Boletus adonis: a new Mediterranean *Boletus* species from Croatia

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Boletus adonis sp. nov. is described and illustrated. Its delimitation from similar taxa such as *B. spretus* and *B. emilei* is discussed. As already shown by Bertéa (1988) *B. emilei* is a *nomen dubium*.

Keywords: *Boletus adonis*, Boletales, basidiomycota, taxonomy.

On the occasion of an mycological excursion to the Croatian islands Cres and Losinj we collected a strikingly red-coloured boletus near Ustrine (Isle of Cres) in Autumn 1997. Six fully mature basidiomes grew near *Quercus ilex* L. and *Pinus nigra* Arnold among grass in the middle of a small sheep pasture. Macroscopically, the basidiomes strongly resembled *Boletus spretus* Bertéa (1988). Upon closer examination, however, they were found to differ clearly from this taxon as well as from all known members of the section *Luridi* Fr.

Methods

Descriptions of microscopical characters were made from sections of dried basidiomes mounted in 2.5% KOH and/or destilled water. Measurements were taken from video print images using a Leitz Diaplan microscope (Nomarski interference contrast; oil immersion objective 100×) with a CCD video camera module and a Sony Multiscan UP-930 video printer. Spore measurements are given as follows: (minimum) mean ± standard deviation (maximum), Q = length/width quotient, V = approximate volume (sample size for each collection ⩾ 31). Colour notations are from Kornerup & Wanscher (1981).

Taxonomy

Boletus adonis Pöder & Ladurner, **sp. nov.** – Figs. 1–2.

Pileo 45–110 mm lato, convexo, inaequali, sicco, subtiliter velutino-tomentoso, plerumque puniceo, marginem versus rubro-aurantiaco, interdum atropur-

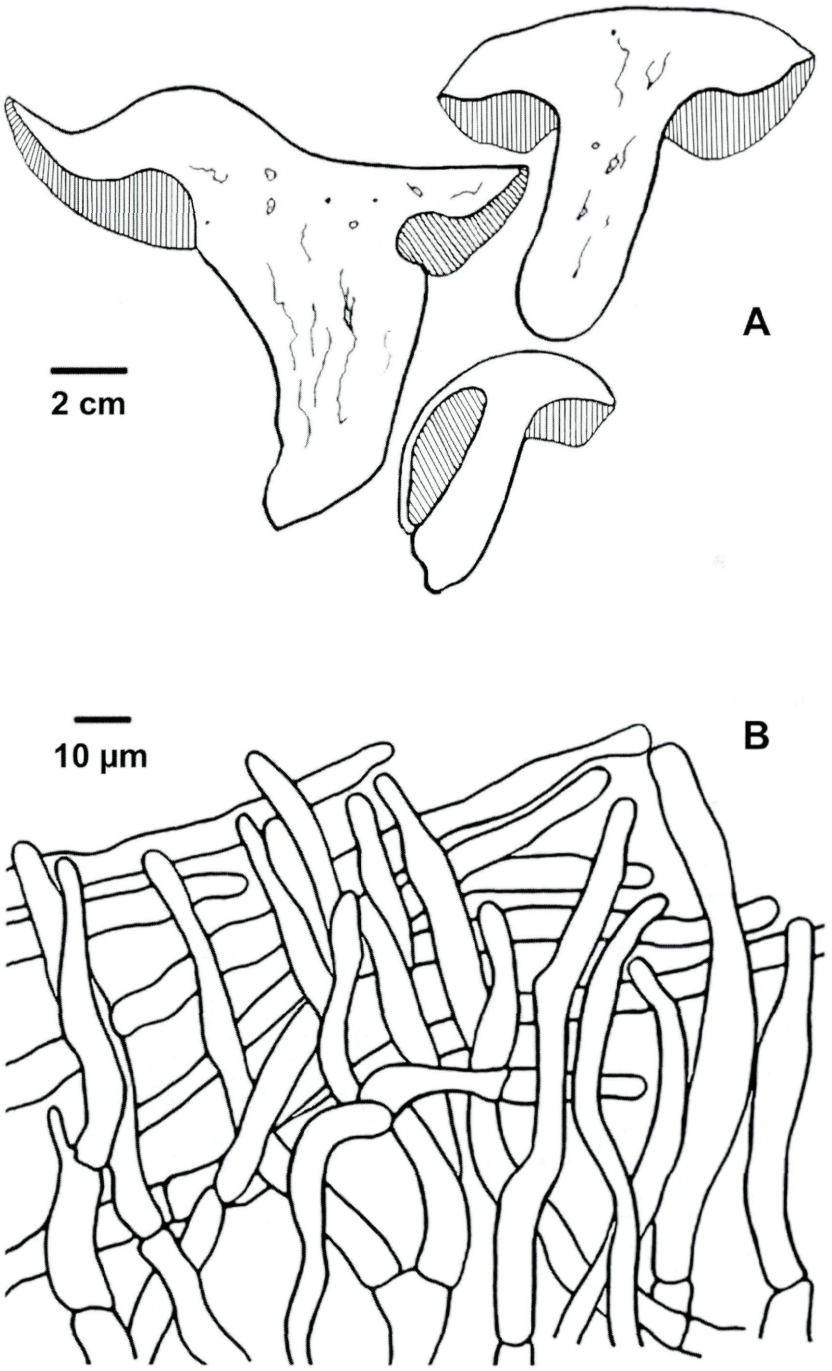

Fig. 1. – *Boletus adonis* (holotype). – A. Basidiomes. – B. Pileipellis.

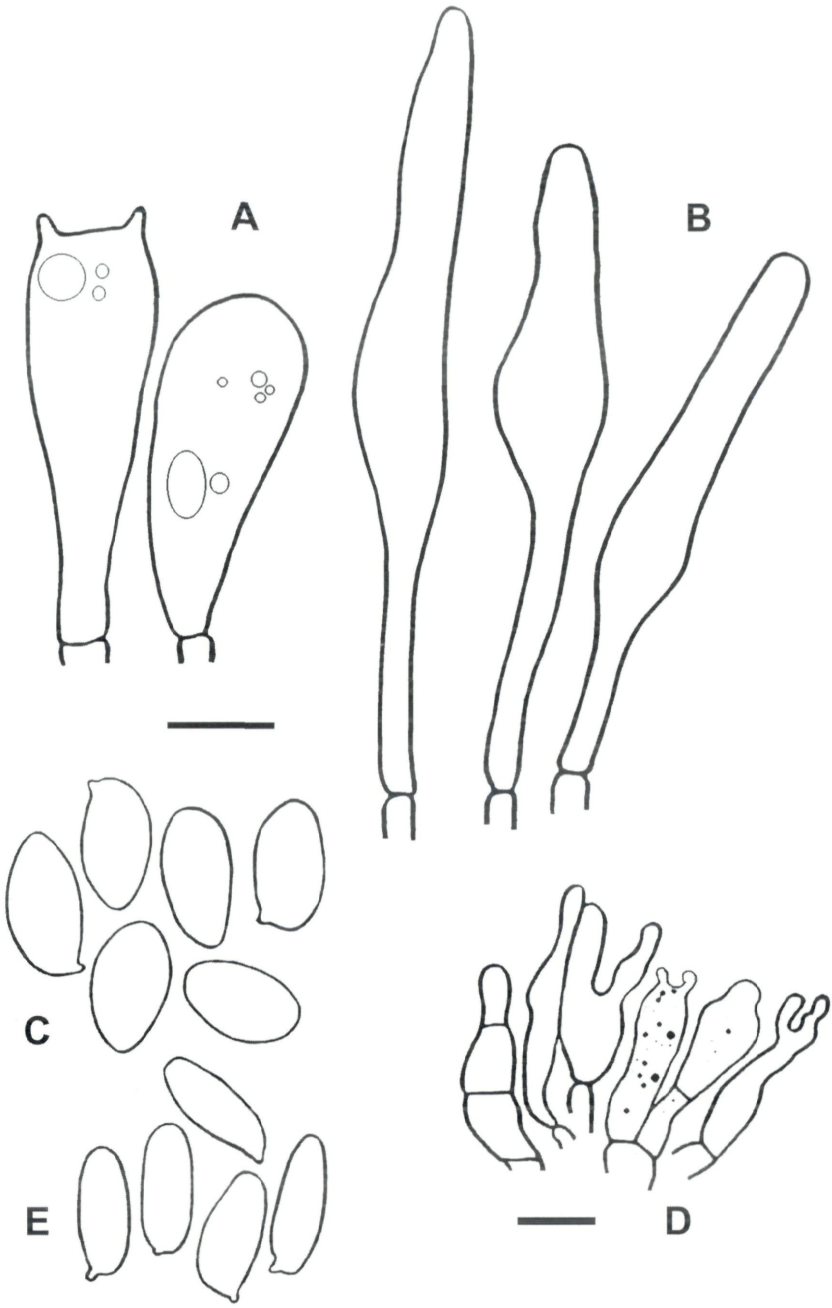

Fig. 2. – *Boletus adonis* (holotype). – A. Basidia. – B. Cheilocystidia. – C. Basidiospores. – D. Elements of the caulohymenium with basidia and cystidioid cells. – *Boletus spretus* (holotype). – E. Basidiospores. Bars 10 µm.

pureo maculato; carne usque ad 25 mm crassa, albidula vel pallide flava, aureo-flava supra tubulos. Tubulis adnatis vel subdepressis prope stipitem, usque ad 17 mm longis, flavis usque olivaceis, poris concoloribus, circa 1 mm diametro, conspicue labyrinthiformibus, vulneratis forte coerulescentibus. Stipite 35–65 mm longo, 10–35 (40) mm crasso, cylindrico vel conico, compacto, pallide flavo usque aureo-luteo vel totius partialiterve pileo concolori, basaliter obscure vinaceo, superficie pruinoso Boleti luridiformi modo, pruina flava, aurantiaca usque rubra. Carne pilei et in parte superiore stipitis albidula usque flava, deorsum vinacea, caerulescente. Odore saporeque haud distincti. Reagente Melzer fortiter amyloidea in partibus omnibus. Sporis (10.5)11.8 ± 0.7(13.4) × (5.5)6.2 ± 0.3(6.7) µm, subovatis, leviter inaequaliteralibus, glabris, ochraceo-brunneis in solutione potassica (2.5%), inamyloideis, haud dextrinoideis; basidiis tetrasporigeris, 30–40 × 11–14 µm; cheilo- pleurocystidiisque raris, 40–70 × 7–10 µm, fusoideo-ventricosis; pileipelli trichodermatacea e hyphis granulosis, segmentibus terminalibus subfusoideis. Fibulae desunt. Granulis pigmenti rubris (in aqua), flavo-ochraceis in solutione potassica.

Habitat in locis graminosis, gregarius usque fasciculatus, sub Querco ilici et Pino nigra.

Holotypus. – Croatia, Insula Cres, prope Ustrine, 8. Oct. 1997, leg. Ladurner et Pöder in herbario IB 1997/0990.

Pileus 4.5–11 cm, convex, uneven, surface dry and dull, very finely velvety-tomentose, uniformly red (9C8, 9C7, 9D8, 9D7, 10C7; "lake red", "Pompeian red", "garnet brown"), coloured paler towards margin (reddish orange, yellow orange), occasionally with purplish black streaks or spots. – Tubes adnate to slightly depressed, near the stipe up to 17 mm long, becoming continuously shorter towards the margin (3–5 mm), yellow to olivaceous; pores concolorous, on average 1 mm wide, conspicuously labyrinthiform, strongly blueing when bruised. – Stipe 3.5–6.5 cm long, 1–3.5(4) cm thick, cylindrical or distinctly attenuating towards the base, solid, pale yellow to golden yellow or partially to completely concolorous with the pileus, base dark vinaceous; surface dry, distinctly pruinose as in *Boletus erythropus* Pears. : Fr., pruina yellow, orange to red. – Context in the pileus up to 2.5 cm thick, whitish to pale yellow, golden yellow above tubes; pale yellow to yellow in the upper third of the stipe, dark vinaceous in the lower part, staining quickly and strongly blue when cut. – Odour and taste not distinctive. – Chemical reactions: all parts of the basidiome react strongly amyloid with Melzer's (deep turquoise to blackish blue); 30% KOH, 2% NH_4OH, and $FeSO_4$ negative on pileipellis; context of pileus vivid orange yellow with $FeSO_4$. – Spore print olive-brown. – Spores (10.5)11.8 ± 0.7(13.4) × (5.5)6.2 ± 0.3(6.7) µm, Q = (1.7)1.9 ± 0.1(2.1), V = 237 ± 30 μm^3, ovate to subelliptic, obscurely inequilateral only, smooth, ochraceous brown in 2.5% KOH, neither amyloid nor dextrinoid. – Basidia 30–40 × 11–14 µm, broadly clavate, 4-spored, without clamp connections. – Cheilocystidia and pleurocysti-

dia scattered, 40–70 × 7–10 µm, fusoid-ventricose. – Hymenophoral trama obscurely divergent to subregular; the mediostratum with hyphae 3–4 µm broad which can easily be distinguished by their strikingly positive reaction with Melzer's; hyphal walls react weakly but the septa stain deeply bluish violet. – Caulohymenium well developed consisting of basidia and cystidioid cells, the latter often with bifurcate apex. – Pileipellis a trichoderm of interwoven, finely granulated hyphae with slightly fusoid-ventricose ("cystidoid") terminal cells that are (30.7)54 ± 14.2(89) µm long and (4.2)6.5 ± 1(9.5) µm wide. Extraparietal pigment granules reddish when observed in water, yellow-ochre in KOH. Without clamp connections.

Habitat. – Gregarious and/or in small clusters of two or three basidiomes on soil among grass near *Quercus ilex* and *Pinus nigra*, 100 m a.s.l.

Material examined. – ***Boletus adonis*** Pöder & Ladturner (holotype): CROATIA, Island of Cres, near main road at the junction to the village Ustrine, among grass under *Quercus ilex* and *Pinus nigra*, 8. Oct. 1997, leg. H. Ladurner et R. Pöder, IB 1997/0990; ITALY, Emilia Romagna, near Pietra di Bismantova, under deciduous trees, 850 m a.s.l., 19. Sep. 1987, leg. B. Bigazzi, herbarium G. Simonini, GS0540, identified as *B. emilei* Barbier; 2. Oct. 1993, from an exhibition in Reggio Emilia, GS1017, identified as *B. emilei* Barbier. – ***Boletus spretus*** Bertéa: FRANCE, near Bédarieux (F-Hérault), under *Castanea sativa* Miller and *Quercus suber* L., 4. Oct. 1986, herbarium P. Bertéa nr. 861001 (holotype); ITALY, from an exhibition in Reggio Emilia, 1. Oct. 1987, GS0521, identified as *B. emilei* Barbier; Prov. Puglie, Gargano, under *Quercus ilex*, leg. A. Ciavarella, GS1760, identified as *B. emilei* Barbier.

Discussion

The macroscopic appearance of *B. adonis* (habitus, colour, ornamentation of stipe) is very similar to that of *B. spretus* Bertéa. The only distinguishing features in the field are the rather long tubes (up to 17 mm long) of *B. adonis* in contrast to the extremely short tubes (up to 5 mm) typical for *B. spretus*. Furthermore, *B. adonis* clearly differs from *B. spretus* in its strong amyloid reaction in all parts of the basidiome (*B. spretus* is nonamyloid); size and shape of the basidiospores of *B. adonis* are also significantly different: spores 6–6.5 µm broad on average, but 4–4.6 µm in *B. spretus* [spores from the type material: (9.7)11.2 ± 0.7(12.6) × (3.4)4.3 ± 0.3(4.6) µm; Q = 2.6 ± 0.3; V = 106 ± 13 µm^3].

Alessio (1985) applied the name *B. emilei* for a boletus which does not fit into the species concept of *B. spretus* but clearly reflects typical features of *B. adonis*: the good colour plate shows basidiomes with relatively broad hymenophores and the spores [(9) 10–12 (14) × 4.5–6 µm] are distinctly broader than the spores of *B. spretus*.

Bertéa (1988) described *B. spretus* (= *B. emilei ss. auct. non* Barbier, *B. speciosus ss. auct. non* Frost, *B. bicolor ss. auct. non* Peck) to solve the puzzling interpretation of *B. emilei* Barbier. He concluded that *B. emilei* is a *nomen dubium* and together with Jean-Claude Verpeau and Guy Redeuilh reconstructed the complicated history of Barbier's boletus (Bertéa, 1990): they rediscovered unpublished notes of Barbier and a meagre spore print of his *B. emilei* (from the single specimen collected on 4th September 1899 on which he based his plate; Barbier, 1915). In one of these notes (from 1931 or later) Barbier's final opinion was that his boletus represents nothing else but a form of *B. appendiculatus* Schaeffer: "Tout bien considéré, je pense qu'*emilei* n'est tout au plus qu'une forme d'*appendiculatus* contrairement à l'interprétation de Gilbert (voir les Bolets) qui ne l'a pas vu en nature." *B. appendiculatus,* however, cannot be mistaken either with *B. spretus* or with *B. adonis*: the basidiomes of *B. appendiculatus* are never deep red (cap pale brown to reddish brown, hymenophore and stipe bright yellow), the stipe is distinctly reticulate, the context turns only slightly blue when cut and is non-amyloid.

Regardless of historical confusions on the taxonomic status of *B. emilei* (formerly also spelled *aemilii* or *emilii*) or any other taxon mentioned above, *B. adonis* is a distinctive Mediterranean boletus well separated from these taxa by its unique set of characters.

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