

Pholiota mucigera (Agaricales), a new species from a boreal old-growth forest

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A new species of Agaricales (Basidiomycetes), *Pholiota mucigera* Holec & Niemelä, is described. It is characterized by fairly large size and almost white, a cup covered with very thick slime. No scales are found on the pileus surface. In the microscope the species can be identified by the absence of cystidia; spores are ca. $5.1\text{--}6.2 \times 3.3\text{--}4\ \mu\text{m}$ and lack the germ pore. The species was found in a virgin spruce-dominated forest in Finland, growing on fallen *Populus tremula*. Differences between related species of *Pholiota* are discussed.

Key words: Agaricales, Finland, *Pholiota*, taxonomy

INTRODUCTION

The Kotinen Virgin Forest in Central Finland is a representative example of pristine western Taiga. Never touched with an axe, it harbours many fungal species which are never found in the surrounding, extensive forest areas with a fairly strong history of human influence. Other examples of species in the virgin forests include an extremely rare agaric, *Lepiota lignicola* P. Karst., which grows there on fallen birch logs. A threatened hydneous fungus, *Gloiodon strigosus* (Schwein.: Fr.) P. Karst., has been collected in Kotinen several times on big aspen trees, and many virgin-forest-inhabiting polypores were noted during field

courses arranged annually there. Examples of these are *Fomitopsis rosea* (Alb. & Schwein.: Fr.) P. Karst. and *Phellinidium ferrugineofuscum* (P. Karst.) Fiasson & Niemelä, and the threatened *Anomoporia bombycina* (Fr.) Pouzar, *Antrrodia pulvinascens* (Pilát) Niemelä, *Antrodiella citrinella* Niemelä & Ryvariden, *Junghuhnia collabens* (Fr.) Ryvariden, *Perenniporia subacida* (Peck) Donk and *Pycnoporellus fulgens* (Fr.) Donk.

The Kotinen Reserve is spruce (*Picea abies*) dominated lowland forest, belonging to the Middle Boreal zone (in the sense of Ahti *et al.* 1968). Several hundred year old pine (*Pinus sylvestris*) trees are commonly found as emergents, and standing, dead, debarked pine trees — the *kelo* in

Finnish — make an important niche for specialized fungi, especially after falling. Birch (*Betula pubescens*, *B. pendula*) and willow (*Salix caprea*) are commonly found, and on moist hillsides also robust specimens of aspen (*Populus tremula*). The last-mentioned tree, in particular, makes Kotinen an interesting site for those studying wood-inhabiting fungi.

What is most important for lignicolous fungi is that the forest has never been clear-cut, and it has even escaped selective cuttings of big trees. For this reason there are abundantly decaying, fallen tree trunks, as well as other woody debris on the ground.

The newly described species of *Pholiota* was collected in the Kotinen Reserve in 1995. It was searched for during the subsequent years, but no additional material has been obtained.

MATERIALS AND METHODS

The specimen was photographed in the field, and was dried in a mushroom dryer. Colour terms in the description derive from photographs taken *in situ*. In macroscopic description *L* means the number of lamellae reaching the stipe, and *l* = the number of lamellulae between the lamellae.

Spores were measured in lactophenol Cotton Blue (abbreviated as CB) and in 5% KOH (the spores swell more strongly in the latter, becoming shorter but thicker); in presenting the variation of the spore size, 5% of the measurements out of each end of the range are given in parentheses. The following abbreviations are used for microscopy: *L* = mean spore length (arithmetical mean of all spores), *W* = mean spore width, *Q* = length/width ratio, *n* = the number of spores measured from given number of specimens. Spores were measured from gills, and the dimensions originate from those seen in side view; hyaline, juvenile ones were excluded from the measurements.

The specimen was studied at magnification up to $\times 1250$ by using a Leitz Diaplan microscope and phase contrast illumination (TN), and by Zeiss Ergaval microscope at magnification of $\times 1600$ for spores and of $\times 640$ for other structures (JH). Draw-

ings were made with the aid of a drawing tube, from sections mounted in Cotton Blue.

Pholiota mucigera Holec & Niemelä, *sp. nova* (Figs. 1 and 2)

Pileus albus, centro ochraceoalbus, glutinosus, non squamosus; lamellae confertae, brunneolae; cystidia nulla, sporae 5.1–6.2 \times 3.3–4 μ m.

ETYMOLOGY: *mucus* (Lat., n.) slime, *gero* (Lat., v.) to carry, to bear.

HOLOTYPE: Finland. Etelä-Häme prov., Lammi, Evo, SW of Lapinkallio, Kotinen Virgin Forest, big trunk of *Populus tremula*, 15.IX.1995 Niemelä 5897 (H, isotype PRM).

Short description

Fruit bodies fairly large, pileus strongly glutinous, white at margin, gradually yellowish to yellow-ochraceous towards the centre, glabrous, stipe whitish-yellowish, with pale ochraceous, cottony squamules. Spores (5–)5.1–6.2(–6.5) \times 3.3–4 μ m, ovoid or rarely ellipsoid in face view, sometimes with slight median constriction, ovoid to slightly phaseoliform in side view, thick-walled, slightly dextrinoid, when young cyanophilous, germ pore absent; cystidia lacking. Growing on dead *Populus tremula*.

Basidiocarps

Pileus 7–10 cm across, convex with broad, low, obtuse umbo, margin slightly inflexed, pileus cuticle strongly glutinous with a thick layer of hyaline slime, white at margin, gradually yellowish to yellow-ochraceous at centre, glabrous, with irregular, small, ochraceous patches; faint, pale and appressed squamules present at very early age, soon disappearing. Lamellae crowded (*L* = 27–38, *l* = usually 4), slightly ventricose, emarginate, with lamellulae, pale tan brown at maturity. Stipe max. 8 cm long, 7–10 mm thick, cylindrical, straw white, with minute and irregular, ochraceous, soft, floccose or cottony squamules. Taste mild. Spore print colour and smell not noted.



Fig. 1. *Pholiota mucigera* Holec & Niemelä, basidiocarps of the holotype, photographed in situ, ca. $\times 0.5$.

Spores

Basidiospores in CB (5–)5.1–6.2(–6.5) \times 3.3–4(–4.5) μm , $L = 5.61$, $W = 3.59$, $Q = 1.56$ ($n = 30/1$) and in KOH (4.8–)5–6.4(–6.7) \times (3.3–)3.4–4(–4.2) μm , $L = 5.57$, $W = 3.68$, $Q = 1.51$ ($n = 30/1$); in face view ovoid or rarely ellipsoid and sometimes with slight median constriction, in side view ovoid to slightly phaseoliform; ochraceous brown in KOH, wall thick, smooth, dark brown, slightly

dextrinoid (with vinaceous-brown tinge in Melzer's reagent), when young cyanophilous in Cotton Blue but mature (brown) acyanophilous, hilar appendix distinct, germ pore absent.

Hymenium

Basidia narrow, long, 28–31 \times 6 μm , 4-spored, rarely 2-spored, narrowly clavate. Basidioles 18–

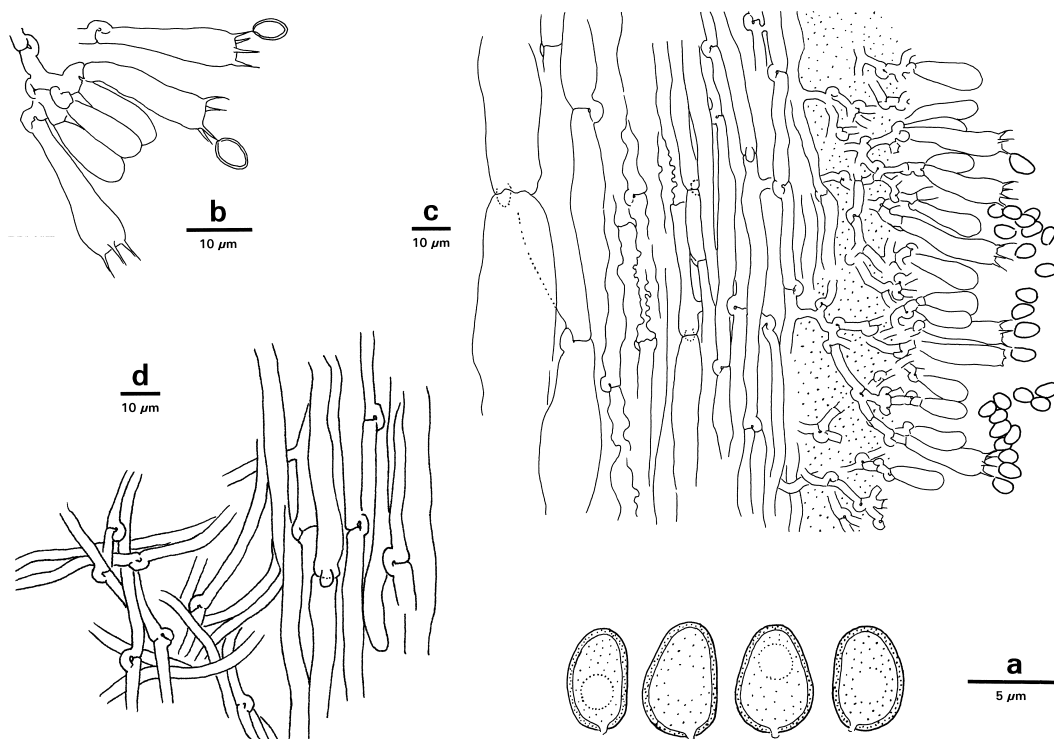


Fig. 2. Microscopic details of *Pholiota mucigera* Holec & Niemelä. — a: Spores. — b: Hymenial cells. — c: Vertical transverse section of gill trama, subhymenium and hymenium. — d: Hyphae from stipe surface and tomentum. Drawn from the holotype, mounted in Cotton Blue.

20 × 5.5–6 µm, clavate. Cystidia absent. Subhymenium distinct and thick, with narrow, spaced hyphae, branched in candelabra fashion and submerged in gelatinous matter.

Hyphal structure

Lamellar trama regular, made up of parallel cylindrical hyphae 7–15 µm in diam., near the subhymenium 3–8 µm only, hyphal walls in inner trama faintly but distinctly cyanophilous; a few gloeoplerous hyphae. Pileal cuticle an ixocutis, upper layer strongly gelatinized, formed by loosely arranged and parallelly aligned to flexuously interwoven hyphae 2–5 µm in diam., with yellow membranous and vacuolar pigment, lower layer formed by densely arranged parallel to slightly interwoven hyphae 4–11 µm in diam., with yellow membranous pigment, sometimes also with membranous or encrusting pigments. Context made

up of inflated, frequently up to 20 µm wide hyphae with thin, faintly cyanophilous walls; prominent gloeoplerous hyphae common. Stipe cuticle a cutis or slightly gelatinous ixocutis formed by parallel to slightly interwoven hyphae 2.5–4.5 µm in diam., with yellow membranous and vacuolar pigments, hyphae sometimes ascending and making up an indistinct tomentum; below these hyphae there is a layer of parallel cylindrical hyphae 3–9 µm in diam. and frequent gloeoplerous hyphae. Velum on stipe surface made up of flexuous or curved hyphae, cells 8–12(–18) µm in diam., cylindrical or narrowly fusiform with rounded apices. Clamp connections present in all tissues.

Ecology

Up to now the species is only known from one locality in southern Central Finland (Kotinen

Reserve in Lammi commune). The find originates from an old-growth forest, never cut and dominated by spruce, and with abundant individuals of *Populus tremula*. The growth site was in the richest area of the forest with many robust, fallen trunks of aspen, pine, spruce and birch. Basidiocarps were found at the broken butt of fallen, large trunk of *Populus tremula*, which was almost barkless and strongly white-rotted at the base. More material will be needed until the complete picture of the ecology of the species can be drawn.

The boreal coniferous and mixed forests of northern Europe certainly host many undescribed fungal species. *Pholiota mucigera* seems to be one of them, perhaps confined to natural to almost virgin vegetation. Owing to its resemblance to the common species *P. lenta*, *P. mucigera* may have been overlooked in the past. On the other hand, it may be an extremely rare species growing only in habitats uninfluenced by man.

Affinities within the genus

By its gross and microscopic characters *Pholiota mucigera* cannot conveniently be placed in any of the subgenera of *Pholiota*, like *Flavidula* (never so slimy; different appearance of fruit bodies) or *Flammuloides* (having both pleuro- and cheilocystidia; spores with germ pore), and so it seems to have a rather isolated position within the genus. At first sight the new species resembles *Pholiota lenta*, but has a more yellow centre of the pileus. However, microscopic characters are so unusual that the species cannot be compared with any European species of *Pholiota* known up to now (e.g., Bas *et al.* 1999). The same concerns the American species of the genus (Smith & Hesler 1968). When discussing the genus in northern Europe, Jacobsson (1991, 1997) stated that "various kinds of cystidia are found in all species". In fact all the species of the genus, known from Europe and North America so far, bear some kinds of cystidia. As a rule they possess at least

cheilocystidia of a rather characteristic shape. The absence of any cystidia in the new species (they were searched for on several microscopic mounts, but without success), and the presence of small spores having no germ pore make *P. mucigera* a distinctive and easily identified taxon.

The porcelain-white margin and yellow-ochraceous centre make the species eye-catching in the field. The pilei were so slimy when collected (after a slightly rainy night) that it was difficult to handle them.

Issakainen (1983) made a study on the species of *Pholiota* in Finland, including some materials that he considered to be possibly undescribed or at least unreported from the country. None of his species match with the newly described one.

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