (*P. clivensis*) sowie der Sektion *Pennatae* Romagn. emend. Kits van Wav. (*P. fulvescens* var. *brevicystis*) verglichen.

Introduction

As mentioned previously (HEYKOOP & ESTEVE-RAVENTÓS 1994; HEYKOOP & MORENO 1998), the genus *Psathyrella* (Fr.) Quél. is a taxon to which little attention has been paid in Spain, often being neglected by the majority of mycologists. On the other hand, the mediterranean areas, and more specifically the Iberian Peninsula, host a high diversity of fungi, many of them being endemic and associated with specific plants in its ecosystems. In recent times, many mycological studies have been carried out in Spain which resulted in the description of several new species in different taxonomic groups: e.g. *Xeromphalina junipericola* Moreno & Heykoop (MORENO & HEYKOOP 1996), *Marasmiellus phaeomarasmioides* Moreno, Heykoop, Esteve-Rav. & Horak (MORENO & al., 1997), *Phaeomarasmius gypsophilus* Esteve-Rav., Villarreal, Heykoop & Horak (ESTEVE-RAVENTÓS & al. 1998), *Inocybe inexpectata* Villarreal, Esteve-Rav., Heykoop & Horak (VILLARREAL & al., 1998), *Mycena olivaceoflava* Villarreal, Heykoop & Maas G. (VILLARREAL & al. 1999),

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among others. However, the mediterranean mycobiota still remains poorly known and more new species are likely to be discovered in the future. This is the case with this new *Psathyrella* which has been discovered in chalk grasslands in mediterranean forests of *Quercus faginea* Lam. and *Quercus ilex* L. ssp. *ballota* (Desf.) Samp.

Materials and methods

The material studied was collected in the province of Guadalajara, Peninsular Spain. Type material has been deposited at AH (Herbarium of Alcalá de Henares University, Spain). Basidiospore measurements were made following the method of HEINEMANN & RAMELOO (1985).

Results

Psathyrella magnispora Heykoop & G. Moreno sp. nov., Figs. 1–3

Etymology: because of its characteristic large spores

Basidiomata solitaria vel gregaria. Pileus 7–25 mm latus, convexus vel planoconvexus, hygrophanus, non striatus, initio obscure brunneus vel spadiceo-brunneus, in sicco cinereo-cremeus vel cinereo-brunneus, colore rosea destitutus. Velum albidum fugax, primo cortinam fibrillosam, dein fibrillas ad marginem formans. Lamellae primo albidae vel cinereo-albidae deinde cinereo-brunneae vel leviter violaceae, adnatae, crebrae, acie lamellarum alba. Stipes 13–35 x 1,5–2,5 mm, cylindraceus, albidus vel cremeo-stramineus in parte inferiore, ad apicem pruinatus. Odore saporeque nullis.

Sporae 9,5 –10,9 x 7–7,3 µm (dimensiones mediae), ellipsoideae, leves, in NH_4OH 10% observatae aurantiaco-brunneae, non-opacae, poro germinativo indistinctus (callus). Basidia 22–30 (32) x 10–12 (14) µm, clavata, 4-sporigera, fibulata. Pleurocystidia (28) 40–50 x (10) 12–17 µm, utriformia vel sublageniformia apicibus obtusis, plurimum (sub)capitata, raro fusiformia, hyalina, tunica tenui praedita vel plerumque tunica incrassata, lutea in NH_4OH 10%. Cheilocystidia 24–40 (47) x 10–17 µm, pleurocystidiis similia, paucis tenuitunicatis et incoloratis cellulis sphero-pedunculatis et clavatis 15–20 x 9–13 µm immixtae. Caulocystidia cheilocystidiis similia. Trama lamellarum pigmento praedita.

Habitat: inter graminis (e.g. Koeleria vallesiana (Honckeny) Gaudin). Typus: Hispania, Guadalajara, Carabias, 27-10-1999, leg. J. Checa, M.N. Blanco, G. Díaz et M. Heykoop, Typus in herbario AH sub no. 24929 depositus.

Material examined

SPAIN: Between Carabias and Moratilla, province of Guadalajara; leg. F. Esteve & J. Álvarez; 12-XI-1988; terrestrial in chalk grasslands, AH 13769. Between Carabias and Moratilla, province of Guadalajara; leg. F. Esteve & J. Álvarez; 12-XI-1988, in chalk grasslands, AH 13770. Carabias, province of Guadalajara; 27-X-1999, leg. J. Checa, M.N. Blanco, G. Díaz & M. Heykoop, in chalk grasslands, AH 24929 (Holotypus). Carabias, province of Guadalajara, 27-X-1999, leg. J. Checa, M.N. Blanco, G. Díaz & M. Heykoop, in chalk grasslands among *Koeleria vallesiana,* AH 24930.

Basidiomata isolated to gregarious. Pileus 7–25 mm in diam., convex to applanate-convex, with a slightly obtuse umbo in young stages, hygrophanous, not striate, at first very dark brown to date-brown, drying out first at margin to ochraceous or orange-ochraceous, the centre remaining first dark date-brown, later drying out to greyish-beige or cream greyish and finally pale brown-greyish,

Fig. 1: *Psathyrella magnispora* (AH 24930): Basidiocarps

without pink. Context thin and concolorous with the cap. Veil fibrillose, whitish, forming a cortina uniting the margin of the cap and the upper portion of the stem, disappearing at maturity and leaving fugacious whitish fibrils along the cap margin. Gills at first whitish, then greyish-whitish to progressively brown-greyish with lilac-violaceous tinges, adnate, very close, lamella-edge white. Lamellulae present. Stipe 13–35 x 1.5–2.5 mm, cylindrical, fragile, whitish with cream strawish tinges, especially in the lower half, sometimes slightly radicating, with pruinose apex (caulocystidia). Context concolorous with stipe. Smell and taste not distinctive.

Spores ellipsoid to broadly ellipsoid, smooth, with dense granular content, orange-brown in NH_4OH 10%, with a reddish hue, not opaque, with very indistinct, practically absent germ pore (callus), easier to observe under phase contrast, size:

9.5–**10.45**–11.8 (–12) x 6.5–**7.19**–7.8 (–8) µm; Q = 1.33–**1.45**–1.61 (–1.64) (n = 21) (AH 24930)
9.5–**10.24**–11.4 (–11.5) x 7–**7.26**–7.9 (–8) µm; Q = 1.25–**1.41**–1.57 (n = 21) (AH 24929)
10–**10.9**–11.5 x 7–**7.07**–7.4 (–7.5) µm; Q = 1.43–**1.54**–1.64 (n = 22) (AH 13769)
(8.5–) 9–**9.52**–10.5 (–11) x 7–**7.04**–7.3 (–7.5) µm; Q = 1.27–**1.35**–1.43 (n = 23) (AH 13770)

Basidia clavate, clamped, tetrasporic, 22–30 (–32) x 10–12(–14) µm. Pleurocystidia (28–) 40–50 x (10–) 12–17 µm, utriform to sublageniform with obtuse apex, many (sub)capitate, sometimes with forked apex, more rarely fusiform, hyaline, often with refractive and locally thickened walls and then yellowish (to greenish) in NH_4OH 10%, some of them with mucoid droplets on the surface. Cheilocystidia 24–40 (–47) x 10–17 µm, similar to pleurocystidia, very abundant and densely packed, few to many with thickened and refractive walls (up to 2 µm), intermixed with clavate to spheropedunculate cells, 15–20 x 9–13 µm, few in number, thin-walled and colourless. Stipitipellis a cutis, covered with caulocystidia, 35–42 x 9–14 µm, utriform to sublageniform or (sub) capitate, few to many with refractive and thickened walls (up to 2.5 µm), especially in the neck

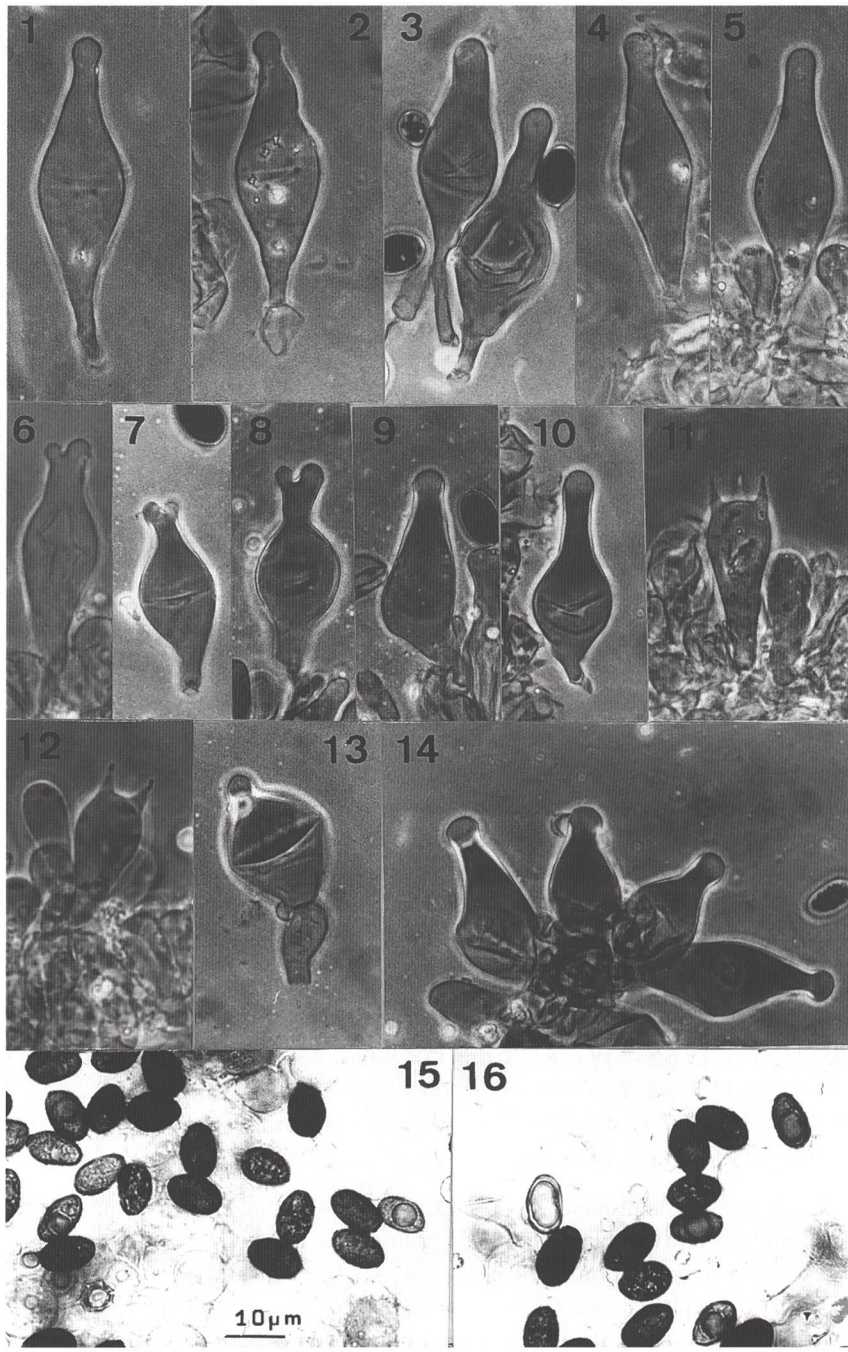

Fig. 2: *Psathyrella magnispora* (AH 24929 *typus*): 1–6: Variability of the pleurocystidial morphology; capitate apices, sometimes forked, with thickened necks can be observed. 7–10: Variability of the cheilocystidial morphology; capitate apices, sometimes forked, with thickened necks can be observed. 11–12: Clavate basidia. 13: Clamp connections. 14: Capitate cheilocystidia. 15–16: Spores.

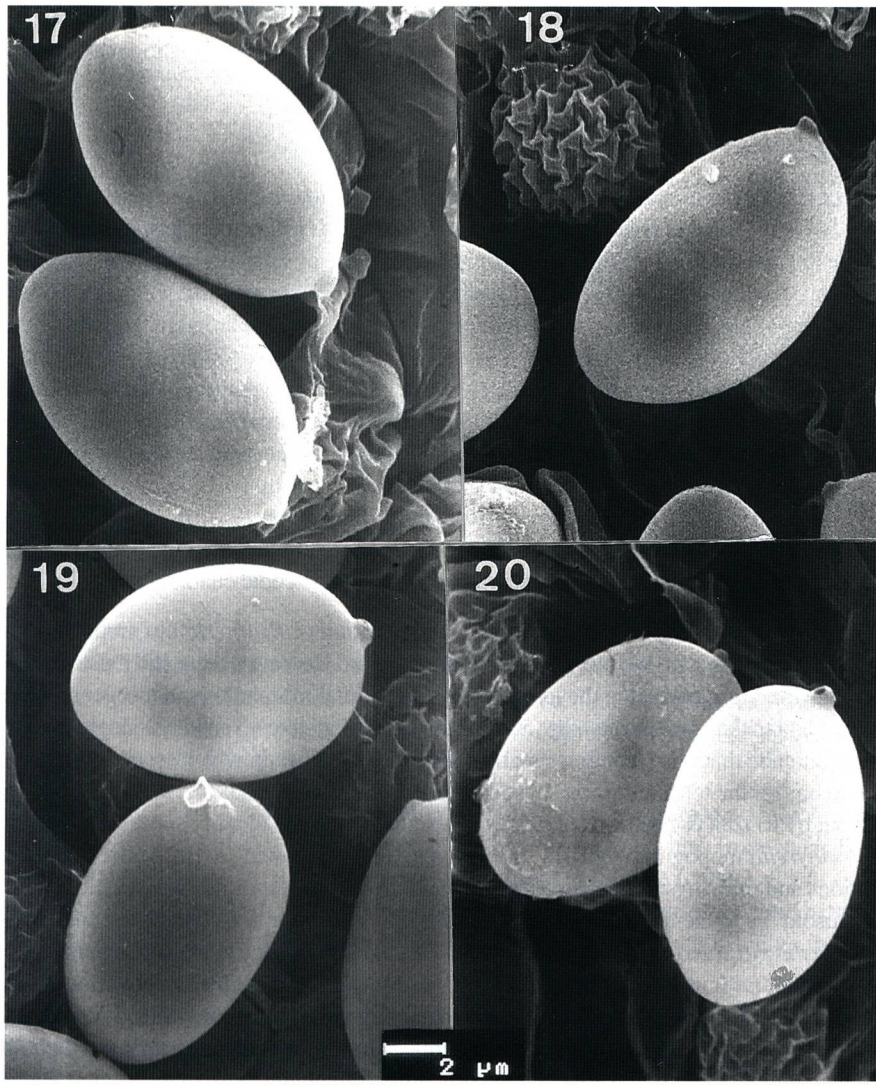

Fig. 3: *Psathyrella magnispora* (17-18 AH 24929 *typus*; 19-20 AH 24930): Spores under SEM seen in frontal and lateral view; germ pore not observed.

and apex, yellowish (to greenish) in NH_4OH 10%, some of them with mucoid droplets on the surface. Hymenophoral trama in NH_4OH 10% sub micr. brownish, with encrusting pigment. Clamp connections present in all tissues.

Discussion

Because of the size of its spores *Psathyrella magnispora* is intermediate between the subgenera *Psathyrella* and *Psathyra*. Following KITS VAN WAVEREN's (1985) monograph this species fits neither the key descriptions of sugenus *Psathyrella* nor those of subgenus *Psathyra*. One must try both key ways concluding, finally, that it does not belong to subgenus *Psathyrella* since its spores are neither very dark nor opaque, as is characteristic for all taxa included in the latter. Furthermore, the habit of *Psathyrella magnispora* as well as its microscopic features fit clearly into subgenus *Psathyra*. On the other hand, KITS VAN WAVEREN (1985: 37) points out the following when characterising the subgenus *Psathyra*: „Exceptionally, spores larger than 10 µm, but then pleurocystidia and thick-walled hair-like pileocystidia lacking, or intermediate species keyed out in both subgenera". According to the latter, species such as *P. dicrani* (A.E. Jansen) Kits van Wav. (spores 10–11.5 µm long), *P. tephrophylla* (Romagn.) Bon (spores (9–) 10–11 (–12.5) µm long) and *P. almerensis* Kits van Wav. (spores 10–11.5 µm long) are included in subgenus *Psathyra* because of both the habit of their basidiocarps and their microscopic characters.

In KITS VAN WAVEREN's (1985) classification, the partition of *Psathyra* into sections is based, among other characters, on the morphology of the cystidia. However, there still exists some confusion in the literature regarding the terminology of cystidial morphology in this genus. Furthermore, if we add to the latter the fact that cystidia are highly variable (even in one single specimen!) we must conclude that it is sometimes really difficult to establish in which section we should include a taxon [for the terminology on cystidial morphology see VELLINGA (1988)]. Moreover, as pointed out by KEIZER & ARNOLDS (1995), it is not always easy to identify some taxa with the aid of the *Psathyrella* monograph by KITS VAN WAVEREN (1985) „owing to differences between his descriptions and drawings of the pleurocystidia and the pleurocystidioid cheilocystidia („lageniform or fusoid") and the usual shape of these cells". In relation to this, one of our collections of *Psathyrella magnispora* (the less typical, AH 13770), has a tendency to present lageniform to fusiform, together with utriform, cystidia, which would point to its inclusion in section *Pennatae* Romagn. emend. Kits van Wav. However, the remaining three collections, though variable, have a clear majority of utriform to (sub)capitate cystidia, some of them being lageniform with obtuse apex, which undoubtedly points to inclusion of *Psathyrella magnispora* in the section *Spadiceogriseae* Kits van Wav., and because of the pattern of the cellular lining of the gill edge it belongs to subsection *Lutenses* Kits van Wav.

In subsection *Lutenses Psathyrella magnispora* keys out (Kits van Waveren, 1987) closest to *P. noli-tangere* (Fr.) Pears. & Dennis, *P.reticulata* (Romagn.) Singer and *P. twickelensis* Kits van Wav., which differ, however, in having smaller spores, differently shaped cystidia and different habitat. The differences between *P. magnispora*, *P. noli-tangere*, *P. reticulata* and *P. twickelensis* are shown in Table 1.

Another species which has to be compared with *Psathyrella magnispora* is *P. fulvescens* (Romagn.) A.H. Smith var. *brevicystis* Kits van Wav. included in section *Pennatae* by KITS VAN WAVEREN (1985,1987) but which, according to KEIZER (1993) and ARNOLDS & KEIZER (1995) and because of the „(narrowly) utriform or obtusely fusiform" cystidia can also be placed in section

Table 1: Differences between *Psathyrella magnispora*, *P. noli-tangere*, *P.reticulata* and *P. twickelensis*[1]

	Mean values of spore size	Germ pore	Cheilocystidial walls	Habitat
Psathyrella magnispora	9.5–10.9 x 7–7.3 µm (4 collections)	Absent or very indistinct (callus)	Few to many thick-walled and yellowish	In chalk grass-lands among *Koeleria vallesiana*
Psathyrella noli-tangere	7.3–7.9 x 4.1–4.5 µm (19 collections)	Present and distinct	Few to many often very pale brown and thin-walled	In marshy areas
Psathyrella reticulata	8.7 x 5.2 µm (1 collection)	Present and small	Hyaline and thin-walled	In humid ground
Psathyrella twickelensis	7.7–8 x 4.5 µm (2 collections)	Present and distinct	Colourless and thin-walled	Terrestrial under *Fagus* and *Quercus*

[1] All data regarding *Psathyrella noli-tangere*, *P. reticulata* and *P. twickelensis* are after Kits van Waveren (1985, 1987). The type of *P. twickelensis*, kept in Leiden (L), has been studied by us, and our results will be the subject of a future paper.

Spadiceogriseae subsection *Lutenses*. *P. fulvescens* var. *brevicystis* may recall *P. magnispora* macroscopically because of the presence of an ochre brown central area on the cap during the process of drying. Nevertheless, *P. fulvescens* var. *brevicystis* differs by its smaller spores, different cystidia, and its fructification in deciduous woods.

Finally, care should also be taken when identifying *Psathyrella magnispora*, since *P. clivensis* (Berk. & Broome) P.D. Orton (placed in subsection *Spadiceogriseae*) also fruits in chalk grass-lands and has spores with very indistinct, practically absent germ pore (callus). *P. clivensis* differs, however, from *P. magnispora* in having smaller spores and because of the ratio between the number of cheilocystidia and spheropedunculate and clavate cells, which is higher in the latter than in the former.

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