

NOTES ON AGARICALES — I

by

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This is the first of a series of papers of miscellaneous notes on and descriptions of rare or incompletely known species of Agaricales.

The present paper deals with two rare species of the genus *Agrocybe*, both of which have not previously been recorded for the Netherlands.

The genus *Agrocybe* has been more generally accepted recently and is rather satisfactorily characterized by its spores and cuticle. However, such important characters as annulus, germ pore, pleurocystidia, and pileocystidia are known to vary considerably. This makes the arrangement within the genus very difficult.

Most of the species of *Agrocybe* are in need of careful analytical studies.

All material studied is preserved in the Rijksherbarium at Leyden.

I wish to thank Dr T. Hongo (Shiga University, Otsu, Japan) and Prof. G. Métrod (Champagnol, France) for kindly sending specimens for comparison.

Agrocybe pusiola (Fr.) Heim in Treb. Mus. Ciènc. nat. Barcelona 15 (sèr. bot. 3): 129. 1934. — *Agaricus pusiolus* Fr., El. Fung. 36. 1828; Syst. mycol. 3 (Ind.): 38. 1832. — *Agaricus pusillus* Fr., Syst. mycol. 1: 264. 1821. — not *A. pusillus* DC. ex Fr., Syst. mycol. 1: 279. 1821.

Descriptions & illustrations. — Fr., Monogr. 1: 372. 1857; Ic. sel. Hym. 2: 23 pl. 124 fig. 4. 1877—84; Métrod in Rev. Mycol. 11: 79—80 pl. 1 fig. 6. 1946.

Fruit-bodies very small, gregarious. Cap 6—12 mm wide, convex, becoming flat, ochraceous or pale buff, with centre sometimes brownish, paler yellow near margin, glabrous and dry, sometimes very minutely granular as if with a thin, cracked surface-layer, slightly viscid when moist, not striate, rather fleshy. Gills 14—17, with 1—3 small gills between each pair of longer ones, rather distant, with straight edge or slightly ventricose, up to 2 mm broad, broadly adnate, sometimes adnexed, seldom uncinete, at first very pale brownish grey and slightly tinged with violet, then dingy ochraceous brown; edge concolorous. Stalk 8—35 × 0.7—1.5 mm, cylindrical or slightly thickened or attenuated towards base, with white rhizoids at base (the rhizoids lacking however when growing on rabbit-pellets), dingy white to pale yellowish brown, slightly and minutely fibrillose (hand-lens!), with patches of adhering grains of sand suggesting some degree of viscosity;

apex pruinose; centre with loose pith. Flesh cream, white in centre of stalk; smell farinaceous, very strong when cut. Spore print not seen.

Spores $7.3-9.3 \times 4.4-4.8 \mu$, ellipsoid to subamygdaliform, pale brown; thick wall consisting of at least two layers, thinner at apex but without visible pore. Basidia $28-36 \times 5.8-9.0 \mu$, 4-spored, with clamps at bases. Pleurocystidia (29-) $45-72 \times 7-18 \mu$, with 10-20 nuclei, broadly fusiform, with a short or long, cylindrical or slightly clavate neck, seldom with yellowish contents; mucous globules at apex when dry, disappearing however in water or amonia. Cheilocystidia $18-75 \times 8-22 \mu$, with 6-15 nuclei, very variable; the large ones slender to broadly ventricose-fusiform, lageniform, or utriform with mucous globules as on pleurocystidia; the small ones lageniform, broadly clavate, or clavate, sometimes mucronate. Trama of gills subregular; hyphae $3-14 \mu$ wide; subhymenium $\pm 10 \mu$ thick, cellular. Cuticle very irregularly hymeniform with slender to broadly clavate cells of variable length, budding sideways, covered by a thin ($5-10 \mu$), gelatinous layer containing remains of about 3μ wide hyphae; some specimens with very scarce pileocystidia. Trama of cap with $5-12 \mu$ wide, interwoven hyphae. Stalk in upper part with all transitions between slender tips of hyphae and caulocystidia resembling cheilocystidia; lower part with scattered yellowish patches of gelatinized, $2-3 \mu$ wide hyphae, usually marked by adhering soil particles; trama with cylindrical hyphae, $3-20 \mu$ thick; pith composed of $2.5-4 \mu$ wide hyphae with slightly thickened walls. Yellow incrusting pigment in cuticle. Clamps present but not frequent.

Habitat. On stubble-field with *Agrocybe praecox*, *A. dura* and *A. pedicels* (Huijsman); in the dunes among grasses near and on rabbit-pellets (Bas 929).

Specimens examined. France: *Métrod 1873* (probably part of the collection described by Métrod 1946: 79-80); Lougres, Doubs, 14 June 1956, *H. S. C. Huijsman*; Netherlands: Oostvoorne, Zuid-Holland, 21 Oct. 1955, *Bas 929* (new to the Dutch flora).

Fries first described his *Agaricus pusiolus* as *Agaricus pusillus* (1821: 264), but renamed it later on (1828: 36) to avoid tautonymy with *Agaricus pusillus* DC. which he placed in the tribus Volvaria (1821: 279).

There may be some doubt as to the identity of the species described above with the true *Agaricus pusiolus* Fr. Size, shape and habitat agree very well, but such terms as "pulcher" (1821: 264), "stipite... filiforme glabro luteo nitido" and "stipes... citrinus" (1838: 195-196), "pileo stipiteque viscidis, citrinus" (1857: 372) may seem somewhat exaggerated. The same may be said of the colour of Plate 124 Figure 4 in Fries "Icones" (1877-84). The indication "stipes... glaber" (1821: 264) disagrees.

One gets the impression that most of Fries's descriptions of *Agaricus pusiolus* are based on a single collection: "(Sularp) Oct. v.v." (1821: 264); "Lecta ad Sularp Scaniae Oct." (1857: 372). In 1857 he apparently had made a second collection, differing so much from the former that he described it as variety: "B. Inter muscos ad Femsjö Smolandiae: Stipes $1\frac{1}{2}$ une longus lineam fere crassus... subviscosus, citrinus, apice pruinosis. Pileus... fulvo luteus...", which agrees much better with our material.

Our fungus is rather variable in shape, which is clearly seen in the drawings (fig. 1 a and fig. 1 c). If the stalk is slender the cystidia near the apex are very scattered and the stalk appears glabrous.

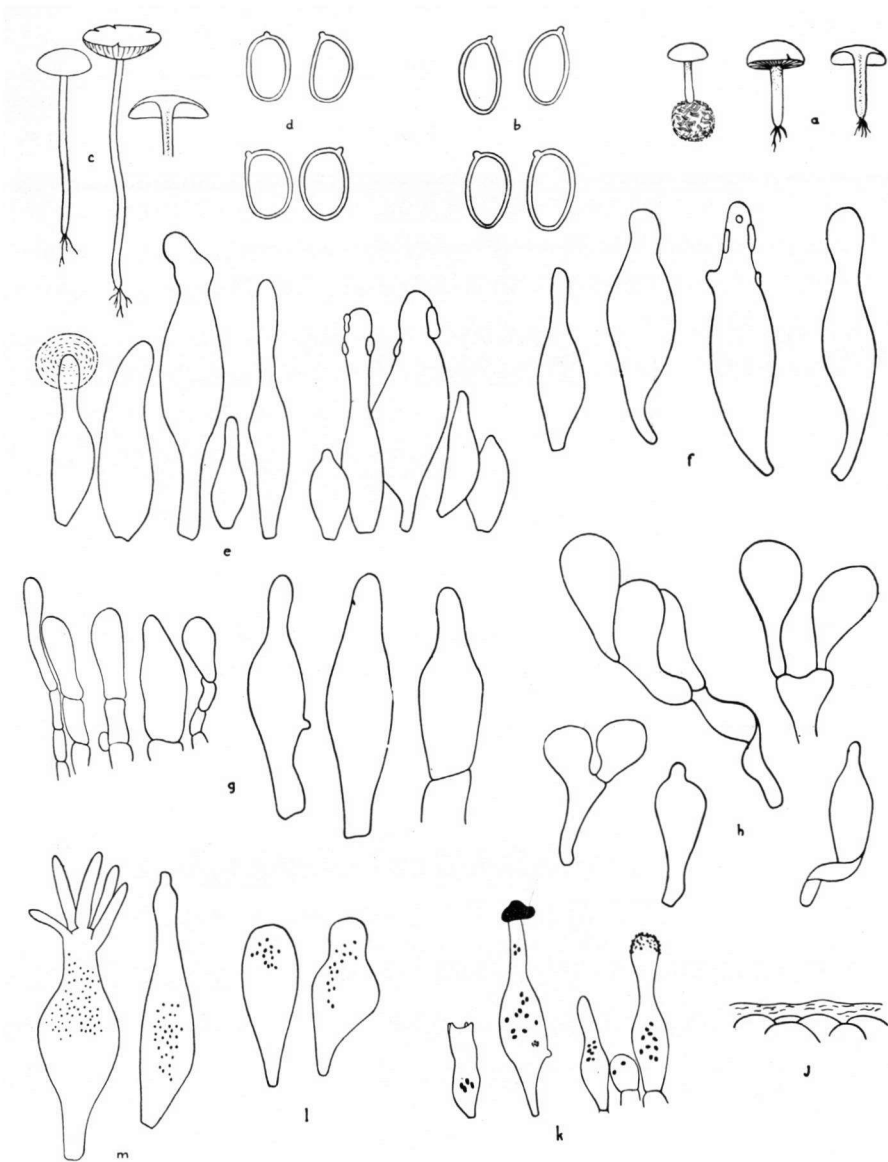


Fig. 1.

Fig. 1. a—k, *Agrocybe pusiola*, a. fruit-bodies, $\times 1$, b. spores, $\times 1250$ (a—b from Bas 929), c. fruit-bodies, $\times 1$, d. spores, $\times 1250$, e. cheilocystidia, $\times 500$, f. pleurocystidia, $\times 500$, g. caulocystidia, $\times 500$, h. elements cuticle, $\times 500$, j. section upper part cuticle with covering gelatinized layer, $\times 500$, k. basidium, pleurocystidium and cheilocystidia stained with aceto-carmin, $\times 400$ (c—h from Huijsman 14 VI 1956). l. *Agrocybe putamium*, pleurocystidia stained with aceto-carmin, $\times 400$ (from Bas 1051). m. *Agrocybe arvalis*, pleurocystidium and cheilocystidium stained with aceto-carmin, $\times 500$ (from Bas 1260).

The presence of a thin gelatinous layer on the cap, as well as scattered gelatinous patches on the stalk would justify the term "viscidulus" used by Fries. However, it must be very slight, in view of the fact, that none of the notes accompanying the collections studied mentions any viscosity.

It would be difficult to reject the identity of the present fungus with Fries' solely on account of discrepancies in colour, the more so as this

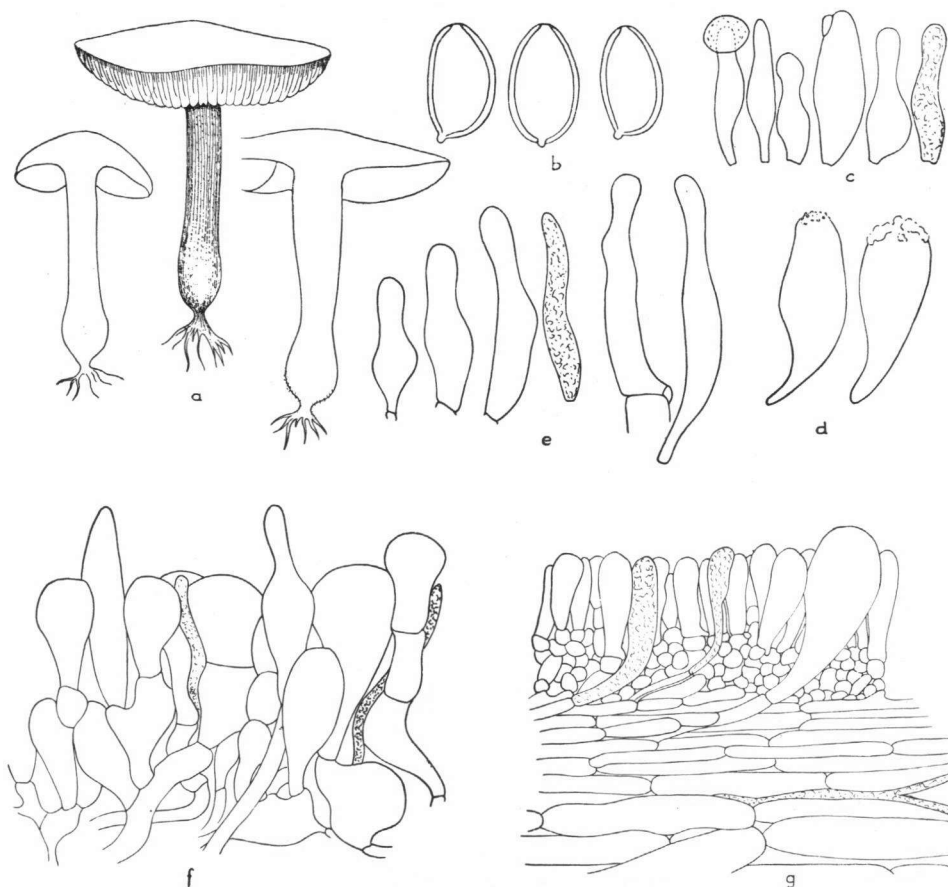


Fig. 2.

Fig. 2. *Agrocybe putaminum*, a. fruit-bodies, $\times \frac{1}{2}$, b. spores, $\times 1250$, c. cheilocystidia, $\times 500$, d. pleurocystidia, $\times 500$, e. caulocystidia, $\times 500$, f. radical section cuticle, $\times 500$, g. cross-section gill, $\times 500$ (from Bas 1051).

author's designations of the colour of the stalk of *A. pusiolus* are not alike: "Stipite...luteo" and "stipes citrinus" (1838: 195—96); "stipite...pallidior", "stipes...laete flavus" and "stipitem...citrinum" (1877—84: 23).

Fries (1830: 717) considered *Agaricus laevis* Pers. (1828: 164 pl. 25 fig. 1) to be conspecific with *A. pusiolus*. The type material of *A. laevis*

in the Herbarium Persoon at Leiden (L 910. 255—762) turned out to be a quite different species with thin-walled, asperulate spores, capitate hairs on the stipe, a filamentous cuticle, and without clamps; it may be *Galerina graminea* (Vel.) Kühn., but I would not vouch for this identification.

The descriptions of the present species by Gillet (1874—78: 546), Cooke (1883: 176), and Ricken (1910—15: 216) are almost identical with those of Fries. The picture by Cooke (1881—91: pl. 457) shows a fungus rather suggesting a *Tubaria*. Quélet (1888: 86) reports it form the north of France and Heim (1934: 129) from Spain. Parker-Rhodes (1954: 334) says it to be rather common on Skokholm Island, Great Britain. Judging from the literature this species is or was unknown to most of the European mycologists. All and all together we may consider *Agrocybe pusiola* widely distributed but rare in Europe.

Kühner (1953: 146) drew attention to the fact that Giemsa reveals many nuclei in the pleurocystidia of *Agrocybe firma* (Peck) Sing. and *A. arvalis* sensu Kühn. & Romagn. (= *A. tuberosa* sensu Singer). No results were obtained by me when applying this colouring agent to dried material; however, I succeeded with aceto-carmin. In *A. pusiola* the nuclei of the pleurocystidia, cheilocystidia, basidia and hyphae of the gill-trama became all strongly coloured; in *A. putaminum* and *A. arvalis* to the contrary only the nuclei in the pleurocystidia and cheilocystidia became visible.

The thin gelatinous layer on the cap and the scattered gelatinous patches on the stalk of *A. pusiola* point to the existence of a gelatinizing universal veil.

Agrocybe putaminum (Maire) Sing. in Beih. bot. Cbl. 56 B: 167. 1936. — *Naucoria putaminum* Maire in Ann. mycol., Berl. 11: 349—351 pl. 16 fig. 8—17. 1913.

Fruit-bodies medium to large, solitary or connate at bases. Cap 33—67 mm wide, rather irregularly convex or flattened-conical, sometimes with flat centre; margin slightly undulating and incurved at first; pale brownish ochre yellow (between Séguy 215 and 250), somewhat darker and browner when moist (slightly paler than Séguy 193), indistinctly zonate when drying; surface appearing somewhat velvety but no hairs visible with hand-lens; fleshy, not striate. Gills 54—60, with 3—7 small gills between each pair longer ones, crowded, thin, occasionally anastomosing, broadly adnate or emarginate, up to 6 mm broad near stalk, narrowing towards margin of cap, slightly ventricose, dingy chamois at first (Séguy 250, but with more grey), later on darker ochraceous brown (near Séguy 193) with whitish, minutely granular edge. Stalk 40—52 × 4—10 mm, cylindrical or slightly attenuated downwards; base somewhat bulbous with white rhizoids; pale brownish ochraceous yellow, slightly browner than cap, somewhat darker at base, wholly conspicuously floccose-granular, longitudinally striate, even slightly sulcate. Flesh in cap brownish white, in stalk darker downwards, reddish sepia brown in bases; smell strongly farinaceous when cut; taste bitter-farinaceous. Spore print dark havana brown near umber brown (between Séguy 131 and 701).

Spores 10.3—13.6(—15.6) × 6.3—7.3(—8.5) μ , ellipsoid, pale brown;

rather thick wall ($0.5-0.7\ \mu$) consisting of at least two layers, with distinct apical pore. Basidia $28-36 \times 8.8-9.3\ \mu$, 4-spored, subclavate, with clamps at bases. Pleurocystidia of two kinds: one type, $45-60 \times 14-19\ \mu$, with 10-20 nuclei, broadly clavate or utriform, with long pedicels, colourless, thin-walled, often with fine crystals on top; the other type $35-63 \times 6-16\ \mu$ (no nuclei observed), slender clavate, with yellow, refractive contents, much more numerous than first type and almost not protruding. Cheilocystidia $29-42 \times 9-13\ \mu$, with less nuclei than pleurocystidia, ventricose fusiform, pedicellate lageniform or subutriform, sometimes with yellowish refractive contents; many of them carrying large colourless mucous globules up to $15\ \mu$ across, which attract methylene-blue but disappear when put under a coverglass. Trama of gills regular; hyphae cylindrical, $5-20\ \mu$ wide, mixed with some slender, yellowish conducting hyphae; subhymenium rather broad, cellular. Cuticle very irregularly hymeniform with more or less clavate cells of varying length, mixed with fusiform or lageniform, protruding cystidia and hypha-like ends of conducting hyphae. Stalk with tufts of sublageniform, ventricose-fusiform and subfiliform, often subcapitate cystidia with sometimes yellowish refracting contents. Pigment brownish, incrusting cell-walls just beneath cuticle. Clamps present.

Habitat. On garden-soil (sandy clay) mixed with partly decayed dung and straw.

Specimens examined. Netherlands: Leiden, Zuid-Holland, 23 July 1956, *Bas 1051* and 8 August 1956, *Bas 1056* (new to the Dutch flora).

Maire's description of *Naucoria putaminum* applies very well to my specimens. The fact that Maire's fungus was found growing on stones of *Prunus* species seems not essential.

Since the collection of the present species comprises nine fairly large fruit-bodies which grew closely together, a great many fruit-stones were expected in the soil. None were found, however, even after careful sifting of the soil, whilst there were no fruit trees around either. It may be assumed, therefore, that *A. putaminum* is not particular to fruit-stones.

The present species seems to be very rare, no further records in the literature could be found.

Dr Hongo was so kind as to send me a part of the type of *Agrocybe farinacea* Hongo (1957: 143). This species is closely related to *A. putaminum* but clearly distinct. I found the following differences.

A. farinacea: spores $8.5-12 \times 6-8.5\ \mu$; stalk pruinose at apex only; hymeniform cuticle with scattered protruding cystidia about $36-50 \times 7-15\ \mu$, which are yellow in KOH.

A. putaminum: spores $10.5-13.5(-15.5) \times 6.5-8.5\ \mu$ (Maire: $10-13 \times 5-7\ \mu$); stalk pruinose down to the very base; hymeniform cuticle with numerous protruding hyaline cystidia and numerous, yellowish extremities of hyphae, not or slightly protruding.

Summary

Full descriptions of *Agrocybe pusiola* (Fr.) Heim and *A. putaminum* (Maire) Sing. are given. The following items may be stressed:

(i). Pleurocystidia and cheilocystidia of both species appear to contain many nuclei when coloured with aceto-carmin.

(ii). *Agrocybe pusiola* most probably has a gelatinized veil.

(iii). *Agaricus laevis* Pers. is not conspecific with *Agrocybe pusiola* as was claimed by Fries.

(iv). *Agrocybe putaminum* has, in addition to the normal pleurocystidia, a remarkable type of cystidia with yellowish contents.

(v). The habitat of *A. putaminum* is not confined to fruit-stones.

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