

## Additions to the Hungarian mycobiota 2. *Coprinus* and *Tricholoma*

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Received 5. 7. 2005

**Key words:** *Agaricales*, *Coprinus*, *Tricholoma*. – New records, new variety. – Mycobiota of Hungary.

**Abstract:** Five *Coprinus* spp. and one *Tricholoma* species of the Kiskunság National Park in Hungary are presented and described in detail, their taxonomy and nomenclature are discussed. Five taxa are reported for the first time in Hungary, *Tricholoma populinum* var. *bohusii* is described as new.

**Zusammenfassung:** Fünf Tintlinge und ein Ritterling aus dem Kiskunság Nationalpark in Ungarn werden vorgestellt und detailliert beschrieben, ihre Taxonomie und Nomenklatur werden diskutiert. Fünf Taxa sind Erstfunde für Ungarn, *Tricholoma populinum* var. *bohusii* wird neu beschrieben.

Some new records to the Hungarian mycobiota, which were collected by the author on the sand-region of the Kiskunság National Park, central Hungary, are presented. *Coprinus* species are rather rarely reported from Hungary. There is, however, a great diversity in species and there are many rare and/or endangered species, as demonstrated by earlier publications (BABOS 1989, 1999).

### Materials and methods

Microscopic examinations were carried out on dried herbarium material, for mounting Congo red in 15 %  $\text{NH}_4\text{OH}$  was used. Drawings were made by free-hand. Numbers in brackets after the word "spores" refers to the number of spores measured, the fruitbodies, and the collections they originate from, respectively. All specimens were deposited in the herbarium of the author, holotypes were deposited in BP.

On the figures the following abbreviations are used: *ch* cheilocystidia, *pl* pleurocystidia, *pi* pileocystidia, *v* veil, *b* basidia, *sp* spores, *ca* caulocutis, *cac* caulocystidia, *pp* pileipellis.

*Coprinus stanglianus* BENDER, ENDERLE & GRÖGER in Z. Mykol. 54: 57. 1988 (Fig. 1)

*Coprinopsis stangliana* (BENDER, ENDERLE & GRÖGER) REDHEAD, MONCALVO & VILGALYS in Taxon 50: 231 (2001).

**Type:** Germany, Baden-Württemberg, Bissingen, on sandy soil, 29. 5. 1986, leg. M. ENDERLE & G. E. KRIEGLSTEINER (M).

**Pileus:** up to 30 x 50 mm when closed, up to 70 mm when fully expanded (in one collection only 30 x 40 mm, up to 50 mm when expanded), conical, later campanulate-convex, convex-applanate when old, margin strongly translucently striate, even, thick,

not striate, at first white, later becoming greyish, black when old, veil abundant, forming irregular to quadrangular, whitish, when dry pale yellow patches (ca. 5 mm in diam.) mainly in centre, rather persistent but vanishing in keen rain.

**Lamellae:** up to 7 mm broad, free, very crowded, slightly ventricose, thin, white when young, later greyish, black when old, rather quickly deliquescent, lamellar edge fimbriate, whitish.

**Stipe:** 40-70 x 4-11 mm, equal to somewhat clavate (15 mm), whitish, not discolouring, when young slightly floccose at apex, fistulose, fragile.

**Spores:** (68, 3, 2) 9.4-12.5 x 6.8-8  $\mu\text{m}$ , on average 10.76 x 7.35  $\mu\text{m}$ ,  $Q = 1.31-1.69$ , on average 1.4-1.5, elliptical with obtuse apex, rather small hilum, often with one large oil inclusion (especially when growing in salinic habitats), very dark reddish brown, germ-pore central, ca. 1.4  $\mu\text{m}$  wide.

**Basidia:** 4-spored, clavate to sphaeropedunculate, with oil inclusions, ca. 25 x 10  $\mu\text{m}$ .

**Cheilocystidia:** 70-155 x 32.5-43.8  $\mu\text{m}$ , cylindrical, slightly utriform to fusoid, sometimes broadly ellipsoid, hyaline, thin-walled, abundant.

**Pleurocystidia:** similar to pleurocystidia, numerous.

**Veil:** composed of thin-walled, diverticulate elements.

**Pileipellis:** a cutis of parallel, often slightly inflated hyphae.

**Habitat and distribution:** It is very rare all over Europe, known from Belgium, The Netherlands and Germany (ULJÉ & NOORDELOOS 1997). HENRICI & LAESSØE (1993) gave an excellent photograph and a description of the material found in Great Britain. KAYA (2001) reported it from Turkey. In Austria 18 collections are known from Lower Austria, Vienna and Burgenland (ÖMG 2005 via I. GREILHUBER, pers. comm.). In Hungary it is reported from eighth localities (BABOS 1999: six localities, as *Coprinus* n. sp.?.; NAGY 2004, two localities) exclusively between Danube and Tisa, from xerophytic grasslands on calcareous, sandy soil and from salinic pastures, often from extremely alcalinic soils, ca. pH 11 (BABOS, pers. comm.).

**Collections examined: Hungary:** com. Bács-Kiskun, Nyomási forest, Cynodonti-Festucetum pseudovinae, on calcareous sand, together with *Coprinus ammophilae* COURTEC., 13. 5. 2004, leg. L. NAGY (herb. NAGY); - Csalánosi forest, Cynodonti-Festucetum pseudovinae, on calcareous sand, 18. 6. 2004, leg. L. NAGY (herb. NAGY); - Fülöpszállás, Kelemen-szék, in saline pasture (Artemisio-Festucetum pseudovinae), 31. 5. 1978, leg. M. BABOS, P. Z. KOMÁROMY and J. SZUJKÓ-LACZA (BP); - Fülöpszállás, Laposrét, in saline pasture (Artemisio-[H1]Festucetum pseudovinae, Potentillo-Festucetum pseudovinae), 30. 5. 1984, leg. M. BABOS and J. SZUJKÓ-LACZA (BP); - Kunszentmiklós, in saline pasture (Artemisio-Festucetum pseudovinae), 30. 5. 1978, leg. M. BABOS (BP); - between Kunszentmiklós and Szabadszállás, in saline pasture (Artemisio-Festucetum pseudovinae), 27. 6. 1979, leg. M. BABOS (BP); - Szabadszállás, in saline pasture (Artemisio-Festucetum pseudovinae), 28. 5. 1974, leg. G. BOHUS and E. VÉSSEY (BP); - - 13. 5. 1977, leg. F. NÉMETH (BP); - - 28. 5. 1978, leg. F. NÉMETH (BP); - Szabadszállás, Büge, in saline pasture (Artemisio-Festucetum pseudovinae), 30. 5. 1984, leg. M. BABOS and J. SZUJKÓ-LACZA (BP).

The present species is characterized by habitat and spore size. The most similar species is *Coprinus picaceus* (BULL.: FR.) GRAY, which differs in much larger spores, somewhat larger basidiocarps and different habitat. Another similar species was reported by ULJÉ & NOORDELOOS (1997) as *Coprinus* spec. (Amsterdamse bos 13. 7. 1958) differing only in spore size. *Coprinus sclerotiorum* HORVERS & DE COCK (in ULJÉ & NOORDELOOS 1997) is macroscopically similar, but has sclerotia, different microscopy and occurs on dung.

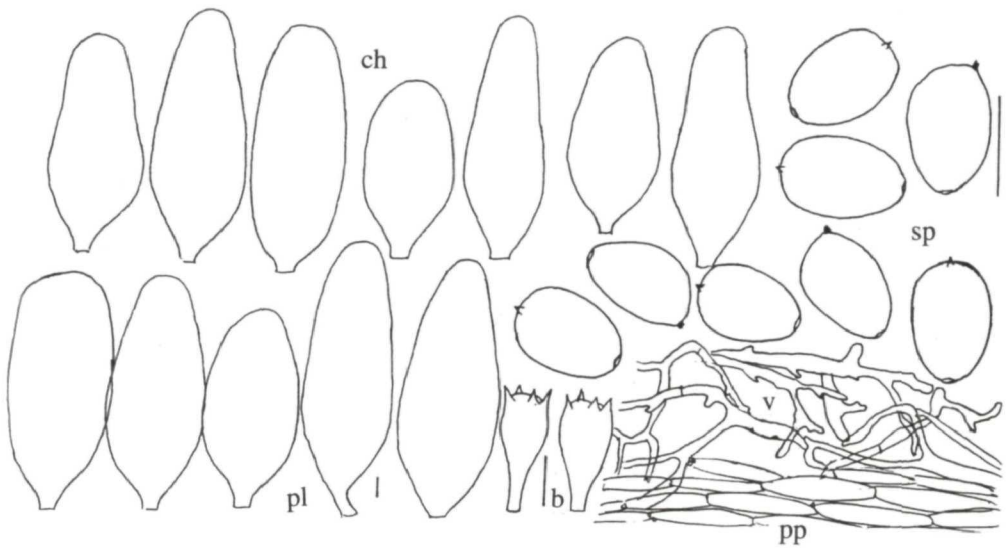


Fig. 1. *Coprinus stanglianus*, bars: 10  $\mu$ m.

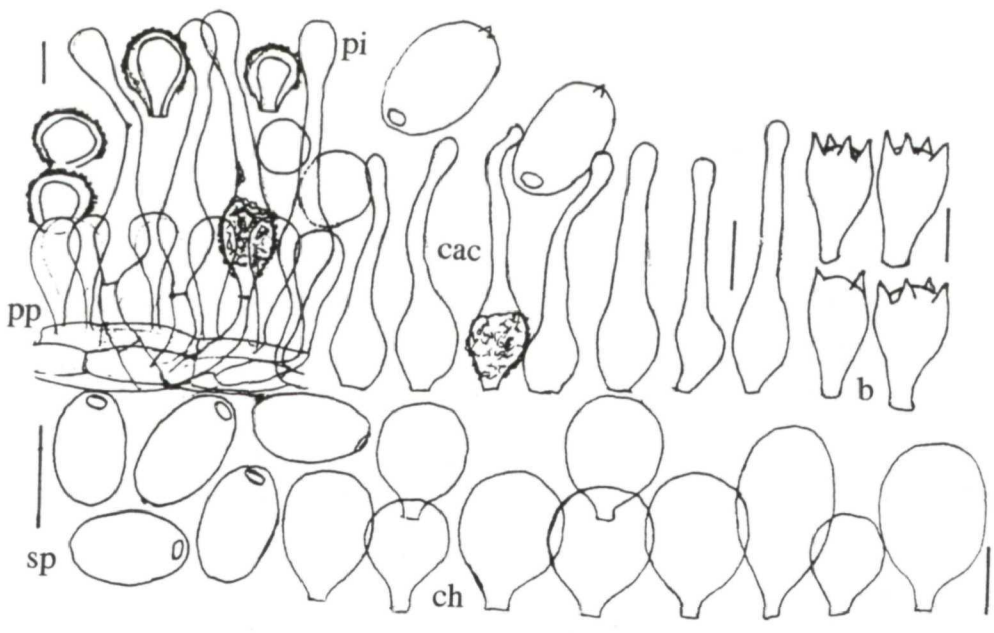


Fig. 2. *Coprinus curtus*, bars: 10  $\mu$ m.

***Coprinus curtus* KALCHBR.** in Thümen, Flora **59**: 424.1876 (Fig. 2)

*Coprinellus curtus* (KALCHBR.) REDHEAD, MONCALVO & VILGALYS in Taxon **50**: 233 (2001); *Coprinus plicatilooides* BULLER in Res. Fung. **1**: 69 (1909).

**Type:** South Africa, Somerset East, foot of Mt Boschberg, on dung, Jan. 1875, leg. MACOWEN No. 1014, in herb NY (labelled as paratype).

**Pileus:** 1-3 x 1-3 mm when young, up to 8 mm broad when expanded, ellipsoid to subglobose when young, later campanulate, surface greyish powdery when young, slightly pilose, becoming naked as the veil vanishes, pale brownish, brownish grey, centre darker.

**Lamellae:** crowded, free, 0.4-1 mm broad, ventricose, lamellar edge slightly fimbriate, white when young, soon blackish.

**Stipe:** 10-27 x 0.3-0.8 mm, fragile, hyaline, finely pubescent when young especially towards base, cylindrical, whitish. Smell indistinct.

**Spores:** (30, 2, 1) 8.9-12.6 x 5.2-7 µm, on average 10.32 x 6.04, Q = 1.48-1.85, AvQ = 1.7, ellipsoid with truncate base, very dark, almost black, subopaque, germ-pore eccentric, 1.8-2 µm in diam.

**Basidia:** clavate to sphaeropedunculate, 4-spored, exceptionally 2-spored, 22-25 x 8.7-11.3 µm.

**Cheilocystidia:** abundant, globose-subglobose to subutriform or ellipsoid.

**Pleurocystidia:** absent.

**Pileocystidia:** 70-100 x 9.7-14 µm, lageniform with strongly swollen apex (8-10.3 µm), often incrustated at base.

**Veil:** sphaerocysts moderately numerous, globose, as a rule incrustated, some with very thick (up to 4-5 µm), bright yellow-brown wall, these horizontally flattened.

**Caulocystidia:** 27-40 x 9-11.3 µm, abundant, lageniform with narrow neck (1-2 µm) and only slightly capitate apex, some incrustated at base.

**Habitat and distribution:** It occurs on dung of several kinds of animals (e.g., horse, cow, deer, rabbit) and is widespread, but rare everywhere. In Hungary this is the first record. In Lower Austria it has been recorded two times (ÖMG 2005 via I. GREILHUBER, pers. comm.). It is known from Europe, Brazil (RICHARDSON 2001), Africa (EBERSON & EICKER 1997), Hawaii (KEIRLE & al. 2004), Australia (MAY & al. 2005), and North-America (VAN DE BOGART 1975).

**Collection examined: Hungary:** Kecskemét, Nyomási-forest, on rabbit-faeces in Cynodonti-Festucetum pseudovinae, 12. 12. 2004, leg. L. NAGY (herb. NAGY).

This species is easily recognized by the capitate pileocystidia, presence of velar sphaerocysts which are often incrustated, and the habitat on dung. Its closest relative is *C. heptemerus* M. LANGE & A. H. SM., which shares the presence of incrustated velar elements, coprophilous habitat and most macroscopic details. It differs, however, in having non-capitate pileocystidia, somewhat larger spores, and velar sphaerocysts which often bear spine-like projections. It is noteworthy that such projections have already been detected by the author in *Coprinus curtus* also. BREITENBACH & KRÄNZLIN (1995: 280) described *C. heptemerus* var. *parvisporus* BREITENBACH & KRÄNZLIN, which has smaller spores. BOGART (1975) described provisionally two taxa which differ in tiny details. *Coprinus subcurtus* THIERS described from Texas, does not seem to be related to *C. curtus* in the present taxonomy. Although the protologue of THIERS

(1959) is obscure, it can be stated that his fungus should belong to subsect. *Nivei* on account of the presence of spherical elements of the pileus, but for further conclusions a study of the type material is necessary.

The only type material existing is in NY and is labelled as paratype. It represents the collection cited in the protologue (KALCHBRENNER 1876) and also is the only one cited. According to Art. 9.5 of the International Code of Botanical Nomenclature (GREUTER & al. 2000) a paratype is a specimen cited in the protologue, that is neither the holotype nor an isotype, nor one of the syntypes. As No. 1014 of MACOWEN is the only specimen cited in the protologue it should be considered the holotype of this name.

*Coprinus krieglsteineri* BENDER in Beitr. Kenntnis Pilze Mitteleur. 3: 215. 1987 (Figs. 3, 6)

*Coprinopsis krieglsteineri* (BENDER) REDHEAD, MONCALVO & VILGALYS in Taxon 50: 229.

**Type:** Germany, Nordrhein-Westfalen, Neersen Schloßpark, MTB 4704, 14. 5. [H2]1983, leg. M. MEUSERS, (M).

**Pileus:** up to 10 x 25 mm when young, cylindrical to narrowly conical, later conical to broadly conical, up to 35 mm when expanded, margin finely striate, especially when old, surface with sparse floccose veil when young, this disappearing very soon, dark brown when young, more greyish on drying, mouse-grey when dry and old, quickly deliquescent.

**Lamellae:** up to 1.5 mm broad, hardly ventricose, crowded, whitish-pale yellowish when young, later blackish, lamellar edge whitish, fimbriate.

**Stipe:** 40-80 x 1.5-2 mm, fragile, fistulose, cylindrical and strongly radicate in substrate (20-30 mm), thickly whitish pubescent in entire length (veil!), white at apex, brownish towards base, root distinctly brown; Smell indistinct.

**Spores:** (36, 2, 1) 11.5-14.7 x 6.2-8 µm, on average 13.13 x 7.12 µm, Q = 1.64-2.07, AvQ = 1.72, oblong to subcylindrical, dark reddish brown, but not opaque, with central germ-pore, ca. 2 µm in diam.

**Basidia:** 22.5-37.5 x 8.2-10.8 µm, 4-spored, clavate to sphaeropedunculate.

**Cheilocystidia:** abundant, utriform, ellipsoid or broadly lageniform, 26.5-92.5 x 16.7-28.8 µm.

**Pleurocystidia:** rather sparse, 65-130 x 19-32.5 µm, almost exclusively fusoid to sublageniform.

**Pileipellis:** a cutis of parallelly arranged, narrow hyphae.

**Veil:** very scarce, made up of chains of cylindrical or slightly inflated cells, terminal cells cylindrical-fusiform.

**Caulocutis:** with abundant veil remnants of various shapes, mostly flexuose, at the apex branched cells, with some utriform-clavate or globose cells.

**Pileo- and Caulocystidia:** absent.

**Clamp-connections:** present but scarce.

**Habitat and distribution:** It is known from wood-chips in parks and other anthropogenic habitats (e.g., paths). Aside from the locus typi and two further localities in Germany (BENDER 1987) it is reported from one locality in the Netherlands (ULJÉ &

NOORDELOOS 1999) and from Hungary (NAGY 2004). Because of the propagation of using wood-chips as path-overlay and flower-bed it is likely that this taxon (and other species growing on hard vegetable refuse) will be discovered in several localities in the future.

**Collection examined: Hungary:** Kecskemét, on ornamental wood-chips, 28. 11. 2003, leg. L. NAGY & Z. GORLICZAI (herb. NAGY).

The universal veil on the pileus is very fugitive, which is very characteristic within subsect. *Lanatulii*. It is difficult to observe also on young fruitbodies. Other good features are the strongly radicate stipe and the greyish colour of the pileus. *Coprinus lagopus* FR.: FR. and its allies [*C. macrocephalus* (BERK.) BERK., *C. radiatus* (BOLT.) GRAY, *C. cinereus* (SCHAEFF.) GRAY] differ, e.g., in the nature of the veil, their overall appearance, and habitat.

The spores in our collection are somewhat broader than given by ULJÉ & NOORDELOOS (1999) and BENDER (1987). In all other features, however, it agrees very well with the protologue and the description of UJLÉ & NOORDELOOS (1999).

***Coprinus deminutus* ENDERLE** in Z. Mykol. **70**: 157. 2004 (Figs. 4, 7)

?*Coprinus spraguei* BERK. & M. A. CURTIS in Ann. Mag. Nat. Hist. Ser 4, no 83, 1859, sensu COOKE, Ill. British Fungi pl. 683B (1881-1891).

**Type:** Germany, Bavaria, Riedheim-Weissingen-Untereichingen, MTB 7526, 3. 8. 1987, leg. M. ENDERLE (ULM).

**Pileus:** ellipsoid to campanulate when young, up to 7 x 4 mm, becoming flattened or slightly depressed on aging, swiftly collapsing, 5-10 mm in diam., margin thin, translucent, strongly sulcate up to centre, surface with whitish to pale yellowish, rather persistent velar patches towards centre, these becoming more intensely (lemon-)yellow with age, whitish, pale brownish in the centre of pileus.

**Lamellae:** distant (20-25 gills per pileus), free, forming a distinct pseudocollar, up to 0.6 mm broad, slightly ventricose, thin, lamellar edge fimbriate, whitish when young, becoming greyish on ageing.

**Stipe:** 15-35 x 0.3-0.6 mm, cylindrical, filiform, fragile, fistulose, surface glabrescent, white. Smell indistinct.

**Spores:** (27, 3, 2) 7.4-10 x 4.5-6  $\mu\text{m}$ , on average 8.54 x 5.17  $\mu\text{m}$ , Q = 1.38-1.96, AvQ = 1.65, ellipsoid, with rounded apex, not phaseoliform, rather pale red-brown, germ-pore central, 1.4-1.7  $\mu\text{m}$  wide.

**Basidia:** clavate, 4-spored, 25-38 x 9-10  $\mu\text{m}$ .

**Cheilocystidia:** oblong-ellipsoid to utriform.

**Pleurocystidia:** not seen.

**Pileipellis:** an epithelioid hymeniderm.

**Veil:** a chain of cylindrical-fusoid to variously inflated cells, terminal cells clavate-utriform or cylindrical, often showing brownish, thickened walls (especially towards centre of pileus, and tips of velar patches) which are finely incrustated, incrustation dissolving in HCl, globose elements 18-40  $\mu\text{m}$  in diam.

**Pileo- and caulocystidia:** absent.

**Clamp-connections:** not found.

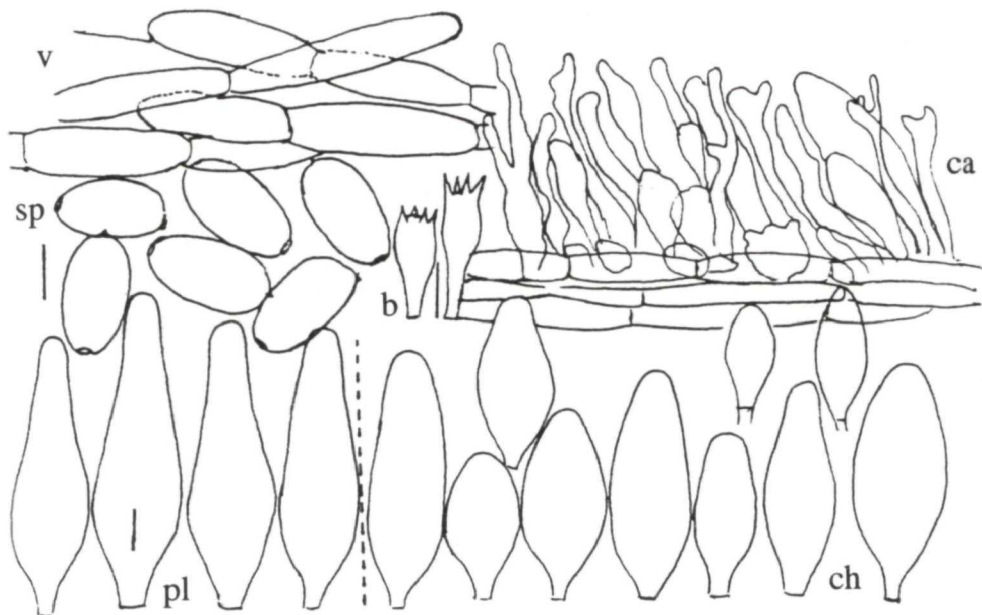


Fig. 3. *Coprinus krieglsteineri*, bars: 10  $\mu$ m.

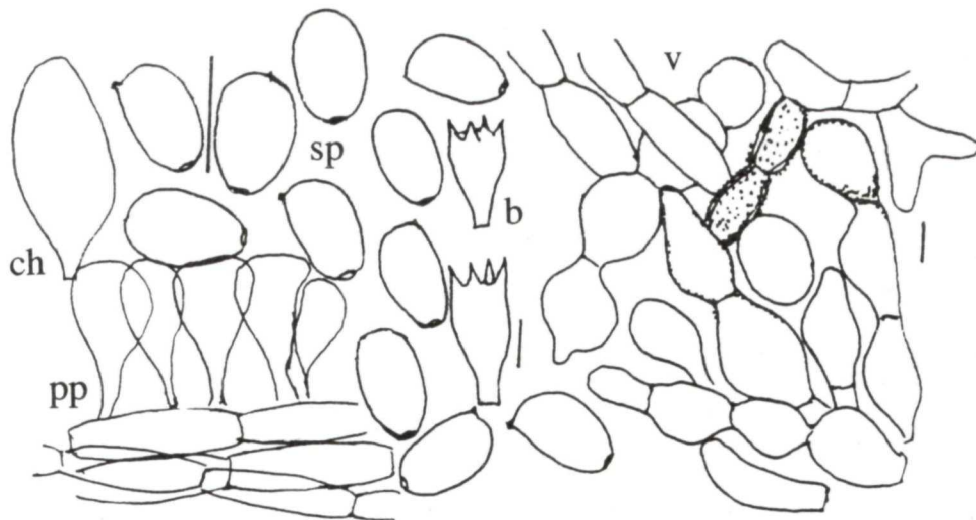


Fig. 4. *Coprinus deminutus*, bars: 10  $\mu$ m.

**Distribution:** It is very rare, known only from two localities, one from Germany (locus typi, ENDERLE, 2004 a, b), and now from Hungary.

**Collections examined:** Hungary: Kecskemét, Nyomási-forest, Cynodonti-Festucetum pseudovivinae, sub *Carduus acanthoides* L., together with *Panaeolus foenicisii* (PERS.) J. SCHROET. and *Conocybe subpubescens* P. D. ORTON, 13. 5. 2004, leg. L. NAGY (herb. NAGY); - - 29. 8. 2004., leg. L. NAGY (herb. NAGY).

It is a very small, ephemeral species characterized by the veil and small, pale spores. This is the smallest species known in subsect. *Domestici*. The only difference that can be discovered between the protologue and my collections is the more diminutive size of the fruitbodies in the Hungarian collections. It is between 5 and 10 mm, contrary to the size given by ENDERLE (8 x 6 mm when young). *Coprinus spraguei* BERK. & M. A. CURTIS sensu COOKE is probably synonymous. It is very likely that plate 683B of COOKE (1881-1891) represents this species, because of the macroscopic similarity and the spores. COOKE (1881-1891) depicted the spores as phaseoliform, a character atypical for *C. deminutus*, but very typical for the other species of the section. Further, it is not clear that COOKE's plate represents the enigmatic *C. spraguei*.

***Tricholoma populinum* J. E. LANGE var. *bohusi*<sup>1</sup> NAGY, var. nova** (Fig. 5)

#### Latin diagnosis:

A typo differt pileo luteo-flavo.

**Holotypus:** Hungary, Kecskemét, Nyomási-forest, Populetum canescentis cult., 25. 10. 2002, leg. L. NAGY, in herbario BP depositus.

#### Description of the holotype:

**Pileus:** 80-200 mm in diam., when young convex with strongly involute margin, expanding to plano-convex, finally applanate, centre slightly depressed when old, margin straight to revolute when matured, not striate, but often costate, surface smooth and glabrous, viscid when moist, sometimes with darker water-spots especially towards margin, pale and vivid lemon-yellow when young, sometimes whitish, becoming dark lemon- to orange-pale ochraceous on ageing, brownish when very old, not discolouring.

**Lamellae:** emarginate to adnate, crowded, up to 8(-9) mm broad, not ventricose, lamellar edge thin, somewhat uneven, concolorous, when young white, whitish-pale cream when old, ochraceous in herbarium material.

**Stipe:** 60-100 x 15-30(-40) mm, cylindrical to clavate, stuffed or fistulose, surface smooth when young, later fibrillose-subsquamous, white to pale cream in entire length, not discolouring to reddish in herbarium material (or at most to ochraceous).

**Context:** thick and firm, whitish, pale ochraceous on drying, smell and taste strongly farinaceous.

**Spores:** (40, 1, 1) 4.5-6.3 x 3-4.2 µm, on average 5.38 x 3.67 µm, Q = 1.2-1.75, AvQ = 1.48, ellipsoid to oblong hyaline with thin wall, often with 1-2 oil drops.

<sup>1</sup> Etymology: Named after GÁBOR BOHUS as a commemoration of his pioneer work in Hungarian mycology.



Basidia: 18.7-26.3 x 5.5-6.5  $\mu\text{m}$ , clavate, 4-spored.

Cystidia: absent.

Pileipellis: a cutis of 3-8  $\mu\text{m}$  wide clampless hyphae, terminal cells cylindrical or slightly clavate, pigment weakly incrusting.

**Collections examined** (besides holotype): **Hungary:** Töserdő, Quercu robori-Populetum canescentis, 1. 11. 2003, leg. L. NAGY, (herb. NAGY); - Csalánosi erdő, Populetum canescentis cult. (with *Eleagnus angustifolia* L.), 14. 10. 2002, leg. L. NAGY & Z. GORLICZAI, [H3](herb. NAGY); - Nyomási-forest, Populetum canescentis cult., 17. 10. 2004, leg. L. NAGY (herb. NAGY, isotype).

This striking variety was found repeatedly in three localities. As no transitional forms were found, we feel necessary to describe it as a new variety. It resembles the type variety in all macro- and microscopic features except the bright yellow colour of the pileus. The lamellae and stipe surface does not show the typical reddish discolouration during maturation and desiccation, but a slight ochraceous-cream colour change.

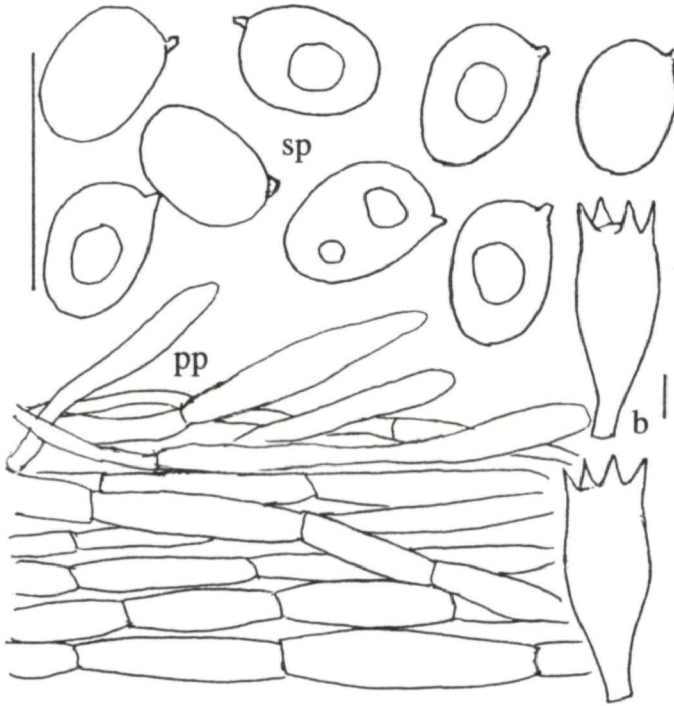


Fig. 5. *Tricholoma populinum* var. *bohusii*, bars: 10  $\mu\text{m}$ .

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Fig. 6. *Coprinus krieglsteineri*. – Phot. L. NAGY.



Fig. 7. *Coprinus deminutus*. – Phot. L. NAGY.

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