



Valid publication of the name *Tricholomopsis flammula* (Fungi, Basidiomycota, Tricholomataceae), a species clearly separated from *T. rutilans*

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ABSTRACT. *Tricholomopsis flammula* Métrod, an invalid name, is here validly published as *T. flammula* Métrod ex Holec. A thorough description based on authentic material and recent collections is published together with line drawings of microcharacters and a colour photograph. Differences from *T. rutilans*, *T. decora* and *T. ornata*: especially the small and slender fruitbodies, minute scales having wine red to purple colour, pure yellow stipe and mostly ellipsoid spores, are outlined.

KEY WORDS. Macromycetes, taxonomy, nomenclature.

INTRODUCTION

Tricholomopsis flammula Métrod was described from the Jura Mts. in France by Georges Métrod (Métrod 1946). The original description is very detailed and it is supported by line drawings and a good quality colour illustration. It represents a small and slender lignicolous fungus with sulphur yellow pileus covered with fine red-violet scales, glabrous and sulphur yellow stipe, yellow lamellae, large clavate cheilocystidia, distinct pleurocystidia with a refractive content, and ellipsoid spores reaching the size of $6.7\text{--}7.8 \times 3.7\text{--}4.7 \mu\text{m}$. However, the name *T. flammula* was published without a Latin diagnosis and, thus, it is an invalid name. The species seems to be very rare and, consequently, later authors mostly treated it without any personal knowledge. This is probably the reason why some mycologists consider it a mere variant of the common *Tricholomopsis rutilans* (Schaeff.: Fr.) Singer (Boekhout & Noordeloos 1999) or a “small and rusty brown-scaled form or variety” of *T. decora* (Fr.: Fr.) Singer (Breitenbach & Kränzlin 1991). Ludwig (2001) considered it a “rare, dwarfish form of *T. rutilans*” and published the validization (he added the Latin diagnosis) and combination *T. rutilans* f. *flammula* (Métrod) ex E. Ludw. However, this name is also invalid as the holotype was not designated. Recently, the combination *T. flammula* (Métrod ex E. Ludw.) P.-A. Moreau & Courtec. was proposed (Courtecuisse 2008). However, being based on the invalid names from Métrod and Ludwig, it is also thus invalid.

The aim of this paper is to strengthen the position of *T. flammula* as a good species and finally validate its name.

MATERIALS AND METHODS

The description of macrocharacters is based on the following collections: PRM 899108 (fresh basidiocarps), WU 25091 (unpublished colour photo by A. Hausknecht), WU 13075 (colour photo by A. Hausknecht, see Fig. 1), WU 10478 (Krisai-Greilhuber et Voglmayr 2000: description + colour photo), IB 84/304 (Moser & Jülich 1993: colour photo). Microscopic examination was made of all collections cited in the Material studied section using an Olympus BH-2 microscope, the material being mounted in a 5% KOH solution. Iodine reaction was studied using Melzer's reagent, prepared according to the formula given in Moser (1983). In each collection studied, 20 randomly selected mature and fully developed spores were measured. Illustrations of microcharacters were drawn at a magnification of 1250 × using a drawing tube. For descriptive terminology see Bas et al. (1988). For colour codes see Kornerup & Wanscher (1981). The collections studied are kept in herbaria PRM, WU, IB and PC (for herbarium codes see Holmgren & Holmgren 1998). Abbreviations: L = number of lamellae reaching up to the stipe, l = number of lamellulae between each pair of two lamellae, Q = quotient of length and width of the spores, Q_{av} = mean value of Q in each of the collection studied.

RESULTS

After detailed study of the collections cited below, I came to the conclusion that *Tricholomopsis flammula* Métrod nom. inval. is a good species, clearly delimited from *T. rutilans* and *T. decora*. Consequently, I decided to validate the name *T. flammula* (to express my admiration for Métrod's taxonomic talent and to retain the traditional name) and provide it with a detailed description.

***Tricholomopsis flammula* Métrod ex Holec, spec. nov. (Figs. 1, 2)**

based on *Tricholomopsis flammula* Métrod, Revue de Mycologie 11(1): p. 77, pl. 1: fig. 5, 1946; invalid name: published without Latin diagnosis.

MYCOBANK: MB 515045.

ETYMOLOGY: *flammula* (*Flammula* by Métrod 1946) – habitually resembling the basidiocarps of the genus *Flammula* (currently a subgenus of *Pholiota*).

HOLOTYPE: France, Jura Mts., damp of wood chips in a saw-mill, 2 Oct 1944, leg. & det. G. Métrod, no. 1444 (PC 0096810). The collection is rather scanty (1 fruitbody), however, the paratypes cited here in Material studied can be used for future revision as they are rich in material.

DIAGNOSIS LATINA: Carposomata solitaria vel gregaria. Fungus parvus, tenuis. Pileus 10-40 mm latus, convexus usque depressus, citrinus, luteus usque ochraceo-luteus, minute et dense squamulosus, squamulis vinaceis usque rubro-brunneis. Lamellis adnexas, adnatis vel subdecurrentibus, citrinis, luteis usque ochraceo-luteis. Stipes 15-50(-60) × 2-5(-6) mm, cylindraceus, citrinus usque luteus, subtiliter tomentosus usque fibrillosus, sine squamulis.



Fig. 1. Basidiocarps of *Tricholomopsis flammula* (WU 13075). Photo by A. Hausknecht.

Contextus luteus usque ochraceo-luteus. Sapor mitis. Odor indistinctus. Basidiosporis 5.2-8.0 x 3.2-4.8 μm , plerumque ellipsoideis, minus obovoideo-ellipsoideis, ovoideo-ellipsoideis usque oblongis, raro late ellipsoideis vel leviter phaseoliformibus in aspectu laterali. Cheilocystidiis magnis, plerumque clavatis. Pleurocystidiis abundantibus, plerumque cylindraco-fusiformibus vel anguste clavatis, contenu homogeneo, aliquot refractivo, pallide luteo. Hyphis omnibus fibulatis. Holotypus: Gallia, montes Jura, 2 Oct. 1944, leg. et det. G. Métrod 1444 (PC 0096810).

DESCRIPTION: **Basidiocarps** growing solitarily or in small groups. **Pileus** 10-40 mm wide, hemispherical-convex to convex with involute margin when young, then convex to plano-convex with inflexed margin, at maturity slightly depressed to depressed with straight and sharp margin and rarely with a low, broad umbo, dry, mat, not hygrophanous, scaly, ground colour lemon yellow (2A5-6), pale to bright yellow (3A5-7) to ochre-yellow (4A6-7), slightly paler towards the margin, scales very small, up to 1 x 1.5 mm, densely arranged, tomentose-fibrillose, adpressed to slightly upraised, colour strongly contrasting to the ground, colour wine red (11D6-7), purple red (10D6-7) to red-brown (9E7-8), in some young basidiocarps the scales are so dense that the pilei appear purple red with yellow margin only. **Lamellae** crowded, L = 25-40, l = 1-3, 1.5-4 mm high, segmentiform to subventricose, adnate to adnexed when young, in older basidiocarps adnate to subdecurrent, pale lemon yellow (2A3-5), yellow to ochre-yellow (4A6-7), edge fimbriate and slightly

more yellow in young carpophores (magnification 20 x, from protruding cheilocystidia), almost even and concolorous or slightly paler in older basidiocarps (cheilocystidia collapsed, see below). **Stipe** 15-50(-60) × 2-5(-6) mm, cylindrical, straight, curved to slightly flexuose, base rounded to subconical, almost without basal tomentum, without mycelial cords, ground pale lemon yellow (2A2-4), pale yellow (3A5-6) to yellow (3A7), dull yellow when old, surface finely white tomentose when young, then finely adpressedly fibrillose, without scales and no traces of purple red colour (however, under light microscope the coloured veil hyphae are present but so infrequently that they are invisible to the naked eye or lens), solid. **Context** firm, yellow to dull ochre-yellow. Taste mild (tested only in WU 10478, see Krisai-Greilhuber & Voglmayr 2000). Smell indistinct (tested only in WU 10478, see below; PRM 899108). **Basidiospores** (5.2-)-5.5-7.2(-8.0) × (3.2-)-4.0-4.4(-4.8) μm, Q = 1.33-2.0, Qav in each of the 7 collections studied = 1.51-1.63, average Qav derived as average value of all 140 spores measured = 1.58, variable in shape, mostly ellipsoid, less frequently obovoid-ellipsoid, ovoid-ellipsoid to oblong, rarely broadly ellipsoid or flat to slightly phaseoliform in side view (in each collection, all these variants are usually present), smooth, thin-walled, with small but distinct hilar appendix, mostly with one big oil droplet, not amyloid, not dextrinoid. In some collections, a large number of immature or poorly developed spores (extremely thin-walled, empty) are present. Such spores were not measured. **Basidia** 23-29 × 4.0-6.5 μm, 4-spored, cylindrical to narrowly clavate with a slight subapical constriction, with oil droplets and finely granular content (observed in well-dried collections only), with basal clamp connection, sterigmata narrow, 3.0-4.5 μm long. **Basidioles** 16-22 × 4-5 μm, cylindrical to narrowly clavate, with oil droplets and finely granular content (observed in well-dried collections only), with basal clamp connection. In addition, cylindrical hymenial cells of size 15-23 × 2.5-3.5 μm were observed in some collections (e.g. PRM 899108, Métrod 1444, WU 13075, WU 10478), situated in the same layer as the basidia and basidioles but differing from them by smaller size, cylindrical shape and hyaline content. **Cheilocystidia** prominent, large, often fasciculate in nests, forming a sterile band which is yellow-brown in mass, variable in size and shape, sometimes partly collapsed so that the shape is hard to recognise, (30-)-35-80(-100) × (10-)-14-32 μm, mostly narrowly clavate to clavate, but also broadly clavate to almost sphaeropedunculate, cylindrical-fusiform, lageniform-fusiform, narrowly utriform, often with a narrow and curved peduncle, rarely papillate at apex, thin- to slightly thick-walled (up to 1 μm), wall yellow, interior hyaline or partially filled with a yellow-brown content (probably collapsed vacuolae). **Pleurocystidia** very abundant, 27-60 × 7.0-10 μm, cylindrical-fusiform, narrowly lageniform-fusiform, narrowly clavate to almost cylindrical, usually with a narrow peduncle, rarely slightly mucronate, hyaline or filled with a homogeneous or finely granular, pale yellow content, thin-walled, very distinctive from other hymenial cells by their larger size, shape and somewhat refractive content. **Lamellar trama** regular to subregular, of densely arranged hyphae 3-11 μm wide, cells cylindrical to slightly inflated, hyaline, with yellow wall, subhymenium not gelatinous, cells hardly discernible, densely arranged, shortly septate. **Pileus surface** a cutis of densely arranged parallel hyphae 3-10 μm wide, with yellow membranal pigment and incrusta-

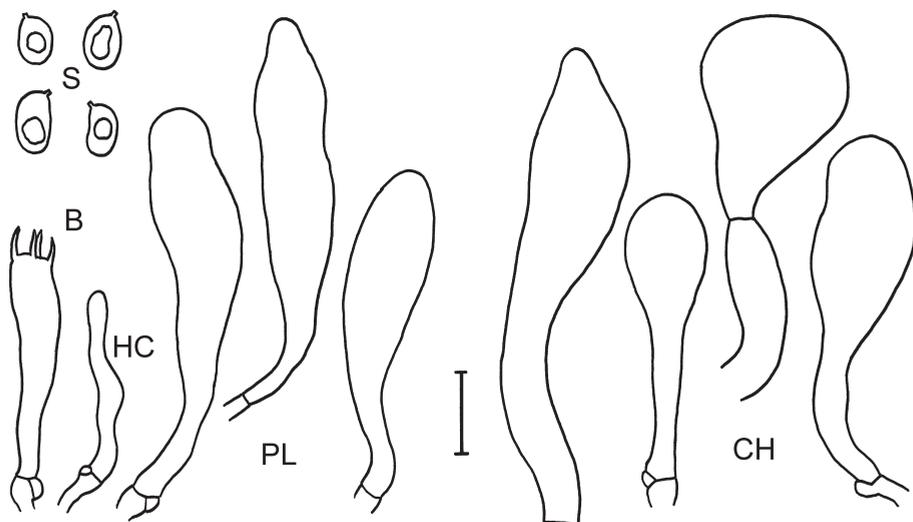


Fig. 2. Microcharacters of *Tricholomopsis flammula* (PC 0096810 = holotype). B: basidium, CH: cheilocystidia, HC: cylindrical hymenial cell, PL: pleurocystidia, S: basidiospores. Scale bar = 10 μ m. Drawing by J. Holec.

tions, in some collections only (e.g. PRM 899108) with upraised terminal cells of narrow hyphae which are curved, narrowly cylindrical with obtuse apex, 20-50 x 2.5-3 μ m, with homogeneous content; the cutis is covered with adpressed scales which are violet-brown as a whole, composed of straight or interwoven cords of densely arranged hyphae 8-20 μ m wide, cells cylindrical to fusiformly inflated, with homogeneous pale violet to violet-brown content, yellow-brown membranous pigment and incrustations, terminal cells narrowly lageniform-fusiform to narrowly clavate with obtuse, slightly clavate or slightly mucronate apex. **Pileus context** composed of subparallel to slightly interwoven hyphae 4-16 μ m wide, cells cylindrical to slightly inflated, hyaline, with pale yellow wall. **Stipe surface** a cutis of densely arranged hyphae 4-6 μ m wide, with yellow membranous pigment and fine incrustations; in some collections only (e.g. PRM 899108, WU 25091) covered with frequent ascending (oblique to upright) hairs resembling those on pileus surface, 20-50 x 2.5-3 μ m, it was impossible to recognise the mode of growth (with septum or not?, in several cases they clearly represent long lateral outgrowths of stipe surface cells); surface sparsely covered with veil remnants resembling those on pileus surface (forming the scales), hyphae 8-20 μ m wide, forming cords or sparse interwoven net, often ascending, with yellow-brown wall and pale brown-violet homogeneous content. **Clamp connections** present in all tissues.

MATERIAL STUDIED: **Czech Republic:** Šumava Mts., 3.9 km NNE of Zátouň village near Lenora, Boubínský prales National Nature Reserve, on decaying trunk of *Abies alba* covered with mosses, 19 Sept 2008, leg. & det. J. Holec (PRM 899108). **Austria:** Oberösterreich, Schärding, Kleines Kesselbachtal, on the ground under old apple trees, 3 Nov 1991, leg. H. Voglmayr, det. I. Krisai-Greilhuber & A. Hausknecht (WU 10478, described and

illustrated in Krisai-Greilhuber & Voglmayr 2000). – Steiermark, Mariazell, Dürradmer, wood of a broadleaved tree, 7 Sep 1994, leg. A. Hausknecht et al., det. A. Hausknecht (WU 13075). – Vorarlberg, Feldkirch, Rote Au, on wood, 2 Sep 2004, leg. I. Oswald, det. A. Hausknecht (WU 25091). **France:** Jura Mts., damp of wood chips in a saw-mill, 2 Oct 1944, leg. & det. G. Métrod, no. 1444 (PC 0096810, holotype). – Jura Mts., on piece of wood in a forest, 2 Sept 1945, leg. & det. G. Métrod, no. 1444.2 (PC 0096809). Both collections represent the authentic material used by Métrod (1946) for his original description of *T. flammula*. – Forêt de Planbois, near Thonon, Chablais, on decayed log of a broadleaved tree covered with mosses, 10 Oct 1984, leg. & det. M. Moser (IB 84/304, colour photo of this collection published by Moset & Jülich 1993; however, it is not representative as the colour of scales is shifted to brown, obviously by a print error).

DISCUSSION

A detailed study of the collections cited showed that there are many characters distinguishing *T. flammula* from *T. rutilans*: smaller and more slender basidiocarps, smaller and finer scales, yellow stipe without any traces of red, purple or violet colour, majority of spores being elongated (not rounded), very abundant pleurocystidia. The same conclusions were published by Krisai-Greilhuber & Voglmayr (2000) and they are also in agreement with the original description and comments by Métrod (1946). In collections of *T. rutilans* studied for comparison (PRM 889808, PRM 889120, PRM 821774), the pleurocystidia were either completely absent or present but scarce to rare (see also Boekhout & Noordeloos 1999).

The key distinguishing character is the spore shape. In *T. flammula*, Qav values in each of the collections studied fall into the range 1.51-1.63 (with total average 1.58 and whole range of Q values 1.33-2.0), whereas in *T. rutilans* the range of Qav values is 1.32-1.35 (with total average 1.33, whole range of Q values 1.14-1.55). Almost the same Q values in *T. rutilans* were revealed by Boekhout & Noordeloos (1999: Q = 1.15-1.50, Qav = 1.3-1.4). There is an overlap of Q values between *T. flammula* and *T. rutilans* when all values are taken into consideration, however, the average values are clearly different (to reveal them, it is necessary to measure at least 20 spores from each collection). The difference is clearly visible under the light microscope – most spores of *T. flammula* are ellipsoid (sometimes slightly phaseoliform in side view) whereas in *T. rutilans* the majority of them are broadly ellipsoid to subglobose (never phaseoliform in side view).

Tricholomopsis decora clearly differs from *T. flammula* by its more robust basidiocarps, absence of red, purple to violet colours (its scales are bronze-coloured, olive brown, fuliginous to dark brown) and lack of indistinct pleurocystidia. *Tricholomopsis ornata* (Fr.) Singer is a less known species differently understood by authors. However, it is said to have more robust fruitbodies and flocculose, fulvous brown scales without distinct red or purple tinges (Fries 1838).

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