

Basidiomycetes at the timberline in Lapland 4. *Postia lateritia* n. sp. and its rust-coloured relatives

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RENVALL, P. 1992: Basidiomycetes at the timberline in Lapland 4. *Postia lateritia* n. sp. and its rust-coloured relatives — *Karstenia* 32:43–60.

The taxonomy of the *Postia fragilis* group (polypores, Basidiomycetes) is revised and three species are recognized in North Europe: *P. fragilis* (Fr.) Jül., *P. leucomallella* (Murr.) Jül. and *P. lateritia* Renvall n. sp. The species are described and illustrated, and the Finnish distributions are mapped. The first two species are widespread in Europe and in North America. *P. lateritia* is a saprotrophic polypore here reported from Finland, Sweden and Canada. It is associated with a brown rot and has been found almost exclusively on decorated windfalls of *Pinus sylvestris* L. in old forests of coniferous trees. A neotype is selected for *Polyporus fragilis* Fr. and the status of the genus *Postia* Fr. is reviewed and it is considered to be validly published; the genus *Oligoporus* Bref. is accepted in a restricted sense to comprise species which have short and often cyanophilous spores and which tend to produce chlamydospores. The new combination *Postia septentrionalis* (Vampola) Renvall is proposed and the identity of *Leptoporus lowei* Pilát (*Oligoporus lowei* (Pilát) Gilb. & Ryv.) is discussed.

Key words: Distribution, Finland, *Oligoporus*, polypores, *Postia lateritia*, *Postia septentrionalis*, taxonomy.

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Introduction

The ferruginous polypores in the genus *Tyromyces* P. Karsten s. lat. have repeatedly been subject to profound taxonomical and nomenclatural discussions (Lowe & Lundell 1956, Kotlaba & Pouzar 1964, Donk 1960, 1972, 1974, Ryvarde 1991). Much of the debate was caused by the lack of authentic material of the recognized species and, on the other hand, most of the old names have remained untypified. The strong variability of the basidiocarps and the lack of striking microscopical characters have enhanced difficulties in obtaining correct interpretations of the old species names, such as *Polyporus fragilis* Fr., *P. mollis* Pers.: Fr., and *P. trabeus* Rostk. As already shown by Donk (1960) and recently clearly demonstrated by Ryvarde (1991), not only the species names but also the generic concepts are strongly engaged with this nomenclatural debate.

The typification of *Polyporus mollis* by Ryvarde (1991) fixed the meaning of that name for a brown-

rot-causing polypore with a monomitic hyphal system and simple-septate generative hyphae. Hopefully it will also put an end to the discussion on the generic type of *Leptoporus* Qué. (see Donk 1960, Teixeira 1983, 1986, Ryvarde 1991), and Donk's (1960) conclusion that *Polyporus mollis* is the type species of the genus will be universally accepted. The identity of *P. fragilis* has for a long time been fairly uniformly understood (Fries 1828, Bourdot & Galzin 1928, Bondartsev 1953, Gilbertson & Ryvarde 1987) and the striking colour change in its bruised basidiocarps has enabled an easy identification. This is despite the fact that the species name lacks the typification. One reason for the established interpretation may be that an illustration named by Fries (1884) himself has been available. On the other hand, evidently because of the variability, the species has been described several times anew and, e.g., Donk (1972, 1974) and Kotlaba (1975) have revealed many synonyms for the species.

However, many manuals provide a note on the strong variability of this taxon, and evidently because of the striking key character, the colour change, the microscopy of *P. fragilis* has received little attention.

I here revise the taxonomy of the *Postia fragilis* group in North Europe. In addition to the well-known species *P. fragilis* and *P. leucomallella* (Murr.) Jül., a new species *P. lateritia* Renvall is recognized. The Finnish distributions of the species are mapped, and because of the similarity of these species descriptions and illustrations of each of them are presented and a neotype is selected for *Polyporus fragilis*. In addition, the identity of *Leptoporus lowei* Pilát (*Oligoporus lowei* (Pilát) Gilb. & Ryv.), a species often linked with these taxa, is outlined, and the status of the genus *Postia* Fr. is discussed.

Materials and methods

All the specimens of *Postia fragilis*, *P. leucomallella* and *Oligoporus lowei* were checked in the herbaria H, HFR, JOE, KUO, OULU, TUR (abbreviated according to Holmgren et al. 1990) and in the personal herbaria of Heikki Kotiranta (abbreviated as H.K.), Tuomo Niemelä (T.N.), Reijo Penttilä (R.P.) and the author (P.R.), and the distribution maps are based on this material. In addition, specimens in GB-J.E. (the collections established by Dr. John Eriksson, Department of Systematic Botany, University of Gothenburg) and in UPS were studied.

160 specimens of *Postia fragilis*, 90 specimens of *P. lateritia* and 136 specimens of *P. leucomallella* were studied under microscope. The types of eight species names which have been considered to be synonyms of *P. fragilis* or *P. leucomallella* were studied as well, and will be discussed under each accepted taxon or in the section Excluded taxa. Microscopical characters were studied with the microscope Leitz Dialux 22 at magnifications up to $\times 1250$. Anatomical details were drawn by using the Leitz drawing tube. The chemical reagents used in the microscopical examination and their reactions are those listed by Niemelä (1985a, b). I have used Cotton Blue (CB) when drawing figures and when making microscopical measurements.

I followed the statistical recommendations of Parmasto and I. Parmasto (1987), and for the species described here 30 basidiospores were measured in each out of ten selected specimens. In addition, variable amounts of spores were measured from further specimens. In presenting the variation of the basidiospore (basidium, cystidium, hyphal) size, 5% of the measurements have been excluded from each end of the range, and are given in parentheses. Basidia, basidio-

les, cystidia and cystidioles were measured to the nearest 0.5 μm . In the text the following abbreviations are used: **L** = the mean spore length (arithmetical mean of all the spores, in μm), **W** = the mean spore width (arithmetical mean of all the spores, in μm), **Q** = quotient of the mean spore length and the mean spore width (L/W ratio; variation of the specimen means), (**n** = **x/y**) = x measurements of spores (basidia, cystidia, hyphae) from y specimens, ! = type specimen examined in microscope.

Key to the species

- 1 Hymenium with gloeocystidia; ferruginous colour change nonexistent, or very slow and weak *Postia leucomallella*
- Hymenium without gloeocystidia; colour of the basidiocarp often changing rapidly to ferruginous on bruising and subsequent drying 2
- 2 Basidiospores 3.9–5 \times 1.7–2.1 μm , phaseoliform; contextual hyphae arranged in radial strands; hyphae at the pileal surface mostly thin-walled and agglutinated in indistinctly yellowish to brownish bundles *P. fragilis*
- Basidiospores 4.5–5.9 \times 1.2–1.6 μm , allantoid; contextual hyphae spaced, interwoven, without orientation; hyphae at pileal surface thick-walled and with distinct ferruginous pigmentation, arising from context separately *P. lateritia*

Postia lateritia Renvall n. sp. — Figs. 1, 2

Carpophorum annum, effuso-reflexum vel effusum, parvum, tenue, molle, ad tactum rubescente brunneum, superficie lateritium - albidum, floccosum, subtus album. Systema hypharum monomiticum. *Postiae fragilis* (Fr.) Jül. affinis, sed sporis angustioribus et longioribus, (4.3–)4.5–5.9(–6.3) \times (1–)1.2–1.6(–1.8) μm .

Holotypus: **Finland**. Pohjois-Karjala, Lieksa, Patvinsuo National Park, Autiovaara, fallen, decorticated trunk of *Pinus sylvestris*, mixed forest dominated by *Picea abies* Grid 27°E: 70081:6816, alt. 200m, 3.X. 1991 Tuomo Niemelä 5547, Reijo Penttilä & Pertti Renvall (H, isotypi in DAOM and O).

Basidiocarps annual, effused-reflexed with an elongated pileus along the upper edge of the tube layer, rarely pileate or totally resupinate; small and solitary, or gregarious with a few delicate patches, soft when fresh, more fragile when dry, but keeping the cottony texture almost unchanged, resupinate areas usually ellipsoid and small (0.5–1 \times 1–2 cm) but sometimes up to 3.5 \times 12 cm wide and 1–5 mm thick at centre. *Pilei* thin and flattening down under the slightest pressure, when old often collapsed, with a blunt or fairly sharp incurved margin, 0.2–11 cm

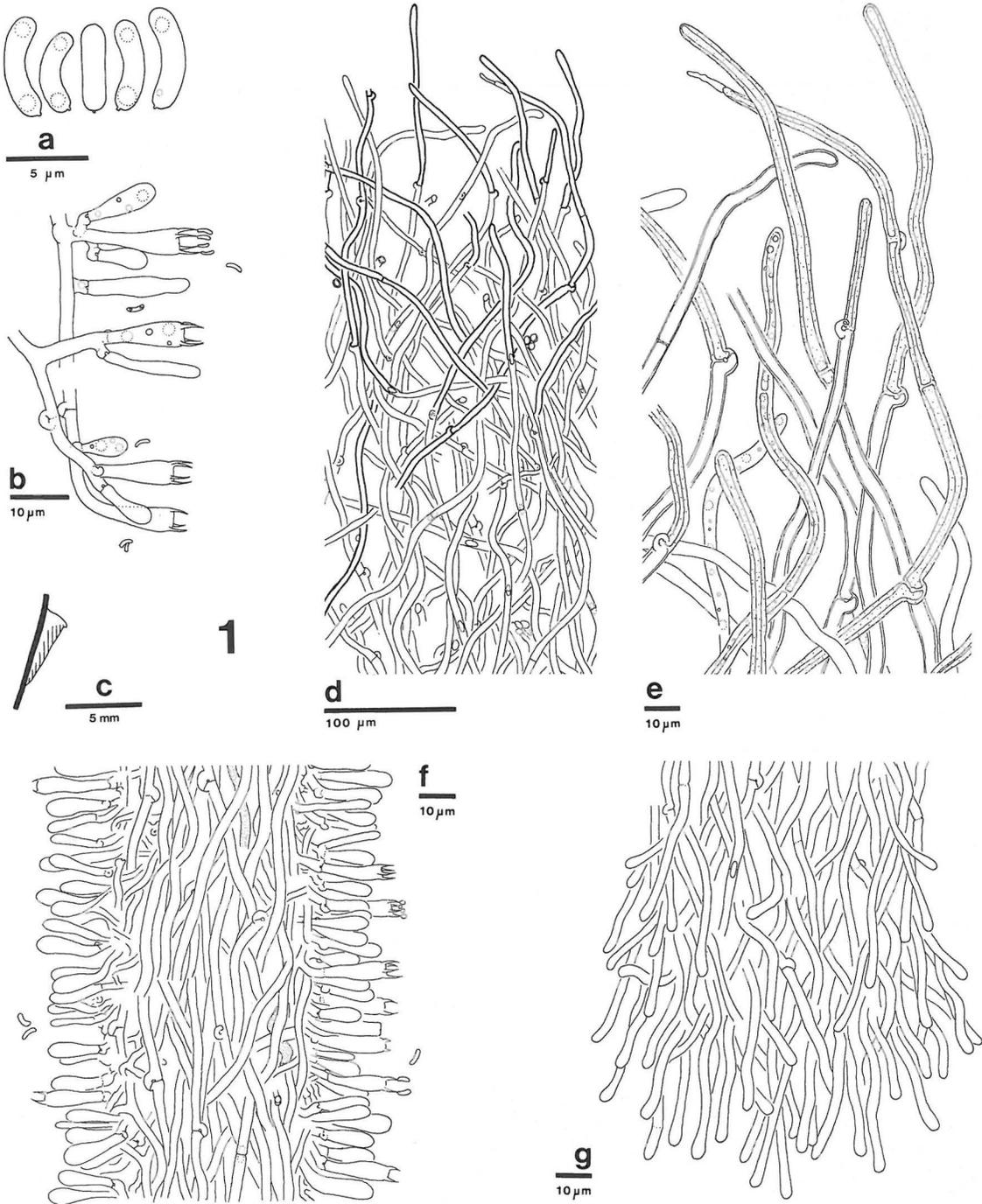


Fig. 1. Anatomical details of *Postia lateritia* Renvall: a) basidiospores, b) basidia, basidioles and hyphoid cystidioles, c) a section through basidiocarp, d) a section through pileal surface and upper context, e) singly arising, pigmented and thick-walled generative hyphae at the pileal surface, f) a vertical section through upper dissepiment, g) dissepiment edge in a vertical section. Drawn in Cotton Blue. From the holotype (H).



Figs. 2–3. Rust-coloured polypores of *Postia* Fr. Fresh basidiocarps, photographed in situ. — 2: *P. lateritia* Renvall, x 1.5. Renvall 1416 (H). — 3: *P. fragilis* (Fr.) Jül., x 2. Niemelä 5503 (H).

wide, projecting 1–5(–15) mm from substrate, up to 9 mm thick at the base, attached to an effused part. *Upper surface* soft, tomentose and azonate, when young basically cream-coloured, but with at least a few reddish brown dots, and changing to ferruginous when touched, when mature more evenly rusty or brick-red, after drying with slightly darker colours. *Sterile margin* distinct especially in resupinate parts, 0.5–1.5 mm wide, finely pubescent, white, when dry usually paler than the pores. *Pore surface* white when fresh, fairly rapidly changing reddish-brown on touching, when dry those parts remaining ferruginous, while unbruised parts stay white or turn cream to yellowish; pores circular to angular, variable in size, (2–)3–4(–5) per mm, walls thin, when dry ca. 0.04–0.07 mm thick; tube mouths when dry under lens (x 50) finely tomentose, when old and in bruised parts even to lacerate. *Section*: Context white to cream, thin, in pilei 0.5–2(–4) mm and in subiculum up to 2 mm thick, soft when fresh, when dry somewhat more fragile. Tubes concolorous with the pore surface, up to 5 mm long.

Microscopy: Hyphal system monomitic. *Context*: Generative hyphae hyaline, inamyloid, indextrinoid, acyanophilous and metachromatic, thin- to thick-walled, rarely branched and with frequent cross-walls and clamp connections, (2.2–)2.8–5(–6.5) μm wide ($n = 193/10$), loosely interwoven, without orientation but becoming more spaced towards the pileal surface, among them winding gloeoplerous hyphae, no distinct basal layer. Hyphae in the pileal surface thick-walled, with oily contents and mostly with a distinct reddish-brown to golden yellow pigmentation, often simple-septate, spaced, interwoven, arising separately from the loose context (i.e., not agglutinated), or exceptionally, in old basidiocarps, as thin strands of two or three glued hyphae. *Tubes*: Tramal hyphae subparallel, straight to somewhat winding and rarely branched, thin- to fairly thick-walled, (1.8–)2.1–3.9(–4.8) μm wide ($n = 217/10$), otherwise as in context; a few of them gloeoplerous. Subhymenium indistinct. Hyphal pegs frequent. Basidia slender-based, narrowly clavate, with a basal clamp, in young basidiocarps and in actively growing parts near dissepiment edges strongly bent and deep-rooting, with four sterigmata, (11.5–)13–19(–24) \times (3–)3.5–5(–5.5) μm ($n = 141/10$). Basidioles slightly shorter, similar in shape. Cystidia lacking, but hyphoid cystidioles or thin-walled, cylindrical cystidioles with a finger-like apex variably present, (10–)13–22(–25) \times (2–)2.5–4 μm ($n = 44/9$). Clamped hyphal ends sometimes projecting through hymenium into the tubes, rare. *Basidiospores* allantoid, thin-walled, smooth, hyaline, inamyloid, index-

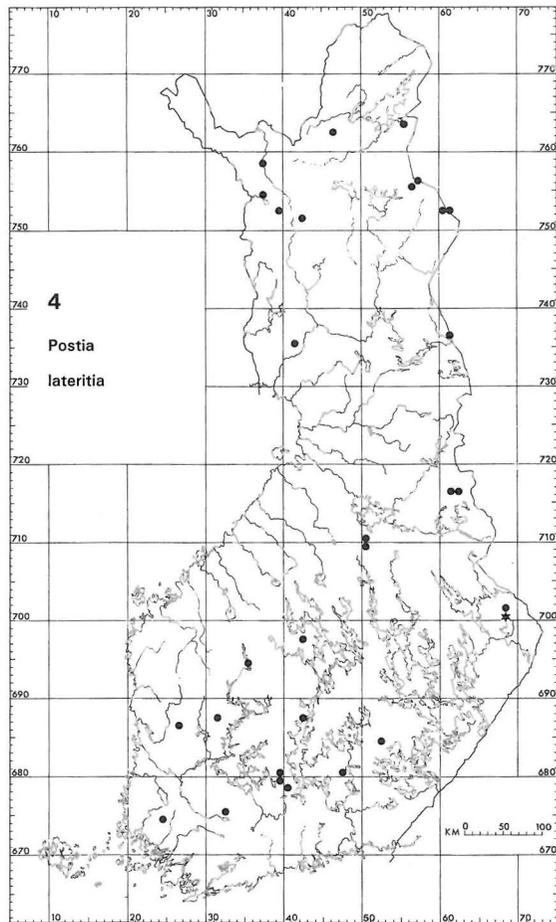


Fig. 4. The distribution of *Postia lateritia* Renvall in Finland according to the material examined. * = The type locality.

trinoid and acyanophilous, (4.3–)4.5–5.9(–6.3) \times (1–)1.2–1.6(–1.8) μm , $L = 5.12$, $W = 1.36$, $Q = 3.57$ –3.93 ($n = 329/11$).

Etymology: *lateritius* (Lat., adj.), referring to the brick red colour of the pileus.

Distribution and ecology

Specimens examined

Canada. *British Columbia:* McLeod Lake District, 1969 Eriksson 12212 (GB-J.E. 11228). *Ontario:* Algonquin Prov. Park, 1982 Hallenberg 7334 & Ginns (GB-J.E.).

Finland. *Varsinais-Suomi:* Nousiainen, 1981 Kotiranta 3780 & Koski (H.K.). *Satakunta:* Kankaanpää, 1940 Laurila (H). Ikaalinen, 1981 Alava 19971, Kause & Laine (TUR), 1986

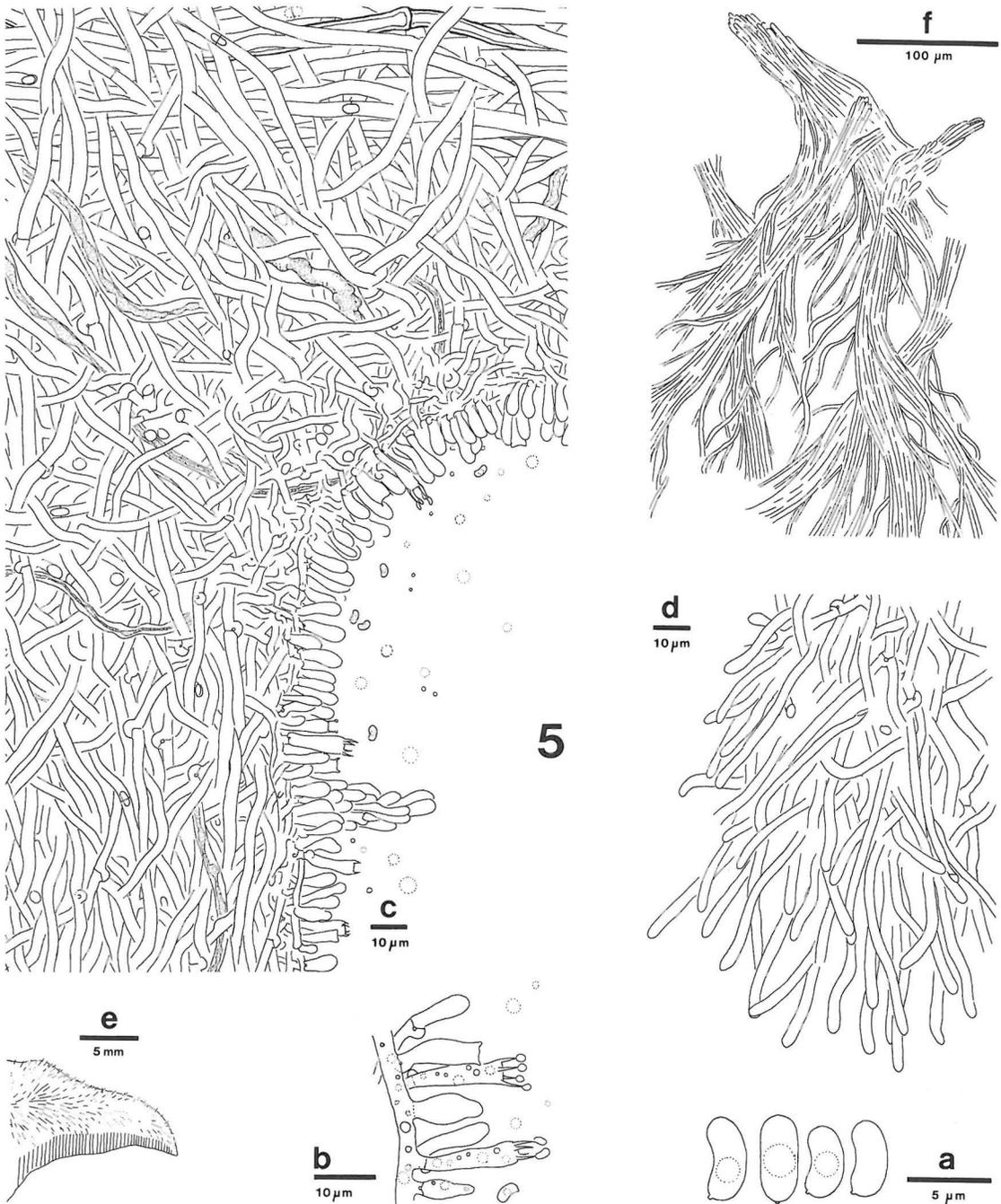


Fig. 5. Anatomical details of *Postia fragilis* (Fr.) Jül.: a) basidiospores, b) basidia and basidioles, c) a section through lower context and upper dissepiment showing inter alia oleiferous hyphae and a hyphal peg, d) dissepiment edge in a vertical section, e) a section through basidiocarp showing the radial orientation of contextual hyphae, f) agglutinated hyphal strands at the pileal surface. Drawn in Cotton Blue. From Niemelä 5503 (H).

Penttilä 161 (H), 434 (T.N.). *Etelä-Häme*: Tammela, 1866 Karsten 3479 (H), 1886 Karsten 1797c, Karsten 3480 (H). Lammi, 1980 Kotiranta 2552 (H.K.), 1990 Renvall 2361, 2368 (H). Padasjoki, 1985 Niemelä 3303 (T.N.). *Pohjois-Häme*: Ähtäri, 1966 Niemelä & Laine (HFR, T.N.). Saarijärvi, 1966 Laine & Kurkela (HFR 022154), 1981 Kotiranta 3711 (H.K.), 1982 Kotiranta 4412, 4417 (H), 1984 Kotiranta 5412, 5433 (H), 1985 Kotiranta 5981 (H). *Etelä-Savo*: Mikkeli rural commune, 1964 Laine & Poutanen B8253 (HFR 016786). Mäntyharju, 1989 Hainonen 11026 (H). *Pohjois-Savo*: Vieremä, 1988 Penttilä 1090 (H). *Pohjois-Karjala*: Lieksa, 1988 Penttilä 932, 1040, 1060 (H), 1989 Penttilä 1057, 1169, 1179, 1401, 1405, 1419, 1424, 1439, 1445, 1448, 1451, 1452 (H), 1439 (T.N.), 1990 Penttilä 1967b, 1978, 1982, 1997 (H), 1991 Niemelä 5547, Penttilä & Renvall (holotype; H, DAOM, O), Penttilä 2646 & Renvall 2682 (H). *Kainuu*: Hyrynsalmi, 1990 Penttilä 1777 (H). Kuhmo, 1991 Penttilä 2512, 2529, 2535, 2559 (H). Vuolijoki, 1989 Kotiranta 7938, Niemelä & Penttilä (H), Kotiranta 7966, Niemelä & Penttilä (H), Kotiranta 7971, Penttilä 1500 (H). *Perä-Pohjanmaa*: Rovaniemi rural commune, 1980 Kotiranta 2135 & Niemelä (H.K.), 1981 Kotiranta 3644, 3563 (H.K.), 1984 Kotiranta 5484 (H). *Koillismaa*: Kuusamo, 1974 Ulvinen (OULU). Salla, 1987 Renvall 363, 540 (H), 1988 Renvall 1088, 1170, 1261, 1262, 1396 (H), 1400 (P.R.), 1416 (H), 1991 Renvall 2592 (H). *Sompion Lappi*: Savukoski, 1988 Renvall 1116, 1127, 1140, 1293 (H), 1331 (P.R.), 1341, 1359 (H), 1989 Renvall 1948 (H). *Kiitilän Lappi*: Kittilä, 1970 Kurkela (HFR 022396), 1981 Kotiranta 3459 (H). Muonio, 1980 Niemelä 2153 & Kotiranta (T.N.), Kotiranta 2314 & Niemelä (H.K.). *Inarin Lappi*: Inari, 1981 Kotiranta 3026 (H.K.), 1990 Kotiranta 8518 (H).

Sweden. Hälsingland: Harmånger, 1944 Eriksson 277 (UPS). *Småland*: Femsjö, 1929 Nannfeldt 3429 (UPS), 1940 Lundell 4112b, 4113 (UPS). Rumsulla, 1970 Niemelä & Ryvarden (T.N.).

According to the present material *Postia lateritia* is a fairly rare boreal species occurring in dry conifer forests of Finland, Sweden and Canada. Further studies may prove that its distribution is circumboreal. This impression can be obtained from the description by Bondartsev (1953) who, when discussing *P. fragilis*, pointed out some characters which better fit the new species. In the description of *P. leucospongia* (Cooke & Harkn.) Jül. (as *Oligoporus leucospongia*) Gilbertson and Ryvarden (1987) state that 'confusing intermediates between *O. fragilis* and *O. leucospongia* occur over elevational gradients in the Rocky Mountains'. This may indicate that *Postia lateritia* is more widely distributed in North America, but has been included either in *P. fragilis* or in *P. leucospongia*. However, Niemelä (1985b) did not find *P. lateritia* in northern Quebec, Canada.

In Finland *Postia lateritia* is rare in general, but locally in old protected pine forests there are fairly abundant populations left. This is true especially in the eastern and northern parts of the country (Fig. 4). The fragmented occurrence in southern Finland, in my opinion, indicates that the new species has earlier been commoner there but has decreased in number. This is evidently due to the modern forestry which

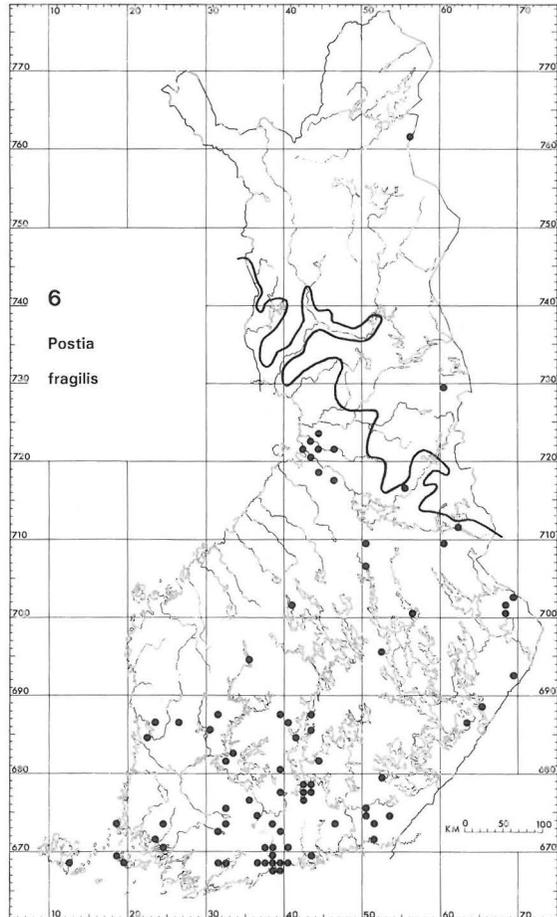


Fig. 6. The distribution of *Postia fragilis* (Fr.) Jül. in Finland according to the material examined. The black line indicates the southern border of the Northern Boreal vegetation zone (according to Ahti et al. 1968).

eradicates old fallen trunks of pine from most of southern and central Finland. In Finland *P. lateritia* has been found almost exclusively in forests where such trunks are left. However, its frequent occurrence in northern and eastern Finland may also indicate a preference to cooler and more continental climate.

The habitat ecology of *Postia lateritia* exhibits some special features. It is a saprotrophic fungus, which causes a slowly proceeding brown rot and favours fairly big fallen trunks. In Finland the species has been found exclusively in virgin or near-climax conifer forests, on fallen trunks of *Pinus sylvestris*. The Finnish finds derive almost exclusively from pines, which had died and lost their bark but remained standing for decades before falling down. Such trunks



Fig. 7. A fresh basidiocarp of *Postia leucomallella* (Murr.) Jül., photographed in situ, x 1.5. Niemelä 1716 (H).

are characteristic of the old and protected pine forests in northern Finland where *Postia lateritia* is one of the basic elements of the wood-inhabiting fungal flora. Although the species clearly favours dry pine forests, most of the collections derive from localities which are intermixed with spruce and where the microclimatic conditions are fairly stable. Of my collections from eastern Finnish Lapland ($n = 18$), 78 per cent are from forests of the *Empetrum*-*Myrtillus* site type (see Renvall et al. 1991a), and the rest were collected in the drier *Uliginosum*-*Vaccinium*-*Empetrum* type.

Postia lateritia has a strong annual variation in the basidiocarp production and it is difficult to estimate its actual abundance and sometimes even to verify its presence. This was clearly noted during the periods of intensive field work in 1987–1991 in eastern Finnish Lapland. The species was found only once in 1991,

while in 1988, when there was an exceptionally good growing season for fungi, it was found 14 times.

Postia fragilis (Fr.) Jül.

— Figs. 3, 5

Postia fragilis (Fr.) Jül., Persoonia 11:423, 1828. — *Polyporus fragilis* Fr., Elench. Fung.: 86, 1828. — Neotype: Sweden. Småland: Femsjö, Prästgårdsskogen, decayed stump of *Pinus sylvestris*, 2.X. 1940 Seth Lundell 4112a (UPS!, here selected).

Daedalea sistotremoides Velen., Mykologia (Praha) 3:102, 1926. — Lectotype: Czechoslovakia. Čechy (Bohemia): Říčany, 1922 Zverinová (PRC!) I agree with Pilát (1936) and Kotlaba (1975) that the specimen belongs to *Postia fragilis*.

Polyporus kavinae Velen., České houby 4–5:648, 1922. — Lectotype: Czechoslovakia. Čechy (Bohemia): Struhařov, 1916 Velenovský (PRC!). As already reported by Pilát (1936) and confirmed by Kotlaba (1975) this is a synonym of *Postia fragilis*.

Polyporus orbicularis Velen., České houby 4–5:687, 1922. — Lectotype: Czechoslovakia. Čechy: Šumava, 1898 Velenovský (PRC!). A synonym of *Postia fragilis* (see also Kotlaba 1975).

Spongipellis sensibilis Murr., Mycologia 4:93, 1912. — Holotype: U.S.A. Washington: Seattle, 1911 Murrill (NY!). When describing this taxon Murrill (1912) reported that the spores are ovoid and $5 \times 3 \mu\text{m}$ in size. However, in the type spores are phaseoliform to slightly curved and cylindrical, measuring ca. $4\text{--}5 \times 1.6\text{--}1.8 \mu\text{m}$. Although the pores are smaller (up to 6 per mm) than in the European material, I agree with Overholts (1953) and Ryvarden (1985) that this belongs to *Postia fragilis*.

Basidiocarps annual, pileate or effused-reflexed, usually fairly small (2–5 cm wide) but variable in size and form, mostly solitary, fairly soft and cheese-like but flexible when fresh, turning rigid and brittle on drying; resupinate areas usually small, but sometimes up to $4 \times 7 \text{ cm}$ wide. *Pilei* sessile or dimidiate with margin sharp and often incurved after drying, up to 8 cm wide, projecting 0.5–5 cm from substrate, 0.5–2(–3) cm thick at the base. *Upper surface* at first pubescent, azonate, white to buff, with age more ferruginous, glabrous, wrinkled and rugulose; when bruised turning rapidly butter yellow and after a few minutes rusty brown, and finally dirty ferruginous to dark brown. *Pore surface* when young and fresh white to cream and soft, when bruised turning rapidly butter yellow and then deep ferruginous, becoming widely discoloured to dirty or dark brown with age and when dry, fairly rigid but fragile; pores angular to sinuous, 2–4(–5) per mm, walls thin when dry, ca. 0.04–0.1 mm thick; tube mouths somewhat lacerate to distinctly dentate, in old basidiocarps often split in flat spines, under lens (50 x) in young, intact basidiocarps finely pubescent, in old basidiocarps and in bruised parts glabrous. *Section*: Context white and soft, when dry fragile and with a distinct reddish-brown to greyish tint, 3–20 mm thick. Tubes first cream but turning brownish with age, on bruising and on drying, darker than the context, up to 10 mm long.

Microscopy: Hyphal system monomitic, all septa with clamp connections. *Context*: Generative hyphae hyaline, inamyloid, indextrinoid, acyanophilous and metachromatic, thin- to somewhat thick-walled, branched and with frequent cross-walls, (2.7–)2.9–6.1(–7.1) μm wide (n = 240/11), among them up to 12.8 μm wide, refractive sclerified generative hyphae, most of the hyphae parallelly arranged in radial strands 5–80 μm in diam, among them loosely interwoven single hyphae and especially in the lower context plenty of winding oleiferous hyphae, no distinct basal layer. Hyphae of pileal hairs and striae mostly thin-walled, with indistinct yellowish to brownish pigmentation and with oily contents, tightly agglutinated in bundles which arise solitarily from the

context, making the upper surface of the pilei pubescent to rugulose. *Tubes*: Tramal hyphae subparallel and fairly straight, thin-walled or more often somewhat thick-walled, (2–)2.3–4.2(–5) μm wide (n = 216/11), otherwise as in context, among them gloeoplerous hyphae. Subhymenium indistinct. Hyphal pegs abundant. Basidia slender-based, clavate, with a basal clamp and four sterigmata, (14–)15–18(–19) \times (3.5–)4–5(–5.5) μm (n = 75/8). Basidioles slightly shorter, similar in shape. Cystidia lacking, but hyphoid cystidioles (basidiole-sized) sometimes present. *Basidiospores* phaseoliform to broadly allantoid, thin-walled, smooth, hyaline, inamyloid, indextrinoid and acyanophilous, (3.7–)3.9–5(–5.5) \times (1.5–)1.7–2.1(–2.3) μm , L = 4.40, W = 1.89, Q = 2.10–2.54 (n = 303/10).

Specimens examined

Czechoslovakia. See the types.

Finland. *Varsinais-Suomi*: Houtskär, 1980 Alava 19348 (TUR). Kaarina, 1944 Kari (TUR). Karjaa, 1860 Hisinger (2 ex. H). Karjalohja, 1937 Laurila (2 ex. H, TUR), 1946 Malmström (H), 1980 Kotiranta 2103 et al. (H.K.). Korppoo, 1941 Eklund (H), 1972 Niemelä (H). Kustavi, 1979 Alava 18892 (TUR). Lohja, 1947 Schulmann (2 ex. H). Turku, 1979 Alava 18862, 18865 (TUR). Vahto, 1937 Kari (2 ex. TUR). *Uusimaa*: Elimäki, 1948 Schulmann (H), 1971 Niemelä (H). Espoo, 1974 Nordström 473 (H). Helsinki, many specimens 1936–1991 (H, HFR). Kauniainen, 1938 Nyberg (H), 1943 Nyberg (H), 1980 Venäläinen (H). Nurmijärvi, 1977, 1989 Askola (2 ex. H, T.N.). Porvoo, 1933–1935 Nyberg (5 ex. H). Porvoo rural commune, 1934–1939 Nyberg (3 ex. H). Sipoo, 1982–1988 Saarenoksa 33582 (H), 25088 (TUR), 1991 Niemelä 5503 (T.N.). Tammi- saari, 1957 Schulmann (H). Tuusula, many specimens 1940–1963 (H, HFR). Vantaa, 1987 Saarenoksa 40287 (KUO). *Etelä-Karjala*: Miehikkälä, 1977 Fagerström (2 ex. H). Sippola, 1977 Fagerström (H). Vehkalahä, 1960 Tiensuu (H), 1980 Fagerström (H). *Satakunta*: Ikaalinen, 1986 Penttilä 145, 209, 393 (H). Jämijärvi, 1940 Laurila (H). Kankaanpää, 1940 Laurila 563 (H). Noormarkku, 1940 Laurila 576 (H). Siikainen, 1936 Laurila (H), 1940 Laurila 565 (H). Viljakkala, 1969 Niemelä (H), 1988 Niemelä 4558 (H). *Etelä-Häme*: Asikkala, 1980–1984 Haikonen 711, 1653, 4915 (H). Hartola, 1983 Haikonen 3964 (H). Hattula, 1989 Renvall 1998 (P.R.). Hollola, 1981–1984 Haikonen 1705, 3186, 4813 (H). Janakkala, 1970 Uotila 6712 (H), 1974 Koponen (H), 1981 Niemelä 2315, 2316 (H). Jämsä, 1938 Koskinen (2 ex. H, 2 ex. TUR), 1967 Eurola (OULU), 1979 Kotiranta 1516, 1556, 1585 (H). Korpilähä, 1978–1979 Kotiranta 305 (H.K.), 1651 (H.K., T.N.). Kuru, 1987 Penttilä 678 (H). Lahti, 1985 Haikonen 6642 (H). Lammi, 1984 Harmaja et al. (T.N.). Lempäälä, 1860 Karsten 3490 (H), 1983 Söderholm 1045 (H). Luhanka, 1989 Kotiranta 7866 (H). Nastola, 1984 Haikonen 4885 (H). Padasjoki, 1979–1980 Kotiranta 1728, 2568 (H), 2477 (H.K.), 1991 Renvall 2665, 2666 (H). Somero, 1967 Sältin (TUR), 1968 unnamed (HFR 022014). Tammela, 1862–1892 Karsten 1797a, 3481–3486 (H), 1967 Koivisto (TUR), 1980 Niemelä 2044 (H). Tampere, 1975 Söderholm (H). *Etelä-Savo*: Punkaharju, 1972 unnamed (HFR 022101, 022088),

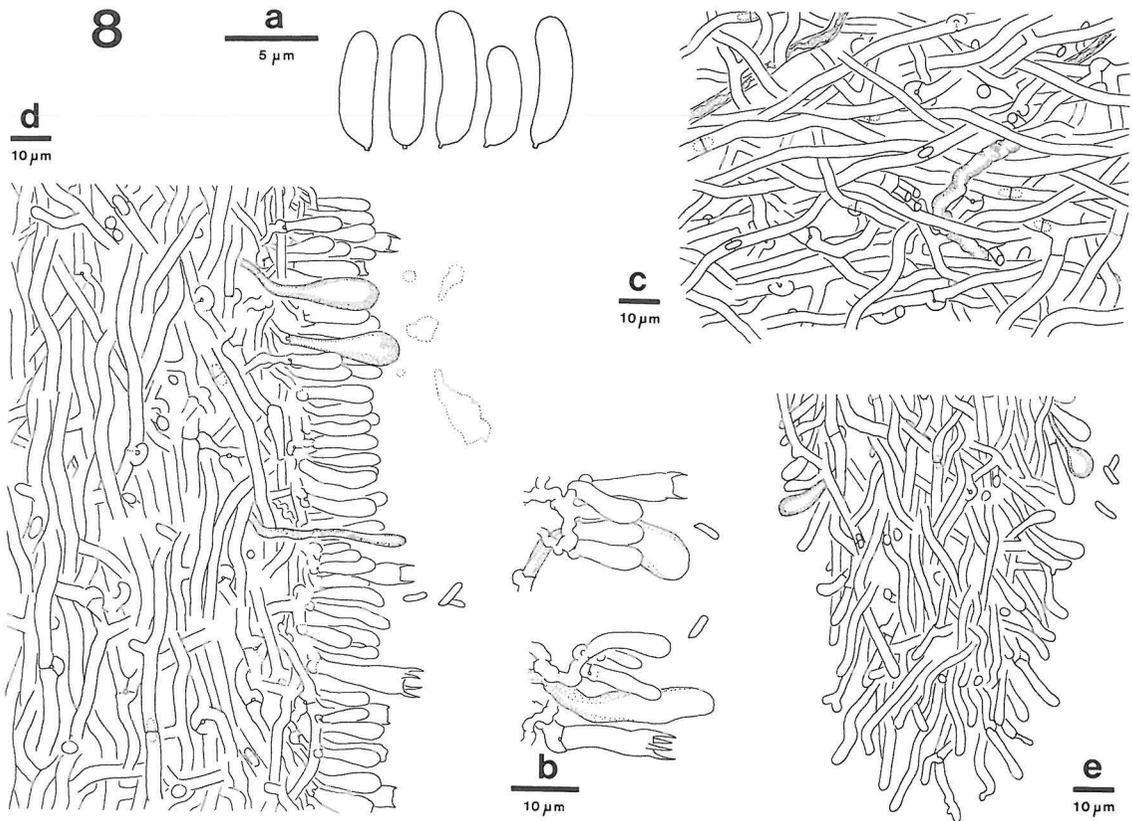


Fig. 8. Anatomical details of *Postia leucomallella* (Murr.) Jül.: a) basidiospores, b) basidia, basidioles and gloeocystidia, c) a section through middle context showing branched generative hyphae and a gloeoclerous hypha, d) a vertical section through upper dissepiment, e) dissepiment edge in a vertical section. Drawn in Cotton Blue. From the holotype of *Tyromyces gloeocystidiatus* Kotl. & Pouz. (PRM 203596).

1987 Kotiranta 6555 (H). Valkeala, 1977 Fagerström (H). *Pohjois-Häme*: Ähtäri, 1970 Pohjola & Ulvinen (OULU). *Pohjois-Savo*: Kuopio, 1967 Hakala (2 ex. KUO). Vieremä, 1970 Puustinen (H), Penttilä 1534 (H). *Pohjois-Karjala*: Kitee, 1980 Niemelä 2014 (T.N.). Lieksa, 1989 Penttilä 1216, 1225 (H). Pielisjärvi, 1936 Laurila (TUR), 1956 Kujala A2401 (H). Tuupovaara, 1967 Takala 4597 (OULU). *Keski-Pohjanmaa*: Haapavesi, 1970 Koskela (OULU). *Kainuu*: Kuhmo, 1990–1991 Penttilä 1616, 1631, 2494 (H). *Oulun Pohjanmaa*: Haukipudas, 1979 Ulvinen (OULU), 1981–1988 Ohenoja (3 ex. OULU). Muhos, 1965 Eurola (OULU), 1982 Heikkinen (OULU). Oulu, 1974 Saaristo (OULU), Ulvinen (3 ex. OULU). *Inarin Lappi*: Inari, 1989 Kotiranta 7694 (H). Sine loco: 'Ölstens', 1938 Nyberg (H).

France. 'Gallia austr. - orient' ? Quélet (UPS).

Russia. Leningrad Region: Vyborg, 1892 Thesleff (3 ex. H). **Karelia:** Vichka River, 1942 Laurila 564 (H).

Sweden. Småland: see the type. **Uppland:** Alsike, 1856 E.P. Fries (UPS). Börje, 1943–1948 Lundell (F. Exs. Suecici 2618, UPS). Vaksala, 1941 Fähracus 18305 (UPS). **Lule Lappmark:** Gällivare, 1947 Eriksson 2111 (UPS).

U.S.A. New York: Warrensburg, 1949 Lowe 3782 (H). **Washington:** see the types.

Postia leucomallella (Murr.) Jül. — Figs. 7, 8

Postia leucomallella (Murr.) Jül., *Personia* 11:423, 1982. — *Tyromyces leucomallellus* Murr., *Bull. Torrey Bot. Club* 67:63, 1940. — Type: U.S.A. *Florida*: Newman's Lake, 1938 Murrill (FLAS 18231!).

Polyporus separabilis Velenovský ex Pilát, *Atlas Champ. Eur.* 3(34–35):176, 1937 (nomen nudum). I have studied two original specimens of Velenovský which both belong to *Postia leucomallella*. Kotlaba (1975) reports that both in PRC and PRM there is also a specimen of *P. lactea* (Fr.) Karst. under this name.

Tyromyces gloeocystidiatus Kotl. & Pouz., *Česká Mykol.* 18:207, 1964. — Holotype: **Czechoslovakia. Čechy (Bohemia):** Benešov nad Černou, 1963 Kotlaba & Pouzar (PRM 203596!). In the type basidiospores measure 4.7–6.1 x 1.3–1.8 µm (n = 30),

being somewhat shorter than those in the type of *T. leucomallellus* (5–6.8 × 1.3–1.8 μm, n = 30). In other features (gloeocystidia, gloeoplerous hyphae, hyphal system) these two are very similar, and, although the type of *T. leucomallellus* is in a rather poor condition, I keep these two as a single species. This has already been proposed, e.g., by Lowe (1975) and Ryvarden (1978).

Basidiocarps annual, pileate, effused-reflexed, with an elongated pileus bordering the upper edge of the tube layer, or resupinate, variable in size, solitary or more often gregarious with several pilei, soft cheese-like when fresh, rigid and chalky brittle when dry, splitting easily along the tubes in both fresh and dry condition; resupinate areas usually 1–3 × 3–10 cm in size, but sometimes up to one meter wide along a fallen trunk. Pilei broadly attached, often confluent, with a slightly incurved and fairly sharp or blunt margin, up to 9 cm wide, projecting 0.3–3 cm from substrate, 0.5–3.5 cm thick at the base. *Upper surface* azonate or with an uneven and brownish zone near the pileal margin, when fresh and young finely fibrillose, white to cream with ferruginous irregular dots, with age smooth, becoming more dirty brownish and when dry often somewhat scrupose and wrinkled, when bruised turning very slowly greyish brown without a yellow phase. *Pore surface* when young and fresh white to cream and soft, turning very slowly dirty brown or greyish in strongly-bruised parts, becoming yellowish to dirty brown and fragile with age and when dry; pores angular to sinuous, (2–)3–4(–5) per mm, walls thin, ca. 0.03–0.07 mm thick when dry; tube mouths even to distinctly lacerate when dry, under lens (50 ×) in young, unbruised basidiocarps finely pubescent, in old basidiocarps and in bruised parts glabrous. *Section*: Context white and soft, when dry brittle and chalky. Tubes first soft and cream but turning soon wood-coloured to brownish, rigid and brittle when dry, darker than the context, up to 10 mm long.

Microscopy: Hyphal system monomitic, all septa with clamp connections. *Context*: Hyphae hyaline, inamyloid, indextrinoid, acyanophilous and metachromatic, mostly thin-walled, richly branched and with frequent cross-walls, (2.2–)2.8–5(–6.5) μm wide (n = 204/10), fairly loosely arranged, with age more densely packed, without a distinct basal layer, a few hyphae gloeoplerous. Hyphae in the pileal surface thin-walled and in young basidiocarps arranged in strands or arising separately from the context, with age more agglutinated and usually somewhat gelatinized, without distinct pigmentation. *Tubes*: tramal hyphae with a greyish tint in IKI, subparallel and fairly straight, thin- to fairly thick-walled, (1.8–)2.1–3.8(–4) μm wide (n = 200/10), with frequent and short side branches, when dry fragile and

easily broken, at dissepiment edges straight to undulating and somewhat interwoven, otherwise as in context, a few hyphae gloeoplerous. Subhymenium indistinct. Hyphal pegs abundant. Basidia slender-based, clavate, with a basal clamp and four sterigmata, (13–)15–18.5(–19) × (3.5–)4–5(–6) μm (n = 91/9). Basidioles slightly shorter, similar in shape. Gloeocystidia always present, usually (especially in old basidiocarps) abundant, cylindrical to pyriform, thin-walled, yellow in IKI and deep yellowish blue in CB, with oily contents, variable in size, 19–42(–68) × 4–9(–9.5) (n = 45/10), often rooting deep from the subhymenium, usually somewhat projecting above the hymenial surface. *Basidiospores* slightly curved and narrowly cylindrical to allantoid, thin-walled, smooth, hyaline, inamyloid, indextrinoid and acyanophilous, (4.3–)4.6–6.3(–7) × 1.3–1.8 μm, L = 5.28, W = 1.53, Q = 3.20–3.91 (n = 306/10).

Specimens examined

Austria. *Niederösterreich*: Gutenstein, 1982 Niemelä 2822 (T.N.).

Belgium. *Namur*: Fronville, 1969 Demoulin (H).

Czechoslovakia. *Čechy* (Bohemia): Jirny, 1922 Velenovský (as *Polyporus separabilis* Velen., PRC, PRM 33602). Soběslav, 1973 Kotlaba et al. (H).

Finland. *Ahvenanmaa*: Vårdö, 1967 Olofsson (H). *Varsinais-Suomi*: Kisko, 1988 Renvall 1449 (H). Kustavi, 1979–1981 Alava 19061, 19930 (TUR). Nousiainen, 1983 Kotiranta 5187 (H). Parainen, 1967–1972 Niemelä (2 ex. T.N.), 1980 Alava 19408 (TUR), 1988 Heinonen 154–88 (TUR). Raisio, 1936 Auer (TUR), 19?? Laurila, Auer & Kari (H). *Uusimaa*: Helsinki, 1985–1988 Saarenoksa 32185, 08688, 44488 (H), 36188 (KUO), 36288 (OULU, TUR), 36388 (TUR), 36588 (KUO), 45388 (KUO). Kirkkonummi, 1963 Kujala B3225 (HFR), 1970 Niemelä (H, T.N.). Mäntsälä, 1985 Haikonen 6707 (H). Riihimäki, 1962 Schulmann (H). Ruotsinpyhtää, 1979 Kotiranta (H.K.). Sipoo, 1981 Niemelä 2334 (T.N.), 1986 Saarenoksa 36686 (H, H.K.), KUO, OULU, TUR), 1987 Saarenoksa 39687 (H). Tuusula, 1966 Laine (HFR 022266). Vantaa, 1987 Saarenoksa 40387 (H). *Etelä-Karjala*: Vehkalahti, 1966 Laine & Kurkela (H, 2 ex. HFR), 1979–1980 Fagerström (3 ex. H, T.N.). Virolahti, 1989 Hietala (H.K.). *Satakunta*: Ikaalinen, 1986 Penttilä 155 (H). Kankaanpää, 1936 Laurila (2 ex. H). Kullaa, 1938 Laurila 579 (H). *Etelä-Häme*: Asikkala, 1981–1991 Haikonen 1862, 13529 (H). Heinola, 1983 Haikonen 3958 (H). Heinola rural commune, 1985 Haikonen 6391 (H). Jämsänkoski, 1967 Koskinen (H). Kuru, 1986–1987 Penttilä 242, 830 (H). Kärkölä, 1981 Haikonen 1486 (H). Lammi, 1979–1983 Niemelä 1716, 1722, 2324 (T.N.), 2939 (H), 1981–1984 Kotiranta 2737 (H.K.), 5937 (H). Padasjoki, 1976 Niemelä (T.N.), 1979–1981 Kotiranta 1719, 1734, 2885, 2900 (H), 1733 (H, H.K.), 1860 (T.N.), 1985 Niemelä 3306 (H). Pertunmaa, 1985 Haikonen 6508 (H). Tammela, 1866–1886 Karsten 1719b, 2248c, 3487 (H), 1882–1888 O. Karsten (4 ex. H), 1980 Niemelä 2040 (T.N.). *Etelä-Savo*: Hirvensalmi, 1987 Rosenlew (H). Ruokolahti, 1979 Haikonen 281 (H). Savitaipale, 1967 Niemelä et al. (H). Valkeala, 1977 Fagerström (H). *Pohjois-Häme*: Saarijärvi, 1981 Kotiranta 2940 (H.K.), 1984–1987 Kotiranta 5424, 5984,

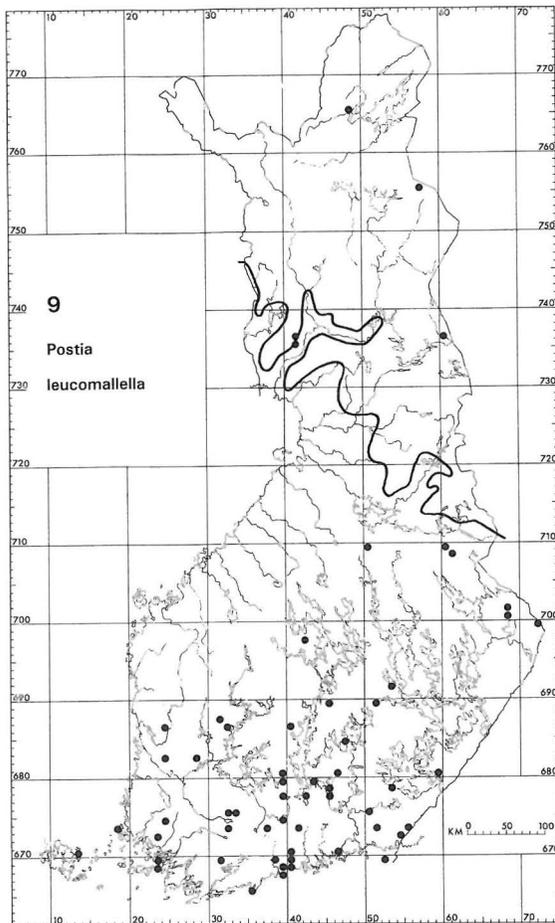


Fig. 9. The distribution of *Postia leucomallella* (Murr.) Jül. in Finland according to the material examined. The black line indicates the southern border of the Northern Boreal vegetation zone (according to Ahti et al. 1968).

6000 (H). Toivakka, 1989 Ohenoja (OULU). *Pohjois-Savo*: Jäppilä, 1987 Haikonen 8931 (H). Vieremä, 1989 Penttilä 1463, 1574 (H). Virtasalmi, 1985 Haikonen 6592 (H). *Pohjois-Karjala*: Ilomantsi, 1985 Söderholm 1179 (H). Lieksa, 1988–1990 Penttilä 1034, 1289b, 1933, 1939, 1963 (H). *Kainuu*: Kuhmo, 1990 Penttilä 1592, 1694, 1717 (H). *Perä-Pohjanmaa*: Rovaniemi rural commune, 1979–1980 Niemelä 1511, 1521, 2081 (H), 1981 Kotiranta 7833 (H). Tervola, 1980–1989 Kotiranta 2182, 7099 (H), 7806 (H, H.K.). *Koillismaa*: Kuusamo, 1988 Kotiranta 7082 (H). *Sompion Lappi*: Savukoski, 1988 Renvall 1370 (H). *Inarin Lappi*: Inari, 1981 Kotiranta 3055 (H).

Germany. Westfalen: Detmold-Hiddesen, 1976 Jahn (T.N.). Sine loco: 'Lorschauer Wald am Rhein', 1938 Sponheimer (UPS, ex PRM 491015).

Norway. Hordaland: Birkeland, 1951 Eriksson 5871, 5853 (UPS). **Buskerud**: Nes, 1951 Stordal 7026 (GB-J.E. 3720).

Poland. Woj. krakowski: Ojców Nat. Park, 1978 Niemelä 1356 (H).

Russia. Leningrad Region: Vyborg, 1892 Thesleff (2 ex., H). *Karelia*: Sel'ghi (Selki), 1943 Kari (TUR). Vedlozero (Vieljärvi), 1943 Railonsala (TUR). Vichka River, 1942 Laurila (H).

Sweden. Skåne: Torekov, 1946 Eriksson 1043 (UPS). **Halland**: Östra Karup, 1945 Foghammar (UPS), 1949 Eriksson 3928 (UPS). **Småland**: Femsjö, 1939–1943 Lundell 1565, 1645, 4126, 4127 (UPS). **Gotland**: Visby, 1945 E.Th. Fries (UPS). **Göteborgs-området**: Göteborg, 1954 Karlvall 6296 (UPS), 1955 Karlvall (F. Ex. Suecici 2619, as *Polyporus lowei*, UPS). Västra Frölunda, 1969 Nordin 4868 (UPS). **Uppland**: Bondkyrka, 1931 Lundell 1324 (UPS). Vänge, 1973 Ryman 1092 (UPS). **Hälsingland**: Harmånger, 1944 Eriksson 219 (UPS), 1945 Eriksson 393, 441 (UPS).

U.S.A. See the type.

Kotiranta and Niemelä (1981) published a map on the Finnish distribution of *Postia leucomallella* but that material included some specimens of *P. lateritia* and lacks the records of the last ten years. For these reasons a revised map (Fig. 9) is presented here.

Discussion

The fact that *Postia lateritia* has escaped the attention of mycologists for so long must be due to its similarities with its ferruginous relatives, particularly *P. fragilis*. The both species attain rust-tinted flecks when touched or bruised and, on the other hand, they both lack cystidia or other specific details. A species with a striking key character (e.g., exceptionally large pores, striking colour change, gloeocystidia) may, as beautifully shown by Niemelä and Penttilä (1992), mask another related taxon because of that single and easily observable character. Those look-alikes tend to remain unobserved if accurate microscopical examinations and ecological notes are omitted.

Postia lateritia differs from *P. leucomallella* and *P. fragilis* by its soft, easily collapsing and small pilei with variably brick-red and floccose upper surface (Figs. 2, 3, 7). Although the basidiocarps of *P. leucomallella* and *P. fragilis* vary greatly in their size and form, they are generally more sturdy and the upper surface becomes with age more rugulose, harder, and the brown colour is dark and dull, not bright reddish. There is no rapid colour change in *P. leucomallella*, while the bruised parts of *P. fragilis* turn almost instantly butter yellow and then deep ferruginous and the colours deepen on drying. In *P. lateritia* the final colour is more or less similar but the quick phase of butter yellow may totally lack. In addition, in *P. lateritia* the ferruginous parts are distinctly predominated by reddish colours and the unbruised pore surface remains white. The contrast

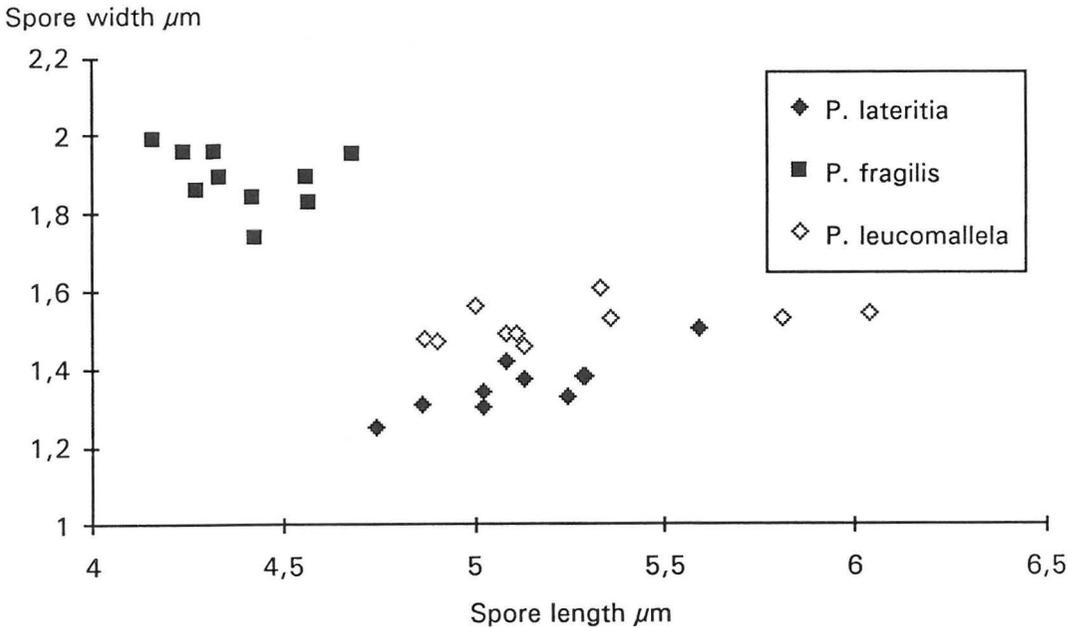


Fig. 10. The variation of the mean spore size in the ten selected specimens of *Postia lateritia* Renvall, *P. fragilis* (Fr.) Jül. and *P. leucomallela* (Murr.) Jül. (30–40 measurements of spores per specimen).

between the bright tomentum and white pores is usually the first aid of identification both in herbarium and in the field.

Dry specimens are also determinable by their general habit. *P. lateritia* keeps its softness after drying, while both *P. fragilis* and *P. leucomallela* turn more or less hard and fragile. The basidiocarps of *P. fragilis* mostly turn brittle-hard on their surface, but are fragile inside, which is due to the arrangement of contextual hyphae. The outer structure of *P. leucomallela* is fairly compact, but the context is fragile to almost chalky and the tubes dry rigid and very brittle.

Although resembling macroscopically each other, the three species are easily identified in the microscope. Gloeocystidia (pseudocystidia or macrocystidia according to Largent et al. 1977) are always present in *Postia leucomallela* and especially in old basidiocarps they are abundant (Figs. 8b, d, e). *P. leucomallela* is also characterized by its thin-walled and subparallel tramal generative hyphae with fairly abundant and characteristically short side branches and richly branched contextual hyphae (Figs. 8c, d).

Both *P. fragilis* and *P. lateritia* lack cystidia and have rarely branched and somewhat thick-walled hyphae. They can be identified from each other by basidiospore and hyphal characters. *P. lateritia* has allantoid and fairly narrow spores (narrower than 1.6 µm), while the spores of *P. fragilis* are more or less phaseoliform and fairly thick (thicker than 1.7 µm; Fig. 10). The hymenial cells are longer in *P. lateritia* than in *P. fragilis*. The contextual hyphae of *P. fragilis* are thicker than in *P. lateritia* and they are characteristically arranged in radial hyphal strands (Figs. 5c, e, f) which arise from the context and make the upper surface of the pileus pubescent to rugulous. In addition, the hyphae in the pileal surface are mostly thin-walled and lack the distinct pigmentation. In *P. lateritia* the contextual hyphae are spaced, interwoven and without any orientation (Fig. 1d). The hyphae in ferruginous parts of the pileal surface are distinctly thick-walled and have a characteristic reddish brown pigmentation (Fig. 1e). Moreover, the tomentum is made up of single hyphae which arise from the loose context, and the result is the soft floccose appearance of the upper surface.

Postia lateritia can be distinguished also by its ecological features. In Finland it is restricted to pine, while *P. fragilis* and *P. leucomallella* inhabit spruce in fairly moist habitats as well (Table 1). This indicates a different adaptation to the moisture and perhaps a need of different fungal associates. The species are separable also by their climatic requirements. *P. lateritia* evidently occurs throughout the Boreal zone, although it seems to prefer more continental Northern Boreal forests (Fig. 4). In Finland both *P. fragilis* and *P. leucomallella* are fairly strictly restricted to the Southern and Middle Boreal zone, and only a few finds derive from the Northern Boreal parts of the country (Figs. 6, 9), although many suitable forests have been thoroughly checked.

Postia undosa (Peck) Jül. and *P. leucospongia* are reminiscent of *P. lateritia* in microscope, but macroscopically their identification is easy. *P. undosa* (NYS!) has characteristically undulating and flexible pilei with large and sinuous pores (1–3/mm), and thick-walled generative hyphae and partly gelatinized trama make the species identifiable in the microscope. *P. leucospongia* is characterized by its fairly large basidiocarps with spongy and very soft upper surface. Like *P. lateritia*, also that species is very soft and, although the tubes turn fragile, the context keeps its softness after drying. *P. hibernica* (Berk. & Br.) Jül. which inhabits same habitats as *P. lateritia* can be identified by its white to cream basidiocarps which totally lack the ferruginous colours

and in microscope by its longer and more cylindrical basidiospores and projecting cystidia.

Other ferruginous polypores may also resemble the species of the *Postia fragilis* group, but usually they are easily identifiable in the microscope. *Amylocystis lapponica* (Rom.) Singer is characterized by strongly amyloid cystidia and hyphae. *Parmastomyces mollissimus* (R. Maire) Pouzar (*P. transmurtans* (Overh.) Ryv. & Gilb.) (see Pouzar 1984) is easy to identify by its dextrinoid and strongly cyanophilous, fairly thick (2.5–4 µm according to Gilbertson & Ryvarden 1987) basidiospores. *Aurantiorporus alborubescens* (Bourdot & Galzin) H. Jahn has resinous tubes, larger (5–8 × 4–5 µm) basidiospores and it is known to grow only on broad-leaved trees, mostly *Fagus sylvatica* L. (see Koch 1975).

Excluded taxa

Leptoporus lowei Pilát

Sborn. Nár. Mus. Praha 9B:101, 1953. (lectotype, PRM 487991!).

Not *Postia lateritia*. See the section on the identity of *Oligoporus lowei*.

Polyporus keithii Berk. & Br.

Ann. Mag. Nat. Hist. (Ser. 4) 15:30, 1875.

I have not had an opportunity to study the type specimen (K), but according to Reid and Austwick (1963) it could be interpreted as *Postia fragilis* (as *Polyporus mollis* Fr.). They reported that the context is characterized by highly refractive, conducting elements 5–11 µm in diam, which fits *Postia fragilis*.

Polyporus vermiculus Veull.

in Roumeguère, Rev. Mycol. 5:46, 1883.

According to Jülich (1984) this is a synonym of *Postia fragilis*.

Polyporus weinmannii Fr.

Epicrisis Syst. Myc.: 459, 1838.

No authentic material is available of this species, although Donk (1974) concluded that there may be an isotype at K. This has traditionally been treated as a synonym of *Postia fragilis* (see Donk 1974).

Tyromyces newellianus Murr.

Bull. Torrey Bot. Club 67:64, 1940 (holotype, F 18215!).

Lowe (1975) and Ryvarden (1978) have proposed that this is a synonym of *Postia leucomallella*. The

Table 1. Host range (in per cent) of the three ferruginous polypore species of *Postia* Fr. in Finland according to the herbarium material examined (n = total number of specimens).

Host	<i>P. fragilis</i>	<i>P. lateritia</i>	<i>P. leucomallella</i>
<i>Picea abies</i>	36	–	25
<i>Pinus sylvestris</i>	37	97	68
<i>P. cembra</i>	1	–	–
<i>P. peuce</i>	1	–	–
Coniferous tree sp.	8	3	7
<i>Alnus incana</i>	1	–	–
Unidentified host	16	–	–
n	139	87	123

species are macroscopically very similar and also the type of *Tyromyces newellianus* has abundant gloeocystidia (a rare character among polypores) and monomitic hyphal system. However, basidiospores and basidia are in the type of *T. newellianus* distinctly shorter than in *Postia leucomallella*, measuring $4.1\text{--}5 \times 1.2\text{--}1.5 \mu\text{m}$, $L = 4.47$, $W = 1.38$, $Q = 3.23$ ($n = 40$), $8\text{--}13 \times 3.5\text{--}4 \mu\text{m}$ ($n = 30$), respectively. *P. leucomallella* is known to grow only on conifers (Ryvarden 1978, Gilbertson & Ryvarden 1987), while the type specimen of *Tyromyces newellianus* was collected from a 'hardwood log'. For these reasons I am not convinced that *T. newellianus* and *Postia leucomallella* represent the same species. Although Lowe (1975) treated these as a single species, also he had doubts about the taxon: in 1970 he left a note 'Spores are shorter than usual, may be another species' into the type of *Tyromyces newellianus*. On the other hand, on examination of the type material alone, I hesitate to make any definite conclusion.

Nomenclatural status of *Postia* Fr.

Mycologists have for ten years discussed on what is the correct generic name for the brown-rot-causing polypores which have a monomitic hyphal system and clamped generative hyphae. The dispute culminates on the interpretation and validity of the name *Postia* Fr. The discussion arose after David's (1980) innovative revision of the genus *Tyromyces* s. lat. She divided the group into smaller genera and chose the name *Spongiporus* Murr. to comprise the species defined above. Her generic concept has been widely accepted, but older generic names were found to substitute *Spongiporus*.

Fries (1874) introduced the genus *Postia* for a few polypores with soft basidiocarps and thin dissepiments. Based evidently on Donk's (1960) thorough analysis, Jülich (1982) combined 18 European species in that genus. His solution (Jülich 1982, 1984) was accepted by Larsen and Lombard (1986) in North America, who added eight new species in *Postia*. In Europe e.g., Breitenbach and Kränzlin (1986) and Renvall et al. (1991) have adopted the name *Postia*.

Suspects on the validity of the name *Postia* make up the major obstacle to its use. According to Teixeira (1986) it is just a nomen provisorium, while Gilbertson and Ryvarden (1985, 1987) rejected it as a nomen nudum. The latter (Gilbertson & Ryvarden 1987) stated that 'Fries himself gave no indication that he intended to publish a new genus and used the name only incidentally in the middle of a sentence'. Accordingly they rejected the proposals of Jülich (1982) and Larsen and Lombard (1986) and replaced *Postia* by

Oligoporus Bref., which was found to be an older name for the *Spongiporus* of David (1980). Despite the arguments adduced by Larsen and Lombard (1986), Ryvarden (1991) concluded that *Postia* is a nomen provisorium and it should be rejected as an invalid name.

According to Ryvarden (1991) the purpose of Fries (1874) was merely to mention the name *Postia* incidentally under the descriptions of the other genera. This is not the case: When Fries introduced *Postia*, it was clear that he intended to describe a genus instead of providing merely a provisional name. In *Hymenomycetes Europaei* (pp. 522–523), he mentions his new genus *Postia* which, according to him, 'has to be added as a new genus beside *Polyporus*, *Polystictus* and *Trametes* and which I shall discuss more under *Daedalea*'. On page 586 he identifies his new genus by providing a description with a list of species (indicated by numbers referring to the text under *Polyporus*) belonging to that genus. In the description he says that 'More distant are many *Polypori* viz. n. 74–76, 84, 88, 110 etc. which have sinuous, labyrinthiform and intricate pores, and which differ from the real *Polypori* as the genus *Daedalea* from *Trametes*. They are easily distinguished from *Daedalea* by their soft context, thin and narrow pores, delicate dissepiments and absence of discoloured trama. Those species are most exactly distinguished as a particular genus under the name *Postia*.' These passages have been printed in their original wording (in Latin) by Donk (1960). Accordingly, because of the informative description, *Postia* is neither a nomen nudum, a nomen dubium nor a nomen provisorium.

Ryvarden (1991) considers that the special treatment of *Postia* in *Hymenomycetes Europaei* (Fries 1874) indicates that the genus was not accepted by Fries himself. However, the deviating typography (e.g., lack of Roman numerals) in the introduction of *Postia* can best be explained by a contradiction of a late decision vs. a laborious typesetting. It was easier to add *Postia* in one or two paragraphs, than to tear down the long ready-set sections. Fries had clearly made up his mind on *Postia* and treats it as a distinct genus. Although he did not formally present any combinations in *Postia*, it does not affect, as pointed out already by Larsen and Lombard (1986), validity of the genus. *Postia* can be interpreted as an alternative name, still being legitimate (see Greuter et al. 1988: article 34.3.). Also the typification of *Postia* has been fixed: Donk (1960) selected *Polyporus lacteus* Fr. as the type species, and his solution has been accepted by all the subsequent authors (see Ryvarden 1991). Thus, *Postia* is validly published and the correct generic name for the species of my study.

Delimitation of *Postia* Fr.

Another and more down-to-earth question is how large entity of species should *Postia* be, and variable generic divisions have been proposed for the brown-rot-causing polypores with a monomitic hyphal system. In order to outline more natural groups of fungi, Pouzar (1967) first described the genus *Strangulidium* Pouzar for *Polyporus sericeomollis* Romell and *P. rennyi* Berk. & Br., but later (Pouzar 1984) adopted an older name *Oligoporus* for the purpose. His division was accepted by Domanski (1972), but Lowe (1975) kept the collective concept. Jülich (1982, 1984) has presented another arrangement and placed *P. sericeomollis* back to the large genus (under *Postia*) and reserved *Oligoporus* only for the species with an imperfect state, like *O. rennyi* and *O. ptychogaster* (Ludw.) Falck & O. Falck. However, although the two last-mentioned species belong to a separable group, I feel it poorly grounded to separate them merely on the basis of chlamydospore production. Many other species, e.g., *O. cerifluus* (Berk. & Curt.) Gilb. & Ryv. and *O. floriformis* (Quél.) Gilb. & Ryv. (T. Niemelä, pers. comm.) produce chlamydospores even in nature. A broader concept was brought about, when Gilbertson and Ryvarden (1985, 1987, under *Oligoporus*) merged 25 brown-rot-causing polypores with a monomitic hyphal system and clamped generative hyphae. This entity is easy to key out, and its wide acceptance is therefore understandable. Although the delimitation practically solves the difficulties in separating the smaller genera, it does not try to remove the problems of phylogenetic heterogeneity of the group.

In my opinion, the separation of *Oligoporus* from *Postia* is an acceptable step towards the natural classification of tyromycetoid polypores and in this respect I follow Niemelä (Erkkilä & Niemelä 1986) who has provided an intermediary delimitation according to which the genera *Postia* (as *Spongiporus*) and *Oligoporus* should be separated. Although he omitted keys to the taxa, he presented a list of characters describing the species of *Oligoporus*. According to him the core of the genus comprises species with shortly cylindrical to broadly ellipsoid, variably thick-walled and cyanophilous basidiospores and the tendency to produce chlamydospores. Based on this he placed *O. balsameus* (Peck) Gilb. & Ryv., *O. cerifluus*, *O. floriformis*, *O. ptychogaster*, *O. rennyi* and *O. sericeomollis* under *Oligoporus*. If *Oligoporus* in this sense is excluded, *Postia* becomes a homogeneous genus comprising species with allantoid to cylindrical, thin-walled and acyanophilous basidiospores, clavate basidia and even other characters in common.

Note on *Poria johnstonii* Murr.

According to Vampola (1991) the type of *Poria johnstonii* Murr. (K) is a cream-coloured specimen of *Diplomitoporus lindbladii* (Berk.) Gilb. & Ryv., and therefore he gave a new name *Oligoporus septentrionalis* Vampola for the very rare polypore earlier known as *Postia johnstonii* (Murr.) Jül. (e.g., Ryvarden 1978, Jülich 1984). The species is characterized by pale citric yellow and resupinate basidiocarps with a monomitic hyphal system and cylindrical to slightly curved, thin-walled and acyanophilous basidiospores. Because of the spore characters I am not able to place it under *Oligoporus* and the following new combination is therefore proposed:

Postia septentrionalis (Vampola) Renvall, n. comb.

Basionym: *Oligoporus septentrionalis* Vampola 1991, Česká Mykol. 45:147 (holotype PRM, not studied).

Identity of *Oligoporus lowei* (Pilát) Gilb. & Ryv.

I have examined the type of *Leptoporus lowei* (PRM 487991) and another original collection (UPS, ex PRM 488452) from the type locality, identified by Pilát (1938) himself. This taxon has remained poorly known due to the lack of striking characters and the scantiness of its collections. The species was described and illustrated e.g., by Domański (1964, 1972) and David (1980), and I agree with them that it should be accepted as a species of its own. It resembles *Postia leucomallella* but lacks gloeocystidia. Basidiospores are thicker than in *P. lateritia*, but fairly similar to those in *P. fragilis*, measuring (4.6–)4.8–5.2 × 1.8–2.1(–2.2) μm (n = 30) in the type. However, they are slightly thick-walled and weakly cyanophilous, tapering somewhat towards the apiculus. *Oligoporus lowei* lacks the distinct colour change and the bundle-like arrangement of agglutinated contextual hyphae which characterize *Postia fragilis*.

Oligoporus lowei is indeed very close to the *O. cerifluus* complex and I am inclined to place it under *Oligoporus*. Similarities are, e.g., the weakly cyanophilous and slightly curved, cylindrical-ellipsoid basidiospores and the mostly thick-walled, richly branched generative hyphae which swell somewhat in KOH, like those of *O. cerifluus*. A closer study is needed to work out the proper species limits in the *O. cerifluus* group, and in that connection also other species names, such as *Leptoporus minusculoides* Pilát, *Polyporus revolutus* Bres., *Tyromyces subpendulus* Atk. should be reconsidered.

In recent Finnish mycofloristic papers (Kotiranta & Niemelä 1981, Niemelä 1991, Renvall et al. 1991b, Rassi et al. 1992) *Postia lateritia* has been treated as a taxon of its own, but it has been misinterpreted as *Oligoporus lowei* (or *Postia lowei*). Accordingly, the identifications of *Postia lowei* in the papers cited above are all referable to *P. lateritia*. Therefore I here present a correction to the occurrence of *Oligoporus lowei* in Finland: according to the present material the species has not been recorded from the country.

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