



Notes on the genus *Buchwaldoboletus* in Galicia and North of Portugal (II). *Buchwaldoboletus pontevedrensis*, sp. nov.

Blanco-Dios JB¹

¹ Centro de Formación e Experimentación Agroforestal de Lourizán. Consellería de Medio Rural. Xunta de Galicia. P.O. Box 127. 36080 Pontevedra, Spain

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Abstract

Buchwaldoboletus pontevedrensis, found in Galicia (NW of Spain), is described as a new species based on morphological data. Morphological description, drawings of microscopic characters and color pictures of the basidiomata are presented. A discussion about other close taxa is also outlined.

Key words – Basidiomycota – *Boletales* – *Buchwaldoboletus* – Spain – taxonomy

Introduction

Buchwaldoboletus Pilát is a small genus of *Boletaceae* of about a dozen taxa with a world-wide distribution. This genus is a useful morpho-genus since it unites species with similar characteristic: lignicolous habit, small spores, predominantly yellow to brownish colors, bluing in some parts, and yellow mycelium (Ortíz-Santana & Both 2011).

Watling & Hills (2005) proposed two stirps for the two species of *Buchwaldoboletus* in Europe: *Lignicola* and *Sphaerocephalus*. Ortíz-Santana & Both (2011) proposed a third stirps: *Hemichrysus*. The stirps *Lignicola* group is characterized by pileus and stipe tomentose, with some shade of brown, reddish brown, dry, context yellow, bluing, especially above the tubes. This stirps includes the following species: *Buchwaldoboletus lignicola* (Kallenb.) Pilát (known from Europe and eastern North America), *B. xylophilus* (Petch) Both & B. Ortiz (Asia: Sri Lanka, Malaysia, Hong Kong, Philippines), *B. kivuensis* (Heinem. & Gooss.-Font.) Both & B. Ortiz (Africa: Congo), *B. brachyspermus* (Pegler) Both & B. Ortiz (Central America: Lesser Antilles, Martinique) and *B. duckeanus* (Singer) Both & B. Ortiz (South America: Brazil, Amazonia). The stirps *Sphaerocephalus* has pileus and stipe yellow, pileus silky tomentose, viscid when wet, context bluing and habitat on sawdust of pines, often in enclosed areas. This stirps includes the following species: *Buchwaldoboletus sphaerocephalus* (Barla) Watling & T.H. Li (Europe, North America and Southwestern Australia) and *B. pseudolignicola* (Neda) Both & B. Ortiz (Asia: Japan). The stirps *Hemichrysus* is characterized by pileus and stipe bright yellow, pulverulent, pore surface yellow, becoming subferruginous, stipe yellow above, reddish below. This stirps includes the following taxa: *Buchwaldoboletus hemichrysus* (Berk. & M.A.Curtis) Pilát (North America, reports from Europe refer to *B. sphaerocephalus*), *B. acaulis* (Pegler) Both & B. Ortiz (Central America: Lesser Antilles, Martinique); *B. parvulus* (Natarajan & Purushothama) Both & B. Ortiz (Asia: India) and *B. spectabilis* Watling (Australia, Queensland) (Ortíz-Santana & Both 2011).

During a revision of collected material of the genus *Buchwaldoboletus* of the author (some of his findings have been published (Blanco-Dios & Tomé Ortega 2011 [2009]), a striking *Buchwaldoboletus* found under maritime and Monterrey's pines (*Pinus pinaster* Aiton, *Pinus radiata* D. Don) has been studied. This taxon was first found in 1989 by the autor and identified by Dr. Luis Freire (†) as *Buchwaldoboletus lignicola*. In addition, some of the material studied was described in that publication as *B. lignicola*, but the study of new collections has taken to us to the conclusion that its morphological characters are so different from the known taxa that it is described here as new species.

Materials & Methods

The specimens were collected, documented and preserved using standard methods. Morphological descriptions are based on the study of the fresh material and analysis of photographic images obtained from fresh specimens. Macro-chemical reactions were determined using 3% KOH, 10% NH₄OH and 10 % FeSO₄. Microscopic observations were recorded both from fresh material and dried material with standard methods, using sections mounted in a solution of 1% Congo red in water, 3% KOH or Melzer's reagent. Spore size is presented as (Min) (mean – SD)–(mean + SD) (Max), where Min= the lowest value measured, Max= the highest value, followed by the mean spore lengths and widths (**Xm**); **Q** =spore length : width ratios, and the mean volume (**Vm**) was determined using the formula $Vm = 4\pi/3 a^2 b$, where **a** is the radius of the minor axis and **b** the radius of the major axis (Breitenbach & Kränzlin 1991).

The maximum and minimum values and the length/width ratio (Q) of the pileipellis end cells were determined by sampling between the centre and the margin (Ladurner & Simonini 2003) in the superior layer of young sporocarps, as recommended by Singer (1965) and Muñoz (2005). Microscopical structures were documented by line drawings on a light microscope equipped with a drawing tube device. The collected material has been deposited in the mycological herbarium LOU-Fungi (Centro de Investigación Forestal de Lourizán, Pontevedra, Spain).

Results

Buchwaldoboletus pontevedrensis Blanco-Dios, **sp. nov.**
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Figs 1–9

Etymology – *pontevedrensis*, from the municipality and province of Pontevedra (Galicia, Spain).

Buchwaldoboletus lignicola similis sed differt pileus 130–198 mm latus, stipes 80–100 longus, (2,2–) 42–71 mm latus, crassus, ab attenuatus ad radicans, sporis leviter plus grandis, (6.5–) 7.5–10 (–11.2) × (2.8–) 3.5–4.5 (–5) μm, Xm = 9.3 × 3.8 μm, Vm = 69 μm³, ovoideus, ellipsoideus vel ellipticus, cystidiis clavatis, fusiformis, mucronatus, flexuosiformis, lageniformis, utriformis, irregulariter fusiformis vel utriformis, pileipellis ex hyphis trichodermium formantibus, 3–12.5 μm latis, cylindraceutis, subcylindraceutis vel leviter constrictus, cum elementis terminalis cylindraceutis, clavatis, latis clavatis vel irregulariter formis, 14–170 × 4–15.5 μm, Q = 1.7–24.3 et caulocystidiis cylindraceutis, fusiformis, mucronatus, lageniformis, irregulariter fusiformis vel lageniformis. Super lignum *Pinus putridum* crescens.

Holotype – SPAIN. Pontevedra: Pontevedra, Bora, 29TNG3397, 120 m, on stump of *Pinus pinaster*, 10.X.2012, J.B. Blanco-Dios (LOU-Fungi 19573).

Pileus 130–198 mm broad, convex to plane, margin decurved, floccose to felty, slightly viscid, covered with soft appressed tomentum which is easily detersible, attached to the flesh by a thin gelatinous layer, ochre-yellow to ochre-creamy in the margin when young, later ochre-brown to brown, with some shade of pink or purple. Hymenophore tubulose, tubes 1–13 mm long, adnexed with decurrent tooth, yellow, changing to blue when bruised or exposed. Pores 0.5–2 × 0.5–0.75 mm, compressed, irregular, pale yellow when young, becoming bright yellow, golden, golden-ochre or with some shade of brown at maturity, staining blue-grey, intense blue to blue-blackish when handled. Stipe 80–100 × (2,2–) 42–71 mm, usually shorter than the diameter of the



Figs 1–4 – *Buchwaldoboletus pontevedrensis*. 1–2. Holotype (Pontevedra, Bora). 3–4. Gondomar, Donas.

pileus, robust, curved, attenuate to radicans, with pine bark remains in the base, sulfur yellow with some shade pallid yellow, yellow-orange, golden, ochre, brown, brown-ochre or pink. Stipe surface changes to blue when bruised. Basal mycelium golden-yellow. Context soft in the pileus and firm in the stipe, yellow, changing to pallid blue with some shade of creamy, yellow to ochre when exposed, except under the pileipellis and in the lower part of stipe, pallid yellow, creamy-ochre, yellow-ochre, ochre or brown (with incrustated pine bark), and pinkish above the tubes. A moment later, the shades creamy or yellow (ochre-orange over the tubes) are the colours dominant. Smell very agreeable, sweet-scented. Taste pleasant, slightly acid, with unctuous texture. Edibility unknown. Chemical reactions: 3% KOH: dark brown in the pileus, brown-greyish in the flesh of the pileus, brown in the flesh of the stipe; 10% NH₄OH: dark brown in the pileus, bottle-green in the flesh of the pileus, pallid green in the flesh of the stipe; 10% FeSO₄: grey in the flesh of the pileus, dark grey-blackish in the flesh of the stipe. Spore print olive-brown.

Basidiospores (6.5–) 7.5–10 (–11.2) × (2.8–) 3.5–4.5 (–5) μm, X_m = 9.3 × 3.8 μm, Q = (1.8) 1.9–2.8 (3.2), V_m = 69 μm³, (n = 100), ovoid, ellipsoid to elliptic, smooth, guttulate, thick-walled, pallid ochre, ochre-grey or creamy-ochre in KOH, dextrinoid in Melzer's. Basidia 17.5–31.5 × 5–8.5 μm, 4-spored, sterigmata 1–3.5 μm long, clavate or broadly clavate, clampless. Basidioles 15–23.5 × 5.5–7.5 μm, clavate. Cystidia 13.5–48 × 5–11 μm, scattered or in clusters, clavate, fusiform, mucronate, flexuous, lageniform, utriform, irregularly fusiform or utriform. Pileipellis an entangled trichodermium of hyphae 3–12.5 μm in diameter, cylindric, subcylindric or slightly constricted, multi-septate, subhyaline or grey-creamy in KOH, ochre or brown in Melzer's; end cells 14–170 × 4–15.5 μm, Q = 1.7–24.3, cylindrical, clavate, broadly clavate or irregularly shaped, short to elongated. Stipitipellis hyphae 2.5–15 μm in diameter, interwoven or subparallel, hyaline, subhyaline or creamy-grey in KOH, cream, ochre or brown in Melzer's. Caulocystidia 13–38 × 3.5–12 μm, scattered, cylindric, fusiform, mucronate, lageniform, irregularly fusiform or lageniform. Clamp connections absent.

Habitat – solitary, two or three (five) specimens fused together. At the base of or on top of stumps of pines (*Pinus pinaster* and *P. radiata*).

Known distribution – up to now known only from three localities in Pontevedra Province (Spain).

Material examined – SPAIN. Pontevedra: Gondomar, Donas, 29TNG1758, 400 m, on stump of *Pinus radiata*, together with *Phaeolus schweinitzii*, 10 Oct 2010, J.L. Tomé Ortega & J. Prieto, LOU-Fungi 19485. Pontevedra, 29TNG2996, 50 m, on stump of *Pinus pinaster*, 25 Oct 1989, J.B. Blanco-Dios, LOU-Fungi 4180. Pontevedra, Bora, 29TNG3397, 120 m, on stump of *Pinus pinaster*, together with *Phaeolus schweinitzii*, 8 Oct 2012, J.B. Blanco-Dios, LOU-Fungi 19573 (holotype); *ibidem*, 24 Oct 2012, J.B. Blanco-Dios, LOU-Fungi 19574.

Other collections examined – *Buchwaldoboletus lignicola* – SPAIN. A Coruña: Ames, Bertamiráns, Caroubáns, 29TNH2847, 120 m, on stump of indeterminate species, 1 Oct 2000, I. Galarza & J. Rodríguez-Vázquez, LOU-Fungi 15532 (*sub Pulveroboletus hemichrysus* (Berk. et Curtis) Singer (Rodríguez Vázquez & Castro 2001)). Pontevedra: Salceda de Caselas, Entenza, 29TNG3657, 90 m., on stump of *Pinus pinaster*, 24 Oct 2003, J.B. Blanco-Dios, LOU-Fungi 19479; *ibidem*, 10 Nov 2004, J.B. Blanco-Dios, LOU-Fungi 19480; *ibidem*, 3 Nov 2005, J.B. Blanco-Dios, LOU-Fungi 19481 (Blanco-Dios & Tomé Ortega 2011 [2009]).

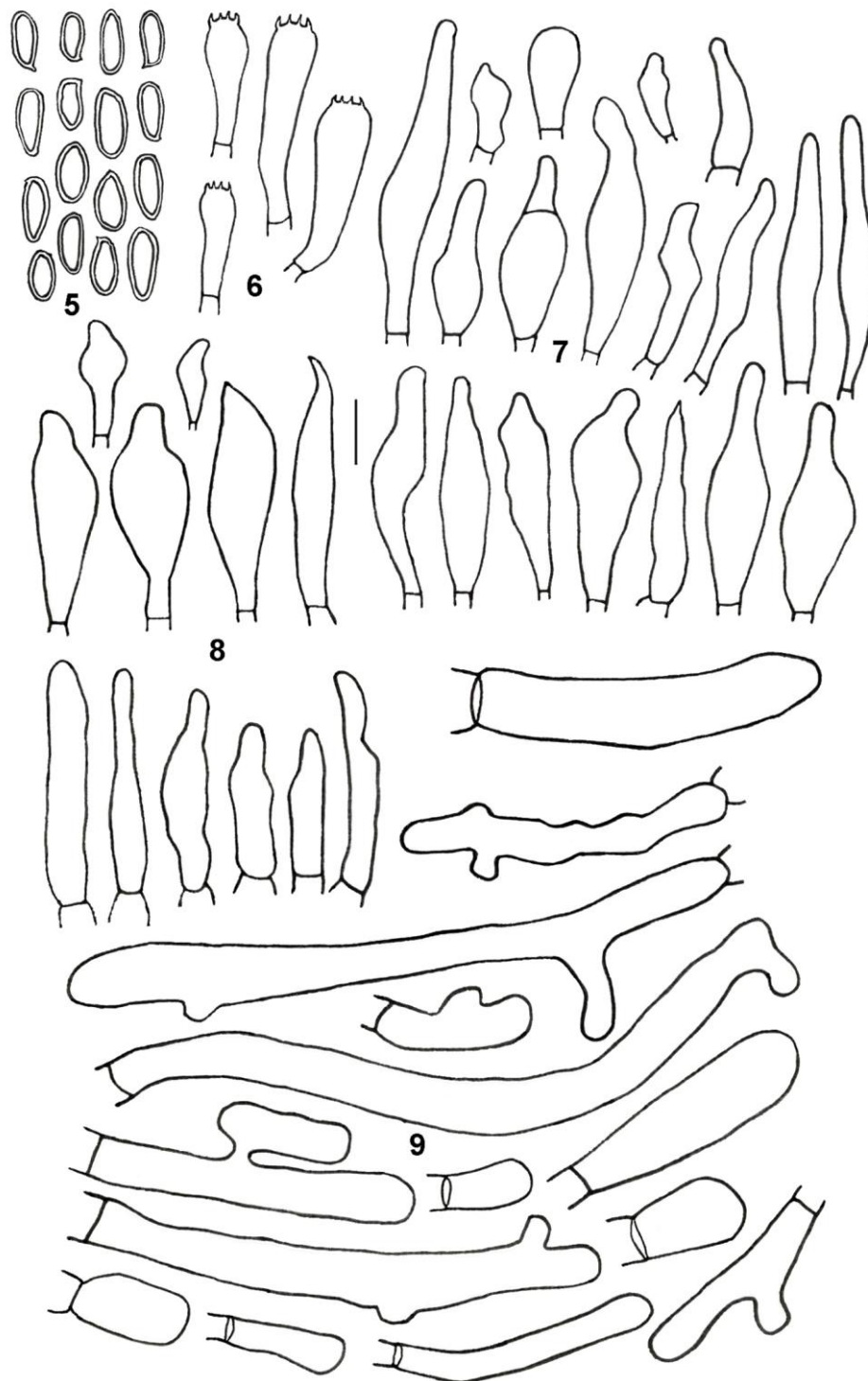
Discussion

Buchwaldoboletus pontevedrensis is included in the stirps *Lignicola*, characterized by pileus and stipe tomentose, brown, reddish brown, dry, context yellow, bluing, especially above the tubes (Ortiz & Both 2011). This new species is morphologically characterized by the following combination of features: (i) pileus fleshy, 130–198 mm broad, (ii) stipe attenuate to radicate, robust, up to 100 × 71 mm, (iii) basidiospores (6.5–) 7.5–10 (–11.2) × (2.8–) 3.5–4.5 (–5) μm , $X_m = 9.3 \times 3.8 \mu\text{m}$, $V_m = 69 \mu\text{m}^3$, ovoid, ellipsoid to elliptic, (iv) versiform cystidia and caulocystidia, (v) end cells of pileipellis 14–170 × 4–15.5 μm , $Q = 1.7–24.3$, cylindrical, clavate, broadly clavate or irregularly shaped, and (vi) habitat at the base of or on top of stumps of *Pinus pinaster* and *P. radiata*.

Among the morphologically similar species, the closest taxon is *Buchwaldoboletus lignicola*. This related species differs specially in having smaller pileus (up to 120 mm broad), stipe up to 25 mm wide, cylindrical or subcylindrical, elliptic and slightly shorter basidiospores, cystidia fusiform or lageniform, end cells of pileipellis short, cylindrical and caulocystidia fusiform or clavate (Breitenbach & Kränzlin 1991, Bessette et al. 2000, Fernández et al. 2001, Muñoz 2005, Arrillaga et al. 2010). *B. lignicola* is widely distributed throughout Europe and Eastern North America and habitat at the base of or on top of stumps of conifers: *Picea abies*, *Pinus sylvestris*, *P. strobus* and other pines, also with *Larix* spp., rarely with deciduous trees (*Prunus avium*) (Muñoz 2005, Ortiz & Both 2011), very often found together with the polypore *Phaeolus schweinitzii* (Fr.) Pat., (as often happens with *B. pontevedrensis*). The association of *Buchwaldoboletus lignicola* with the brown-rot *Phaeolus schweinitzii* is well-documented in the European literature (Jahn 1979; Szczepka & Sokol 1984; Brown 1985; Lipka (1985,1987)).

Proposed key to the taxa of *Buchwaldoboletus* in Europe

- 1a. Pileus and stipe yellow to yellow-orange, pileus silky tomentose. Basidiospores 6.2–7.5 (9.5) × 3.2–4 μm , $X_m = 6.9 \times 3.4 \mu\text{m}$, $Q = 1.7–2$ (2.5), ovoid to ellipsoid ***B. sphaerocephalus***
1b. Pileus brown, brown-ochre, brown-reddish, ochre-creamy, ochre-yellow, ochre-orange to yellow-orange and stipe predominantly sulfur yellow, yellow-ochre to yellow-brown..... 2
2a. Pileus 25–120 mm broad, stipe cylindrical or subcylindrical, up to 100 × 25 mm. Basidiospores: $X_m = 7.5 \times 2.9 \mu\text{m}$, $V_m = 27 \mu\text{m}^3$, elliptic, cystidia fusiform or lageniform, caulocystidia fusiform or clavate and end cells of pileipellis cylindrical, 20–40 × 3.8–5.5 μm , $Q = 6.5–9$ ***B. lignicola***
2b. Pileus 130–198 mm broad, stipe attenuate to radicate, up to 100 × 71 mm. Basidiospores: $X_m = 9.3 \times 3.8 \mu\text{m}$, $V_m = 69 \mu\text{m}^3$, ovoid, ellipsoid to elliptic, versiform cystidia and caulocystidia, and end cells of pileipellis cylindrical, clavate, broadly clavate or irregularly shaped, 14–170 × 4–15.5 μm , $Q = 1.7–24.3$ ***B. pontevedrensis***



Figs 5–9 – *Buchwaldoboletus pontevedrensis* (holotype, LOU-Fungi 19573). 5. Basidiospores. 6. Basidia. 7. Cystidia. 8. Caulocystidia. 9. End-cells of pileipellis. Scale bar= 10 μ m.

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