PALEARCTIC LYOPHYLLACEAE (TRICHOLOMATALES) IN NORTHERN AND EASTERN EUROPE AND ASIA

BY
KUULO KALAMEES

SCRIPTA MYCOLOGICA 18

PALEARCTIC LYOPHYLLACEAE (TRICHOLOMATALES) IN NORTHERN AND EASTERN EUROPE AND ASIA

The genera:
Lyophyllum s.str., *Hypsizygus*, *Gerhardtia*,
Calocybe s.str., *Tricholomella*,
Rugosomyces, *Asterophora*

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TARTU 2004

Cover design by Piret Smagar. The cover shows *Lyophyllum connatum* drawn by the author

Published with the financial support of the Estonian Science Foundation

ISBN 9985-50-356-2

Estonian Academy Publishers

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INTRODUCTION

The object of the investigation was to furnish a study about taxonomy, ecology and distribution of the species of the genera *Lyophyllum* s.str., *Hypsizygus*, *Gerhardtia*, *Calocybe* s.str., *Tricholomella*, *Rugosomyces* and *Asterophora* (Lyophyllaceae, Tricholomatales) reported from the palearctic Northern and Eastern Europe and Asia. Since the 1950s, my collaborators and me have collected, described, depicted and stored in the herbarium of the Institute of Zoology and Botany at the Estonian Agricultural University (TAA) species from many parts of the former Soviet Union, from the Baltic States to the Russian Far East, Transcaucasia and Middle Asia, later (since the 1980s) also from Northern Europe, namely Scandinavian countries. Moreover, thanks to the valuable aid of many other mycologists who worked and collected fungi in the above-mentioned territory (beginning from the materials of P.A. Karsten in Finland in the 1860s already) we have learned much about the palearctic species of Lyophyllaceae in Northern and Eastern Europe and Asia. Precious information on Eastern Europe and Asia from numerous mycological literature sources in the Russian language has also been used.

It is particularly important to point out that the family Lyophyllaceae is a very complicated fungus group from the taxonomic and nomenclatural point of view since there exist many obscure treatments and different unclear and overlapping interpretations concerning the same taxa. The fact that most of the species are rare and many of them are represented by occasional single specimens only makes the investigation of the family especially complicated. It is very difficult to identify non- or incompletely described herbarium material of fungi. Fungistic data with poor descriptions from the literature often cannot be applied in identification. This applies particularly to the genus *Tephrocybe*, the situation of which was very well characterized by Lange and Sivertsen (1966: 204): "The species of *Lyophyllum* sect. *Tephrophana* constitute a total chaos as to their nomenclature". For that reason the genus *Tephrocybe* Donk is excluded from my current investigation.

As the primary aim of my work was to compile a practical guide for the identification of taxa of genera observed in palearctic Northern and Eastern Europe and Asia, I paid little or no attention to the ecology and geographical distribution of these taxa all over the world and to evolutionary aspects. As concerns the phylogenetic relations within the

family Lyophyllaceae, much time will probably be needed to determine them to the genus and species level. Reliable results can evidently be obtained by a molecular method, which has already given preliminary results in this field (cf. Hofstetter et al., 2002a, etc.: cf. below).

A. GENERAL PART

STATE OF KNOWLEDGE

From the taxonomic and distribution position, the family Lyophyllaceae, in particular in palearctic Eurasia, is not adequately reflected in the world literature. The genus *Lyophyllum* (sect. *Lyophyllum*, staining species) is better known in Europe and North America thanks to the publications by Clémençon (1982a, 1986) and Clémençon & Smith (1983). A large number of accepted keys for the determination of the species of the genera observed in the family Lyophyllaceae are presented by Singer (1978), Clémençon (1986), Clémençon & Smith (1983), Moser (1983), Bon (1999a), Hansen & Knudsen (1992), Urbonas (1997), Contu (2000), and Courtecuisse & Duhem (2000). Data on the distribution of the species of Lyophyllaceae in Eastern Europe and palearctic Asia (former Soviet Union, SU) are presented in numerous local fungistic investigations, mainly in Russian (cf. p. 10–12). A general survey about the distribution of these taxa in the former Soviet Union was presented by Kalamees (1994a,b). In addition, the following more important publications on the taxonomy, nomenclature and distribution of several Eurasian taxa discussed in my work deserve mentioning: Aarnaes, 2002; Alessio, 1979, 1995; Anonymous, 1979; Arnolds & Becker, 1993; Babos, 1975; Bellù, 1982; Bon, 1979, 1983, 1988a, 1991, 1992, 1994, 1995a; Bon & Courtecuisse, 1987; Breitenbach & Kränzlin, 1991; Brunelli, 1982; Clémençon, 1968a,b, 1982b, 1983a,b, 1985; Contu & Ortega, 2002; Corner, 1966; Donk, 1962; Fábry, 1974; Geesink, 1982; Gerhardt, 1982, 1989; Gröger, 1992; Gulden, 1969, 1993; Hagen, 1943; Hiromoto, 1961; Hongo & Clémençon, 1983; Horak, 1964; Hujisman, 1956; Imler 1943; Kalamees,1992, 1995, 1996; Knudsen & Hansen, 1991; Konrad & Maublanc, 1927, 1948; Kosina, 1988; Kreisel, 1984; Kühner, 1938, 1980; Kühner & Romagnesi, 1953; Lange, 1930, 1933,1935, 1936; Lange, 1942; Layaz & Brunelli, 1993; Legon, 1989; Migliozzi & Coccia, 1995; Nüesch, 1923, 1937; Pearson, 1946; Phillips, 1981; Pilát, 1968; Raithelhuber, 1979, 1980a,b; Redhead, 1984; Redhead & Singer, 1978; Riva, 1982, 1993; Romagnesi, 1987; Silvano, 1982; Singer 1943, 1962, 1986; Stordal, 1956; Svrček, 1972; Tymans, 1942; Vauras 1978; Wahren, 1987; Woldemar, 1954.

The morphogenesis of some species of the genera *Lyophyllum*, *Calocybe* and *Asterophora* is treated by Gorovoj (1990). Cultural characters

for taxonomic aims in the genus *Lyophyllum* (sect. *Difformia*) were investigated by Moncalvo et al. (1990), and Moncalvo & Clémençon (1992). Computer aided taxonomy (CAT) of the staining species in the genus *Lyophyllum* were carried out by Clémençon (1984, 1985). A preliminary phylogenetic analysis of some taxa of Lyophyllaceae based on rDNA sequences, including relevant methodological aspects, were carried out by Clémençon (1996), Moncalvo et al. (2000, 2002), and Hofstetter et al. (2002a,b).

IMPORTANT TAXONOMIC FEATURES

On the family level, very important features are: (1) the strong siderophility of basidia (weak only in the genus *Hypsizygus*); (2) the presence of clamps in all hyphae and basidia of the basidiocarps (lacking only in the genus *Gerhardtia*).

On the tribus level, significant taxonomic features are: (1) the habit of basidiocarps: prevalently tricholomatoid or clitocyboid, rarely subpleurotoid (tribus Lyophylleae); collybioid (tribus Tephrocybeae); (2) the length of basidia: usually <(25–)30 µm (tribus Tephrocybeae) or >(25)–30 µm (tribus Lyophylleae) (cf. Bon, 1999).

On the genus level, the type of pigments location in the pileipellis hyphae is of relevance. It can be: (1) epiparietal (incrusting hyphal walls) (*Lyophyllum*, *Rugosomyces*, *Gerhardtia*); (2) intracellular (vacuolar) or lacking (*Calocybe*, *Tricholomella*); intracellular or intraparietal (*Hypsizygus*). The species of the genus *Asterophora* are growing parasitically on the basiodiocarps of russules, *Hypsizygus* saprotrophically (parasitically?) on wood; the representatives of other genera are growing saprotrophically on soil humus or forest litter and debris, or they are mycorrhizal.

On the species level, the following macroscopic features are the most significant: colour of the pileus, lamellae and context; colour changing of the basidiocarps by handling and bruising (bluing, greying, blackening, browning or reddening); hygrophanity and striation of the pileus; the character of the surface of pileus and stipe; insertion and distance of the lamellae; silhouette of the stipe (singly, caespitose, connate); smell and taste of basidiocarps. As to the microscopic features, the following are the most significant: the structure of pileipellis (a cutis, (sub)trichoderm, or (sub)hymeniderm or subepithelium; filamentous or "cellular" or a mixture of these elements); the diameter of the hyphae of pileipellis and hymenophoral trama and size; shape and ornamentation of spores.

MATERIAL, METHODS AND PRESENTATION

Most of the specimens treated in this work were studied in dried condition. About 400 herbarium specimens were examined. Specimens were obtained from the following herbaria (abbreviations according to Holmgren et al., 1990): Austria (IB, WU), Belarus (MSK), Denmark (C), Estonia (TAA), Finland (H, JOE, OULU, TUR, TURA), Germany (M, HAL), Latvia (RIG), Lithuania (BILAS), Norway (O, TRH), Russia (IRK, KRAS, KRF, LE, MIM, VLA), Sweden (S, UPS), Ukraine (KW), United Kingdom (K).

Microscopic investigations were carried out using a light microscope SWIFT M4000-D. Pileipellis, hymenophoral trama, cystidia, basidia, basidiospores and chlamydospores were studied at immersion magnification ×1000. Spore sizes were measured in tenths of micrometres and were based on 20 measured mature spores from a gill. In species descriptions, the values of 10% of the spores measured are given in brackets. Preparations were made in 3% KOH solution, only in the *Rugosomyces cerinus* group the examinations were realized in 10% KOH to achieve discolouring of hymenophoral trama (cf. Arnolds & Becker, 1993). FB solution was used when the siderophility of basidia had to be verified according to the method of Clémençon (1986). In addition, the following reagents were used, if required: Congo-red, Cresyl-blue in water, anilin-blue and Melzer's reagent (according to Moser's formula, 1983).

The microscopical descriptions with the measurements of spores, basidia, cystidia, hyphae of basidiocarps etc., as well as all the illustrations except maps in this work, are original, based on the material I have studied. In the illustrations the following abbreviations are used: PP – hyphae of pileipellis, HTR – hyphae of hymenophoral trama, CH – cheilocystidia, B – basidia, SP – basidiospores. Bar in all cases = 10 µm.

Macroscopic descriptions are mainly based on personal observations of fresh material, supplemented by descriptions provided by other mycologists in the territory observed. Some macroscopic descriptions are based only on literature sources as indicated. To establish the colours of fresh specimens the Colour Identification Chart (1969) was used.

The classification proposed in this work coincides with that of Bon (1999a) up to sections. I have not used subsections in this work since the material available did not allow me to find the necessary correlations at this level. Instead, I have grouped species within sections into stirps (cf. also Clémençon, 1986; Bon, 1999a).

Abbreviations of author's names by taxa are used according to Brummitt & Powell (1992), bibliographical abbreviations of periodical literature according to Lawrence et al. (1968) and Bridson & Smith (1991), bibliographical abbreviations of non-periodical literature and books follow Bas et al. (1988–1999). For transliterating Russian the handbook of Butcher (1992) was used.

Geographical distribution of the taxa treated in this book is mainly based on the herbarium material studied (in the text in the paragraph "Distribution" denoted with an exclamation mark (!)) and supplemented by the references listed below. Doubtful literature data are denoted in the paragraph "Distribution" with a question mark (?). Untrue literature data are included in the text in the paragraph "Excluded". Geographical distribution and corresponding abbreviations are presented in accordance with the system of Brummitt (2001), with some modifications (Estonia, Latvia, Lithuania, Kaliningrad Province of Russia and Moldova are treated as independent 3rd-level units, abbreviated as EST, LAT, LIT, KA and MO, respectively; presently valid place names are given if relevant; Great Britain is not explored in this work; the references used by species descriptions in the paragraph "Distribution" are shown) (cf. maps 1–3, p. 13–15):

EUROPE: Courtecuisse & Duhem, 2000
Northern Europe: Hansen & Knudsen, 1992
Denmark (DEN)
Finland (FIN) – Ulvinen, 1976
Iceland (ICE)
Norway (NOR) – Gulden, 1993; Aarnaes, 2002
Sweden (SWE)
Eastern Europe: Weinmann, 1836; Sheremeteva, 1909; Singer, 1943; Lebedeva, 1949; Gorlenko et al., 1980; Kalamees, 1994a,b
Estonia (EST) – Urbonas et al., 1974, 1986; Kalamees, 1971–1972, 1978, 1996, 2000; Järva & Parmasto, 1980; Järva, Parmasto & Vaasma, 1998
Latvia (LAT) – Lapiņš, 1963; Lūkins, 1984; Urbonas et al., 1974, 1986; Avota, 1994; Kalamees,1996; Dāniele et al., 2001; Dāniele [Avota] & Krastiņa, 2002
Lithuania (LIT) – Urbonas et al., 1974, 1986; Kalamees, 1996; Urbonas, 1997
Kaliningrad Province of Russia (KA)
Belarus (BLR) – Serzhanina, 1984, 1994

Ukraine (UKR) – Wasser, 1973a,b; Zerova, 1974; Zerova et al., 1979
Moldova (MO) – Simonov & Manik, 1987
Krym = Crimean Pen. (KRY) – Zerova et al., 1979
Central European Russia (RUC):
Belgorod (29) – Bedenko, 1979
Moscow (15) – Vishnevskij, 1998
Penza (24) – Ivanov, 1981, 1983
Kursk (27)
Mordoviya = Mordvinia (17) – Lebedeva, 1949
East European Russia (RUE):
Bashkiriya = Bashkortostan (33) – Dörfelt & Hoffmann, 1980
Kirov (30) – Lebedeva, 1949
Mari = Mari El (34)
Perm' (31) – Eleusenova & Perevedentseva, 1988; Perevedentseva, 1997
Tatariya = Tatarstan (35) – Vasil'eva, 1977
North European Russia (RUN):
Murmansk (1) – Mikhajlovskij, 1975; Pystina et al., 1969
Karelia (2) – Freindling, 1949
Karelia+Murmansk – Shubin & Krutov, 1979
Komi (4) – Bobretsova, 2004
Northwest European Russia (RUW):
Leningrad (6) (in Brummitt, 2001=St. Petersburg) – Singer, 1943; Stolyarskaya & Kovalenko, 1996; Kovalenko & Morozova, 1999; Žmitrovich et al., 2004
South European Russia (RUS):
Rostov (41) – Vyshchepan, 1992
Volgograd (39)

ASIA-TEMPERATE: Singer, 1943; Lebedeva, 1949; Gorlenko et al., 1980; Kalamees, 1994a,b
Siberia: Killermann, 1943
Altaj (ALT) – Singer, 1943
Buryatiya = Buryatia (BRY) – Singer, 1943; Nezdojminogo, 1973; Petrov, 1991
Irkutsk (IRK) – Kutaf'eva, 1980; Petrov, 1991
Krasnoyarsk (KRA) – Beglyanova, 1972
West Siberia (WSB) – Lebedeva, 1949; Kartavenko, 1961; Mukhin, 1985
Chelyabinsk – Stepanova & Sirko, 1977
Sverdlovsk – Stepanova & Sirko, 1977
Tyumen'

Yamalo-Nenets – Shishmarev, 1998
Yakutiya = Sakha (YAK): Lebedeva, 1928; Petrenko, 1978

Russian Far East:

Amur (AMU) – Nazarova & Vasil'eva, 1974
Kamchatka (KAM) – Kalamees & Vaasma, 1981
Khabarovsk (KHA) – Singer, 1943; Azbukina et al., 1986
Primorye (PRM) – Vasil'eva, 1973; Shalapugina, 1977; Kharkevich, 1978; Gorlenko et al., 1980; Azbukina et al., 1984; Bulakh, 1984
Sakhalin (SAK) – Vasil'eva & Nazarova, 1972
Magadan (MAG)

Middle Asia:

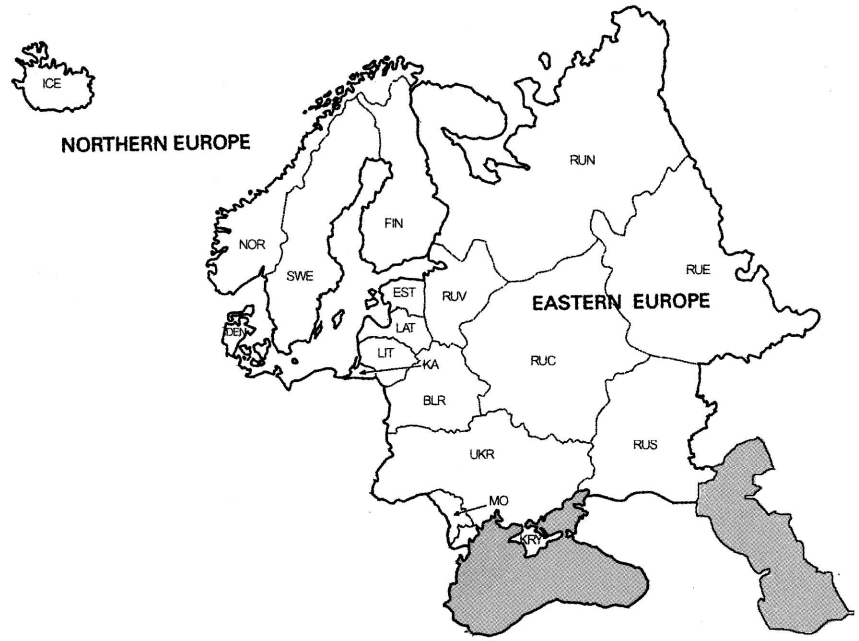
Kazakhstan (KAZ) – Samgina, 1971, 1981
Kirgizstan = Kyrgyzstan (KGZ) – Elchibaev, 1967
Tadzhikistan = Tajikistan (TZK)
Turkmenistan (TKM) – Batyrova, 1985
Uzbekistan (UZB)

Caucasus:

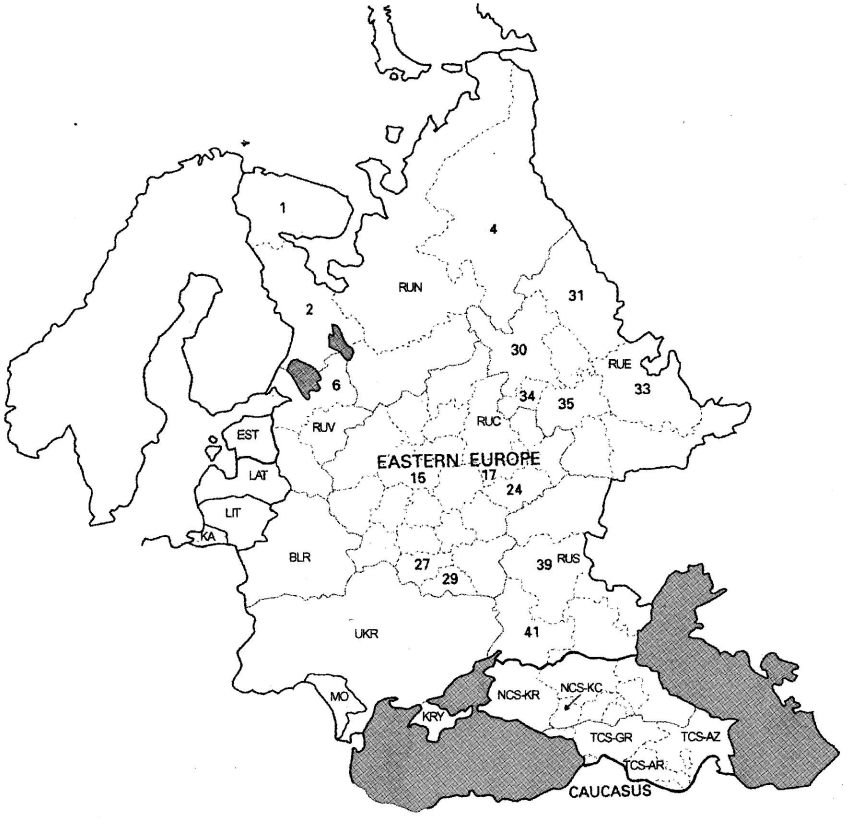
North Caucasus (NCS):
Karacheevo-Cherkessiya (KC) – Kalamees & Botashev, 2000
Krasnodar (KR) – Vasil'eva, 1939; Kovalenko, 1980; Vaasma et al., 1986; Sopina, 2002
Transcaucasus (TCS): Melik-Khachatryan et al., 1985; Nakhutsrishvili, 1986
Azerbaijan (AZ)
Armenia (AR) – Melik–Khachatryan, 1980; Nanagyulyan & Taslakhchyan, 1991
Gruziya = Georgia (GR) – Nakhutsrishvili, 1975, 1986

ACKNOWLEDGEMENTS

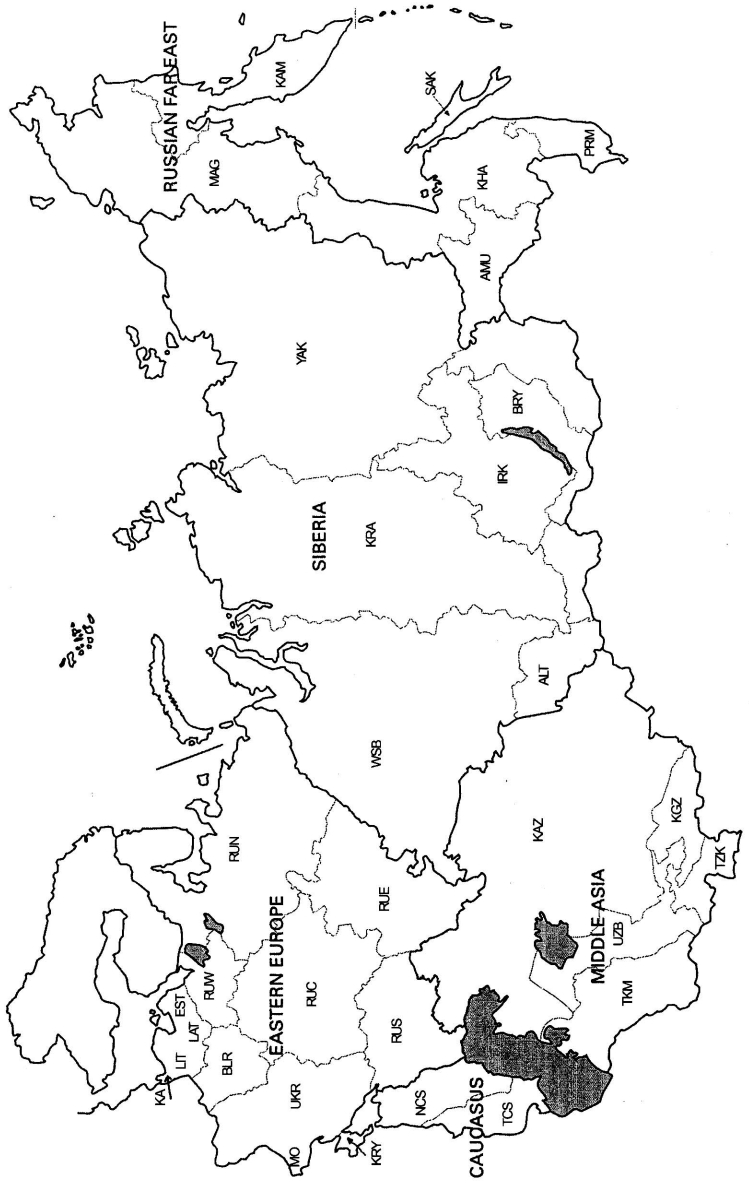
I gratefully acknowledge the directors and curators of the herbaria BILAS, C, H, HAL, IB, IRK, JOE, KRAS, KRF, K, KW, LAU, LE, M, MIM, MSK, O, OULU, RIG, S, TAA, TRH, TURA, TUR, UPS, VLA, WU from which important collections were obtained on loan; all those mycologists, amateurs as well as professionals, who supplied me with many interesting fresh collections and exsiccates; Prof. H. Clémençon for help in the identification of *Tricolomella* species; Dr. R. K. Brummitt for permission to reproduce maps 2, 4 and 5 from his publication of 2001 (with a few additions); Miss Mall Vaasma, Mrs. Maie Pedak, Mrs. Tiia Kaare and Mr. Ants Kivilo for preparing the manuscript for publication. Thanks are due to the Estonian Science Foundation for the financial support, which made this investigation possible (grants Nos 131 and 4984).



Map 1. Northern and Eastern Europe: units mentioned in the present work, cf. pp. 10–12 (from Brummitt, 2001, p 107; with a few additions, cf. p. 10).



Map 2. Eastern Europe and Caucasus: units mentioned in the present work, cf. pp. 10–12 (from Brummitt, 2001, p. 113; with a few additions, cf. p. 10). The numbers of the units studied are the same as used by Brummitt.



Map 3. Eastern Europe, Caucasus, Middle Asia, Siberia and Russian Far East: units mentioned in the present work, cf. pp. 10–12 (from Brummitt, 2001, p. 111; with a few additions, cf. p. 10).

B. TAXONOMIC PART

LYOPHYLLACEAE (Kühner) Jülich

Tricholomataceae tribus Lyophylleae Kühner, Bull. Mens. Soc. Linn. Lyon 7: 209. 1938. – Lyophyllaceae (Kühner) Jülich, Higher taxa Basidiomyc.: 378. 1981. – Nyctalidaceae Jülich, Higher taxa Basidiomyc.: 381. 1981.

Type genus: *Lyophyllum* P. Karst.

Description: Basidiocarps tricholomatoid, clitocyboid, collybioid. Basidia with siderophilous granulation in the mature basidiocarps. Spore print white to pale creamy. Spores predominately smooth, rarely verruculose or echinulate, hyalin, inamyloid, cyanophilous. All hyphae prevalent with clamp connections (only in *Gerhardtia* without clamps), inamyloid. Pileipellis a cutis, hymeniderm or trichoderm. Pigments parietal and usually incrusting the hyphal walls, or intracellular, or lacking.

Ecology & phenology: On the soil, forest litter and debris or wood saprotrophically, or on basidiocarps of *Russulales* or living trees parasitically, or mycorrhizal fungi. Summery to autumnal, exceptionally vernal.

Distribution: Widespread in palearctic Northern and Eastern Europe and Asia, 32 species in 7 genera (the genus *Tephrocybe* is not observed in this work).

Synopsis of the taxa dealt with in the present work:

Tribus LYOPHYLLEAE
Genus LYOPHYLLUM P. Karst.
Sect. Lyophyllum
Stirps Amygdalosporum
1. *Lyophyllum amygdalosporum* Kalamees
Stirps Conocephalum
2. *Lyophyllum conocephalum* (P. Karst.) Clémençon
Stirps Eustygium
3. *Lyophyllum caerulescens* Clémençon
Stirps Infumatum
4. *Lyophyllum infumatum* (Bres.) Kühner
5. *Lyophyllum macrosporum* Singer

Stirps Konradianum
6. *Lyophyllum konradianum* (Maire) Konrad & Maubl.
Stirps Leucophaeatum
7. *Lyophyllum leucophaeatum* (P. Karst.) P. Karst.
Stirps Pallidum
8. *Lyophyllum pallidum* Clémençon & A.H. Sm.
Stirps Semitale
9. *Lyophyllum semitale* (Fr. : Fr.) Kühner
Stirps Transforme
10. *Lyophyllum transforme* (Britzelm.) Singer
11. *Lyophyllum sykosporum* Hongo & Clémençon
Sect. Difformia (Fr.) Kühner
Stirps Connatum
12. *Lyophyllum connatum* (Schumach. : Fr.) Singer
Stirps Decastes
13. *Lyophyllum decastes* (Fr. : Fr.) Singer
14. *Lyophyllum fumosum* (Pers. sensu Fr. : Fr.) P.D. Orton
15. *Lyophyllum loricatum* (Fr.) Kühner
Genus HYPSIZYGUS Singer
16. *Hypsizygus ulmarius* (Bull. : Fr.) Redhead
Genus GERHARDTIA Bon
17. *Gerhardtia borealis* (Fr.) Contu & A. Ortega
Genus CALOCYBE Kühner ex Donk
18. *Calocybe gambosa* (Fr.) Singer ex Donk
19. *Calocybe favrei* (R. Haller Aar. & R. Haller Suhr) Bon
Genus TRICHOLOMELLA Zerova ex Kalamees
20. *Tricholomella constrictum* (Fr.) Zerova ex Kalamees
Tribus TEPHROCYBEAE Bon
Genus RUGOSOMYCES Raithelh.
Sect. Rugosomyces
Stirps Chrysenteron
21. *Rugosomyces caucasicus* (Singer) Kalamees
22. *Rugosomyces chrysenteron* (Bull. : Fr.) Bon
Stirps Fallax
23. *Rugosomyces fallax* (Peck ex Sacc.) Bon
24. *Rugosomyces obscuratus* (P. Karst.) Kalamees
Stirps Onychinus
25. *Rugosomyces onychinus* (Fr.) Raithelh.
Sect. Carneoviolacei (Singer ex) Bon
Stirps Carneus

26. *Rugosomyces carneus* (Bull. : Fr.) Bon

Stirps Ionides

27. *Rugosomyces ionides* (Bull. : Fr.) Bon
28. *Rugosomyces obscurissimus* (A. Pearson) Bon
29. *Rugosomyces persicolor* (Fr.) Bon
30. *Rugosomyces phragmitidis* (Kalamees) Kalamees

Genus ASTEROPHORA Ditmar ex Link : Fr.

31. *Asterophora lycoperdoides* (Bull.) Ditmar : Fr.
32. *Asterophora parasitica* (Pers. : Fr.) Singer

KEY TO THE GENERA

1. Parasitic fungi growing on basidiocarps of *Russulales*; chlamydospores numerous on the surface of pileus or on lamellae ***Asterophora***, pp. 105–110
– Saprotrophic fungi growing on forest litter or humus, seldom on rotten wood, or mycorrhizal fungi; if parasitic then on living deciduous trees; not forming chlamydospores 2

2 (1). Fungi growing parasitically on living trees or saprotrophically on freshly fallen or felled trees; siderophily in basidia weak and not constant ***Hypsizygus***, pp. 58–62
– Fungi growing saprotrophically on forest litter or humus; siderophily in basidia conspicuous and constant 3

3 (2). Hyphae without clamps ***Gerhardtia***, pp. 62–64
– Hyphae with clamps 4

4 (3). Pileipellis a hymeniderm or trichoderm of sphaeropedunculate, sphaeric to pyriform elements or a mixture of these and filamentous hyphae ***Rugosomyces***, pp. 76–105
– Pileipellis a cutis of repent filamentous hyphae; sphaeric to pyriform elements lacking 5

5 (4). Basidiocarps white or light to vivid coloured (creamy, yellow, ochraceous, violet) (special fuligineous by *Calocybe gambosa* f. *graveolens*). Pigments absent or if present never incrusting but vacuolar 6
– Basidiocarps dull coloured (grey, brown, fuscous, umber). Pigments predominately parietal, incrusting hyphal walls 7

6 (5). Spores echinulate. Basidiocarps white. Stipe occasionally annulate ***Tricholomella***, pp. 73–76
– Spores smooth. Basidiocarps white or light to vivid coloured. Stipe never annulate ***Calocybe***, pp. 64–72

7 (5). Basidiocarps mostly tricholomatoid or clitocyboid, usually thick-fleshed; sometimes occurring in dense clusters; often staining blue and/or grey to black, more rarely browning. Basidia usually rather long, >(25–)30 µm. Spores smooth, rarely minutely verrucose and then basidiocarps on bruising bluing/blackening (*L. leucophaeatum*) ***Lyophyllum***, pp. 19–58
– Basidiocarps mostly collybioid, mycenoid or omphalioid, usually thin-fleshed; occurring solitary, gregarious or in small bundles; not changing colour when bruised. Basidia usually short, <(25–)30 µm. Spores smooth or asperulate to echinulate, singular gibbose ***Tephrocybe*** (not observed in this book)

TRIBUS LYOPHYLLEAE

Habit predominately tricholomatoid or clitocyboid, rarely subpleurotoid. Basidicarps medium-sized to big, mostly thick-fleshed. Basides rather long, usually >(25–)30 µm.

LYOPHYLLUM P. Karst.

Lyophyllum P. Karst., Acta Soc. Fauna Fl. Fenn. 2 (1): 3. 1881, emend.

Type species: *Lyophyllum leucophaeatum* (P. Karst.) P. Karst.

Description: Habit tricholomatoid or clitocyboid, more rarely collybioid. Pileus white, creamy, grey, brown, fuligineous, umber, more rarely with yellowish, ochraceous or olivaceous tinge. Basidiocarps often staining blue, grey and/or black, sometimes somewhat browning. Veil none. Spore print pure white to pale creamy.

Spores very variable in shape – globose, subglobose, ovoid, ellipsoid, fusiform, amygdaliform, tetrahedric, rhomboid, triangular, subconic; smooth, exceptionally verruculose (*L. leucophaeatum*); hyaline, inamyloid, cyanophilous. Basidia siderophilous, mostly 4-spored. Hymenial cystidia mostly absent, rarely present. Hymenophoral trama regular, gloeoplerous hyphae sometimes present. Pileipellis a cutis of repent filamentous hyphae. Clamp connections in all hyphae present. Pigments predominately parietal, incrusting the hyphal walls.

Ecology & phenology: Saprotrophically or ectomycorrhizal on soil, forest litter and debris, rarely on very rotten wood. Summery to autumnal.

Distribution: Widespread in palearctic Northern and Eastern Europe and Asia. 15 species, the majority of these are rare.

Notes: Beacause of the lack of new findings and contemporary herbarium materials of some species described by Karsten in Finland a long time ago (in the years 1860–70s already), namely *Agaricus daemonicus* P. Karst., *Lyophyllum ignobile* (P. Karsten) Clémençon and *L. subsimulans* (P. Karsten) Clémençon (cf. Karsten, 1879a; Clémençon, 1982a), these are excluded from this book.

This book does not include also some unclear species: *Lyophyllum conradii* sensu Freindling 1949 and *L. ovisporum* sensu Urbonas 1997.

The herbarium material as well as literature data on *Lyophyllum immundum* sensu auct. (cf. Urbonas et al., 1974, 1986; Zerova, 1979; Nanagyulyan & Taslakhch'yan, 1991; Dāniele [Avota] & Krastiņa, 2002) are not accepted in this work, while *Agaricus immundus* Berk. 1860 is a nomen dubium (cf. Clémençon, 1982a, 1986). Owing to the lack of macroscopic descriptions of herbarium specimens of *L. immundum* studied (I have not seen fresh material) the identification of two species – *L. amariusculum* Clémençon and *L. paelochroum* Clémençon (instead of *L. immundum*, cf. Clémençon, 1986) – from the region investigated was not possible either.

KEY TO THE SPECIES

1. Basidiocarps staining blue or grey by handling or by age, finally often blackening (Sect. *Lyophyllum*) 2
– Basidiocarps not discolouring or changing only brownish but never blackening (Sect. *Difformia*) 12
2 (1). Spores verruculose **7. *L. leucophaeatum***
– Spores smooth 3
3 (2). Spores triangular in side view 4
– Spores not triangular in side view 5
4 (3). Spores widest in the middle **10. *L. transforme***
– Spores widest near the apex **11. *L. sykosporum***
5 (3). Spores < 6.5 × 3.5 µm **6. *L. konradianum***
– Spores bigger, > 6.5 × 3.5 µm 6
6 (5). Spores asymmetrically ovoid to subconic or amygdaliform in side view 7
– Spores fusiform-ellipsoid in side view or globose to globose-ellipsoid 10

7 (6). Spores asymmetrically ovoid to subconic in side view **8. *L. pallidum***
– Spores amygdaliform in side view 8
8 (7). Spores clearly rhomboid in face view 9
– Spores ellipsoid to ovoid in face view **1. *L. amygdalosporum***
9 (8). Hymenophoral trama hyphae narrow, cylindric, up to 8(–10) µm wide. Spores with a moderate abaxial hump or slightly amygdaliform to broadly subfusiform in side view, with clear suprahilar depression **4. *L. infumatum***
– Hymenophoral trama hyphae broad, inflated, very robust, up to 20(–25) µm wide. Spores with a prominent abaxial hump, conspicuous amygdaliform in side view, with well marked suprahilar depression **5. *L. macrosporum***
10 (6). Spores globose to globose-ellipsoid **3. *L. caerulescens***
– Spores fusiform-ellipsoid 11
11 (10). Basidiocarps very light coloured – pale beige. Pileus conical-campanulate **2. *L. conocephalum***
– Basidiocarps notably darker coloured – grey brown to brownish black. Pileus plano-convex **9. *L. semitale***
12 (1). Basidiocarps white, fasciculate **12. *L. connatum***
– Basidiocarps grey, grey brown or brown 13
13 (12). Basidiocarps connate, entirely grey **14. *L. fumosum***
– Basidiocarps fasciculate. Pileus brown or grey brown, lamellae white 14
14 (13). Pileipellis and context thick, cartilagineous; pileus surface ribbed **15. *L. loricatum***
– Pileipellis and context normal, fleshy, not cartilagineous; pileus smooth **13. *L. decastes***

Sect. LYOPHYLLUM

Basidiocarps tricholomatoid or clitocyboid, rarely collybioid, predominately solitary, occasionally fasciculate; bluing and/or greying, finally often blackening. Spores very variable, subglobose to cylindric-ellipsoid or inequilateral, smooth, exceptionally verruculose.

Stirps Amygdalosporum

Basidiocarps tricholomatoid to clitocyboid. Spores inequilateral, in side view amygdaliformes to strongly humply subconic, in face view ellipsoid to ovoid (not rhomboid!), with suprahilar depression, smooth.

1. *Lyophyllum amygdalosporum* Kalamees Fig. 1

Lyophyllum amygdalosporum Kalamees in Urbonas, Kalamees & Lūkin, Consp. Fl. agar. Fung. Lithuaniae Latviae Estoniae: 23. 1986.

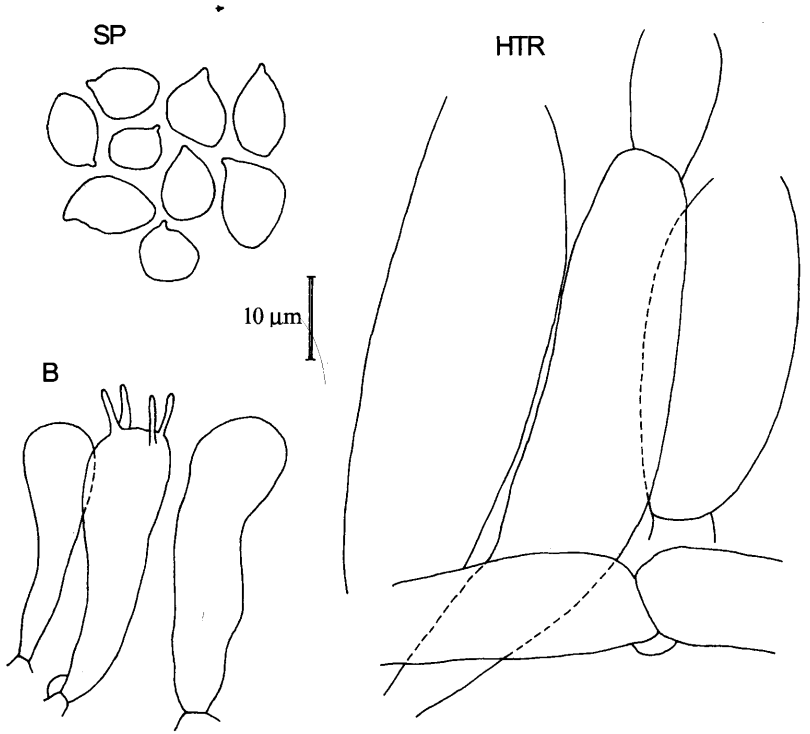


Fig. 1. *Lyophyllum amygdalosporum.*

Description: Pileus up to 10 cm, plano-infundibuliform, inrolled at margin, weakly radially sulcate, smooth, slightly viscid, faintly hygrophanous, not translucently striate, light greyish brown with yellowish or ochre tinge. Lamellae emarginate with tooth to shortly decurrent, rather distant, broad (up to 1 cm), dick, nearly ceraceous, sulcate at sides, whitish, becoming blue and then grey to black in handling. Stipe up to 7 × 3 cm, swollen in centre, tapering at base, smooth, glabrous, dry, whitish-greyish brown. Context thin, strongly watery, whitish. Smell and taste slightly farinaceous. Spore print white.

Spores (7–)7.5–9.5(–10) × 5–6(–6.5) µm, Q = 1.3–1.7, in side view amygdaliform to strongly humply subconic, in face view very variable – ellipsoid, ovoid-ellipsoid, ovoid, lemon-shaped, pyriform, humply ovoid, extraordinarily almost subrhomboid, smooth. Basidia 30–35 × 8–10 µm. Hymenophoral trama made up of 6–16(–20) µm wide hyphae; gloeoplerous hyphae lacking. Pileipellis hyphae 5–9 µm wide.

Ecology: Solitary in coniferous and mixed forests on forest litter, in type locality in Estonia in *Myrtillus* pine forest, in Russian Far East in mixed forest with *Abies*.

Phenology: September.

Distribution: Very rare, so far known only from 2 localities: from type locality in Southern Estonia (Urbonas et al., 1986) and from Primorye Territory in Russian Far East. **Eastern Europe:** EST! **Russian Far East:** PRM!

Collections examined: Estonia: Võru Co.: Tabina, 19 Sep. 1974, K. Kalamees (TAA 80865, holotype). **Russia:** Primorye Terr.: near Vladivostok, Bogataya Griva, 30 Sep. 1983, E. Bulakh (VLA, as *L. infumatum*).

Notes: *L. amygdalosporum* is characterized by strongly humply, amygdaliform rather stocky spores in side view and ovoid-ellipsoid (not rhomboid) spores in face view; discolouring of basidiocarps to blue at first when bruised and then blackening, especially in lamellae. Similar *L. infumatum* and *L. macrosporum* have longer, clearly rhomboid in face view spores.

This species has some similarity with the North American species *L. conoideospermum* Clémençon & A.H. Sm. – in shape and dimensions the spores in both species are somewhat similar (cf. Clémençon & Smith, 1983, fig. 6). However, in *L. amygdalosporum* single subrhomboid spores were detected. Therefore, perhaps *L. amygdalosporum* could be observed as a transition species from *L. infumatum* to *L. conoideospermum.*

Stirps Conocephalum

Basidiocarps collybioid, very light coloured, pale beige. Spores fusiform-ellipsoid with clear suprahilar depression, smooth.

2. *Lyophyllum conocephalum* Fig. 2

Collybia conocephala P. Karst., Hedwigia 28: 363. 1889. – *Lyophyllum conocephalum* (P. Karst.) Clémençon, Sydowia 34: 46. 1981.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 94 (fig.). 1999a. – Clémençon, Sydowia 34: 46, Table 1. 1981.

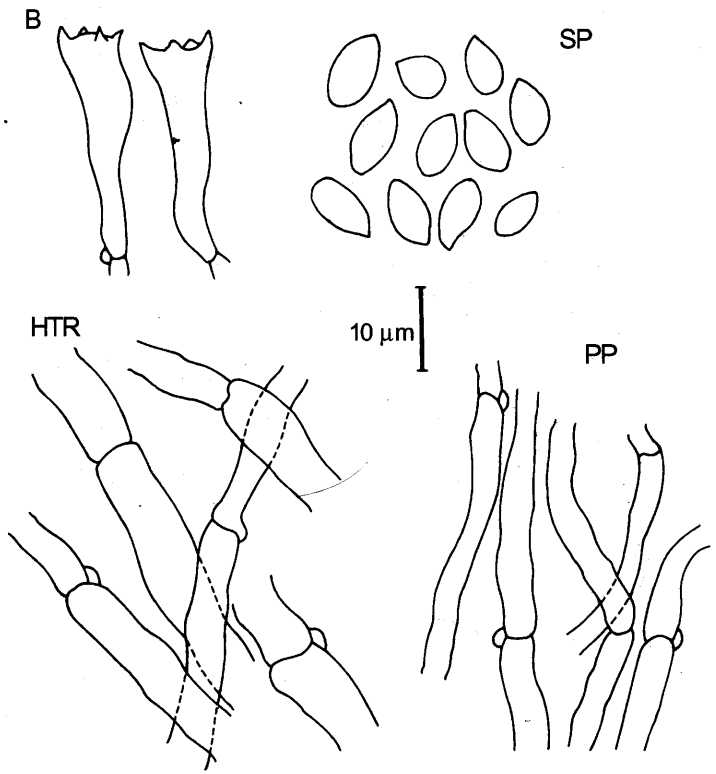


Fig. 2. *Lyophyllum conocephalum.*

Description (after Clémençon, 1981): Pileus up to 3 cm, conical-campanulate, conspicuously umbonate, smooth and glabrous, matt, hygrophan, dirty pale beige. Lamellae emarginate with a tooth, whitish-creamy, soon slightly greying. Stipe up to 3 × 0.3 cm, concolorous with pileus, smooth and glabrous, flocculose at apex. Context concolorous. Smell strongly farinaceous. Spore print white.

Spores (7–)8.2–8.7(–9.5) × (4.2–)4.5–5(–6) µm, Q = 1.5–2, fusiform-ellipsoid in side view, with clear suprahilar depression, ellipsoid in face view, smooth. Basidia 26–29 × 5–7.5 µm. Hymenophoral trama hyphae 3–10 µm thick. Pileipellis hyphae 3–4 µm wide.

Ecology: In coniferous forests.

Phenology: September.

Distribution: Very rare. **Northern Europe:** FIN!

Collection examined: Finland: Etelä-Häme: Tammela, Syrjä, 5 Sep. 1889, P.A. Karsten 2279 (H, as *Collybia conocephala*; holotype).

Notes: *L. conocephalum* is characterized by pale beige basidiocarps, hygrophanous umbonate pileus, greying lamellae, strongly farinaceous smell and fusiform-ellipsoid spores with a clear suprahilar depression. This species was once again collected in Switzerland in 1977 (cf. Clémençon, 1981).

Stirps Eustygium

Basidiocarps tricholomatoid-collybioid. Spores subglobose, smooth.

3. *Lyophyllum caerulescens* Clémençon Fig. 3

Lyophyllum caerulescens Clémençon, Mycotaxon 15: 70. 1982a.

Misapplied names: *Lyophyllum crassifolium* sensu Singer, Ann. Mycol. 41: 99. 1943. – *Collybia crassifolia* sensu Bresadola, Iconogr. mycol. 4: pl. 198. 1928. – *Tricholoma crassifolium* sensu Ricken, Blätterpilze 1: 357. 1915.

Excluded: *Agaricus crassifolius* Berk., Outl. Brit. Fungol.: 100. 1860 (= *A. pachyphyllus* Berk. 1836; not *Lyophyllum*, cf. Clémençon, 1986). – *Tricholoma crassifolium* sensu Lange, Fl. agar. dan. 1: 58. 1935 (= ?*L.* sp.; cf. Clémençon, 1986). – *Lyophyllum crassifolium* sensu Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138. 1992 (= ?*L.* sp.). – *Lyophyllum crassifolium* sensu Cetto, Enzykl. Pilze 2: 322. 1987 (= *L.* sp.). – *Lyophyllum crassifolium* sensu Urbonas, Lietuvos grybai 8 (2): 106. 1997 (= *L.* sp.). – *Lyophyllum immundum* sensu Urbonas et al., Consp. Fl. Agar. Fung. Lithuaniae Latviae Estoniae (1986: 24; syn. *Tricholoma crassifolium* sensu Ricken, Lange) (cf. Notes on p. 27).

Selected icones: Bresadola, Iconogr. mycol. 4: pl. 198 (as *C. crassifolia*). 1928. – Ricken, Blätterpilze 2: pl. 97, 3 (as *T. crassifolium*). 1915.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 93 (fig.). 1999a. – Bresadola, Iconogr. mycol. 4: pl. 198 (as *C. crassifolia*) (copied by Clémençon, 1982a: 70).1928. – Clémençon, Mycotaxon 15: 70. 1982a. – Clémençon, Z. Pilzk. 52 (1): 75, 83 (fig. 12). 1986. – Ricken, Blätterpilze 1: 357 (as *T. crassifolium*). 1915.

Description: Pileus up to 10 cm, convex to plano-depressed, smooth, glabrous, sometimes radially sulcate at margin but not translucently striate, viscid to glutinous, hygrophanous, often watery spotted, shining, light brown grey or grey brown, yellowish grey brown to blackish brown. Lamellae emarginate to subdecurrent, fragile, thick, broad, remote, slightly grooved in sides, whitish to light grey. Stipe up to 8 × 1 cm, pruinose at first, then glabrous and smooth, root-like attenuated downwards, dry, whitish to pale grey. Context thin, greyish or whitish. Smell

and taste strongly farinaceous-rancid, mild. Spore print white. Basidiocarps staining blue at first and then black when cut and bruised.

Spores (5.5–)6.5–7.2 × (5.5–)6–7 µm, Q = 1–1.1, globose to subglobose, smooth. Basidia 30–35 × 8–10 µm. Hymenophoral trama made up of 3–12 µm wide hyphae. Pileipellis hyphae (3–)4–7 µm wide.

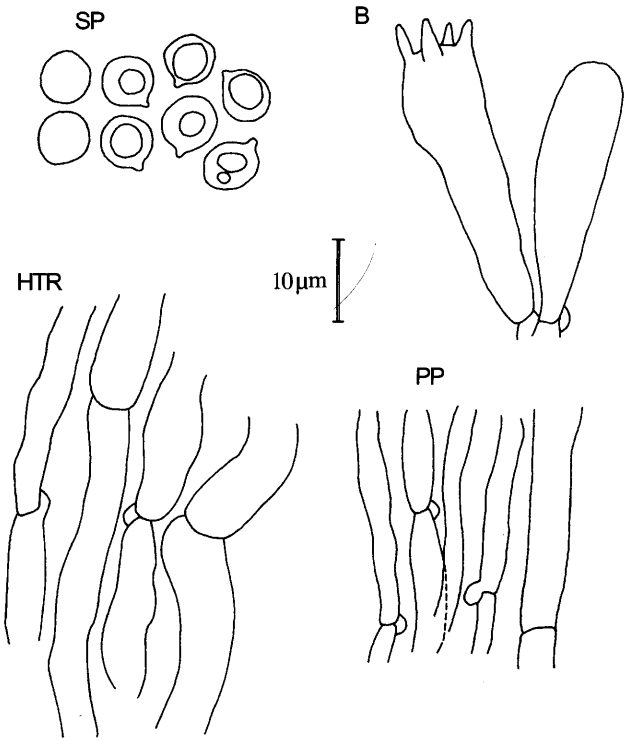


Fig. 3. *Lyophyllum caerulescens.*

Ecology: Solitary or fasciculate in coniferous and deciduous forests and wooded meadows; in Estonia on calcareous soils.

Phenology: July to September.

Distribution: Very rare. **Eastern Europe:** EST!

Collections examined: Estonia: Rapla Co.: Märjamaa, 28 Aug. 1967, K. Kalamees & A. Kollom (TAA 76937, as *L. crassifolium*). Pärnu Co.: Mihkli, 12 Aug. 1988, K. Kalamees & M. Vaasma (TAA 143880).

Notes: *L. caerulescens* is well characterized by long root-like attenuated (not clavate!) stipe, grey brown pileus, whitish grey thick and distant subdecurrent lamellae; basidiocarps discolouring bluish at first and then black when bruised and have a distinct rancid-farinaceous smell and mild taste; spores are rather big, globose.

L. crassifolium sensu Gulden in Hansen & Knudsen (1992), noted from Denmark, cannot be equalized with this species since its basidiocarps are bitter and stipe thick and clavate. Findings of *L. crassifolium* from Latvia and Lithuania (cf. Lūkins, 1984; Urbonas et al., 1974, 1986; Urbonas, 1997: pl. 27, 3, basidiocarps with thick clavate stipe; Dāniele [Avota] & Krastiņa, 2002) are doubtful due to unclear taxonomy and nomenclature.

Stirps Infumatum

Basidiocarps tricholomatoid to clitocyboid. Spores inequilateral, rhomboid to subrhomboid in face view, with a hump to amygdaliform in side view, with well marked suprahilar depression, smooth, big.

4. *Lyophyllum infumatum* (Bres.) Kühner Fig. 4

Clitocybe ectypa var. *infumata* Bres., Fungi trident. 2: 49. 1892. – *Clitocybe infumata* (Bres.) Bres., Iconogr. mycol. 4: pl. 185. 1928. – *Tricholoma infumatum* (Bres.) A. Pouchet, Bull. Soc. Mycol. France 44: 109. 1928. – *Lyophyllum infumatum* (Bres.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938. – *Clitocybe infumata* f. *nana* J.E. Lange, Fl. agar. dan. 1: 89. 1935.

Misapplied names: ?*Tricholoma cinerascens* sensu Ricken, Blätterpilze 1: 359. 1915. – *Lyophyllum deliberatum* sensu Kreisel, Feddes Repert. 95 (9–10): 699. 1984; sensu Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138. 1992.

Excluded: *Agaricus deliberatus* Britzelm., Hymenomyc. Südbayern: 145. 1885 (= ?*Tricholoma* cf. *saponaceum*).

Selected icones: Bresadola, Iconogr. mycol. 4: pl. 185 (as *C. infumata*). 1928. – Cetto, Enzykl. Pilze 2: 328. 1987. – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 252 (as *T. infumatum*). 1927. – Lange, Fl. agar. dan. 1: pl. 31E (as *C. infumata* f. *nana*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 231. 1979. – Zerova, Atlas gribiv Ukraini: pl. 71,1. 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 91 (fig.). 1999a. – Cetto, Enzykl. Pilze 2: 329. 1987. – Clémençon, Mycotaxon 15: 78, 79 (fig. 9). 1982a. – Clémençon, Z. Mykol. 52 (1): 74, 82 (fig. 9). 1986. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138 (as *L. deliberatum*). 1992. – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 252 (as *T. infumatum*). 1927. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 374. 1979. – Pouchet, Bull. Soc. Mycol. France 44: 109, 110 (fig.) (as *T. infumatum*). 1928. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 166. 1979.

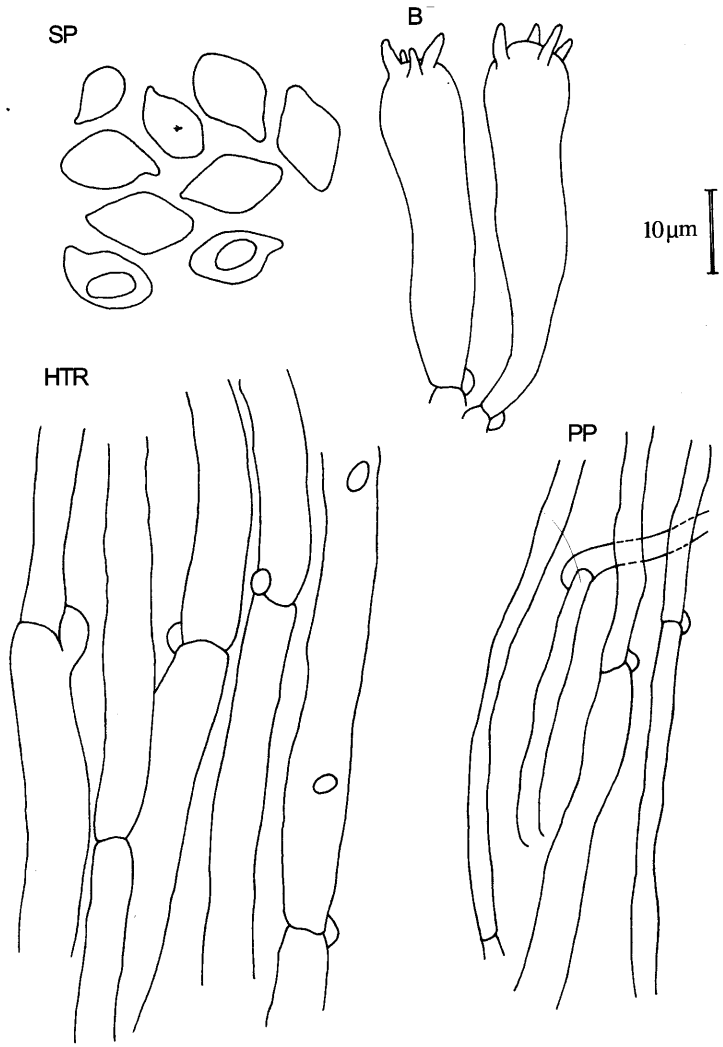


Fig. 4. *Lyophyllum infumatum.*

Description: Pileus up to 8 cm, convex, then plano-convex, slightly umbonate, smooth or faintly radially sulcate in centre, glabrous, sometimes innate fibrillose, hygrophanous, translucently striate at margin, shining, light to dark grey brown, often whitish brown at margin, fading light greyish. Lamellae emarginate to adnate with tooth, rather distant, very broad (1–1.5 cm), thick, whitish. Stipe up to 8 × 1.5(–2) cm, cylindric or slightly clavate at base, dry, smooth to sporadic cottony-fibrillose, white-tomentose at base, white-pruinose-flocculose at apex, white when young, then darkening, concolorous with pileus. Context whitish. Smell and taste subfarinaceous. Basidiocarps staining blue at first when bruised and cut, then blue grey, finally blackening, especially in lamellae. Spore print white.

Spores (8–)9–11(–12) × 5–6.5(–7) µm, Q = 1.5–1.8(–2), inequilateral, with a moderate to strong abaxial hump or slightly amygdaliform to broadly subfusiform in side view, with well marked suprahilar depression, rhomboid to subrhomboid in face view, smooth. Basidia 25–40 × 8–10 µm. Hymenophoral trama from cylindric hyphae 3–8(–10) µm wide; gloeoplerous hyphae mostly abundantly present, about 8 µm wide. Pileipellis hyphae 2–5 µm wide.

Ecology: Solitary or fasciculate in coniferous, deciduous and mixed forests.

Phenology: July to September.

Distribution: Rather rare. **Northern Europe:** DEN!, FIN!, NOR, SWE! **Eastern Europe:** EST!, LIT!, RUC-Penza, UKR. **Caucasus:** TCS-AR. **Siberia:** IRK! **Russian Far East:** KHA!, PRM, SAK!

Collections examined: Denmark: Without locality, 20 July 1993, J. Vesterholt (C 20273). **Estonia:** Lääne Co.: Vormsi Island, between Binas and Saksby, 10 Sep. 1967, K. Kalamees (TAA 77008, as *L.* sp.). Jõgeva Co.: Kaavere, Tuuleveski, 20 Sep. 1962, K. Kalamees (TAA 73391, as *L.* sp.). Rapla Co.: Märjamaa, 27 Aug. 1967, K. Kalamees & A. Kollom (TAA 76918, as *L.* sp.). **Finland:** Etelä-Häme: Mustiala, Syrjä, 18 Sep. 1876, Sep. 1878, Aug. 1889, P.A. Karsten (H, as *Collybia semitalis*). Etelä-Savo: Mäntyharju Comm., Juolasvesi, Hietaniemi, Sojonkangas, 27 Sep. 1997, I. Kytövuori 971865 (H); Kerimäki Comm., Ruokojärvi, Louhi, 8 Sep. 1998, I. Kytövuori 981700 (H). Uusimaa: Tammisaari, Leksvall, Mörksjön SE, 17 Sep. 1979, M. Korhonen, R. Tuomikoski & T. Ulvinen (H); Espoo, 26 Aug. 1993, I. Kytövuori 93474 (H). Varsinais-Suomi: Lohja Rural Comm., Lohjansaari, Hermala, Kalkkimäki, 11 Sep. 1994, I. Kytövuori 941304 (H). **Lithuania:** Vilnius, 11 July 1972, 13 July 1972, 5 Aug. 1972, V. Urbonas (BILAS 12191, 12351, 12373). **Russia:** Irkutsk Prov.: Kob' (KRAS, 14 specimens). Khabarovsk Terr.: Bolshekhekhtsirskij Nature Reserve, 25 July 1981, E. Bulakh (VLA); Komsomol'sk Nature Reserve, M.-Talandinka Stream, 30 Aug. 1985, E. Bulakh (VLA). Sakhalin Prov.: Yuzhno-Sakhalinsk, 27 July 1960, L. Vasil'eva (VLA). **Sweden:** Blekinge: Fridlevstad, 10 Sep. 1946, S. Lundell & S. Wikland (UPS 2289, as *Collybia semitalis*). Gästrikland: Gävle, Norrlandet, Graberget, 6 Aug. 1974, J.Ax. Nannfeldt (UPS 23486, as *Collybia platyphylla*; *L. infumatum*, dupl. det. H. Harmaja 1980). Uppland: Danmark sn, Lunsen, SW of Bergsbrunna, 12 Sep. 1950, J. Eriksson & H. Nilsson (UPS, as *T. infumatum*); Uppsala (Bondkyrka), Nosten, S from Håga, 22 Sep. 1951, H. Belin (UPS, as *T. infumatum*); Dalby par., Jerusalem, 10 Sep. 1982, S. Ryman (UPS); Lena par., Hummeltorp, 3 Sep. 1982, S. Ryman 7012 (UPS).

Extralimital. Austria: Tirol, Sufeld, 21 July 1988, M. Moser (IB 88/36). **Italy:** without locality, July 1898 (S F14545, neotype, as *Clitocybe ectypa* var. *infumata*); Trentino, Paneveggio, 26 Sep. 1988, M. Moser (IB 88/233).

Notes: *L. infumatum* is characterized by big, rhomboid in face view, slightly to moderately amygdaliform in side view spores with clear suprahilar depression, thin to moderately broad cylindric hyphae (3 to 10 µm) in hymenophoral trama, and macroscopically by grey brown hygrophanous, radially fibrillose pileus and discolouring of basidiocarps from blue to black when bruised; smell subfarinaceous.

This species is difficult to distinguish from very similar *L. macrosporum*, which differs in ochre yellow brown pileus, microscopically in very robust, broad inflated hyphae (up to 25 µm) in hymenophoral trama, and conspicuous inequilateral, strongly amygdaliform large spores with very well marked suprahilar depression in side view.

5. *Lyophyllum macrosporum* Singer Fig. 5

Lyophyllum macrosporum Singer, Ann. Mycol. 41: 99. 1943.

Misapplied names: *Clitocybe ectypa* sensu Bresadola, Iconogr. mycol. 4: pl. 184. 1928. – *Lyophyllum infumatum* sensu auct. plur.

Excluded: *Lyophyllum macrosporum* sensu Azbukina et al., Flora Verkhneussurijskogo statsionara: 45. 1984; sensu Azbukina et al., Flora rastitelnost' Bolshekhekhtsirskogo zapovednika: 50. 1986; both identifications = ?*Clitocybe ectypoides* Peck; sensu Shalapugina, in: Aktual'nye voprosy sovremennoj botaniki: 222. 1977.

Selected icone: Bresadola, Iconogr. mycol. 4: pl. 184 (as *Clitocybe ectypa*). 1928.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 91 (fig.). 1999a. – Bresadola, Iconogr. mycol. 4: pl. 184 (as *C. ectypa*). 1928. – Clémençon, Mycotaxon 15: 82, 83 (fig. 14). 1982a. – Clémençon, Z. Pilzk. 52 (1): 74, 82 (fig. 10). 1986.

Description: Pileus up to 10 cm, convex then plano-infundibuliform, radially innate fibrillose, inhygrophanous to slightly hygrophanous, not translucently striate, light ochre yellow brown. Lamellae subdecurrent, distant, thick, broad, whitish or greyish, becoming bluish grey at first and then blackening by handling; separable altogether from context of pileus. Stipe up to 5 × 2 cm, cottony-fibrillose, white-tomentose at base, white-pruinose-flocculose at apex, cylindric, slightly thickened at base, concolorous with pileus. Context whitish. Smell almost unpleasent, taste indistinct or sweetish.

Spores big, (7–)9–10(–11) × (5–)5.5–6.5(–7) µm, Q = 1.5–1.8, inequilateral, with a prominent abaxial hump, amygdaliform in side view, with well marked suprahilar depression, rhomboid, subrhomboid, citriniform or ovoid-ellipsoid in face view, smooth. Basidia 27–37 × 7–9(–10) µm. Hymenophoral trama hyphae inflated, very robust, up to 25 µm thick; gloeoplerous hyphae mostly absent. Pileipellis hyphae 2–5 µm thick.

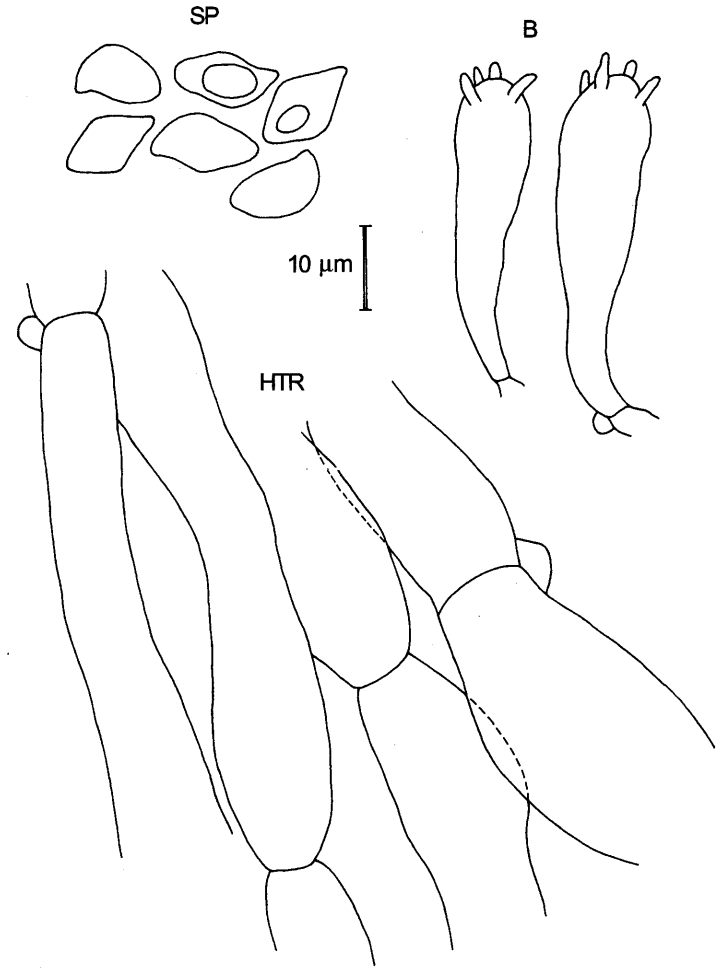


Fig. 5. *Lyophyllum macrosporum.*

Ecology: In coniferous and mixed forests.

Phenology: July to October.

Distribution: Rare. **Northern Europe:** FIN!, NOR!, SWE! **Eastern Europe:** EST!, LAT. **Russian Far East:** PRM!

Collections examined: Estonia: Põlva Co.: Valgesoo, Kriisa, 7 Oct. 1972, K. Kalamees (TAA 80409, as *L. fumatofoetens*); between Taevaskoja and Kiidjärve, 12 Oct. 1984, K. Kalamees (TAA 123854, as *L. infumatum*). **Finland:** Åland: Jomala, 12 Sep. 1991, K. Kalamees (TAA 145123, as *L.* sp.). **Norway:** Sør-Trøndelag: Klaebu, Bromstad, 21 Sep. 1975, Å. Erlandsen (TRH). **Russia:** Primorye Terr.: near Vladivostok, 6 July 1975 (VLA, as *L.* sp.); Khassan Distr., Kedrovaya Pad' Nature Reserve, 27 July 1979, E. Bulakh (VLA); Ol'gin Distr., Margaritovo, Mt. Lysaya, 26 July 1980, E. Bulakh (VLA). Without locality, 6 Aug. 1972 (VLA 257), 15 Aug. 1972 (VLA 420a). **Sweden:** Uppland: Läby sn, Läby, SW of Svinskinnsskogen, 20 Sep. 1950, S. Lundell & J. Eriksson (UPS, as *T. infumatum*); Almunge sn, Länna, 2 Sep. 1951, L. Holm (UPS, as *T. infumatum*).
Extralimital. North America: without locality, leg. Atkinson, herbarium Bresadola no 7665 (S F31549, as *Clitocybe ectypa* 'typica', neotype).

Notes: *L. macrosporum* is characterized by large ochre yellow to pale brown inhygrophanous basidiocarps, becoming bluish grey and then black when bruised, microscopically by large conspicuous humply inequilateral amygdaliform spores with well marked suprahilar depression in side view and rhomboid in face view, by very robust inflated hyphae with diameter of up to 25 µm in hymenophoral trama. Very similar *L. infumatum* differs in grey brown basidiocarps, narrower (3 to 10 µm thick) cylindric hyphae in hymenophoral trama and mostly fewer amygdaliform in side view spores. In many cases the differentiation of these two close species is very complicated. In addition, the same North-American species, namely *L. biconicosporum* Clémençon & A.H. Sm., *L. corrugatum* Clémençon & A.H. Sm. and *L. geminum* Clémençon & A.H. Sm. (cf. Clémençon & Smith, 1983) are also obviously very close to our *L. macrosporum* and *L. infumatum*.

Stirps Konradianum

Basidiocarps tricholomatoid to collybioid. Spores small, ellipsoid to cylindric. Cheilocystidia present, fusiformes. Pileus surface tomentose, dry.

6. *Lyophyllum konradianum* (Maire) Konrad & Maubl. Fig. 6

Clitocybe konradiana Maire, Bull. Soc. Hist. Nat. Afrique N. 36: 32. 1945. – *Lyophyllum konradianum* (Maire) Konrad & Maubl., Encycl. mycol. 14: 368. 1948.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 96 (fig.). 1999a. – Clémençon, Mycotaxon 15: 79, 80 (fig. 10). 1982a. – Clémençon, Z. Pilzk. 52 (1): 71, 80 (fig. 6). 1986 (translated from Maire, 1945). – Kühner & Romagnesi, Fl. anal. Champ. sup.: 163. 1953.

Description (after Clémençon, 1986, from Maire, 1945): Pileus up to 5 cm, convex then plane, finely tomentose at first, then smooth, dry, with inrolled margin, grey. Lamellae adnate with tooth, crowded, rather narrow, mouse grey. Stipe up to 4.5 × 0.5 cm, cylindric to slightly swollen at base, slightly tomentose, dry, fistulose finally, concolorous with pileus. Context thin, whitish. Smell and taste indistinct. Basidiocarps become slowly grey at first and then black when cut or bruised. Spore print white.

Spores small, 3.5–5(–5.5) × 2–2.5(–2.8) µm, Q = 1.4–2.0, ellipsoid-cylindric, smooth. Basidia 18–20(–23) × 4–5 µm. Cheilocystidia 20–40 × 3–6 µm, irregularly cylindric to fusiform, scattered. Hymenophoral trama hyphae 3–7 µm wide. Pileipellis hyphae 2–5 µm wide.

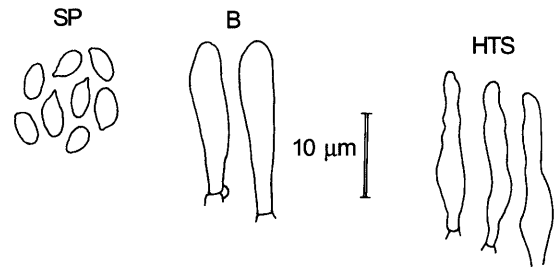


Fig. 6. *Lyophyllum konradianum.*

Ecology: In forests, parks.

Phenology: September and October.

Distribution: Rare. **Eastern Europe:** LAT, LIT! **Russian Far East:** PRM!

Collections examined: Lithuania: Vilnius, 21 Oct. 1971, V. Urbonas (BILAS 12039). **Russia:** Primorye Terr.: near Vladivostok, 5 Sep. 1962, L. Vasil'eva (VLA).
Extralimital. France: Le Frehaut, 19 Sep. 1934, R. Maire (K 104710, as *T. konradianum*, holotype).

Notes: *L. konradianum* is characterized by totally grey (also in lamellae) basidiocarps changing grey and then black when bruised; smell indistinct; tomentose dry pileus and stipe; fusiform cheilocystidia and little smooth ellipsoid-cylindric spores. A similar species *L. leucophaeatum* has bigger

verruculose spores (>5 µm long) and basidiocarps changing blue at first and then black. A very similar species *L. tenebrosum* Clémençon has a smooth viscid shining pileus and disagreeable smell.

Stirps Leucophaeatum

Basidiocarps tricholomatoid. Spores cylindric-ellipsoid, verruculose.

7. *Lyophyllum leucophaeatum* (P. Karst.) P. Karst. Fig. 7

Agaricus gangraenosus Fr., Epicr.: 56. 1838. – *Clitocybe gangraenosa* (Fr.) Sacc., Syll. Fung. 5: 143. 1887. – *Lyophyllum gangraenosum* (Fr.) Gulden in Knudsen & Hansen, Nordic J. Bot. 11 (4): 478. 1991. – *Agaricus fumatofoetens* Secr., Mycogr. suisse: No. 641. 1833 (inval.). – *Lyophyllum fumatofoetens* (Secr.) Jul. Schäff. 1947 (inval.). – *Agaricus leucophaeatus* P. Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 9, N.S. 6: 336. 1868. – *Collybia leucophaeata* (P. Karst.) P. Karst., Ryssl., Finl. Skand. Halföns Hattsvamp.: 142. 1879a. – *Lyophyllum leucophaeatum* (P. Karst.) P. Karst., Acta Soc. Fauna Fl. Fennica 2 (1): 3. 1881 (Hymenomyc. Fennici).

Misapplied name: *Tricholoma crassifolium* sensu Lange, Dansk Bot. Ark. 8 (3): 26. 1933.

Selected icones: Courtecuisse & Duhem, Guide Champ. France Europe: 209 (fig. 469). 2000. – Imler, Bull. Soc. Mycol. France 59: Atlas, pl. 87. 1943. – Lange, Fl. agar. dan. 1: pl. 25E (as *Tricholoma leucophaeatum*), pl. 32B (as *C. gangraenosa*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 229 (as *L. fumatofoetens*).1979. – Phillips, Mushr. other Fungi: 42 (*L. fumatofoetens*). 1981. – Ryman & Holmåsen, Suomen pohjolan sienet: 299. 1987. – Cetto, Enzykl. Pilze 2: 324. 1987 (as *L. fumatofoetens*). – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 261. 1991. – Urbonas, Lietuvos grybai 8 (2): pl. 28, 1. 1997.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 89 (fig.). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): 222, 223 (fig.). 1991. – Cetto, Enzykl. Pilze 2: 325 (as *L. fumatofoetens*). 1987. – Clémençon, Z. Mykol. 52 (1): 69, 79 (Abb. 1). 1986. – Clémençon, Mycotaxon 15: 81, fig. 12. 1982a. Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138 (as *L. gangraenosum*). 1992. – Imler, Bull. Soc. Mycol. France 59: Atlas, pl. 87. 1943. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 374 (as *L. fumatofoetens*). 1979. – Singer, Ann. Mycol. 41: 99. 1943. – Tymans, Bull. Soc. Mycol. France 58: 91 (fig.). 1942. – Urbonas, Lietuvos grybai 8 (2): 107. 1997.

Description: Pileus up to 8(–11) cm, convex then plano-convex, sometimes somewhat umbonate, matt, dry, felty-woolly when young, with inrolled white-tomentose margin at first, later radially innate fibrillose, smooth, wavy at margin, slightly hygrophanous, dirty whitish, olivaceous grey to pale beige grey, adult pale grey brown to ochre brown. Lamellae emarginate to subdecurrent, crowded, narrow, dirty whitish, brownish to beige grey; separable from context of pileus. Stipe up to 6(–9) × 1.5(–2) cm, cylindric or slightly thickened downwards, dark fibrillose, dry, white-tomentose at base, pale greyish pruinose at apex, fistulose finally, concolorous with pileus. Context concolorous with pileus. Smell indistinct or somewhat unpleasent, slightly fetid or acid. Taste indistinct, mild or sometimes slightly bitterish. Spore print whitish to pale creamy. Basidiocarps become blue at first and then black when bruised.

Spores (5–)6–8(–8.5) × (2.7–)2.9–3.5(–3.7) µm, Q = 1.8–2.4, cylindric-ellipsoid, with slightly marked suprahilar depression, verruculose (in water only!). Basidia 18–25 × 5–7 µm. Hymenophoral trama hyphae 3–7 µm wide. Pileipellis hyphae of 2–7 µm wide.

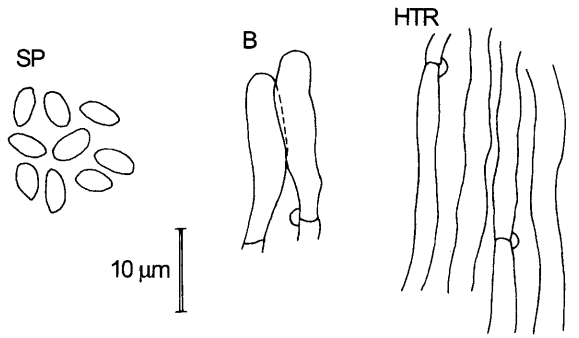


Fig. 7. *Lyophyllum leucophaeatum.*

Ecology: Occasionally solitary or gregarious, sometimes caespitose on forest litter in coniferous, deciduous and mixed forests, parks.

Phenology: July to November.

Distribution: Occasional to common. **Northern Europe:** DEN!, FIN!, NOR, SWE! **Eastern Europe:** BLR!, EST!, LIT!, RUC-Moscow!, RUC-Penza!, UKR. **Siberia:** ALT!, IRK! **Russian Far East:** KHA!, PRM!

Collections examined: Belarus: without locality, 7 Sep. 1950, B. Vasil'kov (MSK 499, as *T. leucophaeatum*), 22 Sep. 1960, G. Serzhanina (MSK 499a, dupl. TAA 142196; as *L. fumatofoetens*). **Denmark:** Without locality, 30 Sep. 1960, M.L. (C 33167). **Estonia:** Ida-Viru Co.: Oru, 11 Sep. 1965, K. Kalamees & V. Urbonas (TAA 75895, as *L. fumatofoetens*). Lääne-Viru Co.: Luusika, 6 Oct. 1970, K. Kalamees (TAA 79416, as *L. fumatofoetens*). Pärnu Co.: Varbla Forest Distr., N of Rannaküla, Jaagu, 12 Sep. 1980, K. Kalamees (TAA 121643, as *L. fumatofoetens*); Nigula Nature Reserve, Salupeaksi, 19 Sep. 1998, K. Kalamees (TAA 175423, as *L.* sp.). **Finland:** Åland:

Lemland, Nåtö, 29 Aug. 1981, C.-A. Haegström & R. Skytén (H); Finström Comm., Bessö, Näset, NNW of Wirkholm, 24 Aug. 2000, J. Vauras 16809 (TURA; dupl. TAA; as *L. gangraenosum*). Etelä-Häme: Tammela, Mustiala, 23 & 24 Aug. 1866, P.A. Karsten 2020 & 2021 (H, holotype & isotype; as *Agaricus leucophaeatus*), Oct. 1874, 19 Sep. 1881, P.A. Karsten 2022 & 2023 (H, as. *T. leucophaeatum*); Lammi, Kaitala, Taka-Killo, 1 Sep. 1988, H. Harmaja (H); Luopioinen, Kuohijoki, 5 Sep. 1988, M. Kuusinen (H); Tampere, Peltolammi, Arranmaa, 24 July 1995, U. Söderholm 2476 (H). Etelä-Karjala: Vehkalahti, Pyhältö, Taipale, 2 Nov. 1974, L. Fagerström (H, as *L. fumatofoetens*?). Etelä-Savo: Kerimäki Comm., Ruokojärvi, Louhi, 8 Sep. 1998, I. Kytövuori 981699 (H). Kainuu: Sotkamo, Kontinjoki, 30 Aug. 1981, I. Kytövuori (H, as *L. fumatofoetens*). Keski-Pohjanmaa: Vimpeli, Hallapuro, Västerbacka, Moskova, 1 Sep. 1985, I. Kytövuori 85646 (H, as *L. fumatofoetens*). Perä-Pohjanmaa: Tervola Comm., Peura, Raemäki, 11 Sep. 1997, I. Kytövuori 971188 (H). Pohjois-Karjala: Kontiolahti Comm., Kyykkä, Kolvananuuro, 19 Sep. 1992, I. Kytövuori 922572 (H). Uusimaa: Kirkkonummi, Smedsby, E side of Lake Hemträsket, 20 Sep. 1978, I. Kytövuori 789454 (H, as *L. fumatofoetens*); Helsinki, 13 Sep. 1953, R. Tuomikoski (H), 30 Aug. 1988, R. Saarenoksa 27188 (H). Varsinais-Suomi: Kuusjoki, Impola, Korvenkulma, Pyörteenkoski, 30 Sep. 1979, I. Kytövuori 79998 (H, as *L. fumatofoetens*); Suomusjärvi, Lemula, N part of Lemulanrinne, 12 Oct. 1985, I. Kytövuori 851620 (H, as *L. fumatofoetens*); Parainen Comm., Simonby, 11 Sep. 1988, I. Kytövuori 881666 (H); Dragsfjärd Comm., Holma Island, Uppgård, 26 July 1996, J. Vauras 11325 (TURA, dupl. TAA; as *L. gangraenosum*). **Lithuania:** Alytus Distr.: Balkasodis, 22 Sep. 1967, V. Urbonas (BILAS 10087, as *L. fumatofoetens*). Ignalina Distr.: Vaišniūnai Forest Distr., 10 Sep. 1975, V. Urbonas (BILAS 13916, as *L. fumatofoetens*). **Russia:** Altaj Terr.: Ojrotiya, 10 km E of Choj, 20 Sep. 1937, R. Singer (LE 18284). Leningrad Prov.: Luga Distr., Oredezh, 20 Sep. 1998, O. Morozova (LE 216027, as *L. gangraenosum*). Irkutsk Prov.: Bratsk Distr., Kob', 26 Aug. 1987, V. Astapenko 28 (TAA). Khabarovsk Terr.: Bolshekhekhtsirskij Nature Reserve, 14 Sep. 1981, E. Bulakh (VLA). Penza Prov.: Borkovka, 8 Sep. 1990, A. Ivanov (TAA 142195 = LE 18938). Primorye Terr.: Suputinskij (Ussurijskij) Nature Reserve, 10 Sep. 1955, L.Vasil'eva (VLA); Partizansk Distr., Bol'shoj Zverinets Stream, 13 Sep. 1989, E. Bulakh (VLA). Moscow Prov.: Kamyshin, 7 Sep. 1950, expedition of the University of Moscow (LE 6384, as *T. leucophaeatum*). **Sweden:** Medelpad: 12 Sep. 1995, S. Muskos (TAA 146650, as *T. leucophaeatum*). Uppland: Uppsala, 25 Sep. 1951, 2 Oct. 1951, 11 Oct. 1953, H. Belin (UPS, as *T. leucophaeatum*).

Extralimital. Austria: Tirol, Pfach, Reute, 11 Aug. 1966, M. Moser (IB 66/123, as *L. fumatofoetens*); Gnadenw., by St. Michael, 28 Sep. 1978, M. Moser (IB 78/388, as *L. fumatofoetens*). **Germany:** Sachsen-Anhalt: Bennungen, NSG Questenberg, 9 Oct. 1974. H. Dörfelt (HAL, as *L. fumatofoetens*). **Italy:** Trentino, Val di Sella, 20 Sep. 1986, 25 Sep. 1988, M. Moser (IB 86/259, 88/222; as *L. fumatofoetens*); Trentino, Valsugana, by Torcegno, 7 Oct. X 1974, L.B. Steidl (IB 74/565, as *L. fumatofoetens*). **Switzerland:** Nodufer Torneträsk, Norrbotten, 25 Aug. 1981, M. Rainer, Hofmann & M. Moser (IB 81/311, as *L. fumatofoetens*); Vanewald by Ins, 8 X 1965, M. Moser (IB 65/257, as *L. fumatofoetens*).

Notes: *L. leucophaeatum* is very well distinguished by verruculose cylindric-ellipsoid spores, pale beige grey felty basidiocarps without distinct smell that change blue at first then black when bruised.

Stirps Pallidum

Basidiocarps tricholomatoid. Pileus lubricous. Spores inequilateral, asymmetrically ovoid to subconic in side view, ovoid to subellipsoid in face view, smooth.

8. *Lyophyllum pallidum* Clémençon & A.H. Sm. Fig. 8

Lyophyllum pallidum Clémençon & A.H. Sm., Mycotaxon 18 (2): 427. 1983.

Selected description and fig: Clémençon & A.H. Smith, Mycotaxon 18 (2): 397 (fig. 19), 427. 1983.

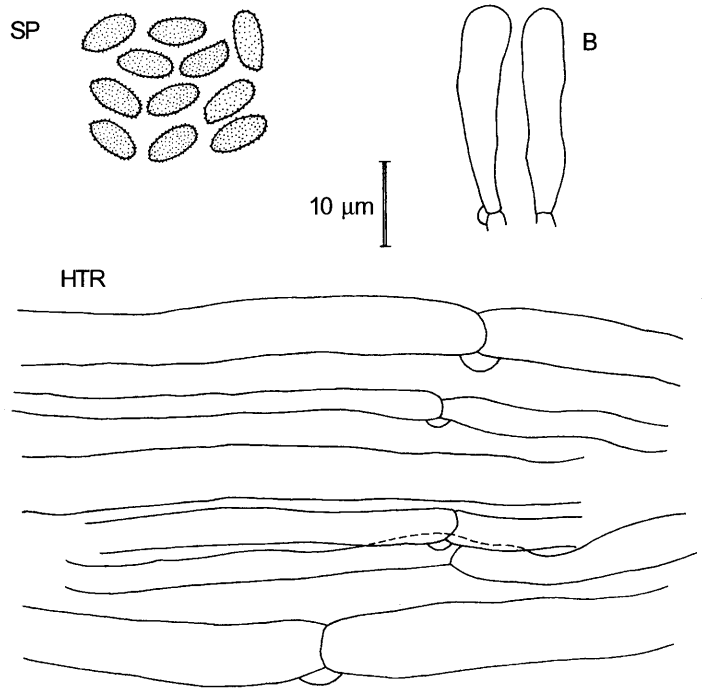


Fig. 8. *Lyophyllum pallidum.*

Description (after Clémençon & Smith, 1983): Pileus up to 6 cm wide, convex with inrolled margin, then broadly umbonate, smooth, shining, lubricous to viscid, hygrophanous, translucently striate at margin, pale grey on disc, pallid at margin, fading pallid overall. Lamellae adnate, whitish, staining pale bluish grey when bruised or cut. Stipe up to

8 × 1 cm, cylindric or attenuate at base, hollow, whitish grey, longitudinally striate, dry, not discolouring noticeably when bruised. Context very thin and pliant, concolorous with pileus, changing to bluish grey when bruised. Smell indistinct.

Spores (5.5–)6–6.5(–8) × (4.5–)5–5.5 µm, Q = 1.2–1.4, inequilateral, asymmetrically ovoid to subconic in side view, thickest towards the apicular end and thinner at the apex; ovoid to subellipsoid in face view; smooth. Basidia 25–35 × 7–10 µm. Pileipellis hyphae 2–6 µm thick. Hymenophoral trama hyphae 3–10 µm thick.

Ecology: In oak forest on forest litter.

Phenology: September.

Distribution: Very rare. **Russian Far East:** PRM!

Collection examined: Russia: Primorye Terr.: Kedrovaya Pad' Nature Reserve, 4 Sep. 1976 (VLA 1358, as *L. infumatum*).

Notes: *L. pallidum* is described in North America and this is the first find in Eurasia. Our specimens are determined as *L. pallidum* according to spore characteristics. *L. pallidum* is characterized by pale grey hygrophanous basidiocarps without smell, changing bluish grey when bruised, and by little stocky spores asymmetrically subconic in side view. Very similar and close to this species is the North American species *L. conoideospermum* Clémençon & A.H. Sm., whose basidiocarps have the smell of potatoes and pileus is dark fuliginous, spores are bigger and slenderer (7–8.7 × 4.3–5.9 µm; Q = 1.3–1.8) (cf. Clémençon & Smith, 1983).

Stirps Semitale

Basidiocarps tricholomatoid to collybioid. Spores fusiform-ellipsoid in side view, with suprahilar depression, ellipsoid with pointed apicular base in face view, smooth.

9. *Lyophyllum semitale* (Fr. : Fr.) Kühner Fig. 9

Agaricus semitalis Fr. : Fr., Syst. mycol. 1: 117. 1821. – *Collybia semitalis* (Fr. : Fr.) Quél., Mém. Soc. Émul. Montbéliard 2 (5): 92. 1872 (Champ. Jura Vosges 1). – *Tricholoma semitale* (Fr. : Fr.) Ricken, Blätterpilze 1: 358. 1915. – *Tricholoma aggregatum* var. *semitale* (Fr. : Fr.) Maire, Étude synth. Genre *Tricholoma*: 69. 1916. – *Lyophyllum semitale* (Fr. : Fr.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938.

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 268. 1992. – Bresadola, Iconogr. mycol. 4: pl. 196 (as *C. semitalis*). 1928. – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 251 (as *T. semitale*). 1927. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 233. 1979. – Urbonas, Lietuvos grybai 8 (2): pl. 28, 4. 1997.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 95 (fig.). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): 228, 229 (fig.). 1992. – Clémençon, Z. Pilzk. 52 (1): 76, 84 (fig. 16.) 1986. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 137. 1992. – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 251 (as *T. semitale*). 1927. – Kühner & Romagnesi, Fl. anal. Champ. sup.: 163 (fig. 222), 164. 1953. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 376. 1979. – Urbonas, Lietuvos grybai 8 (2): 108. 1997. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 165. 1979.

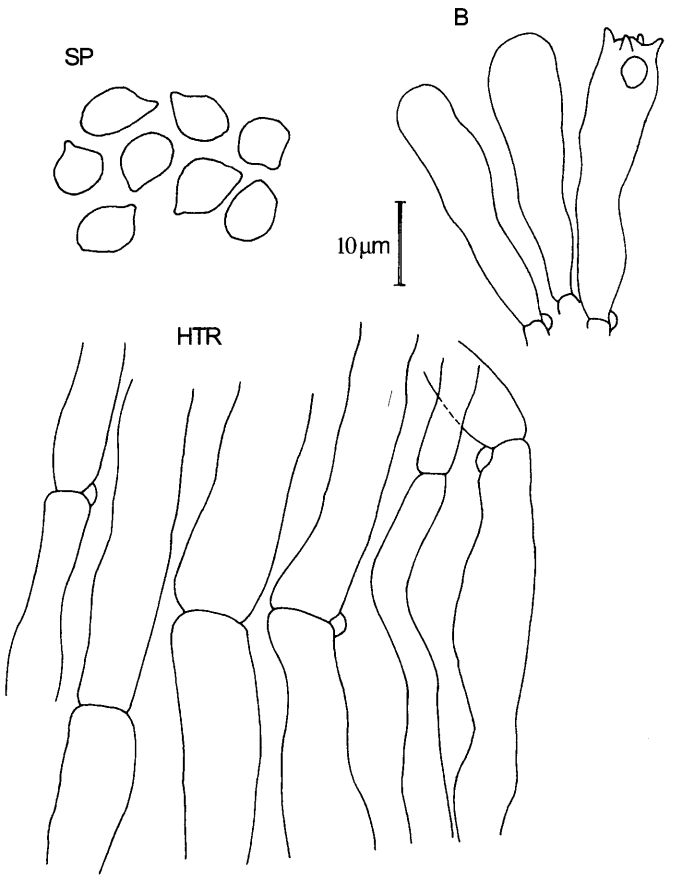


Fig. 9. *Lyophyllum semitale.*

Description: Pileus up to 7 cm, convex, then plano-convex to somewhat depressed in centre, sometimes slightly umbonate, smooth, glabrous, dry,

hygrophanous, translucently striate at margin, shining, sepia, hazel, grey brown to brownish black. Lamellae emarginate to subdecurrent, rather crowded and narrow, greyish to pale brownish. Stipe up to 7 × 1 cm, dry, smooth, pruinose at apex, fibrillose below, dry, cylindric, hollow, concolorous with pileus. Context greyish. Smell and taste farinaceous-rancid. Basidiocarps staining directly grey then black when bruised and cut. Spore print white.

Spores (6–)6.5–8(–9) × 3.5–5 µm, Q = 1.6–2, fusiform-ellipsoid in side view, mostly with clear suprahilar depression, ellipsoid with pointed apicular base, sometimes V-shaped in face view, smooth. Basidia 30–40 × 7–8 µm. Hymenophoral trama hyphae 4–10 µm thick. Pileipellis hyphae 2–5 µm thick.

Ecology: Solitary or caespitose on forest litter in coniferous forests.

Phenology: July to October.

Distribution: Widely distributed but rather rare. **Northern Europe:** DEN!, FIN!, NOR, SWE! **Eastern Europe:** EST!, LAT, LIT!, RUN-Karelia, RUN-Murmansk?, UKR. **Caucasus:** TCS-AR. **Russian Far East:** KHA!, PRM!

Collections examined: Denmark: Without locality, 8 Oct. 1994, T. Læssøe (C 33435). **Estonia:** Harju Co.: Naissaar Island, 4 Oct. 2001, K. Kalamees & I. Saar (TAA 176066, as *L.* sp.). Lääne Co.: Vormsi Island, between Saksby and Binas, 10 Sep. 1967, K. Kalamees (TAA 77009). **Finland:** Etelä-Häme: Mustiala, Syrjä, 4 Oct. 1866, P.A. Karsten (H, as *A.* (*Collybia*) *protractus*); Vilppula, Pohjaslahti, Salmentakanen, 25 Sep. 1988, M.-L. Leppänen (H); Kuru Comm., Länsi-Aure, Seitseminen National Park, 20 July 1996, I. Kytövuori 96138 (H). Etelä-Karjala: Anjalankoski Comm., Kaipiainen, 15 Sep. 1999, I. Kytövuori 94524 (H). Etelä-Savo: Kerimäki Comm., Ruokojärvi, Keplakko, 2 Oct. 1994, I. Kytövuori 941248 (H). Inarin Lappi: Inari Comm., Keskikompsio, 14 Aug. 1995, I. Kytövuori 95336 (H). Perä-Pohjanmaa: Pello Comm., Naamijoki, 31 July 1998, I. Kytövuori 98203 (H). Pohjois-Karjala: Lieksa, Kinahmo, Petroniemi, 10 Sep. 1979, E. Lappi 35/79 (H, *L. semitale*?); Ilomantsi Comm., Hattuvaara, 22 Sep. 1996, I. Kytövuori 961667 (H); Ilomantsi Comm., Niemijärvi, Tapionaho, 24 Sep. 1997, I. Kytövuori 971767 (H). Satakunta: Lappi, Lapinkylä, 15 Oct. 1957, H. Såltin (H). Sompion Lappi: Savunkoski Comm., Sotataival, Lipakkaselkä, 30 Aug. 1988, I. Kytövuori 881008 (H); Sodankylä, Aska, 4 Sep. 1992, H. Väre (H). Varsinais-Suomi: Bromarv, Solböle, 29 Sep. 1957, O. v. Schulmann (H, as *L. inolens*). **Lithuania:** Varėna Distr.: Varina, 17 Oct. 1968, Merkinė, 15 Oct. 1978, V. Urbonas (BILAS 10581, 14175). **Russia:** Leningrad Prov.: Vyborg Distr., Lebedevka, 3 Aug. 1998, O. Morozova (LE 215023). Primorye Terr.: Shkotovsk Distr., Khualaza, 20 July 1965, M. Nazarova (VLA, as *Clitocybe ectypoides*); Chuguevsk Distr., Verkhneussurijsk, 21 Aug. 1975, E. Bulakh (VLA, as *L. infumatum*). Khabarovsk Terr.: Bolshekhekhtsirskij Nature Reserve, 15 Sep. 1981, E. Bulakh (VLA, as *L. infumatum*). **Sweden:** Södermanland: Sorunda par., St. Vika, 18 Oct. 1983, M. Bremond (UPS 18939). Medelpad: Bergåsen, 13 Sep. 1995, I. Kytövuori (TAA 146673, as *L.* sp.), 14 Sep. 1995, G. Gulden (TAA 146782). Uppland: Älvkarleby sn, Muren, 23 Sep. 1950, G. Fåhraeus & G. Stenlid (UPS, as *C. semitalis*, neotypus).

Notes: *L. semitale* is characterized by grey brown hygrophanous basidiocarps with farinaceous smell and translucently striate pileus, by fusiform-ellipsoid spores with pointed apicular base and suprahilar depression.

Stirps Transforme

Basidiocarps tricholomatoid, big. Spores inequilateral, with enormous abaxial hump, triangular in side view, ovoid, subrhomboid or quadrangular in face view, smooth.

10. *Lyophyllum transforme* (Britzelm.) Singer Fig. 10

Clitocybe semitale var. *trigonospora* Bres., Fungi trident. 1: 30. 1883. – *Collybia semitalis* var. *trigonospora* (Bres.) Quél., Enchir. Fung.: 28. 1886. – *Collybia trigonospora* (Bres.) Bataille, Bull. Soc. Mycol. France 27: 371. 1911. – *Clitocybe trigonospora* (Bres.) Sacc., Fl. ital. crypt.: 185. 1915–1916. – *Tricholoma trigonosporum* (Bres.) Ricken, Blätterpilze 1: 358. 1915. – *Lyophyllum trigonosporum* (Bres.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938. – *Agaricus transformis* Britzelm., Hymenomyc. Südbayern: pl. 104, fig. 546. 1893. – *Tricholoma transforme* (Britzelm.) Sacc., Syll. Fung. 11: 12. 1895. – *Clitocybe transforme* (Britzelm.) Maire, Bull. Soc. Mycol. France 27: 408.1911. – *Lyophyllum transforme* (Britzelm.) Singer, Ann. Mycol. 41: 98. 1943.

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 270. 1991. – Bresadola, Iconogr. mycol. 4: pl. 186 (as *Clitocybe trigonospora*). 1928. – Courtecuisse & Duhem, Guide Champ. France Europe: pl. 468. 2000. – Dähncke & Dähncke, 700 Pilze: 186. 1980. – Konrad & Maublanc, Ic. sel. Fung. 3: 249 (as *T. trigonosporum*). 1927. – Zerova, Atlas gribiv Ukraini: pl. 71, 2 (as *L. trigonosporum*). 1974. – Urbonas, Lietuvos grybai 8 (2): pl. 29, 1. 1997.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 90 (fig.). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): 228, 229. 1991. – Clémençon, Z. Pilzk. 52 (1): 73, 81 (fig. 7). 1986. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138, 416 (fig. 195). 1992. – Urbonas, Lietuvos grybai 8 (2): 109. 1997. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 166 (fig. 73). 1979.

Description: Pileus up to 8 cm, convex then plano-convex, with inrolled margin at first, smooth, glabrous, dry, shining, hygrophanous, not translucently striate, slightly innate fibrillose, grey brown to black brown, finally almost black, fading beige to brownish grey. Lamellae narrowly emarginate to subdecurrent, rather distant and broad, whitish to greyish. Stipe up to 10 × 1.5(–2) cm, cylindric or clavate at base, often tapering downwards, smooth, glabrous, dry, white-pruinose at apex, sometimes

compressed, concolorous with pileus. Context whitish, rather thin. Smell and taste indistinct. Basidiocarps discolouring blue at first when bruised, then blackening, especially in lamellae. Spore print white.

Spores (6.5–)8–10(–11) × (4–)5–6.5(–8) µm, Q = 1–1.7(–2) inequilateral, with enormous abaxial hump, triangular in side view, ovoid or subrhomboid in face view. Basidia 30–40 × 7–8 µm. Hymenophoral trama hyphae 3–16 µm thick; gloeoplerous hyphae present but poor. Pileipellis hyphae of 3–8 µm wide.

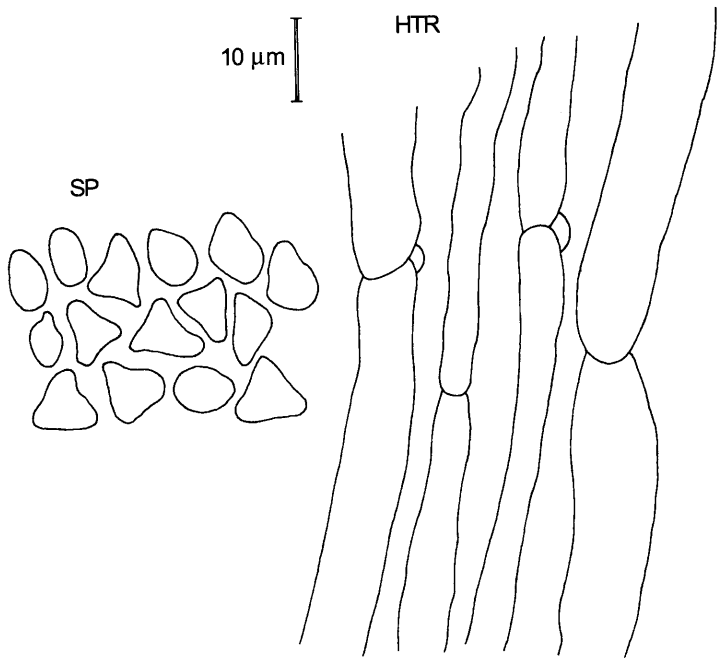


Fig. 10. *Lyophyllum transforme.*

Ecology: Solitary, rarely fasciculate in coniferous, deciduous and mixed forests.

Phenology: August and September.

Distribution: Very rare. **Northern Europe:** DEN, FIN!, NOR, SWE. **Eastern Europe**: LIT!, UKR. **Caucasus:** NCS-KR!

Collections examined: Finland: Etelä-Häme: Korpilahti, Oittila, Korospohja, Vaarunvuoret, 20 Aug. 1986, T.-E. Brandrud (TAA 143232, as *L.* sp.). **Lithuania:** Švenčionys Distr.: 29 Sep. 1965, V. Urbonas (BILAS 8389); Labanoras, 9 Sep. 1973, V. Urbonas (BILAS, as *L. transforme*). **Russia:** Krasnodar Terr.: Caucasus Nature Reserve, Umpyr, 14 Aug. 1976, L. Pihlik & M. Vaasma (TAA 95181, as *L.* sp.).
Extralimital. Germany: Bavaria, near Augsburg, Westerholz by Schwabstadel, 16 Sep. 1967, J. Stangl (M 84/67, neotype).

Notes: *L. transforme* is well characterized by its triangular spores in side view (the hump is located in the middle of the abaxial side of the spores) and discolouring of basidiocarps at first blue when bruised and then grey and black. In all our specimens investigated gloeoplerous hyphae can be detected but are poor in some specimens. After Clémençon (1986) gloeoplerous hyphae cannot be found in *L. transforme.*

There are two very close species different in spore form: *L. sykosporum* with small fig-shaped spores (with a broad abaxial thickening near the top of the spore, which is widest near the apex) and *L. rhopalopodium* Clémençon with an enormous cone in the middle of the spores (often higher than the length of the spores). The latter species has not been determined in the regions studied.

11. *Lyophyllum sykosporum* Hongo & Clémençon Fig. 11

Lyophyllum sykosporum Hongo & Clémençon, Mycol. Helv. 1 (1): 43. 1983.

Selected description & fig: Hongo & Clémençon, Mycol. Helv. 1 (1): 44, 45 (fig. 1). 1983.

Description (after Hongo & Clémençon, 1983): Pileus up to 9 cm wide, convex then expanded, fleshy, dry, slightly innately fibrillose, brownish grey to umbrinous, margin incurved when young. Lamellae sinuate to adnate-sinuate or adnate-subdecurrent, finally separating, moderately crowded, about 5 mm broad, pale grey, staining black when touched. Stipe up to 10 × 1.8(–3 at base) cm, fibrillose striate, pruinose at apex, pale grey, becoming darker in age, solid or stuffed, clavate to bulbose at base. Context thick, soft, white to greyish white, gradually blackening when injured. Taste mild, smell slight.

Spores (5.5–)6–8(–8.5) × (4.5–)5–7 µm, Q = 1–1.2(–1.3) inequilateral, with an enormous apical thickening in the abaxial side, asymmetrically fig- or fun-shaped, irregularly triangular in side view, ovoid to citriniform, subrhomboid to quadrangular in face view, smooth. Basidia 25–35 × 7–9 µm. Pileipellis hyphae smooth or finely incrusted, 2–6 µm thick. Hymenophoral trama hyphae 6–15 µm thick; gloeoplerous hyphae present but poor.

Ecology: Caespitose on forest litter in oak forest.

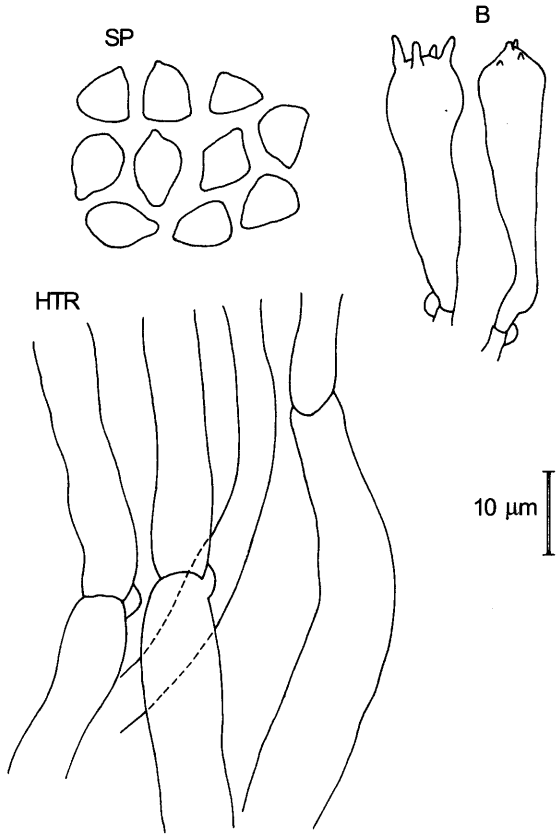


Fig. 11. *Lyophyllum sykosporum.*

Phenology: September.

Distribution: Very rare. **Russian Far East:** PRM!

Collection examined: Russia: Primorye Terr.: Lazo Nature Reserve, 19 Sep. 1974 (VLA 600, as *L.* sp.).

Notes: *L. sykosporum* is characterized by rather small irregularly fig-shaped triangular spores in side view and blackening basidiocarps when bruised and in age. A very similar species is *L. trigonosporum*, which is differentiated by bigger triangular spores with a moderate hump in the middle of the spores and discolouring of basidiocarps at first blue when bruised and then grey and black. *L. sykosporum* is distributed in Japan, probably it can be also quite widely distributed in Russian Far East.

Sect. DIFFORMIA (Fr.) Kühner

Context of basidiocarps neither bluing nor blackening but sometimes slightly browning. Spores globose to ellipsoid, smooth. Habit of basidiocarps tricholomatoid or clitocyboid, fasciculate or connate, occasionally solitary.

Stirps Connatum

Basidiocarps totally white, pruinose, fasciculate, not discolouring when bruised but discolouring violet with $FeSO_4$. Lamellae subdecurrent. Smell disagreeable, sickly sweetish. Spores ellipsoid, smooth.

12. *Lyophyllum connatum* (Schumach. : Fr.) Singer Fig. 12

Agaricus connatus Schumach., Enum. Plant.: 299. 1803; Schumach. : Fr., Syst. mycol. 1: 97. 1821. – *Clitocybe connata* (Schumach. : Fr.) Gillet, Hyménomycètes: 164. 1874. – *Tricholoma connatum* (Schumach. : Fr.) Ricken, Blätterpilze 1: 360. 1915. – *Lyophyllum connatum* (Schumach. : Fr.) Singer, Schweiz. Z. Pilzk. 17: 54. 1939. – *Omphalia connata* (Schumach. : Fr.) Quél., Fl. mycol. France: 246. 1888.

Excluded: *Clitocybe connata* sensu Lebedeva, Opredelitel' Agaricales: 336. 1949. – *Lyophyllum connatum* sensu Samgina, Agarikovye griby: 152. 1981. – *Lyophyllum connatum* sensu Serzhanina, Mushrooms Belarus: 86. 1994.

Selected icones: Bon, Pareys Buch Pilze : 167. 1988b. – Breitenbach & Kränzlin, Pilze Schweiz 3: pl. 256. 1991. – Cetto, Enzykl. Pilze 2: 334. 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: pl. 472. 2000. – Dähncke & Dähncke, 700 Pilze: 187. 1980. – Gerhardt, Grosse Pilzführer: 99. 1997. – Hagara, Atl. húb: pl. 131. 1987. – Kalamees, Mycobiota Estonia: pl. 73. 2000. – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 285 (as *C. connata*). 1927. – Korhonen, Uusi sienikirja: 158. 1986. – Lange, Fl. agar. dan. 1: pl. 38F (as *C. connata*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3.: pl. 235. 1979. – Phillips, Mushr. other Fungi: 42. 1981. – Ryman & Holmåsen, Suomen pohjolan sienet: 300. 1987. – Urbonas, Lietuvos grybai 8 (2): pl. 27, 2. 1997. – Zerova, Atlas gribiv Ukraini pl. 70, 2. 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 98 (fig.). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3: 220–221. 1991. – Cetto, Enzykl. Pilze 2: 335. 1987. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 380. 1979. – Urbonas, Lietuvos grybai 8 (2):105. 1997.

Description: Pileus up to 10 cm, convex, then convex-plane to faintly depressed, sometimes slightly umbonate, often wavy, when young with involute tomentose margin, dry, hygrophanous, finely pure white or pale greyish, white frosty pruinose on greyish or dirty pale brownish base, sometimes with faintly bluish tint, the marginal part often with fragmentary narrow concentric watery zones. Lamellae adnate with tooth to

subdecurrent, seldom emarginate with tooth, very crowded and narrow, white or whitish to faintly dirty creamish. Stipe up to 10 × 2 cm, cylindric or slightly clavate but tapering towards the base, often compressed, frequently eccentric, totally densely tomentose-pruinose, apex flocculose, dry, white; fasciculate. Context white, thick. Smell disagreeable, sickly sweetish, somewhat farinaceous when young and fresh. Taste mild or very faintly bitterish. Basidiocarps discolouring slowly (after some minutes) violet with $FeSO_4$. Spore print white.

Spores 5–6(–7.5) × 3–4(–4.5) µm, Q = 1.4–2, ellipsoid to obovoid, smooth. Basidia 30–37 × 6–10 µm. Pileipellis made up of (2–)3–8(–12) µm thick hyphae. Hymenophoral trama hyphae (2–)3–6(–15) µm thick.

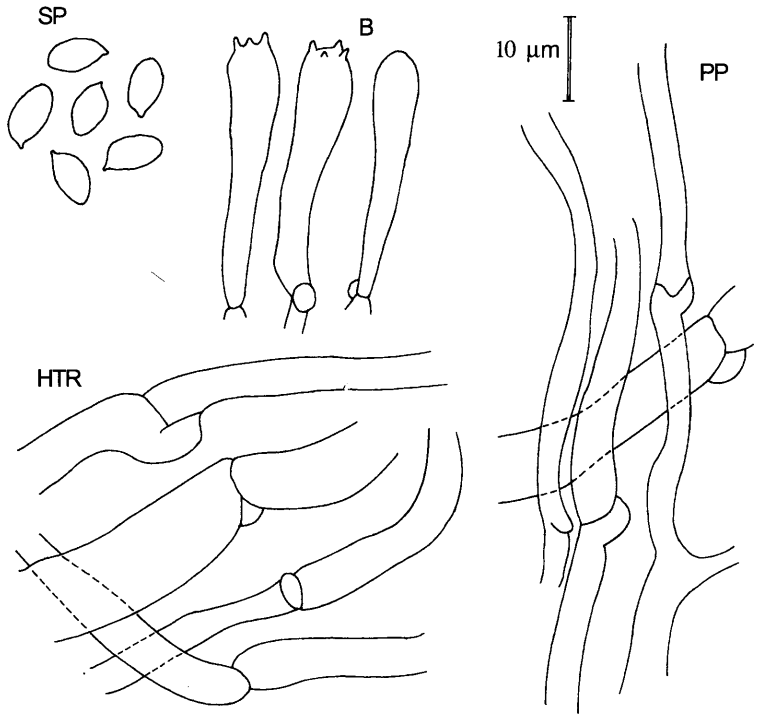


Fig. 12. *Lyophyllum connatum.*

Ecology: Fasciculate, rarely slightly connate, occasionally solitary on soil among grass in parks, lawns, avenues, roadside verges, forest vistas, opencast pits, gardens, ruderal places, also in coniferous, deciduous and mixed forests, in wooded tundra.

Phenology: July to November.

Distribution: Widespread, common to occasional. **Northern Europe:** DEN, FIN!, ICE, NOR!, SWE! **Eastern Europe:** EST!, LAT!, LIT!, KA, MO, RUE-Perm', RUC-Belgorod!, RUC-Moscow, RUN-Murmansk!, RUN-Komi, RUW-Leningrad!, UKR. **Caucasus:** NCS-KR!, NCS-KC. **Siberia:** ALT!, BRY!, IRK!, KRA!, YAK! **Russian Far East:** KHA!, PRM!

Collections examined: Estonia: Hiiu Co.: Hiiumaa Island, Kõpu, 21 Aug. 1967, K. Kalamees (TAA 76858). Jõgeva Co.: Luua, 25 Aug. 1962, H. Kelder (TAA 73182); Puurmani, Riiavälja, 27 Sep. 1962, K. Kalamees (TAA 73437). Ida-Viru Co.: Viivikonna, 4 Oct. 1972, M. Kask (TAA 82054). Lääne-Viru Co.: Neeruti, 7 Sep. 1962, K. Kalamees (TAA 73287). Pärnu Co.: Sambliku, 9 Oct. 1976, K. Kalamees, L. Pihlik & M. Vaasma (TAA 81221). Põlva Co.: Valgemetsa, Marga, 7 Aug. 1984, M. Mänd (TAA 141400). Saare Co.: Abruka Island, 27 Aug. 1984, K. Kalamees (TAA 123800). Tartu Co.: Tartu, 30 Oct. 1957, P. Põldmaa (TAA 864, as *C. connata*), 8 July 1995, 20 Oct. 1996, 20 Nov. 1996, 28 Oct. 1997, 1 Sep. 1998, 30. Nov. 1999, 27 Sep. 2000, 10 Oct. 2001, K. Kalamees (TAA 146522, 147519, 147587, 171727, 175493, 175339, 175682, 175148), 6 Oct. 1995, M. Vaasma (TAA 142821). Võru Co.: Tabina, 12 Oct. 1974, K. Kalamees (TAA 80867). **Finland:** Etelä-Häme: Tampere, Kauppi, 8 Sep. 1966, P. & I. Kytövuori 2264 (H). Etelä-Karjala: Miehikkälä, Kalliokoski, 6 Sep. 1970, I. Sihvonen (H). Etelä-Pohjanmaa: Kurikka, Myllykylä, Vesiperä, 15 Sep. 1980, I. Kytövuori 80803 (H). Kainuu: Hyrynsalmi, Paljakka, 4 Sep. 1977, M. Korhonen & R. Tuomikoski (H). Kittilän Lappi: Kittilä Comm., Sodankylä, Mustavaara, 23 Aug. 1992, I. Kytövuori 92883 (H). Koillismaa: Kuusamo, 28 Aug. 1978, T. Ahti 34501 (H). Pohjois-Savo: Vehmersalmi, Puutosmäki, Pitkälahti, 8 Sep. 1980, I. Kytövuori 80803 (H). Uusimaa: Helsinki, 30 Sep. 1975, M. Korhonen 1469 (H); Espoo, 22 Sep. 1981, M. Korhonen 4261 (H), 6 Oct. 1984, M. Korhonen 6251 (H); Nurmijärvi Comm., Nukari, 28 Sep. 1993, I. Kytövuori 931587 (H). **Latvia:** Talsi Distr.: Slītere National Park, Slītere, 22 Sep. 1982, K. Kalamees (TAA 122569). Riga Distr.: Riga, 2 Aug. 1981, V. Mikhalchenko (TAA 114619). **Lithuania:** Rokiškis Distr.: 17 Sep. 1966, V. Urbonas (BILAS 8388). Kretinga Distr.: Kuluperiai, 16 Sep. 1970, V. Urbonas (BILAS 11519, as *L. connatum*?). Anykščiai Distr.: Traupis, 23 Sep. 1993, S. Obelevičius (BILAS 17329). **Norway:** Nordland: Rana, Ørtfjellmoen, 11 Sep. 1975, Nordic Mycol. Congress (TRH). Østfjold: Oslo, J. Stordal (LE 6361). Sør–Trøndelag: Trondheim, 25 Aug. 1936, Háeg (TRH, as *C. connata*), 6 Oct. 1951, M. Svenningson (TRH, as *C. m.*); Halvik, Smistad, 12 Sep. 1954, O. Gjouvoll (TRH, as *C. connata*); Melhus, SE from Skjetnebekken, 28 Aug. 1978, M. Nettelbladt (TRH). **Russia:** Altaj Terr.: Altaj Nature Reserve, near Lake Teletskoe, 8 Aug. 1985, A. Kovalenko (LE 6364). Belgorod Prov.: Valuy Distr., Razdol'ye, Sep. 1976, E. Bedenko 112 (TAA). Buryatiya: Barguzin Nature Reserve, near Gulf of Sosnovka, 15 Aug. 1967, E. Nezdojminogo (LE 6367). Irkutsk Prov.: Bratsk Distr., Kob', 15 Aug. 1983, K. Kalamees (TAA 122898, as *L.* sp.), 22 Aug. 1983, K. Kalamees & A. Kovalenko (TAA 122986); Gorokhova, N. Kutaf'eva (KRA). Khabarovsk Terr.: Bolshekhekhtsirskij Nature Reserve, 15 Aug. 1981, E. Bulakh (VLA); same locality, by Bykov River, 30 Aug. 1983, 2 Sep. 1983, E. Bulakh (VLA). Krasnodar Terr.: Caucasus Nature Reserve, by Malaya Laba River, 22 Aug. 1936, L. Vasil'eva 425 (VLA; LE 6371). Krasnoyarsk Terr.: near Krasnoyarsk, 10 Aug.

1961, M. Beglyanova (LE 6362). Leningrad Prov.: St. Petersburg, 22 July 1922, R. Singer (LE 6369, as *Clitocybe connata*), 18 Sep. 1946, B. Basil'kov (LE 6366, as *C. connata*), 5 Sep. 1961, B. Vasil'kov (LE 6370); Lodejnoe Pole Distr., Nizhnesvirskij Nature Reserve, 27 Sep. 1988, M. Stolyarskaya (LE 197338), 21 Aug. 1990, A. Kovalenko (LE 197333). Moscow Prov.: Serpukhov Distr., Prioksko–Terrasnyj Nature Reserve, 1 Oct. 2001, G. Levitskaya (LE 214306). Murmansk Prov.: Khibiny Mts, Kukievumchor, 30 Aug. 1973, L. Mikhajlovskij (LE 6363); Khibiny Botanical Garden, 17 Aug. 1973, L. Mikhajlovskij (LE 6368). Primorye Terr.: Vladivostok, 23 Oct. 1960, L. Vasil'eva (VLA, as *C. connata*); Chuguevsk Distr., Verkhneussurijskij Research Station, by Pravaya Sokolovka River, 24 Aug. 1973, 12 Sep. 1974, 7 Nov. 1974, 20 Aug. 1975, E. Bulakh (VLA 127, 130, 895); Suputinskij (Ussurijskij) Nature Reserve, Lamazinu, 11 Sep. 1975, M. Nazarova (VLA). Yakutiya: by mouth of Lena River, Titary Island, 4 Aug. 1955, B.Vasil'kov (LE 6365). **Sweden:** Uppland: Uppsala, 28 Sep. 1934, S. Lundell & O. Modess (LE 6374; Fungi exs. suec. No 208; as *C. connata*).
Extralimital. Austria: Axamer, Lizum Schipiste, 2 Sep. 1978, Gerhold (IB 78/340); Stammberg, Schwarzwald, Martinsmoor, 12 Sep. 1971, student group (IB).

Notes: *L. connatum* is well characterized by its totally white frosty pruinose fasciculate basidiocarps, subdecurrent lamellae and its disagreeable, sickly sweetish smell. *Clitocybe cerussata* (Fr.) P. Kumm. and *C. dealbata* (Sow. : Fr.) P. Kumm. are very similar but differ from *L. connatum* in absence of $FeSO_4$ reaction by the basidiocarps and in lack of siderophilous granulation in basidia.

There are no accurate reports from Middle Asia (Kazakhstan) and Belarus – the spores of *L. connatum* sensu Samgina (1981) and Serzhanina (1994) are indicated as globose or subglobose and asperulate; the same is true about the spores of *Clitocybe connata* ss. Lebedeva (1949).

Stirps Decastes

Basidiocarps tricholomatoid, thick-fleshed, fasciculate or connate, not hygrophanous, grey to grey brown, not discolouring when bruised or sometimes browning. Lamellae white to grey, emarginate to subdecurrent. Spores globose to globose-ellipsoid, smooth.

13. *Lyophyllum decastes* (Fr. : Fr.) Singer Fig. 13

Agaricus decastes Fr., Observ. mycol. 2: 105. 1818; Fr. : Fr., Syst. mycol. 1: 49. 1821. – *Clitocybe decastes* (Fr. : Fr.) Quél., Mém. Soc. Émul. Montbéliard 2 (5): 87. 1872 (Champ. Jura Vosges 1). – *Lyophyllum decastes* (Fr. : Fr.) Singer, Lilloa 22: 165. 1951. – *Clitocybe aggregata* (Schaeff.) Gillet, Hyménomycètes: 161. 1874. – *Tricholoma aggregatum* (Schaeff.) M.J. Costantin & M.L. Dufour, Nouv. Fl. Champ.: 16. 1891. – *Lyophyllum aggregatum* (Schaeff.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938. – *Lyophyllum aggregatum* ssp. *typicum* Singer, Ann. Mycol. 41: 101. 1943.

Misapplied name: *L. fumosum* sensu auct. plur.

Excluded: *Lyophyllum decastes* sensu Korhonen, Uusi sienikirja: 156–157. 1986, 1987 (= *L. fumosum*).

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3: pl. 260 (as *L. fumosum*). 1991. – Courtecuisse & Duhem, Guide Champ. France Europe: fig. 473. 2000. – Dāniele, Meiere & Vimba, Latvijas sēnes: pl. 74. 2001. – Gerhardt, Grosse Pilzführer: 99. 1997. – Hagara, Atl. húb: pl. 134. 1987 (very good). – Kalamees, Mycobiota Estonia: pl. 72. 2000.

Selected descriptions and figs: Bon, Collybio–Marasmioides: 100. 1999a. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 139. 1992. – Hagara, Atl. húb: 248. 1987 (very good).

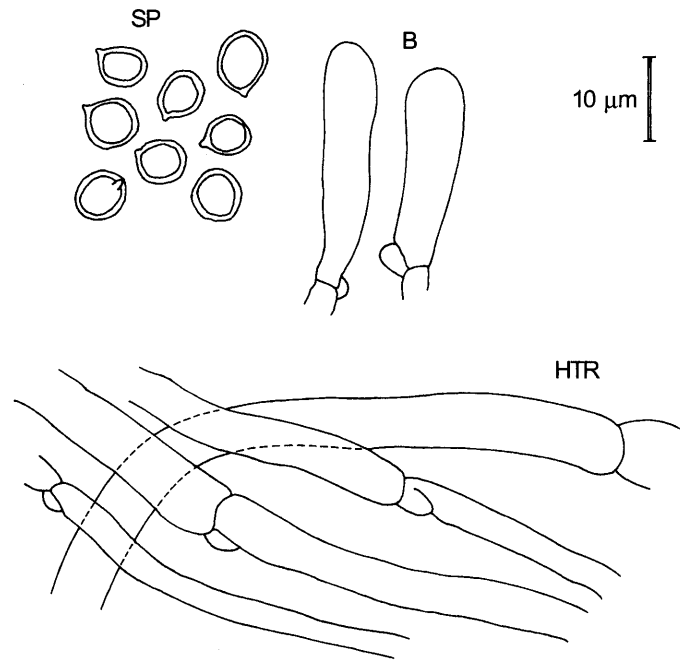


Fig. 13. *Lyophyllum decastes.*

Description: Pileus up to 15(–18) cm, convex then plano-convex to plane, finally depressed, sometimes umbonate, when young thin inrolled tomentose margin becoming straight (sometimes folded) and wavy, smooth, glabrous, dry or faintly sticky, inhygrophanous or faintly hygrophanous, but more often hygrophanously spotted, silky shining, slightly radially fibrillose, not translucently striate, brown to greyish brown. Lamellae emarginate, rather crowded, white or whitish creamy then

with pale brownish tint. Stipe up to 10 × 2 cm, cylindric to clavate, often eccentric, silky shining, fibrillose, pruinose at apex, dry, white, creamy to slightly brownish; fasciculate. Context white, thick. Taste and smell indistinct. Spore print white.

Spores (4.8–)5–6(–7) × (4.2–)4.5–5.5(–6.5) µm, Q = 1–1.2, globose to globose-ellipsoid, smooth. Basidia 25–35 × 6–8 µm. Hymenophoral trama hyphae (2–)4–12(–15) µm thick. Pileipellis hyphae (2–)3–8 µm thick, smooth or faintly incrusted with a pale pigment.

Ecology: Fasciculate on soil in parks, lawns, avenues, brushwoods, ruderal places, parkland meadows; deciduous, coniferous and mixed forests.

Phenology: July to November.

Distribution: Widespread, common to occasional all through the territory investigated.

Collections examined: Belarus: Minsk, 3 Oct. 1967, G. Serzhanina (MSK 473). **Denmark:** Without locality, 21 Aug. 1985, L. Anderson (C 31951, as *L. fumosum*, det. S.A. Elborne); without locality, 14 Oct. 1995, J. Vesterholt (C 26592). **Estonia:** Ida-Viru Co.: Jõetaguse, 7 Aug. 1961, K. Kalamees (TAA 72409). Jõgeva Co.: Mõisamaa, 13 Sep. 1960, K. Kalamees (TAA 71776, as *L. aggregatum*). Järva Co.: Huuksi, by Prandi River, 22 Sep. 1995, M. Vaasma (TAA 142722). Lääne Co.: Märjamaa, 26 Aug. 1967, K. Kalamees & A. Kollom (TAA 76925, as *L.* sp.); Vormsi Island, between Binas and Saksby, 10 Sep. 1967, K. Kalamees (TAA 77013, as *L.* sp.); Karuse, 1 Aug. 1979, K. Kalamees (TAA 120825). Pärnu Co.: Kalli, 28 Aug. 1989, K. Kalamees (TAA 144348); Kabli, 23 Sep. 1990, K. Kalamees (TAA 144796, as *L.* sp.). Tartu Co.: Tartu, 7 Oct. 1947, N. Witkowski (TAA 142601, as *C. conglobata*), 10 Sep. 1964, K. Kalamees (TAA 75677). **Finland:** Koillismaa: Kuusamo, Kiutaköngäs, 30 Aug. 1966, J. Viramo (OULU, as *Lepista* sp.; as *Lyophyllum decastes* coll., rev. G. Gulden 1982). Perä-Pohjanmaa: Rovaniemi Rural Comm., Korkalo, Pöyliöjärvi, 23 Aug. 1981, T. Ulvinen (OULU, as *L. fumosum* s.l.); Kemi, Junko, Sep. 1973, M.L.Anttila (H). Pohjois-Karjala: Liperi, Honkalampi, M. Kirsi (JOE, as *L. aggregatum*). Uusimaa: Helsinki, Kruununhaka, 4 Oct. 1971, Vainikka (H, as *L. conglobatum*). Varsinais-Suomi: Vihti, Tervalampi, 24 Aug. 1986, T. Ahti 454444 (H). **Kazakhstan:** Zap.-Kazakhstan Prov.: by Dzhanybek, 12 Oct. 1952, O. Komirnaya (LE 6341, as *C. aggregata*). **Lithuania:** Vilnius Distr.: Jašiūnai, 8 Oct. 1969, V. Urbonas (BILAS 10981); Nemenčinė, 13 Oct. 1971, V. Urbonas (BILAS 12327, as *L.* sp.); Vilnius, 18 Nov. 1977, 16 Sep. 1978, K. Raulinaitis (BILAS 13792, 15038), 20 Sep. 1958, J. Mazelaitis (BILAS 286a, as *C. conglobata*). Varėna Distr.: Mergežeris, 28 Sep. 1962, V. Urbonas (BILAS 5181, as *L. conglobatum*). **Russia:** Belgorod Prov.: Volokonovka-Chernyanka, Sep. 1976, E. Bedenko 111 (TAA, as *L. fumosum*). Leningrad Prov.: Ushkovo, July 1960, V. Savich (LE 6352, as *L. aggregatum*). Mari: Surok, 6 & 26 Aug. 1939, B.Vasil'kov (LE 6345, 6351; as *T. aggregatum*). Irkutsk Prov.: Bratsk Distr., Kob', 6 Sep. 1987, K. Kalamees & V. Astapenko (TAA 143655); Listvennichnoe, Aug.–Sep. 1947, B. Vasil'kov (LE 6342, 6346, 6350, 6356, as *C. aggregata*). Krasnodar Terr.: Caucasus Nature Reserve, by Kisha River, 12 Sep. 1975, K. Kalamees, M. Vaasma & L. Pihlik (TAA 94661). Krasnoyarsk Terr.: near Krasnoyarsk, 30 Aug. 1963, 20 Sep. 1963, 15 Sep. 1964, M. Beglyanova (LE 6378, 6379, 6381). Murmansk Prov.: Khibiny Botanical Garden, 14 Aug. 1974, L. Mikhajlovskij (LE 6376). **Sweden:** Närke: Getberget, 12 Sep. 1995, S. Muskos (TAA 146780).

Notes: *L. decastes* is characterized by its dry inhygrophanous grey brown pileus, white, emarginate lamellae and fleshy (not cartilagineous), inodorous, fasciculate (not connate) basidiocarps; spores mostly 5–6 µm. *L. fumosum* and *L. loricatum* are very similar to *L. decastes*. These three species are often regarded as subspecies or varieties of one species (cf. Quélet, 1888; Konrad & Maublanc, 1927; Konrad, 1931; Singer, 1943; Kühner & Romagnesi, 1953). *L. fumosum* differs in having grey connate basidiocarps with raw rhubarb like smell, decurrent crowded, narrow and forked lamellae; spores are mostly smaller (4–5 µm). *L. loricatum* differs in having brown, viscid, hygrophanous, veined-ribbed and pronounced shining pileus and cartilagineus basidiocarps with unpleasent smell and bitter after-taste; spores are mostly bigger (6–7 µm) and often absolutely globose.

Particularly, *L. decastes* and *L. fumosum* are very often mixed up in the literature and herbaria. Species identification in such cases is often difficult. Distribution data of these species treated in the literature (without descriptions) are therefore in many cases unacceptable.

14. *Lyophyllum fumosum* (Pers. sensu Fr. : Fr.) P.D. Orton Fig. 14

Agaricus fumosus Pers. sensu Fr., Observ. mycol. 2: 102. 1818; Pers. sensu Fr. : Fr., Syst. mycol. 1: 88. 1821. – *Clitocybe fumosa* (Pers. sensu Fr. : Fr.) Sacc., Syll. Fung. 5: 161. 1887. – *Lyophyllum aggregatum* var. *fumosum* (Pers. sensu Fr. : Fr.) Kühner in Kühner & Romagn., Fl. anal. Champ. sup.: 164. 1953 (inval.). – *Lyophyllum fumosum* (Pers. sensu Fr. : Fr.) P.D. Orton, Trans. Brit. Mycol. Soc. 43: 178. 1960. – *Agaricus cinerascens* Bull., Herb. France 9: pl. 428, fig. 2. 1789. – *Tricholoma cinerascens* (Bull.) Barla, Champ. Alpes marit.: 59. 1888–1892. – *Clitocybe cinerascens* (Bull.) Bres., Fung. Manger.: 59. 1899. – *Tricholoma aggregatum* ssp. *cinerascens* (Bull.) Konrad, Bull. Soc. Mycol. France 47: 141. 1931. – *Clitocybe conglobata* Vittad. sensu Bres., Fungi trident. 1: 27. 1883. – *Tricholoma conglobatum* (Vittad. sensu Bres.) Barla, Champ. Alpes marit.: 56. 1888–1892. – *Lyophyllum conglobatum* (Vittad. sensu Bres.) M.M. Moser, Blätterpilze-Bauchpilze: 43. 1953 (inval.). – *L. conglobatum* (Vittad. sensu Bres.) Bon, Doc. Mycol. 25 (97). 1995b. – *Tricholoma aggregatum* var. *fennica* P. Karst. (ined.).

Misapplied name: *Lyophyllum decastes* sensu auct. plur.

Excluded: *Agaricus fumosus* Persoon, Syn. meth. Fung.: 348. 1801 (= ?*Lyophyllum immundum*). – *Agaricus conglobatus* Vittadini, Fung. mang.: 349. 1835 (nom. conf.). – *Tricholoma cinerascens* sensu Ricken, Blätterpilze 1: 359. 1915 (= *L. infumatum*).

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3: pl. 257 (as *L. decastes*). 1991. – Cetto, Enzykl. Pilze: 338, 340. 1987 (very good). – Hagara, Atl. húb: pl. 133. 1987 (very good). – Korhonen, Uusi sienikirja: 156. 1986, 1987 (in both references as *L. decastes*), 1990 (as *L. fumosum*). – Lange, Fl. agar. dan. 1: pl. 39D (as *C. conglobata*). 1935.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 99 (as *L. conglobatum*). 1999a. – Cetto, Enzykl. Pilze: 339, 341 (as *L. fumosum* f. *conglobata*). 1987. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 138. 1992. – Hagara, Atl. húb: 246. 1987. – Korhonen, Uusi sienikirja: 157. 1986, 1987 (in both references as *L. decastes*), 1990 (as *L. fumosum*). – Lange, Fl. agar. dan. 1: 88 (as *C. conglobata*). 1935. – Singer, Ann. Mycol. 41: 101 (as *L. aggregatum* ssp. *cinerascens*). 1943.

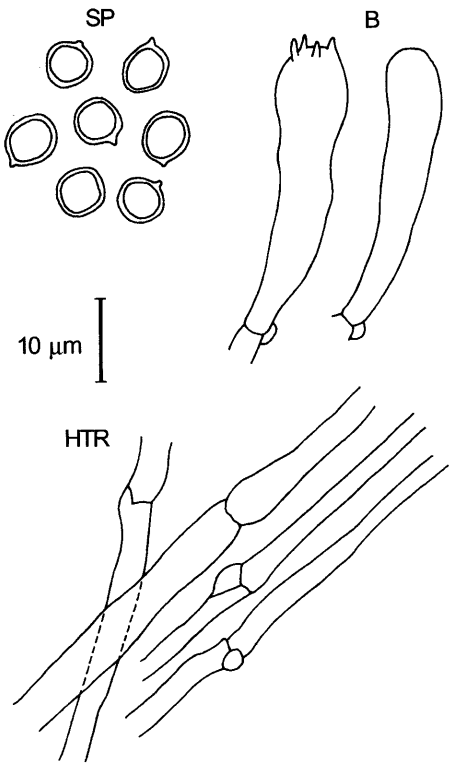


Fig. 14. *Lyophyllum fumosum.*

Description: Basidiocarps very variable in size. Pileus 1–4(–12) cm, conspicuously convex with deeply incurved and inrolled greyish-tomentose margin, then plano-convex to plane or slightly umbonate, finely fibrillose, sometimes sporadically fibrillose-scaly, dry, not hygrophanous or only faintly hygrophanous, often hygrophanously spotted, not translucently striate, grey, brown grey, fuscous black to brown black, often heterogeneously coloured. Lamellae adnexed to short decurrent, very crowded and narrow (1–5 mm), forked, whitish grey, pure grey to brown grey or grey brown. Stipe 1–8(–10) × 0.3–1.5(–3) cm, cylindric or swollen at base, often eccentric, totally faintly white-tomentose-pruinose, snow white, whitish, pale greyish to pale brown grey; connate. Context white or greyish, thick. Smell disagreeable, mouldering, raw rhubarb like to somewhat farinaceous or rancid mixed up, less often indistinct. Taste indistinct. Spore print white to pale creamy.

Spores small, 4–5.5(–6.5) × 4–5(–6) µm, Q = 1–1.2, globose to globose-ellipsoid, smooth. Basidia 25–35 × 6–8 µm. Hymenophoral trama hyphae 2–7(–15) µm thick. Pileipellis hyphae smooth or incrusted with pale pigment, 3–8 µm thick.

Ecology: Connate on soil, exceptionally on very decayed wood in parks, lawns, avenues, roadsides, gardens, ruderal places; deciduous, coniferous and mixed forests; brushwoods, wooded tundra.

Phenology: July to October.

Distribution: Widespread, common to occasional all through the territory investigated. In particular, often en masse in the wooded tundra area in Finland and Norway.

Collections examined: Belarus: Molodechensk Prov.: Myadel'sk Distr., Urmeki, 19 Aug. 1957, G. Serzhanina (MSK 482). Minsk: 3 Oct. 1967, 4 Aug. 1974, G. Serzhanina (MSK 471, 480; as *L. decastes*). Vitebsk Prov.: Lenin Distr., Perekhodzy, 9 Oct. 1969, G. Serzhanina (MSK 484). **Denmark:** Sjælland: Valby Parken, 3 Oct. 1964, K. Hauerslev (C, as *C. conglobata*). **Estonia:** Harju Co.: Jäneda, Mägede, 4 Sep. 1964, K. Kalamees (TAA 75667, as *L. conglobatum*). Pärnu Co.: Põlendmaa, Kivinina, 27 Aug. 1965, K. Kalamees (TAA 76223, as *L.* sp.). Põlva Co.: between Karilatsi and Kiidjärve, 11 Aug. 1966, E. Lõhmus (TAA, as *L. conglobatum*). Saare Co.: Saaremaa Island, Viidumägi Nature Reserve, Audaku, 11 Oct. 1983, A. Kovalenko (TAA 123383, as *L.* sp.). Tartu Co.: Tartu, 6 Oct. 1995, M. Vaasma & K. Kalamees (TAA 142823); Reola, Oct. 1996, M. Hanso (TAA 142989, as *L.* sp.). **Finland:** Etelä-Häme: Lammi, Evo, 9 Sep. 1970, H. Vänskä (H); same locality, 7 Sep. 1979, M. Leino (H); same locality, 5 Aug. 1996, I. Kytövuori 96287 (H); Alinen, Rautjärvi, 31 July 1984, T. Niemelä et al. (H); same locality, 31 Aug. 1984, T. Niemelä (H); Vilppula Comm., Pohjoislahti, Ylä-Kolkki, by Lake Lauttajärvi, Talviniemi, 26 July 1988, I. Kytövuori 88102 (H, as *L. fumosum* group); Virrat Comm., Pohjoislahti, Monoskylä, 30 July 1988, P. & I. Kytövuori 88139 (H, as *L. fumosum* group); Kärkölä, Järvelä, Kukonmäki, 6 Aug. 1984, V. Haikonen 4731 (H). Etelä-Pohjanmaa: Ilmajoki Comm., Kiikerinkylä-Yrjänänloukko, 8 Aug. 1988, I. Kytövuori 88324 (H, as *L. fumosum* group). Etelä-Savo: Juva Comm., Vehmaa, 25 Aug. 1987, I. Kytövuori 87619 (H, as *L.* cf. *fumosum*). Inarin

Lappi: Utsjoki Comm., Kevo, 20 Aug. 1981, K. Kalamees (TAA 121860), 23 Aug. 1981, K. Kalamees (TAA 121935, 121942, 121948, as *L.* sp., *L. decastes*), 14 Aug. 1995, K. Kalamees (TAA 146554, 146564, as *L.* sp.), 15 Aug. 1995, K. Kalamees & M. Vaasma (TAA 146572, as *L.* sp.); Kevo, Tshieskuljoki, 17 Aug. 1995, M. Vaasma (TAA 142655, as *L. decastes*); Kevo, Jesnalvaara, 16 Aug. 1995, K. Kalamees & M. Vaasma (TAA 146600, as *L.* sp.); Kevo, Tsharsjokskaidi, 17 Aug. 1995, K. & M. Kalamees (TAA 146604, 146605, 146607, as *L.* sp.); Inari, Rajajooseppi, Joosepinvaara, 5 Sep. 1993, R. Ohtonen (OULU, dupl. TAA). Keski-Pohjanmaa: Soini Comm., Laasala, 7 Aug. 1988, I. Kytövuori 88251 (H, as *L. fumosum* group). Koillismaa: Kuusamo, Salla, by Kutsajoki River, by Lake Niluttijärvi, 23. July 1937, M. Laurila (H, as *T. fumosum* var. *fennica* P. Karst.); Oulanka, 9 Sep. 1981, K. Kalamees, E. Ohenoja & T. Ulvinen (TAA 122056, as *L.* sp.), 29 Aug. 2001, K. Kalamees (TAA 176001). Pohjois-Häme: Saarijärvi, Pyhä-Häkki National Park, 21 Aug. 1986, K. Kalamees (TAA 143237, as *L.* sp.), VIII NMC (TAA 143246, as *L.* sp.), H. Knudsen 238 (H, dupl. TAA 143244; as *L.* sp.), T. Laessøe (TAA 143248). Sompion Lappi: Pelkosenniemi Comm., Kairala, 15 Aug. 1990, I. Kytövuori 90262 (H); Sodankylä, Aska, Askakangas S, 8 Sep. 1991, O. Tarvainen & U. Ahonen-Jonnarth (OULU, dupl. H, TAA). Uusimaa: Helsinki, 12 Oct. 1938, N. Malmström (H, dupl. TAA 143957, as *C. conglobata*), 4 Sep. 1977, R. Saarenoksa 22977 (H); Espoo, Nuuksio, Metsälampi, 17 Aug. 1977, R. Blomquist (H); Inkoo, Degerby, 9 Sep. 1979, R. Nykänen (H, as *L.* sp.). **Latvia:** Riga Distr.: Ķemeri National Park, Ķemeri, 24 Sep. 1996, K. Kalamees (TAA 146997, as *L. decastes*). **Lithuania:** Vilnius Distr.: Nemenčinė, 1950, J. Mazelaitis (BILAS, as *T. aggregatum*). Varėna Distr.: Marčinkonys, 5 Sep. 1967, V. Urbonas (BILAS, as *L. conglobatum*). Švenčionys Distr.: Kaltanėnai, 28 Sep. 1971, V. Urbonas (BILAS 11910); Švenčionys, 29 Sep. 1971, V. Urbonas (BILAS 12154). Rokiškis Distr.: Meldučiai (BILAS 12447). **Norway:** Finnmark: Aug. 1995, K. Kalamees (TAA 146611, as *L.* sp.). **Russia:** Belgorod Prov.: Valujki, Khuruovka, Oct. 1976, E. Bedenko 113 (TAA 142194, as *L. decastes*). Leningrad Prov.: St. Petersburg, 22 Oct. 1955, Ermolovich (LE 6383), 5 Oct. 1959, B. Vasil'kov (LE 6339, as *L. aggregatum*), Aug. 1970, B. Vasil'kov (LE 6377, as *L. decastes*); Mel'nich'i Ruch'i, 10 July 1966, G. Moskvin (LE 6375, as *L. decastes*); Priozersk Distr., Otradnoe, 15 Sep. 1985, Yu.P. Cherotchenko (LE 6385). Mari: Surok, 8 Aug. 1940, B. Vasil'kov (LE 6343, as *T. conglobatum*). Murmansk Prov.: Lapland Nature Reserve, 8 Aug. 1959, 4 Sep. 1959, N. Pushkina (LE 6380, 6382, as *L. decastes*; LE 6387). Perm' Prov.: Verkh-Kvazhva, 25 Aug. 1993, K. Kalamees (TAA 145879, as *L. cinerascens*). Krasnodar Terr.: Majkop, 7 Sep. 1913, 11 Sep. 1913, N. Shestunov 1849 (LE 6354, 6355, as *T. aggregatum* var. *conglobatum*); Tuapse Distr., by Cape Kadosh, 21 Sep 1997, A. Kovalenko & E. Fomina 97-10-294 (LE 208165). Krasnoyarsk Terr.: Turukhansk Distr., Mirnyj, 18 Aug. 1972, E. Nezdojminogo (LE 6390); Kuznetskij Alatau Mts., Kommunar, 17 Aug. 1985, K. Kalamees (TAA 124093, as *L.* sp.). Sakhalin Prov.: Sakhalin Island, Ado-Tymovo, by Tym' River, 24–25 Aug. 1970, K. Kalamees (TAA 79122, 79171, as *L.* sp.). Tjumen' Prov.: near Labytnangi, 7 Aug. 1962, E. Nezdojminogo (LE 6392). **Sweden:** Medelpad: Lombäcken, 11 Sep. 1995, S. Kuoljok (TAA 146784).

Extralimital. Austria: Wien: Maurerwald, 21 Aug. 1979, mycological coourse 1979 (WU 0579, dupl. TAA 142174, as *L. decastes*); Lainzer Tiergarten, 8 Sep. 1986, E. Herches (WU 5568, dupl. TAA 142177). Burgenland: Sauerbrunn, 1 Oct. 1988, W. Klofac (WU 7291, dupl. TAA 142175, as *L. fumosum* ssp. *cinerascens*). Niederösterreich: Langenlois, Zöbing, 26 Sep. 1988, A. Hausknecht (WU 7341, dupl. TAA 142176). **Italy:** by Trient, Oct. 1974, B. Cetto (IB, as *L. fumosum* f. *conglobatum*).

Notes: *L. fumosum* is characterized by grey connate fleshy basidiocarps with raw rhubarb like smell, dry and inhygrophanous pileus, decurrent crowded, narrow and forked lamellae (likewise grey!); spores are mostly rather small (4–5 µm). Very similar *L. decastes* differs in its grey brown pileus, white, emarginate, broader lamellae and inodorous, fasciculate basidiocarps; spores are mostly larger (5–6 µm). *L. decastes* and *L. fumosum* are very often mixed up in the literature and herbaria (cf. 'Notes' by *L. decastes*, p. 51).

A conspicuous growth form of *L. fumosum* is forma *conglobata* sensu Bresadola (cf. Cetto, 1987) (= *Tricholoma aggregatum* var. *fennica* P. Karst.) with gigantic mycelial lump under the ground and often with very small pileus (1–2 cm in diam.) and very narrow lamellae (1–2 mm wide). This growth form is particularly widely distributed in Finland.

Stirps Loricatum

Basidiocarps tricholomatoid, thick cartilagineus, fasciculate. Pileus hygrophanous, viscid, veined-ribbed, conspicuously shining, brown, surface becomes cracked with clap when bruised. Lamellae whitish creamy, emarginate, sometimes discolouring to brownish when bruised. Smell disagreeable, taste sometimes bitterish. Spores large, absolutely globose, smooth.

15. *Lyophyllum loricatum* (Fr.) Kühner Fig. 15

Agaricus loricatus Fr., Epicr.: 37. 1838. – *Tricholoma loricatum* (Fr.) Gillet, Hyménomycètes : 108. 1874. – *Lyophyllum loricatum* (Fr.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938. – *Lyophyllum aggregatum* var. *loricatum* (Fr.) Kühner in Kühner & Romagn., Fl. anal. Champ. sup.: 164. 1953 (inval.). – *Agaricus cartilagineus* Bull., Hist. Champ. France: pl. 582. 1792; non Fr. 1821. – *Tricholoma cartilagineum* (Bull.) Gillet, Hyménomycètes : 108. 1874. – *Tricholoma aggregatum* ssp. *cartilagineum* (Bull.) Konrad & Maubl., Ic. sel. Fung. 3: pl. 247. 1927. – *Clitocybe cartilaginea* (Bull.) Bres., Iconogr. mycol. 3: pl. 152. 1928.

Misapplied name: *Clitocybe coffeata* sensu Lange, Fl. agar. dan. 1: 88. 1935.

Excluded: *Agaricus cartilagineus* sensu Fr., Syst. mycol. 1: 46. 1821 (= *T. saponaceum* forma).

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3(1): pl. 262. 1991. – Bresadola, Iconogr. mycol. 3: pl. 152 (as *C. cartilaginea*). 1928. – Cetto, Enzykl. Pilze: 336. 1987 (very good). – Hagara, Atl. húb: pl. 132. 1987 (very good). – Kalamees, Mycobiota Estonia: pl. 73. 2000. – Lange, Fl. agar. dan. 1: pl. 39C (as *C. coffeata*). 1935. – Phillips, Mushr. other Fungi: 42. 1981.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 101. 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3(1): 224. 1991. – Cetto, Enzykl. Pilze: 337. 1987. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 139. 1992. – Hagara, Atl. húb: 244. 1987. – Phillips, Mushr. other Fungi: 43. 1981. – Zerova et al., Viznachnik gribiv Ukraini 5(2): 164. 1979.

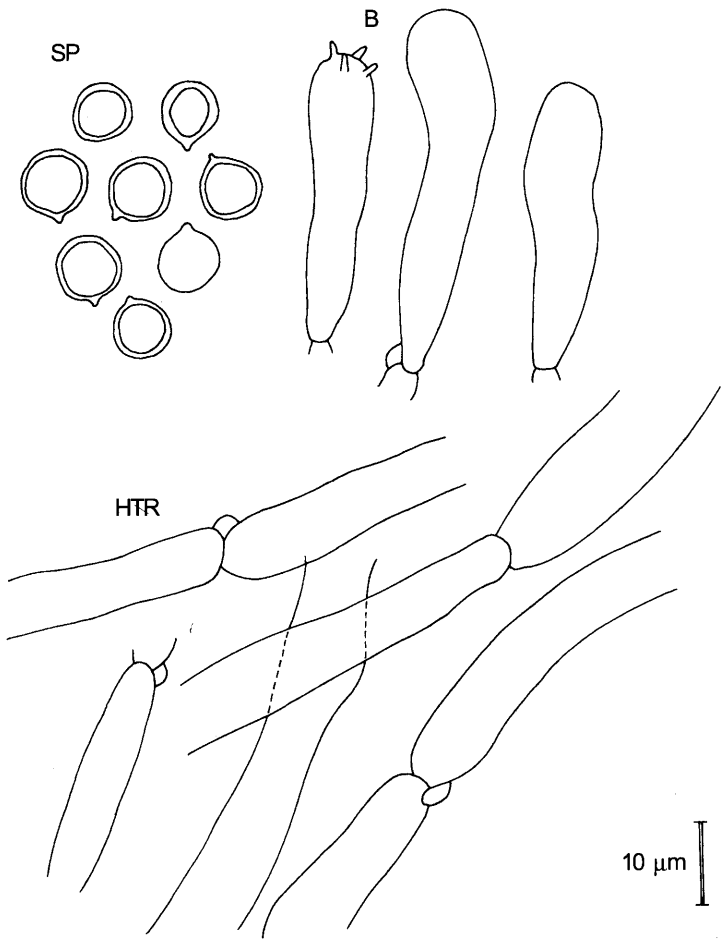


Fig. 15. *Lyophyllum loricatum.*

Description: Pileus up to 7(–12) cm, convex then plano-convex, when young with inrolled tomentose margin, finally slightly depressed, sometimes umbonate, wavy; cuticle thick and cartilagineous (becomes cracked with clap when bruised), uneven, radially veined-rugulose to ribbed, sometimes with sulcate margin, glabrous, conspicuously shining, viscid, strongly hygrophanous, often hygrophanously spotted, sometimes hardly translucently striate at margin, pure brown to fuligineous, olive brown, chestnut brown, fulvous, sepia, darker in centre. Lamellae narrowly adnate or emarginate with tooth, rather crowded and narrow, tough, pure white or whitish creamy, sometimes discolouring slightly brownish by handling and brown-spotted at margin with age. Stipe up to 7 × 2.5 cm, cylindric or thickened at base, at times slightly rooting, often somewhat eccentric, fibrillose, dry, concolorous with pileus but lighter, at apex white and pruinose; fasciculate. Context white to pale brownish, firm, tough, cartilagineous. Smell somewhat unpleasent, slightly mouldering to acidulous or slightly of fish or potatoes or sewage, sometimes indistinct. Taste sweet with somewhat burning aftertaste. Spore print white. At times whole basidiocarp can change brown-spotted with age, especially at base of stipe and lamellae.

Spores (4.5–)5–7(–8) × (4–)4.5–6 (–8) µm, Q = 1–1.1, globose to subglobose, smooth. Basidia 30–37 × 6–10 µm. Pileipellis hyphae smooth or very finely incrusted with pale pigment, (2–)3–6(–15) µm thick. Hymenophoral trama hyphae (2–)4–10(–12) µm thick.

Ecology: Fasciculate on soil, mainly under deciduous trees in parks, roadsides, boulevards, verdures, ruderal places, parkland meadows, deciduous and mixed forests and brushwoods; occasionally by coniferous trees (*Larix* plantation: Vishnevskij, 1998; spruce stand: TAA 142722); sometimes forming arcs (to 1.5 m in diam.).

Phenology: May to November.

Distribution: Rather rare nemoral species. **Northern Europe:** DEN, FIN!, NOR, SWE. **Eastern Europe**: EST!, LAT, LIT!, RUC-Moscow, RUE-Mari!, RUE-Perm', RUW-Leningrad!, UKR. **Siberia:** IRK!, KRA. **Middle Asia:** KGZ, TZK!, UZB!

Collections examined: Estonia: Järva Co.: Huuksi, by Prandi River, 22 Sep. 1995, M. Vaasma (TAA 142722, as *L. decastes*). Lääne Co.: Laelatu, 19 Sep. 1989, I. Lumiste (TAA 141979). Pärnu Co.: Parasmaa, 25 Sep. 1994, K. Kalamees & I. Saar, (TAA 146390, as *L.* sp.). Saare Co.: Saaremaa Island, Viidumägi Nature Reserve, Audaku, 17 Aug. 1984, K. Kalamees & G. Shchukin (TAA 123637), Tartu Co.: Tartu, 9 Nov. 1967, K. Kalamees (TAA 77397, as *L.* sp.), 7 Oct. 2001, K. Kalamees (TAA 176160). **Finland:** Uusimaa: Espoo, Otsolahti, 4 Oct. 1991, M. Korhonen 10583 (H, as *L. loricatum*?). **Lithuania:** Vilnius Distr.: Vilnius, 5 Oct. 1974, K. Raulinaitis (BILAS 12902); Druskininkai, 2 Aug. 1979, V. Urbonas (BILAS 14394, as *Lyophyllum fumosum*). Marijampolė Distr.: Daukšiai, 1 Aug. 1990, V. Urbonas (BILAS). **Russia:** Irkutsk Prov.:

Kob', N. Kutaf'eva (KRA). Leningrad Prov.: St.Petersburg, Oct. 1938, R. Singer (LE 6397, 6398). Mari: Joshkar-Ola, 13 Sep. 1939, B. Vasil'kov (LE 6396). **Tadzhikistan:** Komsomolobadsk Prov.: Tavildara, 18 June 1982, M. Vaasma (TAA 114645, as *L.* sp.). **Uzbekistan:** Tashkent Prov.: Tian Shan Mts., Nevich, Chatkal Nature Reserve, Bash-Kysyl-sai, 19 May 1990, K. Kalamees & M. Vaasma (TAA 144618, as *L.* sp.).

Notes: *L. loricatum* is a very good species, it is characterized especially by thick cartilagineus, distinctly hygrophanous and viscid, veined-ribbed, conspicuously shining brown pileus, becomes cracked with clap when bruised; whitish creamy emarginate, often somewhat browning by handling and with age (especially by specimens collected in Middle Asia!) lamellae; the presence of disagreeable smell and taste with somewhat bitter after-taste; spores are rather large (6–7 μm, in specimens from Middle Asia up to 8 μm). A similar species *L. decastes* differs in dry inhygrophanous smooth grey brown pileus and inodorous fleshy basidiocarps; spores are on average smaller, usually 5–6 μm in diam.

HYPSIZYGUS Singer

Hypsizygus Singer, Mycologia 39: 77. 1947.

Type species: *H. tessulatus* (Bull. : Fr.) Singer

Description: Basidiocarps tricholomatoid to subpleurotoid, with an eccentric stipe, thick fleshy, little pigment, whitish, greyish or ochraceous. Lamellae adnexed to adnate or slightly decurrent. Veil none. Spore print white to pale creamy.

Spores small, broad ellipsoid to subglobose, hyaline, smooth, inamyloid, cyanophilous. Basidia 4-spored, weakly and not constantly siderophilous. Cystidia absent. Hymenophoral trama regular. Pileipellis a cutis of repent hyphae. Clamps present. Pigments predominantly intracellular.

Ecology and phenology: Parasites or saprotrophs on wood of deciduous trees. One species in palearctic Northern and Eastern Europe and Asia. Vernal to autumnal.

16. *Hypsizygus ulmarius* (Bull. : Fr.) Redhead Fig. 16

Agaricus ulmarius Bull., Herb. France 11: pl. 510. 1791; Bull. : Fr., Syst. mycol. 1: 186. 1821. – *Pleurotus ulmarius* (Bull. : Fr.) P. Kumm., Führ. Pilzk.: 120. 1871. – *Tricholoma ulmarium* (Bull. : Fr.) P. Karst., Finl. Basidsv.: 27. 1899. – *Lyophyllum ulmarium* (Bull. : Fr.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938 (inval.). – *Hypsizygus ulmarius* (Bull. : Fr.) Redhead, Trans. Mycol. Soc. Japan 25: 3. 1984. – *Agaricus tessulatus* Bull., Herb. France 11: pl. 513, fig. 1. 1791; Bull. : Fr., Syst. mycol. 1: 186. 1821. – *Pleurotus tessulatus* (Bull. : Fr.) Gillet, Champ. France: 331. 1878. – *Hypsizygus tessulatus* (Bull. : Fr.) Singer, Mycologia 39: 77. 1947.

Misapplied names: *Clitocybe circinata* sensu Singer, Ann. Mycol. 41: 103. 1943. – *Hypsizygus circinatus* sensu Gulden, Nytt. Mag. Bot. 12: 29. 1964; sensu auct.

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 272 (as *L. ulmarium*). 1991. – Cetto, Enzykl. Pilze 2: 330 (as *L. ulmarium*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: pl. 471 (as *L. ulmarium*). 2000. – Lange, Fl. agar. dan. 2: pl. 64C (as *P. ulmarius*). 1936. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 234 (as *H. tessulatus*). 1979. – Ryman & Holmåsen, Suomen pohjolan sienet: 298 (as *L. ulmarium*). 1984. – Shishmarev, Arctic alpine mycology 5: colour photo (as *L. ulmarium*). 1998. – Zerova, Atlas gribiv Ukraini : pl. 70, fig. 1 (as *L. ulmarium*). 1979.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 102 (figs.) (as *H. ulmarius, H. tesselatus*). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): 230, 231 (as *L. ulmarium*). 1991. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 129, 416 (fig. 159). 1992. – Gulden, Musseronflora: 48 (as *L. ulmarium*). 1969. – Gulden, Nytt Mag. Bot. 12: 30, fig. 1A (as *H. circinatus*). 1964. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 378 (as *H. tessulatus*). 1979. – Singer, Ann. Mycol. 41: 103 (as *C. circinata*). 1943. – Serzhanina, Mushrooms Belarus: 88 (as *L. ulmarium*). 1994. – Vasil'eva, Blätterpilze Röhrlinge Primorsky Region: 99 (as *L. ulmarium*). 1973.

Description: Pileus up to 25(–30) cm, convex then plano-convex to plane, circular, with incurved pubescent margin when young, smooth, dry or slightly sticky, glabrous, slightly hygrophanous or often hygrophanously brownish spotted, often areolate-rimose with age, dirty creamy, alutaceous, ochraceous yellowish, snuff brown to pale greyish brownish. Lamellae adnexed, adnate, emarginate, sinuate (often with tooth) to slightly decurrent, rather crowded, broad, white then yellowish, greyish to whitish creamy. Stipe up to 10 × 3 cm, central to eccentric, cylindric, often thickened or attenuated townwards, often curved, solid, dry, tough, all over densely cottony-tomentose-fibrillose, concolorous with pileus. Context white, fleshy, firm. Smell very variable – unpleasantly acid, somewhat raphanoid, slightly aromatic or farinaceous, or nearly indistinct. Taste mild. Spore print white to slightly creamy.

Spores 3.5–6.5 × 3–5 μm, broadly ellipsoid to subglobose, smooth. Basidia 25–35 × 5–6 μm. Pileipellis hyphae 5–10 μm wide.

Ecology: Parasites and saprotrophs on wood of deciduous trees, especially *Ulmus, Tilia, Acer, Populus, Chozenia,* often fasciculate, in parks, deciduous and mixed forests, groves.

Phenology: May to November.

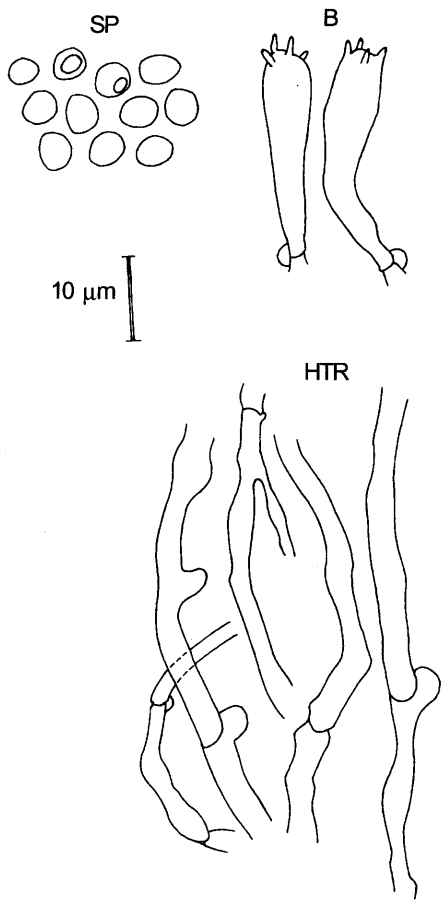


Fig. 16. *Hypsizygus ulmarius.*

Distribution: Common. **Northern Europe:** DEN!, FIN!, NOR!, SWE! **Eastern Europe:** BLR, EST!, LAT!, LIT!, RUC-Moscow!, RUC-Penza!, Smolensk, RUE-Tatariya!, RUN-Murmansk!, RUW-Leningrad!, UKR! **Caucasus**: NCS–KR, TCS–AR!, TCS–AZ!, TCS–GR. **Middle Asia:** KGZ. **Siberia:** ALT, IRK!, KRA!, WSB-Chelyabinsk, WSB-Yamalo-Nenets. **Russian Far East:** KHA!, MAG!, PRM!

Collections examined: Armenia: Gori Distr.: Gori Forest Distr., block no 13, 15 Oct. 1952, E.S. Arutyunyan (LE 6427, as *P. ulmarius* f. *mongolicus*). **Azerbaijan:** Lenkoran, near Gavzava, 18 Oct. 1966, A. Sadykhov (LE 6418). **Denmark:** Without locality, 31 July 1988, T. Læssøe (C 22183, as *L. ulmarium*). **Estonia:** Harju Co.: Tallinn, Vesimets (Veskimägi), 8 Sep. 1977, K. Kalamees (TAA 84422, as *L.* sp.). Ida-Viru Co.: Gorodjonka, Borovnja Nature Reserve, 6 May 1969, 7th trip of Estonian mycologists (TAA 78282, as *L. ulmarium*); Tudulinna Forest Distr., block no 37, Muraka bog, 13 Sep. 1999, M.Vaasma (TAA 172256). Jõgeva Co.: Jõgeva, 8 Oct. 1960, U. & K. Kalamees (TAA 72018, as *L. ulmarium*). Lääne Co.: Vormsi Island, Suuremõisa, 19 Sep. 1986, K. Kalamees (TAA 143385, as *L. ulmarium*). Lääne-Viru Co.: Vinni, 9 Sep. 1963, B. Vasil'kov (TAA 75889, as *L. ulmarium*). Pärnu Co.: Jäärja Forest Distr., block no 192/2, 26 Sep. 1999, M. Vaasma (TAA 172463); Häädemeeste, Orajõe Forest Distr., block no 80/5, Nigula Nature Reserve, 3 Oct. 1999, K. Leenurm (TAA 165543). Põlva Co.: between Laane and Vastse-Kuuste, 1 Oct. 1966, K. Eichwald (TAA 142599, as *L. ulmarium*); Laane, 26 Sep. 1992, K. Kalamees (TAA 142146). Tartu Co.: Kastre-Peravalla, 23 Sep. 1940, N. Witkowski (TAA 142598, as *P. ulmarius*); Kambja, 12 Oct. 1974, K. Kalamees (TAA 80874, as *L. ulmarium*); Tartu, 3 Oct. 1946, N. Witkowski (TAA 142600, as *Clitocybe aggregata*), 30 Oct. 1957, K. Kalamees (TAA 70855, as *P. ulmarius*), 23 Oct. 1989, K. Kalamees (TAA 144428), 14 Sep. 1994, M. Öpik (TAA 142306). Viljandi Co.: Tipu, 28 Aug. 1977, K. Kalamees (TAA 84287); Tipu, Venniksaare, 8 Oct. 1985, K. Kalamees (TAA 124447, as *L. ulmarium*). Valga Co.: Lüllemäe, 10 Sep. 1983, S. Veldre 83209 (TAA 141128, as *L. ulmarium*). Võru Co.: Paganamaa Landscape Reserve, 5 km S from Krabi, 27 Sep. 1997, K. Kalamees (TAA 17175, as *L.* sp.). **Finland:** Etelä-Häme: Lammi, Evo, 18 Sep. 1986, T. Niemelä 3584 (H, as *L. ulmarium*). Inarin Lappi: Utsjoki Comm., Kevo, Tshieskuljoki, 17 Aug. 1995, S. Veldre (TAA 128033). Kainuu: Puolanka Comm., Pihlajavaara, 12 Sep. 1992, I. Kytövuori 92-2168 (H). Koillismaa: Liikasenvaara, Korvasvaara, 11 Sep. 1981, K. Kalamees, E. Ohenoja & T. Ulvinen (TAA 122171, as *L. ulmarium*). Pohjois-Karjala: Eno Comm., Kolvananuuro, 19 Sep. 1992, I. Kytövuori 92-2611 (H). Satakunta: Pori, Kirjurinluoto, 21 Sep. 1986, P. Salo 212 (H, as *L. ulmarium*). Sompion Lappi: Savukoski Comm., Tulppio, Ainijärvi, 29 Aug. 1992, I. Kytövuori 92-1268 (H). Uusimaa: Helsinki, 30 Sep. 1974, M. Korhonen 1311 (H, as *L. ulmarium*); 13 Oct. 1974, T. Ahti 29709 (H, as *L. ulmarium*); 17 Sep. 1989, R. Saarenoksa 16189 (H, as *L. ulmarium*); Espoo, Otsolahti, 16 Oct. 1991, M. Korhonen 10685 (H). Varsinais-Suomi: Halikko Comm., Viurila, Vuorentaka, Vaisakko, 11 Sep. 1988, I. Kytövuori 88-1644 (H, as *L. ulmarium*). **Latvia**: Talsi Distr.: Dundaga, 26 Sep. 1982, K. Kalamees (TAA 122607, as *L. ulmarium*); Madona, 17 Sep. 1985, V. Urbonas (TAA 124322, as *L. ulmarium*). **Lithuania:** Varėna Distr.: Zervynos, 23 Oct. 1980, V. Urbonas (BILAS, as *L. ulmarium*); Joniškis Distr.: Zagarė, 19 Sep. 1990, V. Urbonas (BILAS 18220, as *L. ulmarium*). **Norway:** Sør-Trøndelag: Oppdal, Stølådalen, 11 Sep. 1977, J. Nordsletten (TRH, as *L. ulmarium*); Trondheim, Høiskoleplenene, 27 Sep. 1934, O.A. Húeg (TRH, as *L. ulmarium*); Rosenborg, 16 Sep. 1975, J.B. Jordal (TRH, as *L. ulmarium*). **Russia:** Irkutsk Prov.: Listvennichnoe, 22 Aug. 1947, 26 Aug. 1947, B. Vasil'kov (LE 6413, 6415, as *P. ulmarius*); Bratsk Distr., Kob', 5 Sep. 1987, K. Kalamees & V. Astapenko (TAA 143623). Khabarovsk Terr.: Bolshekhekhtsirskij Nature Reserve (VLA, as *L. ulmarium*). Krasnoyarsk Terr.: Bolshe-Murtinsk Distr., Hmel'evo, K. Kalamees & M. Vaasma, 26 Aug. 1983 (TAA 122993, as *L. ulmarium*); Sayano-Sushensk Nature Reserve, by Uzun-Su River, 30 July 1984, A. Kovalenko (LE 18429, as *L. ulmarium*). Leningrad Prov.: Peterkhof, Sep. 1935, R. Singer (LE 6430, as *P. ulmarius*); St. Petersburg, 5 Sep. 1945, 25 Sep. 1945, 22 Sep. 1946, B. Vasil'kov (LE 6419, 6426, 6432; as *P. ulmarius*), 15 Sep. 1958, L. Gul'cheva (LE 6422, as *P. ulmarius*); Lileno, 8 Oct. 1967, V. Solov'ev (LE 6417, as *L. ulmarium*); Vyborg Distr., Roshtchino, 25 Sep. 1997, O. Morozova 76-LI-97 (LE 216109); Luga Distr., Oredezh, 20 Sep. 1998, O. Morozova 45-LU-98 (LE, as *L. ulmarium*); Tosno Distr., 12 Sep. 1999, O. Morozova 104-TO-99 (LE 215509). Magadan

Prov.: Zhen'k. Distr., Ola (VLA). Moscow Prov.: 1977, E. Rotova (LE 6416, as *L. ulmarium*). Murmansk Prov.: Khibiny Mts., 12 Aug. 1936, M. Kachurin (LE 454, 457; as *P. circinatus*); Khibiny, 25 Aug. 1974, 16 Sep. 1974, L. Mikhajlovskij (LE 6414, 18291; as *L. ulmarium*). Penza Prov.: near Kamzolka, 1 Sep 1978, A. Ivanov (LE 18519); near Akhuny, 20 Sep. 1990, A. Ivanov (LE 18528, as *L. ulmarium*). Primorye Terr.: Chuguevsk Distr., Verkhneussurijsk, 23 Aug. 1975, 11 Sep. 1975, E. Bulakh (VLA, as *L. ulmarium*). Slavyansk Distr., Suputinskij (Ussurijskij) Nature Reserve, 22 Sep. 1961, L. Vasil'eva (VLA, as *P. ulmarius*); same locality, Kajmanovka, 5 Oct. 1991, K. Kalamees (TAA 145264); Lazo Nature Reserve, Perekatnaya, 22 Sep. 1974, E. Bulakh (VLA 635, as *L. ulmarium*). Tatariya: Raifa, 3 Sep. 1943, 11 Sep. 1943, 17 Sep. 1944, B. Vasil'kov (LE 6425, 6428, 6429; as *P. ulmarius*); by Kazan/Volga port, 5 Sep. 1943, B. Vasil'kov (LE 6421, 6431, as *P.ulmarius*). **Sweden:** Västergötland: Göteborg, 25 Oct. 1956, 10 Oct. 1963, F. Karlvall 7217 & A. Thunberg (LE 6435, Fungi exs. suec. No 2867; as *P. ulmarius*). **Ukraine:** Kiev, 21 Oct. 1968, 2 Nov. 1969, 21 Oct. 1971, M. Zerova (KW).

GERHARDTIA Bon

Lyophyllum subgen. *Lyophyllopsis* Ew. Gerhardt, Z. Mykol. 48 (2): 242. 1982.
Gerhardtia Bon, Doc. Mycol. 24 (93): 66. 1994.

Type species: *Gerhardtia incarnatobrunnea* (Ew. Gerhardt) Bon

Description: Basidiocarps tricholomatoid, buff. Veil absent. Basidia siderophilous, 4-spored. Cystidia absent. Hymenophoral trama regular. Spores ellipsoid, hyalin, inamyloid, asperulate. Clamps absent in all hyphae and basidia.

17. *Gerhardtia borealis* (Fr.) Contu & A. Ortega Fig. 17

Agaricus borealis Fr., Epicr.: 44. 1838 – *Lyophyllum incarnatobrunneum* Ew. Gerhardt, Z. Mykol. 48 (2): 241. 1982. – *Gerhardtia incarnatobrunnea* (Ew. Gerhardt) Bon, Doc. Mycol. 24 (93): 66. 1994. – *Lyophyllum serius* Romagn., Beiträge zur Kenntnis der Pilze Mitteleuropas 3: 121. 1987. – *Calocybe borealis* A. Riva, Schweiz. Z. Pilzk. 66 (1): 4. 1988. – *Gerhardtia borealis* (Fr.) Contu & A. Ortega, Bol. Soc. Micol. Madrid 26: 176. 2002. – *Calocybe civilis* (Fr.) Gulden, Blyttia 51 (3–4): 116. 1993.

Selected icones: Bon, Doc. Mycol. 24 (93): pl. 2D. 1994; Collybio-Marasmioides: pl. 3F. 1999a. – Gerhardt, Z. Mykol. 48 (2): pl. (photo, as *L. incarnatobrunneum*). 1982. – Riva, Schweiz. Z. Pilzk. 71 (9/10): 203 (as *L. incarnatobrunneum*). 1993.

Selected descriptions & figs: Bon, Doc. Mycol. 24 (93): 66, 68 (fig. 2). 1994; Collybio-Marasmioides: 103 (fig.). 1999a. – Gerhardt, Z. Mykol. 48 (2): 241, 243 (fig. 2) (as *L. incarnatobrunneum*). 1982. – Riva, Schweiz. Z. Pilzk. 71 (9/10): 201, 206 (fig.) (as *L. incarnatobrunneum*). 1993.

Description (after Gerhardt, 1982, with supplements from Bon, 1994): Pileus up to 7 cm, convex to convex-umbonate, slightly wavy at margin, smooth and glabrous, matt, dry but slightly viscid on umbo, hardly hygrophanous, not translucently striate, buff, darker in centre. Lamellae sinuate-adnate with tooth, creamy whitish. Stipe up to 6 × 1.2 cm, cylindric, sometimes slightly twisted, full, silky fibrillose, pruinose at apex, dry, concolorous with pileus but paler. Context whitish. Taste and smell indistinct or sometimes faintly farinaceous. Spore print pure white.

Spores 4.5–6.5 × 2.5–3.5 µm, Q = 1.7–2, cylindric-ellipsoid, asperulate. Basidia 25–35 × 5–7 µm. Pileipellis hyphae 5–12 µm wide. Clamps lacking in all hyphae.

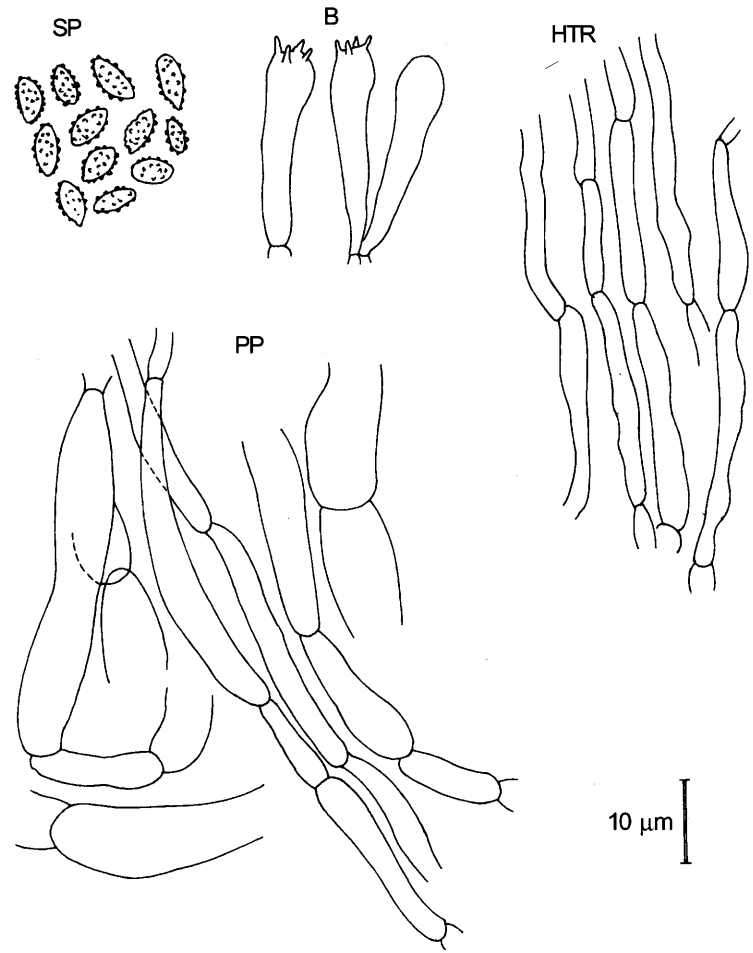


Fig. 17. *Gerhardtia borealis.*

Ecology: In coniferous forests.

Phenology: September and October.

Distribution: Rare. **Northern Europe:** FIN!, NOR, SWE! **Eastern Europe:** EST!

Collections examined: Estonia: Võru Co.: Pähni, 5 Sep. 1985, K. Kalamees & M. Vaasma (TAA 124187, as *Leucopaxillus* sp. = *T. boreale*, det. K. Kalamees). **Finland:** Etelä-Häme: Tammela, Mustiala, Syrjä, Sep. 1874, 27 Oct. 1878, 11 Sep. 1889, Oct. 1889, P.A. Karsten (H, as *Tricholoma linctum* & *T. boreale* = *Calocybe civilis*, det. G. Gulden); Lahti, Joutjärvi, Lakkilanharju, 15 Oct. 1985, I. Kytövuori 851670 (as *C. civilis*); Tampere, Kalevankangas, 15 Sep. 1988, U. Söderholm 1593 (H, as *L. incarnatobrunneum*). Etelä-Savo: Mäntyharju Comm., Juolasvesi, Hietaniemi, Sojonkangas, 27 Sep. 1997, I. Kytövuori 971866 (H, as *C. civilis*). Pohjois-Savo: Juankoski Comm., Akonpohja, Vehka-aho, 8 Sep. 1988, I. Kytövuori 881555 (H, as *Lepista* vel *Rhodocybe*). Uusimaa: Espoo, Luukki, 23 Aug. 1984, J. Issakainen (H, as *Rhodocybe truncata* = *C. civilis*, det. I. Kytövuori); Kiikala, Jokkomi, 13 Oct. 1985, J, Kytövuori 851659 (H, as *Collybia* sp.= *Calocybe civilis*); Nurmijärvi, Kirkonkylä, Parkkimäki, 13 Aug. 1988, P. Askola 2341 (H, as *Tricholoma* sp. = *C. civilis*, det. I. Kytövuori). **Sweden:** Småland, Femsjö sn, Slättagärdet, 13 Sep. 1940, S. Lundell & J. Stordal, 21 Sep. 1948, S. Lundell & G.H. (UPS 6149 & 5552; as *Tricholoma* sp. = *C. civilis*, det. G. Gulden).
Extralimital. Austria: Karlstein, Schlader, 12 Sep. 1987, R. Schütz (WU 6785, as *C. civilis*, det. A. Hausknecht; dupl. TAA 142178).

Notes: *G. borealis* is microscopically very well distinguishable by lack of clamps in all hyphae, by extremely strong siderophilous short basidia and asperulate cylindric-ellipsoid small spores. Macroscopically this species (with buff, hardly hygrophanous, rather fleshy basiodiocarps) is difficult to identify. Very similar species are *Rhodocollybia prolixa* (Hornem. : Fr.) Antonín & Noordel., especially its var. *distorta* (Fr.) Antonín, Halling & Noordel., and *Rhodocybe gemina* (Fr.) Kuyper & Noordel. These two species have no siderophilous basidia.

CALOCYBE Kühner ex Donk

Calocybe Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938 (inval.). – *Calocybe* Kühner ex Donk, Nova Hedwigia 5: 42. 1962, emend. – *Calocybe* sect. *Calocybe* Singer, Agar. mod. Taxon.: 221. 1986. – *Lyophyllum* sect. *Guttata* (Fr.) Singer, Ann. Mycol. 41: 98. 1943.

Type species: *Calocybe georgii* (L.) Kühner.

Excluded: *Calocybe* sect. *Carneoviolaceae* Singer, Ann. Mycol. 41: 106. 1943 (=*Rugosomyces* sect. *Rugosomyces*). – *Calocybe* sect. *Pseudoflammulae* Singer, Ann. Mycol. 41: 107. 1943 (=*Rugosomyces* sect. *Carneoviolacei*). – *Lyophyllum* sect. *Echinospora* (J.E. Lange) Singer, Ann. Mycol. 41: 98. 1943 (=*Tricholomella*). – *Calocybe* sect. *Echinosporae* (J.E. Lange) Singer, Agar. mod. Taxon.: 222. 1986 (inval.) (=*Tricholomella*).

Description: Basidiocarps tricholomatoid, thick-fleshed, white or whitish (with tinge of yellow, grey, beige, brown or ochraceous), exceptionally fuligineous, or bright coloured (violet, sulphureous). Pileus up to 15 cm, convex. Lamellae sinuate, crowded and narrow. Stipe solid. Taste and smell farinaceous or sometimes somewhat unpleasant. Spore print white or creamy.

Spores ellipsoid, hyaline, smooth, cyanophilous, inamyloid. Basidia 4-spored, siderophilous. Pileipellis a cutis of repent or mixed up filamentous hyphae. Clamps present. Pigments absent or if present never parietal but vacuolar. Hymenial cystidia absent or present.

Ecology & phenology: Saprotrophic and mycorrhizal fungi, on humus or forest litter, in meadows, forests and brushwoods, vernal to autumnal.

Distribution: 2 species in palearctic Northern and Eastern Europe and Asia, common to rare.

KEY TO THE SPECIES AND FORMS

1. Lamellae white. Pileus white to fuligineous. Basidiocarps not discolouring when bruised **18. *C. gambosa*** 2
– Lamellae bright yellow. Pileus violet. Basidiocarps staining red then black when bruised **19. *C. favrei***
2 (1). Pileus white, creamy to pale ochraceous 3
– Pileus rather dull coloured, at least partly 4
3 (2). Pileus smooth, not tomentose at margin; pure white at first, greyish when old ***C. gambosa* f. *albella***
– Pileus tomentose at margin; whitish, creamy to pale ochraceous ***C. gambosa* f. *gambosa***
4 (2). Pileus bright yellow ***C. gambosa* f. *flavida***
– Pileus grey brown to fuligineous or in centre violaceous 5
5 (4). Pileus grey brown to fuligineous, lamellae later brownish ***C. gambosa* f. *graveolens***
– Pileus in centre violaceous, at margin creamy ***C. gambosa* f. *palumbina***

18. *Calocybe gambosa* (Fr.) Singer ex Donk Fig. 18

Agaricus georgii L., Spec. Pl.: 1173. 1753. – *Tricholoma georgii* (L.) Quél., Mém. Soc. Émul. Montbéliard 2 (5): 81. 1872 (Champ. Jura Vosges 1). – *Calocybe georgii* (L.) Kühner, Bull. Mens. Soc. Linn. Lyon 7: 211. 1938 (inval.); Kühner ex Kalamees, Z. Pilzk. 60 (2): 360. 1994b (nom. superf.). – *Lyophyllum georgii* (L.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Agaricus gambosus* Fr. : Fr., Syst. mycol. 1: 50. 1821. – *Tricholoma gambosum* (Fr. : Fr.) P. Kumm., Führ. Pilzk.: 135.1871. – *Lyophyllum gambosum* (Fr. : Fr.) Singer, Ann. Mycol. 41: 96. 1943. – *L. gambosum* f. *gambosum* Singer, Ann. Mycol. 41: 100. 1943 (inval.). – *Calocybe gambosa* (Fr. : Fr.) Singer, Lilloa 22: 168. 1951. – *C. gambosa* (Fr. : Fr.) Singer ex Donk, Beih. Nova Hedwigia 5: 43. 1962. – *C. georgii* var. *gambosa* (Fr. : Fr.) Kalamees, Z. Pilzk. 60 (2): 360. 1994b (nom. superf.). – *Clitocybe vasilievae* Singer, Ann. Mycol. 41: 26. 1943. – *Calocybe vasilievae* (Singer) Singer, Agar. mod. Taxon.: 222. 1986.

Misapplied name: *Tricholoma mongolicum* sensu Killermann, Ann. Mycol. 41: 294. 1943.

Ecology & phenology: Grasslands, forests, parks, usually vernal and summery. Saprotrophic and mycorrhizal (cf. Wasser, 1973a).

Notes: *C. gambosa* is a very variable species in the colour of basidiocarps. Five colour forms can be distinguished in the area studied. Only one form – f. *gambosa* – is widely distributed.

Calocybe gambosa f. *gambosa*

Selected icones: Bon, Pareys Buch Pilze: 167 (as *C. gambosa*). 1988b. – Breitenbach & Kränzlin, Pilze Schweiz 3: pl. 144 (as *C. gambosa*). 1991. – Cetto, Enzykl. Pilze 2: 350 (as *C. gambosa*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: 213 (No 482) (as *C. gambosa*). 2000. – Dähncke & Dähncke, 700 Pilze: 194 (as *C. gambosa*). 1980. – Kalamees, Mycobiota Estonia: pl. 74 (as *C. gambosa*). 2000. – Korhonen, Uusi sienikirja: 159 (as *C. gambosa*). 1987. – Lange, Fl. agar. dan. 1: pl. 26B (as *T. gambosum*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 1: pl. 79 (as *C. gambosa*). 1978. – Phillips, Mushr. other fungi: 41 (as *T. gambosum*). 1981.

Selected descriptions & figs: Bon, Pareys Buch Pilze: 167 (as *C. gambosa*). 1988b. – Bon, Collybio-Marasmioides: 105. 1999a. – Courtecuisse & Duhem, Guide Champ. France Europe: 212 (as *C. gambosa*). 2000. – Korhonen, Uusi sienikirja: 159 (as *C. gambosa*). 1987. – Lange, Fl. agar. dan. 1: 61 (as *T. gambosum*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 1: 234 (as *C. gambosa*). 1978. – Phillips, Mushr. other fungi: 41 (as *T. gambosum*). 1981.

Description: Pileus up to 15 cm, conical-convex when young, with thin involute tomentose margin, later convex-plane, finally margin straight, often irregularly wavy, dry, smooth and glabrous, matt, not or slightly hygrophanous, sometimes spotted, whitish, creamy to pale ochraceous. Lamellae sinuate or roundly adnexed, sinuate, often with a tooth, very crowded, narrow (5–6 mm wide), white or creamy white. Stipe up to 10 × 2.5(–3.5) cm, solid, cylindric, ventricose or clavate, sometimes hygrophanously spotted, full, dry, fibrillose, pruinose at apex, tomentose-villose at base, concolorous with pileus. Context white, thick. Taste and smell farinaceous. Spore print white to creamy.

Spores 5–7 × 2–4 µm, ellipsoid, smooth. Basidia 20–30 × 3–5 µm. Pileipellis hyphae 3–4 µm thick. Hymenial cystidia absent.

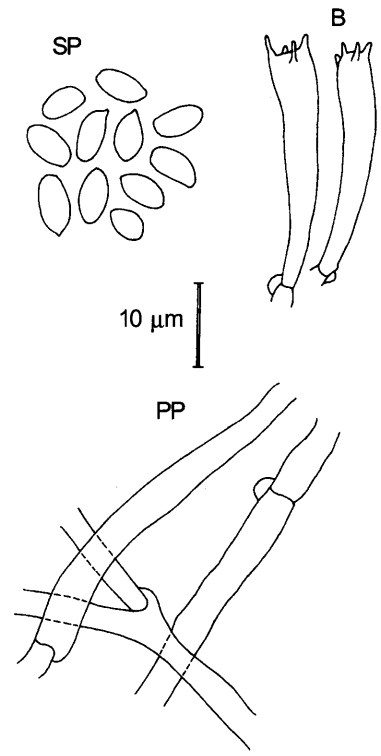


Fig. 18. *Calocybe gambosa* f. *gambosa*.

Ecology: In fairy rings on the ground in grasslands, meadows, pastures, hayfields, parkland meadows, steppes, wooded steppes, grassy places, parks, gardens.

Phenology: May to July (rarely to September).

Distribution: Widespread throughout Northern and Eastern Europe and Asia, common to occasional (in part of the literature regarded as collective species – *C. gambosa* s.l. or *C. georgii* s.l.).

Collections examined (all specimens are collected under the name *C. gambosa*, unless not indicated otherwise): **Estonia:** Hiiu Co.: Hiiumaa Island, Kootsaare, 18. May 1967, A. Kilk & K. Kalamees (TAA 76716); same island, Suuremõisa, 19 May 1967, K. Kalamees (TAA 76725). Järva Co.: Sopa, 31 June 1979, T. Ksenofontova (TAA 120809). Lääne Co.: Matsalu Nature Reserve, Liialaid Islet, 19 May 1977, K. Kalamees, L. Pihlik & M. Vaasma (TAA 83684), Sõmeru Islet, 19 V 1977, K.Kalamees, L. Pihlik & M. Vaasma (TAA 83690), Tauksi Islet, 27 May 1977, K. Kalamees, A. Kollom, L. Pihlik & M. Vaasma (TAA 83737), Kumari Islet, 7–10 July 1977, V. Paakspuu (TAA 95655); Vormsi Island, 12 June 1982, M. Kask (TAA 114980). Saare Co.: Abruka Island, 22 May 1966, K. Kalamees (TAA 76058); Muhu Island, Hellamaa, 3 June 1966, K. Kalamees (TAA 76093). Tartu Co.: Koosa, 25 June 1976, P. Laar (TAA 94990); Nõo, 10 June 1977, I. Parmasto & A. Raitviir (TAA 95472); Elva, 9 June 1991, K. Kalamees (TAA 144992). Valga Co.: Taagepera Forest Distr., Maarjamäe, 29 May 1967, K. Purask (TAA 114497). **Finland:** Åland: Eckerö, Storby, June 1948, O. v. Schulmann (H, as *T. gambosum*); Sund, Bomarsund, 22 June 1948, O. v. Schulmann (H, as *T. gambosum*); Lemland, Nåtö, 12 June 1972, 8 June 1973, C.-A. Haeggström (as *C. georgii*), 5 June 1983, H. Kotiranta 4525 & S. Koski (H); Kökar, Hamnö, 16 June 1976, 24 June 1976, G. Kvist (H); Kumlinge, Enklinge, Tobaksgrundet, 23 June 1991, M. Stjernberg (H). Etelä-Karjala: Kotka, 12 June 2001, U. Nummela-Salo & P. Salo 7661 (H). Etelä-Savo: Lappeenranta, Ihalainen, Mattila, 17 June 1998, U. Nummela-Salo & P. Salo 4807 (H). Uusimaa: Helsinki, 14 June 1971, N. Schwanck, 7 June 1975, J. & R. Saarenoksa 00975, 18 June 1982, R. Saarenoksa 07182, 6 June 1983, R. Saarenoksa 05383, 13 June 1983, M. Korhonen 5207, 17 June 1985, R. Tanskanen, 10 June 1986, R. Saarenoksa 02686 (H); Artjärvi, 15 June & 2 july 1957, H. Snellman (H, as *T. album* = *C. gambosa*, det H. Harmaja); Sipoo, 12 June 1966, E. Packalén, 10 June 1973, G. Lehto, 1 July 1981, M. Korhonen & R. Saarenoksa 11881, 3 July 1985, R. Saarenoksa 09985 (H); Nurmijärvi, 24 June 1981, 21 June 1985, 6 June 1986, 11 June 1986, 6 June 1987, P. Askola 932, 933, 1625, 1915, 1916, 2143 (H); Espoo, Tapiola, Otsolahti, 3 July 2000, M. Korhonen 12920 (H); Särkisalo, Kaukasalo, 3 June 1973, 22 July 1981, M. & B. Federley (H); Nagu, Högsar, 10 June 1973, T. Såltin (H); Rymättylä, Raulahti, Välimäki, 12 June 1973, 2 July 1974, June 1975, 6 July 1978, R. Tuomikoski (H, as *T. georgii*, *C. georgii*, *Melanoleuca* sp.); Hiittinen, Lövökrokarna, Kanteri, 29 May 1983, A.-M. Nyström (H); Nauvo, Lillandet, 30 May 1983, S. Holst & I. Kytövuori (H); Hanko, Tvärminneby, 22 June 1984, M. Korhonen 5820 (H). **Kazakhstan:** Near Almaty, May 1969, I.V. Evseev (LE 6328, as *T. gambosum*). **Russia:** Altaj Terr.: Aktura, Chujskie Alpy, Ojrotiya, 1750 m, 4 Aug. 1937, R. Singer & L. Vasil'eva (LE, as *Clitocybe vasilievae*, holotype). Belgorod Prov.: Valujki, Razdol'e, Sep. 1984, E. Bedenko (TAA 143958). Krasnodar Terr.: near Goryachij Klyuch, 7 May 1976, V. Zhilin (LE 6321). Krasnoyarsk Terr.: Turukhan Distr., near Mirnoe, 13 Aug. 1979, E. Nezdojminogo (LE 6322). Leningrad Prov.: Tosno Distr., Sablino, 10 June 1950, 3 June 1953, I.I. Abramov (LE 6323, 6324, 6326, 6327; as *T. georgii*); St. Petersburg, 20 June 1996, G. Ukrainskaya (LE 215219). Murmansk Prov.: Lapland Nature Reserve, 28 Aug. 1959, N. Pushkina (LE 6326), 13. July 1961 (LE 6327). Penza Prov.: Privolzhskaya Lesostep Nature Reserve, 11 June 1990, A. Ivanov (LE 18531).

Sweden: Uppland: Uppsala (Bondkyrka), Rosendal, 12 June 1942, E. Narfström (Fungi exs. suec. No 1711, LE 6325); Uppsala Comm., Alunda, Haberga, 1 Sep. 1994, K. Kalamees & V. Liiv (TAA 146240, as *C. georgii* var. *gambosa*). **Ukraine:** Donetsk Prov.: Kamennye Mogily Nature Reserve, 7 June 1970, S. Wasser (KW). Odessa Prov.: Belgorod-Dnestr Distr., near Britovka, 14 Sep. 1958, Dobrochaeva, (KW). Stalin Prov.: Ol'ginsk Distr., Veliko-Anadol'skoe, 14 June 1954, M. Zerova (KW); Volodarsk Distr., Kamennye Mogily Nature Reserve, 1 VI, 1 July 1955, Kolesnikov (KW). Sumsk Prov.: Shtepivsk Distr., Mikhajlovskaya Tselina Nature Reserve, 3–22 Sep. 1956, Roshchal' (KW); 22 May 1959, Saricheva (KW).
Extralimital. Mongolia: 1973, Skalon (LE 6330, as *T. gambosum*).

Calocybe gambosa f. *albella* (Schaeff.) Kalamees comb. nov.

Basionym: *Agaricus albellus* Schaeff., Fung. Bavaria 4: 34, pl. 78. 1774. – *Calocybe albella* (Schaeff.) Bon, Doc. Mycol. 25 (97): 4. 1995b.

Selected icone: Zerova, Atlas gribiv Ukraini: pl. 67, 2 (as *C. georgii*, second basidiocarp from the left). 1974.

Selected description: Bon, Collybio-Marasmioides: 105 (as *C. albella*). 1999a.

Characteristics: Cap pure white, greyish brown when old, hygrophanously spotted, with smooth, not tomentose margin. Smell slightly unpleasant, not farinaceous.

Ecology: In steppes (Ukraine; see Zerova, 1974).

Phenology: July.

Distribution: Very rare. **Eastern Europe:** UKR!

Collection examined: Ukraine: Volodarsk Distr., Kamennye Mogily Nature Reserve, 15 July 1957, Bojchuk (KW).

Calocybe gambosa f. *flavida* (Fr.)

Misapplied name: *Calocybe gambosa* f. *flavescens* sensu Urbonas, Lietuvos grybai 8 (2):115. 1997 (ined.).

Selected icones: Cetto, Enzykl. Pilze 2: 352 (as *C. gambosa* var. *flavida*). 1987. – Zerova, Atlas gribiv Ukraini: pl. 67, 2 (as *C. georgii*, in middle). 1974. – Urbonas, Lietuvos grybai 8 (2): pl. 31, 4 (as *C. gambosa* f. *flavescens*). 1997.

Selected description: Cetto, Enzykl. Pilze 2: 353 (as *C. gambosa* var. *flavida*). 1987.

Characteristics: Pileus campanulate-convex for a long time, bright yellow, lighter at margin, brownish in centre. Stipe conspicuously ventricose for a long time, white.

Ecology: In fairy rings fasciculate in forests (Lithuania; see Urbonas, 1997), on calcareous ground in alvar meadows (Estonia, Harju Co., Avakannu, May 1980–1984, G. Shchukin; in litt.), in steppes (Ukraine; see Zerova, 1974).

Phenology: May.

Distribution: Rare. **Eastern Europe:** EST, LIT!, UKR.

Collection examined: Lithuania: Alytus Distr.: 29 May 1984, V. Urbonas (BILAS, as *C. gambosa* f. *lutea*; ined.).

Calocybe gambosa f. *graveolens* (Pers.: Fr.) comb. nov.

Basionym: *Agaricus graveolens* Pers., Syn. meth. Fung.: 361. 1801. – *Agaricus graveolens* Pers. : Fr., Syst. mycol. 1: 45. 1821. – *Tricholoma graveolens* (Pers. : Fr.) P. Kumm., Führ. Pilzk.: 135. 1871. – *Tricholoma georgii* f. *graveolens* (Pers. : Fr.) Konrad & Maubl., Ic. sel. Fung. 6: 313. 1930.

Excluded: *Calocybe graveolens* sensu Bon, Collybio-Marasmioides: 105. 1999a (= ?*C. gambosa* f. *flavida*).

Selected icones: Bresadola, Iconogr. mycol. 3: pl. 104. 1928. – Lange, Fl. agar. dan. 1: pl. 27A. 1935.

Selected descriptions & figs: Bresadola, Iconogr. mycol. 3: pl. 104. 1928. – Lange, Fl. agar. dan. 1: 61. 1935.

Characteristics. Pileus fuligineous, light greyish brown to brownish grey or pale dingy tan, lamellae later brownish.

Ecology: In moist deciduous and mixed forests and brushwoods.

Phenology: May to July.

Distribution: Rare. **Eastern Europe:** DEN, EST!

Collections examined: Estonia: Lääne Co.: Matsalu Nature Reserve, Kloostri, 29 May 1977, M. Vaasma & L. Pihlik (TAA 95463, as *C. gambosa*). Valga Co.: Madsa, 21 June 1982, S. Veldre (TAA 122376, as *C. gambosa*). Viljandi Co.: Vooru, 9 July 1976, K. Kalamees (TAA 80979, as *C. gambosa*); Vooru, Piiri, 24 June 1991, K. Kalamees (TAA 145006, as *C. gambosa*), 20 June 1997, K. Kalamees (TAA 145006, as *C. georgii* var. *georgii*).

Calocybe gambosa f. *palumbina* (Paulet) comb. nov.

Basionym: *Agaricus georgii* var. *palumbinus* Paulet, Traité champignons: pl. 95: 11. 1793. – *Calocybe gambosa* var. *palumbina* (Paulet) Bon, Doc. Mycol. 29 (115): 33. 1999b.

Selected icone: Zerova, Atlas gribiv Ukraini: pl. 67, 2 (as *C. georgii*, first basidiocarp from left). 1974.

Characteristics: Pileus violaceous in centre, creamy at margin.

Ecology: Evidently in steppes (Ukraine; see Zerova, 1974).

Phenology: May, June.

Distribution: Very rare. **Eastern Europe:** UKR.

19. *Calocybe favrei* (R. Haller Aar. & R. Haller Suhr) Bon Fig. 19

Lyophyllum favrei R. Haller Aar. & R. Haller Suhr, Schweiz. Z. Pilzk. 28 (4): 52. 1950. *Calocybe favrei* (R. Haller Aar. & R. Haller Suhr) Bon, Doc. Mycol. 29 (115): 33. 1999b.

Icones: Anonymous (F.B.), Boll. Gruppo Micol. G. Bresadola 22 (1–2): 24–25 (as *L. favrei*). 1979.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 107 (fig). 1999a. – Clémençon, Z. Mykol. 52 (1): 70, 79 (Abb. 3). 1986. – Monthoux, Musées Genève 135: 22 (fig.). 1973.

Description (after Clémençon, 1986): Pileus up to 12 cm, violet grey, violet blue, violetish lead grey, dry, matt, finely tomentose. Lamellae emarginate, very crowded, broad (0.6–1 cm), pale to ochre sulphureous. Stipe concolorous with pileus but lighter, fine pruinose at apex, staining red when bruised. Context pale sulphureous in pileus, whitish in stipe. Basidiocarps staining rapidly red then black when bruised. Smell almost unpleasant, taste sometimes slightly farinaceous.

Spores very small, 3.4–4.3(–4.8) × 2.4–3.0 µm, Q = 1–1.5, short ellipsoid to ovoid, smooth. Basidia 25–30 × 2–4 µm. Pileipellis hyphae 4–8 µm thick. Cheiloystidia irregularly cylindric, 25–35 × 3–5 µm.

Ecology: Singly or gregarious on forest litter in deciduous forests; in Crimea in Ukraine under *Fagus orientalis*.

Phenology: September and October.

Distribution: Very rare. **Northern Europe:** FIN! **Eastern Europe:** KRY!

Collections examined: Finland: Varsinais-Suomi: Vástanfjárd, Södersundvik, 27 Sep. 1961, N. Malmström (H, as *L. favrei*). **Ukraine:** Crimean National Park, Weggabel N from Alushta, by Alma Stream, 9 Oct. 1992, M. Moser (IB 92/288, as *L. favrei*). **Extralimital. Great Britain:** Survey, Norbusy Park, 25 Sep. 1987, Oct. 1987, N.W. Legan (dupl. C, TAA ex K; as *L. favrei*).

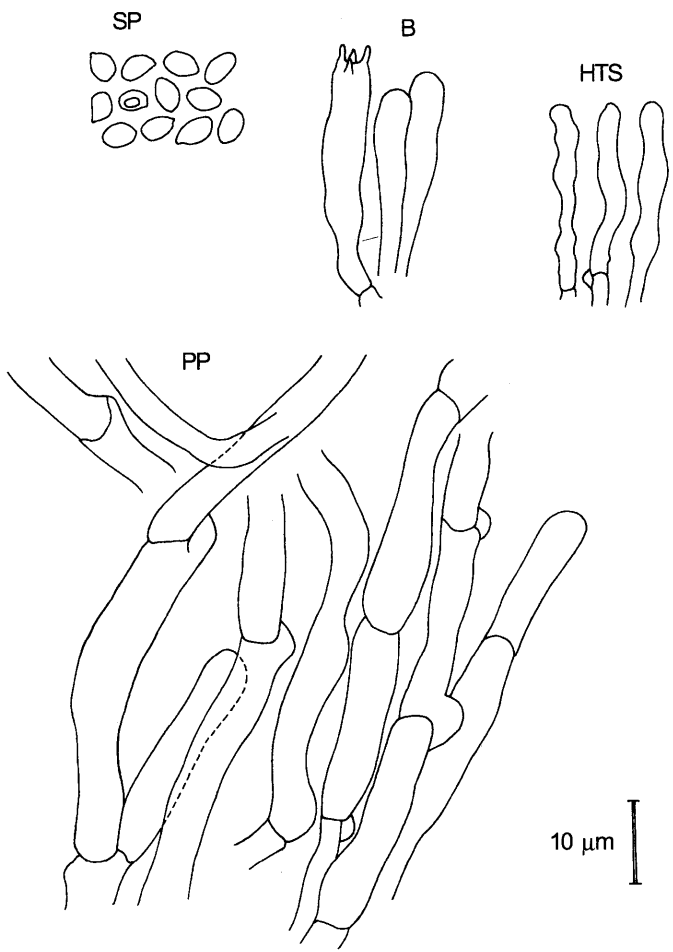


Fig. 19. *Calocybe favrei.*

Notes: *C. favrei* is a beautiful species well distinguishable by its violet blue tomentose pileus and stipe, sulphureous crowded lamellae, very small smooth ellipsoid spores, presence of irregularly cylindric cheilocystidia, and rapid discolouring of basidiocarps red then black when bruised. A similar species is *C. ochracea* (R. Haller) Bon, which differs in greenish ochraceous colour on pileus and smaller basidiocarps; it has not been found in regions studied.

TRICHOLOMELLA Zerova ex Kalamees

Tricholomella Zerova, Atlas gribiv Ukraini: 84. 1974 (inval.) – *Tricholomella* Zerova in Zerova, Sosin & Rozhenko, Viznachnik gribiv Ukraini 5. Basidiomitseti 2: 177. 1979 (inval.). – *Tricholomella* Zerova ex Kalamees, Persoonia 14 (4): 446. 1992.

Type species: *Tricholomella constrictum* (Fr.) Zerova ex Kalamees.

Description. Basidiocarps without pigment, white, tricholomatoid, thick-fleshed, small or of medium size, with white veil. Stipe with annulus when young, later without annulus, sometimes rooting. Lamellae emarginate to nearly free. Smell and taste farinaceous. Spore print white. Spores hyaline, echinulate to almost smooth, inamyloid, cyanophilous, ellipsoid to ovoid, large. Basidia 4-spored, strongly siderophilous. Hymenial cystidia absent. Pileipellis a cutis of repent filamentous hyphae. Clamps present. Hymenophoral trama regular.

Ecology & phenology: Saprotrophs on forest litter in deciduous forests or on humus on meadows, autumnal.

Distribution: Rather rare from Northern and Eastern Europe to Russian Far East.

20. *Tricholomella constrictum* (Fr.) Zerova ex Kalamees Fig. 20

Agaricus constrictus Fr., Syst. mycol. 1: 28. 1821. – *Lyophyllum constrictum* (Fr.) Singer, Ann. Mycol. 41: 96. 1943. – *Calocybe constricta* (Fr.) Kühner ex Singer, Sydowia 15: 47. ('1961') 1962. – *Tricholomella constrictum* (Fr.) Zerova, Atlas gribiv Ukraini: 84. 1974 (inval.). – *Tricholomella constrictum* (Fr.) Zerova ex Kalamees, Persoonia 14 (4): 446. 1992. – *Agaricus leucocephalus* Fr., Epicr. mycol.: 47. 1838 (inval.) – *Tricholoma leucocephalum* Quél., Mém. Soc. Émul. Montbéliard 2 (5): 317. 1872. – *Lyophyllum leucocephalum* (Fr.) Singer, Ann. Mycol. 41: 100. 1943. – *Tricholomella leucocephalum* (Fr.) Zerova, Atlas gribiv Ukraini: 84. 1974 (inval.). – *Tricholomella leucocephala* (Quél.) Zerova ex Bon, Doc. Mycol. 29 (115): 33. 1999b. – *Calocybe leucocephala* (Fr.) Singer ex Bon & Courtec., Doc. Mycol. 18 (69): 37. 1987.

Excluded: *Tricholoma leucocephalum* sensu Ricken, Blätterpilze 1: 349. 1915 (? = *T. saponaceum* forma).

Selected icones: Cetto, Enzykl. Pilze 2: 354 (as *C. constricta*), 356 (as *C. leucocephala*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: 212 (N 483) (as *C. constricta*). 2000. – Lange, Fl. agar. dan. 1: 17A (as *Tricholoma constrictum*), 24A (as *Tricholoma leucocephalum*). 1935. – Moser & Jülich, Farbatl. Basidiomyc. 3: *Calocybe* 1 (as *C. constricta*). 1986. – Phillips, Mushr. other fungi: 41 (as *Tricholoma leucocephalum*). 1981. – Ryman & Holmåsen, Suomen pohjolan sienet: 304 (as *C. constricta*). 1987. – Zerova, Atlas gribiv Ukraini: pl. 68, 1 (as *Tricholomella constrictum*); pl. 68, 2 (as *Tricholomella leucocephalum*). 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 107 (as *Tricholomella constricta*), 108 (as *Tricholomella leucocephala*). 1999a. – Cetto, Enzykl. Pilze 2: 355 (as *C. constricta*), 357 (as *C. leucocephala*). 1987. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 102 (as *C. constricta*). 1992. – Lange, Fl. agar. dan. 1: 17A; 24A (as *Tricholoma leucocephalum*). 1935. – Phillips, Mushr. other fungi: 41 (as *Tricholoma leucocephalum*). 1981. – Ryman & Holmåsen, Suomen pohjolan sienet: 304 (as *C. constricta*). 1987.

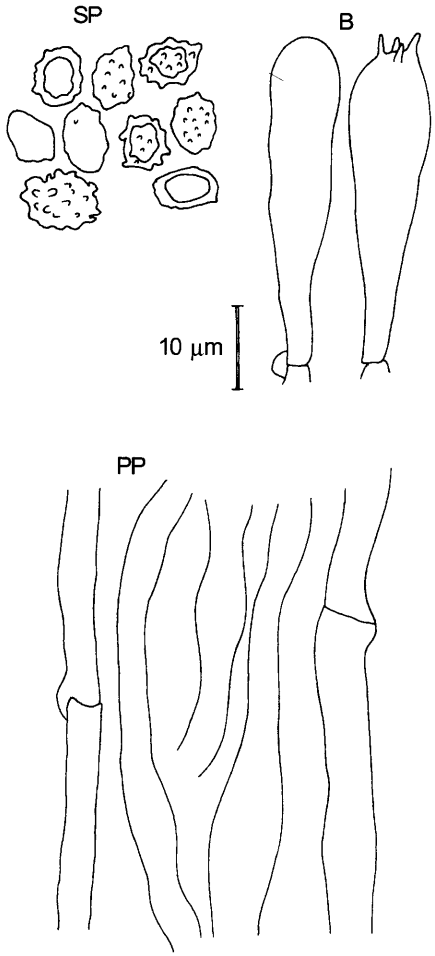


Fig. 20. *Tricholomella constrictum.*

Description: Pileus up to 7 cm, pure white to pale brownish, often with olivaceous, yellowish to greyish tint, densely innately cottony-tomentose, convex, convex-campanulate to convex-plane, sometimes with obtuse umbo, slightly viscid, smooth, mat or partly silky-shiny. Lamellae white, rather crowded, emarginate to almost free. Stipe white, dry, fibrillose-flocculose, with narrow membranaceous quickly disappearing annulus at apex, smooth, cylindric or slightly thickened at base, downwards tapering, sometimes rather long rooting, solid, up to 15 × 1.5(–2) cm. Veil white, membranaceous, disappearing. Context white, thick. Smell and taste strongly farinaceous. Spore print white.

Spores broad ellipsoid to ovoid, robust and distinctly echinulate (with warts up to 1 µm long) or only slightly punctate to almost glabrous, large, (6–)7–9(–10.5) × 4.8–6.5(–7.2) µm. Basidia 30–40(–48) × 8–11 µm. Pileipellis hyphae 3–8 µm thick.

Ecology: On soil in deciduous and mixed forests, steppes, meadows, pastures; often on stale-burnt spots.

Phenology: June to November.

Distribution: Rather rare. **Northern Europe**: DEN, FIN!, ICE?, NOR, SWE! **Eastern Europe**: BLR!, EST!, LAT, UKR, RUE-Kirov, RUS-Rostov, RUW-Leningrad! **Middle Asia:** KAZ. **Russian Far East:** KHA, PRM.

Collections examined: Estonia: Lääne Co.: Osmussaar Island, 4 Sep. 1976, K. Kalamees, U. Pihlik & M. Vaasma (TAA 81042). Lääne-Viru Co.: Sagadi Forest Distr., Koljaku, 16 Sep. 1959, U. Kalamees (TAA 51279, as *Tricholoma constrictum*). Valga Co.: Hargla, by Mustjõgi River, 30 July 1996, K. Kalamees (TAA 146937). **Finland:** Etelä-Häme: Mustiala, 29 Sep. 1868, Sep. 1876, P.A. Karsten 1829, 1830 (H; UPS, Herb. E. Fries; as *Agaricus* (*Tricholoma*) *leucocephalus* = *Calocybe constricta*, det. I. Kytövuori); Kangasala, Ruutana, 1 Sep. 1986, 17 Sep. 1986, L. Kosonen (TUR 083614, 083620; as *C. constricta*). Etelä-Savo: Taipalsaari, Karhunpää, 14 July 1966, O. Vitikainen 219 (H, as *Tricholoma* sp. = *C. constricta*, det. H. Harmaja). Uusimaa: Porvoo, Girsnäs, July 1921, W. Nyberg (H, as *T. leucocephalum* = *C. leucocephala*, det. H. Harmaja = *C. constricta*, det. I. Kytövuori); Ekenäs lk., Tvärminne, 24 Aug. 1936, N. Malmström (H, as *Tricholoma constrictum* = *C. constricta*, det. I. Kytövuori); Tusby, Klemetskog, Huhtarinsaari, 28 Sep. 1940, N. Malmström (H, as *Tricholoma constrictum* = *C. constricta*, det. I. Kytövuori); Granhulla, 8 Sep. 1941, W. Nyberg (H, as *Lepiota* sp. = *C. constricta*, det. I. Kytövuori); Tammisaari, 21 July 1961, O. v. Schulmann (H, as *Rhodophyllus prunuloides* = *C. constricta*, det. I. Kytövuori). Varsinais-Suomi: Turku, University area, 12 Aug. 1987, A. Lämsä (TUR 085814, as *C. constricta*). **Russia:** Leningrad Prov.: Wyborg, Juustila, 20 Aug. 1892, A. Thesleff (H, as *T. leucocephalum*); Sovkhozy, Sep. 1936, R. Singer (LE 5940, as *Tricholoma constrictum*). **Sweden:** Medelpad: Stornäset Nature Reserve, Alnö, Näset, Hussborg, 14 Sep. 1995, E. Medin (TAA 146776). Småland: Säby sn, Romanäs, 5 Oct. 1942, G. Stahlberg (UPS, as *Armillaria constricta*); Nässjö sn, W of Åker, 8 Nov. 1945, G. Haglund 1006 (UPS, as *A. constricta*). Södermanland: Betesmark, Sorunda, 11 Oct. 1981, I.-B. Vesterberg (S, as

C. constricta). Uppland: Uppsala, Carolinaparken, 14 Sep. 1935, S. Lundell (LE 5941, Fungi exs. suec. No 313, as *Armillaria constricta*); Bälinge sn, Löten, 21 Sep. 1937, S. Lundell & H. Smith (UPS, as *A. constricta*); Börje sn, Hagalund, 20 Sep. 1950, S. Lundell & J. Eriksson (UPS, as *A. constricta*); Åland par., Trumpmyra, 24 Sep. 1972, Kerstin & L. Holm (UPS, as *C. constricta*), 12 Oct. 1974, S. Ryman 3175 (UPS, as *C. constricta*); Bondkyrka par., Eriksberg, Hammarparken, 10 Nov. 1974, S. Ryman 3271 (UPS, as *C. constricta*).
Extralimital. Germany: Sachsen Reichenbach/Vogtl., 16 Aug. 1968, H. Dörfelt (HAL, as *C. constricta*). **Hungary:** Budapest, 5 Dec. 1971, G. Bohus (dupl. OULU, as *C. constricta*). **Italy:** Stazzu Badias near Trinita, Sardinia, 27 Oct. 1980, M. Angarano (IB 806675, as *C. leucocephala*). **France:** Petit Luberon, Vaucluse, 28 Oct. 1977, M. Moser (IB 77/212, as *C. constricta*). **Switzerland:** CH: BE: Bienne, Wildermuth, Spital, 17 Nov. 1980, X. Moirandat (TAA 142116 dupl. ex LAU 80/148, as *C. constricta*); CH: VD: Lausanne, Malley, 28 Nov. 1972, H. Wust (TAA 142115 dupl. ex LAU 72/147, as *C. constricta*); Opfikon near Zürich, 1 Nov. 1974, E. Horak (IB 74/631, as *C. constricta*).

Notes: *Tricholomella. constrictum* is a very variable species with white to whitish fleshy basidiocarps. It has a disappearing membranaceous veil, often long rooting stipe, distinctly farinaceous smell and predominantly robust echinulate but sometimes only slightly punctate to almost smooth spores (these are obvious in the same preparation!). It is unsupported to distinguish two separate species – *T. constrictum* and *T. leucocephalum* – as in Lange (1935), Cetto (1987), Bon (1999a), etc.

TRIBUS TEPHROCYBEAE

Habit predominately collybioid. Basidiocarps small to medium-sized, mostly thin-fleshed. Basides rather short, usually <(25–)30 µm.

RUGOSOMYCES Raithelh.

Calocybe sect. *Pseudoflammulae* Singer, Ann. Mycol. 41: 107. 1943 (inval.). – *Calocybe* sect. *Carneoviolaceae* Singer, Ann. Mycol. 41: 106. 1943 (inval.). – *Rugosomyces* Raithelh., Metrodiana 8 (1): 10. 1979, emend. – *Rugosomyces* sect. *Carneoviolacei* (Singer ex) Bon, Doc. Mycol. 21 (82): 65. 1991. – *Rugosomyces* sect. *Rugosomyces* Bon, Doc. Mycol. 21 (82): 65. 1991 (autonym).

Type species: *Rugosomyces onychinus* (Fr.) Raithelh.

Description: Basidiocarps collybioid, bright coloured (melleous, fulvous, purplish red, chestnut brown, violet, pink). Lamellae adnexed, emarginate or adnate, crowded, mostly narrow. Veil absent. Context yellow or white, often with farinaceous smell and taste, taste often bitter. Spore print white to creamy. Basidiospores small, ellipsoid, smooth, hyaline, cyanophilous, inamyloid. Basidia 4-spored, usually rather short (<30 µm), siderophilous. Hymenial cystidia absent. Pileipellis very variable – a hymeniderm, trichoderm to subepithelium of sphaeropedunculate, sphaeric to pyriform elements or a mixture of filamentous hyphae and hymenidermic, trichodermic and/or subepithelial, often irregular, diverticules, lobed, interlocking elements. Hymenophoral trama regular. Clamps present in all tissues. Pigments predominantly parietal.

Ecology & phenology: Saprotrophs on humus or forest debris and litter (needles, leaves), rarely wood saprotrophs (on very rotten wood); mainly in coniferous, to a lesser degree in deciduous and mixed forests, grasslands and lawns. June–November.

Distribution: 10 species in Northern and Eastern Europe and temperate Asia.

KEY TO THE SPECIES

1. Lamellae pure white, creamy or pale yellowish only when adult. Pileus violet, pink or black brown (sect. *Carneoviolacei*) 2
– Lamellae deep yellow. Pileus yellow or brown (sect. *Rugosomyces*) 6
2 (1). Pileus violet, pink or pinkish red 3
– Pileus fuligineous to purple black **28. *R. obscurissimus***
3 (2). Pileus violet to brown violet. Lamellae white at first, then becoming pale yellow **27. *R. ionides***
– Pileus flesh pink to dirty pink red. Lamellae pure white 4
4 (3). Basidiocarps pure flesh pink, solitary. Stipe entirely smooth **26. *R. carneus***
– Basidiocarps darker, dirty pink red to flesh brownish, solitary or fasciculate. Stipe tomentose, hairy, shaggy or strigose at base 5
5 (4). Spores rather short, 3–7 µm long. Growing mostly fasciculate on forest litter. Stipe strongly hairy, shaggy or strigose at base. **29. *R. persicolor***
– Spores longer, 6.5–8.5(–11) µm. Growing solitary on debris of *Phragmites australis,* outside of forests. Stipe tomentose at base. **30. *R. phragmitidis***
6 (1). Pileus, lamellae and stipe yellow, orange yellow or melleous 7
– Pileus and stipe brown (buff brown, rufous brown, purple brown or red brown) to fuligineous, lamellae yellow 9

7 (6). Habitat in mountains in subalpine and alpine zones. Basidiocarps melleous **21. *R. caucasicus***

– Habitat in lowland or mountains in forest zone. Basidiocarps yellow to orange yellow 8

8 (7). Pileipellis of filamentous hyphae or by their predomination a few subsphaeric, pyriform, oval and sphaeropedunculate, often interlocking elements added at places. Lamellae never blackening in exsiccate **22. *R. chrysenteron***

– Pileipellis "cellular", of sphaeropedunculate, pyriform, clavate, oval to subsphaeric elements only. Lamellae mostly blackening in exsiccate **23. *R. fallax***

9 (6). Pileus buff brown, rufous brown to fuligineous. Pileipellis with giant sphaeropedunculate elements, up to 50 µm wide **24. *R. obscuratus***

– Pileus purple brown to red brown. Pileipellis of clavate to pyriform elements, up to 15 µm wide **25. *R. onychinus***

Sect. RUGOSOMYCES

Lamellae deep yellow. Pileus yellow, brown or fuligineous, mostly somewhat subtomentose, mat.

Stirps Chrysenteron

Pileipellis a mixture of hymeniderm, trichoderm and subepithelium of sphaeropedunculate, sphaeric to pyriform cells and filamentous hyphae.

21. *Rugosomyces caucasicus* (Singer) Kalamees comb. nov. Fig. 21

Basionym: *Calocybe caucasica* Singer, Sydowia 15: 47. 1962.

Misapplied names: *Tricholoma chrysenteron* ssp. *alpestre* sensu Vasil'eva, Uchenye zapiski Kazanskogo Gosudarstvennogo Universiteta 99 (1), Botanika 5: 51. 1939. – *Calocybe alpestris* sensu Singer, Ann. Mycol. 41: 108. 1943.

Excluded: *Agaricus alpestris* Britzelm., Hymenomyc. Südbayern 8 (4): 42. 1891. – *Calocybe alpestris* (Britzelm.) Singer, Sydowia 15: 47. 1962; sensu Singer, Sydowia 30: 264, 265. 1978. – *Calocybe alpestris* sensu Huijsman; Moser, Röhrlinge-Blätterpilze: 135. 1983. – *Rugosomyces alpestris* (Britzelm.) Bon, Doc. Mycol. 21 (82): 66. 1991; sensu Bon, Collybio-Marasmioides: 112. 1999a.

Selected descriptions: Singer, Ann. Mycol. 41: 108. 1943 (as *C. alpestris*). – Singer, Sydowia 15: 47. 1962 (as *C. caucasica*).

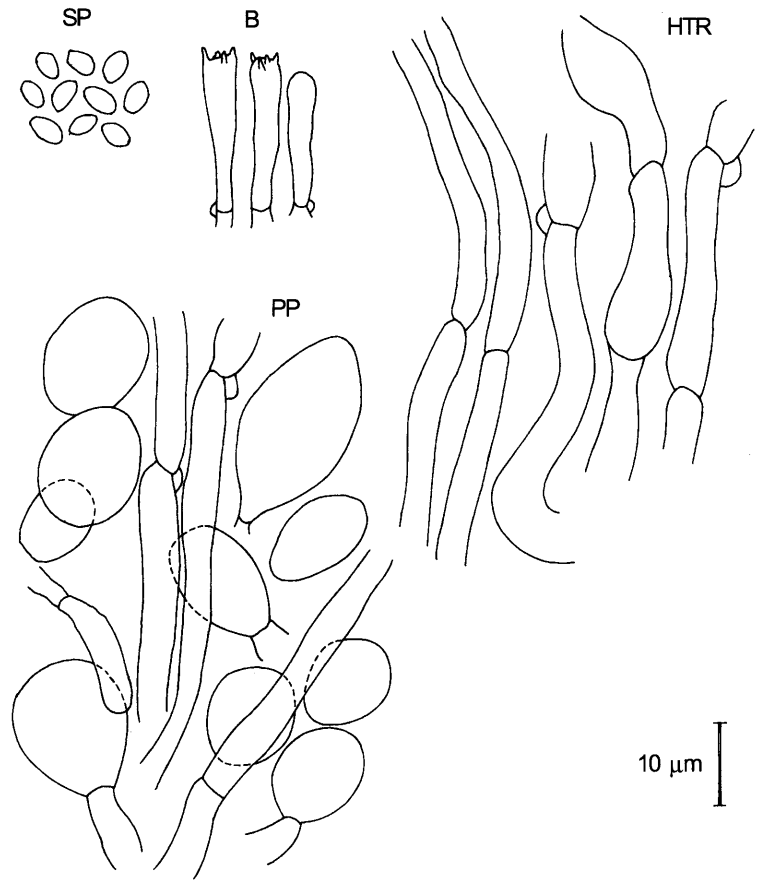


Fig. 21. *Rugosomyces caucasicus.*

Description: Pileus up to 3 cm, convex then plane, slightly umbonate, minutely tomentose, with thin involute margin when young, sometimes wavy, hygrophanous, slightly translucently striate, melleous. Lamellae concolorous with pileus, nearly crowded, adnexed or emarginate (sometimes with a tooth). Stipe up to 5 × 0.4 cm, nearly cylindric, tomentose, of same colour as pileus. Context yellowish. No smell, taste bitterish. Spore print white.

Spores 3.2–4.3 × 1.8–2.6 µm, smooth, ellipsoid. Q = 1.4–1.7. Basidia very short. Pileipellis a mixture of hymeniderm, trichoderm and subepithelium of sphaeropedunculate, sphaeric to pyriform cells of 6–17(–24) µm and of filamentous hyphae of 5–7 µm width.

Ecology: In subalpine sparse forests and alpine meadows in herbs, at 1800 m and higher above sea level.

Phenology: July and August.

Distribution: Rare. **Caucasus:** NCS-KR! **Siberia:** ALT!

Collections examined: Russia: Altaj Terr.: Ust'-Koksa, Kucherla, 1800 m, 25 July 1969, K. Kalamees (TAA 77880, as *C. alpestris*). Krasnodar Terr.: Caucasus Nature Reserve, Jatyrgwarta, 29 July 1936, L. Vasil'eva (LE 18189, as *C. chrysenteron* ssp. *alpestre*; holotype of *C. caucasica*); Alous, 2 Aug. 1936, L. Vasil'eva (VLA, as *T. chrysenteron* ssp. *alpestres*).

Notes: *R. caucasicus* is characterized by completely melleous hygrophanous basidiocarps, very minute ellipsoid (not subglobose!) spores, very short basidia; pileipellis is a mixture of filamentous hyphae and elements of hymeniderm and subepithelium; habitat in subalpine forests and alpine meadows.

True *R. alpestris* (Britzelm.) Bon with subglobose tiny spores has similarity to *R. carneus* (cf. Bon, 1999a) and is probably a different species.

22. *Rugosomyces chrysenteron* (Bull. : Fr.) Bon Fig. 22

Agaricus chrysenteron Bull., Herb. France 12: pl. 556, fig. 1. 1792; Bull. : Fr., Syst. mycol. 1: 126. 1821. – *Tricholoma chrysenteron* (Bull. : Fr.) Quél., Champ. Jura Vosges 1: 233. 1872. – *Lyophyllum chrysenteron* (Bull. : Fr.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Calocybe chrysenteron* (Bull. : Fr.) Singer, Sydowia 15: 47. 1962. – *Rugosomyces chrysenteron* (Bull. : Fr.) Bon, Doc. Mycol. 21 (82): 65. 1991. – *Tricholoma pseudoflammula* J.E. Lange, Dansk Bot. Ark. 8 (3): 24. 1933. – *Calocybe pseudoflammula* (J.E. Lange) M. Lange ex Singer, Sydowia 15: 47. 1962. – *Rugosomyces pseudoflammula* (J.E. Lange) Bon, Doc. Mycol. 21 (82): 65. 1991.

Misapplied name: *Calocybe cerina* sensu Kalamees, Z. Mykol. 60 (2): 362. 1994b; sensu auct. eur. mult. p.p.

Excluded: *Tricholoma chrysenteron* sensu Ricken, Blätterpilze 1: 347. 1915. – *T. chrysenteron* sensu Nüesch, Ritterlinge: 92. 1923. – *Tricholoma chrysenteron* ssp. *cerinum* sensu Konrad & Maublanc, Ic. sel. Fung. 3: pl. 267, 2. 1927. – *Calocybe cerina* sensu Singer, Ann. Mycol. 41: 109. 1943 (= *R. fallax*); sensu Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 225. 1979; sensu Moser, Röhrlinge-Blätterpilze: 135. 1983; sensu Arnolds & Becker, Coolia 36: 70. 1993. – *Rugosomyces cerinus* sensu Bon, Collybio-Marasmioides: 111. 1999a. – *Calocybe chrysenteron* sensu Nakhutsrishvili, Flora sporovykh rastenij Gruzii: 449. 1986; sensu Melik-Khachatryan et al., Opredelitel' agarikal'nykh gribov Zakavkaz'ya: 71. 1985 (= *Tricholoma* sp.); sensu Serzhanina, Mushrooms Belarus: 92. 1994; sensu Zerova, Atlas gribiv Ukraini: pl. 67, 3. 1974 (= *Tricholoma* sp.). – *Lyophyllum chrysenteron* sensu Zerova et al., Viznachnik gribiv Ukraini 5: 163. 1979.

Selected icones: Bon, Fung. rar. Ic. col. 11: pl. 84, 2 (as *C. chrysenteron*). 1979. – Bon, Pareys Buch Pilze: 167 (as *C. chrysenteron*). 1988b. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 143 (as *C. chrysenteron*). 1991. – Bresadola, Iconogr. mycol. 2: pl. 98 (as *T. chrysenteron*). 1927. – Cetto, Enzykl. Pilze 2: 360 (as *C. chrysenteron*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: 211 (N 476). 2000. – Fries, Collection of water-colours of fungi in Uppsala (Museum Botanicum Uppsaliense): N 83 (as *A. chrysenteron*). – Konrad & Maublanc, Ic. sel. Fung. 3: pl. 267, 1 (as *T. chrysenteron*). 1927. – Lange, Fl. agar. dan. 1: pl. 24B (as *T. pseudoflammula*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 224 (as *C. chrysenteron*). 1979. – Romagnesi, Nouv. Atl. Champ. 4: pl. 241A (as *C. chrysenteron*). 1967. – Urbonas, Lietuvos grybai 8 (2): 31, 3 (as *C. chrysentera*). 1997.

Selected descriptions & figs. Arnolds & Becker, Coolia 36: 74, 75 (fig. 3) (as *C. chrysenteron*). 1993. – Bon, Fung. rar. Ic. col. 11: 20 (fig. 4a, b) (as *C. chrysenteron*). 1979. – Bon, Collybio-Marasmioides: 110 (figs.; as *R. chrysenteron & R. pseudoflammula*). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): 144, 145 (fig.) (as *C. chrysenteron*). 1991. – Cetto, Enzykl. Pilze 2: 361 (as *C. chrysenteron*). 1987. – Lange, Dansk Bot. Ark. 8 (3): 24. 1933. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 370 (as *C. chrysenteron*). 1979. – Urbonas, Lietuvos grybai 8 (2): 116 (as *C. chrysentera*). 1997.

Description: Pileus up to 5(–7) cm, convex or widely campanulate then plane umbonate, sometimes slightly depressed, margin thin incurved at first then straight, minutely fibrillose-tomentose, often surface mealy, dry, mat, smooth, slightly hygrophanous, very short and thin translucently striate at margin, bright luteous, melleous, flavous or chrome yellow. Lamellae narrow, crowded, adnexed, emarginate to adnate, sometimes with decurrent tooth, bright yellow like pileus but lighter. Stipe up to 8(–10) × 0.8(–1.0) cm, cylindric or widened above, sometimes compressed, mostly rather stout, fibrillose, dry, thick white-felty or strigose at base, of same colour as pileus, sometimes more brownish townwards. Context light to bright sulphureous (also in exsiccate!). Smell farinaceous, sometimes raphanoid or fruity, taste mild at first but bitter later. Spore print white.

Spores very small, 2.5–3.5(–4) × 1.7–2.5(–3) µm, subsphaeric-ovoid or broad ellipsoid. Basidia 15–25 × 4–6 µm. Pileipellis predominantly with filamentous hyphae (5–8 µm wide) but a small number of hymenidermic or subepithelial subsphaeric and oval, often interlocking elements added at places; sometimes pure filamentous.

Ecology: In groups on needle and leaf litter; in coniferous, mixed and deciduous forests; on mineral, more rarely on paludified soils; rarely on very rotten wood.

Phenology: July to November.

Moser, 1983: 135; sensu Konrad & Maublanc, 1927: pl. 267, 2; sensu Michael, Hennig & Kreisel, 1979: pl. 225; sensu Arnolds & Becker, 1993:70) is a different species, which is characterized by violet colour reaction in the hyphae of basidiocarps in 10% KOH solution. This species has not been collected in the region I studied but I have seen definite herbarium specimens with a beautiful colour reaction (IB 68/165, as *C. pseudoflammula*: Switzerland, forest east of Hausen, Hauserberg, Kt. Zug, on decayed conifer stump, 3 Oct. 1968, M. Moser; WU 10260, dupl. TAA 142172, as *C. cerina*: Austria, Steiermark, Bad Gleichenberg, Trautmannsdorf, on decayed pine stump, A. Hausknecht & W. Klofac).

Two taxa synonymous in my work, namely *R. chrysenteron* and *R. pseudoflammula*, were regarded by Bon (1999a) as independent species. This point of view is not acceptable, because the taxonomic and ecologic features indicated by Bon for distinguishing these species (for example, site in deciduous or coniferous forest on forest litter or wood, bitter or mild taste of basidiocarps, yellow or yellowish orange colour of basidicarps, etc.) are not correlated as herbarium material studied by me shows.

Stirps Fallax

Pileipellis "cellular", hymeniderm to subepithelium of sphaeropedunculate, sphaeric, clavate, pyriform to ellipsoid elements.

23. *Rugosomyces fallax* (Peck ex Sacc.) Bon Fig. 23

Agaricus fallax Peck, Bull. Buffalo Soc. Nat. Sci. 1: 44. 1873 (invàl.). – *Tricholoma fallax* Peck ex Sacc., Syll. Fung. 5: 115. 1887. – *Calocybe fallax* (Peck ex Sacc.) Singer, Lloydia 5 (2): 119. 1942 (inval.). – *Calocybe fallax* (Peck ex Sacc.) Singer ex Redhead & Singer, Mycotaxon 6 (3): 501. 1978. – *Lyophyllum fallax* (Peck ex Sacc.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Rugosomyces fallax* (Peck ex Sacc.) Bon, Doc. Mycol. 21 (82): 65. 1991. – *Melanoleuca naucoria* Murrill, N. Amer. Fl. 10 (1): 15. 1914. – *Calocybe naucoria* (Murrill) Singer, Sydowia 15: 47. 1962. – *Calocybe cerinoides* Kalamees, Z. Mykol. 60 (2): 360. 1994b.

Misapplied name: *Calocybe cerina* sensu Singer, Ann. Mycol. 41: 109. 1943; sensu auct. eur. mult. p.p.

Excluded: *Agaricus fallax* Lasch, Linnaea 4: 524. 1829 (= *Calocybe fallacissima* Singer). – *Calocybe cerina* sensu Arnolds & Becker, Coolia 36: 70. 1993. – *Rugosomyces cerinus* sensu Bon, Collybio-Marasmioides: 111. 1999a.

Selected icones: Bon, Fung. rar. Ic. col. 11: pl. 84, 1. 1979. – Courtecuisse & Duhem, Guide Champ. France Europe: 211 (N 477). 2000. – Kalamees, Mycobiota Estonia: pl. 74. 2000. – Moser & Jülich, Farbatl. Basidiomyc. 3: *Calocybe* 2 (as *C. naucoria*), 4 (as *C. fallax*). 1986. – Urbonas, Lietuvos grybai 8 (2): pl. 31, 2 (as *C. fallax*). 1997.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 110 (fig.). 1999a. – Kühner & Romagnesi, Fl. anal. Champ. sup.: 162 (as *L. fallax*). 1953. – Kalamees, Doc. Mycol. 25 (98–100): 232, 233 (fig. 1, *1* & fig. 2). 1995. – Urbonas, Lietuvos grybai 8 (2): 115 (as *C. fallax*). 1997.

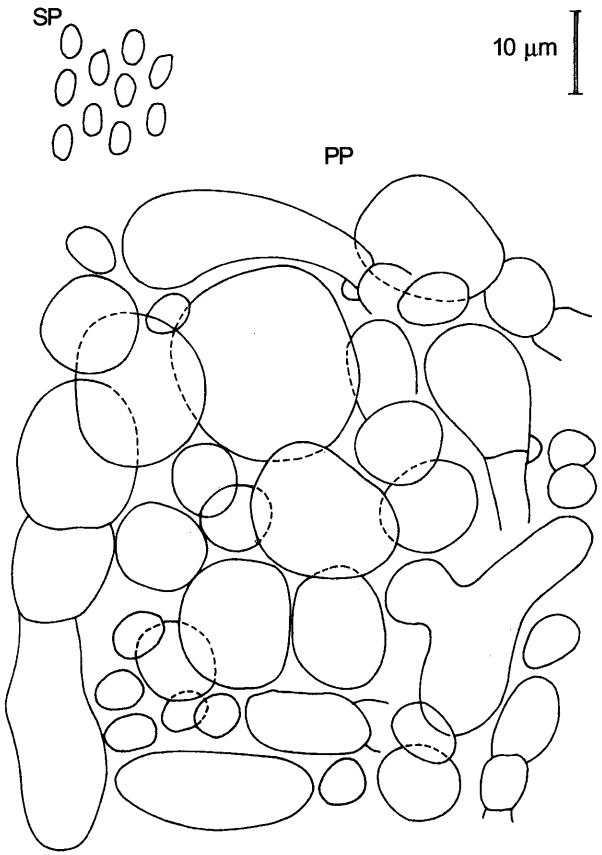


Fig. 23. *Rugosomyces fallax.*

Description: Pileus up to 3(–4.5) cm, subcampanulate-convex when young, minutely tomentose to mealy, with thin involute margin, later plano-convex, umbonate or not, with straight margin, smooth or slightly concentric wrinkled or hardly sulcate at margin, sometimes wavy, dry, mat, slightly hygrophanous or with hygrophanous spots, mostly not but

sometimes in places briefly translucently striate, melleous, orange yellow to ochraceous yellow then ochraceous brown, darker or more fulvous at centre. Lamellae crowded, narrow, adnexed, emarginate or adnate, often with tooth, deep yellow, in exsiccate whitish yellow to greyish yellow, sometimes blackening all over or browning on edge. Stipe up to 4 × 0.4 cm, cylindric, fibrillose, pruinose at apex, dry, stuffed, of same colour as pileus. Context yellow, thin. Smell and taste none or slightly farinaceous, taste sometimes slightly bitter. Spore print white.

Spores 3.5–4(–4.5) × (1.8–)2–2.5(–3) µm, smooth, broad ellipsoid. Basidia 20–25 × 5–6 µm. Pileipellis "cellular", a hymeniderm to subepithelium of sphaeropedunculate, sphaeric, clavate, pyriform to ellipsoid elements (3–)8–24(–30) µm wide, sometimes with yellow to brown contents.

Ecology: In small groups on needle forest litter of *Abies*, *Larix*, *Picea* and *Pinus*, seldom on very decayed wood, chiefly on mineral, rarely on paludified soils and on burnt ground; in coniferous, deciduous and mixed forests, also in mountains up to 1800 m a.s.l. (Altaj, Khibiny, Kamchatka).

Phenology: June to November.

Distribution: Widespread and common; with a high degree of abundance in Kamchatka (Esso) in burned larch mixed forests (Kalamees & Vaasma, 1981). **Northern Europe**: DEN, FIN!, ICE, NOR!, SWE! **Eastern Europe**: BLR!, EST!, LIT!, MO, RUC-Moscow, RUE-Perm'!, RUE-Tatariya!, RUN-Murmansk!, RUW-Leningrad! **Caucasus:** NCS-KR! **Siberia:** ALT!, BRY, IRK!, KRA! **Russian Far East:** KAM!, KHA!, PRM, SAK!

Collections examined: Belarus: Zhitkovich Distr.: Semuradzk, 14 Aug. 1974, G. Serzhanina (MSK 469, as *C. chrysenteron*). Minsk Distr.: Kryzhovik, 10. June 1984, G. Serzhanina (MSK 462, as *L. cerinum*); same locality, 6 Sep. 1987, G. Serzhanina (MSK 3940, as *C. naucoria*). Without locality, 29 July 1973, Zakharov (MSK 468, as *C. chrysenteron*). **Estonia:** Ida-Viru Co.: Gorodjonka, 6 Oct. 1969, 7th trip of Estonian mycologists (TAA 78298, as *C. naucoria*). Järva Co.: Tammsaare, Simisalu, 11 Sep. 1982, trip of Estonian mycologists (TAA 114749, as *C. naucoria*). Pärnu Co.: between Tali and Jäärja, 16 Sep. 1982, M. Vaasma (TAA 114824); Surju, 10 Sep. 1987, M. Vaasma (TAA 141816, as *C. fallax*); Kabli, Lepanina, 23 Sep. 1990, M.-L. & P. Heinonen 143-90 (TUR 102611, as *C. cerina*). Põlva Co.: Kiidjärve, 26 Aug. 1973, K. Kalamees (TAA 80531, as *C. fallax*). Tartu Co.: Ahunapalu, Vabnasaar, 25 July 1990, K. Kalamees (TAA 144690); Aardlapalu, 23 Oct. 1968, K. Kalamees (TAA 77666, as *C. fallax*). Saare Co.: Saaremaa Island, Kihelkonna, 7 Sep. 1979, trip of Estonian mycologists (TAA 113364, as *C. fallax*), 20 Aug. 1984, K. Kalamees, G. Shchukin & M. Vaasma (TAA 123715, as *C. fallax*). **Finland:** Etelä-Häme: Mustiala, Tammela, Syrjä, 10 Aug. 1866, 6 Sep. 1874, Sep. 1876, 7 Sep. 1878, 18 Sep. 1878, 1 Oct. 1878, 3 Nov. 1878, P.A. Karsten 1834, 1835, 1837, 1838, 1840, 1841, 1883 (H, as *A. (Tricholoma) cerinus* & *Collybia macilenta*); Lammi, Mataramäki, Santala, 17 Sep. 1976, 27 July 1977, 22 Sep. 1977, 7 Sep. 1978, 28 Aug. 1979, M. Korhonen & R. Tuomikoski (H, as *Calocybe macilenta*, *Collybia funicularis* & *Collybia macilenta*); Lammi, Onnenvuori, 29 Aug. 1979, M. Korhonen 2832 (H, as *Calocybe macilenta*); Virrat Comm., Pohjaslahti, Monoskylä, Hennilä, 12 Oct. 1997, I. Kytövuori 972323 (H, as *C. fallax*); Nokia, Sarpatti, Maatialanharju, Mushroom Protection Area, 28 Aug. 1998, U. Nummela-Salo & P. Salo 5526 (H, as *C. chrysenteron* = *C. fallax*). Etelä-savo: Kerimäki Comm., Ruokojärvi-Niinimäki, 1 Oct. 1994, I. Kytövuori 941184 (H, as *C. fallax*). Inarin Lappi: Utsjoki, 21 Aug. 1961, Kallio trip (TUR 15521, as *C. naucoria*); Kevo, 4 Sep. 1970, T. Ulvinen (OULU, as *Calocybe* sp.). Kainuu: Paltamo, Mieslahti, 19 Sep. 1986, T. Ulvinen (OULU, as *C. fallax*). Keski-Pohjanmaa: Kälviä, Mansikkamäki, 23 Sep. 1980, T. Ulvinen (OULU, as *C. fallax*). Kittilän Lappi: Kolari, Äkäsjokisuu, 10 Sep. 1983, T. Ulvinen (H, as *C. fallax*). Koillismaa: Kuusamo, Liikasenvaara, 16 Aug. 1977, M. & E. Ohenoja (OULU, as *C. naucoria*); same locality, Korvasvaara, 29 Aug. 1977, T. Ulvinen (OULU, as *C.* sp.); same locality, Hautala, 4 Sep. 1981, I. Kytövuori 811176 (H, as *C. fallax*); same locality, Juuma, Hautaniityvuoma, 29 Aug. 1979, T. Ulvinen (OULU, as *C. fallax*). Oulun Pohjanmaa: Kiiminki, 6 Sep. 1979, T. Ulvinen (OULU, as *C. fallax*); Utajärvi, Ylä-Utos, 6 Aug. 1986, E. Ohenoja (OULU, as *C.* sp.); Oulu, W of Sanginsuu, 19 Aug. 1991, J. Issakainen (OULU, as *C. fallax*). Pohjois-Häme: Äänekoski, Parantala, Aittoniemi, 6 Aug. 1981, R. Storbacka (OULU, as *C. naucoria*), 21 Aug. 1986, T. Ulvinen (OULU, as *C. fallax*). Pohjois-Karjala: Juankoski, Säyneinen, Ala-Siikajärvi, Huosiaisniemi, 10 Sep. 1980, I. Kytövuori 80884 (H, as *C. fallax*); Lieksa, Ruunaa, 6 Sep. 1980, I. Kytövuori 80706 (H, as *C. fallax*). Pohjois-Savo: Siilinjärvi, 26 Aug. 1988, U. Söderholm, J. Laaksonen, P. Salo & L. Kosonen (H, as *C. cerina*). Sompion Lappi: Pelkosenniemi, Suvanto, Kaatunenniemi, 5 Sep. 1989, T.Ulvinen (OULU, as *C. fallax*). Uusimaa: Raisio, Vatsela, 10 Oct. 1935, M. Laurila (H, indet.); Rymättylä, Raulahti, Välimäki, 28 Aug. 1981, R. Tuomikoski (H, as *Gymnopilus* sp.); Sipoo, Östersundom, 28 Aug. 1981, M. Aalto & L. Seppänen 87 (H, as *C. fallax*); Nurmijärvi, Kiljava, 24 July 1985, P. Askola 1674 (H, as *C. fallax*); Espoo, Nuuksio, 1 Sep 1993, L. Hiltunen & I. Kytövuori 93611 (H, as *C. fallax*); Järvenpää, Satukallio, 12 July 1996, I. Kytövuori 96082 (H, as *C. fallax*); Järvenpää, Palkohauta, 20 July 1998, I. Kytövuori 98096 (H, as *C. fallax*). Varsinais-Suomi: Parainen, Attu, 4 Aug. 1953, O. v. Schulmann (H, as *Collybia macilenta* = *Calocybe fallax*, det. I. Kytövuori); Karkkila, Tuorila, 18 Aug. 1954, O. v. Schulmann, (H, as *Collybia macilenta* = *Calocybe fallax*, det. I. Kytövuori); Vihti, Vihtijärvi, 14 Aug. 1979, M. Korhonen & R. Tuomikoski (H, as *Collybia macilenta*); Vihti, Köykkälä, leg. I. Piipponen (H, as *Calocybe chrysenteron*); Vihti Comm., Salmenkartano campsite, N of the lake Iso Parikas, 3 Aug. 1997, I. Kytövuori 97084 (H, as *C. fallax*). **Lithuania:** Vilnius Distr.: Vilnius, 5 Sep. 1969, V. Urbonas (BILAS 10884), 8 Sep. 1969, V. Urbonas (BILAS 10881), 7 July 1972, V. Urbonas (BILAS 12186), 25 Sep. 1975, V. Urbonas (BILAS 13199) (all specimens as *C. cerina*). Švenčionys Distr.: near Kaltanėnai, 27 Sep. 1971, V. Urbonas (BILAS 12346, as *C. chrysenteron*). Varėna Distr.: near Žilinėliai, 20 Sep. 1972, V. Urbonas (BILAS 12471, as *C. cerina*). **Norway:** Randsfjord, Skrukli, 14 Sep. 1984, A. Elborne (C 32192, as *C. naucoria*); Nordingra par., Halsvik ravine, 1.5 km W of Rävän, 2 Aug. 1993, I. Britt Vesterberg (S, as *C. fallax*). Finnmark: Nesseby, Karlbotn, 7 Sep. 1970, T. Ulvinen (OULU, as *C. naucoria*). **Russia:** Tatariya: Raifa,

1940, L. Vasil'eva (VLA, as *T. cerinum*), 19 Aug. 1943, B. Vasil'kov (LE 5923, as *T. chrysenteron*). Leningrad Prov.: S fromVsevolozhskij, 1940, R. Singer (LE 6316, as *C. cerina*). Murmansk Prov.: Khibiny Mts., 10 & 28 Aug. 1974, L. Mikhajlovskij 46 (74), A-14 (LE 18163, 18165; as *C. cerina*). Krasnodar Terr.: Caucasus Nature Reserve, A. Kovalenko 84-7-61 (LE 18162, as *C. cerina*). Perm' Prov.: Verkh-Kvazhva, 29 Aug. 1988, A. Petrov VII-88-K (IRK, as *Calocybe* sp.), 25 & 26 Aug. 1993, K. Kalamees (TAA 145881, 145913; as *C.* sp.). Altaj Terr.: Chujskie Alpy, Aktura, 1 Aug. 1937, R. Singer & L. Vasil'eva A-468 (LE 6332, as *C. cerina*), R. Singer A-466 (LE 18179, as *C. cerina*), A-657 (LE 18160, as *C. naucoria*), A-631 (LE 18152, as *C. naucoria*), A-693 (LE 18180, as *C. cerina*). Khabarovsk Terr.: Komsomol'sk Nature Reserve, 22 Aug. 1986, E. Bulakh (VLA, as *C. naucoria*). Krasnoyarsk Terr.: Sayano-Shusensk Nature Reserve, by Uzun-Su River, 29 July 1984, A. Kovalenko (LE 18162, as *C. cerina* s. Singer). Irkutsk Prov.: near Irkutsk, 24 Aug. 1981, A. Petrov VIII-81-200 (IRK, as *C. cerina*); Baikal, Maloe more, by Gulf of Ulan, 8 Aug. 1984, A. Petrov VIII-81-600 (IRK, as *C. naucoria*); same locality, MRS, by Gulf of Radost', 17 Aug. 1984, A. Petrov VIII-84-31 (IRK, as *C. naucoria*); Bratsk Distr., Sukhaya Zorb', 16 Aug. 1983, K. Kalamees & M. Vaasma (TAA 122919, as *C. fallax*); Bratsk, 7 Aug. 1988, Gundar VIII-88-01 (IRK, as *C. cerina*). Kamchatka Prov.: Esso, Gornyj, 4 Aug. 1978, K. Kalamees & M. Vaasma (TAA 84951, as *C. naucoria*). Sakhalin Prov.: Novo-Aleksandrovsk, 20 Aug. 1970, K. Kalamees (TAA 78984, as *C. fallax*). **Sweden:** Medelpad: Getryggen, 25 Aug. 1986, A. Elborne (C 24928, as *C. fallax*); Borgsjö, Harrån, 2 Sep. 1991, A. Aronsen (S, as *C. cerina*); Tuna sn, Bällsta, 30 Sep. 1982, S. Muskos 1208 (UPS, as *C.* sp.?); same locality, Sköte, 4 Sep. 1985, S. Muskos 5327 (S, as *C. cerina*); Lombäcken-Harrån, 11 Sep. 1995, I. Kytövuori (TAA 146632), E. Engerdahl (TAA 146802); S of Sillre, 14 Sep. 1995, A. Blom (TAA 146778, as *C. fallax*); Haverö, Torrflonäs, 3 Sep. 1997, J. Vesterholt (C 27664, as *C. fallax*). Småland: Femsjö sn, Slättagårds, 17 Sep. 1948, S. Lundell & G. Haglund 5471 (UPS, as *T. cerinum*); Femsjö par. "Slättagärdsskogen", 24 Sep. 1943, S. Lundell (LE 6317; Fungi exs. suec. No 1709; as *T. cerinum*). Uppland: Älvkarleby, 29 Aug. 1991, Å. Strid 19227 (S, as *C. cerina*); Palarna, Rättvik, Rättviksheden, 26 Aug. 1987, B. Wasstorp (S, as *C.* cf. *fallax*); Bälige sn, Löten, 7 Aug. 1956, H. Smith (UPS, as *T. cerinum*); Bondkyrka sn, Sunnerståsen, 28 Aug. 1936, S. Lundell (UPS, as *T. cerinum*); Dannemora par., Andersby, 21 Sep. 1977, S. Ryman 4473 (UPS, as *C. cerina*); Lena par., Hummeltorpet, 16 Sep. 1980, S. Ryman 5919 (UPS, as *C. cerina*). Västmanland: Sala, Barnelund, 26 Aug. 1945, R. Morander 470 (UPS, as *T. cerinum*); Abisko, 20 Aug. 1981, R. Pöder (IB 81/205, as *C. naucoria*).
Extralimital. Austria: Eggenburg, Etzmannsdorf, Sauberg, 26 Oct. 1981, A. Hausknecht (WU 5039, as *C. fallax*; dupl. TAA 142170); Innsbruck, Sonnenburgerhof, 19 VI 1965, M. Moser (IB 65/13, as *C. naucoria*); Tirol, Ötztaler Alpen, Sölden, 24 Aug. 1969, E. Kankainen & H. Haas (OULU, as *C. pseudoflammula*); Zwieselstein, 26 Aug. 1969, E. Kankainen (OULU, as *C. naucoria*), 24 Aug. 1973, Furrer (IB 73/15, as *C. cerina*); Station Gurgl, 29 Aug. 1963, M. Moser (IB 63/588, as *C. naucoria*); Mühlbachtal near Matrei, alt. ca 1300 m, 23 Aug. 1967, M. Moser (IB 67/62, as *C. naucoria*). **Mongolia:** Khentej Distr., leg. G. Uranchimeg (LE 18164 = 8544, as *C. naucoria*).

Notes: *R. fallax* is characterized by pure "cellular" pileipellis; small and thin-fleshed, on surface deep yellow basidiocarps with whitish context; indistinct smell and taste; blackening in exsiccate lamellae; minute ellipsoid spores; habitat typically in coniferous forests.

A very similar species is *R. chrysenteron*, whose basidiocarps are bigger, lamellae never blacken in exsiccate, context is deep yellow, pileipellis from filamentous hyphae.

R. fallax is considered in the literature and herbaria often under the name *Calocybe cerina* (cf. 'Notes' by *R. chrysenteron*). Problems of the taxonomy of the species of the *R. fallax* complex are treated in details by Kalamees (1995).

24. *Rugosomyces obscuratus* (P. Karst.) Kalamees Fig. 24

Tricholoma cerinum Pers. ssp. *obscuratum* P. Karst., Meddeland. Soc. Fauna Fl. Fenn. 5: 43. 1879b (basionym). – *Rugosomyces obscuratus* (P. Karst.) Kalamees, Doc. Mycol. 25 (98–100): 235. 1995.

Selected descriptions & figs: Karsten, Meddeland. Soc. Fauna Fl. Fenn. 5: 43. 1879b. T. cerinum ssp. obscuratum – Kalamees, Doc. Mycol. 25 (98–100): 233 (fig. 1, 2), 235. 1995.

Description: Pileus up to 9 cm, when young convex then plano-convex to plane, umbonate, minutely tomentose, with thin involute margin, slightly wavy, hardly sulcate at margin, dry, mat, hygrophanous in places, buff brown, rufous brown to fuligineous. Lamellae crowded, adnexed to sinuate, often with tooth, dirty yellow, not blackening in exsiccation. Stipe up to 6 × 1.5 cm, cylindric or slightly thickening downwards, fibrillose, pruinose at apex, dry, of same colour as pileus. Context yellowish. Smell and taste none. Spore print white.

Spores 3.5–5 × 2.5–3 µm, smooth, ellipsoid. Pileipellis a hymeniderm to subepithelium of very big clavate, pyriform, sphaeric, ovoid, ellipsoid or sphaeropedunculate elements, (5–)15–40(–50) µm wide.

Ecology: In small groups on needle litter in coniferous and mixed forests with *Picea*, *Pinus* and *Larix*, rarely on burnt ground.

Phenology: August to November.

Distribution: Very rare. **Northern Europe:** FIN! **Siberia:** ALT! **Russian Far East:** KAM!

Collections examined: Finland: Etelä-Häme: Tammela, Mustiala, Syrjä, 2 Aug. 1866, 4 Oct. 1869, Sep. 1876, 3 Oct. 1878, 28 Oct. 1878, 3 Nov. 1878, P.A. Karsten 1831, 1832, 1833, 1836, 1839, 1842 (holotype) (H, all specimens as *T. cerinum* var. *obscuratum* = *C. onychina*, det. I. Kytövuori). **Russia:** Altaj Terr.: R. Singer A-466 (H 529), A-693 (LE 18179, 18180, both as *C. cerina*). Kamchatka Prov.: Esso, 5 Aug. 1978, K. Kalamees & M. Vaasma (TAA 84954, as *C. fallax*).

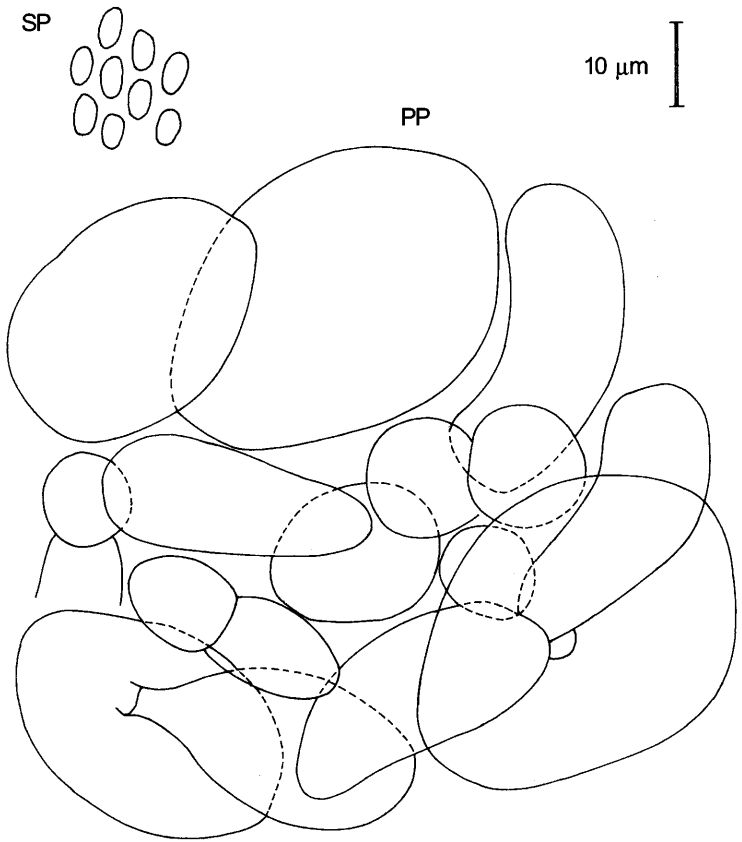


Fig. 24. *Rugosomyces obscuratus.*

Notes: *R. obscuratus* is characterized by fuligineous pileus and stipe, yellow lamellae, yellowish context without smell and taste; pileipellis is a hymeniderm to subepithelium of very big (to 50 µm wide) sphaeric and sphaeropedunculate elements; spores rather broad (2.5–3 µm). Similar *R. fallax* has smaller pileipellis elements (up to 24 µm in diam.), narrower spores (1.8–2.5 µm) and orange yellow basidiocarps. Very similar *R. onychinus* has obviously smaller pileipellis elements (up to 15 µm wide) and purplish brown pileus and stipe.

Stirps Onychinus

Characteristic features cf. by *R. onychinus.*

25. *Rugosomyces onychinus* (Fr.) Raithelh. Fig. 25

Agaricus onychinus Fr., Epicr.: 41. 1838. – *Lyophyllum onychinum* (Fr.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Calocybe onychina* (Fr.) Kühner ex Donk, Beih. Nova Hedwigia 5: 43. 1962. – *Rugosomyces onychinus* (Fr.) Raithelh., Metrodiana 9 (2): 47. 1980b.

Selected icones: Bresadola, Iconogr. mycol. 3: pl. 101 (as *T. onychinum*). 1928. – Cetto, Enzykl. Pilze 2: 362 (as *C. onychina*). 1987. – Gulden in Gulden & Jenssen, Arctic Alpine Fungi 2: 7 (as *C. onychina*). 1988. – Moser & Jülich, Farbatl. Basidiomyc. 3, *Calocybe* 2 (as *C. onychina*). 1986. – Zerova, Atlas gribiv Ukraini: fig. 67, 1 (as *C. onychinum*). 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 109 (fig.). 1999a. – Cetto, Enzykl. Pilze 2: 363 (as *C. onychina*). 1987.– Gulden in Gulden & Jenssen, Arctic Alpine Fungi 2: 7 (as *C. onychina*). 1988. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 163 (as *L. onychinum*). 1979.

Description: Pileus up to 7 cm, convex then plano-convex to depressed, often umbonate, with involute margin, often wavy with age, slightly hygrophanous, not translucently striate, smooth, becoming slightly felty, mat, purplish, chestnut-coloured to blackish brown, with darker umber centre, sometimes with hardly lilac tint. Lamellae adnexed to adnate (with a tooth), crowded, narrow, flavous, bright yellow to olivaceous yellow, sometimes staining dark brownish or blackish. Stipe up to 5 × 1 cm, cylindric, solid, stuffed, apex minutely pubescent, below fibrillose, base white tomentose, of same colour as pileus but paler, often with greyish tint, sometimes becoming blackish at base. Context sordid yellowish white, thick in pileus. Smell and taste none. Spore print white.

Spores 4–4.5(–5) × (2–)2.5–3 µm, ellipsoid, smooth. Basidia 20–25 × 5–6 µm. Pileipellis a subhymeniderm of clavate to pyriform elements, 8–15 µm wide.

Ecology: In coniferous forests.

Phenology: August to October.

Distribution: Rare. **Northern Europe:** FIN!, NOR, SWE!, RUN-Murmansk! **Eastern Europe:** LAT, UKR. **Caucasus:** TCS-GR. **Siberia:** IRK!

Collections examined: Finland: Etelä-Savo: Kerimäki Comm., Ruokojärvi-Niinimäki, 1 Oct. 1994, I. Kytövuori 941183 (H, as *C. onychina*). Kittilän Lappi: Kolari, Äkäsjokisuu, 10 Sep. 1983, T. Ulvinen (H, UPS; as *C. onychina*); same locality, 6 Sep. 1988, I. Kytövuori 881441 (H, as *C. onychina*). Koillismaa: Kuusamo Comm., Oulanka National Park, N of the Biological Station, 28 Aug. 1988, 1 Sep 1992, I. Kytövuori 88940, 921459 (H, as *C. onychina*); same locality, 28 Aug. 1988, P. Salo 6490 (H, as *C.*

onychina). Perä-Pohjanmaa: Laurila, Kallinkangas, 17 Aug. 1981, K. Kalamees & T. Ulvinen (TAA 121781, as *C. onychina*). Pohjois-Savo: Lapinlahti, Rasila, 5 Sep. 1956, O. v. Schulmann (H, as *C. onychina*). Sompion Lappi: Savukoski Comm., Tulppio, Ainijärvi, 29 Aug. 1992, I. Kytövuori 921306 (H, as *C. onychina*). **Russia:** Irkutsk Prov.: Bratsk Distr., Kob', 17 Aug. 1983, K. Kalamees & M. Vaasma (TAA 122940, as *C. onychina*). Murmansk Prov.: Khibiny Mts., Tul'ek, 24 Aug. 1974, L. Mikhajlovskij (LE 6337, as *C. onychina*). **Sweden:** Medelpad: Bergåsen, P. Kytövuori, 13 Sep. 1995 (TAA 146671, as *C. onychina*).

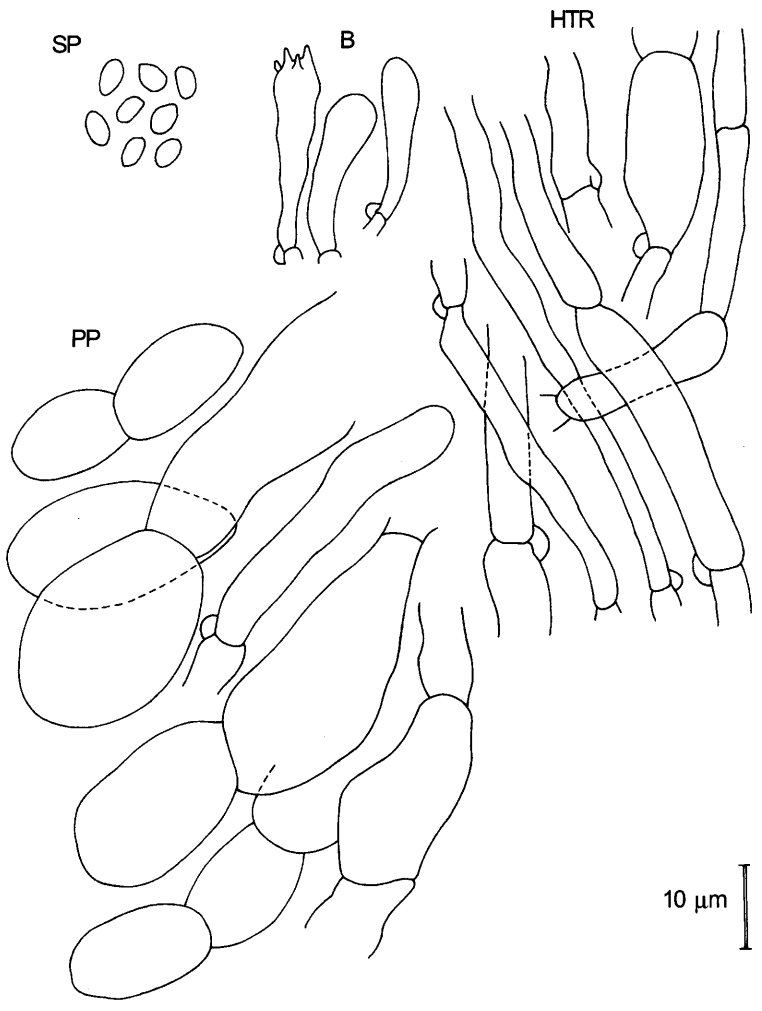


Fig. 25. *Rugosomyces onychinus.*

Extralimital. Austria: Mühltal near Matrei, ca 1300 m a.s.l., 23 Aug. 1967, M. Moser 67/61 (IB, as *C. onychina*).

Notes: *R. onychinus* is characterized by purplish brown to blackish brown pileus and stipe, bright yellow lamellae, sordid yellowish context without smell and taste; pileipellis is a subhymeniderm of pyriform and clavate elements.

Sect. CARNEOVIOLACEI (Singer ex) Bon, Doc. Mycol. 21 (82): 65. 1991.

Lamellae pure white, creamy or pale yellowish when adult. Pileus violet, pink or blackish brown, somewhat silky-fibrillose.

Stirps Carneus

Characteristic features cf. by *R. carneus.*

26. *Rugosomyces carneus* (Bull. : Fr.) Bon Fig. 26

Agaricus carneus Bull., Herb. France 12: pl. 533, fig. 1. 1792; Bull. : Fr., Syst. Mycol. 1: 130. 1821. – *Calocybe carnea* (Bull. : Fr.) Kühner ex Donk, Nova Hedwigia 5: 43. 1962. – *Tricholoma carneum* (Bull. : Fr.) P. Kumm., Führ. Pilzk. 1871. – *Lyophyllum carneum* (Bull. : Fr.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Rugosomyces carneus* (Bull. : Fr.) Bon, Doc. Mycol. 21 (82): 66. 1991. – *Agaricus paeonius* Fr., Epicr.: 42. 1838.

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 142 (as *C. carnea*). 1991. – Cetto, Enzykl. Pilze 2: 365 (as *C. carnea*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe: 211 (N 480). 2000. – Lange, Fl. agar. dan. 1: pl. 24C (as *T. carneum*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 373 (fig. 227, as *C. carnea*). 1979. – Moser & Jülich, Farbatl. Basidiomyc. 3, *Calocybe* 5 (as *C. carnea*). 1986. – Phillips, Mushr. other fungi: 43 (as *C. carnea*). 1981. – Ricken, Blätterpilze 2: pl. 94, 8 (as *T. carneum*). 1915. – Ryman & Holmåsen, Suomen pohjolan sienet: 305 (as *C. carnea*). 1987. – Urbonas, Lietuvos grybai 8 (2): pl. 31, 1 (as *C. carnea*). 1997.

Selected descriptions: Bon, Collybio-Marasmioides: 110 (fig.). 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 142 (as *C. carnea*). 1991. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 102 (as *C. carnea*). 1992. – Lange, Fl. agar. dan. 1: 57 (as *T. carneum*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 372 (as *C. carnea*). 1979. – Urbonas, Lietuvos grybai 8 (2): 115 (as *C. carnea*) 1997.

Ecology: Mainly solitary (not fasciculate) on humus (or herb debris?) in grasslands and lawns, in tundra, outside of forests.

Phenology: July to September.

Distribution: Rare, more distributed (occasional to common) in northern parts of Northern countries, in tundra communities (in Iceland partly common!) (cf. Hansen & Knudsen, 1992). In Estonia only one find on Saaremaa Island (V. Liiv, *in litt.*). **Northern Europe:** DEN!, FIN!, ICE, NOR!, SWE! **Eastern Europe:** EST, LIT!

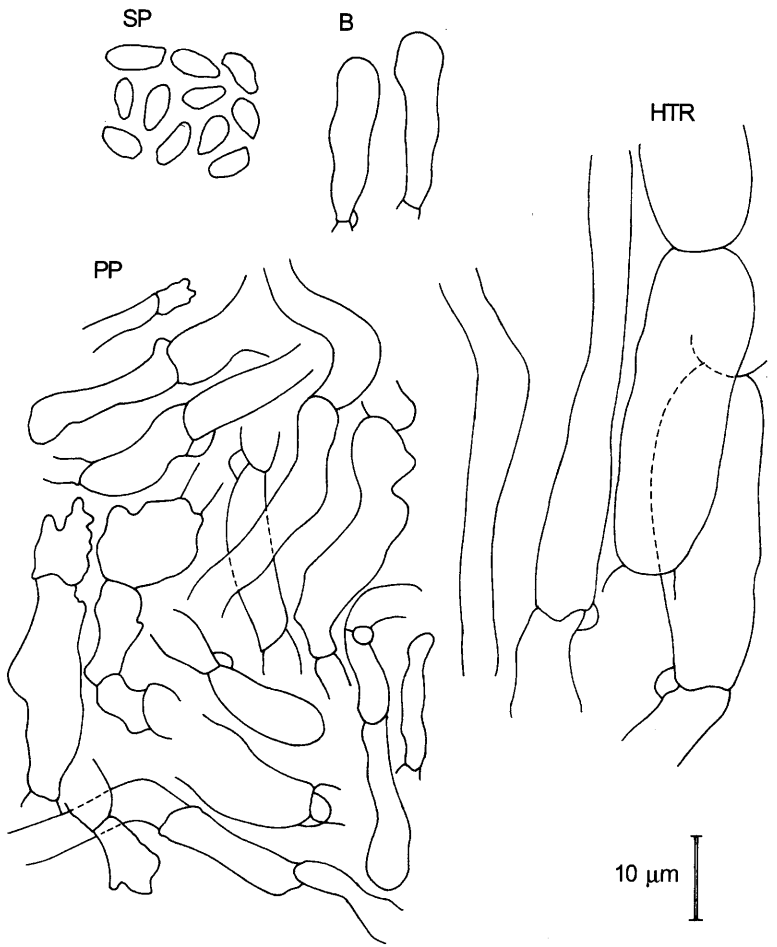


Fig. 26. *Rugosomyces carneus.*

Description: Pileus up to 2(–3) cm, plano-convex, finally plane to slightly depressed, with incurved margin, sometimes with papilla, dry, mat, very faintly fibrillose-flocculose-granulose at first, then glabrescent, pure pale flesh pink or salmon. Lamellae crowded, rather narrow, emarginate, white. Stipe rather short, up to 4 × 0.5 cm, cylindric, often attenuated downwards, fistulose, dry, concolorous with pileus but brighter, shortly (1 mm!) and densely white pruinose-flocculose at apex, downwards very fine fibrillose-flocculose at first, then glabrescent, naked (not tomentose-shaggy) at base. Context white. Smell and taste indistinct. Spore print white.

Spores 3–7(–8) × 1.8–3 µm, ellipsoid, naviculare-ellipsoid to cylindric-ellipsoid, smooth. Basidia 20–25 × 5–6 µm. Pileipellis a trichoderm of 4–7 µm wide hyphae (with brownish pigmentation in upper part). Hymenophoral trama hyphae 6–12 µm wide.

Collections examined: Denmark: Sjælland: Eskebjerg, Vesterlyng, 7 Sep. 1974, H. Knudsen (C, as *C. carnea*). **Finland:** Etelä-Häme: Mustiala, 12 Aug. 1881, P.A. Karsten (H, as *T. carneolum*). Oulun Pohjanmaa: Kuivaniemi, Alahyry, 21 July 1984, T. Ulvinen & H. Väre (H, as *C.*). **Lithuania:** near Vilnius, 6 July 1972, V. Urbonas (BILAS 12215, as *C. carnea*). **Norway:** Møre og Romsdal: Kristiansund, 7 Aug. 1951, J. Stordal (TRH, as *T. carneum*). **Sweden:** Uppland: Alsike par., Morga, 8 Aug. 1977, S. Ryman 4269 (as *C. carnea*); Dalby par., Dalkarlskärret, 17 Aug. 1974, S. Ryman 2581 (UPS, as *C. carnea*); Uppsala Comm., 2 Sep. 1994, A. Blom & K. Kalamees (TAA 146243a, as *C. carnea*).
Extralimital. Switzerland: Pont de Nant, 1280 m a.s.l., Bex Kt. Waadt, 1 Sep. 1986, M. Moser 86/149 (IB, as *C. carnea*).

Notes: *R. carneus* is a very good species, which is clearly different from *R. persicolor.* The following features are characteristic of this rare species: pure flesh pink coloured plane pileus, the stipe is rather short, relatively solid and glabrous right down to the base, white pruinose-flocculose at apex only (with a very narrow white determinate zone!), emarginate lamellae (not decurrent with tooth!); it grows solitary (not fasciculate) on grasslands (not in forests). Similar *R. persicolor* has more sordid flesh brown coloured convex-umbonate pileus, decurrent lamellae with tooth, from base upwards (to 1/2–2/3) white strigose, hairy or shaggy stipe, predominantly fasciculate habit, mostly in forests.

R. carneus and *R. persicolor* are very often mixed up in the literature and herbaria. Species identification in such cases is often difficult. Therefore, for example, the findings of *C. carnea* sensu Sheremeteva (1908–1909), Lebedeva (1949), Vasil´eva (1973), Zerova et al. (1979), Bulakh (1984), Melik-Khachatryan et al. (1985), Dāniele [Avota] & Krastiņa (2002) from Eastern Europe and Asia are doubtful.

Stirps Ionides

Basidiocarps rather vivid or dull coloured – violet, pink, flesh-brown, purple brown. Spores cylindric-ellipsoid, navicular-ellipsoid to subconic.

27. *Rugosomyces ionides* (Bull. : Fr.) Bon Fig. 27

Agaricus ionides Bull., Herb. France 12: pl. 533, fig. 3. 1792. – *Agaricus ionides* ("*jonides*") Bull. : Fr., Syst. mycol. 1: 107. 1821. – *Tricholoma ionides* (Bull. : Fr.) P. Kumm., Führ. Pilzk.: 130. 1871. – *Lyophyllum ionides* (Bull. : Fr.) Kühner & Romagn., Fl. anal. Champ. sup.: 162. 1953 (inval.). – *Calocybe ionides* (Bull. : Fr.) Kühner ex Donk, Beih. Nova Hedwigia 5: 43. 1962. – *Rugosomyces ionides* (Bull. : Fr.) Bon, Doc. Mycol. 21 (82): 66. 1991.

Selected icones: Bon, Collybio-Marasmioides: pl. 4A. 1999a. – Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 145 (as *C. ionides*). 1991. – Cetto, Enzykl. Pilze 2: 358 (as *C. ionides*). 1987. – Courtecuisse & Duhem, Guide Champ. France Europe : 211 (N 478). 2000. – Dāniele, Meiere & Vimba, Latvijas sēnes: pl. 68 (as *C. ionides*). 2001. – Kalamees, Mycobiota Estonia: pl. 74. 2000. – Lange, Fl. agar. dan. 1: pl. 25D (as *T. ionides*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 373 (as *C. ionides*). 1979. – Moser & Jülich, Farbatl. Basidiomyc. 3, *Calocybe* 3 (as *C. ionides*). 1986. – Urbonas, Lietuvos grybai 8 (2): pl. 32, 1 (as *C. ionides*). 1997.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 111 (fig.) (as *R. ionides*). 1999a. – Cetto, Enzykl. Pilze 2: 359 (as *C. ionides*). 1987. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 102, 415 (fig. 80) (as *C. ionides*). 1992. – Kühner & Romagnesi, Fl. anal. Champ. sup.: 162 (as *L. ionides*). 1953. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 372 (as *C. ionides*). 1979. – Urbonas, Lietuvos grybai 8 (2): 116 (as *C. ionides*). 1997.

Description: Pileus up to 6 cm, when young subcampanulate-convex then plane to convex, umbonate, surface minutely tomentose, with thin involute margin, smooth, dry, mat, inhygrophanous, grey violet or brown violet, pure violet at margin, more brown in centre. Lamellae crowded, emarginate or adnate (sometimes with a tooth), white becoming creamy. Stipe up to 6 × 1.2 cm, cylindric, cottony-fibrillose, dry, stuffed, base white tomentose, with same colour as pileus. Context whitish, often with lilac tint, thin. Taste and smell strongly farinaceous. Spore print pale creamy.

Spores 5–6(–7) × 2.5–3(–3.5) µm, Q = 1.7–2, cylindric-ellipsoid, sometimes somewhat conic. Basidia 20–25 × 5–6 µm. Pileipellis a mixture of filamentous hyphae 3–5 µm wide and subtrichodermic (sometimes interlocking) elements up to 12 µm wide.

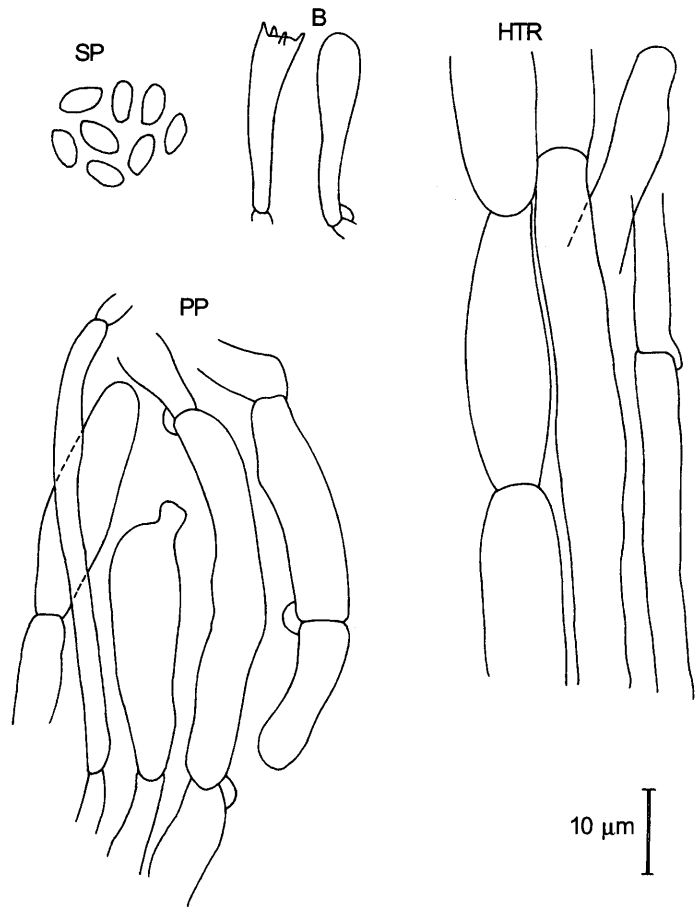


Fig. 27. *Rugosomyces ionides.*

Ecology: On leaf litter and needle litter in deciduous, mixed and coniferous forests with *Quercus*, *Fagus*, *Betula*, *Hippocastanus*, *Picea*, *Pinus* etc., mainly in broad-leaved deciduous forests.

Phenology: July to October.

Distribution: Rather rare but widespread. **Northern Europe**: DEN, FIN!, ICE?, NOR, SWE. **Eastern Europe**: BLR!, EST!, LAT, LIT!, MO, UKR, RUC-Mordoviya!, RUC-Penza, RUE-Bashkiriya, RUS-Volgograd! **Caucasus:** NCS-KC, TCS-AZ, TCS-AR, TCS-GR. **Middle Asia:** KAZ. **Russian Far East:** KHA, PRM!

Collections examined: Belarus: Gomel' Prov.: Zhitkovich Distr., Najda, 21 Aug. 1967, G. Serzhanina (MSK, as *L. ionides*). **Estonia:** Hiiu Co.: Hanikatsi Islet, 24 Aug. 1967, H. Kelder (TAA 76887, as *C. ionides*). Pärnu Co.: Mihkli, 28 Aug. 1989, E. Bendiksen & L. Ryvarden (TAA 144330, as *C. ionides*). Saare Co.: Abruka Island, 25 Aug. 1984, K. Kalamees (TAA 123766, as *C. ionides*); Kessulaid Island, 10 Oct. 1983, K. Kalamees (TAA 123303, *C. ionides*). Tartu Co.: Peedu, 29 Sep. 1971, E. Nilson (TAA 79957, as *C. ionides*). **Finland:** Etelä-Häme: Ypäjä, Kartano, 16 Aug. 1993, J. Pykälä 12195 (H, as *C. ionides*, det. H. Harmaja). Uusimaa: Helsinki, Torpparinmäki, 21 Aug. 1988, T. Ahti 47484 (H, as *C. ionides*). **Lithuania:** Palanga, 13 July 1960, J. Mazelaitis (BILAS 3643, as *T. ionides*); Vilnius, 30 Aug. 1972, 8 Sep. 1972, V. Urbonas (BILAS 12452, 13202; as *C. ionides*). **Russia:** Mordoviya: Mordoviya Nature Reserve, 1936, Kuznetsov (LE 6335, as *T. ionides*). Volgograd Prov.: Kamyshin, 11 Aug. 1950, expedition of Moscow State University (LE 6336, as *T. ionides*). Primorye Terr.: Anisimovka, Khualaza Mt., 1 Aug. 1970, K. Kalamees (TAA 78732, as *C. ionides*).
Extralimital. Germany: Baden-Württemberg: Konstanz, Liggeringen, 1 Oct. 1981, T. Ulvinen (OULU, as *C. ionides*).

Notes: *R. ionides* is a very nice species, whose pileus, stipe and mostly context are violet, lamellae white becoming creamy, smell and taste strongly farinaceous; spores are rather big, cylindric-ellipsoid. Similar *R. obscurissimus* has very dark fuligineous to purple black pileus and stipe. Macroscopically *R. ionides* can be sometimes misidentified with *Entoloma* spp. or even with *Lepista sordida* (Schum. : Fr.) Singer.

28. *Rugosomyces obscurissimus* (A. Pearson) Bon Fig. 28

Tricholoma ionides var. *obscurissima* A. Pearson, Trans. Brit. Mycol. Soc. 29: 192. 1946. – *Calocybe obscurissima* (A. Pearson) M.M. Moser, Röhrlinge Blätterpilze: 101. 1967. – *Tricholoma obscurissimum* (A. Pearson) Hora, Trans. Brit. Mycol. Soc. 43 (2): 459. 1960. – *Rugosomyces obscurissimus* (A. Pearson) Bon, Doc. Mycol. 21 (82): 66. 1991. – *Tricholoma conicosporum* Métrod, Rev. Mycol. 4: 107. 1939 (inval.).

Selected icones: Alessio, Micol. Ital. 8 (1): 17 (pl. 22) (as *C. obscurissima*). 1979. – Bon, Collybio-Marasmioides: pl. 4B-C. 1999a. – Cetto, Enzykl. Pilze 2: 360 (as *C. obscurissima*). 1987. – Lange, Svampe 32: 12. 1995. – Métrod, Rev. Mycol. 4: pl. 2, 5 (as *T. conicosporum*). 1939. – Moser & Jülich, Farbatl. Basidiomyc. 3, *Calocybe* 3 (as *C. obscurissima*). 1986.

Selected descriptions & figs: Alessio, Micol. Ital. 8 (1): 18–19 (as *C. obscurissima*). 1979. – Bon, Doc. Mycol. 24 (96): 33, 39 (fig. 3C). 1995a. – Bon, Collybio-Marasmioides: 112 (fig.). 1999a. – Cetto, Enzykl. Pilze 2: 361 (as *C. obscurissima*). 1987. – Métrod, Rev. mycol. 4: 107. 1939 (as *T. conicosporum*). – Pearson, Trans. Br. Mycol. Soc. 29: 192 (as *T. ionides* var. *obscurissima*). 1946.

Description: Pileus up to 3.5 cm, convex then plane to slightly depressed, minutely radially folded in centre, often squamulose-fissile, minutely tomentose to rather glabrous, dry, not hygrophanous, dark purple brown to fuligineous or purple blackish, sometimes with violet tinge, paler at margin. Lamellae rather distant and broad, emarginate with decurrent tooth, sordid creamy buffy then pale ochraceous. Stipe up to 5 × 0.7 cm, rather solid, cylindric or somewhat tapering downward, cottony fibrillose, white tomentose at base, concolorous with pileus or slightly paler. Context whitish, in stipe somewhat yellowish. Smell and taste hardly farinaceous, mild. Spore print white.

Spores cylindric- to conic-ellipsoid, very variable in size, (4–)4.5–7(–8) × (2–)2.5–3.5 µm. Q = 1.5–2. Basidia short, about 20 × 5 µm. Pileipellis a subtrichoderm to hymeniderm, partly of sphaero- to pyriform-pedunculate, often interlocking elements, up to 15 µm wide (contents in lower part of cells sometimes brownish by 3% KOH; pedunculate part often very long, about 15–20 × 3.5 µm).

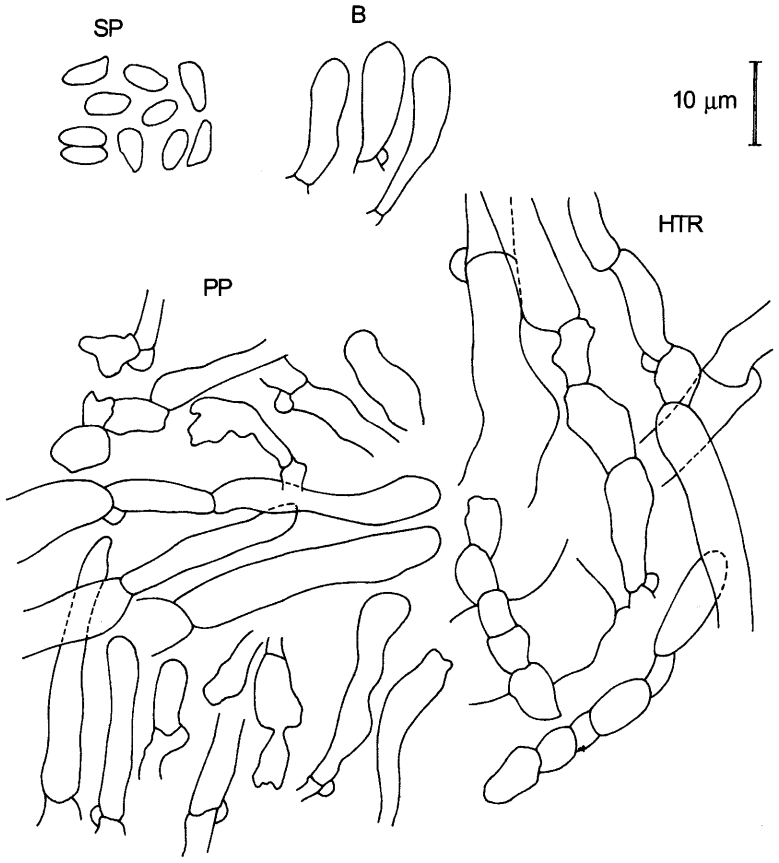


Fig. 28. *Rugosomyces obscurissimus.*

Ecology: On debris in deciduous forests.

Phenology: August to October.

Distribution: Very rare. **Northern Europe:** DEN!, FIN!, NOR. **Eastern Europe:** EST!

Collections examined: Denmark: Sjaelland: Allindelille Fredskov, 30 Sep. 1990. H. Knudsen & M. Sasa (C 12714, as *C. obscurissima*). **Estonia:** Saare Co.: Abruka Island, 9 Sep. 1979, K. Kalamees and members of a mycological trip (TAA 113459, as *C. obscurissima*); same island, 6 July 1990, K. Kalamees (TAA 1444647, as *C. ionides*). **Finland:** Uusimaa: Helsinki, Myllypuro, 6 Oct. 1984, R. Saarenoksa 43384 (H, as *C. ionides*), 30 Aug. 1988, R. Saarenoksa 26488 (H, as *C. obscurissima*). Inarin Lappi: Utsjoki, Kevo, 16 Aug. 1988, I. Kytövuori (TUR, as *C. obscurissima*). **Extralimital. France:** d'Ardon Gyra, 24 Oct. 1938, G. Métrod 952 (LE, as *T. conicosporum,* holotype). **Germany:** Baden-Württemberg: Konstanz, Liggeringen, 1 Oct. 1981, T. Ulvinen & S. Huhtinen (OULU, as *C. obscurissima*). **The Netherlands:** Dronten Municip.: Oostelijk Flevoland, 8 Oct. 1981, C. Bas 7817 (dupl. H, OULU; as *C. obscurissima*).

Notes: *R. obscurissimus* is a very rare species with fuligineous subtomentose pileus and stipe, distant creamy lamellae, whitish context, farinaceous smell and taste, rather big cylindric-ellipsoid spores and hymenidermic pileipellis. A similar species is *R. ionides* with a beautiful violet to violet brown pileus and stipe.

29. *Rugosomyces persicolor* (Fr.) Bon Fig. 29

Agaricus ionides var. *persicolor* Fr., Ic. sel. Hymenomyc. 1: 35. 1867. – *Tricholoma ionides* var. *persicolor* (Fr.) P. Karst., Bidrag Kännedom Finlands Natur Folk 32. 1879a. – *Tricholoma persicolor* (Fr.) Boud., Ic. mycol.: 13 (pl. 25). 1905–1910. – *Calocybe persicolor* (Fr.) Singer ex Bon & Courtec., Doc. Mycol. 18 (69): 37. 1987. – *Lyophyllum persicolor* (Fr.) Contu, Micologia 2000: 132. 2000. – *Rugosomyces persicolor* (Fr.) Bon, Doc. Mycol. 21 (82): 66. 1991.

Misapplied name: *Calocybe carnea* sensu auct. mult. eur.

Selected icones: Bon, Collybio-Marasmioides: pl. 4D. 1999a. – Lange, Fl. agar. dan. 1: pl. 24G (as *T. persicolor*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 373 (fig. 226) (as *C. persicolor*). 1979. – Moser & Jülich, Farbatl. Basidiomyc. 3, *Calocybe* 5 (as *C. persicolor*). 1986. – Ricken, Blätterpilze 2: pl. 94, 7 (as *T. persicolor*). 1915. – Urbonas, Lietuvos grybai 8 (2): pl. 32, 2 (as *C. persicolor*). 1997.

Selected descriptions: Bon, Collybio-Marasmioides: 113 (fig.). 1999a. – Courtecuisse & Duhem, Guide Champ. France Europe: 210 (N 481). 2000. – Lange, Fl. agar. dan. 1: 57 (as *T. persicolor*). 1935. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 372 (as *C. persicolor*). 1979. – Ricken, Blätterpilze 2: 346 (as *T. persicolor*). 1915. – Urbonas, Lietuvos grybai 8 (2): 116 (as *C. persicolor*). 1997.

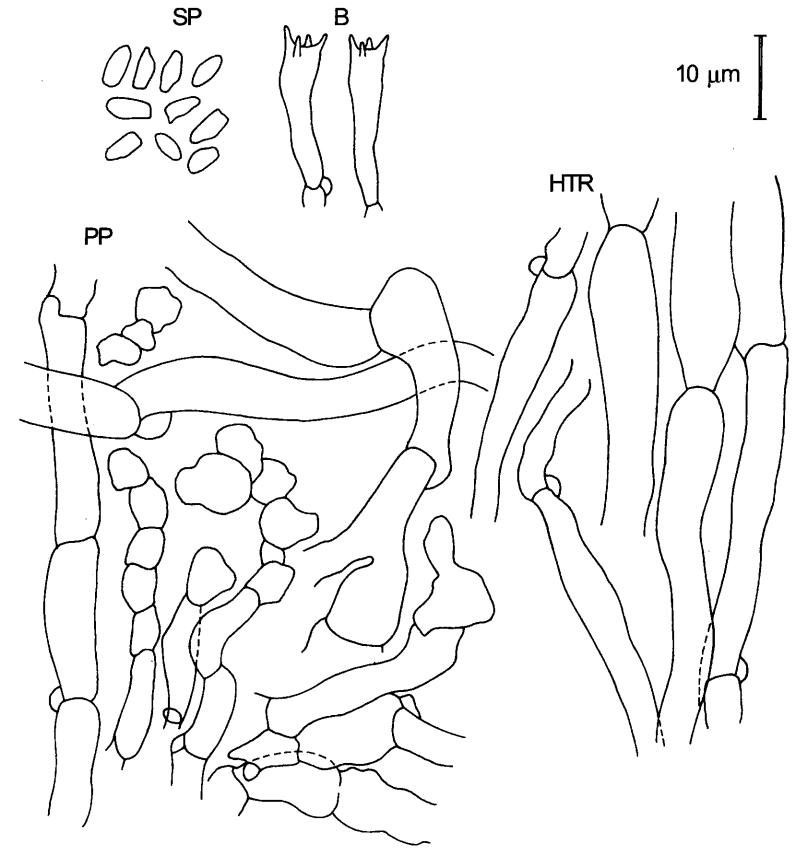


Fig. 29. *Rugosomyces persicolor.*

Description: Pileus up to 4(–5) cm, convex then plano-convex to depressed, umbonate, sometimes wavy, glabrous or slightly tomentose, sometimes thin squamulose in centre, with thin involute white mealy margin, smooth, dry, mat, not or slightly hygrophanous, not translucently striate or hardly striate (0.5–1 mm!), pale creamy pink, flesh pink to sordid pink, pale pink brown, sometimes with lilac tinge, fading alutaceous or sordid whitish flesh pink, becoming pale brown or sordid lilac pink with age. Lamellae crowded, broad to narrow, thin, emarginate to adnate (often with decurrent tooth), pure white at first, becoming creamy to sordid pale yellowish with age. Stipe up to 4(–8) × 0.5(–0.8) cm, cylindric or slightly thickened at base, dry, fibrillose, fistulose, white tomentose to thin hairy or shaggy from base upwards (often even nearly

all over or up to 1/2–2/3), of same colour as pileus but paler at apex, brownish downwards, sometimes slightly excentric, often fasciculate. Context whitish. Smell and taste none or slightly fruity or farinaceous. Spore print white.

Spores 4–5 × 2–3 µm, ellipsoid to navicular-subconic, smooth. Basidia 20–25 × 5–6 µm. Pileipellis a mixture of filamentous hyphae and hymenidermic, subtrichodermic and subepithelial sphaeropedunculate, sphaeric to pyriform elements, partly interlocking.

Ecology: In coniferous and mixed forests, grasslands, lawns, parks.

Phenology: June to November.

Distribution: Rather common. **Northern Europe:** DEN!, FIN!, NOR!, SWE! **Eastern Europe:** BLR!, EST!, LAT!, LIT!, RUW-Leningrad! **Russian Far East:** AMU.

Collections examined: Belarus: Negorel'sk Forest Distr., 30 Aug. 1974, G. Serzhanina (MSK, as *C. persicolor*). **Denmark:** Jylland: Malle Hedegård Plantage, 6 Oct. 1974, J. Borgen (C, as *C. persicolor*). Sjælland: Lellinge, 18 Sep. 1974, H. Knudsen (C, as *C. carnea*); Tolstrup, 12 July 1978, H. Knudsen (C, as *C. carnea*); Distr. 45a, 22 July 1980, M. Schrøder (as *C. persicolor*, det. H. Knudsen). Without locality, 28 Sep. 1974, L. Hansen (C, as *C. carnea*); Eno ved Naestved, 18 Aug. 1974, H. Dissing (C, as *C. carnea*). **Estonia**: Ida-Viru Co.: between Jõetaguse and Puru, 7 Aug. 1961, K. Kalamees (TAA 72432a, as *C. carnea*); between Kõnnu and Raudi, 14 Aug. 1961, M. Kask (TAA 72553, as *C.* sp.). Järva Co.: Järva-Madise, Simisalu, Vargamäe, 12 Sep. 1982, mycological trip (TAA 114775, as *C. persicolor*). Lääne Co.: Matsalu Nature Reserve, Saastna, 5 Aug. 1979, K. Kalamees (TAA 120741, as *C. persicolor*); Vormsi Island, Rumpo, 20 Sep. 1986, S. Veldre (TAA 143457, as *C. persicolor*). Lääne-Viru Co.: Lahemaa National Park, Oruveski, 17 Oct. 1975, M. Vaasma & V. Lasting (TAA 94737, as *C. persicolor*). Viljandi Co.: Vooru, 15 July 1974, K. Kalamees (TAA 80630, as *C. persicolor*), 14 Aug. 1988, K. Kalamees (TAA 143906, as *C. persicolor*); Roosilla, 13 Aug. 1976, K. Kalamees (TAA 80990, as *C. carnea*). **Finland:** Etelä-Häme: Lammi, 9 Sep. 1975, R. Tuomikoski (H, as *C. carnea*), 14 Sep. 1975, T. Ulvinen & W. Jakovlev (OULU, as *C. carnea*), 6 Sep. 1978, A. Leivo (H, as *C. persicolor*); Koski, Laaviosuo, 29 Aug. 1978, M. Vuorinen (H, as *C. carnea*); Koski, Huljala, 30 Aug. 1989, J. Teeriaho 1 (H, as *C. carnea*); Pirkkala, Kyösti, 6 July 1984, R. Linkoaho (OULU, as *C. persicolor*); Tampere, Härmälä, 30 Aug. 1979, U. Söderholm 559 (OULU, as *C. persicolor*); Tampere, Kalevankangas, 14 Sep. 1981, L. Kosonen (TUR 054783, as *C. persicolor*); Tampere, Teiskontie, Sep. 1981, L. Kosonen (TUR 068716, as *C. carnea*); Tampere, Peltolammi, 8 Aug. 1985, U. Söderholm (TUR 080220, as *C. carnea*). Etelä-Pohjanmaa: Vaasa, Aug. 1988, M. Kyrölainen (OULU, as *C. carnea*?). Oulun Pohjanmaa: Oulu, Myllyoja, 23 Aug. 1981, E. Ohenoja (OULU, as *C. carnea*); Oulu, Linnanmaa, Botanical Garden, 1 Sep. 1987, E. Ohenoja (OULU, as *C.* sp.). Perä-Pohjanmaa: Ylitornio, 4 Sep. 1973, E. Ohenoja (OULU, as *Collybia* sp.); Tornio, Hirsikangas, 1 Aug. 1985, V. Tammilehto (OULU, as *C. carnea*). Pohjois-Häme: Äänekoski, Parantala, 6 Aug. 1981, R. Storbacka (OULU, as *C. carnea*?). Pohjois-Savo: Kuopio, 7 July 1981, J. Vauras (KUO, as *C.* cf. *persicolor*). Satakunta: Kullaa, Koskenranta, 7 Sep. 1983, E. Ohenoja (OULU, as *C. carnea*). Uusimaa: Kyrkslätt, Jorvas, 29 Aug. 1941, R. Frey (H, as *T. carneum*); Tammisaari, 1 Sep. 1960, O. v. Schulmann (H, as *C. persicolor*); Helsinki, Vanhakaupunki, Annala, 22 Sep. 1984, R. Saarenoksa 54084 (H, as *C. carnea*); Helsinki, Myllypuro, 19 Aug. 1988, R. Saarenoksa (H 18788dubl, 18988, 18988dubl, as *C. ionides*; H18888dubl2 & TUR 098179, as *C. persicolor*); same locality, 12 Aug. 1993, R. Saarenoksa & I. Kytövuori 93069 (H, as *C. carnea*); Espoo, Otaniemi, 4 Sep. 1992, S. Jakobsson 25 (H, as *C. persicolor*); Espoo, Nuuksio, 1 Sep. 1993, I. Kytövuori 93627 (H, as *C. carnea*). Varsinais-Suomi: Parainen, Attu, 21 June 1953, 27 Aug. 1953, O. v. Schulmann (H, as *T. persicolor*, *Collybia* sp.). **Latvia:** Madona Distr.: Dūku, Krustkalnu Nature Reserve, 14 Sep. 1985, K. Kalamees (TAA 124273, as *C. carnea*). **Lithuania:** Švenčionys Distr., Kaltanėnai, 22 Sep. 1971, V. Urbonas (BILAS 12314, as *C. carnea*). **Norway:** Finnmark: Troms, 3 Aug. 1981, E. Ohenoja (OULU, as *C.* sp.). Møre og Romsdal: Kristiansund, 7 Aug. 1951, J. Stordal (as *T. carneum*). **Russia:** Leningrad Prov.: Ollila, R. Singer (LE, as *C. carnea*). **Sweden:** Dalarne: Ludvika par., Sörvik, 23 Aug. 1980, S.-E. Blom (UPS 18478, as *C. carnea*); Orsa par., Taltrastvägen, 6 Aug. 1985, D. Broström 476 (UPS 25867, as *C. carnea*). Gotland: Hogrän sn, 9 Sep. 1948, E.Th. Fries (UPS, as *T. paeonium*). Gästrikland: Sandviken, Havregränd, 25 July 1979, E. Sundström (UPS, as *C. persicolor*). Småland: Femsjö par., "Haggårds tomter", NW of Skattegård, 31 Aug. 1940, S. Lundell (LE 6050, Fungi exs. suec. No 1105, as *T. paeonium*); Femsjö sn, Nydala, 1 Sep. 1943, S. Lundell (UPS 3788, as *T. paeonium*); Femsjö, by Gustava Stuga (Sveastuga), 19 Aug. 1978, M. Moser 78/264 (IB, as *C. carnea*); Källebö, 4 Sep. 1948, S. Lundell & G. Haglund 5047 (UPS, as *T. paeonium*); Kvarnhagen, 11 Sep. 1948, S. Lundell & G. Haglund 5302 (UPS, as *T. paeonium*). Uppland: Uppsala, 23 July 1938, S. Lundell (UPS, as *T. paeonium*), 28 Aug. 1951, S. Lundell (UPS, as *T. paeonium*), 4 Sep. 1957, O. Persson (UPS, as *T. paeonium*); Gamla Uppsala, 5 Sep. 1978, R. Moberg 3716 (UPS, as *C. persicolor*); Bälinge sn, Löten, 21 Sep. 1937, H. Smith & S. Lundell (UPS, as *T. paeonium*); Bälinge par., N of Marsta, 26. Sep. 1972, S. Ryman (UPS, as *C. carnea*); Ärentuna par., Storvreta, 2 Aug. 1979, N. Lundquist 12268 (UPS, as *C. persicolor*). Västergötland: Göteborg, Björkdalen, 1 Nov. 1942, F. Karlvall (UPS, as *T. paeonium*). Västmanland: Västerås (Badelunda), Lundby, 31 Aug. 1951, H. Belin (UPS, as *T. paeonium*); Västerås par., Viksängskyrka, 10 Aug. 1985, H. Kaufmann (UPS, as *C. carnea*); same locality, 30 Aug. 1986, H. Kaufmann (UPS, as *C. carnea*).
Extralimital. Austria: Tirol, Nockhof by Mutters, Stubaital, 6 July 1948, E. Chaida & M. Moser 48/247 (IB, as *C. persicolor*); Tirol, Thaur, 29 Aug. 1978, Gerholt & M. Moser 78/80 (IB, as *C. persicolor*). **France:** Draillant by Thonon, Chablais, 11 Oct. 1984, M. Moser 84/325 (IB, as *C. persicolor*). **Italy:** Trentino, Val di Sella, 4 Oct. 1982, M. Moser 82/417 (IB, as *C. carnea*).

Notes: *R. persicolor* is characterized by sordid flesh brown coloured convex-umbonate pileus; white, rather adnate (often with tooth) lamellae; rather tall, from base upwards (to 1/2–2/3) white strigose, hairy or shaggy stipe; predominantly fasciculate habit mostly in forests. Very similar is the rare species *R. carneus*, which has pure flesh pink coloured plane pileus; rather short, relatively solid, glabrous and absolutely naked to downright base (perhaps somewhat strigose in mycelial part in litter

only!), white pruinose-flocculose at apex (with a very narrow white determinate zone) stipe; emarginate lamellae (not decurrent with tooth!); and grows solitary (not fasciculate) on grasslands only (not in forests!). *R. phragmitidis* has longer spores and grows only on debris of *Phragmites australis* (Cav.) Trin. ex Steud.

R. persicolor is very often mixed up with *R. carneus* (cf. 'Notes' by *R. carneus*) in the literature and herbaria.

30. *Rugosomyces phragmitidis* (Kalamees) Kalamees comb. nov. Fig. 30

Basionym: *Calocybe phragmitidis* Kalamees, in Urbonas, Kalamees & Lūkins, Consp. Fl. agar. Fung. Lithuaniae Latviae Estoniae: 25. 1986.

Description: Pileus 2 cm, plano-convex, without papilla, with slightly incurved faintly pruinose margin at first, then smooth and glabrous, hygrophanous, not translucently striate, dry, mat, pale flesh brownish. Lamellae crowded, rather narrow, emarginate, whitish. Stipe short, 2 × 0.5 cm, curved-cylindric, attenuated downwards, white pruinose-flocculose at apex, glabrous in the middle, whitish creamy tomentose at base, dry, smooth, concolorous with pileus but lighter. Context whitish. Smell and taste indistinct. Spore print white.

Spores (5–)6.5–8.5(–11) × (1.5–)2.5–3.5 µm, navicular- to fusiform-ellipsoid in side view, ellipsoid, cylindric-ellipsoid to conic-ellipsoid in face view, smooth. Basidia 20–25 × 5–6 µm, 2-spored. Hymenophoral trama hyphae of 4–8(–14) µm wide. Pileipellis a subtrichoderm, hyphae 3.5–8.5 µm wide.

Ecology: Solitary on debris of *Phragmites australis*, outside of forest.

Phenology: July.

Distribution: Very rare, only from type locality. **Eastern Europe:** EST!

Collection examined: Estonia: Tartu Co.: Tamme, by Lake Võrtsjärv, 10 July 1974, K. Kalamees (TAA 80611, as *C. phragmitidis*, holotype).

Notes: *R. phragmitidis* is characterized by long navicular-, fusiform-, cylindric- to conic-ellipsoid spores; basidiocarps are pale flesh brownish. It grows solitary on debris of *Phragmites australis*. Similar *R. persicolor* has smaller spores and basidiocarps and it grows mostly fasciculate on forest litter.

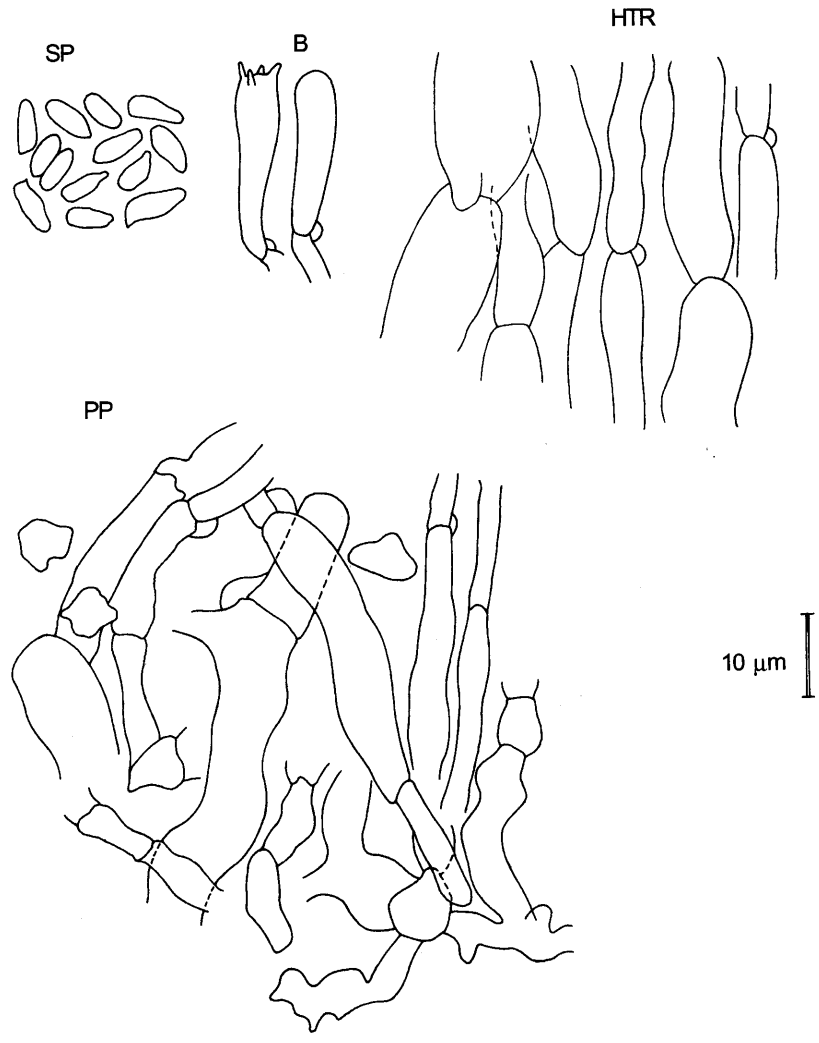


Fig. 30. *Rugosomyces phragmitidis*

ASTEROPHORA Ditmar ex Link : Fr.

Asterophora Ditmar, Neues J. Bot. 3 (3): 56. 1809; Ditmar ex Link, Neues J. Bot. 3: 17. 1809; Ditmar ex Link : Fr., Syst. mycol. 1: LI. 1821. – *Nyctalis* Fr., Syst. Orb. veg. 1: 78. 1825; Fr. : Fr., Elenchus 1: 19. 1828.

Type species: *Asterophora lycoperdoides* (Bull.) Ditmar : Fr.

Description: Basidiocarps mycenoid to collybioid, small. Lamellae thick, distant, often reduced. Veil none. Smell and taste farinaceous. Basidiospores ellipsoid, hyalin, inamyloid, cyanophilous, their production reduced. Chlamydospores abundantly on pileus surface or on lamellae, cyanophilous. Basidia 4-spored, siderophilous. Cystidia absent. Clamps present.

Ecology & phenology: Parasitically on basidiocarps of Russulales, in summer and autumn.

Distribution: Widespread but scattered in palearctic Northern and Eastern Europe and Asia. Two species in area studied.

KEY TO THE SPECIES

1. Pileus soon brown powdery from chlamydospores, thick-fleshed, hemisphaeric to convex. Chlamydospores formed on pileus surface, stellate **31. *A. lycoperdoides***
– Pileus never powdery, thin-fleshed, conico-campanulate. Chlamydospores formed on lamellae, smooth, ellipsoid-fusoid **32. *A. parasitica***

31. *Asterophora lycoperdoides* (Bull.) Ditmar : Fr. Fig. 31

Agaricus lycoperdoides ("*lycoperdonoides*") Bull., Herb. France 4: pl. 166. 1784; nom. cons. prop. (Redhead & Seifert, 2001b). – *Asterophora lycoperdoides* (Bull.) Ditmar, Neues J. Bot. 3 (3): 56. 1809; (Bull.) Ditmar : Fr., Syst. mycol. 3: 206. 1829. – *Nyctalis lycoperdoides* (Bull.) J. Schröt. in Cohn, Krypt.-Fl. Schlesien 3: 525. 1889. – *Asterophora agaricoides* Fr., Symb. gasteromyc.: 8. 1817; Fr. : Fr., Elenchus: 19. 1828; nom. rej. prop. (Redhead & Seifert, 2001b). – *Asterophora nauseosa* Weinm., Hymeno-Gasteromycetes imperio rossico: 629. 1836. – *Nyctalis nauseosa* (Weinm.) Fr., Hymenomyc. eur.: 463. 1874. – *Nyctalis agaricoides* (Fr. : Fr.) Bon, Doc. Mycol. 19 (76): 74. 1989. – *Nyctalis asterophora* Fr., Epicr.: 371. 1838 (inval.).

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 375 (as *N. asterophora*). 1991. – Cetto, Enzykl. Pilze 2: 366. 1987. – Bresadola, Iconogr. mycol. 10: pl. 486, 2 (as *N. asterophora*). 1929. – Dāniele, Meiere & Vimba, Latvijas sēnes: pl. 80 (as *N. asterophora*). 2001. – Dähncke & Dähncke, 700 Pilze: 195. 1980. – Konrad & Maublanc, Ic. sel. Fung. 4: pl. 362, 2 (as *N. asterophora*). 1928. – Lange, Fl. agar. dan. 5: pl. 161G (as *N. asterophora* f. *major*), 162F (as *N. asterophora*). 1940. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 236 (as *N. asterophora*). 1979. – Phillips, Mushr. other Fungi: 76. 1981. – Ryman & Holmåsen, Suomen pohjolan sienet: 306. 1984. – Zerova, Atlas gribiv Ukraini: pl. 53, 1 (as *N. asterophora*). 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 132 (fig.) (as *N. agaricoides*). 1999a. – Cetto, Enzykl. Pilze 2: 367. 1987. – Corner, Monograph cantharelloid fungi: 154 (fig. 69), 157 (fig. 71), 158 (as *N. lycoperdoides*). 1966; Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 100, 415 (fig.136). 1992. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 382 (as *N. asterophora*). 1979. – Urbonas, Lietuvos grybai 8 (2): 118. 1997. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 182, 183 (fig. 86). 1979.

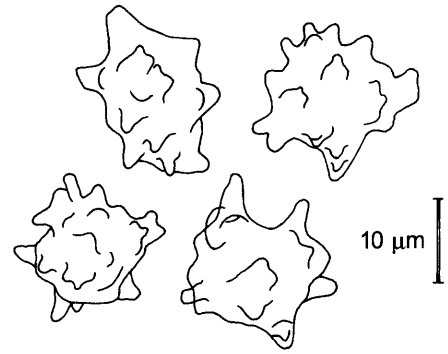


Fig. 31. Chlamyodospores of *Asterophora lycoperdoides*.

Description: Pileus up to 2(–4) cm, hemisphaeric to convex, thick-fleshed, whitish and flocculose when young, soon brown powdery from chlamydospores. Lamellae greyish whitish, very narrow, thick, distant, reduced to veins, adnexed. Stipe up to 3(–3.5) × 0.5(–0.8) cm, short and stout, cylindric, whitish to brownish, silky-fibrillose to cottony-tomentose. Context whitish creamy. Smell and taste farinaceous.

Basidiospores 5–6 × 3–4 µm, ellipsoid, smooth, often not developed. Chlamydospores 15–24 × 12–21 µm, notably stellate, ovoid to subglobose, with coarse arms, light brownish, formed on surface of pileus. Basidia 20–25 × 5–6 µm.

Ecology: In forests, parasitically on basidiocarps of Russulales, especially on *Russula adusta* (Pers. : Fr.) Fr. and *R. delica* Fr., also on basidiocarps of *Lactarius piperatus* group and *L. necator* (J.F. Gmel. : Fr.) P. Karst.

Phenology: July to October.

Distribution: Occasional to rare. **Northern Europe:** DEN, FIN!, NOR, SWE. **Eastern Europe:** BLR, EST!, LAT, LIT, RUC-Kursk!, RUC-

Moscow!, RUC-Penza, RUE-Kirov!, RUE-Perm', RUN-Karelia!, RUW-Leningrad!, UKR! **Caucasus**: NCS-KR, TCS-AR, TCR-AZ, TCS-GR. **Middle Asia:** KAZ. **Siberia:** KRA, WSB-Chelyabinsk, WSB-Sverdlovsk. **Russian Far East:** AMU, PRM, SAK.

Collections examined: Estonia: Harju Co.: Rooküla Forest Distr., Kreo, Sep. 1958, U. Kalamees (TAA 50589, 50591, 114493, as *N. asterophora*); same Forest Distr., Jõevärava, 2 Sep. 1963, H. Kelder (TAA 114494); Tallinn, Veskimets (Veskimägi), 20 Aug. 1957, U. Haug (TAA 50406, as *N. asterophora*). Lääne Co.: Metsanurga, 26 Sep. 1994, K. Kalamees & K. Põldmaa (TAA 161456, as *N. asterophora*). Lääne-Viru Co.: Põlula, 26 Aug. 1963, E. Parmasto (TAA 16472, as *N.* sp.), Oct. 1963, U. Kalamees (TAA 114495); Põlula Forest Distr., Männikvälja, 25–27 Aug. 1963, U. Kalamees (TAA 51558); Venevere Forest Distr., Hanguse, 7 Sep. 1963, E. Parmasto (TAA 114491, as *A.* sp.); Muuga, 6 Sep. 1993, E. Parmasto (TAA152653). Pärnu Co.: Uulu, 19 Sep. 1988, M. Vaasma (TAA 141940). Põlva Co.: Kanepi, Laiavangu, 1957, E. Parmasto & V. Lasting (TAA 114496, as *N.* sp.); Taevaskoja, 29 Sep. 1959, A. Raitviir (TAA 40648); Kiidjärve, 16 Oct. 1960, K. Kalamees (TAA 72062); between Taevaskoja and Kanariku, Aug. 1966, M. Kask (TAA 114490); near Kiidjärve, Visse, 5 Sep. 1970, M. Kask (TAA 39011, as *N. lycoperdoides*); Räpina, 7 Aug. 1978, P. Põldmaa (TAA 88523, as *N.* sp.). Saare Co.: Saaremaa Island, Viidumägi Nature Reserve, 30 Aug. 1960, A. Raitviir (TAA 41136, as *A.* sp.); same island, Kihelkonna Forest Distr., Kuumi, 15 Aug. 1978, M.Vaasma (TAA 171978). Tartu Co.: Peedu, 10 Aug. 1960, A. Elango (TAA 114492); Rähni, 26 July 1960, K. Kalamees (TAA 71632); Haaslava, 19 Aug. 1934, N. Witkowski (TAA 142640, as *N. lycoperdoides*); Rannu, Aug. 1978, H. Mäemets (TAA 114573). Valga Co.: Koobassaare, 5 Sep. 1957, E. Parmasto (TAA 8281, as *N. asterophora*). **Finland:** Etelä-Häme: Urjala, Kivijärvi Nature Reserve, 30 July 1972, P. Alanko 20081 (H). Etelä-Karjala: Joutseno (former Jääski), Kuurmanpohja, Tikanhuuto, 14 Aug. 1984, I. Kytövuori 84148 (H). Etelä-Savo: Puumala, Vähävesi, 18 Aug. 1972, P. Isoviita (H). Laatokan Karjala: Uukuniemi Comm., Kokonlahti, 14 Aug. 1987, I. Kytövuori 87376 (H). Satakunta: Parkano, Alkkia, 4 Sep. 1976, K. Salo (H); Orivesi, Yliskylä, 23 Aug. 1981, I. Kytövuori 81725 (H); Tampere, Peltolammi, 30 Aug. 1989, U. Söderholm 1663 (H). Uusimaa: Sipoo, Helgträsk, 4 Aug. 1985, I. Kytövuori 85134 (H); Sipoo, Immersby, 9 Sep. 1979, T. Ahti 37660 (H); Helsinki, Vuosaari, Uutela, Pitkälahti, 7 Aug. 1979, T. Ahti 37736 & B. Federley (H); Nurmijärvi kk., Pitkämäki, 7 Aug. 1977, P. Askola 326 (H); Lohja, Vappula, 24 Aug. 2000, U. Nummela-Salo & P. Salo 7128 (H). Varsinais-Suomi: Lohja Rural Comm., Virkkala (Virkby), Pähkinäniemi, 7 Sep. 1993, I. Kytövuori 93776 (H); Rymättylä, Raula, 11 Aug., R. Tuomikoski (H). **Russia:** Karelia: Kontopohja Distr., Kivach Nature Reserve, 9 Aug. 1977, K. Kalamees, L. Pihlik & M. Vaasma (TAA 83942); Valaam Island, 1 Aug. 1995, L. Mikhajlovskij (LE 203202, as *N. asterophora*). Kirov Prov.: Gordino, 23 Aug. 1924, M. Khokhryakov (LE 7039, as *N. asterophora*). Leningrad Prov.: Siverskij, 1859, F.I. Ruprecht (LE 7041, as *N. asterophora*); Vyborg Distr., July 1996, 22 July 1998, O. Morozova (LE 200285, 215123, as *N.asterophora*); Tosno Distr., 22 July 1999, O. Morozova 20-TO-99 (LE 215476, as *N. asterophora*). Moscow Prov.: Manikhino, Aug. 1956, A. Nikolaeva (LE 7040, as *N. asterophora*). Kursk Prov.: Ryl'sk Distr., Aug. 1984, E. Bedenko (TAA). **Sweden:** Uppland: Alsike par., near Uppsala, 28 Aug. 1936, S. Lundell (LE 7045). **Ukraine:** Poltava Prov.: Tereshki, Aug. 1984, E. Bedenko (TAA).

32. *Asterophora parasitica* (Pers. : Fr.) Singer — Fig. 32

"Agaric parasite" Bull., Herb. France 12: pl. 574, fig. 2. 1792 (inval.). – *Agaricus parasiticus* Pers., Syn. meth. Fung.: 371. 1801; Pers. : Fr., Syst. mycol. 1: 135. 1821. – *Nyctalis parasitica* (Pers. : Fr.) Fr., Epicr.: 372. 1838. – *Asterophora parasitica* (Pers. : Fr.) Singer, Lilloa 22: 171. 1951.

Selected icones: Breitenbach & Kränzlin, Pilze Schweiz 3 (1): pl. 376 (as *N. parasitica*). 1991. – Cetto, Enzykl. Pilze 2: 366. 1987. – Bresadola, Iconogr. mycol. 10: pl. 487, 1 (as *N. parasitica*). 1929. – Dähncke & Dähncke, 700 Pilze: 196. 1980. – Konrad & Maublanc, Ic. sel. Fung. 4: pl. 362, 1 (as *N. parasitica*). 1928. – Lange, Fl. agar. dan. 5: pl. 162G (as *N. parasitica*).1940. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: pl. 237 (as *N. parasitica*). 1979. – Ryman & Holmåsen, Suomen pohjolan sienet: 306. 1984. – Phillips, Mushr. other Fungi: 76. 1981. – Zerova, Atlas gribiv Ukraini: pl. 53, 2 (as *N. parasitica*). 1974.

Selected descriptions & figs: Bon, Collybio-Marasmioides: 132 (fig.) (as *N. parasitica*). 1999a. – Cetto, Enzykl. Pilze 2: 367. 1987. – Corner, Monograph cantharelloid fungi: 149 (fig. 66), 151 (fig. 67), 152 (fig. 68), 156 (fig. 70), 157 (fig. 71), 158; as *N. parasitica*. 1966. – Gulden in Hansen & Knudsen, Nord. Macromyc. 2: 100, 415 (fig. 137). 1992. – Michael, Hennig & Kreisel, Handb. Pilzfr. 3: 382 (as *N. parasitica*). 1979. – Urbonas, Lietuvos grybai 8 (2): 119. 1997. – Zerova et al., Viznachnik gribiv Ukraini 5 (2): 183. 1979.

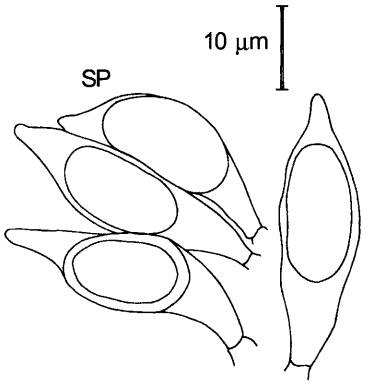


Fig. 32. *Asterophora parasitica.*

Description: Pileus up to 2.5 cm, conico-campanulate, then plano-convex to slightly depressed in centre, white, greyish to brownish, often with lilac tinge, thin-fleshed, cottony- to silky-fibrillose when young, nearly glabrous when adult, never powdery, dry to slightly viscid. Lamellae whitish to creamy, adnate, often reduced, thick, distant, waxy. Stipe up to 5 × 0.3 cm, cylindric, fistulose, concolorous with pileus, dry, cottony to

silky fibrillose. Context greyish-brownish. Smell indistinct or slightly unpleasent.

Basidiospores 5–7 × 3–4 µm, ellipsoid, smooth. Chlamydospores 12–20 ×7–10 µm, smooth, ellipsoid-fusoid, yellowish brownish, formed on lamellae only. Basidia 20–25 × 5–6 µm.

Ecology: In forests, parasitically on basidiocarps of Russulales, especially on *Russula adusta* (Pers. : Fr.) Fr. and *R. delica* Fr., also on basidiocarps of *Lactarius* spp.

Phenology: August to October.

Distribution: Rare. **Northern Europe:** DEN, FIN!, NOR!, SWE! **Eastern Europe**: BLR, EST!, LAT, RUC-Moscow, RUW-Leningrad!, UKR. **Caucasus**: NCS-KR!, TCS-GR. **Siberia:** KRA.

Collections examined: Estonia: Harju Co.: Viimsi Forest Distr., by road of Kloostrimetsa-Iru, 7 Aug. 1957, U. Haug (TAA 50291, as *Asterophora* sp.); Tallinn, Veskimets (Veskimägi), 8 Sep. 1958, T. Leisner (TAA 80426, as *N. parasitica*), 19 Sep. 1963, H. Kelder (TAA 80427). Saare Co.: Saaremaa Island, Koltsi, 22 Sep. 1966, H. Verlin (TAA 76513). **Finland:** Varsinais-Suomi: Turku, Ruissalo, 27 Sep. 1980, C.-A. Haeggström 2963 (H), R. Skytén 3106 (H). **Norway:** Møre og Romsdal: Tingvoll, Boksaspas, 16 Oct. 1980, Sveum & S. Sivertsen (TRH). **Russia**: Leningrad Prov.: Nizhnesvirskij Nature Reserve, 11 Sep. 1994, M. Stolyarskaya (LE 200286, 202205). Krasnodar Terr.: Caucasus Nature Reserve, Abago, 16 Sep. 1966, E. Parmasto (TAA 14494, as *N. parasitica*). **Sweden:** Gotland: Bro, 4 Oct. 1945, E.Th. Fries (UPS, as *N. parasitica*); Atlingbo sn, Myrände, 22 Sep. 1946, B. Pettersson (UPS, as *N. parasitica*). Västergötland: Tunhem par., Aug.–Sep. 1953, S. Woldmar (LE 7059, Fungi exs. suec. No 2368).

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