

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XXXVI
Tricholoma

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The genus *Tricholoma* contains several taxonomically difficult groups. During the revision of the genus *Tricholoma* for the Flora agaricina neerlandica, vol. 4 (Bas et al., in press) some of these groups have been tackled. Detailed studies are presented of sect. *Lasciva* and sect. *Atrosquamosa* subsect. *Terrea* with keys, descriptions, and comments. Where possible neotypes or epitypes have been designated. In addition two new varieties are described in other sections, viz. *Tricholoma psammopus* var. *macrosporum* and *T. equestre* var. *populinum*. Notes are given on some nomenclatural problems within the genus *Tricholoma*.

Like in several other genera of Agaricales the application of species-names in *Tricholoma* is often based on old and usually short diagnoses. Types are often missing and current usage of names is often primarily based on mycological tradition and personal observations by the various authors. Confusion and misunderstanding of the original diagnosis and plates have often led to different concepts in different books and/or different parts of Europe. In an attempt to solve some of these problems lectotypes, neotypes and epitypes are designated for some species where no proper type material exists or is represented only with an icon.

MATERIAL AND METHODS

The descriptions given in this paper and in the Flora agaricina neerlandica (Noordeloos & Christensen, 1999) are based on personal observations of newly collected material and on studies of herbarium specimens. Field observations on *Tricholoma* species were made in Denmark and The Netherlands as well as during field trips in Norway, Sweden, Great Britain, France, Germany, Austria and Italy. Herbarium specimens were studied primarily from the Rijkherbarium in Leiden (L), but also from the Botanical Museum in Copenhagen (C), University of Oulu (OULU) and Natural Museum in Lugano (LUG), focussing on microscopical structures such as size and shape of spores and pileipellis structures. The average spore size presented in the diagrams (Figs. 1, 2) are based on at least 10 representative spores from each collection measured in 35% KOH. Drawings of microscopical structures have been made with a drawing-tube on a Leica microscope. The terminology and abbreviations in this paper follow Bas et al. (1988).

TAXONOMIC PART

Tricholoma section Lasciva M. Bon

The species in this section are characterised by a matt, glabrous pileus without obvious radial structure, a rather strong to very strong, unpleasant chemical smell reminiscent of

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radish, strong perfume or strongly scented flowers, and the frequent occurrence of clamp-connections in the pileipellis and pileitrama. Although the members of this section are relatively easy to recognize as a whole, species concept and delimitation appears to be rather difficult. In this paper the authors have tried to present well-delimited species, focussing on characters like spore size and -shape, frequency of clamp-connections, colour and discolouration of fruiting bodies, and smell. Concepts have also been fixed with lectotypes or neotypes. Confusion may also occur with other white or pale *Tricholoma* species from other sections, viz. *Tricholoma inamoenum* (Fr.: Fr.) Gillet (sect. *Inamoena*) which has very distant lamellae and very large spores ($9.0-12.0 \times 6.0-7.5 \mu\text{m}$). Confusion may also occur with pale forms of *Tricholoma saponaceum* (sect. *Saponacea*), but the smell of that species is normally different and rather weak, reminiscent of cheap nonperfumed soap, and the context stains often slightly reddish. *Tricholoma columbetta* (sect. *Albata*) is a pure white species which can be distinguished by the radially fibrillose structure of the pileus, mild taste and often by the blue or reddish spots in older basidiocarps. *Tricholoma albidum* (sect. *Albida*) has a similar radially fibrillose pileus but is smaller than *T. columbetta*, and stains yellow. Even *Tricholoma acerbum* (sect. *Imbricata*) may be confused with members of sect. *Lasciva*, but the more brownish colour, the very crowded lamellae, the lack of smell and the very small spores distinguish it easily.

KEY TO THE EUROPEAN SPECIES OF SECT. LASCIVA

- 1a. Spores $6.0-8.0(-9.5) \mu\text{m}$ long, ellipsoid to oblong, av. $Q > 1.6$; pileus with pale greyish tinge when old; lamellae in exsiccates dark greyish brown *T. lascivum*
- b. Spores $5.0-7.0 \mu\text{m}$ long, subglobose to broadly ellipsoid or ellipsoid, av. $Q < 1.5$; pileus without grey tinges when old; lamellae in exsiccates ochraceous 2
- 2a. Surface of pileus and stipe, lamellae, and context strongly discolouring yellow when bruised; spores subglobose to broadly ellipsoid, av. $Q = 1.1-1.3$; taste somewhat acrid, and only slightly bitter; smell relatively weak, aromatic mixed with gascomponent
T. sulphurescens
- b. Basidiocarps not discolouring strongly yellow when bruised, but sometimes pileus and stipe turning ochre-brownish with age or stipe with yellow spots; context not yellowing; spores broadly ellipsoid to ellipsoid, av. $Q = 1.3-1.5$; taste acrid and bitter; smell strong, unpleasant gaslike, raphanoid or aromatical or a mixture of those smells 3
- 3a. Pileus usually fairly small to medium-sized, less than 70 mm diam., regularly shaped when old, margin not costate; lamellae rather distant, often thickish, lamellae and lamellulae irregular, of unequal width; smell aromatic mixed with gascomponent; clamps usually absent or scarce in pileipellis *T. album*
- b. Pileus usually large when old, up to 100 mm or more, irregularly shaped with undulating, often costate margin; lamellae moderately crowded to crowded, of normal thickness, of equal width; smell aromatic, rarely a bit chemical; clamps usually present on many septa in pileipellis *T. stiparophyllum*

DESCRIPTIONS OF THE SPECIES

Tricholoma album (Schaeff.: Fr.) Kumm.— Fig. 1a, Plate 1

Tricholoma album (Schaeff.: Fr.) Kumm., Führ. Pilzk. (1871) 131.

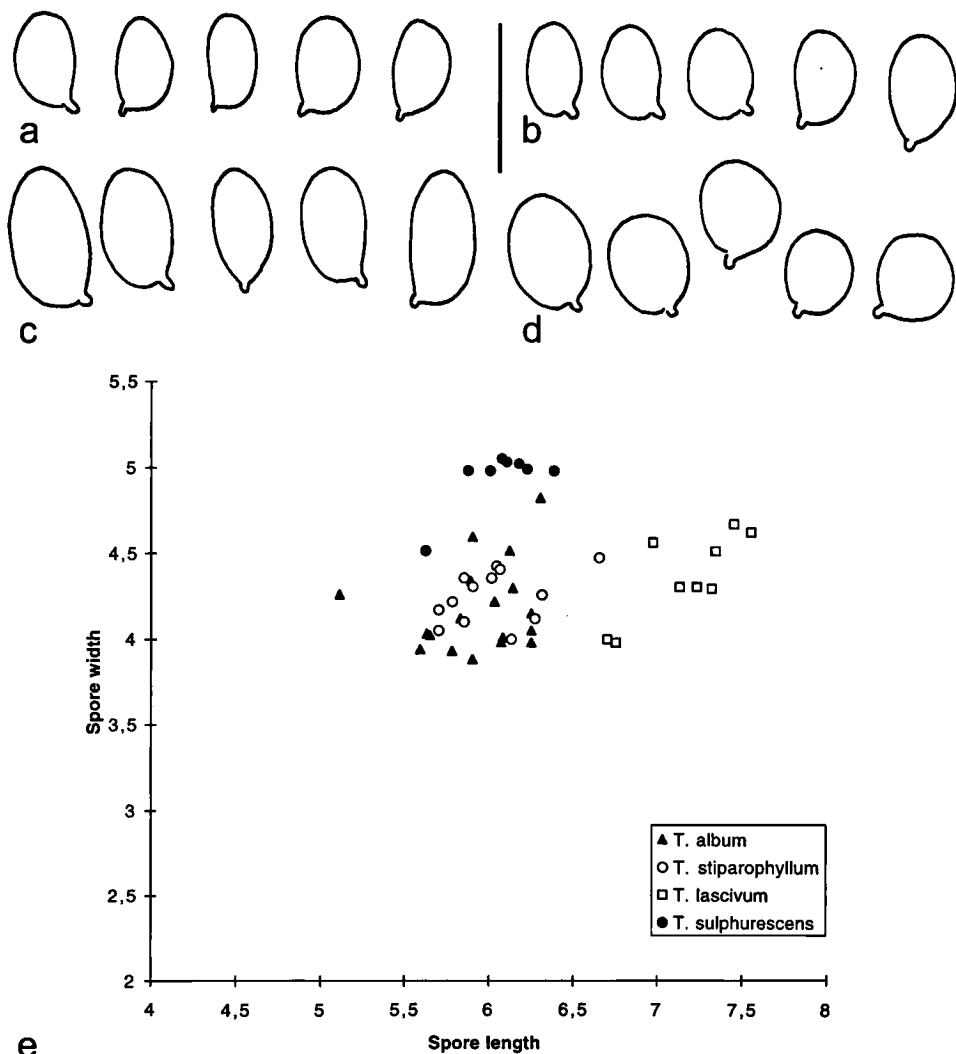


Fig. 1. Spores of sect. *Lasciva*. a. *T. album*; b. *T. stiparophyllum*; c. *T. lascivum*; d. *T. sulphurens*; e. average spore sizes in sect. *Lasciva*. Bar = 10 µm.

Agaricus albus Schaeff., Fung. Bavaricae 3 (1771) pl. 256; *Agaricus albus* Schaeff.: Fr., Syst. mycol. 1 (1821) 53; *Gyrophila alba* (Schaeff.: Fr.) Quél., Fl. mycol. France (1888) 270. — *Tricholoma album* f. *gracilis* Bres., Iconogr. mycol. 3 (1928) pl. 108. — *Tricholoma thalliophilum* R. Henry, Bull. Soc. mycol. Vesoul (1956) 153; *Tricholoma album* var. *thalliophilum* (R. Henry) M. Bon, Bull. trimest. Soc. mycol. Fr. 85 (1970) 487.

Misapplied. *Tricholoma resplendens* sensu Marchand, Champ. Nord Midi 9 (1986) pl. 840.

Excluded. *Tricholoma album* sensu Fr., Ic. sel. Hymenomyc. 1 (1874) pl. 43 (= *T. stiparophyllum*); J. Lange, Fl. agar. dan. 1 (1935) pl. 27D (= *T. stiparophyllum*).

Selected icons. Bres., Iconogr. mycol. 3 (1928) pl. 108 (f. *gracilis*); Konr. & M., Ic. sel. Fung. 8 (1934) pl. 266; Marchand, Champ. Nord Midi 9 (1986) pl. 840 (as *T. resplendens*); 842 and 843 (var. *thalliophilum*).

Selected descriptions and figures. M. Bon, *Tricholomes Fr. Eur. occ.* (1984) 90–91, fig. 11B; M. Bon, *Fl. mycol. Eur.* 2, *Tricholomes* (1991) 47; Marchand, *Champ. Nord Midi* 9 (1986) 88, 90, 92.

Lectotype (Iconotype): *Agaricus albus* Schaeff., *Fung. Bavariae* (1762) pl. 37.

Epitype (design. here): France, Territoire de Belfort, Le Salbert, NW of Belfort, 7 Oct. 1998, M. Christensen (MC 98094) (L, isoeotype in C).

Pileus 30–60(–75) mm, conico-campanulate with subinvolute margin, expanding to convex or plano-convex with small umbo, with deflexed then straight margin, white to pale yellow tinge, often with ochre-yellow centre when mature (Mu. 10 YR 8/2, 8–7/6–8, 2.5 Y 8/4–2, 7/6), smooth, glabrous, dry and dull, without radial structure. Lamellae, L = 50–60, l = (1–)3–5(–7), rather distant, thickish, irregularly segmentiform to ventricose, 4–11 mm broad, entire lamellae and short lamellulae of unequal width, white to pale yellowish (K. & W. 4A2) with serrate edge. Stipe 30–60(–85) × 8–15 mm, cylindrical, broadened or tapering towards base, white to pale brownish yellow (2.5 Y 8/4), then with yellowish spots, becoming brownish when handled, glabrous to minutely granular-flocculose at apex, felted-subfibrillose to fibrillose in lower part, at base sometimes with white mycelial strands. Context white. Smell strong, a mixture of aromatical-sweet (cheap soap, honey) and an unpleasant component (radish), sometimes more farinaceous when cut. Taste very unpleasant, subfarinaceous at first, soon acrid mixed with bitter.

Spores (5.0–)5.5–6.5(–7.0) × 3.5–4.5(–5.0) µm, Q = 1.2–1.8, av. Q = 1.3–1.5, broadly ellipsoid to oblong with pronounced hilar appendage. Basidia 25–34 × 5.0–6.0 µm, 4-spored, clamped. Lamella edge fertile. Cystidia absent. Pileipellis a cutis of cylindrical, 2.5–6.0 µm wide hyphae with scattered subclavate terminal elements, 20–50 × 3.0–9.0 µm; subpellis not differentiated from pileitrama, made up of cylindrical to inflated elements, 19–50(–70) × 3.0–12 µm. Pigment absent or very pale, intracellular. Clamp-connections very rare, practically absent on most septa in covering layers and hymenium.

Habitat & distribution — Ectomycorrhizal, mainly with *Quercus* on sandy and loamy soils. Widespread in Europe.

Collections examined. THE NETHERLANDS: prov. Gelderland, Estate 't Joppe, 16 Oct. 1983, G. & H. Piepenbroek (L); prov. Utrecht, Vijverbos near Harmelen, 3 Oct. 1994, M.E. Noordeloos (MEN 94111) (L); Nijenrode, 22 Sept. 1998, M.E. Noordeloos (MEN 98100) (L); prov. Noord-Holland, Bergen, 19 Oct. 1984, P. Ijpelaar (Bas 8330) (L) (var. *thalliophilum*); Vogelenzang, 18 Oct. 1982, C. Bas (Bas 8031) (L); prov. Noord-Brabant, Ulvenhoutse bos, 19 Oct. 1952, R.A. Maas Geesteranus (MG 9222) (L); Dorst, 29 Oct. 1975, P.B. Jansen (PBJ 75394) (L). — DENMARK: NE Jylland, Skivum Krat near Vegger, 28 Sept. 1995, R. Ernaes (MC 95159) (C); Lovns Egekrat, 2 Oct. 1995, L. Samsøe (MC 95169) (C); NW Jylland: Kaas Egekrat, 15 Sept. 1998, R. Ejnaes (MC 98039) (C). — FRANCE: Territoire de Belfort, Bois Lachat, 7 Oct. 1998, M. Christensen (MC 98094) (C); Le Salbert, 7 Oct. 1998, M. Christensen (MC 98094) (epitype, L, C); Val de Masevaux, 8 Oct. 1998, M. Christensen (MC 98099) (C). — SWITZERLAND: Ticino, Stabio, 12 Sept. 1979, G. Lucchini (LUG); Aargau, Mellingen, 8 Oct. 1981, A. Riva (Riva 23.01) (LUG). — ITALY: Lombardia, Varese, 31 Oct. 1983, A. Riva (LUG).

Tricholoma album is generally smaller and more regularly shaped than *T. stiparophyllum*, and has distant, rather thick and irregular lamellae. The lamellae and lamellulae are of unequal width. It occurs mainly under *Quercus*. *Tricholoma album* var. *thalliophilum* differs by staining blue-green with thalliumoxide and sulfoformol (Bon, 1970). Since there are hardly any other morphological differences between var. *thalliophilum* and the typical variety, we do not attach much taxonomic value to it. *Tricholoma lascivum* differs by the more elongate spores and more frequent clamp-connections in pilei-, stipitipellis, and hymenium. *Tricholoma resplendens* (Fr.) P. Karst. sensu P. Karst. (1879) is likely misapplied for *T. album*, but the original description by Fries (1857) may refer to any species in section *Lasciva* or even to *T. columbetta* (Fr.) Kumm. It is consequently considered a nomen dubium.

Tricholoma stiparophyllum (Lund in Fr.) P. Karst. — Fig. 1b, Plate 2

Tricholoma stiparophyllum (Lund in Fr.) P. Karst., Ryssl. Finl. Skand. Halföns Hattsvamp. (1879) 42.

Agaricus stiparophyllus Lund in Fr., Monogr. Hymenom. Sueciae (1857) 29.

Tricholoma pseudoalbum M. Bon, Bull. trimest. Soc. mycol. Fr. 85 (1969) 486.

Misapplied. *Tricholoma album* sensu Fr., Ic. sel. Hymenomyc. 1 (1874) pl. 43; sensu J. Lange, Fl. agar. dan. 1 (1935) pl. 27D.

Selected icons. Breitenb. & Kränzli., Pilze Schweiz 3 (1991) 339, pl. 435; J. Lange., Fl. agar. dan. 1 (1935) pl. 27D (as *T. album*); Marchand, Champ. Nord. Midi 9 (1986) pl. 842 (as *T. pseudoalbum*); Riva, Tricholoma (1988) pl. 9 (as *T. pseudoalbum*).

Selected descriptions and figures. Breitenb. & Kränzli., Pilze Schweiz 3 (1991) 338.

Neotype (design. here): Sweden, Medelpad, Getberget near Borgsjö, 12 Sept. 1995, *M. Christensen* (MC 95114) (herb. L, isoneotypes in C, UPS).

Pileus 40–100 mm, conical, hemispherical or convex with involute to deflexed margin at first, expanding to plano-convex or applanate with low umbo or with depressed centre, with undulating marginal zone and deflexed to reflexed margin, almost white when young, soon with yellow-ochre or yellow-brown tinges (Mu. 10 Y 6/8, 10 YR 7–8/4–8), particularly at centre, often with brownish or ochre spots all over when old, rather smooth, glabrous or silky, margin usually distinctly costate, particularly in large mature specimens. Lamellae, L = 60–120, l = 39, moderately crowded to crowded, broadly adnate-emarginate or with small decurrent tooth, normally thick, regular, segmentiform to subventricose, white to cream-coloured or with pinkish tinge (10 YR 8–7/2), with brownish spots and marks when old or bruised, with coarsely eroded, concolorous edge. Stipe 70–100 × 5–15(–30) mm, cylindrical, often with broadened base, sometimes tapering towards base, white or with yellow-ochre tinges like pileus, pruinose to subfurfuraceous at apex, innately fibrillose to fibrillose-tomentose below with concolorous fibrils. Context firm, white, sometimes with a yellow tinge (5 Y 8/8). Smell strong, perfumed like cheap soap or flowers, a bit chemical. Taste very nasty acrid sometimes mixed with bitter and farinaceous.

Spores 5.0–7.0 × 3.4–4.5 µm, Q = 1.2–1.8, av. Q = 1.4–1.5, broadly ellipsoid to oblong with rather large hilar appendage. Basidia 26–32 × 5.0–7.0 µm, 4-spored. Lamella edge fertile. Cystidia absent. Pileipellis a cutis of 2.5–7.0 µm wide cylindrical hyphae with cylindrical to subclavate terminal elements, 20–45 × 3.5–9.0 µm; subpellis not differentiated from pileitrama, made up of inflated elements, 18–45 × 3.0–11 µm. Pigment pallid, intracellular in pileipellis. Stipitipellis a cutis of narrow, cylindrical hyphae, 2.5–6.0 µm wide. Caulocystidia scattered, simple, cylindrical or irregularly shaped, 15–35 × 3.0–5.0 µm with hyaline, colourless walls. Clamp-connections infrequent but present on many septa in pilei ad stipitipellis.

Habitat & distribution — Ectomycorrhizal, usually associated with *Betula*, but also with *Picea*, *Populus*, *Fagus* and *Quercus*, in mixed deciduous and coniferous forests on mesic, sandy soils, sometimes on calcareous soil. Widespread and locally common in Europe, from the subarctic to the mediterranean.

Collections examined. THE NETHERLANDS: prov. Friesland, Schiermonnikoog, 19 Oct. 1970, *G. Stobbe* (L); prov. Zuid-Holland, Wassenaar, 9 Oct. 1993, *M. E. Noordeloos* (MEN 93238) (L); same loc. 25 Oct. 1996, *M. Nauta* (L); Rockanje, 20 Oct. 1963, *C. Bas* (*Bas* 4004) (L); Prov. Overijssel, Delden, 3 Oct. 1977, *Kits van Waveren* (L). — GERMANY: Bayern, Hilpoltstein near Roth, 20 Sept. 1995, *M. E. Noordeloos* (MEN 95203) (L). — DENMARK: NE Jylland, Skindbjerglund, 30 Sept. 1995, *T. Laessøe* (MC 95161) (C); Lovns, 2 Oct. 1995, *M. Christensen* (MC 95170) (C); E Jylland, Ørnjerg Mølle, 20 Oct. 1994,

C. Brandt (MC 94054) (C); Trolldbakke near Langesø, 19 Oct. 1996, *C. Brandt, L. Skipper & M. Christensen* (MC 96217) (C); Djurslund Plantage, 19 Oct. 1996, *C. Brandt, L. Skipper & M. Christensen* (MC 96222) (C); Fyn, Snarup Mose, 26 Sept. 1992, *M. Christensen* (MC 92120) (C); NE Sjælland, Tokkekøb Hegn, 3 Oct. 1984, *J. Vesterholt* (JV 841436) (C); NW Sjælland, Jyderup Skovene, 19 Oct. 1994, *M. Christensen* (MC 94079) (C); Bredevang S of Jyderup, 19 Oct. 1994, *C. Brandt* (MC 94080) (C). — SWEDEN: Medelpad, Getberget near Borgsjö, 12 Sept. 1995, *M. Christensen* (neotype, MC 95114) (L); Borgsjö Church, 12 Sept. 1995, *M. Christensen* (MC 95117) (C); Jämtland, Bräcke, 1 Sept. 1997, *M. Candusso* (MC 97039) (C); Lockna W of Änge, 4 Sept. 1997, *M. Christensen* (MC 97114, MC 97119) (C); E of Brukvallernäs, 9 Sept. 1997, *M. Christensen* (MC 97166) (C). — NORWAY: Buskerud, Ringerike, 6 Oct. 1968, *G. Gulden* (L). — FINLAND: Oulun-Pohjanmaa, Ylikylä near Kiiminki, 12 Sept. 1970, (OULU); Inari Lapland, Kevo, 15 Aug. 1995, *M.E. Noordeloos* (MEN 95068) (L); 17 Aug. 1995, *M.E. Noordeloos* (MEN 95085) (L).

Tricholoma stiparophyllum is distinguished from *T. album* by the larger fruit-bodies, the irregular pileus often with costate margin, the more regularly shaped, crowded lamellae, and its occurrence with *Betula*. *Tricholoma lascivum* has a more greyish-yellowish tinge in the pileus, distinctly larger spores, and occurs mainly with *Fagus* on rich soil. *Agaricus stiparophyllus* clearly refers to a large species with whitish-yellowish pileus, resembling *T. acerbum*, with strong smell and acrid taste. It is originally described from the Stockholm region. Karsten (1879) adopted it in the same concept as *Tricholoma stiparophyllum* (Fr.) P. Karst. From the original diagnosis there is no doubt that this is the same fungus described by Bon (1970) as *T. pseudoalbum* and as *Tricholoma album* by Lange (1935). Judging from the original diagnosis, *Tricholoma raphanicum* P. Karst. may also be synonymous.

***Tricholoma lascivum* (Fr.) Gillet — Fig. 1c, Plate 5**

Tricholoma lascivum (Fr.) Gillet, Hyménomycètes (1878) 111.

Agaricus lascivus Fr., Syst. mycol. 1 (1821) 110; *Gyrophila lasciva* (Fr.) Quél., Fl. mycol. France (1888) 279.

Selected icons. Breitenb. & Kränzl., Pilze Schweiz 3 (1991) 331, pl. 423; Bres., Congr. mycol. 1 (1928) pl. 94; J. Lange, Fl. agar. dan. 1 (1935) pl. 27C; Konr. & M., Ic. sel. Fung. 4 (1928) pl. 265; R. Phillips, Mushr. other Fungi (1981) 40; Riva, *Tricholoma* (1988) pl. 7.

Selected descriptions and figures. M. Bon, *Tricholomes* Fr. Eur. occ. (1984) 88; Breitenb. & Kränzl., Pilze Schweiz 3 (1991) 330.

Neotype (design. here): Denmark, E Jylland, Borum, 10 Oct. 1995, *M. Christensen* (MC 95184) (L).

Pileus 40–100 mm, broadly campanulate to hemispherical or convex with involute margin when young, expanding to applanate with low umbo or with shallowly depressed centre, with straight margin, very pale greyish-yellow, especially when old (Mu. 10 YR–2.5 Y 8–7/2), sometimes with yellow spots (7.5 YR 7(–6)/2), smooth, glabrous or subfelted, dry. Lamellae, L = 60–80, l = 39, rather distant, thickish, irregularly segmentiform, of unequal width, white, with yellow-ochre or reddish spots when bruised, with coarsely serrate, concolorous edge. Stipe 40–80 × 6.0–15 mm, cylindrical, tapering downwards, or broadened at base, often rather irregularly shaped, white to pale pinkish cream-coloured, with yellow-ochre spots when bruised, innately fibrillose, glabrous, base with white tomentum. Context white. Smell strong, a mixture of aromatical fruity and nauseating chemical, sometimes more farinaceous when cut. Taste very strongly acrid and bitter, mixed with farinaceous.

Spores 6.0–8.0(–9.5) × 3.5–5.0 µm, Q = 1.3–2.0, av. Q = 1.6–1.7, ellipsoid-oblong with pronounced hilar appendage. Basidia 22–40 × 6.0–7.0 µm, 4-spored. Lamella edge fertile. Cystidia absent. Pileipellis a cutis of cylindrical, 3.0–5.0(–6.5) µm wide hyphae; subpellis not differentiated, made up of cylindrical to inflated elements, 15–45(–60) × 4.0–

15 µm. Pigment pallid, intracellular in pileipellis. Stipitipellis a cutis of cylindrical hyphae, 3.5–5.0(–6.0) µm wide. Caulocystidia scattered at apex, simple, cylindrical, 5.0–35 × 3.5–6.0 µm. Clamp-connections rather numerous and very large, in pileipellis, stipitipellis and also in hymenium.

Habitat & distribution — Ectomycorrhizal, associated with *Fagus* on rich loamy, preferably calcareous soil, more rarely associated with *Quercus* on similar soils. Widespread in Europe, but real distribution poorly known because of the taxonomic confusion with similar species.

Collections examined. GERMANY: Bayern, Weissehofener Espaan near Roth, 25 Sept. 1995, *M.E. Noordeloos* (MEN 95181) (L); Teutener Wald, 25 Sept. 1964, *C. Bas* (*Bas* 4571) (L). — UNITED KINGDOM: Kings Langley, 26 Nov. 1953, *D.A. Reid* (L). — DENMARK: NE Jylland: Buderupholm Skov, 30 Sept. 1995, *M. Christensen* (MC 95163) (C); E Jylland: Trelde Skov, 24 Sept. 1994, *C. Brandt* & *C. Lange* (MC 94042) (C); Marselisborg Sko, 27 Sept. 1995, *J. Vesterholt* (MC 95157) (C); Borum, 10 Oct. 1995, *M. Christensen* (MC 95184, MC 95186) (C); 10 Oct. 1996, *M. Christensen* & *C. Brandt* (MC 96168) (neotype, L, C); Marielund, 14 Oct. 1997, *M. Christensen* & *J.H. Petersen* (MC 97232) (C); W Sjælland: Kattrup Skov S of Jyderup, 19 Oct. 1994, *C. Brandt* (MC 94081) (C). — ITALY: Toscana, Monte Soldano, 8 Nov. 1996, *M. Christensen* (MC 96342) (C).

Tricholoma lascivum is very similar to *T. album* in many respects, particularly in the general habit with rather thick, irregular, distant lamellae. The colour of the pileus, however, has a distinct pale greyish component, and the spores are definitely longer and more elongate. In exsiccata the lamellae have a rather dark greyish-brownish tinge, whereas those of *Tricholoma album* are normally paler in exsiccata. It is assumed that some records from the Netherlands of *T. inamoenum* from deciduous woodland actually represent *T. lascivum*, but this could not be confirmed because well-annotated collections were not available.

***Tricholoma sulphurescens* Bres. — Fig. 1d, Plate 3, 4**

Tricholoma sulphurescens Bres., *Annls. mycol.* 3 (1905) 159.

Misapplied. *Gyrophila resplendens* (Fr.) Quél., *Fl. Myc.* (1888) 287.

Selected icons. M. Bon, *Tricholomes Fr.*, *Eur. occ.* (1984) pl. 2A; Bres., *Iconogr. mycol.* 3 (1928) pl.; Cetto, *Funghi Vero* 3, ed. 1 (1983) pl. 589; Courtec. & Duhem, *Champ. Fr. Eur.* (1994) 366; Mal. & Bert., *Fl. champ. sup. Maroc* 2 (1975) pl. 5; Mos. & Jül., *Farbatl. Basidiomyc.* III (1987) *Tricholoma* 9; Riva, *Tricholoma* (1988) pl. 6.

Selected descriptions and figures. M. Bon, *Fl. mycol. Eur.* 2, *Tricholomes* (1991) 47; Christensen et al., *Boll. Gruppo micol. G. Bres.* 40 (1997) 151; Daun et al., *Windahlia* 15 (1985) 19; Mal. & Bert., *Fl. champ. sup. Maroc* 2 (1975) 113; Riva, *Tricholoma* (1988) 170.

Pileus 50–100(–120) mm, campanulate to convex with involute to deflexed margin, expanding to irregular applanate, with low umbo, with undulating marginal zone, with deflexed margin, white when young then strongly yellowing, particularly when bruised, finally yellow with brown-yellow centre (2.5 Y 8/6–8), dry, silky-fibrillose at first, when old tomentose or breaking up in small, irregular, appressed squamules. Lamellae, L = 100, l = 37, moderately distant, adnate-emarginate, white, yellowing with age (2.5 Y 8/4) with subentire, concolorous, finally often staining yellow edge, particularly near pileus margin. Stipe 50–100(–120) × 10–20 mm, cylindrical or broadened towards base, white then pale yellow at apex and turning deep-yellow to ochre-brown in basal part, (10 YR 7–6/8), particularly when bruised, upper part finely floccose to squamulose with slightly darker squamules, lower part velutinous, finely squamulose with brown fibrillose scales. Context white, staining

lemon-yellow to sulphur-yellow or ochre, particularly when bruised. Smell strong, aromatic fruity with nauseating component reminiscent of that of *T. sulphureum*. Taste somewhat acrid.

Spores (5.0–)5.5–6.5(–7.0) × (4.0–)4.5–5.0(–5.5) µm, Q = 1.1–1.4, av. Q = 1.2–1.3, subisodiametrical to broadly ellipsoid with large hilar appendage. Basidia 30–40 × 6.0–8.0 µm, 4-spored, clamped. Lamella edge fertile. Cheilocystidia absent. Pileipellis a cutis of narrow, cylindrical, 5.0–10.0 µm wide hyphae with scattered ascending bundles of hyphae. Pigment pallid, intracellular in pileipellis. Stipitipellis a cutis with transitions to a trichoderm, made up of long, septate hyphae, 2.5–7.0 µm wide. Clamp-connections scarcely present in pileipellis and stipitipellis.

Habitat & distribution — Ectomycorrhizal, associated with *Betula*, *Fagus*, *Quercus*, and *Castanea*. Widespread all over Europe, from the subarctic to the Mediterranean, but rare in most areas. *Tricholoma sulphurescens* has a wide ecological and geographical range (Christensen et al., 1998), but occurs most frequently on calcareous soil under deciduous trees like *Fagus*, *Quercus* or *Betula*.

Collections examined. THE NETHERLANDS: prov. Gelderland, Apeldoorn, 21 Oct. 1966, *E. Kits van Waveren* (L). — Germany: Bayern, Weisenhofener Espaan near Roth, 25 Sept. 1995, *M. E. Noordeloos* (MEN 95182) (L). — AUSTRIA: Kärnten, St. Margareten im Rosental, 9 Sept. 1998, *M. E. Noordeloos* (MEN 9881) (L). — ITALY: Toscana, Cipresseta di S. Agnese E of Poggibonzi, 5 Nov. 1996, *M. Christensen* (MC 97296) (C); Ullignano SE of Volterra, 5 Nov. 1996, *M. Christensen* (MC 97294) (C). — SWEDEN: Öland, Ismantorp, 31 Aug. 1996, *P. Ålind & T. Knutsson* (herb. T. Knutsson); Medelpad, Stöde, 22 Aug. 1995, *J. H. Petersen & S. A. Elborne* (SAE 95.7S) (C). — FINLAND: Kainuu, Yli-Näljänkä, 1 Sept. 1991, *M. Ohenoja* (OULU); 8 Sept. 1991, *M. Ohenoja* (OULU); Mieslahti near Paltamo, 12 Aug. 1987, *M. Ketonen & S. Leinonen* (OULU); Pohjois-Pohjanmaa, Muhos, 5 Sept. 1965, *S. Eurola* (OULU); Oulun-Pohjanmaa, Kiiminki, 9 Sept. 1972, *M. Ohenoja* (OULU); Inarin Lappi, Kevo, 4 Sept. 1970, *Tauno Ulvinen* (OULU); same loc. 17 Aug. 1995, *M. E. Noordeloos* (MEN 95086) (L).

Tricholoma sulphurescens is well-characterized by the quick yellow staining of the basidiocarps when touched, the yellow context, the initially smooth pileus, the rather crowded lamellae and the floccose to squamulose stipe, in combination with subglobose to broadly ellipsoid spores. *Tricholoma sulphureum* has overall yellow colours, more distant lamellae and much larger, oblong spores and a very characteristic nauseous smell. The name *Gyrophila resplendens* has been used for *T. sulphurescens* (Quélet, 1888), but the original description of *Agaricus resplendens* (Fries, 1857) does not mention the strong yellow staining which is the most obvious macroscopical character (see comments under *T. album*). It is likely that the name *Tricholoma impolitum* (Lasch) Gillet also has been used for *T. sulphurescens*. According to the original description, however, *Tricholoma impolitum* does not belong to sect. *Lasciva*, but probably refers to a species close to, or even synonymous with *T. acerbum*. Also the name *Tricholoma saponaceum* var. *cnista* Lange has been misused for *T. sulphurescens*, but that taxon is characterised by a slight reddish and not yellow staining of the basidiocarp.

Tricholoma section Atrosquamosa subsect. Terrea (Konr. & M.) M. Bon

Subsection *Terrea* is distinguished from the other *Tricholoma* species with grey colours in the pileus, by its relatively small basidiocarps with a fibrillose-tomentose to squamulose pileus, and a mild, never bitter taste. Furthermore many species in stirps *Scalpturatum* have very small spores and frequently a strong yellow staining of old and/or bruised basidiocarps.

Several authors have discussed the species in subsect. *Terrea* (Bon, 1976; Clemençon, 1983; Huijsman, 1968; Marriotto & Turetta, 1996; Basso & Candusso, 1997; Riva, 1998). After revising the material for the Flora agaricina neerlandica the need was felt, however, to present our own concept on this difficult group.

1a. Pileipellis with well-differentiated subpellis of subisodiametrical to broadly ellipsoid elements; spores relatively large, $5.5\text{--}9.0 \times 4.0\text{--}5.0\text{ }\mu\text{m}$; surface and context never staining strongly yellow when bruised or with age; smell generally absent or weak

b. Pileipellis poorly differentiated, subpellis made up of cylindrical hyphae hardly differentiated from pileitrama; spores relatively small, $4.5\text{--}6.0 \times 2.5\text{--}4.5\ \mu\text{m}$; surface and context often staining strongly yellow when bruised or with age; smell more or less farinaceous stirps *Scalpturatum*, 3

b. Stipe with minute darker dots and/or squamules; spores $7.0\text{--}9.0 \times 4.0\text{--}5.0 \mu\text{m}$, $Q = 1.6\text{--}2.2$, av. $Q = 1.7\text{--}1.9$, oblong to ellipsoid *T. triste*

b. Stipe without a woolly annulus, but often with a fibrillose cortina 4

4a. Pileus rather pale, often almost white, tinged grey at centre only, often with an acute umbo, even when expanded; spores narrow, $4.5\text{--}6.0\text{--}(6.5) \times 2.5\text{--}3.5\text{ }\mu\text{m}$, $Q = 1.4\text{--}2.1$, av. $Q = 1.5\text{--}1.9$ ellipsoid to oblong *T. argyraceum*

b. Pileus moderately dark to very dark grey to grey-brown; convex with broad umbo when expanded; spores (4.5–)5.0–6.0 × 3.0–4.0(–4.5) μm, Q = 1.2–1.7, av. Q = 1.3–1.5, broadly ellipsoid to oblong *T. scalpturatum*

Tricholoma terreum (Schaeff.: Fr.) Kumm. — Fig. 2a, Plate 7, 8

Agaricus terreus Schaeff., Fung. Bavariae (1762) 28; *Agaricus terreus* Schaeff.: Fr., Syst. mycol. 3, index (1832) 44; *Gyrophila terrea* (Schaeff.: Fr.) Quél., Fl. mycol. France (1888) 285; *Agaricus myomyces* Pers., Syn. meth. Fung. (1797) 20; *Agaricus myomyces* Pers.: Fr., Syst. mycol. 1 (1821) 44; *Tricholoma myomyces* (Pers.: Fr.) J. Lange, Dansk bot. Ark. 8 (3) (1933) 21; *Tricholoma bisporigerum* J. Lange, Dansk bot. Ark. 8 (3) (1933) 20.

Selected icons. Breitenb. & Kränzln., Pilze Schweiz 3 (1991) 340; Bres., Iconogr. mycol. 2 (1927) pl. 75; Cetto, Funghi Vero 1, ed. 1 (1976) pl. 127; Courtec. & Duhem, Champ. Fr. Eur. (1994) 392 & 394 (as *T. myomyces*); J. Lange, Fl. agar. dan. 1 (1935) pl. 21A (as *T. myomyces*); Marchand, Champ. Nord Midi 1 (1973) pl. 43; Marchand, Champ. Nord Midi 9 (1984) pl. 849 (as *T. myomyces*); Riva, Tricholoma (1988) pl. 16 & pl. 18 (as *T. myomyces*); Rocabruna in Bolets Catalunya 1 (1982) pl. 49.

Selected descriptions and figures. M. Bon, *Tricholomes Fr. Eur. occ.* (1984) 141; M. Bon, *Fl. mycol. Eur.* 2, *Tricholomes* (1991) 60; Riva, *Tricholoma* (1988) 209.

Lectotype (Iconotype): *Agaricus terreus* Schaeff., *Fung. Bavariae* (1762) pl. 28.

Epitype (design. here): Bayern, Sperberslohe near Roth, 24 Sept. 1995, *M.E. Noordeloos* (MEN 95192) (L).

Pileus 30–90 mm, conical, campanulate or conico-convex, hemispherical to campanulate, often with conical umbo, expanding to conico-convex, convex or plano-convex with conical or rather flat umbo, with deflexed then straight margin, mouse-grey to very dark grey-brown (Mu. 10 YR 7/3–2, 10 YR 3–5/2; 3/1–2, 3/2, 4/2) rarely more reddish brown (7.5 YR 5/4–3/2–3), at margin sometimes more brown (10 YR 5/4; 7.5 YR 7/2), entirely radially fibrillose to tomentose, finally breaking up in small appressed or erect squamules, often in radial pattern showing paler flesh in between with age, dry. Veil usually present in primordia, and often clearly visible as a fibrillose-arachnoid layer on young pilei, but often absent in mature specimens, sometimes clearly visible as white fibrillose-arachnoid patches near and along margin of pileus and as a fibrillose zone on stipe. Lamellae, L = 60–90, l = 37, moderately distant, adnate-emarginate, segmentiform to subventricose, up to 9 mm broad, often more or less thick and brittle, white to grey (10 YR 6–8/2, 6/3; 5 YR 6/1) with irregular, concolorous or slightly paler edge or rarely blackish edge. Stipe 50–90 × 7–20 mm, cylindrical or fusiform, straight or flexuous, solid then narrowly fistulose, straight or flexuous, whitish, then with sordid greyish or ochre-yellow tinges in lower part, with or without remnants of veil otherwise glabrous or with a few loose fibrils. Context white, often greyish under pileipellis at centre of pileus, firm. Smell none, or weakly farinaceous when crushed. Taste mild.

Spores 5.5–7.0(–7.5) × 4.0–5.0(–5.5) µm, Q = 1.3–1.7, av. Q = 1.4–1.5, broadly ellipsoid to oblong with pronounced hilar appendage. Basidia 28–35 × 6.0–7.0 µm, 4-spored, clampless. Lamella edge fertile. Pileipellis a cutis, sometimes with transitions to a trichoderm, made up of long, septate hyphae with cylindrical to inflated elements, straight or constricted at septa, 15–70(–90) × 5.0–16 µm; subpellis usually well differentiated, composed of (2–) 3–5(–7) layers of strongly inflated, subisodiametrical or elongate elements, 10–35(–50) × 8.0–28 µm. Pigment brown, parietal and incrusting in pileipellis, sometimes in addition intra and intercellular brown pigment clots have been observed. Stipitipellis an undifferentiated cutis of 2.5–7.0 µm wide, cylindrical hyphae. Caulocystidia absent or scarce, single, 10–42 × 2.5–6.0 µm, cylindrical to subclavate or irregularly shaped, hyaline, thin-walled. Clamp-connections not observed.

Habitat & distribution — Ectomycorrhizal with *Pinus*, more rarely *Abies*, *Picea* or *Fagus* on more or less calcareous, sandy to loamy soils. Rather common to common in most parts of northern Europe.

Collections examined. FRANCE: ex Herb. Persoon collection of *Agaricus myomyces*, without date, locality (L). — THE NETHERLANDS: prov. Noord-Holland, Wassenaar, 31 Oct. 1954, *R.A. Maas Geesteranus* (MG 10217); Noordwijk, 20 nov. 1956, *R.A. Maas Geesteranus* (MG 11888) (L); Heemstede, Amsterdamse Waterleiding Duinen near Oase, 1 Oct. 1994, *M.E. Noordeloos* (MEN 94101) (L); Putten, 15 Nov. 1958, *E. Kits van Waveren* (L); Aerdenhout, 18 Oct. 1979, *E. Kits van Waveren* (L); prov. Zeeland, Haamstede on Westenschouwen, 7 Nov. 1998, *M. Christensen* (MC 98209) (C). — GERMANY: Bayern, Sperberslohe near Roth, 24 Sept. 1995, *M.E. Noordeloos* (epitype, MEN 95192) (L); Mauk near Roth, 26 Sept. 1995, *M.E. Noordeloos* (MEN 95207) (L). — ITALY: Trentino, Roncigno, Cinque Valli, Sept. 1996, *M.E. Noordeloos* (MEN 96137) (L). — AUSTRIA: Steiermark, Mariazell, Greith, Krönerin, 7 Sept. 1994, *M.E. Noordeloos* (MEN 9460) (L). — DENMARK: E Jylland, Brabrand near Aarhus, 25 Sept. 1995, *B. Vestergaard & K. Nielsen* (MC 95155) (C); Mols, 9 Oct. 1995, *C. Brandt* (MC 95176) (C);

Nordlandsvej, Risskov, 15 Oct. 1998, *M. Christensen* (MC 98118) (C). — SWEDEN: Jämtland: Fillstabäcken SW of Östersund, 2 Sept. 1997, *M.E. Noordeloos* (MEN 9739) (L); Ormskärret, 6 Sept. 1997, *M. Christensen* (MC 97133) (C).

Tricholoma terreum is a rather variable species. Several taxa have been recognized, mainly on account of the structure of the pileipellis, the shape and colour of the pileus and the presence or absence of veil, which prove to be similar. *Tricholoma myomyces* sensu Cléménçon (1983) and Bon (1991) is characterized by only one or two layers of isodiametrical cells in the pileipellis in contrast to three or more in *T. terreum*. But according to our observations the number of layers in the pileipellis is very variable and also depends on the age of the basidiocarps and ecological and climatical conditions. The shape of the pileus in *Tricholoma myomyces* is described as more or less convex contrasting with a more or less conical pileus in *T. terreum*. The illustrations of *Tricholoma myomyces* (Lange, 1935; Marchand, 1986; Riva, 1988) do not support these differences and our observations from fresh collection frequently show a rather continuous range of pileal shapes from conical or campanulate to convex, in basidiocarps from one mycelium. The same applies to the colour of the pileus, ranging from rather pale grey to deep greyish-black, connected with the variation found in the microscopy of the pileipellis. Another character used in the literature to distinguish *Tricholoma myomyces* from *T. terreum* is the presence (*T. myomyces*) or absence (*T. terreum*) of a fibrillose cortinate veil as white, fibrillose, arachnoid patches along the margin of the pileus, and a fibrillose annuliform zone on the stipe. Our studies show a rather big variation in the occurrence of veil. In many collections veil was observed in very young basidiocarps or primordia, but it may disappear completely in the course of development. Presence of veil remnants in mature basidiocarps did not seem to be correlated with any of the other distinguishing characters mentioned for *Tricholoma myomyces* and *T. terreum*. Therefore, it was decided to consider *Tricholoma myomyces* as a synonym of *T. terreum*.

Tricholoma gausapatum (Fr.) Quél. as conceived by Huijsman (1968) and Bon (1976, 1991) differs from *T. terreum* by the woolly-plushy, not squamulose surface of the pileus, which may also have a more brown-grey tinge, the greyish-glaucous tinge of the lamellae, and the fugacious fibrillose annuliform zone on the stipe. According to Cléménçon (1983) *Tricholoma gausapatum* is also characterized by clamps or pseudoclamps in the hymenium. So far we have not studied any material that matches this concept of *T. gausapatum*. It seems to be a very rare species, restricted to southern Europe.

Tricholoma bisporigerum Lange (1933) may represent a 2-spored form of *T. terreum*, but further studies are needed.

Tricholoma leucoterreum Mariotto & Turetta (1996), described from central Italy, resembles in all aspects *T. terreum*, but differs in the lack of any pigment. It probably is a pigment-less albino-form.

***Tricholoma triste* (Scop.: Fr.) Quél. — Fig. 2b, Plate 6**

Tricholoma triste (Scop.: Fr.) Quél., Mém. Soc. Emul. Montbéliard, sér. 2, 5 (1872) 79 (Champ. Jura Vosges 1).

Agaricus tristis Scop., Fl. carn., ed. 2 (1772) 483; *Agaricus tristis* Scop.: Fr., Epicrisis (1836) 34; *Gyrophila triste* Quél., Fl. mycol. France (1888) 285.

Excluded. *Tricholoma triste* sensu Cetto, Funghi Vero 2, ed. 1 (1976) pl. 567 (= ? close to *T. terreum* or *T. atosquamosum*); sensu Marchand, Champ. Nord Midi 9 (1986) pl. 850 (?); sensu M. Bon, Tricholomes Fr. Eur. occ. (1984) 146; Fl. mycol. Eur. 2, Tricholomes (1991) 59 (= *T. scalpturatum*?).

Neotype (design. here): Germany, Baden-Württemberg, Seedorfer Wald, Schwarzwald, 27 Sept. 1996, *M. Meusers* (E 3754) (L).

Pileus 10–50 mm, conical to conico-convex with deflexed margin, expanding to plano-convex with or without low umbo, with deflexed to straight margin, with undulating lobed marginal zone when old, uniformly very dark grey-brown to almost black or more brown-grey when old (Mu. 10 YR 2–3/2, 3/4, 4/3, 7.5 YR 3–4/2), very finely tomentose all over, then sometimes breaking up in very fine fibrillose squamules, with very conspicuous whitish, arachnoid veil along margin. Lamellae, L = 50–60, l = 1–7, moderately distant, adnate-emarginate, segmentiform to narrowly ventricose, grey (10 YR 7–6/2) with concolorous or in part blackish-dotted, subentire to eroded edge. Stipe 25–40 × 4–7 mm, cylindrical or slightly broadened towards base, straight or flexuous, pale grey, fibrillose-punctate with greyish fibrils all over, glabrescent, innately fibrillose with age. Context white to pale grey. Smell indistinct. Taste indistinct.

Spores 7.0–9.0 × 4.0–5.0 µm, Q = 1.6–2.2, av. Q = 1.7–1.9, oblong with pronounced hilar appendage. Basidia 29–38 × 6.0–7.5 µm, 4-spored, clampless. Lamella edge fertile. Cystidia absent. Pileipellis a cutis with transitions to a trichoderm, made up of septate hyphae, with elements 15–60 × 3.5–7.0 µm, constricted at septa or not; subpellis well differentiated from pileitrama, made up of inflated elements, 14–50 × 4.0–15 µm. Pigment dark yellow-brown, incrusting in pileipellis. Stipitipellis a cutis of cylindrical hyphae, 3.0–7.0 µm wide, with yellow, finely incrustated walls. Caulocystidia in clusters, 14–40 × 3.5–5.0 µm, subcylindrical, with yellow-brown, incrustated walls. Clamp-connections not observed.

Habitat & distribution — Ectomycorrhizal, associated with coniferous and deciduous trees (*Picea*, *Pinus*, *Larix*, *Fagus*) in mountainous forest on more or less acid bedrock. Recorded from central Europe, but distribution poorly known.

Collections examined. GERMANY: Baden-Württemberg, Seedorfer Wald, Schwarzwald, 27 Sept. 1996, *M. Meusers* (neotype, E 3754) (L) — ITALY: Trento, Spera Val Campella, 8 Sept. 1996, *M. E. Noordeloos* (MEN 96112) (L).

Tricholoma triste — as presented here — agrees with the rather short original diagnosis of Scopoli (1772). As such, it also fits well within the concept of Bresadola (1927). It is distinguished from *Tricholoma terreum* mainly by the large and slender spores, the smaller size of the basidiocarps and the blackish squarrose stipe. *Tricholoma triste* sensu M. Bon (1984, 1991) has smaller spores, a fibrillose, not squamulose stipe and a less differentiated pileipellis. This taxon seems to be a transition between stirps *Terreum* and stirps *Scalpturatum*, and may even be a variant of *Tricholoma scalpturatum*. Bon (1995) states that *Tricholoma scalpturatum* var. *atrocinctum* Romagn. (1974) represents a kind of intermediate form between *T. scalpturatum* and *T. triste*, but according to our species concept this variety seems to be more related to *T. argyraceum* (see below).

***Tricholoma argyraceum* (Bull.) Gillet — Fig. 2c, Plate 9**

Tricholoma argyraceum (Bull.) Gillet, Hyménomycètes (1878) 103.

Agaricus argyraceus Bull., Herb. France (1779) pl. 423, fig. 1; *Gyrophila argyracea* (Bull.) Quél., Enchir. Fung. (1886) 12; *Tricholoma scalpturatum* var. *argyraceum* (Bull.) Kühn. & Romagn., Fl. anal. Champ. sup. (1953) 154.

Selected icons. Alessio & Rebaudengo, Micol. ital. 7 (1) (1978) pl. 19; Dähncke & Dähncke, 700 Pilze (1979) pl. 182; J. Lange, Fl. agar. dan. 1 (1935) pl. 23B; R. Phillips, Mushr. other Fungi (1981) 37 (as *T. inocybeoides*); Riva, *Tricholoma* (1988) 27.

Selected descriptions and figures. M. Bon, *Tricholomes France, Europe occ.* (1984) 153 (as *T. scalpturatum* var. *argyraceum*); M. Bon, *Fl. mycol. Eur.* 2, *Tricholomes* (1991) 61; Riva, *Tricholoma* (1988) 248.

Iconotype: *Agaricus argyraceus* Bulliard, *Herb. Fr.* (1789) pl. 423.

Epitype (design. here): The Netherlands, Prov. Groningen, Verhildersum near Leens, 21 Sept. 1994, M. E. Noordeloos 9491 (L).

Pileus 15–60 mm, conico-convex to convex with pronounced conical umbo, with deflexed margin, expanding with age to convex or plano-convex, usually with acute umbo and deflexed to straight margin, marginal zone sometimes undulating and splitting with age, thin-fleshed, white or very pale cream-coloured (Mu. 10 YR 8/2, 2.5 Y 8/2), at centre sometimes with brown fibrillose covering (10 YR 5–4/2, 10 YR 5/3) that sometimes agglutinate in minute squamules, towards margin innately radially fibrillose, silvery shining, often distinctly staining yellow when old and bruised, particularly near the margin. Veil present in primordia, usually quickly disappearing, but sometimes visible in mature specimens as arachnoid fibrils at pileal margin. Lamellae, L = 60–80, l = 37, rather crowded, deeply emarginate, rarely broadly adnate, segmentiform to ventricose, then often extending under pileus, white or very pale grey, often staining yellow when old or bruised, with entire to eroded, concolorous edge. Stipe 20–50 × 3–8(–9) mm, cylindrical or tapering towards base, white, sometimes tinged pale grey in lower part, sometimes staining yellow when bruised, finely fibrillose-striate lengthwise, silky shining. Context thin, white. Smell farinaceous, sometimes weakly so, but then strongly farinaceous when cut. Taste farinaceous rancid.

Spores 4.5–6.0(–6.5) × 2.5–3.5 µm, Q = 1.4–2.1, av. Q = 1.5–1.9, narrowly oblong with pronounced hilar appendage. Basidia 21–30 × 5.0–7.0 µm, 4-spored, clampless. Lamella edge sterile or heterogeneous with few to abundant, sometimes clustered cheilocystidia, 16.5–25.5 × 2.0–6.0 µm, versiform, subcylindrical to clavate or lageniform, thin-walled. Pileipellis a poorly differentiated cutis, rarely with a slightly tendency towards a trichoderm, made of narrow, cylindrical hyphae; elements 15–55(–70) × 2.5–7.5(–9.0) µm; subpellis not differentiated from pileitrama, made up of cylindrical to slightly inflated elements, 30–95 × 5.0–13(–17) µm. Pigment absent or pale yellow, membranous or very minutely incrusting. Stipitipellis a cutis of cylindrical hyphae, 2.0–6.0 µm wide. Caulocystidia absent or sparsely present, 15–24 × 2.5–6.0 µm, cylindrical to subclavate or irregularly shaped. Clamp-connections absent.

Habitat & distribution — Ectomycorrhizal with deciduous trees (*Carpinus*, *Populus*, *Betula*, *Quercus*, *Tilia*) in parks and woods on nutrient rich, sandy or clayey soil. Widespread all over Europe, but apparently rare.

Collections examined. THE NETHERLANDS: prov. Groningen, Verhildersum near Leens, 21 Sept. 1994, M. E. Noordeloos (MEN 9491) (Epitype, L); prov. Flevoland, Noordoost Polder, Voorsterbos, 12 Oct. 1983, C. Bas (Bas 8201) (L); prov. Noord-Holland, Amsterdamse Waterleiding duinen, 30 Nov. 1958, Kits van Waveren (L); Vogelenzang near Bloemendaal, 11 May 1972, C. Bas (Bas 5808) (L); 7 Nov. 1970, P. B. Jansen (PBJ 70252) (L); Koningshof near Bloemendaal, 9 Sept. 1987, A. G. Becker (L); prov. Zuid-Holland, 's-Gravenhage, 18 Nov. 1973, H. Kroes (L); Meyendel near Wassenaar, 23 May 1983, M. E. Noordeloos (MEN 8303) (L); prov. Zeeland, Schouwen, 23 Oct. 1966, C. Bas (Bas 4867) (L); Haamstede, 7 Nov. 1998, N. Dam (MC 98210). — ITALY: Trentino, Valle di Sella, 16 Sept. 1995, M. E. Noordeloos (MEN 95144) (L). — DENMARK: E Jylland, Vestre Kirkegaard in Aarhus, 9 Oct. 1995, M. Christensen (MC 95171–173) (C); 11 Aug. 1998, M. Christensen (MC 98007) (C). — SWEDEN: Jämtland, Östersund, 2 Sept. 1997, M. Christensen (MC 97060) (C).

Tricholoma argyraceum is a pale coloured species, usually with prominent umbo, with rather small fruit-bodies with a short stipe in relation to the diameter of the pileus, and nar-

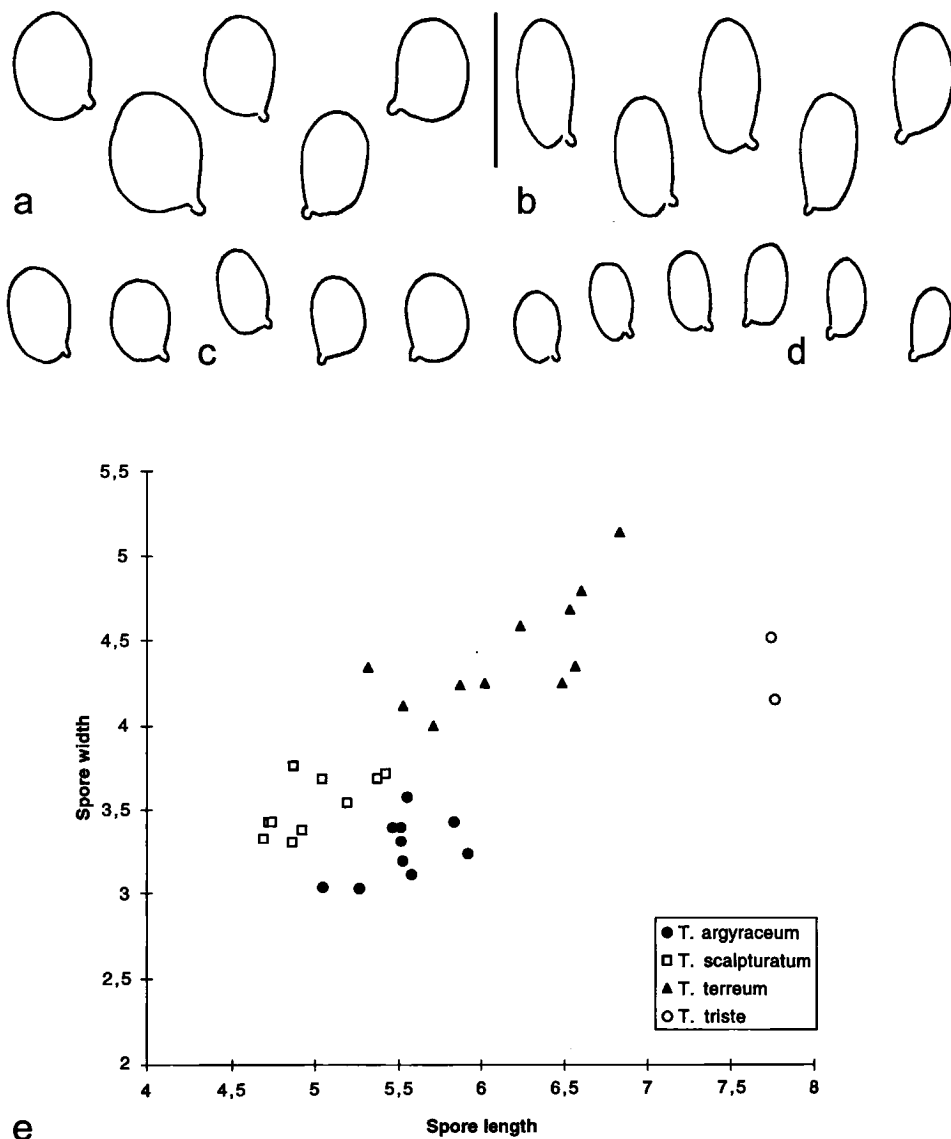


Fig. 2. Spores of subject *Terrea*. a. *T. terreum*; b. *T. triste*; c. *T. argyraceum*; d. *T. scalpturatum*; e. average spore size for species in subject *Terrea*. Bar = 10 µm.

row spores. Within this concept is also included *Tricholoma inocybeoides* A. Pears., which is considered a form with a pileus with a prominent grey-fibrillose umbo (see below). *Tricholoma scalpturatum* differs mainly by the darker colours, slightly larger habit, and broader spores. *Tricholoma scalpturatum* var. *atrocinctum* Romagn. is considered a form of *T. argyraceum* with a distinct black line around the stipe. *Tricholoma scalpturatum* var. *argyraceum* as depicted in Riva (1998: photo p. 247) represents typical *T. argyraceum* in our concept, but unfortunately no microscopical details are given for the depicted collection. Also

T. inocyboides and *T. alboconicum* discussed and illustrated in the paper of Riva (1998) fit well in our concept of *T. argyraceum*.

Tricholoma albidum M. Bon has an innately silky fibrillose pileus without squamules. It is probably closely related to *Tricholoma columbetta*.

Tricholoma argyraceum* forma *inocybeoides* (A. Pears.) M. Christensen & Noordel., *comb. nov.

Basionym: *Tricholoma inocybeoides* A. Pears., Trans. Br. mycol. Soc. 22 (1938) 29.

Synonyms: *Tricholoma argyraceum* var. *inocybeoides* (A. Pears.) M. Bon, Bull. trimest. Soc. mycol. Fr. 85 (1970) 475–492; *Tricholoma alboconicum* (J. Lange) Cléménçon, Mycol. helv. 1 (1983) 26; *Tricholoma myomyces* var. *alboconicum* J. Lange, Fl. agar. dan. 5 (1940) IX.

Neotype: (Basso & Candusso, 1997): Great Britain, Sussex, Richmond, Royal Botanic Garden, Kew, 15 Oct. 1966, D.A. Reid (herb. K; not studied).

Tricholoma bonii Basso & Candusso (1997), described from southern Europe, is very similar to *Tricholoma argyraceum* forma *inocybeoides* but differs by larger spores, (5.5–) 6.0–7.0 × 4.0–4.5(–5.0) µm, and a more differentiated pileipellis, characteristic for stirps *Terreum*.

***Tricholoma scalpturatum* (Fr.) Quél. — Fig. 2d**

Tricholoma scalpturatum (Fr.) Quél., Mém. Soc. Emul. Montbéliard, sér. 2, 5 (1872) 232 (Champ. Jura Vosges 1).

Agaricus scalpturatus Fr., Epicrisis (1838) 31. — *Tricholoma scalpturatum* var. *atrocinctum* Romagn., Bull. trimest. Soc. mycol. Fr. 90 (1974) 166.

Misapplied. Tricholoma argyraceum sensu auct. non Bull.

Selected icon. Breitenb. & Kränzl., Pilze Schweiz 3 (1991) pl. 431; Courtec. & Duhem, Champ. Fr. Eur. (1994) 396; Marchand, Champ Nord Midi 9 (1987) pl. 852; R. Phillips, Mushr. other Fungi (1981) 37 (as *T. argyraceum*); Riva, *Tricholoma* (1988) pl. 24.

Selected descriptions and figures. M. Bon, *Tricholomes France, Europe occ.* (1984) 150; M. Bon, Fl. mycol. Eur. 2, *Tricholomes* (1991) 61; Breitenb. & Kränzl., *Pilze Schweiz* 3 (1991); Marchand, Champ. Nord Midi 9 (1984) 852; Riva, *Tricholoma* (1988) 238.

Neotype (design. here): Sweden, Jämtland, Sundnäs Sjö, 8 Sept. 1997, M. Christensen (MC 97165) (L).

Pileus 20–70 mm, conico-convex with subinvolute to deflexed margin when young, expanding to plano-convex or applanate with low umbo, with straight or reflexed, often undulating margin, uniformly dark grey-brown, entirely densely tomentose when young, when expanded breaking up in radially arranged, grey-brown small appressed or slightly uplifted, fibrillose squamules on paler background (Mu. 10 YR 4–5/2–3; 6/2–3), dry. Lamellae, L = 80–100, l = 15, moderately crowded, emarginate adnate, segmentiform to narrowly ventricose, white to pale cream-coloured (10 YR 8–7/2), staining yellow with age or not, with entire to eroded, concolorous edge. Stipe 20–40 × 5–10 mm, cylindrical, white, finally pale yellow, innately silvery fibrillose, sometimes with veil as a very faint fibrillose, white, rarely blackish annuliform zone. Context white. Smell strongly farinaceous. Taste farinaceous to rancid.

Spores (4.5–)5.0–6.0 × 3.0–4.0(–4.5) µm, Q = 1.2–1.7, av. Q = 1.3–1.5, broadly ellipsoid to oblong with pronounced hilar appendage. Basidia 19–28 × 4.5–7.0 µm, 4-spored, clampless. Lamella edge fertile, heterogeneous or rarely almost sterile, with single to clus-

tered thin-walled, cylindrical to clavate cheilocystidia, $18\text{--}30 \times 4.0\text{--}7.0\ \mu\text{m}$. Pileipellis a cutis with transitions to a trichoderm, made up of cylindrical elements, $15\text{--}45 \times 2.5\text{--}7.5\ \mu\text{m}$, constricted at septa or not; subpellis not very much differentiated from pileitrama, made up of cylindrical to slightly inflated elements, $21\text{--}74 \times 4.0\text{--}17\ \mu\text{m}$. Pigment brown, parietal and strongly incrusting in pileipellis, in addition sometimes intracellular. Stipitipellis a cutis of cylindrical hyphae, $2.5\text{--}7.5\ \mu\text{m}$ wide. Caulocystidia scattered, single, $12\text{--}30 \times 2.0\text{--}6.0\ \mu\text{m}$, cylindrical to versiform, thin-walled.

Habitat & distribution — Ectomycorrhizal, usually associated with deciduous trees (*Quercus*, *Fagus*, *Tilia*, *Populus*), rarely with coniferous trees (*Pinus*), on clay or on nutrient-rich sandy or sandy-peaty soils. Widespread all over Europe and fairly common.

Collections examined. THE NETHERLANDS: prov. Groningen: Gieten, Boekweitveentje, 11 Sept. 1994, M.E. Noordeloos (MEN 9468); prov. Friesland: Sneek, Ijsbrechtum, 17 Oct. 1978, J. Wisman (L); dito, 17 Oct. 1978, C. Bas (Bas 60B, L); prov. Noord-Brabant, Valkenburg near Landgoes NW of Ginneken, 25 Oct. 1964, P.B. Jansen (PBJ 64245); prov. Utrecht, Vijverbos near Harmelen, 2 Oct. 1993, M.E. Noordeloos (MEN 93213); Koningsweg near Bunnik, 13 Oct. 1968, E. Arnolds (Arnolds 337) (L); Kasteel de Haar near Haarzuilens, 4 Sept. 1953, C. Bas (L); Eemsdijk near Baarn, 7 Nov. 1998, H. van der Aa (Aa 12493, Aa 12495, MC 98213) (C); prov. Zuid-Holland, Duinrell near Wassenaar, 31 Oct. 1954, R.A. Maas Geesteranus (MG 10217) (L); Katwijk, 5 Feb. 1989, L. Jalink & M. Nauta (J&N 6032) (L); Noord-Holland, Vogelenzang, 11 May 1972, C. Bas (Bas 5808); prov. Flevoland, Noordoost Polder, 3 Nov. 1977, H. van der Aa (Aa 6118) (L); 12 Oct. 1983, C. Bas (Bas 8201) (L). — SWEDEN: Jämtland, Sundnäs Sjö, 8 Sept. 1997, M. Christensen (neotype, MC 97165) (L). — FRANCE: Territoir Belfort, Bois Lachat SE of Belfort, 7 Oct. 1998, M. Christensen (MC 98091) (C).

Tricholoma scalpturatum is used here in a narrow sense. It remains a rather variable species, however, with the colour of the pileus ranging from grey-brown to blackish grey. The pileus is darker than in *T. argyraceum* and normally more convex and without an acute papilla which is characteristic for *T. argyraceum*. The most important distinguishing character, however, is found in the rather broad spores with an average Q less than 1.5. *Tricholoma cingulatum* is very similar, differs mainly by its well-developed, woolly fibrillose annulus on the stipe. *Tricholoma scalpturatum* var. *atrocinctum* Romagn. has a blackish fringed annuliform zone, which occasionally also has been observed in *T. cingulatum*.

NEW VARIETIES

***Tricholoma psammopus* var. *macrosporum* Noordel. & M. Christensen, nov. var. — Fig. 3**

A varietate typica sporis grandis $7.0\text{--}8.5 \times 5.5\text{--}7.0\ \mu\text{m}$ differt.

Holotypus: The Netherlands: prov. Zuid-Holland, Noordwijk, 15 Nov. 1957, C. Bas 1381 (L).

Pileus 30–50 mm, convex to plano-convex with low, broad umbo and deflexed margin, pale yellow-brown to ochraceous with darker red-brown centre, dull to somewhat shining, smooth-rugulose at centre, towards margin more rugulose-fibrillose to subsquamulose. Lamellae, L = 40–70, l = 15, rather distant, adnate-emarginate, cream-coloured to pale yellowish-ivory, sometimes with rusty spots with age, with entire, concolorous edge. Stipe 30–50 \times 48 mm, cylindrical often tapering towards base, white to pale cream at apex, often sharply delineated from rest of stipe, downwards concolorous with pileus, with reddish brown punctate to floccose covering, more reddish-tinged towards base. Context whitish in inner parts, reddish brown in base of stipe. Smell indistinct. Taste bitter-sweet.

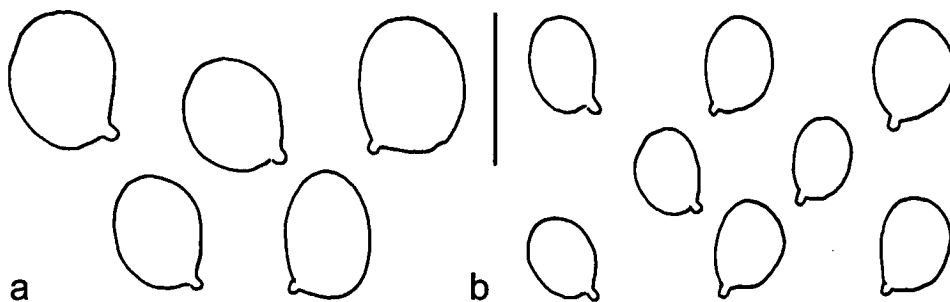


Fig. 3. Spores of *Tricholoma psammopus*. a. var. *macrosporum*; b. var. *psammopus*. Bar = 10 µm.

Spores $7.0\text{--}8.5 \times 5.5\text{--}7.0$ µm, $Q = 1.1\text{--}1.5$, av. $Q = 1.2\text{--}1.3$, subglobose, broadly ellipsoid to ellipsoid with pronounced hilar appendage. Basidia $24\text{--}40 \times 6.0\text{--}8.0$ µm, 4-spored, clampless. Lamella edge fertile. Cystidia absent. Pileipellis a cutis of cylindrical, $3.0\text{--}7.5$ µm wide hyphae with trichodermal tufts of subclavate terminal elements, up to 12.0 µm wide. Pigment membranous and intracellular in pileipellis. Stipitipellis a cutis of $3.0\text{--}6.0$ µm wide, cylindrical hyphae with membranous, sometimes finely incrusting pigment, with trichodermal tufts of cylindrical to clavate caulocystidia, $22\text{--}75 \times 4.0\text{--}8.0$ (–9.0) µm with intracellular pigment. Clamp-connections absent.

Habitat & distribution — Ectomycorrhizal, associated with *Pinus* in plantations on calcareous, sandy soils and loamy-sandy soil. So far only known from The Netherlands.

Collections examined. THE NETHERLANDS: prov. Zuid-Holland, Noordwijk, 15 Nov. 1957, C. Bas (holotype, Bas 1381) (L); prov. Overijssel, Delden 1974, E. Kits van Waveren (L).

Tricholoma psammopus is characterized by its moderately dark, reddish brown, very finely tomentose, granulate-punctuate to finely floccose pileus and stipe, and lack of smell. It occurs widespread in Europe in association with *Larix*, particularly in mountainous regions and on rich, often calcareous soil. However, it has also been found sometimes in association with *Pinus*. Bon (1984) reports also association with *Abies* and *Picea*. From the Netherlands only two collections are known, one from the coastal dune-area, collected under *Pinus* on calcareous sand, and one from an inland locality on loamy-sandy soil, without indication of accompanying trees. Both collections deviate from the current concept of *Tricholoma psammopus* (Bon, 1991; Riva, 1988) by having larger spores, that are born on 4-spored basidia. *Tricholoma psammopus* forma *bisporum* M. Bon has similar spores, born on 2-spored basidia, however, but grows also in association with *Pinus* (Bon, 1984). Considering the differences in basidia, it seems best, however, to keep forma *bisporum* separate from var. *macrosporum*.

Tricholoma equestre var. *populinum* M. Christensen & Noordel., var. nov. — Plate 10

A typo pileo haud viscoso sed appresso squamuloso, sporis tenuioribus $5.0\text{--}6.5 \times 3.5\text{--}4.5$ µm et sub *Populo* crescit differt.

Holotypus: Sweden, Medelpad, Borgsjö, 1 km W of the village, 16 Sept. 1995, M. Christensen (MC 95151) (L).

Tricholoma equestre var. *populinum* differs from var. *equestre* by the non viscid, entirely appressedly squamulose pileus, the more bright yellow colour of the lamellae and the

smaller, subglobose to ellipsoid spores, $5.0\text{--}6.5 \times 3.5\text{--}4.5\ \mu\text{m}$, $Q = 1.2\text{--}1.8$, av. $Q = 1.4\text{--}1.6$. The pileipellis is a cutis with transitions to a trichoderm, made up of $2.0\text{--}5.0\ \mu\text{m}$ wide, cylindrical hyphae, with cylindrical to subclavate terminal elements, $18\text{--}35 \times 2.0\text{--}7.0\ \mu\text{m}$ and with poorly differentiated subpellis composed of inflated elements, $2.5\text{--}7.0\ \mu\text{m}$ wide.

Habitat & distribution — Ectomycorrhizal with *Populus* and possibly also *Picea*; widespread in northern and western Europe, not yet recorded from the Netherlands.

The pileus of *Tricholoma equestre* var. *equestre* varies from rather smooth and viscid, particularly in young and fresh specimens, to rather dry and radially fibrillose to subsquamulose, but the spore size of the typical variety is larger ($6.0\text{--}7.5 \times 3.5\text{--}5.0\ \mu\text{m}$, $Q = 1.2\text{--}1.9$, av. $Q = 1.5\text{--}1.7$), and slightly more oblong than in var. *populinum*, and the lamellae are normally less yellow. Some authors (Bon, 1991) distinguish *T. auratum* (Paul.) Gillet as a separate species with viscid pileus. It is here considered a morphological variant of var. *equestre*.

NEW COMBINATIONS

***Tricholoma* section *Megatracholoma* (Kost) M. Christensen & Noordel.,
*comb. & stat. nov.***

Basionym: *Megatracholoma* Kost, Sydowia 37 (1984) 54.

Kost (Sydowia 37 (1984) 53–74) created the genus *Megatracholoma* to accommodate *Tricholoma colossus* (Fr.) Quél. The present authors, however, consider the differences not convincing enough to support a distinction on generic level and propose to accommodate *Tricholoma colossus* in a separate section of *Tricholoma*.

***Tricholoma atosquamosum* var. *squarrulosum* (Bres.) Christensen & Noordel.,
*comb. nov.***

Basionym: *Tricholoma squarrulosum* Bres., Fungi trident. 2 (1892) 47, Plate 152.

NOMENCLATORAL NOTES

1. On the names *Agaricus fulvus* and *A. ustale*

The name *Agaricus fulvus* was used by Bulliard (1792a), first in connection with plate 555, fig. 2. Later Bulliard (1792b) published a second icon of the same species (pl. 574). From the descriptions with the plates in the later reissue of the plates (Bulliard 1809: 608) it becomes clear that pl. 555, fig. 2 stands for the *Tricholoma* species currently named *Tricholoma fulvum* or *T. flavobrunneum* with a distinct yellow tinge in the context of stipe and lamellae, growing with *Betula*. Plate 574 clearly depicts *T. ustale* (Fr.: Fr.) Kumm. in its current use, with whitish context, lamellae white then pale yellow, with brown spots, etc., associated with *Fagus*.

Fries (1821: 37) sanctioned the name *A. fulvus* Bull., referring to both plates of Bulliard. In his diagnosis, Fries stressed the yellowing of the context of the stipe as an important character to distinguish it from *A. albobrunneus* and *A. ustalis*. It is clear that in this concept, *A. fulvus* Bull.: Fr. is the same as the current use of *Tricholoma fulvum* or, as it is also generally called, *T. flavobrunneum* (Fr.) Kumm.

Fries (1821: 37) included *Agaricus flavobrunneus* Fr. (1818) in the synonymy of *Agaricus fulvus*. Judging from the diagnosis of *A. flavobrunneus*, Fries was completely right in accepting this synonymy. However, he did not cite Bulliard's plate 555, fig. 2 for *A. flavobrunneus*, but Bulliard pl. 574, fig. 1! Since *Agaricus flavobrunneus* has not been sanctioned by Fries, it seems appropriate to accept it as a synonym of *A. fulvus*, excluding the cited plate of Bulliard. From the diagnosis it seems also very likely that *Agaricus nictitans* Fr.: Fr., (1821) is a synonym of *A. fulvus*.

Fries (1821) also describes *Agaricus ustalis* Fr.: Fr., characterized by a red-brown, viscid, glabrous pileus, white lamellae, and a stipe with glabrous apex, fibrillose-squamulose in lower part, growing under *Fagus* as well as *Betula*.

However, confusion starts when Fries (1838) completely reconsidered the taxonomy of this group of species. He abandoned *Agaricus fulvus*, obviously considering it a nomen confusum, connected with the name *Agaricus rufus* in various interpretations. A new species was described as *Agaricus fulvellus* Fr., referring to Bulliard's plate 555, fig. 2. In his description, however, Fries does not mention any yellow tinges in the context of stipe, nor in the colour of the lamellae. It is said to grow under *Fagus* in S Sweden, and the description therefore most likely refers to the current concept of *Tricholoma ustale* (Fr.: Fr.) Kumm. The description of *Agaricus nictitans* Fr. was emended to include Bulliard's plate 574, fig. 1, and might therefore refer to *Agaricus ustalis*. Fries redescribed in this publication also *Agaricus flavobrunneus* Fr. (1818), as a common species from *Betula* forest with a red-brown, virgate-squamulose, viscid pileus, deeply emarginate, yellow lamellae that stain reddish with age, and a stipe which is slightly viscid when moist, with naked apex, and fibrillose lower part. Fries indicates that *Agaricus rufus* sensu Fr. (1821: 37) is a synonym of *A. flavobrunneus*.

Finally, Fries (1838) gives a new description of *Agaricus ustalis*, characterized by a red-brown, glabrous, viscid pileus, white lamellae which stain reddish when old, and a stipe with naked apex, reddish fibrillose below, growing in mountainous *Pinus* forest.

CONCLUSIONS

Tricholoma fulvum (Bull.: Fr.) Bigeard & Guill., Fl. Champ.: 89, 1913

Basionym: *Agaricus fulvus* Bull., Herb. France (1792) pl. 555, fig. 2; *Agaricus fulvus* Bull.: Fr., Syst. mycol. 1 (1821) 37.

Lectotype: Bull., Herb. France (1792) pl. 555, fig. 2.

Epitype: Denmark: N. Jylland, Livö, 29 Sept. 1995, J. Vesterholt & M. Christensen (MC 95-160) (L, C).

We exclude from the sanctioning description the second plate by Bulliard (1792, pl. 574, fig. 1).

SYNONYMS

Agaricus flavobrunneus Fr., Observ. mycol. 2 (1818) 119; *Tricholoma flavobrunneum* (Fr.) Kumm., Führ. Pilzk. (1871) 130.

Type-description: Fries, Observ. mycol. 2 (1818) 119, excl. the reference to Bulliard, pl. 574, fig. 1.

Agaricus fulvellus Fr., Epicr. (1838) 28.

Lectotype: Bull., Herb. France (1792) pl. 555, fig. 2.

The type-description is excluded because it is confusing, and probably refers to *Agaricus ustalis*.

Tricholoma ustale (Fr.: Fr.) Kumm., Führ. Pilzk. (1871) 130.

Basionym: *Agaricus ustalis* Fr., Obs. mycol. 2 (1818) 122; *Agaricus ustalis* Fr.: Fr., Syst. mycol. 1 (1821) 37.

Lectotype: Bull., Herb. France (1792) pl. 574, fig. 1.

Epitype: Denmark: N. Jylland, Rold Skov E of Store Øksø, 7 Oct. 1997, M. Christensen (MC 97-239) (L, C).

The original diagnosis and sanctioning description clearly refer to the current concept of *Tricholoma ustale* (Fr.: Fr.) Kumm. The fact that Fries in later works confused several species under that name, is irrelevant for the nomenclatural status. The current use is now fixed with the designation of an iconotype and epitype.

2. *Tricholoma populinum* versus *T. suffocatum*

Tricholoma populinum J. Lange, Dansk Bot. Arkiv 8 (3) (1933) 14 (as nom. nov. for *Tricholoma pessundatum* var. *stans* forma *campestris* Fr.).

Holotype not existing. Neotype (selected here): Denmark, E. Jylland, Edwin Rahrse Vej, Braband, W of Aarhus, 10 Oct. 1996, M. Christensen (MC 96-171) (C, L).

Tricholoma suffocatum Richon. & Roze (1888) 81, represents an older synonym of *T. populinum* J. Lange (1933) and should be used instead. In fact, Lange (1935) was aware of the possibility that his *T. populinum* was a synonym of *T. suffocatum*. However, the older name has never been used in modern literature. Most authors (Bon, 1984, 1991; Breitenbach & Kränzlin, 1991; Courtecuisse & Duhem, 1994; Gulden, 1992; Marchand, 1986; Moser, 1983; Riva, 1988) use the name *Tricholoma populinum*. Therefore a formal proposal has been made to conserve the name *T. populinum* in favour of *T. suffocatum*. Awaiting the decision of the nomenclature committee of the International Botanic Congress, we continue the use of the name *T. populinum*.

3. *Tricholoma albobrunneum* versus *T. striatum*

The species around *Tricholoma albobrunneum* are all characterized by a more or less red-brown, viscid pileus, white lamellae, and a stipe which may have a distinctly delimited white apical zone or not. Several species have been distinguished in this group, but there is still confusion, in particular with regard to the interpretation of old names.

Agaricus striatus Schaeff. (1762, pl. 38) is depicted as a fungus which clearly belongs to this group. Persoon (1801: 293) describes *Agaricus albobrunneus* Pers. referring to *A. striatus* Schaeff., which he considers a synonym. Fries (1821: 37) sanctioned the name *Agaricus albobrunneus* Pers. and confirms the synonymy of *Agaricus striatus* Schaeff., but Fries specifically states that the plate of Schaeffer is not representative. Since the name *Agaricus albobrunneus* has been sanctioned, we use that name for our interpretation of Persoon's taxon. Furthermore, from a taxonomical point of view, the synonymy of *Agaricus striatus* Schaeff. is questionable, as it may represent another species in the same group, such as *Tricholoma batschii* Gulden.

4. *Tricholoma equestre* versus *T. flavovirens*

Agaricus equestre L. 1772: 12 is sanctioned by Fries (1821). Although Linnaeus described a rather unspecific taxon, the sanctioning description is rather unambiguous. Following the advice of the International Code of Botanical Nomenclature (Greuter et al., 1994) we use therefore the name *Tricholoma equestre* (L.: Fr.) Kumm. in favour of *T. flavovirens* Pers.: Fr., although the latter also has been sanctioned by Fries in 1821.

5. *Agaricus luteovirens* versus *T. apium*

Agaricus luteovirens A. & S. (1805: 168) has been interpreted as a species of *Floccularia* (Pouzar, 1957; Pilát, 1969; Bon, 1991). According to the original diagnosis this could well be true. Kreisel (1987), however, concluded from the original description that the name *Agaricus luteovirens* A. & S.: Fr. must be considered an older synonym of *Tricholoma apium* Schaeff. However, since Albertini & Schweinitz (1805), nor Fries (1821) in the sanctioning description refer to the very characteristic celery-like smell of *Tricholoma apium*, we do not follow Kreisel (1987), and continue the use of the name *Tricholoma apium* for the species in question.

6. *Tricholoma batschii* versus *T. fracticum*

Agaricus subannulatus Batsch is typified by a description and plate that can be identified without problems as the *Tricholoma* species currently known as *T. batschii* Gulden. Gulden (1969) created this new name for *T. subannulatus* (Batsch) Bres., because it is a later homonym of *T. subannulatus* (Peck) Zeller. Unfortunately, the new name was not valid according to the International Code of Botanical Nomenclature, because Gulden did not mention the basionym, nor presented a diagnosis.

Kreisel (1984) considered *Agaricus fracticus* Britzelmayer (1885: pl. 568) as conspecific with *T. batschii*, and recombined the epithet of Britzelmayer in *Tricholoma*. The present authors, however, disagree with the synonymy proposed by Kreisel (1984). Britzelmayer's plate does not show the sharply delimited white apical zone of the stipe, which is the main characteristic for *T. batschii*. It therefore likely represents another species in the group of *T. albobrunneum*. We therefore validate Guldens binomial.

Tricholoma batschii Gulden ex. M. Christensen & Noordel., *nom. nov.*

Basionym: *Agaricus subannulatus* Batsch, Elench. Fung. (1786) pl. 16.

Lectotype: Batsch, Elench. Fung. (1786) pl. 16, fig. 75ab.

Epitype (design. here): Germany, Gerolstein, Eifel, 23 Sept. 1980, H van der Aa (*Aa 7541*) (L).

Synonyms: *Tricholoma subannulatum* (Batsch) Bres., Icon. Myc. 2 (1927) pl. 63 non *T. subannulatum* (Peck) Zeller, Mycologia 14 (1922) 187. — *Tricholoma batschii* Gulden, Musseronflora (1969) 60 (invalid).

Misapplied. *Tricholoma fracticum* (Britz.) Kreisel sensu Kreisel, Feddes Rep. 95 (9, 10) (1984) 700 non Britz.

ACKNOWLEDGMENTS

The authors are very grateful to Thomas Kuyper, Marijke Nauta, and Thomas Læssøe for critically reading the various concepts of the manuscript. The foundation 'Rijksherbariumfonds Kits van Waveren' made it possible for the first author to stay in Leiden during November and December 1998 to work on *Tricholoma*.

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