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Pleurotoid fungi of the family Polyporaceae in the Czech Republic and Slovakia

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This paper presents a survey of the pleurotoid genera belonging to the family *Polyporaceae* in the Czech Republic and Slovakia. It is based on material deposited in Czech and Slovak herbaria as well as on published records of finds of the included species from the studied territory. For each species a short description is provided, accompanied by taxonomic or nomenclatoric notes in some problematic cases, and characters distinguishing it from related species are highlighted. Short notes about phenology, ecology, occurrence and distribution are included. The study is supplemented with distribution maps for individual species. A new combination, *Neolentinus degener*, is submitted instead of *Neolentinus cyathiformis* (Schaeff.: Fr.) Redhead et Ginns.

Key words: Pleurotoid fungi, phenology, ecology, occurrence, distribution, Czech Republic, Slovakia.

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Práce představuje souhrnný přehled výsledků studia hlívovitých hub řazených do čeledi *Polyporaceae* na území ČR a SR. Je založena na studiu materiálu uloženého v českých a slovenských herbářích a na literárních záznamech nálezů daných hub ze studovaného území. U každého druhu je vyhotoven stručný popis, zdůrazněny rozlišovací znaky od podobných druhů, případně diskutována taxonomická problematika. Stručně je komentována fenologie, ekologie, výskyt a rozšíření. Studie je doplněna mapami rozšíření jednotlivých druhů. Pro houževnatec pohárovitý je navržena nová kombinace *Neolentinus degener*.

INTRODUCTION

Systematic classification of studied genera

A recent systematic classification of the genera *Lentinus, Neolentinus, Panus, Pleurotus, Phyllotopsis* and *Faerberia* is following:

Division:	*Eumycota*
Subdivision:	*Basidiomycotina*
Class:	*Homobasidomycetes*
Subclass:	*Hymenomycetidae*
Order:	*Polyporales*
Family:	*Polyporaceae*

(classification into order and family according to Moser 1983)

Classification of these genera at the level of order and lower is often varied according to different authors. In the "classical" conception of Singer (1975), this group is classified in the order *Agaricales*, family *Polyporaceae*, tribus *Lentineae*. Kühner (1980) classifies it in his new order *Tricholomatales*, family *Pleurotaceae*, tribus *Lentineae* (this is a nomenclatorical mistake, since the nominate tribus of a family should have the same name) with the genera *Pleurotus* (including the subgenera *Phyllotopsis, Pleurotus, Lentinopanus* and *Lentinotus*) and *Lentinus* (subgenera *Lentinus* and *Geopetalum*). Pegler (1983) classifies this group more closely to *Aphyllophorales* than to *Agaricales* (he refers to the presence of the dimitic hyphal system, which is almost absent in *Agaricales*); he considers it an evolutionary branch derived from the ancestral polyporoid types with the genus *Pleurotus* more recently derived from the genus *Lentinus* (sensu lato).

During the last decade, the taxonomic classification of this group of genera has been studied using the methods of molecular biology, and the results correspond with Moser's conception. Restriction analysis of the ribosomal DNA of *Lentinus tigrinus* (Hibbett and Vilgalys 1991) shows a closer relationship to the family *Polyporaceae* than to the family *Tricholomataceae*. This is also supported by anatomical characters (dimitic hyphal system and the creation of "hyphal pegs" – fascicles of hyphae arising from the gill surface, occurring with the exception of the genus *Lentinus* in some polyporoid genera as well). The whole group is probably derived from the family *Polyporaceae* and the similarity of the gills of these genera with the gills in the order *Agaricales* is the result of convergent evolution (Hibbett et Vilgalys 1993).

Morphology and anatomy of the basidiomes

Basidiomes are solitary or fastigiate, of the pilothecium type, cantharelloid, pleurotoid or cyphelloid in shape (according to Váňa 1996: 120), fleshy or tough. The pileus surface is smooth, slightly fibrillose, flocculose or tomentose to pilose (with slight squamulae in *Lentinus tigrinus* and *Neolentinus degener*, or broken into scales in *Neolentinus lepideus*. Gills[1] are shortly to longly decurrent in various species, and some of them create anastomoses especially on the stipe at some of them. *Neolentinus lepideus* and the species of *Pleurotus* subgen. *Lentodiopsis* create a veil (velum partiale), which leaves more or less persistant fragments on the pileus margin or a ring on the stipe. The stipe is central, excentric, lateral or missing, if the pileus is laterally adnate.

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[1] If the term gill is limited strictly to the order *Agaricales*, then the 'gills' of the representatives of *Polyporales* (a case of convergent evolution - see above) should be called 'pseudogills' or 'pseudolamellae'. But I consider it more understandable to use the term 'gills' for these genera as well.

Table 1. Generic classification of the studied species according to the conceptions of various authors. (The mentioned authors still recognise *Geopetalum carbonarium*; in later studies [Watling and Gregory 1989, Boekhout et al. 1990, Käärik 1992] the species is refered to as *Faerberia carbonaria*.)

species	**Kreisel in Michael et al. 1977**	**Kühner 1980**	**Corner 1981**	**Pegler 1983**	**Moser 1983 (as Singer 1975)**	**Hilber 1982, 1997**
... *calyptratus*	*Lentodiopsis*	*Pleur.* subgen. *Pleurotus*			*Pleurotus*	*Pleur.* subgen. *Lentodiopsis*
... *dryinus*	*Lentodiopsis*	*Pleur.* subgen. *Pleurotus*			*Pleurotus*	*Pleur.* subgen. *Lentodiopsis*
... *eryngii*	*Pleurotus*	*Pleur.* subgen. *Pleurotus*			*Pleurotus*	*Pleur.* subgen. *Pleurotus*
... *cornucopiae*	*Pleurotus*	*Pleur.* subgen. *Pleurotus*			*Pleurotus*	*Pleur.* subgen. *Pleurotus*
... *ostreatus*	*Pleurotus*	*Pleur.* subgen. *Pleurotus*	*Pleurotus*		*Pleurotus*	*Pleur.* subgen. *Pleurotus*
... *pulmonarius*	*Pleurotus*	*Pleur.* subgen. *Pleurotus*			*Pleurotus*	*Pleur.* subgen. *Pleurotus*
... *nidulans*	*Phyllotopsis*	*Pleur.* subgen. *Phyllotopsis*			*Phyllotopsis*	*Phyllotopsis*
... *conchatus*	*Panus*	*Pleur.* subgen. *Lentinopanus*	*Panus*	*Lent.* subgen. *Panus*	*Panus*	*Panus*
... *strigosus*	*Panus*	*Pleur.* subgen. *Lentinopanus*		*Lent.* subgen. *Panus*	*Panus*	*Panus*
... *suavissimus*	*Lentinus*	*Pleur.* subgen. *Lentinotus*		*Lent.* subgen. *Lentinus*	*Panus*	
... *tigrinus*	*Lentinus*	*Pleur.* subgen. *Lentinotus*	*Lentinus*	*Lent.* subgen. *Lentinus*	*Panus*	**Redhead and Ginns 1985**
... *adhaerens*	*Lentinus*	*Lent.* subgen. *Lentinus*	*Panus*	*Lent.* subgen. *Panus*	*Lentinus*	*Neolentinus*
... *lepideus*	*Lentinus*	*Lent.* subgen. *Lentinus*	*Panus*	*Lent.* subgen. *Panus*	*Lentinus*	*Neolentinus*
... *degener*	*Lentinus*	*Lent.* subgen. *Lentinus*	*Panus*	*Lent.* subgen. *Panus*	*Lentinus*	*Neolentinus*
... *carbonarium*		*Lent.* subgen. *Geopetalum*	*Geopetalum*		*Geopetalum*	

The hyphal system is monomitic (only generative hyphae), dimitic (generative and skeletal hyphae) or amphimitic (generative and ligative hyphae)[2]. Generative hyphae are thin-walled or thick-walled, in some *Pleurotus* species sclerified; clamp-connections are present. Skeletal (unbranched) and ligative (branched) hyphae are always thick-walled, without clamp-connections.

Table 2. Occurrence of particular hyphal types in the studied genera

genus	hyphal type		
	generative (always present)	**skeletal** (always thick-walled)	**ligative (= binding)** (always thick-walled)
Faerberia	thin-walled	present	absent
Lentinus	thin-walled	absent[3]	present
Neolentinus	thin- and thick-walled	present	absent
Panus	thin-walled	present	absent
Phyllotopsis	thin- and thick-walled, sclerified	absent	absent
Pleurotus subgen. *Lentodiopsis*	thin- and thick-walled, sclerified	present, rare	absent
Pleurotus subgen. *Pleurotus*	thin- and thick-walled, sclerified	present at the stipe base (not only in the stipe base in *P. cornucopiae*), rare	absent

Cystidia: Cheilocystidia are present in most of the species, or sometimes reduced to cystidiiform hyphal ends (*Neolentinus degener, N. lepideus*). Pleurocystidia are present in *Panus* species, in *Neolentinus adhaerens* and *Faerberia carbonaria* (with incrustations on the surface in last two species), and as thick-walled metuloids in *Panus strigosus* and *Faerberia carbonaria*. Cheilo- and

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[2]) Although both systems with two types of hyphae are called dimitic in recent studies of hyphal systems of these genera (Stankovičová 1973, Corner 1981, Pegler 1993), I consider it practical to follow Singer's (Singer 1975) approach of distinguishing amphimitic system from practical point of view. (Corner rejects the term 'amphimitic' and on the basis of the translation of the Greek word 'amphimitos' he considers it a synonym of the term 'dimitic'. He considers the term 'amphimitic system' to be misleading because it does not allow for the occurrence of long skeletal segments of hyphae /see footnote 3/ - but the term 'dimitic system' is equally misleading in this case. Use of the term 'dimitic system' for both types would have its justification in the case that skeletal and ligative hyphae are considered to be one type of hyphae; however, in this case the term 'trimitic system' lacks significance for the system containing generative, skeletal and ligative hyphae - but this term is used by both Stankovičová and Corner.)

[3]) While Stankovičová (1973) considers longer unbranched segments to be only long branches of the ligative hyphae, Corner (1981) and Pegler (1983) mention skeleto-ligative (resp. skeleto-binding) hyphae, in which they distinguish unbranched 'skeletal' segments and branched segments.

pleurocystidia are mostly clavate, visibly fusiform only in *Faerberia carbonaria*. Caulocystidia occur in *Pleurotus* subgen. *Pleurotus* as projecting hyphal elements with cystidiiform ends. On the gills of *Lentinus* species so called hyphal pegs are created – fascicles of unbranched hyphae projecting 25–50 μm (in extreme up to 300 μm) from the gill surface. Their function is not clear – possibly retaining moisture, protection against insect attack or vestiges of clavarioid ancestry (Corner 1981, Pegler 1983).

Basidia are clavate, tetrasporic, ranging in size from 16 × 4 μm (*Lentinus suavissimus, Panus strigosus*) to 40–50 × 7,5–8,5 μm (*Pleurotus dryinus*). Spores are ellipsoid, oval to cylindrical, or reniform at *Phyllotopsis nidulans*, the smallest 5–6,5 × 2,5–3,5 μm (genera *Panus, Phyllotopsis*), the largest approx. 15 × 5 μm (*Neolentinus lepideus, Pleurotus* subgen. *Lentodiopsis*), and non-amyloid.

Conidia creation is known in *Pleurotus dryinus*, where many thick-walled conidia (also called aleuriospores or chlamydospores) are created on the stipe base surface.

Ecology and phenology

The studied group contains – with the exception of the genus *Faerberia* – saprotrophic lignicolous fungi, which may become secondarily parasitic, when infection begins through injured places on roots and trunks as well as through the broken branches (Černý 1989). Although some species considerably prefer certain host trees, no species is limited to only one tree species or genus (possible exception: *Pleurotus calyptratus* on *Populus* species). Some species are limited to deciduous or coniferous trees. In some conditions, growth is not limited to live or dead trees – the growth of *Neolentinus lepideus* on worked wood in cellars and mines or on the pylons and railway sleepers is commonly known, whereas *Pleurotus ostreatus* was recorded growing on the vertebra of a recently washed up sperm whale on Jersey of the Channel Islands (Reid 1985). The monotypic genus *Faerberia* is distinguished by a specific substrate, as it grows on burnt places.

It was discovered that some representatives of lignicolous fungi get nutrients from captured nematodes; nutrients from the nematode bodies probably compensate the low quantity of nitrogen available in wood. Thorn and Barron (1984) present *Pleurotus* (*P. ostreatus, P. cornucopiae*), *Hohenbuehelia* and *Resupinatus* species among such fungi. Various *Pleurotus* species are often "hosts" of mycophilous beetles (Švec and Švecová 1990).

Some authors (Junková and Staněk 1972, Ginterová 1973, Ginterová and Maxianová 1975, Kurtzmann 1978) report that *Pleurotus ostreatus* mycelium fix nitrogen from the air. Hilber (1982) however is sceptical and declared that only some Prokaryota are able to fix nitrogen.

In direct connection with the wood substrate of these fungi, there is a lower dependence of their fructification on the weather course (especially rainfall) than in the terrestrial fungi. Lignicolous fungi have usually – in comparison with other trophic groups – the longest time of fructification (Ivanov 1985), less dependent on some season and on a parallel temperature and rainfall optimum. They are usually recorded in the interval from spring to autumn, but we can also find representatives with year-long fructification in this group (*Neolentinus adhaerens, Phyllotopsis nidulans, Pleurotus ostreatus*).

Some species create more or less shapeless photomorphoses in dark conditions(most often elongated stipes without any pilei or only with small reduced pileoli), known as darkness forms or "mine forms" – their creation is commonly known in *Neolentinus lepideus*, but other species may also create these forms in proper light conditions (light deficiency) – they were observed in *Neolentinus adhaerens, Lentinus tigrinus, Pleurotus ostreatus, Pleurotus dryinus*.

MATERIAL AND METHODS

The core of the work represents a revision of material deposited in Czech and Slovak herbaria (BRA, BRNM, BRNU, CB, HR, Karlovy Vary Museum, LIM, LIT, MJ, MZ, OLM, OLP, OP, OSM, OVMB, PL, PRC, PRM – abbreviations according to Hradílek et al. 1992), as well as personal collections during the 1990's. Special thanks belong to J. Herink and P. Vampola, who kindly offered material from their private herbaria, and to F. Kotlaba and J. Herink, who kindly offered their records of finds not deposited in the herbaria. All unidentified or uncertainly identified specimens as well as specimens of critical species (not clearly distinguishable by macroscopic characters) were studied microscopically and critical cases consulted with Z. Pouzar. The basic characters by which such critical species were distinguished were hyphal system and spore morphology (shape and size).

The studied species are treated as follows. The introduction to the special part is formed by the key to the genera; treatment of the genera and species follows. Discussion of problematic topics for particular genera and species is always included in the text of the genus or species, in the appropriate paragraph (taxonomy, occurrence, ecology etc.).

In species descriptions practical diagnostic characters were emphasized. Descriptions of macroscopic and microscopic characters were created according to live material or exsiccates. Characters undetectable on exsiccates were copied from descriptions in literature (Boekhout et al. 1990, Hilber 1982, 1997, Moser 1983, Pegler 1983, Pilát 1935, 1946, Redhead and Ginns 1985, Watling and Gregory 1989) for species which were not seen alive during recent years; this was also partially done in cases where the number of studied specimens was not regarded sufficiently representative. Descriptions are accompanied by a passage about related or similar species and how to distinguish them. Only the distinguishing characters of the other species are presented (example: for *Neolentinus adhaerens* it is mentioned that "similar *Lentinellus cochleatus* has amyloid spores" and there it is not stated that "spores of *N. adhaerens* are non-amyloid").

Further comments for each species include changes in occurrence during the 20th century, phenology, substrates, distribution in the Czech Republic and Slovakia and world-wide distribution. In comments on substrates (host trees), I have also tried to record changes in the representation of substrates for individual species through time. Distribution is appraised according to the occurrence in the altitude belts, climatic and phytogeographic regions.

Distribution maps produced with DMAP for Windows 6.1 (© Alan Morton 1993–97) are included for each species. Abundant species were grid mapped, using the Central European botanical mapping grid (MTB grid); for less abundant species point mapping was used. In the case of broadly defined localities the centre of each symbol was situated in the centre of the given site (mostly a larger town). The symbol explanation is an integral part of each map. The records from the periods before 1945, 1945–1970 and after 1970 are differentiated in the distribution maps. If records were made from one locality during different periods, the last collection is always decisive; documented records are preferred to literature ones.

In the lists of recorded localities (rare species only) the localities are arranged geographically (from west to east).

Special part

Key to the genera of Czech and Slovak pleurotoid fungi of the family *Polyporaceae*:

1) Anthracophilous fungi; cystidia thick-walled ... *Faerberia*
1') Lignicolous fungi; cystidia absent or thin-walled (exception: thick-walled at *Panus strigosus*) ... 2
2) Tough basidiomes with central or slightly excentric stipe and irregularly serrate gill edge ... 3
2') Tough or fleshy basidiomes, stipe central, excentric, lateral or absent, gill edge smooth ... 4
3) Subtle basidiomes with amphimitic hyphal system; fungi causing white rot ... *Lentinus*
3') Subtle to massive basidiomes with dimitic hyphal system; fungi causing brown rot ... *Neolentinus*
4) Basidiomes adnate laterally or by crest, yellow– to brown-orange; spores reniform, 5–6 × 2–3 μm ... *Phyllotopsis*

4') Basidiomes of various shapes and colours; spores ellipsoid to cylindrical, at least 6 × 3 μm ... 5

5) Young and fresh basidiomes with violet hue or considerably pilose on the pileus and stipe surface; hyphal system dimitic, skeletal hyphae frequent; veil always absent; spores 6–7 × 3-4 μm ... *Panus*

5') Basidiomes are not pilose on the surface and have not any violet hue; hyphal system mono– or dimitic, skeletal hyphae rare; veil present or absent; spores always longer than 7 μm ... *Pleurotus*, see 6

6) Skeletal hyphae present only in the stipe base (also elsewhere in the basidiome at *P. cornucopiae*), cystidia present, veil absent ... subgen. *Pleurotus*

6') Skeletal hyphae present in the whole basidiome, cystidia absent, veil present when young ... subgen. *Lentodiopsis*

Faerberia Pouzar

Terrestrial, anthracophilous fungi. Basidiomes solitary, tiny, cantharelloid (pileate with central stipe and decurrent gills). Pileus smooth or slightly radially fibrillose. Gills low, lamelliform, decurrent, with entire edge. Stipe central. Hyphal system dimitic, clamp-connections present. Thick-walled cystidia present. Spores oval to ellipsoid, colourless. Spore print white.

The genus has some possible systematic relations. Some characters are similar to the genus *Hohenbuehelia* (it was classified close to this genus in the family *Tricholomataceae* by some authors). On the other hand, Kühner (1980) classifies it in the same genus (on the subgeneric level) with the species of the genus *Neolentinus*.

Monotypic genus. Type species: *Faerberia carbonaria* (Alb. et Schw.: Fr.) Pouzar.

The genus name *Faerberia* was proposed by Pouzar (1981) to replace the name *Geopetalum*, which he considered inapplicable for the following reasons:

– the name *Geopetalum* was applied by Patouillard (1887) to the genus including species *G. petaloides, G. geogenium* and *G. carbonarium*; the genus type was not mentioned;

– in this study, Patouillard ignored the older generic name *Hohenbuehelia* – this genus had been described by Schulzer (Schulzer et al. 1866, cited sec. Pouzar 1981) including only the species *H. petaloides*, which is therefore the only possible type of the genus *Hohenbuehelia*;

– if a newly described genus includes a species, which is the type species of some formerly described genus, the new genus name is superfluous and species of the new genus should be included in the formerly described genus;

– a name thus superfluous, from the moment of its description, cannot be used for this or for any other genus – this fact is unaffected by later typification of the name *Geopetalum* (on the subgenus level) by the species *Cantharellus carbonarius* (Patouillard 1900), although the newly typified genus already did not include the species *Hohenbuehelia (= Geopetalum) petaloides*;

– Singer (1951, cited sec. Pouzar 1981) created the name *Geopetalum* "de novo", but it is a later homonym of the name *Geopetalum* Pat. and therefore cannot be used.

Singer (1986) disagrees with Pouzar's opinion that the name *Geopetalum* is superfluous according to Art. 63 of the International Code of Botanical Nomenclature (= Art. 52 in the last edition: Greuter et al. 1994). He states that the name is not superfluous if at the time the genus name was published, a type species was established, which was later found to be of a different genus (here *Geopetalum*) than the type species for the previously published genus (here *Hohenbuehelia*) according to paragraph 63.2 (= 52.2 in Greuter et al. 1994). This would be so if Patouillard's genus *Geopetalum* was at the same time typified by *Geopetalum carbonarium*. As the typification followed the description by 13 years, the above mentioned paragraph 63.2 (= 52.2) does not apply, and the generic name *Geopetalum* must be rejected on behalf of the name *Faerberia*.

After all, as Pouzar mentions (personal communication), the etymology of the name *Geopetalum* indicates epigeous, petaloid fungi (which means it was evidently assigned based upon the species currently included in *Hohenbuehelia* and not upon *G. carbonarium*, an anthracobiontic species with a central stipe).

Faerberia carbonaria (Alb. et Schw.: Fr.) Pouzar

Basidiomes solitary. Pileus 1–4 cm in width, dark brown, grey-brown to grey, depressed in the centre, involute on the margin, sometimes radially fibrillose. Gills distinctly lamelliform, low, concolorous with the pileus or paler, grey-brown (to grey-yellow), decurrent, with entire edge. Stipe 1–4 cm long, 1–3 mm wide, concolorous with the pileus. Context light yellow– to grey-brown. Hyphal system dimitic, generative hyphae thin-walled. Numerous conspicuous hymenial cystidia (metuloids) are lanceolate, 90–120 × 15–20 μm, thick-walled, covered with crystalic matter in the apical part. Spores oval to ellipsoid, (7.5-)8.5–10 × (3.5-)4–5(-5.5) μm. Smell inexpressive, taste mild.

This species is unmistakable based on a combination of macroscopic (grey cantharelloid basidiome), microscopic (conspicuous cystidia) and ecological (substrate) characters.

Occurrence: Rare species with constant occurrence. Because it is limited to a specific substrate, there is a relatively limited chance of finding it – the species is possibly more abundant than the count of observations indicates.

Phenology: Fructification in summer and autumn seasons, rare finds up to the end of the year.

Substrate: The species is restricted to burnt ground, formerly only in deciduous forests (if the forest type was recorded), recently (since the 1980s) also in coniferous forests. Noordeloos (Boekhout et al. 1990) reports its growth on peat, as well.

Distribution in the Czech Republic and Slovakia: Scattered localities especially in the middle altitudes in both states; the species does not occur in higher altitudes and cold regions. As mentioned above, it probably occurs more abundantly than indicated by the distribution map, which more likely represents places where mycologists have encountered basidiomes of this species.

World-wide distribution: Scattered occurrence throughout Europe. It is probably distributed only in Europe.

List of recorded localities:

Czech Republic

Koryta (W Bohemia, N of Plzeň), chalet settlement near the Střela river, 300 m, MTB 6046d, burnt place, 29. IV. and 15. VII. 1979, leg. et det. Z. Hájek ut*Geopetalum carbonarium*, rev. P. Hrouda 3. 4. 1996 (PL).

Záluží near Litvínov (N Bohemia, W of Ústí n. L.), 1 km NE, marshalling yard, 270 m, MTB 5447b, slag and burnt rests of plants and coal, 25. IX. 1980, leg. B. Aubrecht, det. B. Aubrecht et J. Šutara (LIT).

Jetřichovice (NE of Ústí n. L.), on the top of "Koliště" [Goliště] hill, 450 m, MTB 5152a, burnt place (in *Fagetum*), 10. VII. 1970, leg. et det. M. Svrček (PRM).

Nová Ves near Bakov nad Jizerou (NE Bohemia), settlement Velký Rečkov, near the reserve "Klokočka" in the valley of the Rokytka stream on SWW foot of "Lovotín" hill, 220 m, MTB 5455c, old burnt place, 17. VI. 1970, leg. J. Herink et A. Komárková, 12. VII. 1970, leg. J. Herink, both det. J. Herink (Herb. Herink, recently PRM).

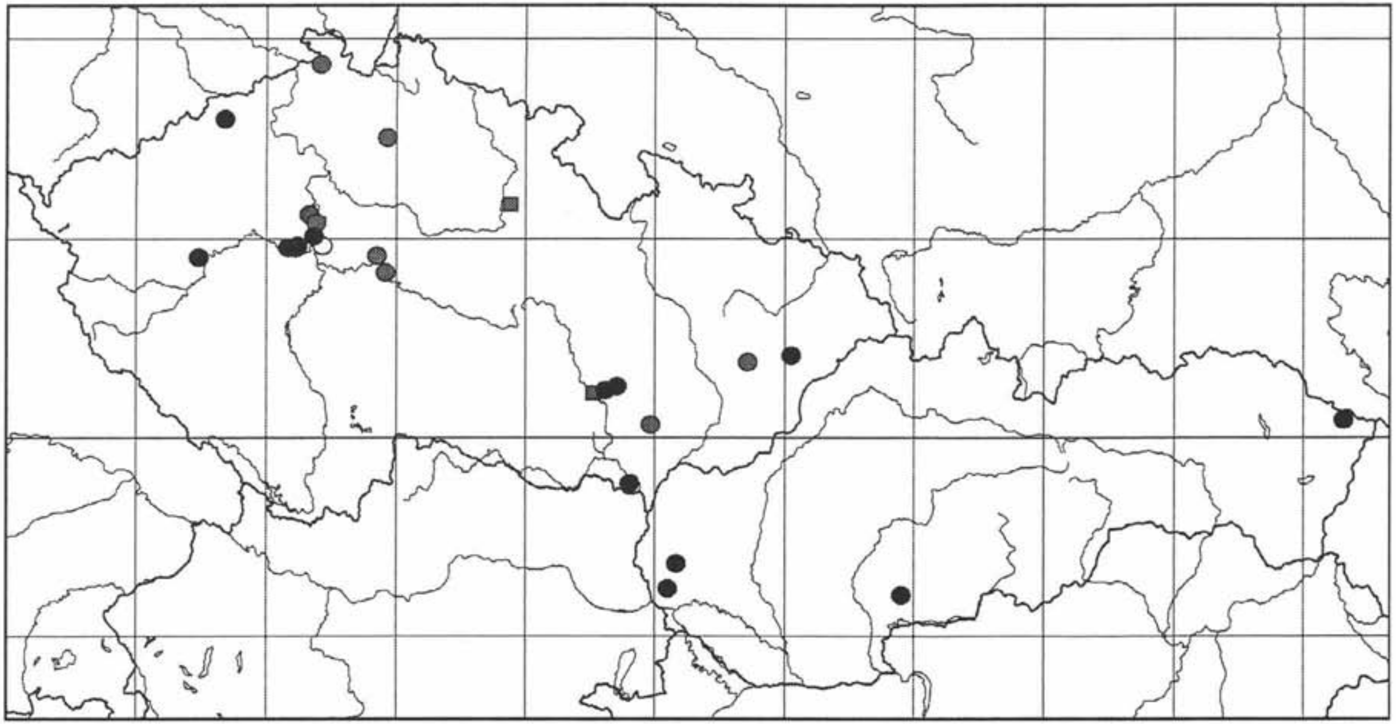
Karlštejn (SW of Prague), "Dřínová hora" hill, near the way to "Královská studánka" spring, MTB 6050d, burnt place on the clearing in *Piceetum*, 5. IX. 1987, leg. R. Fellner et al.; southern slope, burnt place on the clearing in *Piceetum*, 20. X. 1990, leg. J. Herink, J. Holec et K. Kult, both det. J. Herink (Herb. Herink, recently PRM).

Roblín (SW of Prague), MTB 6051a, burnt place, 3. X. 1943, leg. I. Charvát, det. J. Herink ut *Cantharellus carbonarius*; burnt place around the *Fagus* stumps, 13. XI. 1976, leg. J. Trapl, det. Z. Pouzar (PRM).

Prague, part Zbraslav, forest behind "Závist", MTB 6052a, 12. IX. 1922, coll. G. Beck (PRC).

Prague, part Velká Chuchle, "Svatý Jan" hill, 280 m, MTB 5952c, burnt place in deciduous forest, 2. X. 1978, leg. et det. L. Kubičková (PRM).

Map 1 – Faerberia carbonaria



Documented data:

○ - locality where the species was found before 1945

● - locality where the species was found between 1945 and 1970

● - locality where the species was found after 1970

Data from literature:

■ - locality where the species was recorded between 1945-1970

Prague, part Smíchov, "Kinského sady" park, MTB 5952a, burnt place under *Quercus*, 17. VI. 1953, 27. VII. 1953, both leg. E. Wichanský, det. A. Pilát ut *Cantharellus carbonarius*, rev. P. Hrouda 7. 2. 1996 (PRM).

Prague, part Nebušice, MTB 5851d, burnt place, IX. 1946, leg. S. Hejný, det. M. Svrček ut *Cantharellus carbonarius*, rev. P. Hrouda 7. 2. 1996 (PRM).

Stříbrná Skalice (SE of Prague), MTB 6155a, burnt place, 6. VII. 1949, leg. Z. Pouzar, det. J. Charvát ut *Cantharellus carbonarius*, rev. P. Hrouda 7. 2. 1996 (PRM).

Sázava (SE of Prague), settlement Poříčko, valley of "Křešický potok" stream, MTB 6155d, burnt place, 3. X. 1948, leg. J. Kubička, det. J. Herink ut *Geopetalum carbonarium* (PRM).

Hradec Králové (E Bohemia), forest near "Biřičky" lake, MTB 5861a, 30. XII. 1951, leg. et det. J. Hásek ut *Cantharellus carbonarius* (Hásek 1952).

Brno (S Moravia), part Bystrc, site "Rakovec" (near the water reservoir), MTB 6765c, burnt place in *Quercus-Fagus* forest (already overgrown by moss and grass), 21. VI. 1970, leg. V. Fux (Kříž et al. 1971).

Brno, part Lesná, "Suchá hora" between Lesná and Soběšice, MTB 6765d, old burnt place, 15. VII. 1990, leg. et det. A. Vágner (BRNM).

Bílovice nad Svitavou (E of Brno), 1,5 km NW of the village, site "U luže", 360 m, MTB 6765b, old burnt place, 8. VI. 1986, leg. et det. A. Vágner ut *Faerberia carbonaria* (BRNM).

Valtice (S of Brno), "Boří les" forest [= in Theimwald], MTB 7266d, under *Quercus*, 24. VI. 1912, leg. et det. H. Zimmermann ut *Cantharellus carbonarius* (PRM; Zimmermann 1914); 2 km E of the town, site "Rendezvous", 190 m, burnt place, 18. VI. 1993, leg. et det. V. Antonín ut *Faerberia carbonaria* (BRNM).

Silničná near Žarošice (SE of Brno), MTB 6967b, burnt place in deciduous forest, 16. VIII. 1946, leg. et det. V. Vacek ut *Cantharellus carbonarius*, rev. P. Hrouda 7. 2. 1996 (PRM).

Bystřice pod Hostýnem (E Moravia), "Čerňava" forest, 540 m, MTB 6672a, 6. XI. 1962, leg. L. Rychtera, det. A. Pilát ut *Cantharellus carbonarius*, rev. P. Hrouda 7. 2. 1996 (PRM).

Bystřička (E Moravia), left bank of Bystřička water reservoir, MTB 6574c, burnt place in coniferous forest *(Picea)*, 22. IX. 1994, leg. et det. A. Vágner ut *Faerberia carbonaria* (BRNM).

Slovakia

Marianka (N of Bratislava), 3,4 km SEE, near "Marianský potok" stream, 370 m, MTB 7768d, burnt place in *Piceetum*, 4. IX. and 8. X. 1988, leg. et det. L. Hagara; dtto 350 m, 8. X. 1988, leg. et det. J. Kuthan ut *Geopetalum carbonarium* (both BRA).

Pernek (N of Bratislava), MTB 7668b, 5. VI. 1987, leg. S. Cubínek, det. A. Dermek ut *Geopetalum carbonarium* (BRA).

Ladzany (S part of central Slovakia), 450 m, MTB 7779a, burnt place under *Quercus*, 18. IX. 1979, leg. et det. J. Kuthan ut *Geopetalum carbonarium* (BRA).

Veľká Poľana (E Slovakia), settlement Ruské, valley of the Cirocha river, 450 m, MTB 6800c, burnt place, 29. IX. 1988, leg. et det. J. Kuthan ut *Geopetalum carbonarium* (BRA).

Lentinus Fr.

Lignicolous fungi. Basidiomes solitary, tiny, stipitate. Pileus surface smooth or squamulose, involute on the margin. Gills decurrent, with slightly serrate edge. Stipe central. Hyphal system amphimitic, clamp-connections present. Cystidia present. Spores cylindrical to ellipsoid, colourless. Spore print white.

Type species: *Lentinus crinitus* (L.: Fr.) Fr.

The genus *Lentinus* typification is not an unambiguous matter. Fries (1825) did not establish the type and later the following species have been proposed as lectotypes: *Agaricus tuber-regium* (Earle 1909: 416), *A. tigrinus* (Clements et Shear 1931: 349), *A. lepideus* (Singer et Smith 1946: 254) and *A. crinitus* (Donk 1949: 313–314).

All these species were originally published as belonging to *Lentinus* in Systema Orbis vegetabilis (Fries 1825). On the basis of the citation from Systema Orbis vegetabilis, Donk (1962: 159) gave reasons for using the lectotype *Agaricus (Lentinus) crinitus*: "Species ... optimae tropicae, versus polos rarescent" shows that for Fries the typical representatives of the genus *Lentinus* were tropical species, representing the substantial part of the genus; he supported this statement with another citation from Elenchus Fungorum (Fries 1828): "Fungi ... praecipue tropici, in temperatis raro obvii". On the other hand, for Singer (1975) the type species remains *Lentinus lepideus*, based on the basionym description (Fries 1821). The latest monographs (Corner 1981, Pegler 1983) nevertheless, present *L. crinitus* as the type species.

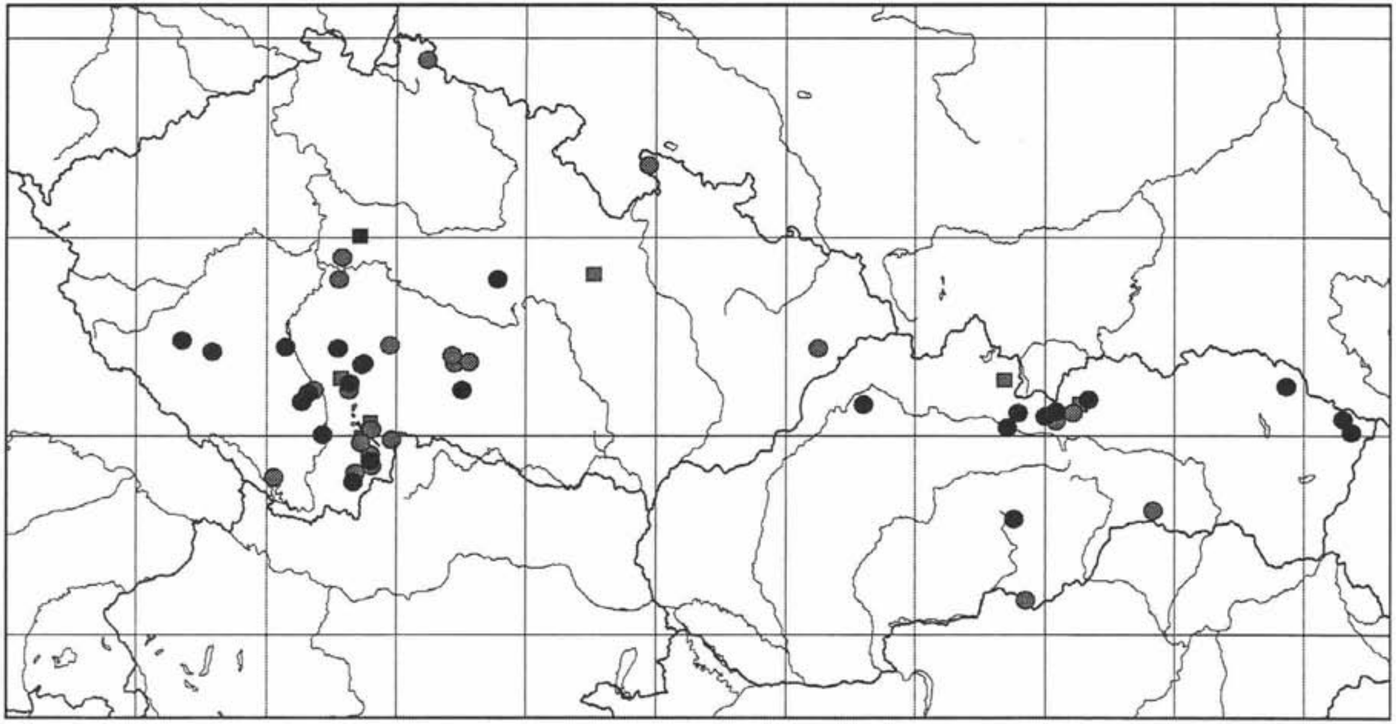
Key to the species:

1)	Pileus surface covered with dark squamulae	... *L. tigrinus*
1')	Pileus surface smooth	... *L. suavissimus*

Lentinus suavissimus Fr.

Basidiomes solitary. Pileus 1–5 cm in width, rarely more (specimen with 11 cm wide pileus was found at "Borkovická blata" near Soběslav /Kotlaba 1957/),

Map 2 – Lentinus suavissimus



Documented data:

● - locality where the species was found between 1945 and 1970

● - locality where the species was found after 1970

Data from literature:

■ - locality where the species was recorded between 1945-1970

Broadly defined localities:

✳ - locality where the species was found between 1945 and 1970 depressed in the centre, pale, beige or yellow, sometimes with orange or brown hue. Gills dense, relatively low, pale or yellowish, decurrent; edge slightly serrate, with hyphae fascicles outgoing from the gill side ("hyphal pegs"). Stipe up to 1 cm long, 2–4 mm wide, concolorous with the pileus; often the gills are so longly decurrent that the stipe is almost missing. Context whitish. Hyphal system amphimitic, generative hyphae thin-walled, ligative hyphae thick-walled, branched. Cystidia absent. Spores cylindrical to ellipsoid, (5.5-)6–8 × 2.5–3(-3.5) μm. Smell anise, very pungent in fresh state (characteristic also for the mycelium /Pilát 1946/), taste fungal.

Related species. *Lentinus tigrinus* has the pale pileus surface covered with dark "squamulae" created by interwoven hyphal strands. *Lentinellus flabelliformis* has darker (brownish) basidiomes with brown stipes and almost globose amyloid spores. *Panellus stipticus* has darker (ferrugineous) gills, which are not decurrent and small (up to 3 μm) amyloid spores. Fresh basidiome of *Lentinus suavissimus* is clearly characterised by the pungent anise smell.

Occurrence: Less abundant species, showing a decline during the last decades (rather considerable in the Czech Republic). There are not any records from either the Czech Republic or Slovakia from the 1990s.

Phenology: Fructification summer (maximum VII.-VIII.) to autumn, rare finds in the mild winter.

Substrate: Deciduous wood. The species of the genus *Salix* (most often *S. caprea, S. aurita*) are most common. White rot is caused by this species.

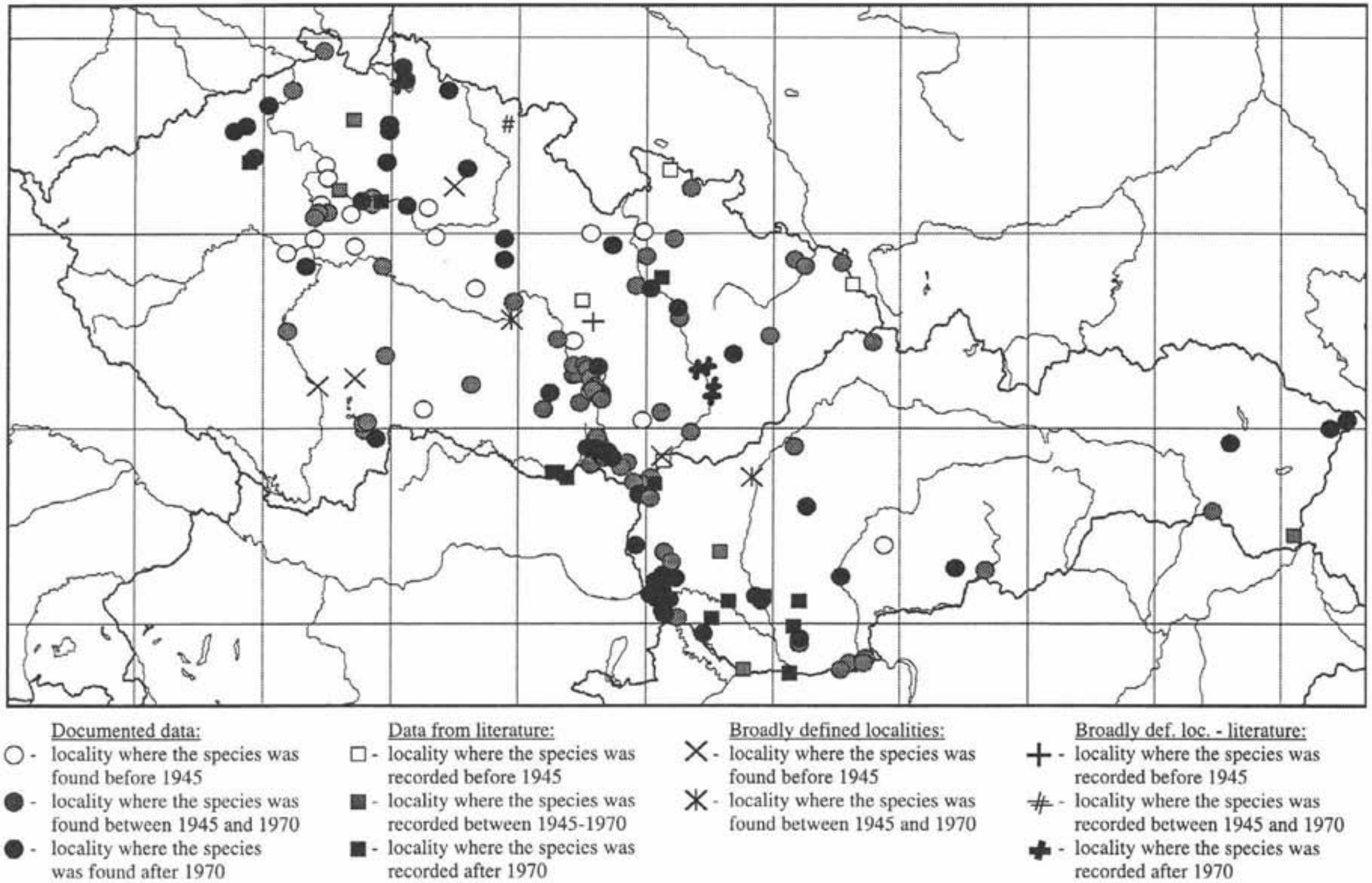
Distribution in the Czech Republic and Slovakia: The species occurs in middle to high altitudes (up to 1200 m in Slovakia). It is absent in the warm regions (the finds from the pannonic thermophyticum are dependant upon higher altitudes ["Šiatoroš" hill] or on inversions ["Zádielska dolina" valley]). There are two distinct distribution centres – southern Bohemia and the Tatra Mts. region. It has been found elsewhere in scattered locations.

World-wide distribution: Temperate zone of the northern hemisphere. The species occurs from subtropical to boreal regions.

Lentinus tigrinus (Bull.: Fr.) Fr.

Basidiomes solitary, more rarely fastigiate. Pileus 2–8 cm wide (rarely more), depressed in the centre, pale, beige or light ochraceous, covered with dark brown or black radial squamulae created by interwoven hyphal strands (rarely the pileus is ochraceous to brown, and without squamulae). Gills dense, relatively low, pale to ochraceous, decurrent; edge slightly serrate, "hyphal pegs" present. Veil (velum partiale) present in the juvenile stage, but soon disappears. Stipe 1–10 cm long, 2–6 mm wide, sometimes broadened below the pileus, concolorous with the pileus, more or less covered with tiny dark squamulae (uniformly dark in extreme cases).

Map 3 – Lentinus tigrinus



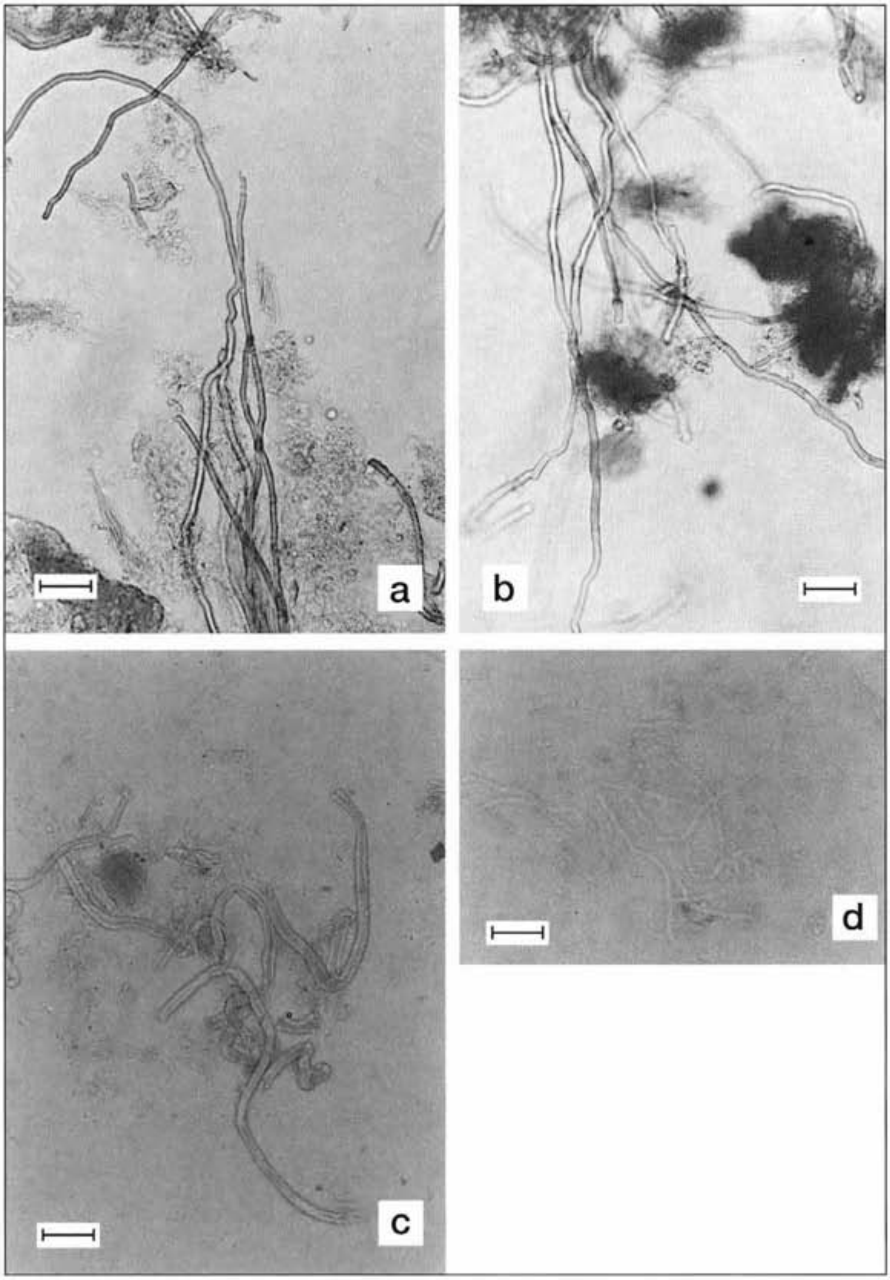


Fig. 1. **a** *Neolentinus degener*, skeletal hyphae; **b** *Panus conchatus*, skeletal hyphae; **c** *Pleurotus cornucopiae*, skeletal hyphae; **d** *Lentinus suavissimus*, ligative (= binding) hyphae. Scale bars = 25 μm.

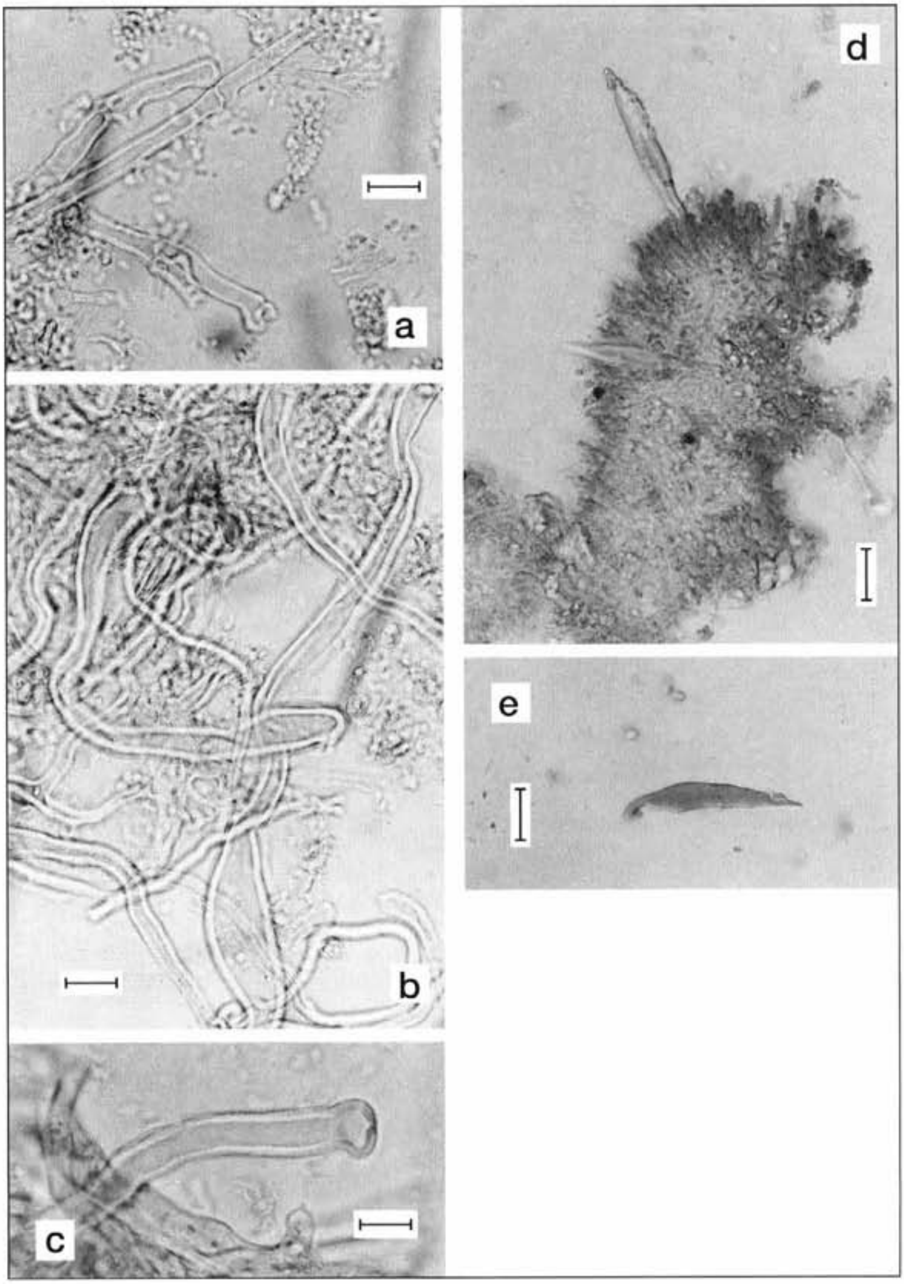


Fig. 2. **a** *Neolentinus adhaerens*, generative hypha with clamp-connection; **b** *Lentinus tigrinus*, inflated generative hyphae; **c** *Phyllotopsis nidulans*, inflated generative hypha. Scale bars = 10 μm. **d** *Faerberia carbonaria*, thick walled cystidia (metuloids) outgoing from the hymenial surface; **e** *Faerberia carbonaria*, isolated cystidium. Scale bars = 25 μm.

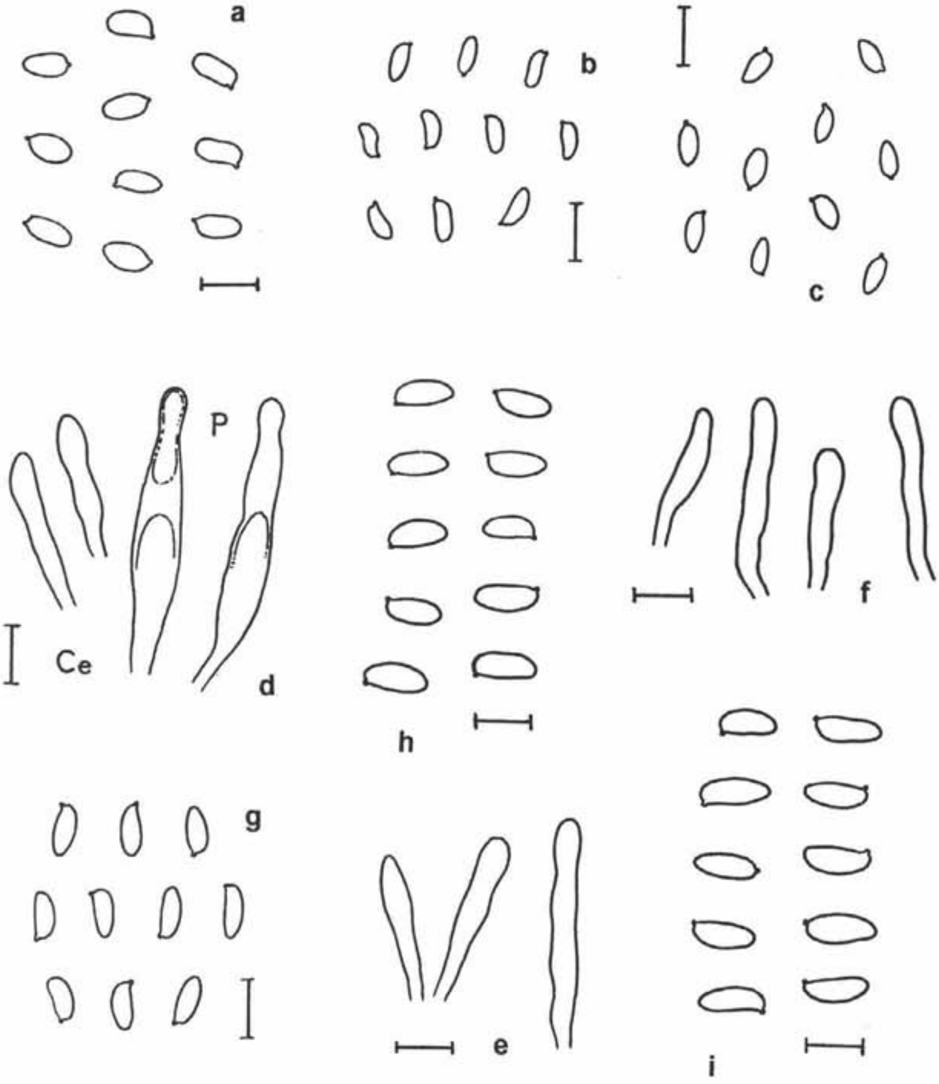


Fig. 3. **a** *Faerberia carbonaria*, spores. **b** *Lentinus suavissimus*, spores; **c** *Lentinus tigrinus*, spores; **d** *Neolentinus adhaerens*, pleurocystidia (P) and cystidiiform ends of hymenial hyphae (Ce); **e** *Neolentinus degener*, cystidiiform ends of hymenial hyphae; **f** *Neolentinus lepideus*, cystidiiform ends of hymenial hyphae; **g** *Neolentinus adhaerens*, spores; **h** *Neolentinus degener*, spores; **i** *Neolentinus lepideus*, spores. Scale bars = 10 μm.

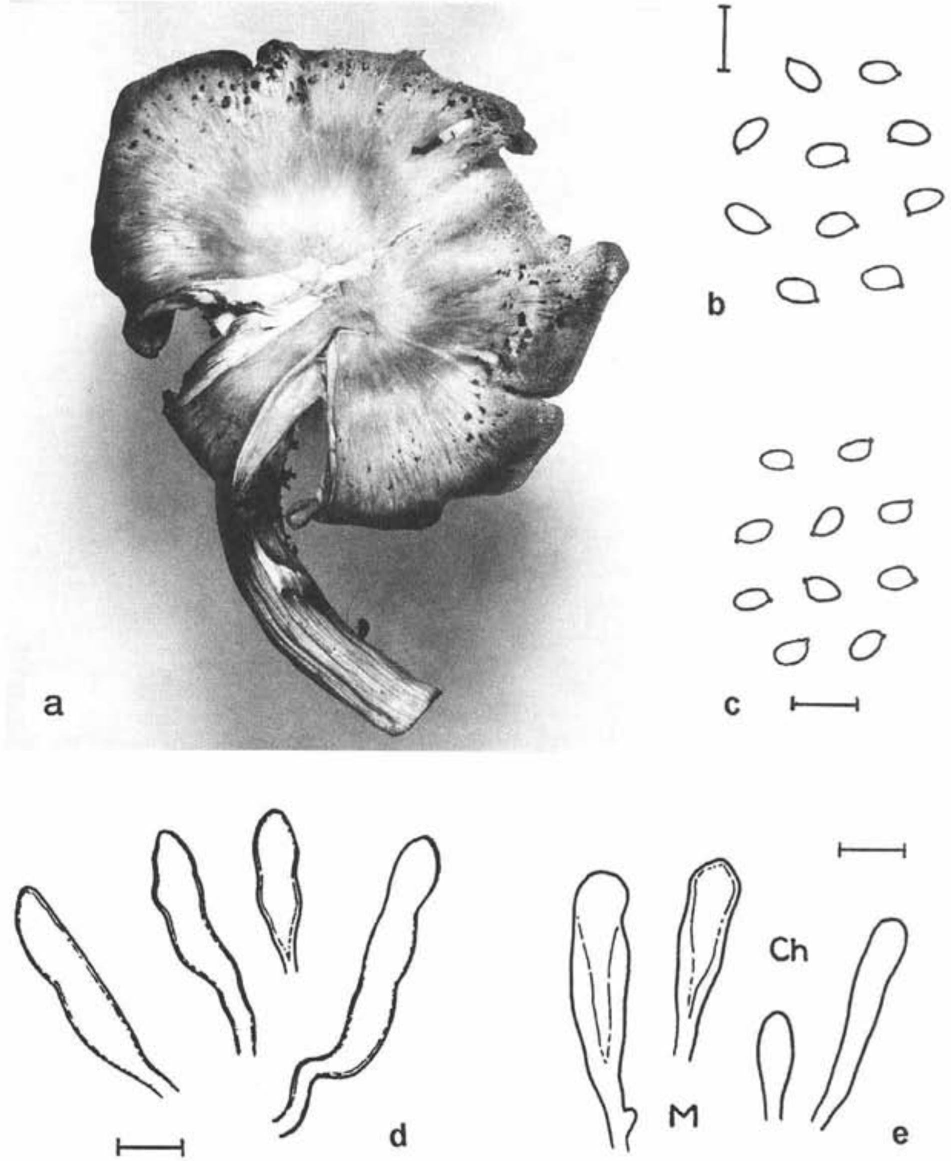


Fig. 4. a *Neolentinus lepideus*, rare form with smooth pileus without scales. Photo I. Gottvaldová. **b** *Panus conchatus*, spores; **c** *Panus lecomtei*, **d** *Panus conchatus*, pleurocystidia; **e** *Panus lecomtei*, cheilocystidia (Ch) and metuloids (M). Scale bars = 10 μm.

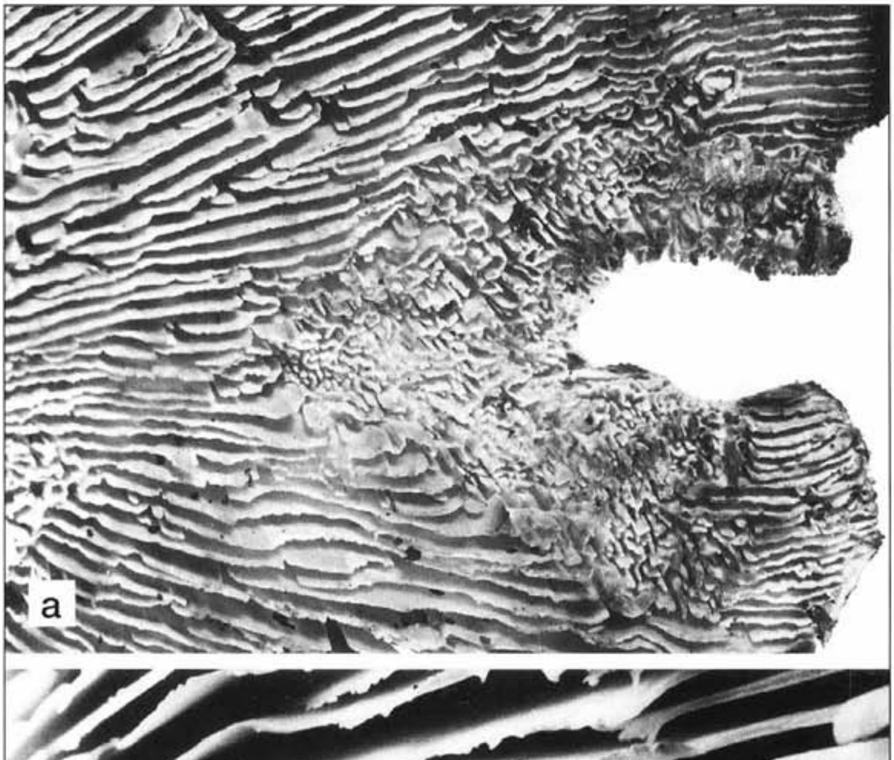


Fig. 5. a *Neolentinus degener*, detail of gills. Labyrinthiform structure is formed by the secondary lamellae (in the place where the gills have been eaten by some animals). **b** *Neolentinus lepideus*, detail of shortly decurrent gills with irregularly serrate edge. Photos I. Gottvaldová.

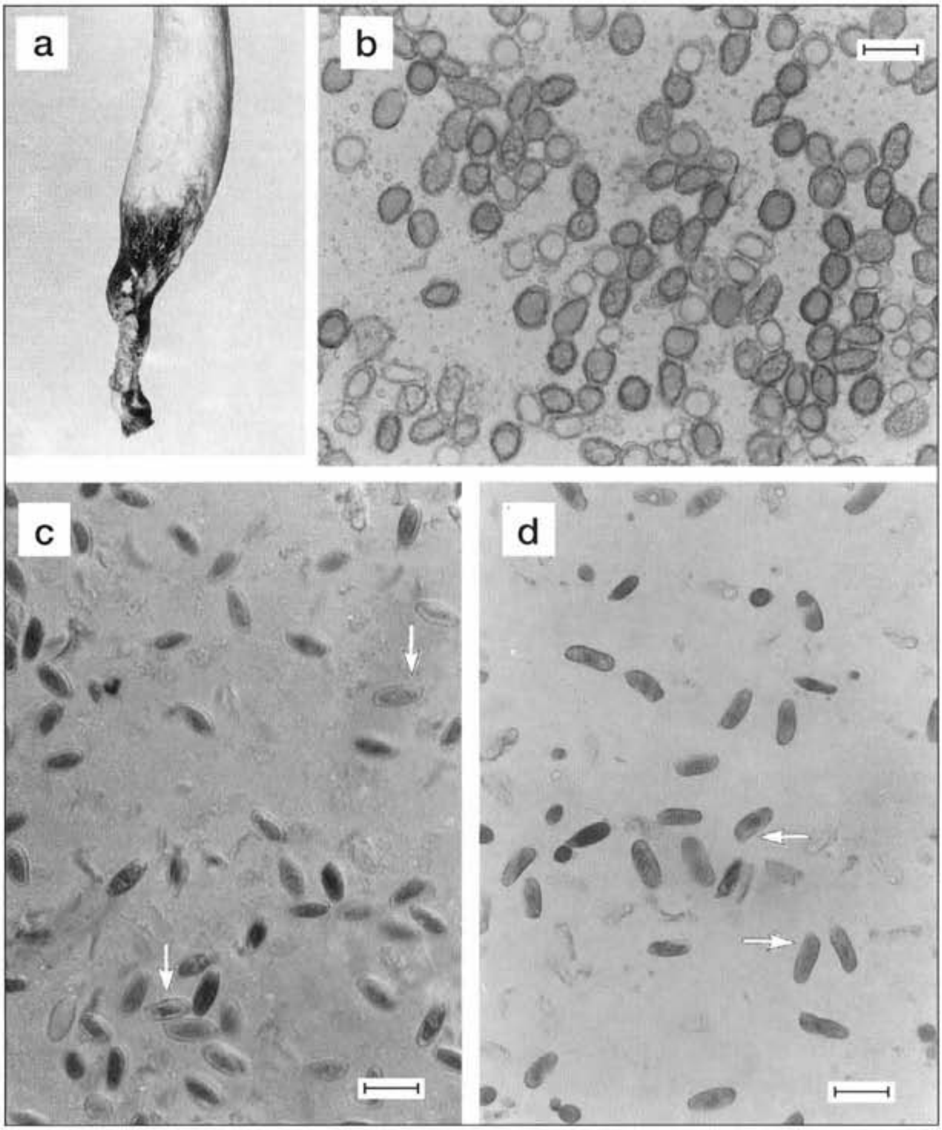


Fig. 6. **a** *Pleurotus dryinus*, anamorph. Dark surface of the stipe base is covered with mass of conidia. Photo I. Gottvaldová. **b** *Pleurotus dryinus*, conidia. Scale bar = 10 μm. **c–d** Comparison of the spore shape of *Pleurotus cornucopiae* and *Pleurotus ostreatus*; **c** *P. cornucopiae* – spores slightly concave on all sides; **d** *P. ostreatus* – spores slightly convex in the subapical part. (Well represetative spores are matked by arrows on both figures.) Scale bars = 10 μm.

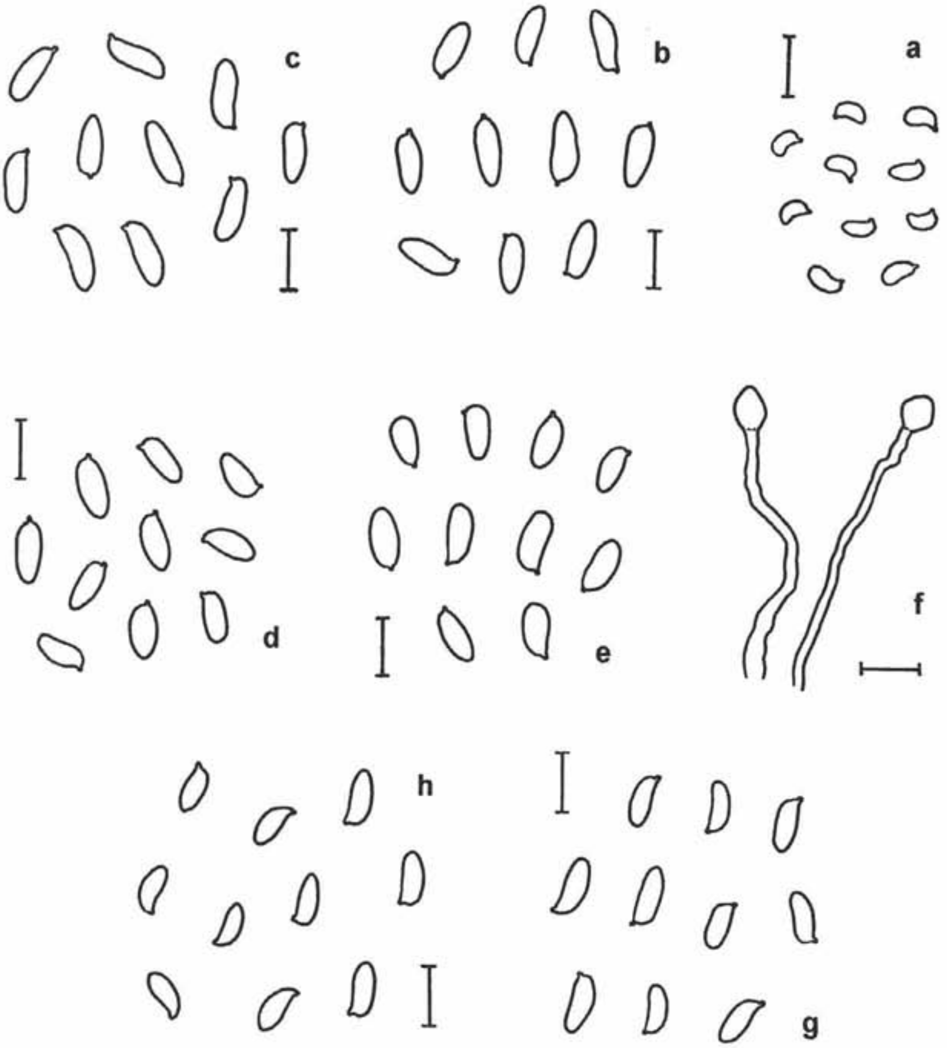


Fig. 7. **a** *Phyllotopsis nidulans*, spores; **b** *Pleurotus calyptratus*, spores; **c** *Pleurotus dryinus*, spores; **d** *Pleurotus cornucopiae*, spores; **e** *Pleurotus eryngii*, spores; **f** *Pleurotus eryngii*, cystidiiform hyphal ends, ending with spherical elements (so called "conidia"); **g** *Pleurotus ostreatus*, spores; **h** *Pleurotus pulmonarius*, spores. Scale bars = 10 μm.

Context pale. Hyphal system amphimitic, generative hyphae thin-walled, ligative hyphae thick-walled, copiously branched. Cheilocystidia clavate, 20–30 × 3–6 μm. Spores cylindrical to ellipsoid, (5.5-)6.5–7.5(-8) × 2.5–3.5(-4) μm. Smell fungal or farinaceous (Kovář 1994 reports pungent farinaceous smell), taste somewhat acidic.

Romagnesi (1968) describes *Lentinus tigrinus* var. *dunalii* as a variety with an elongated stipe (5–11 cm) tapering towards the base; sometimes the pileus creation is reduced. It is evidently a habitat form from shaded habitats (Romagnesi reports it not only from cavities or fissures, but also growing through the forest litter layer). Arcangeli (1895) reports that the clavarioid forms and normal basidiomes are formed at the same time.

Related species. The pileus of *Lentinus suavissimus* is yellowish to ochraceous, without any squamulae. No other lignicolous species is characterised by the following character combination: tiny basidiome with decurrent gills and squamulose pileus surface.

Occurrence: The species is still abundant. The fact the greatest number of collections was made in the 1960s is probably because the collectors were most active during this period.

Phenology: Greatest fructification in late spring (maximum V.-VI.), continuing to a lesser degree until autumn. A clear peak in occurrence in May can be recorded in warm regions (where the species is most abundant), while occurrence in the meso- or oreophyticum is equal during the whole summer.

Substrate: Different deciduous trees, most often from the genus *Salix*. Occasionally found on another substrate (1× *Abies*, 1× straw). White rot is caused by this species.

Sporadic find on *Abies*: Mnichovice (SE of Prague, Czech Republic), "Kožený vrch" hill, MTB 6054c, 1. VII. 1936, leg. et det. Josef Velenovský, rev. F. Kotlaba et Z. Pouzar 10. 5. 1984 (PRM).

Sporadic find on straw (weedly in the bale culture of *Pleurotus pulmonarius*): Mnichovo Hradiště (Czech Republic, NE Bohemia), No. 285, MTB 5455d, 31. I. 1988, leg. Svatava Horáčková, det. Josef Herink (Herb. Herink, recently PRM).

Distribution in the Czech Republic and Slovakia: Relatively common species in the low altitudes and the warm regions; found elsewhere in many scattered locations.

World-wide distribution: Cosmopolitan species occurring all around the world except cold regions; the northern boundary of its occurrence is approximately the 50^{th} parallel line, in Europe it occurs on the whole continent except Scandinavia.

Neolentinus Redhead et Ginns

Lignicolous fungi. Basidiomes stipitate, tiny or large, solitary or the stipes are connate at the base. Pileus surface smooth or covered with scales or squamulae of different origin. Gills decurrent, with irregularly serrate edge. Stipe central or slightly excentric. Hyphal system dimitic, clamp-connections present. Cystidia present or absent. Spores cylindrical to ellipsoid, colourless. Spore print white.

Type species: *Neolentinus kauffmannii* (A. H. Smith) Redhead et Ginns.

The genus was described only 15 years ago (Redhead et Ginns 1985) on the basis of the brown rot and microscopic characters (regular hymenophoral trama, binucleate spores). This was later supported by Hibbett and Vilgalys (1993), who, using morphological characters and nucleic acids sequences characters did not confirm that the genus *Lentinus* sensu Pegler (1983) is monophyletic; on the other hand, in the scope of this "wide genus", they identified three monophyletic groups equivalent to the genera *Lentinus* s. str., *Panus* and *Neolentinus*.

Key to the species:

1) Tiny basidiomes (up to 7 cm), pale to brown-orange, surface of the fresh pileus glutinous; cylindrical cystidia on the gill side ... *N. adhaerens*

1') Carnous basidiomes (usually bigger than 7 cm), pale with darker scales or squamulae, never glutinous on the surface; cystidia on the gill side absent ... 2

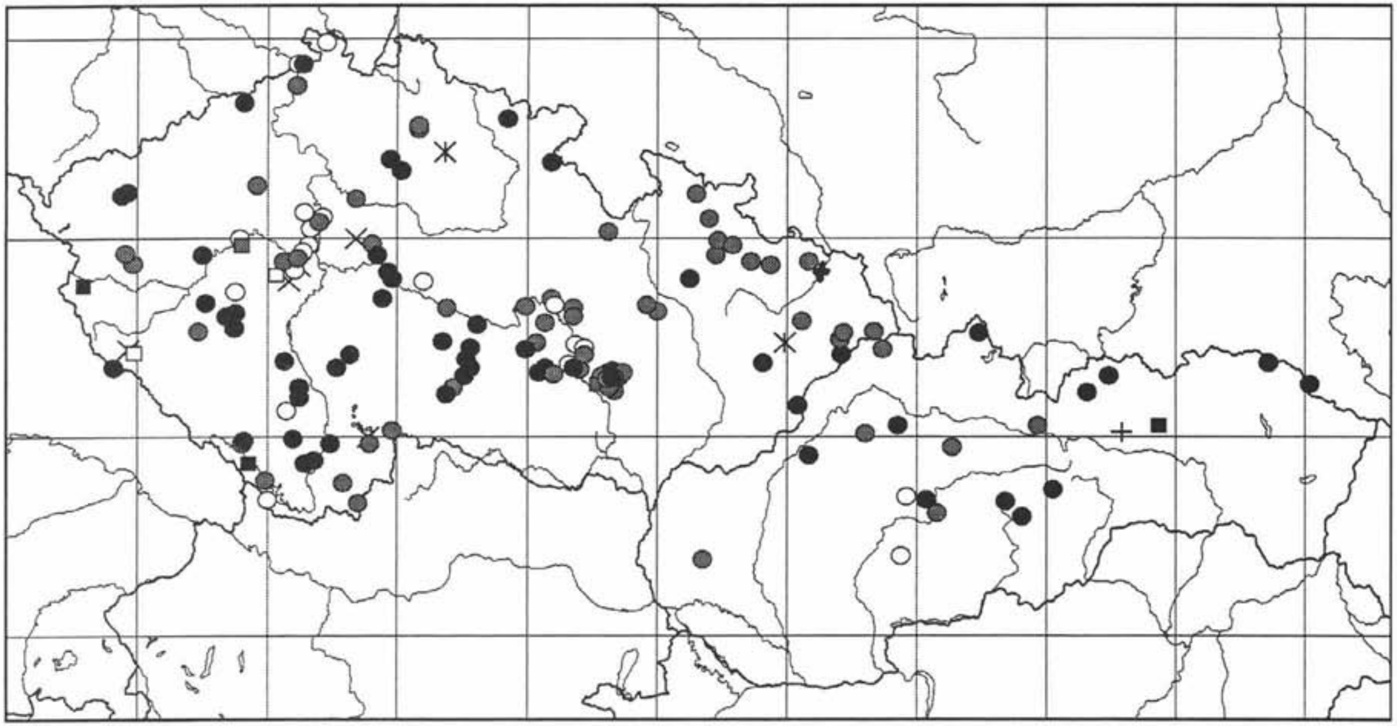
2) Conspicuous (several milimeters) scales of broken cuticle usually on the pileus and stipe surface; veil in the juvenile stage present; found mostly on conifers ... *N. lepideus*

2') Stipe and pileus covered at most by tiny squamulae (max. 1 mm wide); veil absent; found on deciduous trees in warm regions ... *N. degener*

Neolentinus adhaerens (Alb. et Schw.: Fr.) Redhead et Ginns

Basidiomes solitary, more rarely fastigiate. Pileus 2–7 cm in width, sallow or pale ochraceous in the juvenile stage (sometimes till maturity), turning ferrugineous (with orange or brown hue) with age. In the juvenile stage, the whole basidiome can be white (V. Barabáš, herbarium specimen label: Ml. Boleslav, Jemníky village, the surroundings of "Boží voda", 1992 /Herb. Herink/). Expulsion of a glutinous resin-like substance on the pileus surface causes the ferrugineous tint after drying. Gills pale to ochraceous, uncinate and decurrent (not typically decurrent as is common in pleurotoid fungi – the gill edge is parallel with the pileus and forms a short, abrupt curve where it attaches to the stipe; sometimes it looks like non-decurrent gills); edge irregularly serrate. Stipe 3–7 cm long, 0.5–1 cm wide, concolorous with the pileus or somewhat paler, smooth. Context whitish. Hyphal system dimitic, generative hyphae thin– or thick-walled, skeletal hyphae

Map 4 – Neolentinus adhaerens



Documented data:
- ○ - locality where the species was found before 1945
- ● - locality where the species was found between 1945 and 1970
- ● - locality where the species was found after 1970

Data from literature:
- □ - locality where the species was recorded before 1945
- ■ - locality where the species was recorded between 1945-1970
- ■ - locality where the species was recorded after 1970

Broadly defined localities:
- × - locality where the species was found before 1945
- ✳ - locality where the species was found between 1945 and 1970

Broadly def. loc. - literature:
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thick-walled. Cystidia: pleurocystidia fusiform, 40–60 × 7–12 μm (Pegler 1983 reports a length of 60–120 μm), additional "cystidiform hairs" on the gill edge. Spores cylindrical to longly ellipsoid, (6.5-)7.5–9.5(-11) × 3–4 μm. Smell fungal or resinous. Taste bitter, astringent (A. Procházka, specimen label: Lomnice, the valley in the direction of Rašov, 1950 /BRNU/).

Neolentinus adhaerens (like *N. lepideus*) forms under insufficient light conditions so called "mine forms" – sterile sprout-like basidiomes without pilei. These forms are (like the juvenile basidiomes) pale to white (Haller 1948). Their occurrence is distinctly more rare than at *N. lepideus* (2 records in the Czech Republic, in one of these cases the determination is not certain).

Related species. Similarly ferrugineous *Lentinellus cochleatus* has an infundibuliform basidiome with longly decurrent gills and globose amyloid spores; it occurs on deciduous trees. Tiny basidiomes (especially juvenile) are mistakable for *Panellus mitis* (it also occurs on conifers, is also glutinous on the pileus surface), which does not have decurrent gills and has smaller (up to 6 μm), amyloid spores.

Occurrence: The species is relatively abundant with constant occurrence in the Czech Republic and quite rare in Slovakia.

Phenology: There are two distinct fructification peaks – spring (with occurrence maximum in April) and autumn (maximum in October). In cold regions (in higher altitudes), only the autumn peak distinctly appears – this is why the spring peak is almost absent in Slovakia, where the most finds are in sub-mountain altitudes. In any case, *Neolentinus adhaerens* is not a winter fungus; the winter finds count is distinctly lower, as is the summer finds count.

Substrate: Almost exclusively coniferous trees; the finds are mostly connected with *Picea* or *Abies* (97 % of our finds were on these trees). Exceptionally found on other substrates (1× *Fagus sylvatica*, 1× humose soil). Brown rot is caused by this species.

Sporadic find on *Fagus sylvatica*: Dobřejice (Czech Republic, S Bohemia), 2,1 km south of village, 410 m, MTB 6653c, 9. IV. 1993, leg. et det. Jiří Valter (CB).

Sporadic find on the humose soil: České Budějovice (Czech Republic, S Bohemia), Štítného street No. 16, house yard, 390 m, MTB 7052b, 23. V. 1986, leg. Tomáš Papoušek, det. František Tondl (CB; note: dia 465).

Distribution in the Czech Republic and Slovakia: In the climatic conditions of our countries, this species distinctly prefers middle to mountain altitudes with colder climates; it is almost absent in the Pannonic region, where it has been recorded only once at the boundary (Brno-Obřany). In the scope of the mentioned higher and colder areas, its occurrence is rather even within the Czech Republic and Slovakia.

World-wide distribution: The species occurs in the northern temperate zone of Eurasia and America. Although it seems – according to its distribution in our countries – that it is a boreal species, its occurrence in northern Europe is not documented. (Käärik 1992 presents the only doubtful record in Finland.)

Neolentinus degener (Kalchbr. in Fr.) P. Hrouda, comb. nov.

Basionym: *Lentinus degener* Kalchbrenner in Fries, Hymenomyc. Eur.: 482, 1874.

Commonly, since Fries (1838), this species is presented as *Panus*, or *Lentinus cyathiformis*. The basionym of this name (*Agaricus cyathiformis*) can be found in Schaeffer (1771). But Kotlaba and Pouzar (1996) on the basis of its illustration and description suggest that *Agaricus cyathiformis* in Schaeffer's work represents quite another species, probably *Pleurotus pulmonarius*. This statement is supported by the following arguments:

– entire gill edge (for comparison: on the illustration of *Agaricus tubaeformis* Schaeff. /= *Neolentinus lepideus*/ by the same painter, the gill edge is distinctly serrate);

– the gills breadth distinctly exceed the pileus context thickness (this proportion is reversed in *Neolentinus degener*);

– dark colour on the stipe is probably a shadow made by the painter, because the description reports pale yellow ("pallide luteo") stipe colour;

– striate pileus is undoubtedly the result of the painter's conventionalization (it was used also on the other pictures in the same work);

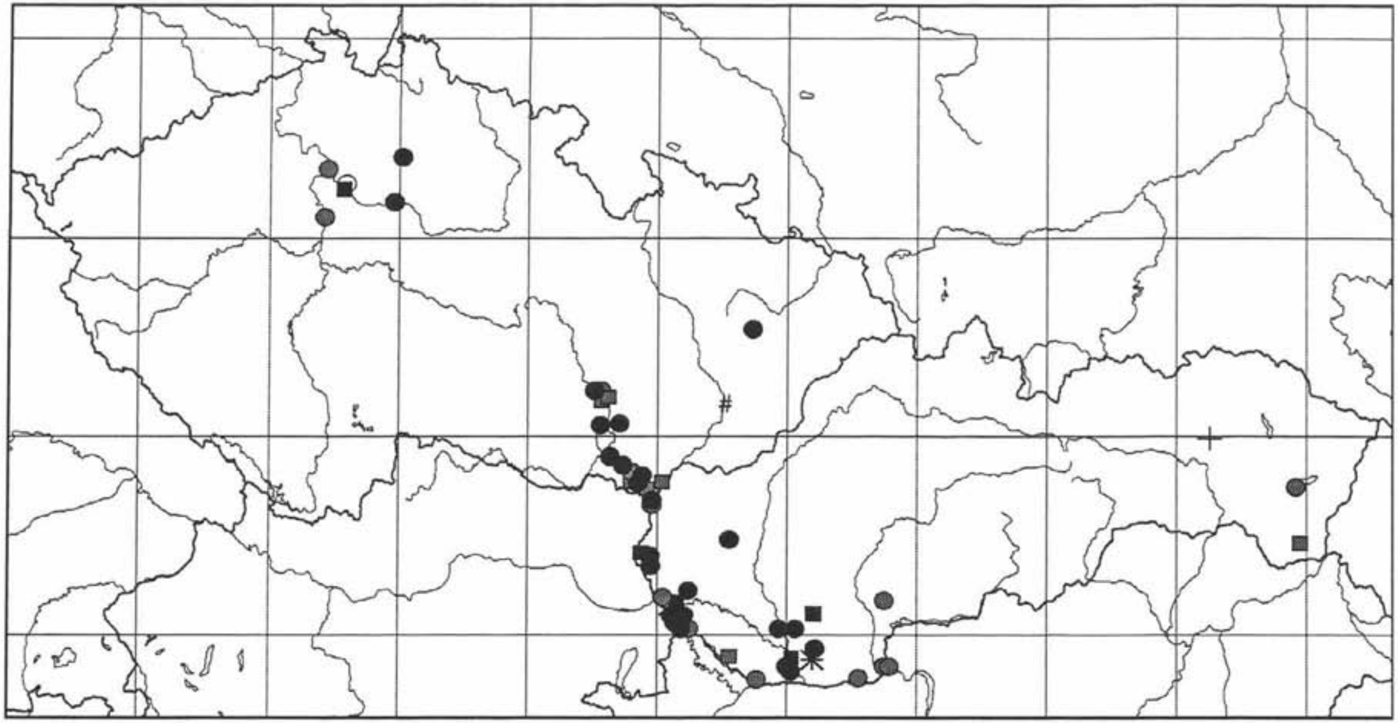
– *Neolentinus degener* occurrence on conifers is known in the Mediterranean region only, but not in central Europe – the illustrated specimens of *Agaricus cyathiformis* were found on *Abies* in Bavaria.

For the above mentioned reasons, Schaeffer's *Agaricus cyathiformis* cannot be identified with thie discussed species and this is why Schaeffer's epithet cannot be used. For the same reason, it is impossible to use the name *Lentinus schaefferi* (Weinm.) Rauschert – its basionym *Agaricus schaefferi* Weinmann is only a new name for Schaeffer's species. One other older name, *Panus urnula*, according to its description also does not relate to this species. This is why it is necessary to keep Kalchbrenner's name *Lentinus degener* as the basionym of this species.

Regarding recent classification of this species into the genus *Neolentinus*, it is necessary to submit a new combination *Neolentinus degener* (Kalchbr. in Fr.) P. Hrouda, as made above.

Basidiomes solitary or fastigiate. Pileus 8–20(-25) cm wide, pale to light ochraceous (sometimes to silvery), covered with tiny (less than 1 mm), unpalpable, sometimes scarcely visible brown squamulae. Gills pale to ochraceous, dense, longly decurrent; edge irregularly serrate; on the stipe the gills are lamelliform, smooth, tapering (in some places seemingly interrupted), anastomosing. Stipe 5–15(-20) cm long, 1–3 cm wide, pale below the gills, densely covered with the

Mapa 5 – Neolentinus degener



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Broadly def. loc. - literature:

+ - locality where the species was recorded before 1945

- locality where the species was recorded between 1945 and 1970

tiny dark squamulae towards the base (to solid black-brown "velvet" on the base). Context whitish. Hyphal system dimitic, generative hyphae thin-walled, skeletal hyphae thick-walled. Cystidia absent, only "cystidiform hairs" occur on the gills edge. Spores cylindrical to longly ellipsoid, (9-)10–12(-14) × (3.5-)4–4.5 μm. Smell fungal, taste mild.

Related species. Massive basidiomes, beige to brown (depending on the density and colour of the tiny squamulae) with decurrent gills, growing on deciduous wood (in studied countries) can be considered practically unmistakable.

Occurrence: Not very abundant species, its occurrence is limited to the warm regions; slight occurrence decline has been recorded during the last few decades.

Phenology: Fructification in the late spring to summer (maximum V.-VI.), found rarely in autumn. (Some of the autumn records possibly are finds of old, dry basidiomes.)

Substrate: The typical hosts of this species are *Populus* species, it also occurs rarely on other deciduous trees. (Domański /1955/ also reports *Pinus* among the most common hosts of this species in the world. Kotlaba et Pouzar /1996/ mentioned its occurrence on conifers in the Mediterranean region, but not at our latitude.) Although the small number of finds on live trees indicates a saprophyte, according to Černý (personal communication) this species is parasitic: brown rot caused by this species over many years finally leads to the death of the tree, and the fungus then fructificate on the dead wood.

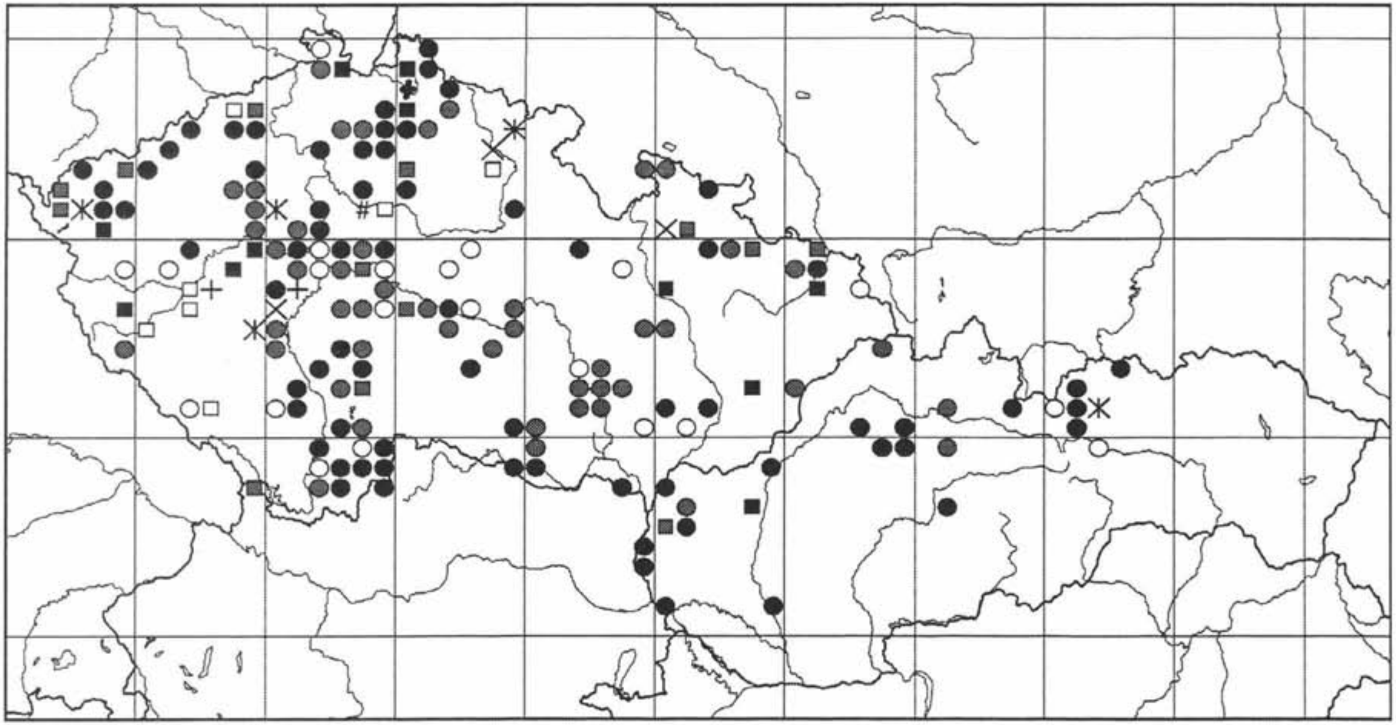
Distribution in the Czech Republic and Slovakia: This species occurs in the lowlands, its area includes Bohemian and Pannonian thermophyticum (Labe River surroundings, the lowlands around the Svratka, Dyje, Morava and Dunaj rivers) and several isolated localities (C Moravia, E Slovakia).

World-wide distribution: The species has been recorded in the temperate and subtropical zones of the Old World. It occurs mainly in flood-plain forests (Pilát 1946). This is confirmed by the specimens in Czech and Slovak herbaria.

Neolentinus lepideus (Fr.: Fr.) Redhead et Ginns

Basidiomes solitary. Pileus 5–15 cm in width (rarely larger), sallow to pale ochraceous. Mature pileus surface (later the surface layer of the context as well) breaking up into brown scales, turning dark with age. (Specimens with a smooth pileus surface occur rarely.) Gills pale to ochraceous, uncinate and decurrent; edge irregularly serrate. Stipe 5–10 cm long, 1–2.5 cm wide, its cutis breaks up into scales or strips. Veil (velum partiale) distinct in the juvenile stage, disappearing with age, creating a spurious ring, more or less palpable. Context whitish. Hyphal system dimitic, generative hyphae thin– or thick-walled, skeletal hyphae thick-walled. Cystidia absent, only "cystidiform hairs" occur on the gill edge. Spores cylindrical

Map 6 – Neolentinus lepideus



Documented data:
- ○ - locality where the species was found before 1945
- ◍ - locality where the species was found between 1945 and 1970
- ● - locality where the species was found after 1970

Data from literature:
- □ - locality where the species was recorded before 1945
- ▩ - locality where the species was recorded between 1945-1970
- ■ - locality where the species was recorded after 1970

Broadly defined localities:
- × - locality where the species was found before 1945
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- ✱ - locality where the species was found after 1970

Broadly def. loc. - literature:
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- ✚ - locality where the species was recorded after 1970

to ellipsoid, (8-)10–15 × (3.5-)4–5(-5.5) μm. Smell fungal, sometimes anise. Taste mild to somewhat acidic.

Neolentinus lepideus often forms so called "mine forms" – habitat forms occurring on the wood in the mines, cellars etc. *Lentinus lepideus* forma *ceratioides* (Holmsk.) Pilát (often identified as *Lentinus suffrutescens* in the herbaria) forms only smooth, pale coloured, antler-like branched sprouts, 0,5–1 cm wide and up to several decimeters long. Forma *tubaeformis* Schaeff. forms similarly sprout-like elongated stipes with tiny (1–2 cm in width) smooth or squamulose pileoli at the end. These habitat forms (sometimes also part of normal basidiomes growing out of fissures) often have the surface dusty coloured to entirely black.

Related species. Pileus and stipe surface broken up into scales, the irregularly serrate edge of the decurrent gills and growth on coniferous wood make this species easily distinguishable.

Occurrence: Abundant species. Because of this, finds are not always recorded.

Phenology: Fructification in summer (V.-IX., maximum VII.-VIII.) Formerly, it occurred relatively often in autumn as well. Recently the summer occurrence maximum is more marked.

Substrate: Coniferous trees are the common substrate. When the relative abundance of particular tree species occurrence in our countries is taken into account, *Neolentinus lepideus* prefers mostly *Pinus* and *Larix*. Some changes in the substrate spectrum have been recorded: The species was mostly found on *Picea* in the first half of the 20^{th} century, while the percentage of *Pinus* records has increased during the last decades (almost half of all records have been made since the 1960s). Brown rot is caused by this species. This rot is accompanied by the wood aromatisation by acids (p-methoxycinnamomic and anisic) excreted by the hyphae (Birkinshaw et Findlay 1940, cit. sec. Paclt 1960). Growth on various forms of worked wood (poles, railway ties, mine shoring) is common.

Distribution in the Czech Republic and Slovakia: Common species, occurring throughout both countries, where conifers occur. As mentioned above, not all finds are recorded – this is certainly the reason why the distribution map is not more densely covered by dots.

World-wide distribution: Cosmopolitan species, occurring in the Old and New World, from the tropical zone to Arctic Circle. Only from South America has it not been recorded.

Panus Fr.

Lignicolous fungi. Basidiomes pleurotoid, solitary or mostly clustered. Pileus surface smooth or tomentose. Gills decurrent, with entire edge. Stipe excentric, rarely central. Hyphal system dimitic, clamp-connections present. Cystidia present. Spores oval or ellipsoid, colourless. Spore print white.

The generic name *Panus* is nomen conservandum with the type species *Panus conchatus* (Bull.: Fr.) Fr. (Singer 1975).

Key to the species:

1) Pileus surface distinctly tomentose to crinite; basidiomes mostly separate ... *P. lecomtei*
1') Pileus surface smooth, basidiomes mostly clustered ... *P. conchatus*

Panus conchatus (Bull.: Fr.) Fr.

Basidiomes clustered, more rarely solitary. Pileus fleshy, smooth, 5–10 cm in width (rarely larger), brown to flesh coloured, in time turning pale with a violet hue, sometimes lasting to maturity. Gills pale to yellow-brown, longly decurrent, anastomosing; edge entire. Stipe up to 1(-2) cm long, 0.5–1.5 cm wide, excentric to lateral, sometimes nearly absent, concolorous with the pileus or paler; stipes of the clustered basidiomes are concrescent (sometimes it looks like several pilei from one stipe). Context whitish. Hyphal system dimitic, generative hyphae thin-walled, skeletal hyphae thick-walled. Cheilocystidia broadly clavate, thin-walled, 24–60 × 7–16 μm; pleurocystidia clavate, thick-walled (metuloid-like) on the base, 26–60 × 5–12 μm. Spores oval to ellipsoid, (5-)5.5–6.5 × 2.5–3.5 μm. Smell fungal, taste mild.

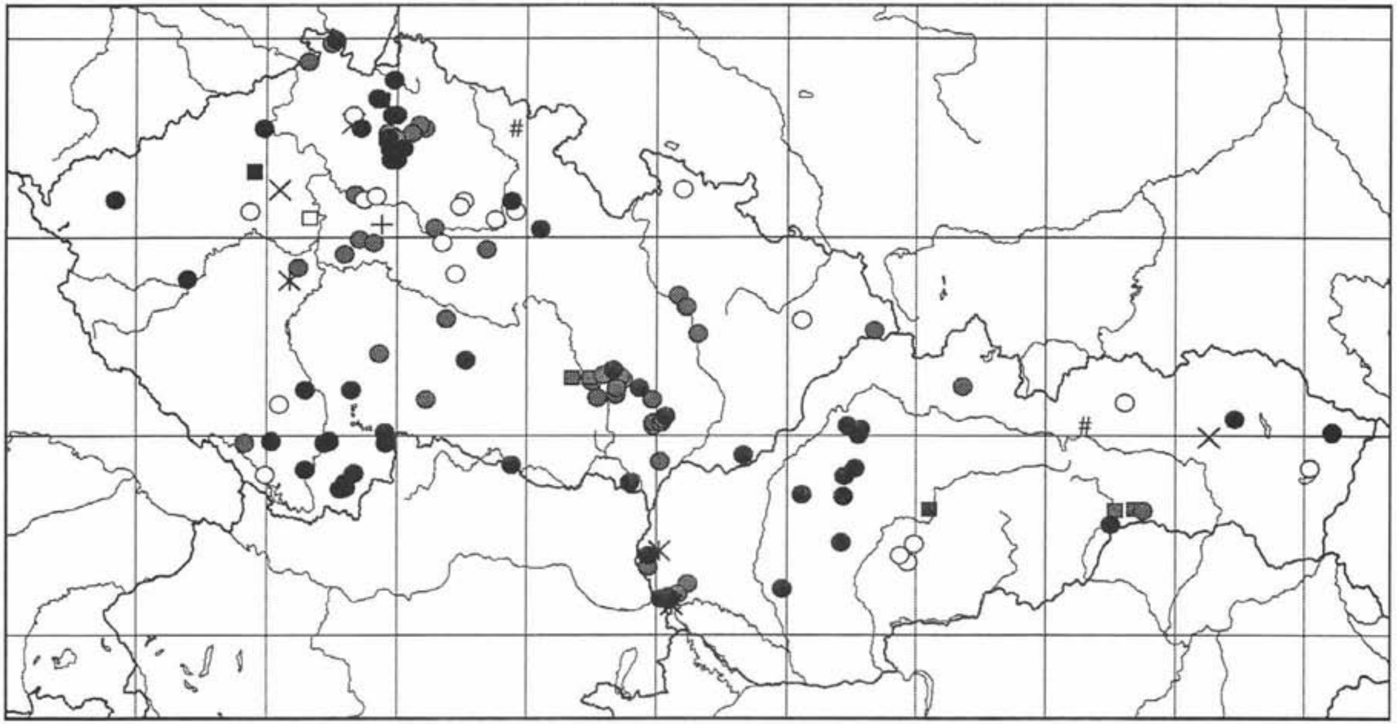
Related species. *Panus lecomtei* is a fungus of a similar shape, but it is noticably tomentose on the pileus and stipe surface. The *Pleurotus* subgen. *Pleurotus* species have a whitish stipe and gills; their hyphal system is monomitic throughout most of the basidiome. The pileus surface of *Pleurotus dryinus* is lanately tomentose or slightly areolate, its gills turn yellow with age or when bruised or dried; spores of all *Pleurotus* species are longer then 7 μm. *Hohenbuehelia petaloides* (and related species) has an almost lateral stipe and whitish gills; apparent acute cystidia (metuloids) are abundant on its gill surface.

Occurrence: Moderately abundant species. Its occurrence is relatively constant.

Phenology: Fructification time of this species are summer and autumn seasons (maximum VII.-IX.), rare occurrences have also been recorded in early winter.

Substrate: Commonly deciduous trees; Pilát (1935) mentions conifers as well on rare occasions. There is great difference between the host spectrum of *Panus conchatus* in the Bohemian Massif region compared with the Carpathian Mountains and the Pannonic region: on the Bohemian Massif (Hercynic part of the Czech Republic) *Betula* species dominate (70 %) among all hosts; on the other hand, *Betula* has been recorded only 3 times as the substrate in the Carpatho-Pannonic territory (Brno and Morava River surroundings, no records in Slovakia); the most common substrate there is *Fagus*. White rot is caused by this species.

Map 7 – Panus conchatus



Documented data:
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◍ - locality where the species was found between 1945 and 1970
● - locality where the species was found after 1970

Data from literature:
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Broadly def. loc. - literature:
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Sporadic find on *Pinus sylvestris* (noted with question mark): Byšť (Czech Republic, E Bohemia), 230 m, MTB 5861c, 18. VI. 1941, leg. Z. Schaefer, det. A. Pilát ut *Pleurotus conchatus*, rev. F. Kotlaba 26. 6. 1984 (PRM).

Distribution in the Czech Republic and Slovakia: Scattered occurrence especially in the middle altitudes of both countries. Relatively large number of localities surrounding collectors' centres (Brno, Mnichovo Hradiště) suggests that the species is probably more frequent than the distribution map shows.

World-wide distribution: Cosmopolitan species of the Old and New World, occurring in all climatic zones. In the southern hemisphere it has been recorded only in Australia, there are no records from Africa or South America.

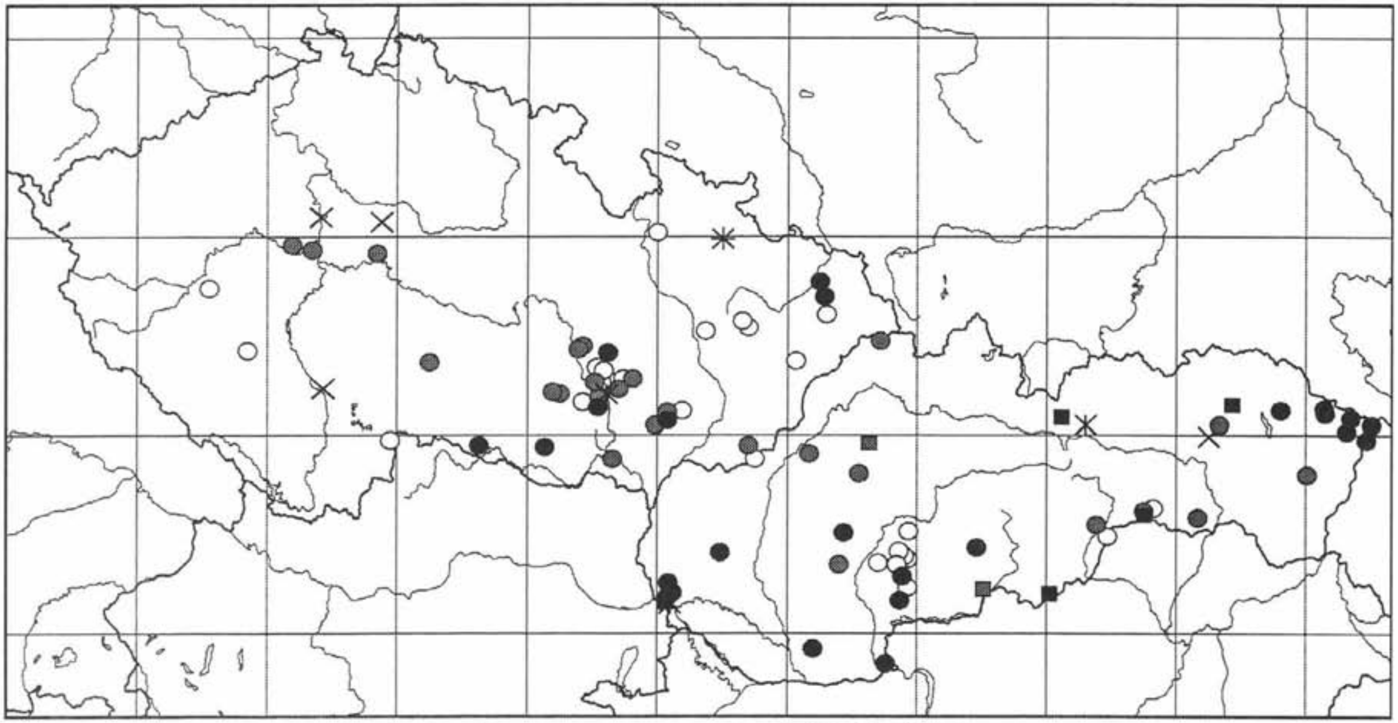
Panus lecomtei (Schw.) Corner

The species is known in our region mostly as *Panus rudis* (Fries 1838). This is apparently the first epithet used in the genus *Panus*, but there are older epithets *lecomtei* and *strigosus*, used by Schweinitz (1822) in the genus *Agaricus*. These, as older validly published epithets of the species, have a priority according to Art. 11.4 of the Code (Greuter et al. 1994). Later, Fries (1828) in Elenchus Fungorum presented both *Lentinus lecomtei* and *L. strigosus*; thereby both names are sanctioned against any other (including older) names (paragraph 13.1d). In the genus *Panus*, the name *Panus strigosus* (Schw.) Lloyd is a later homonym of *Panus strigosus* Berk. et Curt.; this is why *Panus lecomtei* (Schw.) Corner is the only correct name of this species.

Basidiomes solitary, more rarely confluent. Pileus 3–8 cm in width (rarely larger), ochraceous to pale brown (with a violet hue in the fresh juvenile basidiomes); hyphae fascicles projecting from the pileus surface make it coarsely tomentose to pilose (fasciculate coarse "hairs" up to 1 mm long), glabrescent on the exsiccates. Gills pale to yellow-brown, decurrent; edge entire. Stipe up to 4 cm long, 0.5–1.5 cm wide, excentric to lateral, sometimes almost missing, shortly but densely tomentose, concolorous with the pileus or paler; stipes of the clustered basidiomes are concrescent (as in *Panus conchatus*). Context whitish. Hyphal system dimitic, generative hyphae thin-walled, skeletal hyphae thick-walled. Cheilocystidia narrowly clavate, thin-walled, 15–30 × 4–6 μm; pleurocystidia (metuloids) clavate, thick-walled (except the apex), 30–50 × 8–12 μm. Spores oval to ellipsoid, (5-)6–6.5 × 3–3.5(-4) μm. Smell fungal, taste bitterish.

Related species. No other lignicolous fungus occurring in these countries has such a markedly tomentose to pilose pileus and stipe surface. Perhaps in the herbarium it is possible to mistake *Panus lecomtei* for tropical *Lentinus crinitus* (or related species), which has a central stipe and much longer (even curved) "hairs" on the pileus surface.

Map 8 – Panus lecomtei



Documented data:

○ - locality where the species was found before 1945

● - locality where the species was found between 1945 and 1970

● - locality where the species was found after 1970

Data from literature:

■ - locality where the species was recorded between 1945-1970

■ - locality where the species was recorded after 1970

Broadly defined localities:

× - locality where the species was found before 1945

✳ - locality where the species was found between 1945 and 1970

✳ - locality where the species was found after 1970

Occurrence: Formerly not very abundant, currently rare species. Very sharp decline in occurrence in the Czech Republic, where only one find has been recorded since the beginning of the 1980s.

Last find in the Czech Republic: Lovčice (southern Moravia), valley of Lovčický potok, approx. 2 km NE of village, SW slope of the valley, MTB 6968a, *Fagus* sp., stump, 12. V. 1989, leg. et det. Vladimír Antonín ut *Pleurotus conchatus*, rev. P. Hrouda 24. 10. 1997 (BRNM).

Last find in Bohemia: Vratišov (Czech Republic, Bohemian-Moravian highland), near the road between Vratišov and Rynárec, MTB 6657a, *Cerasus avium*, stump, half-dead branch, 5. IX. 1953, leg. et det. František Kotlaba (PRC).

Phenology: Fructification in summer (maximum VI.-VII.), more rare in the spring and autumn.

Substrate: Except for two finds on *Abies*, deciduous trees are the common hosts of *Panus lecomtei*. Species of family *Fagaceae* dominate among them. White rot is caused by this species.

Sporadic finds on *Abies*: Karlštejn (SW of Prague, Czech Republic), MTB 6051c, *Abies alba*, stump, X. 1954, leg. et det. Mirko Svrček (PRM);

Banská Štiavnica (Slovak Republic, S part of central Slovakia), Sitno mountain, MTB 7579c, *Abies* sp., wood, 20. X. 1886, leg. et det. Andrej Kmeť, rev. F. Kotlaba 3. 7. 1985 (BRA).

Distribution in the Czech Republic and Slovakia: Scattered occurrence from lowlands to mountains, but especially in the middle altitudes of Moravia and Slovakia; relatively more recorded in warmer regions. Species has always been rare in Bohemia (only 10 localities).

World-wide distribution: Cosmopolitan species, occurring in the Old and New World, from tropical to temperate zones. In Central Europe it reaches its northern boundary on the continent (but it is known from Sweden) – this is the probable reason for its rare occurrence in the Hercynic part of the Czech Republic.

Phyllotopsis (Gilb. et Donk) ex Sing.

Lignicolous fungi. Basidiomes lateral, solitary or imbricate. Pileus rounded, velutinous to tomentose on the surface. Gills decurrent to the connection with the substrate, edge entire. Stipe absent. Hyphal system monomitic, clamp-connections present. Cystidia present. Spores tiny, reniform. Fresh spore print pinkish, turning pale with time.

This is probably the genus least related to the other pleurotoid genera in *Polyporales*. The typical characters of *Phyllotopsis* – thick-walled hyphae, "medallion" clamp-connections, small basidia, allantoid spores and specific cystidia – can be found in some genera of Meruliales (Kost 1986).

Type species: *Phyllotopsis nidulans* (Pers.: Fr.) Sing.

Phyllotopsis nidulans (Pers.: Fr.) Sing.

Basidiomes solitary or imbricate, adnate laterally or partially with the upper part, 3–7 cm in width. Basidiome surface orange coloured in the juvenile stage, turning to dull colours, yellow-brown (to grey-brown) with age, distinctly tomentose or flocculose. Gills yellow-orange to ferrugineous, decurrent to one place (either to the connection place of the lateral basidiome with the substrate or an excentric point to which the "upper" connection with the substrate projects); edge entire. Context dully yellow. Hyphal system monomitic, generative hyphae thin– as well as thick-walled (to sclerified). Cheilocystidia acicular, 30–50 × 1.5–3 μm. Spores ellipsoid to reniform, (4.5-)5–6 × (2-)2.5–3(-3.5) μm. Smell unpleasant (Pilát 1930 reports an offensive odour in the fresh basidiome), taste mild.

Related species. *Paxillus (Tapinella) panuoides* is typically brown (to olive hue) coloured, its context smell is (not always) anise; brown rot is caused by this species only on coniferous wood (often on worked wood). The *Crepidotus* species, which have a similar shape, are mostly pale coloured, their basidiome surface is glabrous and their spore print is ferrugineous. The pileus surface of *Panellus serotinus* is olive coloured, its gills yellow-ochraceous to orange and its spores amyloid.

Occurrence: Uncommon species with constant occurrence.

Phenology: *Phyllotopsis nidulans* fructificates throughout the year with a mild peak in autumn. Two parallel changes can be observed in the Czech Republic: a shift from autumn and winter to year-long occurrence and a shift of the occurrence centre from middle to sub-mountain and mountain altitudes. Considering that no such changes have been observed in Slovakia, they probably reflect only a shift in the collectors' activity to other (higher in the Czech Republic) regions (see also the distribution map).

Substrate: Species growing on both coniferous and deciduous trees. In the first half of this century the majority of finds were on conifers, recently finds on deciduous trees predominate. White rot is caused by this species.

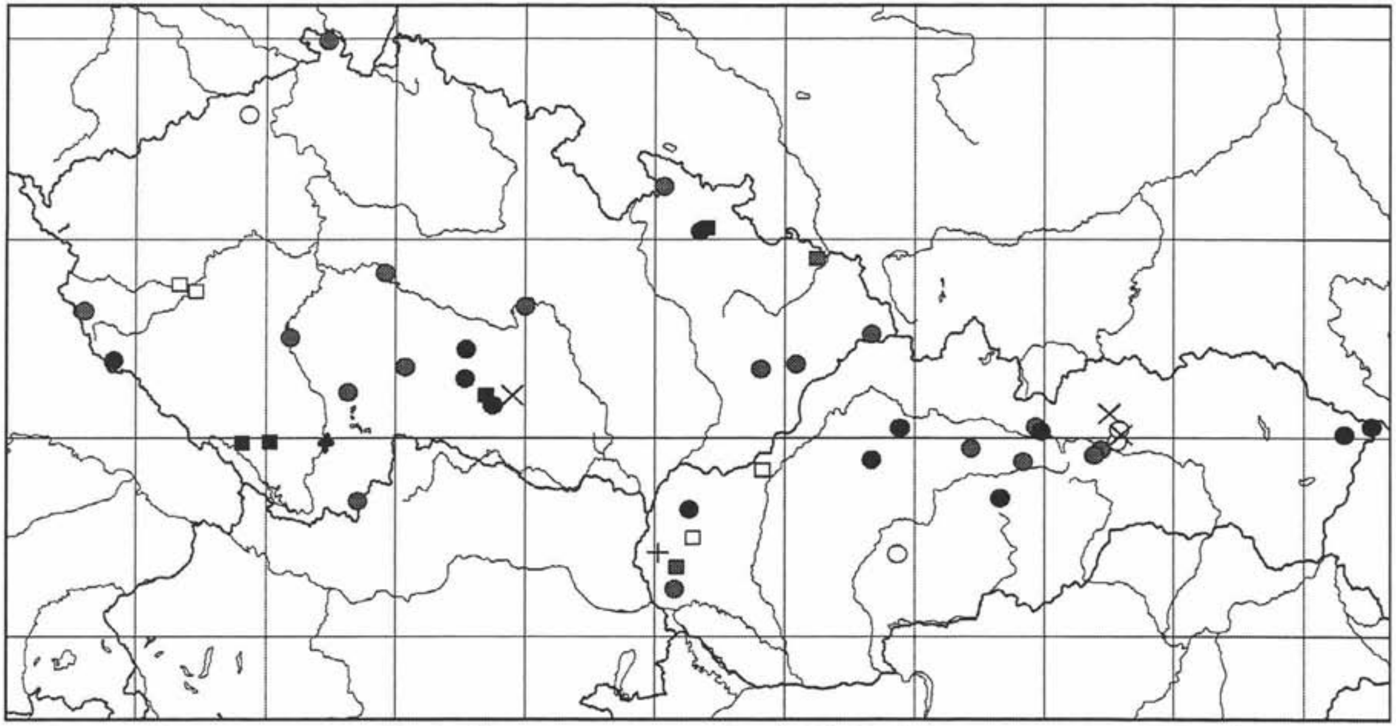
Distribution in the Czech Republic and Slovakia: The species occurs mostly in higher altitudes and colder regions (meso- and oreophyticum); scattered localities in both countries.

World-wide distribution: Its distribution area covers the northern temperate zone, it reaches the Arctic Circle in Europe (according to Pilát /1935/, this species occurs frequently in northern Europe). Singer (1975) mentions its occurrence in temperate zones of both hemispheres, but in southern Africa and South America it is probably adventitious.

Pleurotus (Fr.) Kummer

Lignicolous fungi. Basidiomes pleurotoid, tiny or large, solitary or clustered. Pileus smooth, sometimes slightly radially fibrillose in some species. Gills decurrent, edge entire. Stipe central, excentric, lateral or absent. Hyphal system mono-

Map 9 – Phyllotopsis nidulans



Documented data:

○ - locality where the species was found before 1945

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● - locality where the species was found after 1970

Data from literature:

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or dimitic (skeletal hyphae are sooner scattered, they do not interweave the tissue so densely as in the *Panus* or *Neolentinus* context), clamp-connections present. Cystidia present or absent. Spores cylindrical or ellipsoid, colourless. Spore print white or slightly coloured (yellowish in the subgenus *Lentodiopsis*, light violet in *P. cornucopiae* and *P. ostreatus*).

Type species: *Pleurotus ostreatus* (Jacq.: Fr.) Kummer.

Singer (1975) does not concede Kummer's publication (Kummer 1871) as valid and he presents Quélet (1872) as the generic name author. The problem is in the interpretation of the Arts. 32.1c, 32.4 and 32.5 of the International Code of Botanical Nomenclature, concretely whether Kummer's indirect reference to Fries' taxa is a sufficient reference to the genus basionym. In the last edition of the Code (Greuter et al. 1994), the indirect reference in Kummer's work is directly the subject of Art. 32.5, example 8, where the problem is explicitly solved. (At the same time, Art. 33.6 gives an exception to Art. 33.5 for Fries' Systema mycologicum – taxa used there on the "tribus" level are considered as validly published, although the term "tribus" is incorrectly used for the infrageneric taxa.)

Systematic classification within the genus *Pleurotus*:

– subgenus *Lentodiopsis* (Bubák) O. Hilber: in Europe *P. calyptratus, P. dryinus*;

– subgenus *Pleurotus*: in Europe *P. eryngii, P. cornucopiae, P. pulmonarius, P. ostreatus*;

– subgenus *Coremiopleurotus* O. Hilber: without European representatives.

Subgenus *Coremiopleurotus* is characterised by coremia creation and a strictly monomitic hyphal system. Characters of the subgenus *Lentodiopsis* are veil creation in basidiome ontogenesis and a dimitic hyphal system. The most complicated situation is explicitly delimiting the nominate subgenus *Pleurotus*. Hilber (1982) presents its representatives as monomitic with the exception of *P. cornucopiae*; if this were true, the character dissimilarity of the subgenus *Lentodiopsis* would probably be sufficient for its classification at the level of a separate genus (resp. for Bubák's genus application). As skeletal hyphae are present in the stipe context of *P. ostreatus* and *P. pulmonarius*, also the explicit delimitation of the above mentioned taxa is limited to veil presence/absence, and this is why they are retained at the subgenus level.

Key to the species:

1) Growth on the roots or stalk bases of *Apiaceae* ... *P. eryngii*
1') Growth on dead or live wood ... 2
2) Basidiomes non-stipitate, laterally adnate; distinct veil in the juvenile stage ... *P. calyptratus*
2') Basidiomes with distinct central or excentric stipe; veil present or absent ... 3

3) Veil in the juvenile stage leaves some residue on the pileus margin; fresh pileus surface slightly tomentose to flocculose; conidia creation on the stipe base ... *P. dryinus*

3') Veil absent; pileus surface smooth or slightly fibrillose; no conidia creation on the stipe base ... 4

4) Occurrence from spring to autumn; gills longly decurrent (often to the stipe base); skeletal hyphae can be present in the whole basidiome context ... *P. cornucopiae*

4') Occurrence more or less all year; gills shortly decurrent; skeletal hyphae present in the stipe base ... 5

5) Pileus colour grey (to bluish), brown, ferrugineous (to ochraceous); basidiome does not turn yellow with age or when bruised or dried ... *P. ostreatus*

5') Pileus colour pale (to almost white), ochraceous, light brown; basidiome turns yellow with age or when bruised or dried ... *P. pulmonarius*

Subgenus *Lentodiopsis* (Bubák) O. Hilber

This subgenus is characterised by veil presence and a dimitic hyphal system (but skeletal hyphae are present in the subgen. *Pleurotus* species, too). It includes two species occurring in central Europe; except for the above mentioned characters these two species do not show close affinity, so they are divided at the section level – *P. calyptratus* to section *Calyptrati* Sing. and *P. dryinus* to section *Lepiotarii* Pilát (they are each the type species of the section).

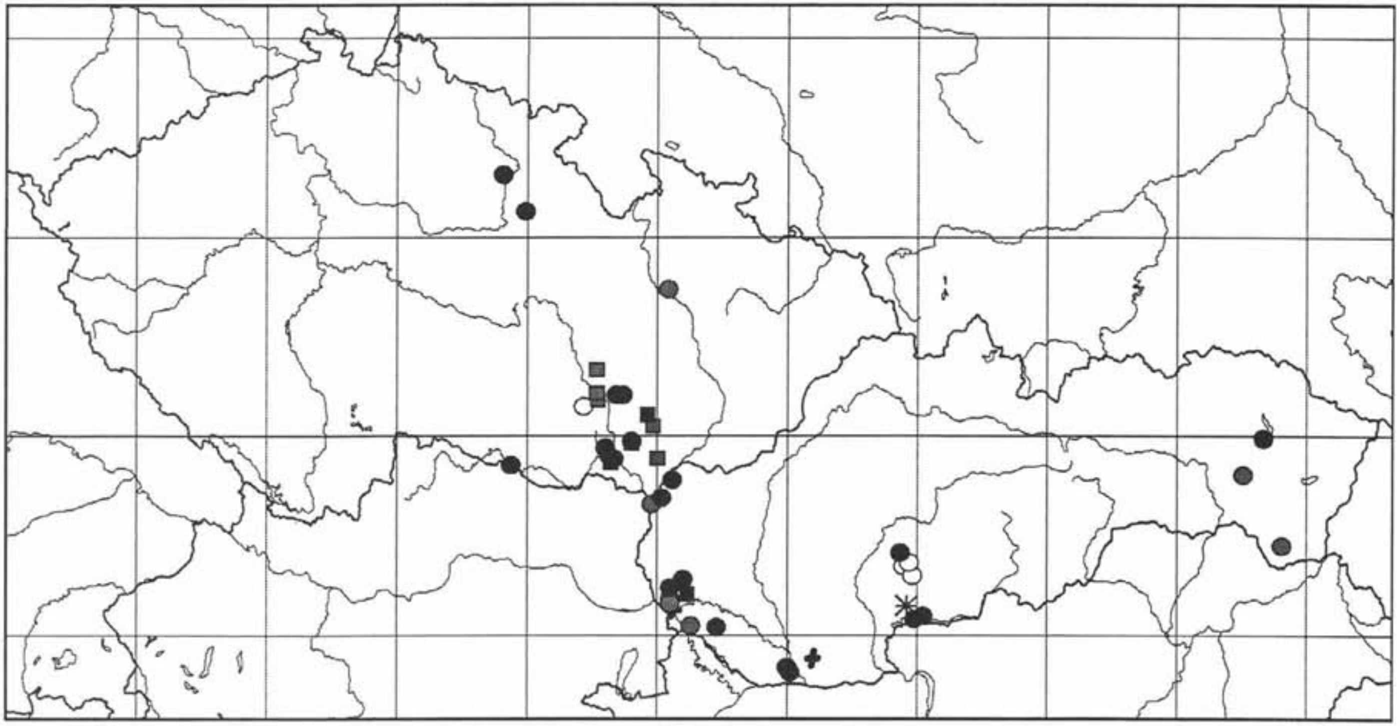
Subgenus type species: *Lentodiopsis albida* Bubák = *Pleurotus dryinus* (Pers.: Fr.) Kummer

Pleurotus calyptratus (Lindbl. in Fr.) Sacc.

Basidiomes solitary or imbricate, adnate laterally, 2–6 × 3–10 cm. Basidiome surface smooth or slightly radially fibrillose, sallow or light brown (to grey-brown). Gills whitish, decurrent to the connection place of the lateral basidiome with the substrate. Juvenile gills are covered with whitish mucid membranaceous veil (velum partiale); remnants of this veil remain on the pileus margin or disappear at maturity. Context whitish. Hyphal system dimitic, generative hyphae thin-walled, skeletal hyphae thick-walled. Cystidia absent. Spores cylindrical or longly ellipsoid, (8.5-)10.5–13.5(-14.5) × (3.5-)4–5(-6) μm. Smell farinaceous, slightly acid or sweet, taste mild.

Related species. Can be confused with the *Crepidotus* species, which are distinguishable by the absence of the veil, presence of hymenial cystidia and smaller spores (up to 10, max. 11 μm). The pileus surface of *Panellus serotinus* is olive coloured, its gills yellow-ochraceous and spores smaller (up to 6 μm) and amyloid.

Map 10 – Pleurotus calyptratus



Documented data:

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Data from literature:

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Broadly defined localities:

✳ - locality where the species was found after 1970

Broadly def. loc. - literature:

✚ - locality where the species was recorded after 1970

Occurrence: Uncommon species, extremely rare (or not found?) during the first half of the 20th century. Recently, certain occurrence decline in the Czech Republic, but the species is found in new region (E Bohemia) at the same time.

Phenology: Thermophilous species growing mainly during the summer (maximum in the Czech Republic V.-VI., in Slovakia V.-VIII.). It has been found only in spring and early summer (IV.-VI.) in Czech mesophyticum.

Substrate: *Populus* species are the typical host of *Pleurotus calyptratus*; if the *Betula* determination was correct, it may rarely occur on other deciduous trees. White rot is caused by this species.

Sporadic find on *Betula*: Banská Štiavnica (Slovakia, S part of central Slovakia), Sitno mountain, MTB 7579c, 21. VII. 1887, leg. et det. Andrej Kmeť ut *P. mollis?*, rev. F. Kotlaba 4. 7. 1985 (BRA).

Distribution in the Czech Republic and Slovakia: Distribution in the Czech Republic and Slovakia has been limited for a long time (with a few exceptions) to Pannonic thermophyticum – S Moravia, S and E Slovakia, but there are recent finds from E Bohemia.

Sporadic finds in Bohemia: Bělečko (E Bohemia, SE of Hradec Králové), reserve "Buky", deciduous tree, dead trunk, 1996, leg. et det. Josef Slavíček (HR);

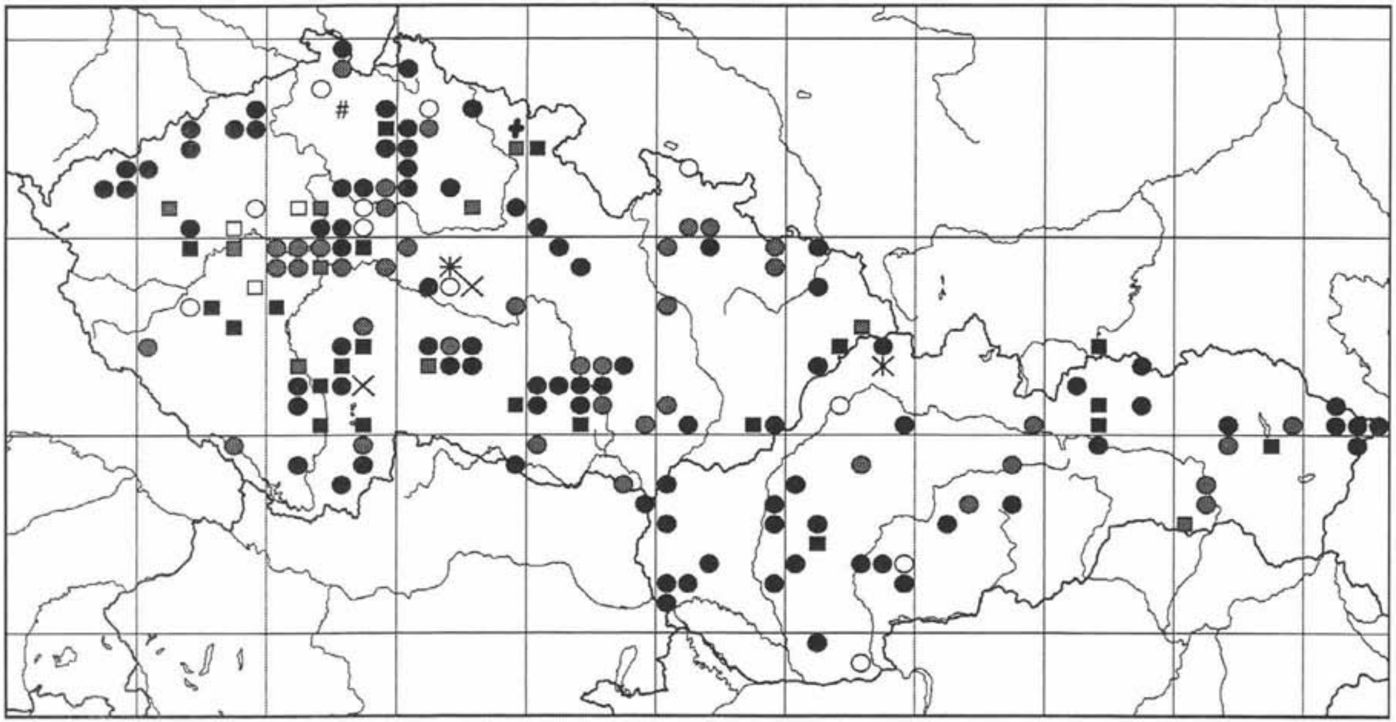
Račice nad Trotinou (N of Hradec Králové), 700 m NE of the village, north part of "Hořička" forest, *Populus tremula*, 17. V. 1997, leg. Zdeněk Herman, 13. IV. 1998, leg. Miloslava Dobešová, both det. Josef Slavíček (HR).

World-wide distribution: Quite rare species in Europe; Zervakis and Balis (1996) present its occurrence also in Asia.

Pleurotus dryinus (Pers.: Fr.) Kummer

Basidiomes solitary. Pileus toughly fleshy, 7–25 cm in width (rarely larger – up to 37 cm, according to V. Vaníček, herbarium specimen label: Karlovy Vary-Doubí, 1989 /K. Vary museum/), whitish, beige or yellowish to grey-brown ochraceous, softly tomentose on the surface; the surface tomentum sometimes changes to adnate lanate squamulae or the surface becomes slightly areolate at maturity. Gills whitish, shortly or longly decurrent. Juvenile gills are covered with a soon disappearing veil (velum partiale); no distinct traces remain on the pileus margin at maturity. Stipe 5–10 cm long (rarely longer), 1–3 cm wide, pale, yellowish or ochraceous, rarely with tiny veil remnants creating an incomplete "annulus". Stipe base dark brown or black with copious conidia production (see later). Context whitish; context, gills and stipe surface turn yellow with age or when bruised or dried. Hyphal system dimitic, generative hyphae thin-walled, skeletal hyphae thick-walled. Cystidia absent. Spores cylindrical or longly ellipsoid, (8-)10–14(-16) × (3-)3.5–4.5(-5) μm. Smell fungal, taste mild.

Map 11 – Pleurotus dryinus



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- ● - locality where the species was found between 1945 and 1970
- ● - locality where the species was found after 1970

Data from literature:
- □ - locality where the species was recorded before 1945
- ■ - locality where the species was recorded between 1945-1970
- ■ - locality where the species was recorded after 1970

Broadly defined localities:
- × - locality where the species was found before 1945
- ✳ - locality where the species was found between 1945 and 1970
- ✳ - locality where the species was found after 1970

Broadly def. loc. - literature:
- + - locality where the species was recorded before 1945
- # - locality where the species was recorded between 1945 and 1970
- ✚ - locality where the species was recorded after 1970

Anamorph: *Antromycopsis ruzena* O. Hilber (nom. invalid.). Conidia arising on the stipe base hyaline when young, thick-walled and dark brown at maturity. No creation of coremia (conidiophore fascicles); because of this, the anamorph should not be classified in the genus *Antromycopsis*, but in a separate, closely related genus (Hilber 1997).

Fungi growing on conifers were formerly classified as the species *Agaricus tephrotrichus* (later variety, or forma *tephrotrichus*) – except the coniferous substrate, they do not show any other difference, so there is no reason to separate them either at the specific, or at the infraspecific level.

Like the genus *Neolentinus* species, *P. dryinus* also creates habitat forms under conditions of insufficient light (typically, in tree cavities) – elongated light stipes with reduced pilei creation (Herink 1950b, some herbarium specimens).

Related species. Juvenile basidiomes with a visible veil can be similar to *Neolentinus lepideus*, but its pileus surface is broken up into scales from a very early stage. Distinguishment at maturity: the subgenus *Pleurotus* species do not have a lanate pileus surface, they do not turn yellow with age or when bruised (with the exception of *P. pulmonarius*) and do not have skeletal hyphae in the pileus context (except of *P. cornucopiae*). *Panus conchatus* has flesh-brown juvenile basidiomes (partly the colour remains until maturity), short brown stipe and smaller (up to 7 μm) spores. *Ossicaulis lignatilis* has a more whitish basidiome and smaller (up to 6 μm), widely ellipsoid spores.

Occurrence: Still abundant species. Because of this, not every find is recorded.

Phenology: Fructification in the second half of the year with sharp peak in September and October. Very rarely found in winter and spring.

Substrate: Deciduous trees (*Malus, Quercus, Fagus* etc.) dominate as hosts, but the occurrence of this species on the conifers (mainly *Picea*) is not rare. It has often been found on frost breaches. White rot is caused by this species. The percentage of recorded finds on live trees has increased gradually, as has the percentage of finds on conifers; a certain connection is supported by the fact that the percentage of records on the live trees has increased more sharply among conifers.

Distribution in the Czech Republic and Slovakia: Common species especially in the middle altitudes of both countries. The more prominent (among the studied species) accumulation of finds in the "collectors' centres" (Praha, Brno etc.) suggests that the species certainly is not recorded in all places of its occurrence and the distribution map should be more densely covered by dots.

World-wide distribution: The distribution centre is the northern temperate zone; the species occurs from the subtropical regions to the Arctic Circle. In the southern hemisphere, the species has probably only been recorded in Australia, but its occurrence in other regions of the southern temperate zone is also possible.

Subgenus *Pleurotus*

This subgenus is characterised by absence of the veil; the hyphal system is dimitic, but (with the exception of the mature basidiomes of *P. cornucopiae*) the skeletal hyphae occur only in the basal part of the stipe.

Subgenus type species: *Pleurotus ostreatus* (Jacq.: Fr.) Kummer

There are non-uniform opinions on the relations within this taxonomically compact subgenus. Molitoris and Prillinger (1986) discern two evolutionary branches within each of which are closely related species – the first branch contains *P. ostreatus* and *P. columbinus*, the second *P. eryngii, P. cornucopiae, P. pulmonarius*. Zervakis and Labarere (1992) present *P. ostreatus* as closely related to *P. sapidus* (= *P. cornucopiae*), whereas *P. pulmonarius* is positioned near the afro-asiatic *P. sajor-caju*. Hilber (1997) classifies the species with a monomitic pileus context (among them *P. ostreatus, P. eryngii, P. pulmonarius*) in one group and in a considerably less closely related second group, dimitic species including *P. cornucopiae*.

Except *Pleurotus eryngii*, the species of this subgenus have been classified at the level of infraspecific taxa within the species *P. ostreatus*. In the table of negative results of intersterility tests, Bresinsky et al. (1976) report an incompatibility of *P. cornucopiae, P. columbinus, P. ostreatus* and *P. pulmonarius*. After more experiments, Hilber (1982) confirms 100% incompatibility of *P. ostreatus, P. pulmonarius* and *P. cornucopiae*, but on the contrary reports compatibility between *P. ostreatus* and *P. columbinus*. Whereas *P. columbinus* is reduced to the variety level (see more under *P. ostreatus*), *P. cornucopiae* and *P. pulmonarius* are confirmed as separate species.

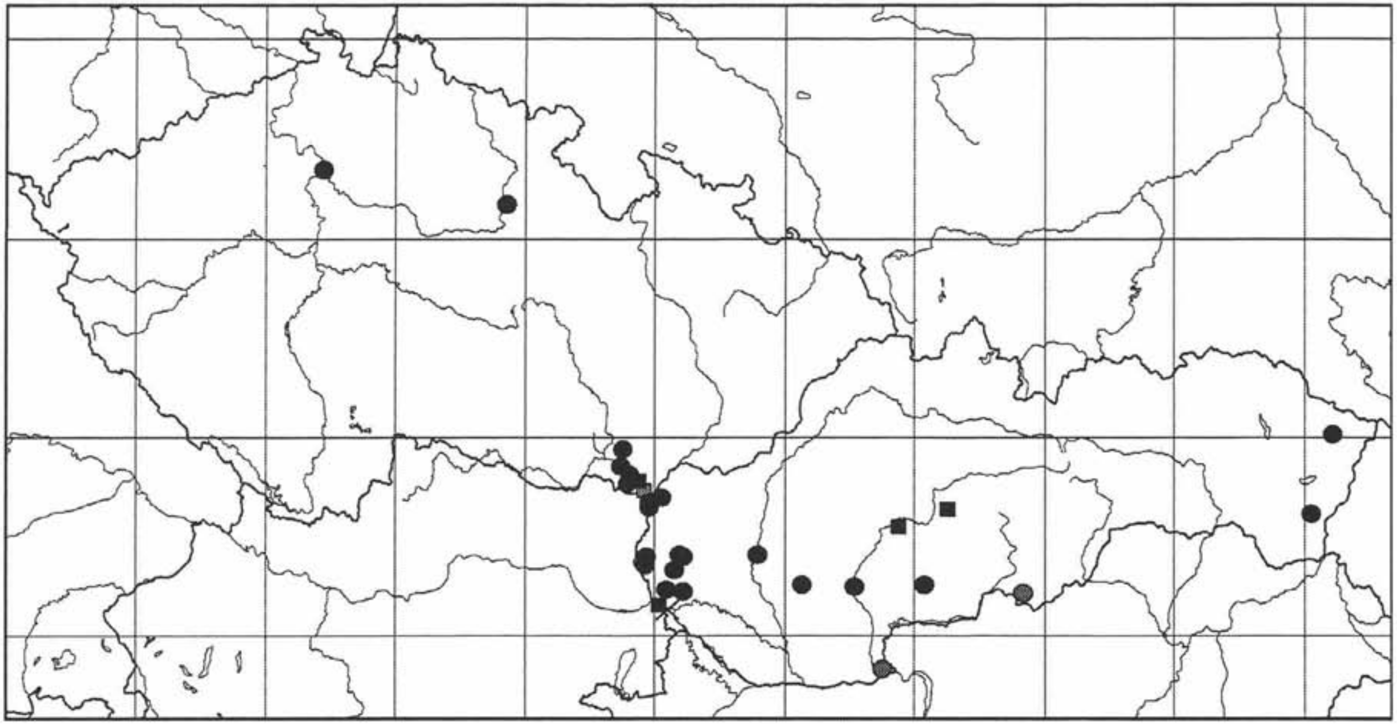
Pleurotus cornucopiae (Paulet) Rolland

Basidiomes solitary or fastigiate. Pileus 4–10 cm in width, depressed in the centre, infundibuliform at maturity; white-brown when young, light-brown at maturity, sometimes with ochre hue. Gills whitish, longly decurrent on the stipe, in this area densely reticulately anastomosing. Stipe 2–6 cm long (often shortened by longly – up to 15 cm – decurrent gills), 1–2 cm wide, white. Context white. Hyphal system dimitic, generative hyphae both thin-walled and sclerified. Caulocystidia present as tapering hyphal ends, bearing so called "conidia". Spores cylindrical to ellipsoid, (7-)7.5–9.5(-11) × 3.5–4.5(-5) μm. Smell farinaceous to anise, taste mild.

Formerly this species was thought a variety, resp. forma of *Pleurotus ostreatus* – intersterility tests (Hilber 1982) proved 100% incompatibility of these two species.

Pleurotus citrinopileatus was distinguished from *P. cornucopiae* according to such characters as yellow pileus and smaller spores. Intersterility tests proved the full compatibility of these two species; the hybrids create normal basidomes with

Map 12 – Pleurotus cornucopiae



Documented data:
● - locality where the species was found between 1945 and 1970
● - locality where the species was found after 1970

Data from literature:
■ - locality where the species was recorded between 1945-1970
■ - locality where the species was recorded after 1970

Broadly defined localities:
× - locality where the species was found before 1945

yellow pilei; spore size is approximately intermediate between the parents' spore sizes. For this reason, *P. citrinopileatus* is reduced to a variety of *P. cornucopiae* (Ohira 1990, Hilber 1997).

Related species. *P. cornucopiae* is characterised by an anise smell and dense gill anastomoses on the stipe, if these characters are well developed. If not, there is a possibility of confusion with *P. ostreatus* or *P. pulmonarius*; these species do not have skeletal hyphae in the context (except the stipe base); the pileus of *P. ostreatus* is rather conchate (not conspicuously infundibuliform); *P. pulmonarius* is characterized by context, gills and stipe surface turning yellow with age or when bruised or dried. Romagnesi (1969) based the distinguishment of these species on the spore shape: *P. cornucopiae* spores are slightly concave on all sides, whereas *P. ostreatus* and *P. pulmonarius* spores are (from the lateral view) slightly convex in the subapical part (subcylindrical).

Occurrence: Not very abundant species with relatively constant occurrence; first records in the 1960s. The possible reasons for the absence of earlier records are either sporadic research of its native flood-plain forests or indistinguishing of this species, long considered a form of the abundant (and often not recorded) *P. ostreatus*.

Phenology: Fructification in summer (maximum V.-VIII.), rare occurrences also in autumn.

Substrate: The deciduous riparian forests species; *Ulmus* species are the dominant substrate in the Czech Republic (69 %). White rot is caused by this species. In the literature, *P. cornucopiae* is considered the leading cause of the *Ulmus* wood destruction (Ivanov 1985).

Distribution in the Czech Republic and Slovakia: Species distribution is restricted to the warm regions of southern Moravia and southern Slovakia, it occurs in the riparian forests and the lower altitudes in the Carpathians; a few isolated finds elsewhere. Cultivated mushroom (Ginterová 1974, Jablonský 1980).

Sporadic finds in Bohemia: Hořín near Mělník (N of Prague), chateau park, 160 m, MTB 5652d, *Populus alba (?)*, fallen trunk, 18. V. 1996, leg. et det. Jiří Baier, rev. F. Kotlaba et Z. Pouzar 23. 5. 1996 (PRM); 22. V. 1999, leg. et det. Václav Janda (HR);

Hradec Králové (E Bohemia), part Nový H. K., northern slope of the hill of Sv. Jan, MTB 5860b, deciduous tree, dead trunk, 14. VII. 1993, leg. et det. Josef Slavíček (HR).

World-wide distribution: The distribution area probably covers the temperate zone and subtropical regions of the northern hemisphere. The relatively small number of records does not allow speculations whether or not its distribution is continuous.

Pleurotus eryngii (DC.: Fr.) Quél.

Basidiomes solitary. Pileus 4–10 cm in width, light to dark-brown, surface smooth. Gills pale to ochraceous, shortly decurrent. Stipe 4–8 cm long, central or slightly excentric, 1–1,5 cm wide, whitish. Context white. Hyphal system monomitic, generative hyphae thin-walled. Cheilocystidia and pleurocystidia present as tapering hyphal ends, carrying so called "conidia". Spores cylindrical to ellipsoid, (7-)8–10(-11) × (3-)3.5–4.5(-5) μm. Smell fungal, taste mild.

Some authors (most recently Hilber 1978) separate the species *P. nebrodensis*, growing on *Laserpitium*; besides the substrate, it differs in size. Intersterility tests proved a considerable compatibility between the taxa, recently separated at the variety level – var. *eryngii*, var. *nebrodensis* and var. *ferulae* (Hilber 1982, after more tests, he changed his appraisal). The basidiome size of the particular varieties is largely proportional to the size of their host plants (Pilát 1935).

Related species. Because it grows on the roots and stem bases of the *Apiaceae* or the *Asteraceae*, not to be confused with other species.

Occurrence: Very rare species, whose occurrence is dependant upon its substrates' habitats. Only one record from the former Czechoslovakia in the first half of the 20^{th} century; not recorded in the 1990s either.

Phenology: This species occurs in the summer and autumn months in the Czech Republic, and in Slovakia only in autumn. This is probably caused by the noticeable drought in the steppe regions of southern Slovakia in the summer months (the same is reported by Pilát /1935/ from the Mediterranean region).

Substrate: The only *Pleurotus* species growing parasitically on the roots and stem bases of the plants of the family *Apiaceae* or *Asteraceae* (recorded *Eryngium, Peucedanum, Laserpitium, Ferula* etc., see Zervakis et Balis 1996). The mycelium covers the roots and may cause the young leaves to dry up (Pospíšil 1952).

Distribution in the Czech Republic and Slovakia: The distribution of this rare species is limited to the steppe habitats of its host plants – scattered localities in the Czech and Pannonic thermophyticum (the surroundings of the town Most, southern Moravia and southern Slovakia). Cultivated mushroom (Jablonský 1980). Endangered species (Lizoň 1995).

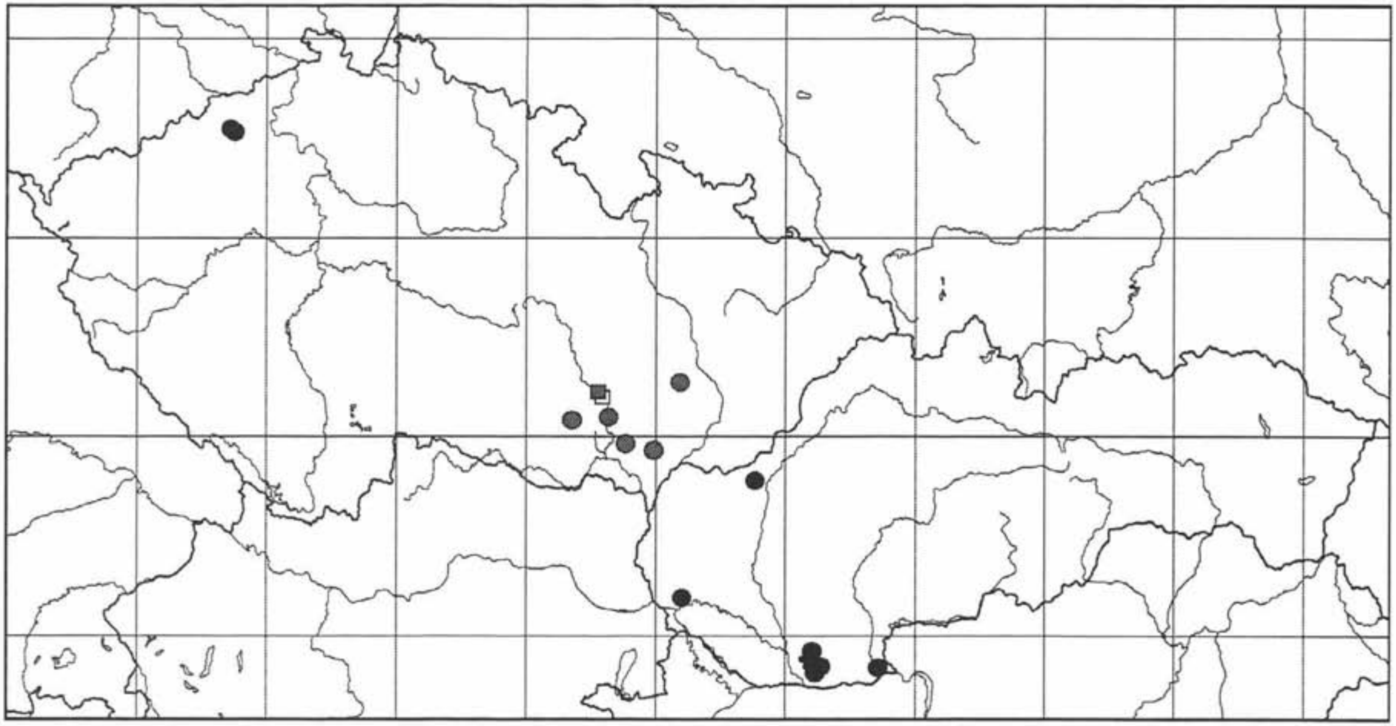
World-wide distribution: Steppe regions of Eurasia (from western Europe to Central Asia), the species also occurs in northern Africa (Algeria).

List of recorded localities:

Czech Republic

Braňany (NW Bohemia), balk near the nursery school, 300 m, MTB 5448c, *Eryngium campestre*, basal parts, 22. IX. 1975, leg. et det. J. Šutara, rev. F. Kotlaba 4. 5. 1984; hill "Kaňkov" 1 km SEE of Braňany, grassland, S and SW slope, MTB 5448c, *Eryngium campestre*, root and basal part, 5. XI. 1975,

Map 13 – Pleurotus eryngii



Documented data:

● - locality where the species was found between 1945 and 1970

● - locality where the species was found after 1970

Data from literature:

□ - locality where the species was recorded before 1945

■ - locality where the species was recorded between 1945-1970

Broadly def. loc. - literature:

✚ - locality where the species was recorded after 1970

1. VIII. 1977, X. 1978, X. 1979, all leg. et det. J. Šutara, rev. F. Kotlaba 4. 5. 1984; 11. XI. 1989, leg. et det. J. Šutara (all LIT).

Budkovice near Ivančice (S Moravia, SW of Brno), dry slope – grassland, MTB 6964a, *Eryngium* sp. (*Peucedanum?* – note of F. Šmarda), dead rootstocks, 11. X. 1967, leg. A. Vágner, det. F. Šmarda (BRNM).

Brno, between parts Komín and Bystrc, MTB 6765c, 2. X. 1955, leg. J. Šmarda (Dermek 1974).

Brno, part Stránice, "Žlutý kopec" hill, MTB 6765c, *Eryngium campestre*, roots, leg. (et det.?) G. Niessl (Hruby 1935).

Rebešovice (S of Brno), sands ("Horky") near the village, steppe slope, MTB 6865d, *Eryngium campestre*, 25. V. 1962, leg. M. Smejkal et J. Vicherek, det. J. Špaček (BRNU).

Kurdějov (S of Brno), NE of the village, "Kamenný kopec" hill, SW of spot height 409, steppe margin of deciduous grove, 350 m, MTB 7066b, *Peucedanum cervaria*, 23. V. 1954, leg. et det. F. Šmarda, rev. J. Klán 1. 1984 (BRNM), 15. V. and 29. VII. 1954, VI. 1956, all leg. F. Šmarda, 6. X. 1957, leg. V. Zajícová et K. Podhora, 12. VI. 1962, leg. J. Šmarda (all Dermek 1974).

Čejč (SE of Brno), "Panský Špidlák", grassy steppe, MTB 7067d, *Eryngium campestre*, roots, 14. XI. 1954, leg. F. Šmarda (Herb. Herink, recently PRM; Dermek 1974).

Prasklice (E of Brno), site "Křéby", 250 m, MTB 6769a, *Eryngium campestre*, roots, 5. VI. 1952, leg. et det. V. Pospíšil, rev. F. Kotlaba 26. 6. 1984 (PRM, Pospíšil 1952, Šebek 1961, Dermek 1974).

Slovakia

Bratislava, part Vajnory, airport of Aeroklub Zväzarmu, 130 m, MTB 7769c, grassy place, on ground, 27. IX. 1984, leg. V. Kabát, det. A. Dermek (BRA).

Bzince pod Javorinou (W Slovakia), "Maleník" hill, 280 m, MTB 7172c, grassland, community with *Eryngium campestre*, 14. X. 1983, leg. et det. P. Lizoň (BRA).

Bajč (S Slovakia, as all following localities), 110 m, MTB 8075c, 15. X. 1971, leg. et det. E. Futó (BRNM).

Hurbanovo, MTB 8175, 1972 (Semerdžieva et Musílek 1976).

Svätý Peter = Dolný Peter, MTB 8175d, 12. XI. 1972, leg. et det. E. Futó, rev. F. Kotlaba et Z. Pouzar 11. 1972; *Eryngium campestre*, 25. IX. 1974, leg. et det. E. Futó, rev. F. Kotlaba 14. 4. 1983 (both PRM, 1974 also Herb. Herink); 29. IX. 1972, leg. et det. E. Futó; 30. X. 1972 and 10. V. 1974, leg. et det. E. Futó; *Eryngium campestre*, root, 12. XI. 1972, leg. E. Futó, det. A. Dermek (also Dermek 1973); both rev. F. Kotlaba 27. 6. 1985; 17. X. 1974, leg. et det. I. Fábry; on ground in community with *Eryngium* sp., 10. X. 1981, leg. et det. E. Futó (all BRA), 26. X. 1973, leg. A. Dermek, E. Futó et P. Lizoň (Dermek 1974).

Chotín, grassland near the railway station, 110 m, MTB 8175c, on ground in community with *Eryngium campestre*, XI. 1972, 23. IX. 1976, both leg. et det. E. Futó; 26. X. 1973, leg. et det. A. Dermek, all rev. F. Kotlaba 27. 6. 1985; 2. X. 1984, leg. P. Lizoň et L. Opold, det. P. Lizoň (all BRA); near field way, 21. IX. 1977, leg. et det. E. Futó (Herink – personal record).

Štúrovo, 6 km NE, Kováčovské kopce hills, dry grassland on the oak grove margin, 300 m, MTB 8178d, *Eryngium* sp., dead stalks, 10. IX. 1988, leg. et det. P. Škubla (BRA).

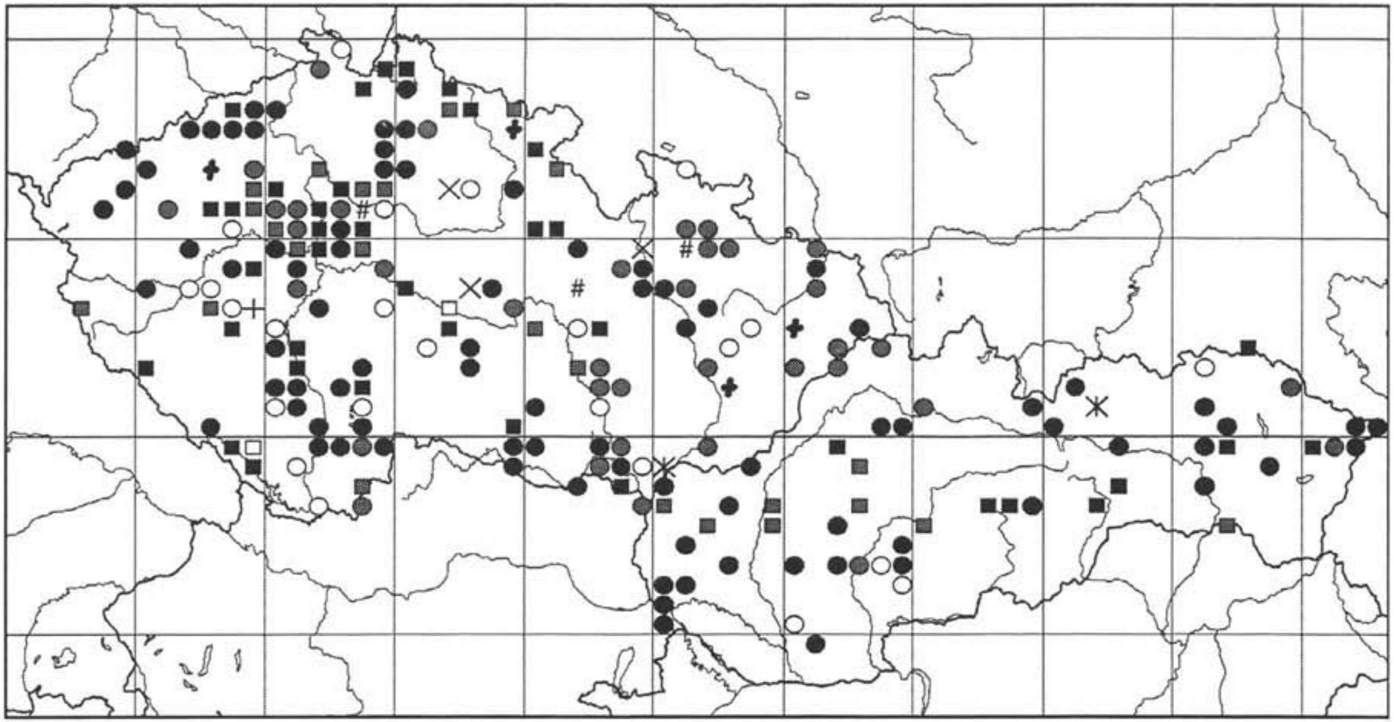
Pleurotus ostreatus (Jacq.: Fr.) Kummer

Basidiomes solitary or frequently fastigiate or imbricate, often a lot of basidiomes cover a large area of the substrate. Pileus 5–15 cm in width (maximum up to 25 cm), surface smooth or slightly radially fibrillose, of different colour – from yellow-brown or ferrugineous (determined as forma *salignus*), through dark-brown, grey-brown (typical *P. ostreatus*), to grey-blue to blue-green (forma *columbinus*). Gills pale, whitish to ochraceous, sometimes with the hue of the pileus colour, decurrent. Stipe excentric to lateral, up to 3 cm long, 1–2 cm wide, often almost absent, especially in rich fascicles or when the basidiome grows laterally. Context white. Hyphal system dimitic, generative hyphae thin– and thick-walled, skeletal hyphae present in the stipe base. Caulocystidia present as tapering hyphal ends, carrying so called "conidia". Spores cylindrical to ellipsoid, (6.5-)7.5–9.5(-11) × 3–4 μm. Smell fungal, taste mild.

P. columbinus and *P. salignus* have been classified at different levels – from forma to separate species. Intersterility tests of *P. ostreatus* and *P. columbinus* (Hilber 1982) showed almost 90% compatibility. On the other hand, Zervakis and Labarere (1992) classified them as separate species based on numerical analysis of the results of enzyme isoelectric focusing. The respective values of the genetic distances in relation with the degree of compatibility noted before, lead to the hypothesis of a sympatric speciation process that is currently under way for *P. columbinus* (Zervakis et Balis 1996). Nevertheless, my opinion is that compatible taxa cannot be rated on the species level (is questionable, whether or not numerical analysis results have greater importance than results of the intersterility tests).

Hilber (1978) tested strains identified as *Pleurotus salignus* and he found compatibility among the different strains (got from the different countries) and *P. ostreatus* or *P. pulmonarius*. Probably, *P. salignus* is in many regions a potential synonym for both above mentioned species, specimens of which have been determined under this name. The characters in Fries' description (Fries 1821) – dense grey gills and grey to ferrugineous spore print – are possible within the scope of *Pleurotus ostreatus* variability, whereas the described colours do not occur in

Map 14 – Pleurotus ostreatus



Documented data:

○ - locality where the species was found before 1945

● - locality where the species was found between 1945 and 1970

● - locality where the species was found after 1970

Data from literature:

□ - locality where the species was recorded before 1945

■ - locality where the species was recorded between 1945-1970

■ - locality where the species was recorded after 1970

Broadly defined localities:

× - locality where the species was found before 1945

✳ - locality where the species was found between 1945 and 1970

✳ - locality where the species was found after 1970

Broadly def. loc. - literature:

+ - locality where the species was recorded before 1945

- locality where the species was recorded between 1945 and 1970

✚ - locality where the species was recorded after 1970

P. pulmonarius. This is why the name *P. salignus* is considered a synonym of *P. ostreatus*.

Because *Pleurotus ostreatus*, *P. columbinus* and *P. salignus* do not show any notable differences except the pileus colour and because all colour formae – grey-red(?) to blue-violet – were found growing on one tree (Nikolovský 1969), the taxa should be appraised at the forma level. J. Herink in his notes about some specimens (Slabce, 1940 /PRM/, Praha-Troja, 1932 /personal record/) mentions finding ochraceous specimens following a frost. It is probable that mechanical damage caused by frost can lead to basidiome colour change.

Pleurotus ostreatus is another species which in insufficient light creates habitat forms – elongated stipes with reduced pilei or only clavarioid forms (van der Aa 1984, cit. sec. Boekhout et al. 1990).

Related species. The *P. pulmonarius* basidiome is paler (yellow-brown, almost white when young) and turns yellow with age or when bruised or dried. The same yellowing is characteristic for *P. dryinus*; further characters are a dimitic hyphal system throughout the entire basidiome and a veil in the juvenile stage. *Panus conchatus* also has a dimitic hyphal system; its basidiome is (especially when young) fleshy-brown and the stipe is brown. The gills of *Pleurotus cornucopiae* are longly decurrent with dense anastomoses, skeletal hyphae are present in its context (only in the stipe base in *P. ostreatus*); this species does not occur in higher and colder regions, in the cold months or (as with *Panus conchatus*) on coniferous trees.

Occurrence: Very abundant species. Because of this, not every find is recorded or published.

Phenology: Fructification all year with a maximum in October and November. There is a clear dependence of the occurrence maximum during the year on environmental conditions – it is clearly an autumn fungus in the warm regions, whereas its occurrence is more equally spread throughout the year in colder regions.

Substrate: The common hosts are deciduous trees, more rarely conifers. The spectrum of substrate trees is very wide. Growth can be either saprotrophic or parasitic. White rot is caused by this species. Sometimes it occurs on somewhat strange substrates – collection from Most 16. X. 1964 (PRM): "The fungus grew in the space between WC and concrete." On Jersey (Channel Islands), it was found on the vertebra of a recently washed up sperm whale (Reid 1985).

Distribution in the Czech Republic and Slovakia: Common species. Usually not recorded, occurring throughout the entire Czech Republic and Slovakia. Cultivated and market mushroom.

World-wide distribution: Cosmopolitic species, occurring all over the world, from tropics to the Arctic Circle.

Pleurotus pulmonarius (Fr.) Quél.

Basidiomes solitary, fastigiate or imbricate. Pileus 5–10 cm in width, almost white when young (as the whole basidiome is), light-brown or yellow-brown at maturity, turning yellow with age, by drying or when bruised. Gills whitish, decurrent. Stipe up to 2 cm long, 0,5–1,5 cm wide, or reduced especially in dense fascicles or when the basidiome grows laterally. Context white. Hyphal system dimitic, generative hyphae thin- and thick-walled, skeletal hyphae present in the stipe base. Cystidia: only hyphal ends suggesting pleurocystidia on the stipe surface and elements such as "hyphal pegs" on the gills' sides. Spores cylindrical to ellipsoid, (6.5-)7.5–9.5(-11) × 3–4 μm. Smell fungal (somewhat unpleasant in older basidiomes), taste mild.

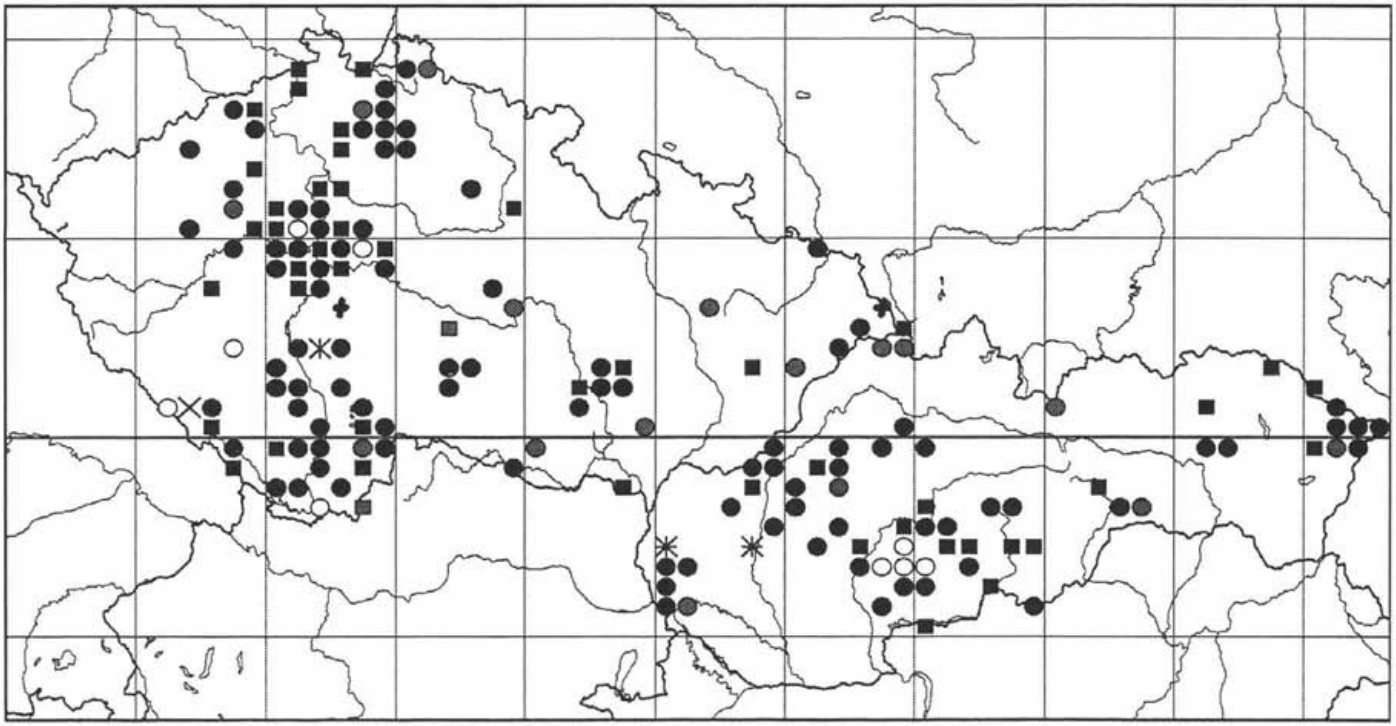
Although the species was already distinguished by Fries (1821, as *Agaricus pulmonarius*), it was classified by many authors as a variety of *P. ostreatus* until the second half of the 20^{th} century. Hilber's intersterility tests (100% incompatibility) in the 1970s and 1980s (Hilber 1982) demonstrated the species' independence of *P. pulmonarius*. Separation of *P. ostreatus* and *P. pulmonarius* as biological species on the basis of intersterility tests was confirmed by Petersen and Hughes (1993); on the other hand, no sexual compatibility barriers were found among specimens of either of these species, even though they were from various parts of the world. Separation of these species was also confirmed by Zervakis and Labarere (1992) on the basis of enzyme pattern isoelectric focusing.

Classification of the cultivated "taxon" *Pleurotus florida* Eger (nom. nud.) is heterogeneous. Hilber (1977) reports its compatibility with *P. pulmonarius* and incompatibility with *P. ostreatus*, whereas 20 years later (Hilber 1997) he lists this name among the synonyms of *P. ostreatus* (without further comment).

As reported by Kotlaba and Pouzar (1996; see also the note for *Neolentinus degener*), the fungus described by Schaeffer (1764: tab. 252) as *Agaricus cyathiformis* probably represents *Pleurotus pulmonarius*; the epithet *cyathiformis* is in this case older than *pulmonarius* for this species. However, the name *Agaricus pulmonarius* was used by Fries (1821: 187) – the name with epithet *pulmonarius* is therefore sanctioned against Schaeffer's older epithet, according to Art. 13.1(d) of the International Code of Botanical Nomenclature (Greuter et al. 1994).

Related species. The *P. ostreatus* basidiome is darker (ferrugineous, brown, grey to blue) and does not turn yellow with age or when bruised or dried. The *P. dryinus* basidiome is larger with gills coloured orange at maturity, a dimitic hyphal system throughout the whole basidiome and a veil in the juvenile stage. The gills of *Pleurotus cornucopiae* are longly decurrent with dense anastomoses, skeletal hyphae are present in its context (only in the stipe base in *P. pulmonarius*); this species does not occur in higher and colder regions, in the cold months or on coniferous trees. Young white basidiomes can be confused with *Pleurocybella*

Map 15 – Pleurotus pulmonarius



Documented data:
- ○ - locality where the species was found before 1945
- ● - locality where the species was found between 1945 and 1970
- ● - locality where the species was found after 1970

Data from literature:
- ■ - locality where the species was recorded before 1945
- ■ - locality where the species was recorded between 1945-1970

Broadly defined localities:
- ✕ - locality where the species was found before 1945
- ✳ - locality where the species was found between 1945 and 1970
- ✳ - locality where the species was found after 1970

Broadly def. loc. - literature:
- ✚ - locality where the species was recorded after 1970

porrigens, characterised by almost globose 6–8 μm large spores and by growth on coniferous trees.

Occurrence: Abundant species. The records count has increased by several times in the last third of this century. Probable reason: Around the end of the 1960s, *P. pulmonarius* began to be commonly distinguished from *P. ostreatus* (this species had been distinguished before, but was considered a separate species by mycologists in general approximately since this time, see above). Before this, *P. pulmonarius* mostly had not been distinguished (the great majority of records made before 1960 is determined as *P. ostreatus* or one of its varieties or forms, including *P. ostreatus* var./forma *pulmonarius*) and – as with specimens of common species – its finds had not been documented. (Pilát /1930/ reports that "this remarkable species has not been noticed in Czechoslovakia until now" and he considered its rare occurrence to be the reason – the documents from before 1930 are almost non existant /Pilát probably did not see the old Slovak finds/, but I do not believe that this was caused by the species absence.)

Phenology: Although *P. pulmonarius* is considered a spring species, generally this is not true. Its occurrence is staggered from spring to autumn; only in the last decades has it shown some occurrence shift towards early summer. (Probably this depends on the region – Biber /1991/ observed the species phenology /1979–1990, generally 24 finds/: III. – 5, IV. – 9, V. – 6, VI. – 1, VII. – 1, IX. – 1, X. – 1. In the Teplice region, *P. pulmonarius* is a notably spring species.)

Substrate: The most frequent host of *P. pulmonarius* is *Fagus*, also other deciduous and rarely coniferous trees. In recent decades, the spectrum of species is wider and the percentage of finds on *Fagus* is lower. White rot is caused by this species. In the literature, this species is presented as the leading element in the destruction of *Tilia* wood (Ivanov 1985).

Distribution in the Czech Republic and Slovakia: Frequent occurrence, especially in the middle to submountain altitudes; no large areas where this species is absent are known. Cultivated mushroom (under the synonymic name *P. florida*) (Hilberová-Podlahová 1977).

World-wide distribution: Cosmopolitan species, occurring from subtropical to polar regions (Pilát /1935/: it accompanies *Betula* to the northern tree line) in the Old World and America. Recorded in Australia, but its occurrence in other continents of the southern hemisphere is also probable.

CONCLUSIONS

Fifteen species of pleurotoid fungi of the family *Polyporaceae* were recorded from the Czech Republic and Slovakia. Their occurrence, phenology, ecology and distribution is commented and documented with distribution maps.

Several species show an occurrence decline especially in the Czech Republic (*Panus lecomtei, Pleurotus eryngii*), others show an increasing number of records due to their growing recognition as separate taxa (*Pleurotus cornucopiae, P. pulmonarius*). Some species show interesting differences in their maximum of fructification in various regions – commonly the species have clearer fructification "peaks" and a more marked time of fructification in warmer regions.

Some of the species also show a certain shift in host spectrum – the usual trend is that the spectrum enlarges, i. e. the fungi are found on more diverse trees. This is just the opposite of the trend which was observed for mycorrhizal hydnaceous fungi. There are two possible explanations: either the enlarging of the substrate spectrum is a relict caused by more records being made during the last decades, or it is a reality caused by the deterioration of environmental conditions, which leads to more trees being susceptible to fungal infection. This hypothesis may be supported by the increasing number of records on live trees (*Pleurotus dryinus*).

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REFERENCES

ARCANGELI G. (1895): Sopra una monstruosita del Lentinus tigrinus. – Nuovo Giorn. Bot. Ital. 2 (1): 57–62.

BIBER J. (1991): Hlíva plicní (Pleurotus pulmonarius) v Milešovském středohoří – zajímavá sukcese. – Čas. Čs. Houb.-Mykol. Sborn., Praha, 68 (3–4): 83–85.

BIRKINSHAW J. K. and FINDLAY W. P. K. (1940): Biochemistry of the wood-rotting fungi. I. Metabolic products of Lentinus lepideus Fr. – Fr. Biochem. J. 34: 82–88.

BOEKHOUT T., BAS C. and NOORDELOOS M. E. (1990): Pleurotaceae Over. ex Kühner. – In: Bas C. et al. [eds.]: Flora Agaricina Neerlandica 2: 19–30, Rotterdam.

BRESINSKY A., HILBER O. and MOLITORIS H. P. (1976): The genus Pleurotus as an aid to understanding the concept of species in Basidiomycetes. – In: Proc. Herbette Symp. spec. concept Hymenomyc., Lausanne: 229–258.

CLEMENTS F. E. and SHEAR C. L. (1931): The genera of fungi. – New York (non vidi).

CORNER E. J. H. (1981): The Agaric genera Lentinus, Panus, and Pleurotus. – Beih. Nova Hedwigia, fasc. 69, Vaduz.

ČERNÝ A. (1989): Parazitické dřevokazné houby. – 104 p., Praha.

DERMEK A. (1973): Hliva kotúčová (č. hlíva máčková) – Pleurotus eryngii (DC ex Fr.) Quél. na južnom Slovensku. – Čas. Čs. Houb.-Mykol. Sborn., Praha, 50 (1–2): 3–4.

DERMEK A. (1974): Hliva kotúčová – Pleurotus eryngii (DC. ex Fr.) Quél. na Slovensku. – Čes. Mykol., Praha, 28 (1): 57–59.

DOMAŃSKI S. (1955): Nowe stanowisko grzyba Lentinus cyathiformis (Schaeff.) Bres. w Polsce. – Acta Soc. Botan. Poloniae, Warszawa, 24 (1): 197–205.

DONK M. A. (1949): Nomenclature notes on generic names of agarics (Fungi: Agaricales). – Bull. Bot. Gard. Buitenzorg III, 18: 271–402 (non vidi).

DONK M. A. (1962): The generic names proposed for Agaricaceae. – Beih. Nova Hedwigia, Weinheim, 5: 1–320.

EARLE F. S. (1909): The genera of North American gill fungi. – Bull. N. Y. Bot. Gard., New York, 5: 373–451 (non vidi).

FRIES E. M. (1821): Systema mycologicum 1.–520 p., Gryphiswaldiae.

FRIES E. M. (1985): Systema Orbis vegetabilis. – 374 p., Lundae.

FRIES E. M. (1828): Elenchus Fungorum. – 154 p., Gryphiswaldiae.

FRIES E. M. (1836–8): Epicrisis Systematis mycologici. – 610 p., Upsaliae.

GINTEROVÁ A. (1973): Nitrogen fixation by higher fungi. – Biológia, Bratislava, 28 (3): 199–202.

GINTEROVÁ A. (1974): Hliva miskovitá (Pleurotus cornucopiae) nová huba pre priemyselné pestovanie. – Mykol. Zprav., Brno, 18 (1): 9–13.

GINTEROVÁ A. and MAXIANOVÁ A. (1975): The balance of nitrogen and composition of proteins in Pleurotus ostreatus grown on natural substrates. – Folia Microbiol. 20: 246–250.

GREUTER W. et al. [eds.] (1994): International Code of Botanical Nomenclature (Tokyo Code). – 389 p., Königstein.

HALLER R. (1948): Monstrose Pilzformen. – Schweiz. Z. Pilzk., Bern-Bümpliz, 26: 5–6.

HERINK J. (1950b): Ekologické studie – II: vyšší houby v dutinách stromů. – Čes. Mykol., Praha, 4 (6–7): 74–79.

HIBBETT D. S. and VILGALYS R. (1991): Evolutionary relationships of Lentinus to the Polyporaceae: Evidence from restriction analysis of enzymatically amplified ribosomal DNA. – Mycologia, Lancaster (Pennsylv.), 83 (4): 425–439.

HIBBETT D. S. and VILGALYS R. (1993): Phylogenetic relationships of Lentinus (Basidiomycotina) inferred from molecular and morphological characters. – Syst. Bot. 18 (3): 409–433.

HILBER O. (1977): Einige Aspekte aus der Pleurotus ostreatus Gruppe. – Čes. Mykol., Praha 31 (3): 142–154.

HILBER O. (1978): Biosystematische Untersuchungen zur Kenntnis von Pleurotus sect. Pleurotus. – Z. Mykol. 44 (1): 31–50.

HILBER O. (1982): Die Gattung Pleurotus. – 448 p., 197 fig., Vaduz.

HILBER O. (1997): The genus Pleurotus (Fr.) Kummer (2). – 63 p., Kelheim.

HILBEROVÁ-PODLAHOVÁ R. (1977): Některé aspekty druhů ze skupiny hlívy ústřičné – Pleurotus ostreatus (Jacq. ex Fr.) Kumm. – Mykol. Zprav., Brno, 21 (1–2): 7–8.

HRADÍLEK Z., LIZOŇ P. and TLUSTÁK V. (1992): Index herbariorum čechoslovacorum. – 74 p., Olomouc.

IVANOV A. I. (1985): Makromicety dubrav Penzenskoj oblasti 1. Ksilotrofy. – Mikol. Fitopatol., Leningrad, 19 (5): 383–388.

JABLONSKÝ I. (1980): Pěstování tropických a subtropických hub. – Čas. Čs. Houb.-Mykol. Sborn., Praha, 57 (5): 131–135.

JUNKOVÁ A. and STANĚK M. (1972): Poutání vzdušného dusíku hlívou ústřičnou (Pleurotus ostreatus [Jacq. ex Fr.] Kummer). – Čas. Čs. Houb.-Mykol. Sborn., Praha, 49 (3–6): 51–55.

KÄÄRIK A. (1992): Faerberia, Lentinus, Phyllotopsis, Pleurotus. – In: Hansen L. et Knudsen H. [eds.]: Nordic Macromycetes vol. 2: 46–49, Copenhagen.

KOST G. (1986): Morphology, anatomy, and systematics of carotenoid containing agaricoid Basidiomycetes. – Ber. Deutsch. Bot. Ges., Berlin 99 (1/2): 43–58.

KOTLABA F. (1957): Lokality dvou vzácných houževnatců v Československu. – Čes. Mykol., Praha, 11 (4): 231–235.

KOTLABA F. and POUZAR Z. (1996): The identity of Agaricus cyathiformis Schaeff. – Persoonia, Leiden, 16 (2): 233–238.

KÜHNER R. (1980): Les Hyménomycètes Agaricoïdes. Etude générale et classification. – Bull. Soc. Linn. Lyon, Num. spéc., 1027 p.

KUMMER P. (1871): – Der Führer in die Pilzkunde. – Zerbst.

KURTZMANN R. H. (1978): Nitrogen fixation by Pleurotus? – Mushroom Sci. 10 (1): 427–435.

MICHAEL E., HENNIG B. and KREISEL H. (1977): Handbuch für Pilzfreunde, 2. ed., fasc. 3: Blätterpilze – Hellblätter und Leistlinge. – 464 p., Jena.

MOLITORIS H. P. and PRILLINGER H. (1986): Isoenzyme spectra for characterization and identification of fungi (influence of genetical and nongenetical factors). – Mycol. Helv. 2 (1): 103–122.

MOSER M. (1983): Die Röhrlinge und Blätterpilze. – In: Gams H. [ed.]: Kleine Kryptogamenflora, fasc. IIb/2, 533 p., Stuttgart, New York.

OHIRA I. (1990): A revision of the taxonomic status of Pleurotus citrinopileatus. – Rep. Tottori Mycol. Inst., Tottori, 28: 143–150.

PACLT J. (1960): Mykoflóra odumírající pavlovnie. – Čes. Mykol., Praha, 14 (4): 244–247.

PATOUILLARD N. (1887): Les Hyménomycètes d'Europe. – Paris.

PATOUILLARD N. (1900): Essai taxonomique sur les familles et les genres des Hyménomycètes. – Lons-le-Saunier (non vidi).

PEGLER D. N. (1983): The genus Lentinus: a world monograph – Kew Bull. Add., ser. 10: 1–281.

PETERSEN R. H. and HUGHES K. W. (1993): Intercontinental interbrending collections of Pleurotus pulmonarius, with notes on Pleurotus ostreatus and other species. – Sydowia, Horn, 45 (1): 139–152.

PILÁT A. (1930): Poznámky k některým druhům rodu Pleurotus. – Travaux Mycol. Tchécosl. 13: 1–32.

PILÁT A. (1935): Pleurotus Fr. – Hlíva. – In: Kavina K. et Pilát A.: Atlas hub evropských, fasc. 2., 193 p., Praha.

PILÁT A. (1946): Evropské druhy houževnatců (Lentinus Fr.). – In: Kavina K. et Pilát A.: Atlas hub evropských, fasc. 5, 44 p., Praha.

POSPÍŠIL V. (1952): Pleurotus Eryngii (DC.) Fr. v Československu. – Čes. Mykol., Praha, 6 (6–7): 85–87.

POUZAR Z. (1981): Faerberia, a genus of cantharelloid fungi. – Čes. Mykol., Praha, 35 (4): 185–188.

QUÉLET L. (1872): Les Champignons de Jura et des Vosges, Ed. 1. – Montbéliard.

REDHEAD S. A. and GINNS J. H. (1985): A reappraisal of agaric genera associated with brown rots of wood. – Trans. Mycol. Soc. Japan, Tokyo, 26: 349–381.

REID D. A. (1985): Further records of Jersey [UK] fungi. – Trans. Brit. Mycol. Soc., Worcester, 84 (4): 715–722.

ROMAGNESI H. (1968): Lentinus tigrinus var. dunalii. – Bull. Soc. Myc. France, Paris, 84: Atlas, tab. 178.

ROMAGNESI H. (1969): Sur les Pleurotus de groupe Ostreatus (Ostreomyces Pilat). – Bull. Soc. Mycol. France, Paris, 85 (3): 305–314.

SCHULZER S., KANITZ A. and KNAPP. J. A. (1866): Die bisher bekannten Pflanzen Slavoniens. – Verh. Zool. bot. Ges. Wien, 16: 3–172 (non vidi).

SCHAEFFER J. C. (1771): Fungorum qui in Bavaria et Palatinatu circa Ratisbonam nascuntur icones, vol. 3, Index primus 1774. – Ratisbonae.

SCHWEINITZ L. D. (1822): Synopsis fungorum Carolinae superioris. – 131 p., 2 tab.

SEMERDŽIEVA M. and MUSÍLEK V. (1976): List of cultures of Basidiomycetes of the Institute of Microbiology, Czechoslovak Academy of Sciences. – Čes. Mykol., Praha, 30 (1): 49–57.

SINGER R. (1951): The "Agaricales" (Mushrooms) in modern taxonomy. – Lilloa, Tucumán, 22: 1–832 (non vidi).

SINGER R. (1975): The Agaricales in modern taxonomy, 3. ed. – 912 p., Vaduz.

SINGER R. (1986): The Agaricales in modern taxonomy, 4. ed. – 981 p., Königstein.

SINGER R. and SMITH A. H. (1946): Proposals concerning the nomenclature of gill fungi including a list of proposed lectotypes and genera conservanda. – Mycologia, Lancaster (Pennsylv.), 38: 240–299 (non vidi).

STANKOVIČOVÁ Ľ. (1973): Hyphal structure in some pleurotoid species of Agaricales. – Nova Hedwigia, Stuttgart, 24: 61–120.

ŠEBEK S. (1961): Extrazonální prvky v mykoflóře ČSSR. – Čas. Čs. Houb.-Mykol. Sborn., Praha, 37 (7–8): 97–101.

ŠVEC Z. and ŠVECOVÁ A. (1990): Houby rodu Pleurotus (Fr.) Quél. a mykofilní brouci. – Čas. Čs. Houb.-Mykol. Sborn., Praha, 67 (1): 8–10.

THORN R. G. and BARRON G. L. (1984): Carnivorous mushrooms. – Science, Lancaster (Pennsylv.), 224 (4644): 76–78.

VÁŇA J. (1996): Systém a vývoj hub a houbových organismů. – 164 p., Praha.

WATLING R. and GREGORY N. M. (1989): Crepidotaceae, Pleurotaceae and other pleurotoid agarics. – In: Gregory N. M. et Watling R.: British fungus flora, Agarics and Boleti, fasc. 6, Edinburgh.

ZERVAKIS G. and BALIS C. (1996): A pluralistic approach in the study of Pleurotus species with emphasis on compatibility and physiology of the European morphotaxa. – Mycol. Res. 100 (6): 717–71.

ZERVAKIS G. and LABARERE J. (1992): Taxonomic relationships within the fungal genus Pleurotus as determined by isoelectric focusing analysis of enzyme patterns. – J. Gen. Microbiol., Cambridge, 138 (3): 635–645.

ZIMMERMANN H. (1914): Verzeichnis der Pilze aus der Umgebung von Eisgrub. – Verh. Naturf. Vereines Brünn, Brno 52 [1913]: 66–128.