
NEW COMBINATIONS IN *BOLETACEAE* AND *GOMPHIDIACEAE* (*BOLETALES*)

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Five new combinations are made in the *Boletales*: *Chroogomphus rutilus* var. *corallinus*, *Boletus declivitatum*, *B. immutatus*, *B. ripariellus* and *Buchwaldoboletus sphaerocephalus*. Comments are made on other British poroid boletes.

Keywords. *Boletales*, *Boletellus*, *Boletus*, *British Fungus Flora*, *Buchwaldoboletus*, *Chroogomphus*, *Gomphidius*, *Xeroconus*.

INTRODUCTION

During the preparation of a revision of the British poroid, putrescent basidiomycetes and their lamellate relatives for the publication of a new and enlarged edition of the *British Fungus Flora: Agarics and Boleti*, vol. 1 (BFF) it was found necessary to make several changes to the present nomenclature. By so-doing the taxa discussed below fall in line with the proposed systematic arrangement.

1. NEW STATUS FOR *CHROOGOMPHUS CORALLINUS*

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The *Gomphidiaceae* is a small family of lamellate and sequestrate basidiomycetes related to the poroid boletes and numbering no more than 30 species worldwide. They are boreal in distribution, although they have in historic times been introduced with exotic plantings to other continents and southern hemisphere countries, e.g. *Gomphidius maculatus* Scop.: Fr. to New Zealand. The two main genera, *Gomphidius* Fr. and *Chroogomphus* O.K.Mill., have co-evolved with the *Pinaceae*, the former with *Larix* Miller, *Picea* A.Dietr. and *Abies* Miller, and the latter with *Pinus* L. (Miller, 2003).

In the British Isles there are five species in the family, four in *Gomphidius* and now only one in *Chroogomphus*. The reduction of species in British *Chroogomphus* is a result of molecular studies undertaken by Catherine Aime, supervised by O.K. Miller. Their work (pers. comm., 2003) has shown that *C. rutilus* (Schaeff.: Fr.) O.K.Mill., as currently circumscribed in Europe, is too narrowly defined and that in the United States what has been generally referred to as *C. rutilus* is a distinct, vicarious species.

In BFF ed. 1 *Chroogomphus rutilus* and *C. helveticus* (Singer) M.M.Moser were both included, the latter name being applied to specimens with a rather velvety,

ochraceous pileus, associated with exotic *Pinus* spp., whereas *C. rutilus* was thought to occur in Britain only with *P. sylvestris* L., and possessed only slightly thicker-walled cystidia. Some 10 years later Kahn *et al.* (1978) proposed the new species *Chroogomphus britannicus* A.Z.M.Khan & Hora for another British species.

The cystidial characters and the intensity of the amyloid reaction of the pileipellis hyphae are now known to be rather more variable than previously thought, and from observations in the United States it appears ochraceous pileus pigmentation may dominate in some populations of *C. rutilus* (Miller & Aime, 2002). This colouration led to the introduction of the name *C. ochraceus* (Kauff.) O.K.Mill. Molecular studies indicate that this North American taxon should be considered the sister to *C. rutilus* of Europe. *Chroogomphus britannicus* is considered to lie within the variation in size and micromorphology found in *C. rutilus* (Miller, 2003).

The name *Chroogomphus corallinus* was introduced for the ochraceous, drier-capped species which occurs periodically in Britain especially in plantations (Miller & Watling, 1970), which is referred to as *C. helveticus* in BFF ed. 1 (Watling, 1970). This formerly separate species is apparently equivalent to *C. ochraceus* in North America and is to *C. rutilus* in Europe as *C. ochraceus* is to the ‘*rutilus*’ of North America. The molecular profiles of *C. corallinus* and *C. rutilus* are the same but because the pileus colour is so distinctive I propose to recognize it as a variety of *C. rutilus*.

The following combination is therefore made:

Chroogomphus rutilus* var. *corallinus* (O.K.Mill. & Watling) Watling, **comb et stat. nov.*

Basionym: *Chroogomphus corallinus* O.K.Mill. & Watling, Notes Roy. Bot. Gard. Edinburgh 30: 392 (1970).

2. A NAME FOR A WIDESPREAD YET CONFUSED XEROCOMOID BOLETE

In the British Isles there is a widely distributed xerocomoid bolete (i.e. with poorly gelatinized, hardly pigmented, relatively loose hymenophoral anatomy) with pinkish tones to the pileus, an orange context at the stipe-base and which lacks a name. It has been mentioned at various times in the literature although always ‘hidden’ in descriptions of other common taxa, wrongly assumed to be variable. Engel *et al.* (1996) recognized the problem and introduced the epithet ‘*quercinus*’, although this has not been validly published. The ambiguous name *Boletus communis* has also been applied to this species but it is based on an exceedingly poor colour plate by the French mycologist P. Bulliard, which could be one of several closely related boletes. As this species is widespread throughout Europe, ‘*communis*’ would be a good epithet, but must be rejected. The names ‘*Boletus quercinus*’ and *B. communis* have been used extensively for field collections. However, this bolete was in fact well delimited by the Swiss mycologist Martin (1903) a century ago, although hidden amongst the surfeit of infraspecific taxa he introduced in a major work on his

concept of '*Boletus subtomentosus* Fr.'. The figure given by Martin (plate 1, figs 1–7) leaves no doubt that this is the fungus so widespread in the British Isles and previously included in British literature and foray records under *B. subtomentosus*, *B. versicolor* Mass. or even *B. chrysenteron* (Bull.) Quél.

Consequently the following new combination is necessary:

***Boletus declivitatum* (Martin) Watling, comb. et stat. nov.**

Basionym: *Boletus subtomentosus* subsp. *declivitatus* Martin, Mat. pour la Flore Cryptogamique Suisse 2(1): 18 (1903).

Syn.: *Xerocomus quercinus* H.Engel & T.Brückn. *ad int.* Schmeir- und Filröhrlinge in Europa: 205 (1996), nom. inval.

Misapplied: *Boletus communis*, Bull. Hist. Champ. France II: pl. 393, auct. pl., nom. reject.

3. ELEVATION OF *BOLETUS LURIDIFORMIS* ROSTK. VAR. *IMMUTATUS*
PEGLER & A.E.HILLS TO SPECIFIC RANK

The blueing of the flesh of some members of the genus *Boletus* L.: Fr. is an important taxonomic character. In the genus *Leccinum* S.F.Gray the blueing which takes place in the stipe-cortex and context of the stipe-base is not constant and is thus unreliable. The flesh of the *Boletus edulis* Bull.: Fr. group lacks any signs of blueing, whereas that of the *Boletus luridus* Schaeff.: Fr. group becomes quickly and intensely blue on cutting or bruising. In *Boletus satanas* Lenz and its allies the flesh only slowly becomes blue and is less intense and more cobalt blue compared with the indigo or Prussian blue of the *B. luridus* and *B. luridiformis* Rostk. groups. The flesh of *Boletus badius* Fr. undergoes a very characteristic series of colour changes on cutting, finally becoming azure blue. It appears that the different colour reactions agree with species groupings recognized from molecular studies, although this needs to be tested further.

Imler (1950) was able to subdivide these different groups still further by demonstrating that some species become intensely blue in Melzer's reagent, e.g. *Boletus calopus* Pers.: Fr., whilst others, even though they might turn blue in air, did not react at all. One which changes dramatically is *B. queletii* Schulz., whereas *B. luridiformis* (*B. erythropus* (Fr.) Krombh., 1821 [see Watling, 1970] non *B. erythropus* Pers., 1796) and its var. *immutatus* Pegler & A.E.Hills are non-blueing with Melzer's reagent, the flesh of var. *immutatus* becoming rich red- or mahogany-brown. Whereas in *B. luridiformis* var. *discolor* (Quél.) Kriegerst., a yellow-capped variety, the flesh changes similarly to that of the type variety, in var. *immutatus* the context is unchanging. As there are also microscopic differences between the type variety and var. *immutatus*, especially in basidiospore size, the latter is considered to warrant specific rank.

The following combination is therefore made:

Boletus immutatus (Pegler & A.E.Hills) A.E.Hills & Watling, **comb. et stat. nov.**
 Basionym: *Boletus luridiformis* Rostk. var. *immutatus* Pegler & A.E.Hills,
 Mycologist 10: 80 (1996).

Unfortunately the basidiospore measurements in the original description are incorrect and should be $(8-12.9-15(-16) \times 4.5-8 \mu\text{m})$ as opposed to $9.5-12.5 \times 4.5-5.5 \mu\text{m}$. The problem of damage to the type specimen is being addressed in a separate article (Hills, pers. comm., 2003).

4. YELLOW-CAPPED BLUEING BOLETES

Much discussion has surrounded the delimitation of *Boletus discolor* Quél., *B. junquilleus* Quél. and *B. pseudosulphureus* Kalchbr. (Watling, 1970). The last name is here adopted for a bolete with canary- or chrome-yellow pileus and pores and similar pruina and background colour to the stipe, all of which become intensely blue when damaged or handled as stated in the original description. *Boletus junquilleus* is frequently but erroneously considered a synonym of *B. pseudosulphureus*; the latter, despite its epithet, is unrelated and does not resemble *B. sulphureus* (a synonym of *B. sphaerocephalus* Barla; see Section 7 below) in habitat preference or life-form. On the other hand, *Boletus discolor* is described as having orange-flushed pores, as discussed by Orton (1960), and must be considered a yellow-capped variant of *B. luridiformis*, with which it shares microscopic characters and the negative Imler reaction (see Section 3 above). Its context does not blue strongly in Melzer's reagent and it therefore cannot be considered a variety of *B. queletii* Schulz., a treatment adopted by some continental authors. This bolete is best referred to as *B. luridiformis* var. *discolor* Kriegelst., and *B. junquilleus* regarded simply as a more strongly yellow-capped form.

5. COLOUR VARIATION IN *BOLETUS FERRUGINEUS* SCHAEFF.: FR. AND *B. MORAVICUS* VACEK

Molecular studies in the xerocomoid boletes by Taylor *et al.* (2001) have demonstrated unequivocally that *Boletus citrinovirens* Watling is merely an apple-green colour-form of *B. ferrugineus* (*B. spadiceus* Fr.: Fr.; Watling, 1970) and this synonymy will be adopted in BFF ed. 2. More recently Taylor (pers. comm., 2002) has confirmed suggestions by Pöder (1990) that the rusty brown-capped *B. moravicus* and the yellow, slightly scaly-capped *B. leonis* D.A.Reid are conspecific, the former name having priority.

6. THE HYGROPHILOUS BOLETE *XEROCOMUS RIPARIELLUS* REDEUILH

A recently recognized member of the British *Boletaceae* is *Xerocomus ripariellus*, which is apparently widespread in suitable sites, particularly in southern England. It

prefers wet places, especially willow carrs, and is associated there with *Salix caprea* L., other members of *Salix* sect. *Caprisalix* and with *Populus* L. and *Quercus* L. Any suggested relationship with *Alnus* Miller needs to be carefully assessed. As indicated by Watling (2002), there is uncertainty as to where the line between *Boletus* and *Xerocomus* should be drawn to take into account boletes worldwide and not simply from Europe. While it is likely that recognition of only two genera is a much oversimplified approach, a broad concept of *Boletus* will be retained for the new edition of BFF until more data are obtained.

It is therefore necessary to make the following new combination:

***Boletus ripariellus* (Redeuilh) Watling & A.E.Hills, comb. nov.**

Basionym: *Xerocomus ripariellus* Redeuilh, Doc. Mycol. 26(104): 30 (1997).

Syn.: *Boletellus ripariellus* (Redeuilh) Redeuilh, Doc. Mycol. 27(106): 54 (1997).

As indicated in the synonymy, within months of first describing this bolete, Redeuilh moved it into *Boletellus* Murrill because of its longitudinally striate basidiospores. However, this taxon is not a member of that genus. Striate spores are found in several xerocomoid and phylloporoid boletes, especially in tropical species, and this character alone cannot be used for inclusion in *Boletellus*, a genus based on the North American *Boletus ananus* M.A.Curt. (Watling, 2001).

7. XYLOPHILOUS BOLETES ON CONIFERS

Buchwaldoboletus Pilát is a small genus of poroid boletes comprising a few species worldwide, all growing on coniferous wood, a rather rare habitat for members of the *Boletales*. The genus has been variously synonymized with *Gyrodon* Opat. (Heinemann, 1955), *Pulveroboletus* Murrill (Singer, 1986) and *Phlebopus* Heim (Heinemann & Rammeloo, 1991). *Pulveroboletus* is typified by an ectomycorrhizal bolete with a detersile, yellow filamentous veil with disarticulating elements and is not related in any way to *Buchwaldoboletus* (Watling, 2001, 2002). Habitat preferences clearly separate *Buchwaldoboletus* from *Phlebopus*, the latter being a group of ectomycorrhizal tropical to subtropical species. The ecology of larger fungi appears to be highly taxonomically significant and is usually strongly supported by molecular data. Molecular studies (Binder, pers. comm., 2000 *et subseq.*; Watling, 2001) also indicate that the three genera are indeed separate. The rather anomalous character-set displayed by the two European species of *Buchwaldoboletus*, especially the configuration of the hymenophore, led Heinemann (1955) to place them in *Gyrodon* but on ecological criteria alone this is not supported. The type of *Gyrodon*, *G. lividus* (Fr.) Sacc., is in fact closely related to the widespread north temperate *Paxillus involutus* Batsch: Fr. (*Paxillaceae*).

The two species of *Buchwaldoboletus* in the British Isles are *B. lignicola* (Kallenb.) Pilát and one which grows on conifer sawdust often previously referred to as *Boletus hemichrysus* Berk. & M.A.Curt. (Watling, 1970). *Buchwaldoboletus lignicola* is

unusual as it appears to be always associated with the fruiting bodies of *Phaeolus schweinitzii* (Fr.) Pat., a root and butt-rot bracket fungus of conifers and occasionally of *Prunus avium* L. The relationship between these two fungi is not understood but must be very close. Such an association is not rare in the boletes, e.g. *Gomphidius roseus* (Fr.) Fr. and *Suillus bovinus* (L.: Fr.) O.Kuntze. *Boletus hemichrysus* was described from North America and re-examination of the rather mouldy type specimen and several collections from eastern North America indicates that it is not the same as the bolete extensively referred to as *Boletus sulphureus* Fr., as suggested by some authorities (Singer, 1947). This discovery led Watling & Gregory (1988) to transfer *Boletus sulphureus* to *Buchwaldoboletus*. However, the bracket fungus now known as *Laetiporus sulphureus* (L.: Fr.) Murrill, which is not a bolete, is based on *Boletus sulphureus* Bull. As the name *B. sulphureus* Fr. appeared later and is not in Fries (1821) it cannot be sanctioned and the next available name for this species is *Boletus sphaerocephalus* Barla. The epithet admirably describes its immature ball-like pileus.

Although Watling & Li (1999) indicated that it was necessary to transfer Barla's epithet to *Buchwaldoboletus*, they did not do so and the combination is made here.

***Buchwaldoboletus sphaerocephalus* Watling & T.-H.Li, comb. nov.**

Basionym: *Boletus sphaerocephalus* Barla, Champ. Nice: 72 (1859).

Syn.: *Boletus sulphureus* Fr., Epicr. Syst. Mycol. 413 (1838); non Bulliard (1788).

Versipellis sulphureus Quél., Ench.: 157 (1886).

Phlebopus sulphureus (Quél.) Singer, Amer. Midl. Naturalist 37: 3 (1947).

Gyrodon sulphureus (Quél.) Heinem., Bull. Jard. Bot. État 25: 170 (1955).

Buchwaldoboletus sulphureus (Quél.) Watling & N.M.Gregory, Proc. Roy. Soc. Queensland 99: 77 (1988).

Boletus hemichrysus auct. pl.

Pulveroboletus hemichrysus sensu Singer, Sydowia 15: 82 (1961).

Buchwaldoboletus hemichrysus sensu Pilát, Friesia 9: 217 (1969).

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