NOMENCLATURE

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Studies in *Perenniporia*: *Polyporus unitus*, *Boletus medulla-panis*, the nomenclature of *Perenniporia*, *Poria* and *Physisporus*, and a note on European *Perenniporia* with a resupinate basidiome

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The status and identities of *Polyporus unitus*, type of *Perenniporia* Murrill, of *Boletus medulla-panis*, their supposed synonymy, and the nomenclatural status of *Perenniporia*, *Poria*, and *Physisporus* are discussed. It is demonstrated, based on the study of its type, that *Pol. unitus* is not a synonym of *B. medulla-panis* even in the historically wider context than that recognised here. Although not precisely identifiable, the type of *Pol. unitus* does not belong to *Perenniporia* in its current sense, which is based on *B. medulla-panis*. *Poria* Pers. and *Physisporus* Chevall. are discussed as possible generic names for *B. medulla-panis* and related taxa. However, in view of the need for nomenclatural stability, it is proposed to maintain *Perenniporia* as currently accepted, with *B. medulla-panis* as conserved type. This name is epitypified and *Perenniporia medulla-panis* redefined. Based on a study of European specimens, two species are recognized within the historical circumscription of *P. medulla-panis*, *Perenniporia meridionalis* being described as new. Both species are compared with other European taxa with resupinate basidiomes and a key to all these taxa is presented.

KEYWORDS: Europe, nomenclature, polypores, *Perenniporia*, taxonomy.

INTRODUCTION

Historically, *Poria* Pers. (1794: 109) was used for all resupinate polypores. Since Patouillard (1900), however, segregates have been accepted as new genera or included in existing genera of pileate species. Murrill (1920) restricted *Poria* to the light-coloured (white) species, with *Poria medulla-panis* (Jacq. : Fr.) Pers. (basionym: *Boletus medulla-panis* Jacq.) as type; previously Murrill (1907) had transferred a number of dark-coloured species to different genera (e.g., *Fomitoporia* Murrill, *Fomitoporella* Murrill). Murrill's concept (1920) of *Poria medulla-panis* was primarily based on that of Persoon (when he noted "it is to him [Persoon] that we must look for the true idea of the species") and Bresadola (1897), but was broader in scope. Significantly, he noted that the species was perennial. *Physisporus* Chevall. was listed as a synonym.

Later, Murrill (1942) proposed *Perenniporia* for two *Poria* species, *Poria unita* (Pers.) P. Karst. (basionym: *Polyporus unitus* Pers.) and *Poria nigrescens* Bres., based on the presence of a perennial basidiome and thus restricting *Poria* to the seasonal (annual) species. Murrill (1942) did not designate a type for *Perenniporia*; W. B. Cooke (1953) later lectotypified the name with *Pol. unitus*. However, *Por. medulla-panis*, considered as the type of *Poria* Pers. (Murrill, 1920, 1942), is typically a perennial species (Murrill, 1920). Therefore the distinction between *Poria* and *Perenniporia* remained unclear.

The identity and status of *Pol. unitus* has long been debated and remains uncertain (Bresadola, 1897, 1920; Donk, 1933, 1960; Lowe, 1946, 1957, 1966). It is not known precisely how Murrill (1942) interpreted *Pol. unitus*. Following Donk (1933), it has generally been considered a synonym of *Boletus medulla-panis* Jacq. [presently known as *Perenniporia medulla-panis* (Jacq. : Fr.) Donk; Donk, 1960; Ryvarden, 1991)]. Consequently, the latter has been universally used as the correct name for the species that includes the type of *Perenniporia* (Ryvarden, 1972, 1978, 1985, 1991; Ryvarden & Johansen, 1980; Gilbertson & Ryvarden, 1987; Corner, 1989; Ryvarden & Gilbertson, 1994).

In the course of a revision of the genus *Perenniporia*, the typification of both *Pol. unitus* and *B. medulla-panis* and the status and identity of the species to which these names have been applied have been examined. The sta-

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tus and identity of *Perenniporia* are also discussed and *P. medulla-panis* is compared with related European taxa.

MATERIALS AND METHODS

The study is based on specimens from BPI, H, HUBO, L, MUCL, NY, PC, PRM, S, O (herbarium acronyms from Holmgren & al., 1990 and http://sciweb.nybg.org/science2/IndexHerbariorum.asp). Specimens were dissected under a stereomicroscope and examined in Melzer's reagent, 4% KOH, and lactic acid cotton blue. Colours are described according to Kornerup & Wanscher (1978). All microscopic measurements were done in Melzer's reagent. Extremes of size ranges (5%) are given in parentheses when relevant. In the text, the following abbreviations are used: x [$\bar{x}$] = arithmetic mean, R = length/width ratio of basidiospores, and x_R [$\bar{x}_R$] = arithmetic mean of the ratio R.

NOMENCLATURE AND TYPIFICATION

Perenniporia Murrill, Mycologia 34: 595. 1942.

Of the two original species, *P. unita* [*Pol. unitus*] and *P. nigrescens*, Cooke (1953) listed the first as lectotype without comment. In an earlier publication, Cooke (1940) used the "first species rule" when selecting lectotypes, hence leaving some doubt regarding the status of his lectotypifications in either publication under Art. 10.5. Kotlaba & Pouzar (1959) listed (either selected or accepted, depending on whether Cooke's choice is acceptable) *P. unita* as lectotype of *Perenniporia*. Donk (1960), apparently unaware of Kotlaba & Pouzar's (1959) publication, followed Cooke (1953) in accepting *Pol. unitus* as lectotype. He believed that *Pol. unitus* was synonymous with *Por. medulla-panis*, which he considered to be the lectotype of "*Poria* Pers. per S. F. Gray" and therefore considered *Poria* and *Perenniporia* to be homotypic, along with *Physisporus* Chevall., which he also lectotypified by *Por. medulla-panis*. However, Donk recommended that *Poria*, considered the oldest available name, not be adopted for *Perenniporia medulla-panis*, as is explained below. Both generic names and their types require new analyses to resolve this dilemma.

Polyporus unitus Pers., Mycol. Eur. 2: 93. 1825 ≡ *Physisporus unitus* (Pers.) Gillet, Les Hyménomycètes: 700. 1878 ≡ *Poria unita* (Pers.) P. Karst., Rev. Mycol. 3 : 9. 1881 ≡ *Fomes unitus* (Pers.) J. Lowe, Mycologia 47: 222. 1955 ≡ *Perenniporia unita* (Pers.) Murrill, Mycologia 34: 595. 1942.

Lectotype: (designated here): France, "*in montibus Vogesorum, in lignis abietinis*", ex-type fragment in Herb. Bresadola, S! (superseding "lectotypification" by Donk (Meded. Bot. Mus. Herb. Rijks-Univ. Utrecht 9: 234. 1933) as being a neotypification, or alternatively under Art. 9.17b).

Persoon (1825) described *Pol. unitus* based on a specimen collected in the mountainous area of northeastern France ("*in montibus Vogesorum*"), on coniferous wood ("*in lignis abietinis*"). The description was short and the species described as having a "deep reddish brown" colour ("*spadiceus opacus*") and (very) small, sub-inconspicuous pores ("*poris minutis subinconspicuis*").

Most early mycologists (Fries, 1828; Karsten, 1881; Cooke, 1886; Saccardo, 1888) accepted the species and copied Persoon's diagnosis, most probably without having seen original material.

Bresadola (1897, 1920) was probably the first to reinterpret Persoon's species based on study of the original specimen. He reduced *Pol. unitus* to synonymy under *Poria megalopora* (Pers.) Cooke ("Etiam *Poria unita* Pers. meo sensu, tantum statum juniorem *Poria megalopora*"), a species presently known as *Donkioporia expansa* (Desm.) Kotl. & Pouzar (Kotlaba & Pouzar, 1973; Ryvarden & Gilbertson, 1994). The phrase "statum juniorem" might refer either to the fact that Persoon's specimen had "sub-inconspicuous" pores (Persoon, 1825), or to a poorly developed specimen with shallow, almost invisible pores. Lowe (1966) followed Bresadola's conclusion based on study of a specimen in Stockholm (S) annotated by the latter as "fragm. type". Previously, he (Lowe, 1946, 1957) had interpreted the species in the sense of *Por. medulla-panis* following Donk (1933).

Donk (1933, 1960) was first of the opinion that *Pol. unitus* was conspecific with *Por. medulla-panis*, following a comparison of Persoon's specimens of the two species. There is only one specimen of *Pol. unitus* in L (L 910.277-214), the label of which bears the same data as published in the protologue [*Polyporus* (*Poria*) *unitus*, Mycol. Europ., "in Vogesia, les troncs pourris de sapin"] and annotated as "*Polyporus medulla-panis* Pers., Bres., non Fr." (Donk, handwritten note on the herbarium label dated 1932). Previously, Bresadola (handwritten notes on the herbarium label dated 1895) and Romell (1912) had also compared this specimen with Persoon's specimens of *Por. medulla-panis*, and had annotated it as "*prorsus* = *Polyporus medulla-panis* Pers…." and "*Polyporus unitus* Myc. Eur. est = *Poria medulla-panis* Pers.", respectively. However, Romell (1912) also noted that the specimen differed from Persoon's description of *Pol. unitus*. Most subsequent authors have followed Donk's (1933) interpretation of *Pol. unitus* (e.g.; Baxter, 1940; Overholts, 1942; Lowe, 1946, 1957; Bondarzew, 1953; Cunningham, 1965; Ryvarden, 1991).

Later, however, Donk (1967, 1974) questioned the origin of the specimen L 910.277-214, suggested it might not be the type, and queried the identity of *Pol. unitus* and its synonymy with *Por. medulla-panis*. Although he was convinced that the label of this specimen really belonged to the type, he thought that most probably a confusion of label/specimen had occurred and concluded: "so far I have not been able to locate the counterpart sheet on which the specimen is pasted that would be the real type of *Pol. unitus*" (Donk, 1967, 1974).

It is not known precisely how Murrill (1942) interpreted *Pol. unitus* when he erected *Perenniporia*. However, since he considered the species as a light-coloured (white to yellow) "*Poria*", it is likely that he took the species neither in the sense of Persoon (1825), who described it as dark brown, nor in the sense of Bresadola (1897), viz. *Por. megalopora*, which has also a brown tube layer. Murrill (1907) created some genera for the brown "*Poria*", e.g., *Fomitoporia* Murrill and *Fomitoporella* Murrill, that could have hosted *Pol. unitus* as originally described. We have found no other interpretation of *Pol. unitus* by Murrill. In all probability, he did not use it in the sense of *Por. medulla-panis* as done later by Donk (1933). Murrill had indeed a clear concept of *Por. medulla-panis*, primarily based on that of Persoon & Bresadola (1897).

To understand Persoon's concept of *Pol. unitus*, we analysed his original diagnosis and material. The "ex-type" fragment in S is very small (4 × 2 mm) and represents a part of a poorly developed (immature?) polypore with a resupinate basidiome. It has a dark brown pore surface (6E7-7E7), brown to reddish brown) with shallow, poorly developed, almost invisible pores. The hyphal system is dimitic with brown, non-branched skeletal hyphae (the generative hyphae were not seen). It has no basidiospores, nor hymenium. The specimen corresponds well to Persoon's diagnosis (viz. "spadiceus opacus" and pores "subinconspicuis") and could represent a fragment of the type. However, to try to identify in a modern sense such a poorly developed, sterile specimen is, for the time being, impossible.

Identification with *Poria megalopora* (= *Donkioporia expansa*), first proposed by Bresadola (1897, 1920) and followed by Lowe (1966), does not appear to be correct. *Donkioporia expansa* has a trimitic construction, with skeletal and binding hyphae (Domanski & Orlicz, 1967; Jahn, 1967; Ryvarden & Gilbertson, 1994), thus differing from the dimitic construction and the unbranched skeletal hyphae of the ex-type specimen of *Pol. unitus* in S. *Donkioporia expansa* is a very rare species from deciduous wood, mainly oak, in the warm and dry forests of southern Europe (Ryvarden & Gilbertson, 1994). It is improbable to occur on coniferous wood in mountainous northeastern France [but might occur here in unnatural environments, *Donkioporia expansa* being found much more frequently on oak (or pine) timber in buildings (Kotlaba & Pouzar, 1973; Buchwald, 1986; Ryvarden & Gilbertson, 1994)]. Consequently, this excludes the possibility that *Perenniporia* Murrill would be the correct name for *Donkioporia* Kotl. & Pouzar, as would have been necessary if the conclusions of Bresadola (1897) and Lowe (1966) were correct.

The colour of the pore surface and the hyphal construction of this ex-type specimen also exclude any relationship with Persoon's specimens of *Por. medulla-panis*. The latter have a lighter pore surface colour, but more importantly a different hyphal system with hyaline, branched, arboriform skeletobinding hyphae. It would be surprising if Persoon mixed the two species because his concept of *Por. medulla-panis* was well-defined (although broader than that accepted below), as verified by his specimens kept in L, which are homogeneous and for the most part conspecific (see below). In conclusion, *Polyporus unitus*, represented by the ex-type fragment at S, doubtlessly does not belong to *Perenniporia* as currently circumscribed.

Identification with *B. medulla-panis* Jacq. (Jacquin, 1778), is to be excluded, the latter being described with a white basidiome ("*albidus*", see below).

The specimen L 910.277-214, designated by Donk, 1933, 1960) as lectotype, was compared with the ex-type fragment (S) and Persoon's diagnosis. The specimen (L 910.277-214) does not correspond to Persoon's description of *Pol. unitus* as previously noted by Romell (1912). Also, it does not correspond to the ex-type fragment, and without doubt represents a different taxon. It has a lighter coloured pore surface, dark greyish orange to light brown (pale cinnamon, glancing with light), thus not "spadiceus opacus", and rather large, well-developed pores, 3–4 per mm, 145–250 µm diam. (thus not "minutis, subinconspicuis"). Its hyphal system is dimitic but with hyaline, variably dextrinoid, arboriform skeletobinding hyphae in the trama of the tubes, thus differing from the brown, unbranched skeletal hyphae of the isotype. It is evident that this specimen, although accompanied by a label that, in Donk's opinion, belonged to the type of *Pol. unitus*, could not have served as a basis for the description of *Pol. unitus*.

The discrepancy between the ex-type fragment (in S), the specimen L 910.277-214, and the original diagnosis of the species is such that we concur with Donk's (1967, 1974) hypothesis regarding a mislabeled specimen and subsequent confusion. As the specimen pasted on sheet L 910.277-214 cannot be part of Persoon's original material of *Pol. unitus*, Donk's (1933) typification must, therefore, be treated as a neotypification (*ICBN* Art. 9.8, Greuter & al., 2000). However, since an appar-

ent isotype exists (S), this neotypification must be rejected (*ICBN* Art. 9.17a). Even if the specimen L 910.277-214 was considered original material, it could also be rejected under *ICBN* Art. 9.17b (Greuter & al., 2000), being in major conflict with the protologue.

The comparison of L 910.277-214 with Persoon's specimens of *Por. medulla-panis* (which reflect Persoon's concept of the species) demonstrated their conspecificity (although Persoon's concept actually encompassed two distinct species, see below) as already noted by previous authors (Bresadola, 1895 [note on the label], Romell, 1912 [note on the label]; Donk, 1932 [handwritten note on the label], 1933, 1960). They share an identical macro- and micro-morphology, e.g., the arboriform branching pattern of the skeletobinding hyphae and ovoid to subglobose, apically truncate, strongly dextrinoid basidiospores (Table 1). They doubtlessly belong to *Perenniporia* as the latter is currently conceived.

We therefore conclude that:

a) the ex-type fragment in S constitutes part of the lost type collection of *Pol. unitus* (thus an isotype);
b) there is no type specimen in L (Donk, 1967, 1974);
c) the fragment in S cannot be precisely identified; Persoon's diagnosis is of little help, perhaps because his description was based on a poorly developed, immature specimen,
d) the name *Polyporus unitus* must apply to the unidentifiable species represented by the isotype at S which is here formally recognised as the lectotype.

The conclusion is unsatisfactory as it raises doubt as to the application of the name *Perenniporia* Murrill, typified by *Pol. unitus*, which is unidentifiable but traditionally based on *B. medulla-panis* and with more than 50 species presently classified within it. Selection of an epitype would equate *Pol. unitus* with *B. medulla-panis* sensu Persoon (see below) and supersede the current usage of *Perenniporia* under Art. 9.16 (Greuter & al., 2000) because the type of *Pol. unitus*, although unidentifiable, is clearly neither *B. medulla-panis* nor any other species of *Perenniporia* as currently understood.

Among existing generic names of polypores, two are based on *B. medulla-panis* and might therefore provide a name for the species currently included in *Perenniporia*; they are *Poria* Pers. (1794) and *Physisporus* Chevall. (1826). This will be discussed below.

Boletus medulla-panis Jacq., Misc. Austriaca 1: 141. 1778. Fig. 1.

Boletus medulla-panis is correctly attributed to Jacquin (1778), although in describing "*Boletum* voco medullam panis crustaceum, album, effusum, difformen", the latter had no intention of describing an unknown fungus but rather sought to propose a new name and a description for an existing fungus described and illustrated by Micheli ("*Agaricum* album, terrestre, medullam panis referens, Micheli [1729], 121. Tab. 63, f. 2.") and cited by von Haller (1768, p. 139) as "num. 2272" viz. "*Polyporus crustaceus,* effusus, farinosus*, albus*". [Both von Haller and Micheli's "names" are non-binomial, and the latter also pre-starting date, and thus cannot be used.] Jacquin (1778) considered the fungi of Micheli (1729) and von Haller (1768) as identical, but considered that the description was absent in Micheli ("Michelii nulla") and very short ("descriptio brevissima est") in von Haller, and that he could not provide more detail ("nec ampliorum ego in fungo tan simplice dare potero").

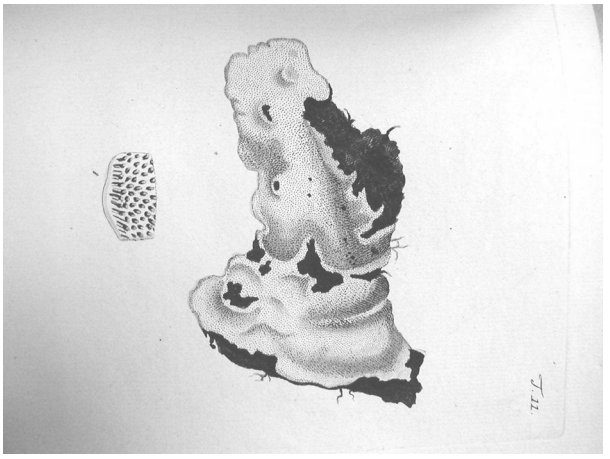

Fig. 1. *Boletus medulla-panis*, from Jacquin, 1778.

No specimen of Jacquin's fungus has remained but Jacquin (1778) associates his description with a plate (Fig. 1) that Donk (1960) proposed as type (lectotype). Although we consider it difficult to identify Jacquin's fungus based on his description and plate, Murrill (1920) thought that they "gave a fairly good and complete description" of the species, but he also referred to Persoon's specimens. Donk (1960) was also of the opinion that Persoon had indeed a correct interpretation of *B. medulla-panis* and after comparing Jacquin's description and plate with Persoon's material of *Por. medulla-panis*, he concluded that both authors "might well have had the same fungus". Additionally, Bresadola (1897) used Persoon's specimens as basis of his concept of *Por. medulla-panis* ("in herbario persooniano plura adsunt specimina cum nostris prorsus identica").

Ryvarden (1991) "lectotypified" *P. medulla-panis* with a specimen from Fries's herbarium: Sweden, Västmanland: Västerå-Barkarö, Oct. 1852, M. A. Lindblad. Because of Donk's (1960) earlier lectotypification, Ryvarden's choice is superfluous.

Murrill (1920) and Donk's (1960) conclusions are accepted here, and in order to stabilize the concept of *B. medulla-panis*, an epitype is being designated here (see

below) based on Persoon's interpretation of the taxon and in agreement with Jacquin's description and plate. It is therefore important to return to Persoon's specimens to understand the application of the name *Por. medulla-panis*.

Seven specimens from Persoon's herbarium (L) and three from Bresadola's (S, NY) were examined. Two morphologically closely related species are represented among Persoon's specimens. One species of them, represented by six specimens including the "*Pol. unitus*" specimen pasted on the sheet L 910.277-214 is characterised by having large pores, (2)–3–4 per mm, averaging 200 µm diam., arboriform skeletobinding hyphae, non- to yellowish to slightly dextrinoid in Melzer's reagent, 1.8–3.0 µm wide, averaging 2.4 µm diam., and subglobose to broadly ovoid, apically truncate, thick-walled, strongly dextrinoid, and cyanophilous basidiospores, averaging 6.7 × 5.4 µm (Table 1). All three specimens from Bresadola belong to this species.

A single specimen (sheet L 910.263-835) labelled *P. medulla-panis* in Persoon's herbarium) represents the other species. It has smaller pores, 5–6 per mm, averaging 139 µm diam. (Table 1), arboriform skeletobinding hyphae, 1.7–2.0 µm wide, averaging 1.5 µm diam., hyaline, non-dextrinoid but with an amyloid reaction in the lumen or on the inner side of the wall, the reaction being more conspicuous at the branching points. This second species has smaller, apically truncate, dextrinoid, cyanophilous basidiospores, averaging 4.6 × 3.6 µm (Table 1). Persoon's concept of *P. medulla-panis* (here after designated as "sensu Persoon") was sufficiently broad as to include two morphologically very close but distinct species.

Fries's concept (1821) of *B. medulla-panis* was for a time considered to be different from that of Persoon (Bourdot, 1932; Donk, 1933, 1960; Overholts, 1942). However, Donk's final conclusions (1960) were that Fries's description "does not ... exclude either Jacquin [*B. medulla-panis*] or Persoon's fungus [*Por. medulla-panis*]". Indeed, Fries (1821) cited von Haller, Jacquin, and Persoon, and thus there is no reason, a priori, to believe that he had a different concept. Four specimens from Fries's herbarium were examined, and three corresponded to *P. medulla-panis* sensu Persoon. One specimen represents the species with large pores and large basidiospores, and was collected by Mougeot (most

Table 1. Characters of *Perenniporia medulla-panis*, *P. meridionalis*, *P. rosmarini*, *P. tenuis* var. *pulchella*, and *P. fulviseda*.

Species / specimens	Basidiospores	Average	R	x_R	Pores/mm	Pores size	x
1. *Perenniporia medulla-panis*							
LR 7587 (NT)	(4.2)–4.7–5.8–(6.0) × (3.5)–3.5–4.5–(4.5)	5.0 × 3.9	1.1–1.1	1.2	4–5	(125)–143–200	175
P. xylostromatis (IT)	(4.3)–4.5–5.5–(5.7) × (3.3)–3.8–4.7–(5.0)	5.0 × 4.2	(1.0)–1.1–1.4	1.2	4–5	125–185	150
LR22531	(4.5)–4.7–5.5–(5.5) × (3.2)–3.4–4.3–(4.5)	5.1 × 4.5	1.1–1.6	1.3	4–5	130–185	157
LR271/6	(4.3)–4.6–5.5–(6.0) × (3.5)–3.5–4.0–(4.5)	5.1 × 3.8	1.2–1.4–(1.5)	1.3	4–5	125–200	161
LP203385	(4.3)–4.5–5.0–(5.0) × (3.3)–3.4–4.2–(4.2)	4.8 × 3.7	1.1–1.4	1.3	4–5	(100)–125–200–(225)	164
Persoon 910.263–835	(4.3)–4.5–5.0–(5.0) × (3.5)–3.5–4.0–(4.0)	4.6 × 3.6	1.2–1.4	1.2	(4)–5–6	(110)–115–160	139
Fries (Femsjö)	(4.0)–4.2–5.2–(5.2) × (3.5)–3.5–4.0–(4.2)	4.8 × 3.8	1.0–1.4	1.3	5–6	(125)–150–200	167
2. *Perenniporia meridionalis*							
LR42233 (T)	(6.0)–6.2–7.7–(8.7) × (4.7)–5.0–6.5–(6.7)	7.1 × 5.7	(1.0)–1.1–1.3–(1.4)	1.2	(3–4–(5)	150–300	218
Herbier Persoon: *Polyporus unitus*							
L 910.277–14	(6.0)–6.1–7.0–(7.0) × (5.0)–5.0–6.0–(6.5)	6.6 × 5.6	(1.0)–1.1–1.3–(1.3)	1.2	3–4–(5)	145–250	190
Herbier Persoon: *Poria medulla-panis*							
L 910.263–293	(5.0)–5.5–6.5–(7.3) × (4.0)–4.1–5.5–(5.7)	6.1 × 4.9	(1.1)–1.1–1.4–(1.4)	1.2	3–4	(150)–160–225–(275)	197
L 910.203–832	(6.0)–6.0–7.3–(7.5) × (5.0)–5.0–6.5–(7.0)	6.5 × 5.7	(1.0)–1.0–1.3–(1.4)	1.1	4–5	(125)–136–206–(225)	174
L 910.277–211	(5.8)–6.3–7.5–(7.5) × (4.8)–5.1–6.2–(6.3)	6.7 × 5.7	(1.0)–1.0–1.3–(1.4)	1.2	3–4	125–240–(250)	192
L 910.263–895	(6.3)–6.4–7.4–(7.5) × (4.7)–5.0–6.0–(6.8)	6.9 × 5.6	(1.0)–1.1–1.2–(1.4)	1.2	(3)–4–(5)	150–275	208

Table 1 (continued).

Species / specimens	Basidiospores	Average	R	x_R	Pores/mm	Pores size	x
L 910.263–837	(5.8)–6.0–7.0–(7.2) × (4.5)–5.0–6.3–(6.8)	6.6 × 5.7	(1.0)–1.0–1.3–(1.4)	1.2	3–4–(5)	(150)–175–275	211
L 910.263–899	(6.3)–6.3–7.3–(7.5) × (4.8)–4.8–6.0–(6.2)	6.8 × 5.6	(1.1)–1.1–1.3–(1.3)	1.2	–	–	–
L 910.268–831	(7.0)–7.5–9.0–(9.0) × (5.5)–5.5–6.5–(6.7)	8.0 × 6.0	(1.1)–1.2–1.4–(1.5)	1.3	3–4	(165)–177–280	224
Herbier Bresadola : *Poria medulla–panis*							
Bresadola (NY) Donum	(5.7)–6.0–6.7–(7.0) × (4.5)–4.5–5.5–(6.2)	6.3 × 5.1	1.0–1.4–(1.5)	1.2	3–4	(150)–170–275	219
Bresadola, Aug. 1890 (S)	(6.0)–6.3–7.0–(7.5) × (4.5)–4.5–5.6–(6.0)	6.7 × 5.1	1.2–1.4–(1.5)	1.3	4–5	125–250	182
Herbier Bourdot: *Poria medulla–panis*							
Bourdot 24517	(6.5)–6.8–8.0–(8.5) × (5.2)–5.3–6.5–(7.0)	6.5 × 5.9	1.1–1.4	1.2	3–4–(5)	160–229–(250)	199
Herbier MUCL: *Perenniporia medulla–panis*							
MUCL 30807	(6.0)–6.1–7.3–(7.3) × (4.5)–4.8–6.0–(6.2)	6.7 × 5.5	(1.0)–1.1–1.3	1.2	(2)–3–4–(5)	(165)–175–275–(325)	222
MUCL 41242	(6.0)–6.1–7.4–(7.5) × (4.0)–4.4–6.2–(6.2)	6.8 × 5.4	1.1–1.5–(1.8)	1.3	3–4	(150)–157–237–(245)	194
Perenniporia tenuis var. *tenuis* sensu Kotlaba (PRM)							
PRM 830048	(6.0)–6.5–7.0–(7.0) × (4.8)–5.0–6.0–(6.0)	6.7 × 5.4	1.1–1.4	1.2	3–4–(5)	150–245–(275)	201
PRM 869087	(6.3)–6.3–7.5–(8.0) × (4.5)–4.8–6.2–(6.5)	7.0 × 5.7	1.1–1.4	1.2	(3)–4–(5)	(155)–175–232–(250)	201
PRM 818449	(6.3)–6.5–7.4–(7.8) × (4.8)–5.2–6.0–(6.0)	7.0 × 5.5	1.1–1.4–(1.5)	1.3	(4)–5	(125)–137–205–(225)	170
PRM 878534	(6.0)–6.1–7.8–(8.0) × (4.5)–4.5–6.2–(6.5)	7.0 × 5.4	(1.1)–1.2–1.5	1.3	3–4–(5)	165–250–(275)	212
3. *Perenniporia rosmarini*							
Bernicchia 6622	(6.2)–6.2–7.5–(7.8) × (4.5)–4.6–5.8–(6.5)	6.9 × 5.3	(1.1)–1.2–1.5–(1.6)	1.3	6–7	(90)–97–135–(150)	115
LD 43309	(6.3)–6.5–7.5–(8.0) × (5.0)–5.0–5.9–(6.3)	7.0 × 5.5	1.1–1.4–(1.5)	1.3	6–7	(125)–127–153–(175)	141
4. *Perenniporia tenuis* var. *pulchella*							
Pol. pulchellus (T)	(5.0)–5.8–6.8–(7.0) × (3.5)–3.8–4.7–(5.0)	6.3 × 4.3	1.3–1.7	1.5	(4)–5–(6)	116–160–(175)	140
P. vitellinus (T)	(6.0)–6.0–7.5–(7.7) × (3.3)–3.7–4.7–(5.0)	6.7 × 4.2	1.4–1.8	1.6	4–5	(135)–140–226–(250)	183
P. vitellenilus (T)	(6.0)–6.0–7.0–(7.5) × (3.5)–3.7–4.6–(5.0)	6.5 × 4.1	1.4–1.8	1.6	4	150–235	188
P. chrysella (T)	(5.5)–5.7–6.5–(6.8) × (3.6)–3.8–4.7–(5.0)	6.1 × 4.2	(1.2)–1.3–1.6	1.4	4	125–250	192
R. Pentillä 1342	(6.0)–6.0–7.0–(7.0) × (3.5)–3.8–4.6–(5.0)	6.4 × 4.2	1.4–1.7–(1.8)	1.5	(3)–4–(5)	(100)–125–200–(250)	168
Pol. tenuis (T)	(5.7)–5.7–7.0–(7.0) × (3.5)–3.5–4.2–(4.4)	6.2 × 3.9	1.4–1.8	1.6	(4)–5	141–250	187
5. *Perenniporia fulviseda*							
P. fulviseda, Type	(4.2)–4.2–5.0(–5.0) × (2.7)–2.7–3.5(–3.5)	4.6 × 3.2	1.3–1.8	1.4	4–5	125–200	160
P. fulviseda, France	(4.5–)4.7–5.5(–5.5) × (3.0–)3.1–4.0(–4.0)	5.0 × 3.4	1.3–1.7	1.5	4–5	120–180(–200)	152
P. fulviseda, BIO– 4610	(4.3–)4.3–5.0(–5.0) × (3.0–)3.2–3.7(–3.8)	4.7 × 3.4	1.2–1.6	1.4	(4)–5	(104–)113–180(–192)	144
P. fulviseda, Canary (O)	(4.3–)4.3–5.0(–5.3) × (3.0–)3.0–3.8(–3.8)	4.8 × 3.4	1.2–1.6	1.4	5–(6)	120–184	151
P. japonica (LT)	(4.0–)4.0–4.8(–4.8) × (3.0–)3.0–3.5(–3.5)	4.5 × 3.2	1.2–1.6	1.4	7–8	68–100	87
P. japonica (62052)	(3.8–)3.8–4.8(–4.8) × (2.7–)2.8–3.7(–3.8)	4.3 × 3.2	1.2–1.5–(1.7)	1.4	6–8	100–124–(140)	114
P. japonica (53868)	(4.0)–4.0–4.5–(4.5) × (3.0)–3.0–3.5–(3.5)	4.3 × 3.2	1.1–1.5	1.3	(6)–7–8	80–104	94

probably in France). Two specimens correspond to the species with the small pores and smaller basidiospores, and came from Scandinavia. The fourth specimen was sterile but does belong neither to *P. medulla-panis* sensu Persoon nor to *Perenniporia* as usually understood, and cannot be identified.

If we accept Murrill's (1920) and Donk's (1960) opinions that Persoon's concept of *P. medulla-panis* included Jacquin's fungus, and that Fries's interpretation was not contradictory, then, one of the two species noted above has to be identified as *B. medulla-panis* Jacq. s. s.

Comparing Jacquin's description and plate with specimens of Persoon, Fries, Bresadola, and other collections gathered from various herbaria, we conclude that the taxon with the small pores, small basidiospores, and an amyloid reaction of the lumen of the vegetative hyphae would better represent Jacquin's fungus. The latter shares with Jacquin's fungus a mostly white basidiome ("*crustaceum album*") and the small pores ("pori exigui"). Furthermore, this species occurs in Austria where Jacquin could have collected it (and where it was also later described as *Polyporus xylostromatis* by Fuckel, 1872, see below) and also in Scandinavia where Fries could have collected it. Micheli's (1729) fungus, described and illustrated in Tab. 63, Fig. 2, and which served as the basis of Jacquin's *B. medulla-panis*, was also reported from Scandinavia (speciatim in Scandicci alti praediis [Micheli, 1729]). This small-pored species also corresponds to the concept of *P. medulla-panis* used by some modern European authors, for instance Niemelä & al. (1992). This taxon is here identified as *B. medulla-panis* s.s., and in order to stabilize the application of the name, an epitype specimen is designated below.

The other species recognized within Persoon's concept of *Por. medulla-panis* (thus not "pori exigui") has a more southern distribution in Europe, probably does not occur in Austria and Scandinavia, and is unlikely to have been collected by Jacquin or Fries. This species is described below as *Perenniporia meridionalis*, spec. nov.

The binomial *Poria medullaris* Gray (Gray, 1821) has also been used for the species known as *P. medulla-panis* (Donk, 1949; Gray, 1821; Kotlaba & Pouzar, 1959). Donk (1960) considered this a superfluous name for *B. medulla-panis*. Indeed, in describing *Poria medullaris*, (that he also qualified "Crumblike"), Gray (1821) cited Jacquin's fungus, viz. "*Boletus medulla-panis*, Bolton [1792]: 166, Persoon 545". [Bolton's plate 166 does not correspond to *B. medulla-panis* but pl. 167 does, so that Gray reference to "166" is probably erroneous and should have been pl. 167]. We thus endorse Donk's conclusions.

Nomenclatural status of the genera *Poria* and *Physisporus*. — *Poria* Pers., Neues Mag. Bot. 1: 109. 1794, nom. illeg., non *Poria* Adans. (1763).

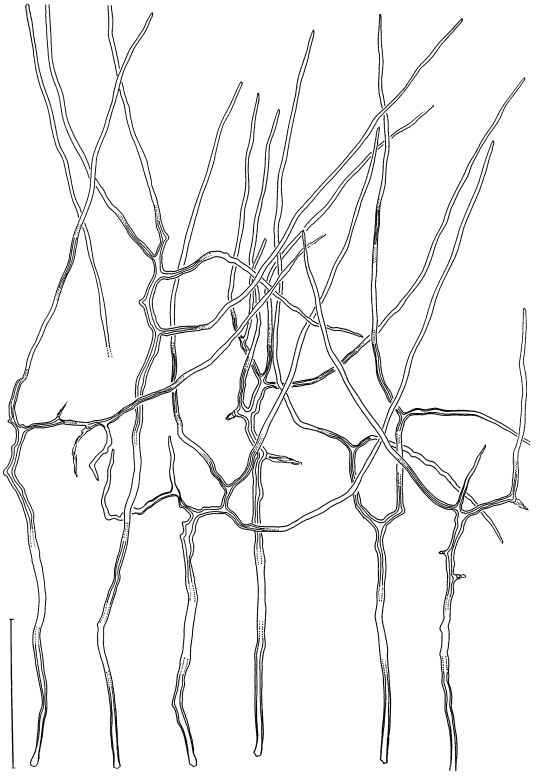

Fig. 2. *Perenniporia medulla-panis*. Arboriform skeletobinding hyphae from the trama of the tubes (from the epitype). Bar = 50 µm.

Lectotype (see Murrill, 1903: 100. 1920: 48; Wakefield, 1939): *Poria medulla-panis* (Jacq. : Fr.) Pers., Neues Mag. Bot. 1: 109. 1794 (≡ *Boletus medulla-panis* Jacq., Misc. Austriaca 1: 141, t. 11, 1778).

When first published, *Poria* Pers. (1794) contained three species, *P. medulla-panis* (Jacq.) Pers., *P. salicina* (Pers.) Pers. and *P. fimbriata Pers.* The genus was first lectotypified by *P. medulla-panis*, by Murrill (1903, 1920) based on the the "first species listed" rule. Hence, these lectotypifications may be superseded (Art. 10.5b). Clements & Shear (1931) proposed *Poria vaporaria* Pers. as lectotype for *Poria* Pers., referring to Persoon's *Synopsis methodicum fungorum* (1801). However, in that work Persoon treated the taxon as *Boletus* sect. *Poria*, based upon *Poria* Pers. 1794. Notably, *P. vaporaria,* although included by Persoon in *Boletus* sect. *Poria* (Persoon, 1801), was not an original species of *Poria* in 1794; hence it is not available as a lectotype.

The first non-mechanical lectotypification of *Poria* Pers. was by the Nomenclatural Committee of the British Mycological Society (Wakefield, 1939), who also chose *Poria medulla-panis* [for "*Poria* (Pers.) Karst. emend. Cooke", noted to be based upon *Poria* Pers. 1794], thus effectively validating the mechanical lectotypification of Murrill (1903).

When the starting point for the nomenclature of "*fungi caeteri*" was 1821, as in editions of the *ICBN* up to the Leningrad Code (Stafleu & al., 1978), *Poria* "Pers. per S. F. Gray" (1821), with *B. medulla-panis* Jacq. as lectotype (Donk, 1960), was considered to be the correct generic name for the species considered congeneric with that type. Donk (1960) discussed the history, interpretation, and typification of *Poria* in detail, but refrained from restricting the then very large, artificial *Poria* "Pers. per S. F. Gray" to *B. medulla-panis* and a few related species. Instead, he suggested considering *Perenniporia* temporarily for the latter taxa and leaving "*Poria* Pers." as "if the name were not associated with a generally acceptable type species". This follows Donk's (1941) earlier opinion state avoiding usage of the name *Poria* pending clarification of segregate genera. Domanski (1972) and Ryvarden (1972) followed Donk's (1960) proposal to use *Perenniporia* temporarily, but most authors have used it for *B. medulla-panis* and congeneric species, without any reference to its temporary status. Donk (1960) also discussed *Poria* Adans., which under the rules in operation at that time it was not a validly published name, and therefore, not a threat to "*Poria* Pers." Wright (1964) rejected Donk's opinion. He believed, rightly, that it was contrary to the *ICBN* and considered the taxonomic situation of the species of *Poria* Pers. as sufficiently solved since many generic names were available for the latter. He (Wright, 1964) then considered *Poria* in a narrow sense, following Kotlaba & Pouzar (1959).

Teixeira (1983) argued that since *B. medulla-panis* should be considered the type of both *Poria* Pers. and *Perenniporia*, the latter was superfluous and illegitimate. To legitimize *Perenniporia*, he sought to replace the lectotype by *Por. nigrescens*, the second original species in that genus. A change of lectotype can only be accomplished by conservation (Art. 14.3), by demonstrating that the original choice was in conflict with the protologue (Art. 10.5a), or was selected by mechanical means (Art. 10.5b). As none of these apply, the choice of *P. unita* as lectotype (e.g., Kotlaba & Pouzar, 1959; Donk, 1960) has to be followed (*ICBN* Art. 9.17, Greuter & al., 2000). Moreover, typification by *P. nigrescens* would make *Perenniporia* a taxonomic synonym of *Rigidoporus* Murrill, as *P. nigrescens* is a synonym of *Rigidoporus crocatus* (Pat.) Ryvarden (Ryvarden, 1987, 1991).

Later, Ginns (1984) also proposed to use *Poria* Pers. in a strict sense with *B. medulla-panis* as type, considering *Perenniporia* as a synonym, and proposed 23 new combinations in the former. Both Teixeira (1983) and Ginns (1984) assumed that *P. medulla-panis* was the correct name for *P. unita*, which is not the case, and both ignored the fact that *Poria* Pers. (1794) was an illegitimate homonym of *Poria* Adans. (1763) as is explained below.

Historical use of *Poria* prior to 1794. — Hill (1751) was the first to have used the name "*Poria*" (see Donk, 1960), for both pileate and resupinate species. He described three species and mentioned 19 others. However, being published in a pre-starting date publication, "*Poria* Hill" is not validly published and so has no status under the *ICBN* (Art. 12).

Browne (1756) used "*Poria*" for four taxa originating from Jamaica where he recorded them as very common. The descriptions of these four taxa are very short and, for two of them, their interpretation in a modern sense remains uncertain. Only the fourth cited taxon has a reference to a previously published species viz. *Agaricum ignarium* in Micheli (1729) *T. 61 f. I*. This plate represents a pileate polypore with a concentrically sulcate, tuberculate pileus, and, based on both the plate and the accompanying description, Micheli's fungus has been tentatively identified as *Fomitopsis officinalis* (Vill. : Fr.) Bond. & Sing. However, the latter species is known neither from Jamaica nor from the Caribbean. Browne's second taxon probably represents a species of *Pycnoporus* P. Karst., more precisely *P. sanguineus* (Fr.) Murrill. Browne (1756) described his taxon as: "The scarlet [bright red] *Poria* with a smooth surface", that corresponds quite well to *P. sanguineus*, which has a remarkable bright red pileus and pore surface and is one of the most common and consequently most frequently collected polypore in the tropics, including Jamaica. The two other species cannot be interpreted at all in a modern sense.

However, Browne's species are not acceptable nomenclaturally. As noted by Donk (1960), Browne (1756) neither provided a generic description or a diagnosis for his "*Poria*", nor did he refer to a previous description of the genus, e.g., that of "*Poria* Hill" (1751). Consequently, "*Poria* Browne" is also not validly published (Art. 34.1d, "a name is not validly published (*d*) by the mere mention of the subordinate taxa…" Greuter & al., 2000), nor, therefore, are any species included under it (Art. 43.1).

Adanson (1763) used *Poria* for a species with a pileate, stipitate basidiome. He referred to "*Poria* Brown." (1756), and to Micheli (1729), although citing a Micheli's plate (Agaricum t. 61, Ordo 3, f. 2) different from that cited by Browne (T. 61 f. I.). Adanson (1763) had probably no intention to create a new "*Poria*" but rather to use it in the sense of Browne (1756). However, unlike Browne, Adanson (1763) did validly publish the name providing a description and an illustration (Agaricum t. 61, Ordo 3, f. 2) (Ryvarden 1985).

Donk (1960) and Ryvarden (1985) commented on the status and identity of Adanson's species. The former

(Donk, 1960) concluded that the type of Adanson's name: "should be either one of the [four] Browne's species to whom Adanson ascribed the name *Poria* [in which case, probably the species linked to Micheli, 1729, T. 61 f. 1]; or Micheli's fungus cited by its illustration [Agaricum t. 61, Ordo III, f. 2] and which became the basis of *Polyporus michelii* Fr.". The latter illustration could be chosen as type of *Poria* Adans. under modern rules. However, the identity of Micheli's fungus remained uncertain. *Polyporus michelii* is usually considered as a synonym of *Polyporus squamosus* (Huds.) Fr. (Ryvarden, 1991). However, Micheli's plate and description could also (and perhaps better) be interpreted as representing a species of *Albatrellus* S. F. Gray. Micheli (1729) wrote: "*Agaricum* esculentum, candidum, flabelliforme, multiplex, pediculo donatum, & favi modo ample perforatum …. Fungo ventaglio bianco buono". There are only two species of *Polyporus* in Scandinavia with large pores, viz. *P. squamosus* and *P. tuberaster* Jacq. : Fr. Neither of them is actually white (*candidum*), and the latter is very rare in Scandinavia. Furthermore, Micheli neither described nor illustrated characteristic pilear squamules, present on both taxa and conspicuous on *P. squamosus*. *Albatrellus*, in particular *A. ovinus* (Schaeff. : Fr.) Murrill, could be an option for Micheli's fungus. The latter can be white when fresh and young, and is flabellate, edible, and common in Scandinavia. However, identifying Micheli's fungus cited by Adanson [Agaricum t. 61, Ordo 3, f. 2] to *A. ovinus* would, as a consequence, reduce *Albatrellus* to a synonym of *Poria* Adans., *A. ovinus* also being the selected type of *Albatrellus* (Murrill 1903, 1905; Ryvarden 1991), (but see Pieri & Rivoire, 2002 and Ryvarden, 1991 for a discussion of the status of *Albatrellus*). This situation would be undesirable because, as noted by Ryvarden (1985), historically, Poria has been used for over almost 200 years for resupinate polypores and not for stipitate species. However, it is out of the scope of this paper to solve this potential problem.

Ryvarden (1985) concluded that it made "no sense to make a guess as to what species is shown on the [Micheli's t. 61, Ordo 3, f. 2] plate [cited by Adanson]" and proposed to reject the name as *a nomen ambiguum*.

In conclusion, as emphasized by Ryvarden (1985), *Poria* Adans. (1763) is the earliest valid publication of the name *Poria*. Although the identity of Adanson's *Poria* species remains uncertain, doubtlessly, it is not congeneric with *B. medulla-panis*. *Poria* Pers. is thus no longer available, and if one wanted to use it for *B. medulla-panis* and related species, a proposal would have to be made to conserve it against *Poria* Adans. (1756).

Physisporus Chevall., Fl. Gén. Env. Paris 1: 261. 1826

Lectotype (see Donk, 1960: 256–7): *Physisporus medulla-panis* (Jacq. : Fr.) Chevall., Flore Générale des Environs de Paris, vol. 1: 262. 1826 (≡ *Boletus medulla-panis* Jacq., Misc. Austriaca 1: 141, t. 11, 1778)

Physisporus Chevall. is a possible generic name for the species currently classified in *Perenniporia*. It was published by Chevallier (1826), who did not designate a type, and its typification has long been disputed (Murrill, 1903, 1920; Donk, 1960; Ryvarden, 1987, 1991).

In the view of Ryvarden (1987), Chevallier (1837) typified *Physisporus* when he selected *Physisporus radula* (Pers.: Fr.) Chevall. as an example of his genus. This interpretation would make *Physisporus* the correct name for *Schizopora* Velen. To maintain nomenclatural stability, Ryvarden (1987) proposed conserving *Schizopora* against *Physisporus*. Citation of an example, even if it were in the protologue, does not constitute typification, however. The Committee for Fungi and Lichens rejected the proposal (Gams, 1992) because it erroneously believed that *Physisporus* was illegitimate, Chevallier listing *Poria* Pers. in synonymy. However, as *Poria* Pers. was itself illegitimate (see above) and could not have been adopted, the name *Physisporus* is legitimate. Nonetheless, Ryvarden's conservation proposal was unnecessary as the lectotypification by *P. radula* is not acceptable.

Murrill (1903) first lectotypified the name with Chevallier's first species, *Polyporus obliquus* Pers. : Fr., a choice followed by W. B. Cooke (1940), both of whom followed the "first species listed" approach. This lectotypification is superseded (see below) and *Polyporus obliquus* is now universally accepted as a species of *Inonotus* P. Karst. (Donk, 1960; Ryvarden, 1987). Murrill's (1903) lectotypification would have made *Physisporus* the correct name for the latter genus. Murrill (1920) later implied that *Physisporus* was based on *B. medulla-panis*, without any comment on his previous lectotypification (Murrill, 1903), stating that the latter species was "the first accompanied by the citation of a figure". Consequently, he listed *Physisporus* as a synonym of *Poria* Pers., which he typified by the same species. However, Murrill (1920) did not explicitly typify *Physisporus*, and even if interpreted as a lectotypification by implication, this could be superseded as he was following the American Code (Art. 10.5b) (Arthur & al., 1907).

Donk (1960), in discussing the status of *Physisporus* and its typifications, argued that the name was in fact not intended as a new genus but an apparently unjustified new name for *Poria* "Pers. per S. F. Gray", assuming that all pre-1821 names were not validly published. Indeed, Chevallier (1826) cited in synonymy in his protologue: "*Polypori* spec. Fries *Superne Porosi*. Hall. Schrad. *Poria*. Hill. Pers. *Resupinati*. Nees. Fries" and the then current *ICBN* (Lanjouw & al., 1956) supported Donk's

interpretation. Although *Physisporus* can no longer be interpreted as being illegitimate (see above), it cannot be argued that Donk selected *Por. medulla-panis* mechanically or even automatically based upon a previously typified legitimate genus. He discussed and rejected both *P. obliquus* and *P. radula*. Therefore, his is the first explicit lectotypification that supersedes the choice of *P. obliquus* by Murrill (1903, 1920), and is itself not supersedable except by conservation. *Physisporus* was not an avowed substitute for the older name, *Poria* Pers. although it was listed in synonymy with other names, and it did not include all original species. Therefore, it is not automatically typfied by the lectotype of *Poria* Pers. (Art. 7.3).

As lectotypified by *Por. medulla-panis*, *Physisporus* is the oldest available generic name for species currently assigned to *Perenniporia*, excluding the type of the latter name as explained above. It has not been in use since last adopted by Costantin & Dufour (1916).

This situation, if adopted, would require more than 50 new combinations in a long forgotten name, and therefore, conservation is recommended. One option would be to conserve *Poria* Pers. against *Poria* Adans. This option would require fewer new combinations than adoption of *Physisporus*. However, as *Perenniporia* is now universally accepted as though *B. medulla-panis* were type (Domanski, 1972; Ryvarden, 1978; Ryvarden & Johansen, 1980; Gilbertson & Ryvarden, 1987; Corner, 1989; Ryvarden & Gilbertson, 1994; Bondartseva, 1998), the best option would be to maintain the name but with, as conserved type, *P. medulla-panis*, that mycologists long believed to be the correct name for the existing type (*P. unita*), hence stabilizing current usage (see Decock & Stalpers, 2006).

TAXONOMY

Perenniporia medulla-panis (Jacq. : Fr.) Donk, Persoonia 5: 76. 1967. Figs. 1–3, 10–16 ≡ *Boletus medulla-panis* Jacq., Misc. Austriaca 1: 141. t. 11. 1778 (basionym) ≡ *Poria medulla-panis* (Jacq.) Pers., Neues Mag. Bot. 1: 109. 1794 ≡ *Polyporus medulla-panis* Jacq. : Fr., Syst. Mycol. 1: 380. 1821 ≡ *Poria medullaris* Gray, Nat. Arrang. Br. Pl.: 640. 1821, nom. illeg. ≡ *Physisporus medulla-panis* (Jacq. : Fr.) Chevall., Flore Générale des Environs de Paris 1: 262. 1826 – Lectotype (see Donk, 1960: 266): [icon in] Jacq., Misc. Austriaca 1: t. 11. 1778 – Epitype (designated here): Norway, Vestfold NL 77, Guldkronen ved Jarlsberg hovegård, on wood of *Quercus*, 01 Aug. 1971, *L. Ryvarden 7587* (O); isoepitype (MUCL 43250); nrDNA 5.8S, ITS1 & 2, and partial 28S sequence available at MUCL.

= *Polyporus xylostromatis* Fuckel, Jb. Nassau. Ver. Naturk. 27–28: 86. 1872 ≡ *Poria xylostromatis* (Fuckel) Cooke, Grevillea 16: 111. 1886 – Lectotype (designated here): Austria, Bachweg, spring, on old trunk of *Quercus / Betula*, *Fuckel* (NY).

Basidiome (annual to) perennial, resupinate, becoming widely effused, adnate, rigid, individual pieces observed up to 120 × 60 mm, (1)–2–20 mm thick. Margin narrow, thin to slightly rounded, concolorous with the pore surface. Pore surface homogeneous, white when fresh, drying white to pale cream-coloured, cream-coloured (4A3) to pale corky, or pale greyish orange (5(A–B)3) to greyish orange (5B5) on bruising, rarely with pale yellow to pale orange area, discolouring to dark brown to black (6F6) in old pore surface. Pores round to angular, ellipsoid, elongated on oblique part, 4–5–(6) per mm, (100)–125–198–(225) µm diam. (x = 159 µm). Dissepiments entire, smooth, (35)–40–102–(180), (x = 73 µm). Tubes layers single to stratified, up to 7–8 layers, 2–20 mm thick, elongated on oblique part, individual layers 1–3 mm thick, the entire tube with a (hard) corky consistency, a fibrous texture, the youngest layers white, creamy, discolouring to pale greyish orange (pale corky) to greyish orange up to light brown (cinnamon) in the older layers. Subiculum absent or strongly reduced to a thin, soft, flexible, fibrous sheet ("xylostromata"), white to cream, greyish orange to pale brown, also present in the substrate.

Hyphal system dimitic, both in the subiculum and the trama of the tubes. Generative hyphae hyaline, thin-walled, clamped, 1.5–3.0 µm diam. Vegetative hyphae mainly as arboriform skeletobinding hyphae, hyaline, non-dextrinoid, but with a variable amyloid reaction in the lumen or close to the inner side of the wall, more conspicuous at the branching points, cyanophilous, non-swelling in KOH. Subiculum (xylostromata) composed of densely packed vegetative hyphae, hyaline, sparingly branched. trama of the tubes with arboriform skeletal hyphae, composed of an unbranched basal stalk, clamped at the basal septum, straight to sinuous or geniculated, then often with lateral aborted processes, thick-walled, but not solid, (30)–54–142–(165) µm long (x = 91 µm), slightly widening from 1.7–2.3 µm (x = 2.0 µm) wide at the basal septum up to 1.8–2.5 µm wide (x = 2.2 µm) at the branching point, branches straight to sinuous, 1.2–1.7–(2.0) µm wide, (x = 1.5 µm), slightly narrowing at the thin-walled apices.

Basidia clavate to slightly pedunculate, with a clamp at the basal septum, 15–17 × 7.8–10 µm, with four sterigmata. Basidioles similar, without sterigmata. Cystidioles few, hyphal-like to slightly clavate, slightly fusoid, or slightly ventricose, occasionally slightly apically mamillate, clamped at the basal septum, 14.3–25.0 × 4.4–6.3 µm (x = 17.7 × 5.2 µm). Basidiospores ellipsoid to

broadly ovoid to subglobose, apically truncate, with an apiculus, thick-walled, with an apical germ pore, 0–1 guttate, hyaline, (non-) to mostly strongly dextrinoid, cyanophilous, (4.2)–4.5–5.5–(6.0) × (3.2)–3.5–4.5–(6.0) µm, R = (1.0)–1.1–1.4–(1.6), (x = 4.9 × 3.9 µm, x_R = 1.3). *Chlamydospores* absent.

Type of rot: a white rot.

Cultural features: unknown (see remarks)

Sexuality: Most probably heterothallic tetrapolar (see below)

Substrate: dead wood of deciduous tree, with a marked preference for *Quercus*.

Distribution: Europe.

Specimens examined:

Lectotype & Epitype (see above)

Selected additional specimens examined: Germany: Thuringia, Plottendorf, MTB 4940/2, 25 Jun 2002, *F. Dämmrich* 6177 (MUCL 43906); Italy: Prov. Potenza, Mormanno, 21 Oct 1984, *K. Hjortstam, K. H. Larsson* and *L. Ryvarden*, LR 22531 (O); Norway: *M. N. Blytt,* in Fries's herbarium (UPS); Sogn. & Fjordane, Florø, Lykkebovatnet, 21. Apr 1991, *Geiri Gaarder 121*, *LP 203 385* (O, MUCL 43258); Arendal, Brastad, 19 Sep 1999, *T. Dahl* (O, MUCL 43342, ITS1 & 2, 5.8S sequence available at MUCL); Telemark, Nome, Mørkvasslia skogsreservat, 24 Sep 2003, *L. Ryvarden* 46097 (O, MUCL); Russia: Eastland, Pärnu, Mikkli, 27 Aug 1989, *L. Ryvarden* 271/6, (O); Sweden: Sm. Femsjö, 18 Aug 1856, *E. Fries*, in Fries's herbarium (UPS).

Remarks. — *Perenniporia medulla-panis* is characterized by a white pore surface, 4–5–(6) pores per mm, narrow, hyaline, non-dextrinoid, arboriform vegetative hyphae, but with frequently an amyloid reaction in the lumen, and small, dextrinoid basidiospores, (4.2)–4.5–5.5–(6.0) × (3.2)–3.5–4.5–(6.0) µm. This combination of characters is unique within *Perenniporia*, and defines the species well, as previously noted by Niemelä & al. (1992). *Perenniporia amylodextrinoidea* Gilb. & Ryvarden also presents an amyloid reaction of the vegetative hyphae, but it differs by having strongly amyloid wall (not the inner side or the lumen) and more ellipsoid, narrower basidiospores, 4.5–5.5–(6.0) × 3.0–3.5–(4) µm wide (Gilbertson & Ryvarden, 1987). The latter species is only known from a few collections in Southern United States (Gilbertson & Ryvarden, 1987). *Perenniporia narymica* (Pilát) Pouzar (= *Perenniporia amylohypha* Ryvarden & Gilb.) was characterized also by having slightly amyloid skeletal hyphae (Gilbertson & Ryvarden, 1987). However, this species does not belong to *Perenniporia*; it differs by having non-branched skeletal hyphae and thin-walled, ellipsoid basidiospores (Gilbertson & Ryvarden, 1987; Bernicchia, 1990; Ryvarden & Gilbertson, 1994) and may belong in *Diplomitoporus* (see below).

The previously used concept of *P. medulla-panis* (Donk, 1967; Domanski, 1972; Ryvarden, 1978; Ryvarden & Johansen, 1980; Gilbertson & Ryvarden, 1987; Ryvarden & Gilbertson, 1994; Bondartseva, 1998) was broad and included two species in Europe, as demonstrated by the examination of specimens of Persoon, Bresadola, Fries, and other collections from various herbaria (see above discussion). The situation is still more complicated when one includes other areas e.g., North America, Australia, or the tropical areas, where more taxa are represented under the name *P. medulla-panis* (C. Decock, pers. obs.).

As presently defined, *P. medulla-panis* is known only from Europe (ranging from Italy to Norway, eastward to Russia). However, its precise geographic distribution remains largely unknown. As well, details of its ecological requirements are largely fragmentary. The species seems to occur preferably (but not exclusively) on dead wood of *Quercus* and Ryvarden & Gilbertson (1994) reported it in North Europe up to the limit of the *Quercus* range. *Perenniporia medulla-panis* sensu auctores has been reported in literature on many other hosts (Ryvarden & Gilbertson, 1994).

The literature contains descriptions of the *cultural features* and the sexual behaviour of *P. medulla-panis* (Baxter, 1940; David & Malençon, 1978; Stalpers, 1978; Flott & Gilbertson, 1991). However, it is not known if these cultures belong to *P. medulla-panis* s.s. as described here or to *P. medulla-panis* sensu auctores. The *P. medulla-panis* cultures used by David & Malençon (1978) to determine the sexual behaviour of the species probably belong to *P. meridionalis*. The identities of the North American cultures (Baxter, 1940; Flott & Gilbertson, 1991) are uncertain. A revision of these cultures and of the original herbarium specimens from whence they were isolated is necessary to ascertain their identity.

The literature contains several presumed synonyms of *Perenniporia medulla-panis* (Ryvarden, 1991). None of them except *Polyporus xylostromatis* Fuckel are based on European materials and thus far, only this latter name is accepted here as a synonym of *P. medulla-panis*.

Perenniporia meridionalis C. Decock et Stalpers, **sp. nov.** Mycobank 500704; Figs. 4–9, 17–20. – Holotype: Italy, Sardinia, Nuoro Province, Montarbo reserva, Baccu e Pira, on dead wood of *Quercus ilex*, 03 Dec 2000, *L. Ryvarden 43233* (O; isotype in MUCL 43114). Ex-type culture derived from this specimen in MUCL (MUCL 43114) nrDNA 5.8S, ITS1 & 2, and partial 28S sequence available at MUCL.

– *Perenniporia tenuis* sensu auctores Europ., non Schweinitz (1832)

– *Poria medulla-panis* Persoon pro parte, typo excl.
– *Polyporus medulla-panis* Jacq. : Fr. pro parte, typo excl.

Basidiocarpi resupinati, vel pseudopileati, adnati, effusi, annui vel perennes (albidi) vel isabellini, pallide aurantiogrisei, flavidi vel pallide aurantiaci. Pori rotundati, (2)–3–4–(5) per mm, (125)–150–262–(325) µm lati. Systema hypharum dimiticum. Hyphae generatrices fibulatae, hyalinae. Contextus hyphis skeletalibus pauciramosis, crassitunicatis, (hyalinis) vel flavidis, varie dextrinoideis, 3.0–4.0 µm latis provisus. Trama hyphis skeletalibus laxe usque dense arboriformibus, crassitunicatis, (hyalinis) vel flavidis, varie dextrinoideis, stipite (15)–25–112–(180) µm longo, basi 1.8–2.6 µm, apice usque ad 2.3–3.5 µm lato, ramulis crassitunicatis, laxe ramosis, (1.5)–1.8–3.0–(3.5) µm latis provisa. Basidia clavata vel pedunculata, tetrasterigmatica 17–23 × 7–10 µm. Cystidiola hyphoidea, sinuosa, fusiformia vel leviter ventricosa, apice rotundata vel leviter lageniformia, 12.8–21.9 × 4.4–6.3 µm. Basidiosporae ellipsoideae vel ovoideae vel subgloboseae, apice truncatae, crassitunicatae, dextrinoideae, (5.0)–6.0–7.7–(9.0) × (4.0)–4.5–6.2–(7.0) µm. Chlamydosporae nullae.

Basidiomes usually completely resupinate, widely effused to rarely effused reflexed, adnate, rigid, individual basidiomes measured up to 150 × 25–60 mm wide, sometime fusing laterally to form larger basidiomes, 1–6 mm thick in resupinate specimens, occasionally, when growing on a vertical substrate, the upper margin becoming reflexed, then forming a pseudo-pileus by the marginal accumulation of tubes layers. Pseudo-pilei nodulose to triquetrous in section, up to 20 mm long and 20 mm thick, the surface hard, turning greyish to greyish black, to black, becoming rimose with age. Margin well delimited, thin to more commonly slightly thickened, rounded, "nodulose", 1–2–(4) mm wide, concolorous with the pore surface or sometimes more yellowish, sometimes fissured. pore surface homogeneous, occasionally cracked on drying, white, whitish, pale creamy to cream-coloured to greyish orange, cork-coloured, yellowish to yellow, rarely with some pale orange (pale brick red, yellowish rusty) tint, drying whitish, whitish grey, dirty creamy (isabelline) to more pale greyish orange (corky) to greyish orange. Pores round to angular, more striking on drying, ellipsoid-elongated on oblique part, (2)–3–4–(5) per mm, (125)–150–262–(325) µm diam. (x = 202 µm), sometimes 2–(3) fused to form larger cavities, up to 500 µm diam. Dissepiments entire, smooth, thin, sinuous when the pores are elongated, (25)–35–104–(170) µm thick (x = 62 µm). Tubes layer single to stratified, usually with 1–2–(3) layers totalling 1–4 mm thick (individual layer 1–1.5 mm thick) but with up to 7–8 layers in old specimens with a pseudo-pileus, totalling up to 10–15 mm thick, the entire tube layer with a (hard) corky consistency when dry, concolorous with the pore surface in the youngest layers, discolouring to greyish orange to light brown in the older layers. Subiculum thin, 1–2 mm thick, with a corky consistency, (whitish) to more commonly cork-coloured to light brown (pale cinnamon).

Fig. 3. *Perenniporia medulla-panis*. Arboriform skeletobinding hyphae from the trama of the tubes (from the type of *P. xylostromatis*). Bar = 50 µm.

Hyphal system dimitic both in the subiculum and the trama of the tubes. Generative hyphae hyaline, clamped, 2.0–3.2 µm diam. Vegetative hyphae hyaline to faintly yellowish, non- to yellowish to slightly dextrinoid, more conspicuous in the subiculum and the dissepiments, cyanophilous, slightly swelling in KOH. Subiculum with sparingly branched, almost skeletal-like vegetative hyphae, thick-walled, straight, 2.5–3.5 µm diam. Trama of the tubes with arboriform skeletal hyphae, composed of a basal stalk, sometimes strongly reduced, straight to slightly sinuous or geniculated (then sometimes with lateral aborted processes), thick-walled but not solid, (15)–25–112–(180) µm long (x = 67 µm long), gradually widening from 1.8–2.6 µm wide at the basal septum (x = 2.2 µm) to 2.3–3.5 µm wide at the branching point (x = 2.7 µm), the latter sometimes bulbous, then up to 4–5 µm wide. Branches short to long, straight, occasionally geniculated, thick-walled but not solid, (1.5)–1.8–3.0–(3.5) µm diam., ending thin-walled. Dendro-

hyphidia-like elements variably present from absent to abundant, then lining the dissepiments, with a short, narrow, hyphal-like stalk, and narrow, 1.0–1.5 µm diam., short, apical branches.

Basidia clavate to pedunculate, clamped at the basal septum, 17–23 × 7–10 µm (x = 19.8 × 8.2 µm), with four sterigmata. Basidioles clavate to slightly pedunculate, clamped at the basal septum, (12)–14–22 × 6.7–10 µm (x = 17.7 × 7.8 µm). Cystidioles slightly clavate to fusiform, occasionally slightly ventricose, slightly lageniform, or with collapsed remains of a (aborted) hyphae, 12.8–21.9 × 4.4–6.3 µm (x = 17.7 × 5.2 µm). Basidiospores ellipsoid, broadly ellipsoid to ovoid, up to subglobose, apically truncate, with a small apiculus, thick-walled and with an apical germ pore, 0–1 guttate, hyaline, (non-) to mostly strongly dextrinoid, cyanophilous, (5.0)–6.0–7.7–(9.0) × (4.0)–4.5–6.2–(7.0) µm, R = (1.0)–1.1–1.4–(1.5), (x = 6.7 × 5.4 µm, x_R = 1.2). *Chlamydospores* absent.

Type of rot: a white rot.

Cultural features: unknown (see remarks under *P. medulla-panis*).

Sexuality: heterothallic tetrapolar (David & Malençon, 1978, see remarks under *P. medulla-panis*)

Substrate: dead wood of hardwood genera, with a preference for *Quercus*, but in literature, recorded on many other hosts.

Distribution: Southern and Central Europe.

Selected additional specimens examined: Belgium: Prov. Luxembourg, Freylange, Jun 1990, *C. Decock* (MUCL 30807, specimen and culture, nrDNA 5.8S, ITS1 & 2, and partial 28S sequences available); Prov. Hainaut, Buissenal, Jun 1998, *N. Fouret*, (MUCL 41242, specimen and culture, nrDNA 5.8S, ITS1 & 2 sequences available); Bulgaria: Montes Eminska Planina, in valle "Kozluka", 16 Aug 1982, F. Kotlaba (PRM 830048, as *Perenniporia tenuis*); France (?): [Desmaz., in Herb. Pers.], L (910.263-293); Hb. Pers. 12, (L 910.263-832); France: on rotten roof timbers [sur les planches carriées des toits], Hb. Pers. 13, (L 910.263-833); Hb. Pers. (L 910.263-837); France: Poitou, near Châtelnault, Delastre in Hb. Pers. (L 910.263-899); on timber [sur bois de charpente; souvent dans les serres sur les bois qui se pourrissent], Hb. Pers., 16, (L 910.268-831); near Paris ? (*Prope Parisios*), Hb. Pers. 14, (L 910.277-211); Vosges, rotten trunk of fir tree [*in Vogesia*, les troncs pourris de sapin] [this locality is most probably incorrect, the specimen pasted on the sheet resulting from a confusion of label], Moug. in Hb. Pers. (L 910.277-214, as *Polyporus unitus* Pers.); Greece: Peninsula Peloponnesos, Pr. Korinthos, Tolo ap. Argos, 02 Jun 1993, *F. kotlaba* (PRM 878534, as *Perenniporia tenuis*); Italy: Pondasio, Aug 1890, *G. Bresadola* (S); Czechia: Pr. Skryje, "Týřovické skaly", 22 Oct 1964, *Z. Pouzar* (PRM 869087, as *Perenniporia pulchella*); ibid., district Rakovník, in "valle Úpoøský potok", 26 Apr 1966, *Z. Pouzar* and *F. Kotlaba* (PRM 818449, as *Perenniporia pulchella*).

Fig. 4. *Perenniporia meridionalis*. Arboriform skeletobinding hyphae from the trama of the tubes (from L. 910.277-214, *P. unitus*). Bar = 50 µm.

Remarks. — *Perenniporia meridionalis* is characterized by large pores ((2)–3–4–(5) per mm), hyaline vegetative hyphae, yellowish to slightly dextrinoid in Melzer's reagent, and large basidiospores (5.0)–6.0–7.7–(9.0) × (4.0)–4.5–6.2–(7.0) µm (x = 6.7 × 5.4 µm). The colour of the pore surface is variable. *Perenniporia meridionalis* occurs preferably, but not exclusively, on *Quercus* dead wood, in the warmer forests of central and southern Europe, extending eastward up to the Caucasus. Kotlaba (1976) and Niemelä & al. (1992) reported the species as an unnamed taxon as a thermophile. The species also can be found in more northern locations but on construction timber.

The pore size, the reaction of vegetative hyphae in Melzer's reagent, the average diameter of the vegetative hyphae, and the basidiospore size differentiate *P. meridionalis* from *P. medulla-panis*. Within the European taxa, *P. meridionalis* shares with *P. rosmarini* A. David & Malençon identical basidiospores (Table 1, 2) but the latter is distinguished by having smaller pores (5)–6–7–(8) per mm (Table 1, 2), and occurrence on *Rosmarinus* and

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Fig. 5. *Perenniporia meridionalis*. Arboriform skeletobinding hyphae from the trama of the tubes (from L. 910.268-831). Bar = 50 µm.

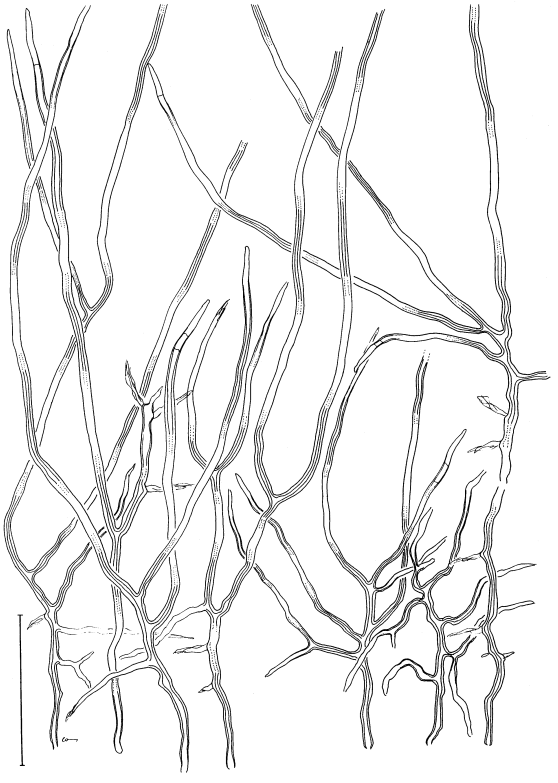


Fig. 6. *Perenniporia meridionalis*. Arboriform skeletobinding hyphae from the trama of the tubes (from PRM 818449). Bar = 50 µm.

other Mediterranean shrubby hosts (David & Malençon, 1978; Bernicchia, 1990).

Perenniporia meridionalis has sometimes been called *Perenniporia tenuis* (Schwein.) Ryvarden var. *tenuis* by European authors (Kotlaba, 1976; Kuthan & Kotlaba, 1981; Niemelä & al., 1992; Ryvarden & Gilbertson, 1994). Niemelä & al. (1992) discussed the European concept of the latter taxon, originally described from North America, and compared it with *P. tenuis* (Schwein.) Ryvarden var. *pulchella* (Schwein.) Lowe, also described from North America. They then concluded that, in Europe, *P. tenuis* var. *tenuis* is probably misused, and that the specimens referred to this taxon belong to a different, perhaps unnamed species (Niemelä & al., 1992). However, they concluded that the specimens of *P. tenuis* var. *pulchella* from Europe, North America, and Asia are probably conspecific.

The comparison of the European specimens of *P. tenuis* var. *tenuis* and *P. tenuis* var. *pulchella* with the type specimens of both names confirmed the observations of Niemelä & al. (1992). The European specimens called *P. tenuis* var. *tenuis* differ from the type of the latter name by having, e.g., larger, ovoid to globose, strongly dextrinoid basidiospores (Table 1), and variably dextrinoid vegetative hyphae. The type specimens of *P. tenuis* var. *tenuis* and var. *pulchella* have ellipsoid to oblong, almost cylindrical, non- to only faintly dextrinoid (pinkish) basidiospores, 5.7–7.0 × 3.5–4.3 µm and (5.0)–5.8–6.8–(7.0) × (3.5)–3.8–4.7–(5.0) µm, respectively, and non-dextrinoid vegetative hyphae.

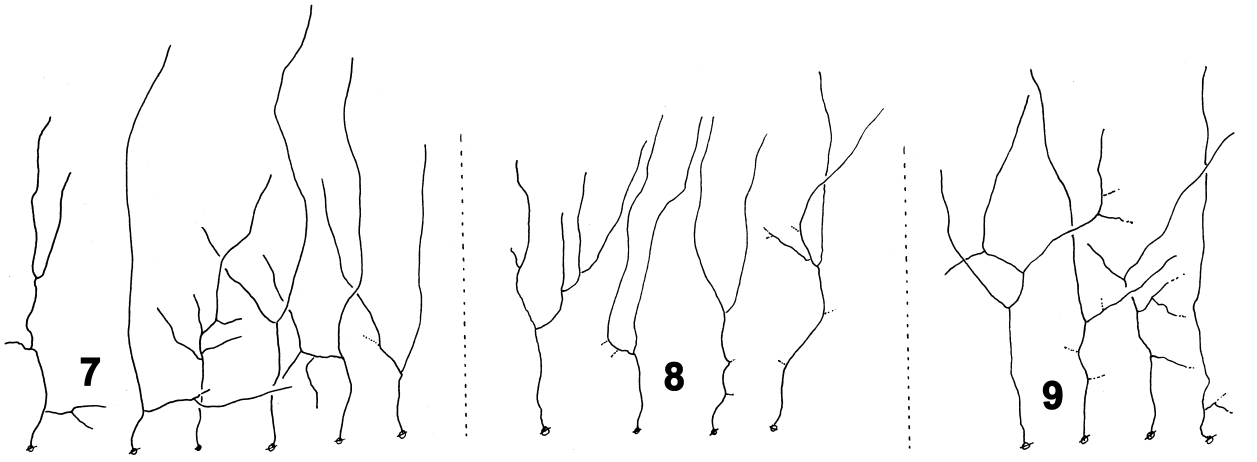
Klán & Kotilová-Kubièková (1982) reported a collection of *P. tenuis* var. *pulchella* [as *Poria pulchella* (Schwein.) Cooke] from West Caucasus. The specimen cited was not examined, but from the data provided (i.e. cream to yellow-white to yellow rusty pore surface, pores 3–5 per mm, skeletal hyphae 2–4 µm diam., basidiospores broadly ellipsoid or ovoid, 6.0–7.5 × 4.0–5.5 µm), it represents most probably a yellowish specimen of *P. meridionalis*.

Notes on other European *Perenniporia* species with a resupinate basidiome.

Perenniporia rosmarini A. David & Malençon, Bull. Soc. Mycol. Fr. 94: 407. 1978 ≡ *Poria rosmarini* (A. David & Malençon) Ginns, Mycotaxon 21: 331. 1984. – Type: France, Var, Port-Cros, on *Rosmarinus*, 04 Nov 1977, *A. David* (LY).

For a complete description, see Bernicchia (1990) and Ryvarden & Gilbertson (1994).

Perenniporia rosmarini is characterized by a



Figs. 7–9. *Perenniporia meridionalis*. Arboriform skeleto-binding hyphae from the trama of the tubes: schematic representation. 7; from L. 910.268-831. 8; from PRM 878534. 9; from L 10.277-214). Bar = 100 µm.

resupinate white basidiome, small pores, (5)–6–7–(8) per mm (Tables 1, 2), and ellipsoid to ovoid, up to subglobose, dextrinoid basidiospores, (6.2)–6.4–7.5–(8.0) × (4.5)–4.8–5.8–(6.5) µm (x = 6.9 × 5.4 µm, pers. obs.). The species has a preference for *Rosmarinus* sp. but also occurs on other Mediterranean shrubby hosts as *Cistus, Erica, Juniperus, Pistacia*, growing on dead or living branches near the soil level, and has a Mediterranean distribution (Bernicchia, 1990, David & Malençon, 1978). *Perenniporia medulla-panis* has smaller basidiospores and grows preferably on *Quercus*. *Perenniporia meridionalis* has larger pores and also grows preferably on *Quercus*.

David & Malençon (1978) carried out compatibility tests between "*P. medulla-panis*" and *P. rosmarini* and demonstrated a complete intersterility. However, from their data, we have concluded that they probably tested *P. meridionalis* and not *P. medulla-panis* as circumscribed here.

Specimens examined [although requested several times from LY, the type specimen (for details see above) was not available for examination]: Italy: Sardinia, Nuoro Province, Lanaitto, 11 Nov 1994, *A. Bernicchia* 6622 (HUBO, MUCL 42969); ibid., 02 Dec 2000, *L. Ryvarden 43309* (O, MUCL 43116), nrDNA ITS1, 5.8S, ITS2 and partial 28S sequences available at MUCL.

Perenniporia tenuis (Schwein.) Ryvarden, Norw. J. Bot. 20: 9. 1973 ≡ *Polyporus tenuis* Schwein., Trans. Am. Phil. Soc. 4: 159. 1832 (basionym). – Holotype: U.S.A.: Pennsylvania, Bethlehem, on wood (BPI).

For a description, see Gilbertson & Ryvarden (1987), Kotiranta & Niemelä (1993), Niemelä & al. (1992).

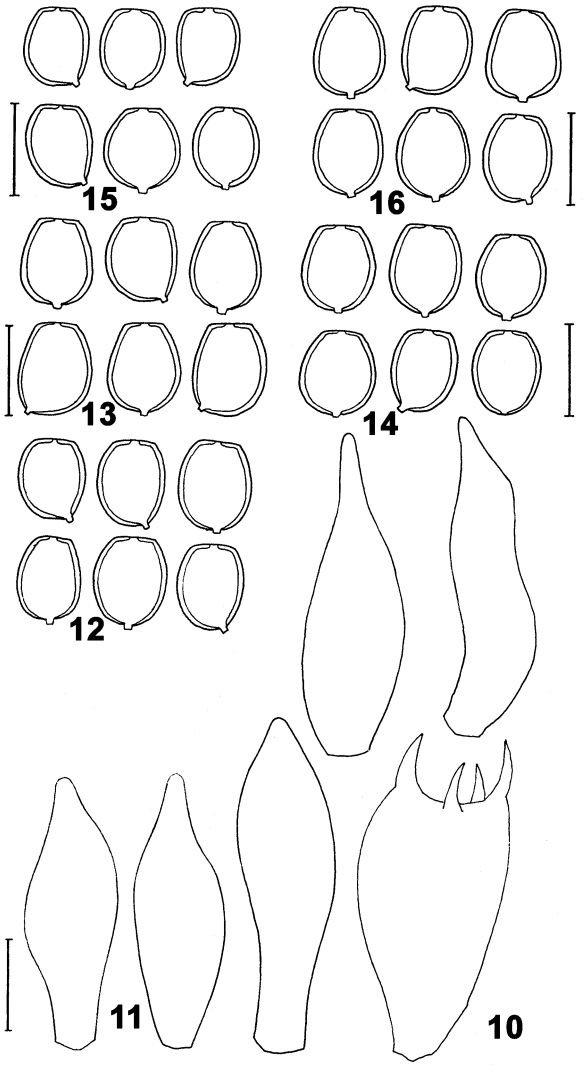
Perenniporia tenuis is well characterised by its oblong ellipsoid to almost cylindrical, only faintly (pinkish) dextrinoid basidiospores, 5.7–7.0 × 3.5–4.3 µm, and non-dextrinoid vegetative hyphae. Two varieties are recognised within the species:

Perenniporia tenuis var. *tenuis* and *P. tenuis* var. *pulchella* (Schwein.) Lowe ≡ *Polyporus pulchellus* Schwein., Trans. Am. Phil. Soc. 4: 159. 1832 – Holotype: U.S.A., Pennsylvania, Bethlehem, on wood (BPI).

Only *P. tenuis* var. *pulchella* occurs in Europe (see also discussion of *P. meridionalis*). It differs from the typical variety by having a bright yellow colour of the pore surface (Gilbertson & Ryvarden, 1987, Kotiranta & Niemelä, 1993, Niemelä & al., 1992). The taxon had been described previously in Europe as *Physisporus vitellinus* P. Karst., *Physisporus nitidus* subsp. *vitellinu-*

Table 2. Morphological data of the European species of *Perenniporia* s.s. with a resupinate basidiocarp.

Species	Basidiospores	Average	L/l	x_R	Pores/mm	Pores size	x
P. medulla–panis	(4.2)–4.5–5.5–(6.0) × (3.2)–3.5–4.5–(6.0)	4.9 × 3.9	1.0–1.4 –(1.6)	1.3	4–5–(6)	(100)–125– 198–(225)	159
P. meridionalis	(5.0)–6.0–7.7–(9.0) × (4.0)–4.5–6.2–(7.0)	6.7 × 5.4	1.0–1.4– (1.5)	1.2	3–4–(5)	(125)–150– 262–(325)	202
P. rosmarini	(6.2)–6.2–7.5–(7.8) × (4.5)–4.6–5.8–(6.5)	6.9 × 5.3	1.1–1.5 –(1.6)	1.3	(5)–6–7–(8)	(90)–97– 135–(150)	115
P. tenuis var. *pulchella*	(5.0)–5.7–7.0–(7.5) × (3.5)–3.8–4.7–(5.0)	6.3 × 4.2	1.2–1.7 –(1.8)	1.5	(3)–4–5–(6)	(100)– 125–250	172
P. fulviseda (Europe)	(4.0)–4.2–5.3–(5.5) × (2.7)–3.0–3.8–(4.0)	4.7 × 3.4	1.1–1.6 –(1.8)	1.4	4–5–(6)	(104)–120 –184–(200)	153



Figs. 10–16. *Perenniporia medulla-panis.* 10; Basidium. 11; Cystidoles. 12–16; Basidiospores (12; from the epitype. 13; 14; From LR 22531. 15; from the type of *P. xylostromatis*. 16; From LR 271/6). Bar = 5 µm.

lus P. Karst., and *Poria chrysella* Egel.

Perenniporia tenuis var. *pulchella* is a very rare taxon in Europe, known almost exclusively from the Nordic countries (but recorded once from mountainous areas of Austria, Niemelä & al., 1992). It grows mainly on *Betula* sp., *Alnus* sp., or *Populus* sp. (Niemelä & al., 1992, Gilbertson & Ryvarden, 1987).

Perenniporia tenuis var. *pulchella* differs from *P. medulla-panis*, *P. meridionalis*, and *P. rosmarini* in its oblong ellipsoid, only faintly dextrinoid basidiospores, which are ovoid to subglobose and strongly dextrinoid in the latter. These species also differ in their host preference, and for *P. rosmarini* and *P. meridionalis* in their distribution. *Perenniporia fulviseda* (Bres.) Dhanda has smaller basidiospores and produces light brown mycelial chords.

In Northern Europe, *P. tenuis* var. *pulchella* is sometimes mistaken for some bright yellow specimens of a taxon very close, if not identical, to *Perenniporia subacida* (Peck) Donk. The latter species has completely unbranched and strongly dextrinoid skeletal hyphae, and not truncate, ellipsoid basidiospores.

Specimens examined: Holotypes of *P. tenuis* var. *tenuis* and *P. tenuis* var. *pulchella* (see above).

Additional specimens examined of *P. tenuis* var. *pulchella*: Austria: Falzthurntal, Achensee region, on dead hardwood (probably *Populus*), 6 Aug 1982, *A. David* (O, LYAD); Norway: on trunk of *Betula* sp., 1912 (type of *Poria chrysella* Egel., BPI, S); Finland: on *Alnus incana*, 27 Sep 1879, *P. A. Karsten* (type of *Physisporus vitellinus* P. Karst., S). Finland: Heinsimaa, on trunk of *Alnus* sp. (type of *Physisporus nitidus* subsp. *vitellinulus* P. Karst., S); ibid., Kb. Lieksa, Patvinsuo National Park, Rauvunvaara, on fairly big, strongly decayed, decorticated fallen trunk of *Populus tremula*, 20 Sep 1989, *R. Pentillä 1342* (H).

Perenniporia fulviseda (Bres.) Dhanda, Indian Phytopath. 33: 386. 1981. ≡ *Poria fulviseda* Bres., Ann. Mycol. 18: 37. 1920. – Holotype: Italy, Cavara, on *Castanea* wood (S!).

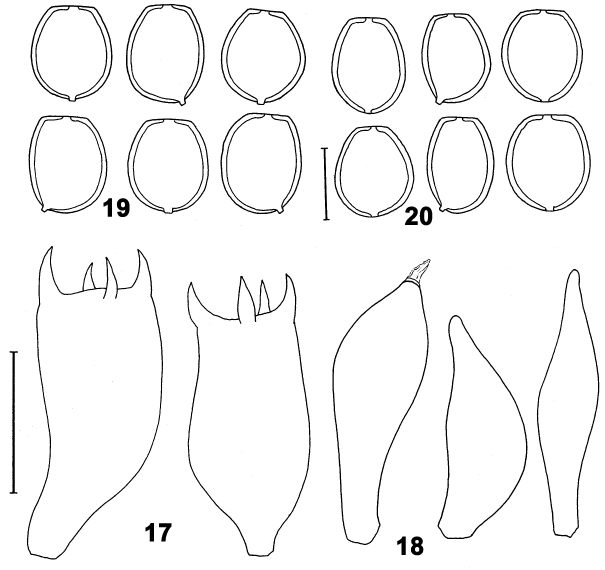
For a description, see Keller (1986), Ryvarden & Gilbertson (1994).

Perenniporia fulviseda is a remarkable species, readily distinguished from other European taxa by the presence of light brown, cinnamon-coloured mycelial cords at the margin of the basidiome or in the substrate. The vegetative hyphae are narrow (on average 1.5 µm diam., pers. obs.), non-dextrinoid, and the basidiospores ellipsoid to ovoid, on average smaller than 5 µm long, (4.0)–4.2–5.3–(5.5) × (2.7)–3.0–3.8–(4.0) µm.

Hattori & Ryvarden (1994) reduced P. *fulviseda* to synonymy with *Perenniporia japonica* (Yasuda) Hatt. & Ryvarden. The synonymy remains uncertain, however. Indeed, the Japanese material examined, including the type, consistently differs from the European material by having much smaller pores, viz. 7–8 per mm and 3–4 per mm respectively (Table 1). The basidiospores, hyphal system, and vegetative hyphae are otherwise identical. Whether the difference in pores size represents a specific or infraspecific characters remains unknown. More studies, including compatibility tests, are necessary to ascertain the status of the two names.

Specimen examined: Holotype (see above)

Additional specimens examined: France: Aveyron, *H. Bourdot & A. Galzin* (S); Italy: Fiorano Canavese (Torino), 350 m alt., 20 Feb 1982, *A. Bernicchia 698* (HUBO, O); Spain: Canary Islands, Tenerife, Pijaral Anagua, 18 Feb 1989, *L. Ryvarden 26523* (O); Basque Country, Alava, Zuya, Guillerna, 600 m alt., 21 Jan 1995,



Figs. 17–20. *Perenniporia meridionalis*. 17; Basidia. 18; Cystidioles (from the type). Bar = 10 µm. 19–20; Basidiospores (19; from the type. 20; from L. 910.277-214). Bar = 5 µm.

I. Salcedo, *s.n.* (BIO-Fungi no. 4610 Universidad del Pais Vasco); ibid., Vizcaya, Urkiola, Sabigain, 800 m. alt., on *Erica arborea*, 22 Apr 1994, *I. Salcedo*, *M. Duñabeitia & S. Hormilla s.n*. (BIO-Fungi no. 1585 Universidad del Pais Vasco).

Perenniporia japonica (Yasuda) Hatt. & Ryvarden in Mycotaxon 50: 36. 1994 ≡ *Trametes japonica* Yasuda in Bot. Mag. Tokyo 32: 356. 1918 – Holotype: Japan, Prov. Awaji, *A. Yasuda*, 17 Mar 1918, G. C. Lloyd Mycol. Coll. 53867 (BPI!, US0320326).

Additional specimens examined: Japan: 18 Sep 1921, *A. Yasuda s.n.*, C. G. Lloyd Mycological Collections, 53867 (BPI, US0320327); Sendai, *A. Yasuda 62052* (as *T. japonica*) (BPI, US0247067).

Perenniporia subacida (Peck) Donk, Persoonia 5: 76. 1967. ≡ *Polyporus subacidus* Peck, N.Y. State Mus. Ann. Rept. 38: 92. 1885. – Type: U.S.A.: New York, Osceola, July, *C. H. Peck 5* (isotype NY).

For a description, see Gilbertson & Ryvarden (1987), Ryvarden & Gilbertson (1994).

Although it has been traditionally accepted in *Perenniporia*, *P. subacida* does not appear to belong to this genus. It differs from *Perenniporia* mainly by the combination of completely unbranched skeletal hyphae and ellipsoid, non-truncate basidiospores. It is close, if not identical, to *Perenniporia ellipsospora* Ryvarden & Gilb., which shares the same morphology (Gilbertson & Ryvarden, 1987). Its taxonomic position remains however uncertain, and for the time being, it is maintained in *Perenniporia*. *Perenniporia subacida* and related taxa will be treated in detail in a separate publication.

Specimens examined: Isotype.

Perenniporia narymica (Pilát) Pouzar, Ceská Mykol. 38: 204. 1984 ≡ *Trametes narymica* Pilát, Bull. Soc. Mycol. Fr. 51: 364.1935. – Type: Russia, Siberia, Narim district, on decayed wood of *Betula verrucosae*, 1933, *Krawtzew 3112* (PRM).

= *Perenniporia amylohypha* Ryvarden & Gilb., Mycotaxon 19: 140. 1984. – Type: U.S.A., Pennsylvania, Kane County, Tionesta Tract, on *Acer* log, 03 Oct 1936, *Overholts 21129* (PAC).

For description see Gilbertson & Ryvarden (1987); Bernicchia (1990); Ryvarden & Gilbertson (1994).

Perenniporia narymica should be excluded from *Perenniporia*. It has thin-walled, ellipsoid non-truncate basidiospores, and a dimitic hyphal system with unbranched, slightly amyloid skeletal hyphae. Its taxonomic placement is uncertain but it could possibly be placed in *Diplomitoporus* Dom. (Ryvarden pers. comm.). *Diplomitoporus* is characterised by a dimitic hyphal system with unbranched skeletal hyphae, which can be slightly amyloid, as in *D. lindbladii* (Berk.) Gilb. & Ryvarden (Ryvarden & Gilbertson, 1994). *Antrodiella* Ryvarden & Johansen could be a possibility too, although an amyloid reaction of the vegetative hyphae is unknown in that genus (Ryvarden & Gilbertson, 1994). This will also be treated in a separate publication.

Preliminary key to the European species of *Perenniporia* with a resupinate basidiome.

1a. Vegetative hyphae completely unbranched, usually with a wide to very wide lumen, more conspicuous in the subiculum, strongly dextrinoid; basidiospores ellipsoid, non-truncate although sometimes angular on drying, without germ pore, mostly 4.5–6.0 × 3.5–4.5 µm . . . . . *P. subacida*

1b. Vegetative hyphae mostly branched, non- to slightly dextrinoid; basidiospores distinctly apically truncate, with an apical germ pore (*Perenniporia* s.s.) 2

2a. Basidiospores at least 5.5 µm long (range: 5.7–7.7 µm) 3

2b. Basidiospores up to 5.5 µm long (range: 4.2–5.3 µm) 5

3a. Basidiospores mostly strongly dextrinoid, (ellipsoid) to mostly broadly ellipsoid to ovoid (up to subglobose or ventricose), on average wider than 5 µm (4.8–5.8 µm), R averaging 1.2 4

3b. Basidiospores non- to faintly dextrinoid (pale pinkish), ellipsoid to more commonly oblong to almost cylindrical, on average narrower than 5 µm (3.8–4.7

μm), R averaging 1.5 . . . . . *P. tenuis*
In Europe, only *P. tenuis* var. *pulchella* occurs which has a bright yellow pore surface when fresh; vegetative hyphae non-dextrinoid; basidiospores mostly 5.7–7.0 × 3.8–4.7 μm, averaging 6.2 × 4.2 μm; a rare species, mainly in Nordic countries, growing on *Populus*, *Betula*, *Alnus*.

4a. Pores 3–4–(5) per mm; vegetative hyphae, non- or slightly dextrinoid in Melzer's reagent, more conspicuous in dissepiments and the subiculum; basidiospores mostly 6.0–7.7 × 4.5–6.2 μm (averaging 6.7 × 5.4 μm); pore surface usually whitish to corky, occasionally yellowish, rarely pale brick red; mainly on *Quercus* . . . . . *P. meridionalis*
The colour of pore surface is variable, although mostly white, whitish, pale corky, but occasionally yellowish to yellow or with some pale (brick-red) orange tint; the species is found preferably on *Quercus* but also on wood of other deciduous tree in the warmer forests of central and Southern Europe. Also on timber in houses, greenhouses, window frames, etc.

4b. Pores 6–8 per mm; vegetative hyphae hyaline and mostly non-dextrinoid in Melzer's reagent; basidiospores mostly 6.3–7.5 × 4.8–5.8 (averaging 6.9 × 5.4 μm), (6.5–7.5 × 5.5–6.5, David & Malençon, 1978); pore surface white; on *Rosmarinus*, and other Mediterranean shrubs . . . . . *P. rosmarini*
The species generally appears near the soil level on dead or living plants. It has a Mediterranean distribution.

5a. Basidiome thin to very thick, adnate, hard and rigid; pore surface mainly white when fresh, whitish to creamy when dry, without rhizomorph, but with xylostromata in the substrate; pores (4)–5–6 per mm; vegetative hyphae hyaline in Melzer's reagent, but the lumen often with an amyloid reaction, more conspicuous at the branching points; basidiospores mostly strongly dextrinoid, broadly ellipsoid to ovoid, up to subglobose, mostly 4.5–5.5 × 3.5–4.5 μm, averaging 4.9 × 3.9 μm, R mostly 1.1–1.4, averaging 1.3 . . . . . *P. medulla-panis*

5b. Basidiome thin (to thick), separable, flexible (soft); pore surface white to isabelline, with the margin light brown, cinnamon, merging into concolorous rhizomorphs; pores 4–5 per mm; vegetative hyphae non-dextrinoid, nor amyloid in the lumen; pore surface whitish to isabelline, margin pale cinnamon; basidiospores mostly 4.2–5.3 × 3.0–3.8, averaging 4.7 × 3.4 μm, R mostly 1.2–1.8, averaging 1.4 . . . . . *P. fulviseda*, European specimens*
* see remarks under *Perenniporia fulviseda*.

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