

NEW TAXA AND COMBINATIONS OF AUSTRALIAN BOLETES

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In the Australian bolete mycota *Gasterotylopilus brunneus* gen. et sp. nov., five *Tylopilus* spp. nov., two *Boletus* spp. nov., two *Rubinoboletus* spp. nov. and one *Phlebopus* sp. nov. are proposed, together with new combinations for *Meiorganum* and *Rubinoboletus*.

Keywords. Australian mycota, Boletales, *Boletaceae*, *Coniophoraceae*, *Gyrodontaceae*, *Strobilomycetaceae*.

INTRODUCTION

During the preparation of an account of the Australian boletes it was found necessary to recognize several new taxa. There are undoubtedly many more new species to be described but because the material or descriptions of the field characters is either poor or wanting, formal recognition is impossible. It is hoped by the publication of a preliminary survey with keys and descriptions (Watling & Li, ined.) that some of these anomalies can be solved. The new taxa and new combinations included below are to be treated in Watling & Li (ined.), in full with English descriptions, illustrations, citation of additional material and systematic discussions. Through further field work collectors on the ground will be able to verify or expand our delimitations and ideas. The publication, although including boletes from all the major areas of Australia, uses those of the Cooloola Sand-mass, Queensland, as a baseline. This is only because the area has been studied in detail over many years, especially by the late J.E.C. Aberdeen (1913–1996; Langdon, 1996) of Manly, Queensland. The results from his collecting and that of the second author have spawned many accounts (Watling & Gregory, 1986, 1988a, 1988b, 1989a, 1989b, 1991).

The abbreviation JECA refers to Aberdeen's herbarium housed at CSIRO Primary Industries, Indooroopilly, Brisbane (BRIP). UWA refers to collections made by R. Hilton now in the University of Western Australia Herbarium, Nedlands, Perth. Wat. = Watling Herbarium in Royal Botanic Garden Edinburgh, Scotland.

NEW TAXA

An alphabetical arrangement of the genera is used herein. However, according to the classification of the Boletales outlined in the eighth edition of Ainsworth and Bisby's 'The Dictionary of The Fungi' (Hawksworth *et al.*, 1995) the genera treated

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in this paper may be assigned to the following families: *Boletaceae* (*Boletus*), *Coniophoraceae* (*Meiorganum*), *Gyrodontaceae* (*Phlebopus*), *Strobilomycetaceae* (*Gastrotylopilus*, *Rubinobloetus* & *Tylopilus*).

***Boletus angustisporus* T.-H. Li & Watling, sp. nov.**

Pileus 55–80mm latus, pruinosis, punctatus, rubello- vel castaneo-brunneus, margine pallidus vel stramineus, siccus, immutabilis. Tubuli 15mm longi, sulphurei; pori angulares, c.1mm diam., sulphurei, tactu caerulei. Stipes 35–60 × 15–30mm, base mycelio albo. Contextus luteus vel argillaceo-roseolus, exposito fuscans. Sporae 8.5–12 × 2.8–5µm, laeves, dilute flavae. Pleurocystidia 65–85 × 13–16µm, fusoidea, flava. Trama hymenophori parallela vel leviter divergens, mediostrato subfusco, hyphis partialibus chryso-brunneis. Hyphae pileipellis tubulares, 3.5–7µm latae, palisadae vel implexae. Terrestris.

Type: Australian Capital Territory, Tidbinbilla Nature Reserve, on bankside, 27 iv 1974, *Watling* 10496 (holo. E).

The structure of the hymenophoral trama indicates this species is assignable to subgenus *Xerocomus*; it is characterized particularly by the narrow basidiospores.

***Boletus obscureorubens* T.-H. Li & Watling, sp. nov.**

Pileus 45–53mm latus, convexus, sanguineus cum coloratione purpureo-castanea, obscurior centro, dilute rufo-aurantiacus margine. Stipes 50–70 × 10–12mm, saturate rufus cum abscedentia lutea, punctulis carmineis, base sordido lutea. Contextus flavus pileo, luteus stipo, tactu caeruleus, mitis. Pori aurantiaci vel aurantiaco-sanguinei, tactu caerulei; tubuli subviridio-flavi, tactu caerulei. Sporae (10–)12–17.5 × 4.5–6(–7)µm, boletoidae, laeves, flavae. Basidia 24–29 × 8–11µm, 4-sporis. Pleurocystidia 45–55 × 11–14µm, ventricosa. Trama hymenophori phylloporoides vel xerocomoides, subparallela. Caulocystidia 40–50 × 11–14mm. Hyphae pileipellis palisadae, elementis terminalibus 5–15(–26)µm latis valgo extremos acutis, defibulatae. Prope sclerophyll.

Type: Australian Capital Territory, Red Hill Trail, Tidbinbilla, on ground in dense shade, in wet sclerophyll forest, Tidbinbilla, 27 iv 1974, *Watling* 10662 (holo. E).

The structure of the hymenophoral trama indicates this species to be assignable to subgenus *Xerocomus*, but its dark red pileus and reddish orange pores would be anomalous in that group.

***Gastrotylopilus* T.-H. Li & Watling, gen. nov.**

Basidiomata ut in *Tylopilo* sed sporae haud ejectae; tubuli haud verticale ordinati et in maturiate saepe inclusi. Basidiosporae laeves, vinaceo-brunneae.

Type: *Gastrotylopilus brunneus* T.-H. Li & Watling.

The authors consider the genus *Gastroboletus* Lohweg to be an artificial assemblage and follow Thiers (1989) in separating the various entities into genera close to what

are considered to be their gymnocarpic, fully pileus-expanding relatives. This pink-spored genus is therefore recognized for the new species described below.

Gastrotylopilus brunneus T.-H. Li & Watling, *sp. nov.*

Pileus 25–40mm latus, humidus, convexus, luteus vel subpurpureo-fulvus, margine avellaneus. Tubuli ≤ 8 –9mm longi, contorti, sinuosi ad stipem, albi vel leviter fulvo-albi, completi prope poros; pori 1–1.5 per mm, irregulares vel subangulares, rosati, depressionibus. Stipes 35–45 \times 7–14mm, cylindricus leviter angustatus deorsum, albus, deorsum gilvus vel fulvidus. Contextus lilaceo-albus in pileo, fulvus in stipite, mitis vel subacidus. Basidiosporae (11–)12–17 \times (4.5–)6–7.5 μ m, ellipsoideae vel subfusioideae, laeves, hyalinae vel subhyalinae, inamyloideae vel leviter dextrinoideae. Basidia (24–)28–33 \times (8–)9–11 μ m, clavata. Pleurocystidia 40–50 \times (4–)6–12 μ m, cylindrica, hyalina. Pileipellis trichodermate, hyphis 3.5–5.5 μ m latis, subglutinosa. Prope *Eucalyptum*.

Type: Victoria, Mount Cole, Victoria Mill, near the trunk or logs of *Eucalyptus obliqua* L'Hérit., 29 iv 1982, *Watling* 14741 (holo. E).

Phlebopus xanthopus T.-H. Li & Watling, *sp. nov.*

Pileus 40–90mm latus, primo velutinus, demum subviscidus, fulvus vel olivaceo-fulvus, margine diluitor. Stipes 25–70 \times 10–17mm, sulfureus vel chromato-luteus, superne albidus, juvenili subtus punctis carminatis, base sulfureus mycelio luteo-albo. Tubuli et pori citreo- vel chromato-lutei, demum fulvi vel aurantiaci, tactu caerulei. Contextus chromato-luteus, mosaico punctatis carminatis, tactu caeruleus. Sporae (4.5–)5–7(–8) \times (3.5–)4–5(–5.5) μ m. Pleurocystidia (35–)40–55(–60) \times 6–10 μ m. Cheilocystidia 25–40 \times 6–8 μ m. Trama tubuli divergens. Hyphae pileipellis (3–)4–7 μ m crassae, repentes vel compacto implexae, defibulatae. Prope *Eucalyptum*. Species hace congeris sect. *Brunneorubri* sporis brevi-ellipsoidis, defibulata, cyanescens.

Type: Victoria, Daylesford, Wombat State Forest, near Farm Road, with *Eucalyptus macrorhyncha* F. Muell., 28 iii 1982, *Watling* 14703 (holo. E).

Rubinoboletus ballouii var. *viscidus* T.-H. Li & Watling, *var. nov.*

Hace varietas similis variati typae sed differt pileo viscido, basidiosporis longioribus, caro subrufescens.

Type: New South Wales, Cumberland State Forest, West Pennant Hills, gregarious and half buried in humus rich soil or litter, 15 vi 1980, *A. Young* 1 (holo. E).

The specimen is characterized by the short, pinkish, rather dark tubes, the oily, yellow-brown contents of the cystidia, and the pinkish flesh discoloration. The basidiospores are slightly longer than those of the type variety but even in var. *ballouii* this character is rather variable over its entire range.

Rubinoboletus phaseolisporus T.-H. Li, Hilton & Watling, *sp. nov.*

Pileus 50–80mm latus, subviscidus, stramineus demum subcinnamoneus. Tubuli irregulares, elongati ad stipitem, leviter decurrentes; pori pallidi, obscuriores orificiis (tactu tabacini), 2–4 per mm. Stipes 45–90 × 10–15mm, leviter angustatus deorsum. Contextus non-caeruleus, temporaliter leviter persicinus, mitis, inodorus. Basidiosporae 5.5–6.5 × 3–3.5µm, phaseoliformes, levis. Basidia 25–30 × 5–7µm, oblongia. Pleurocystidia 45–80 × (10–)15µm, ampulliformia, lutea. Trama hymenophori divergens. Pileipellis subgelatinosa. Fibulae raras. Terrestris, prope *Eucalyptum*.

Type: Western Australia: Mundaring State Forest, with *Eucalyptus marginatus* Dorn ex Smith, 15 vi 1975, R.N. Hilton [UWA 1990] (holo. E).

Tylophilus cyanescens T.-H. Li & Watling, *sp. nov.*

Pileus 85–90mm latus, obscure brunneus, tomentosus, planus. Contextus albus, tactu caeruleus vel rubens. Pori et tubuli flavidi, rubello-brunneis, tactu caerulei. Stipes 65 × 28–32mm, solidus, flavidus ad basem, rubellus ad apicem, fibrillis rubeo-brunneis, punctulatus. Depositum sporae leviter fulvidum. Sporae 10–12.5(–15) × 3.5–4.5µm, laeves, subhyalinae, leviter amyloideae. Basidia 20–30 × 6–7µm, 4-sporis. Pleurocystidia 40–60 × 7–9µm. Trama hymenophori leviter divergens. Hyphae pileipellis 5–9µm latae, laeves, trichodermatae, implexae vel subpalisadicae. Gregarius prope *Eucalyptum*.

Type: New South Wales, Kelly Falls near Helensberg, gregarious in eucalypt forest in sandy soil, 21 vi 1980, Coveney 5 (holo. E).

Tylophilus cyanogranulifer T.H. Li, Watling & N.M. Gregory, *sp. nov.*

As '*Tylophilus sp. 6* (BRIP 9175)', Watling & N.M. Gregory in Proc. Roy. Soc. Queensland 100: 29 (1989).

Pileus c.70mm latus, griseo-brunneus vel atro-rubiginosus, siccus, laevis vel fibrillosus demum asperatus cum aggregatis fibrosis. Stipes c.70 × 20mm, fulvidus, apice dilutior minute asperatus cum punctis, demum aggregatis punctorum obscuris, obscure late reticulatus, solidus. Pori depressi ad stipem, varii, aliquando labyrinthiformes, subcaeruleogrisei demum brunnei. Tubuli caerulei exposito. Contextus pilei fere albus, tactu leviter subgriseus vel dilute brunneus; contextus stipitis dilute brunneus tactu (½h). Basidiosporae 11.7–13.2(–14.3) × 3.3–4µm, coloratae. Pleuro- et cheilocystidia elongato-ellipsoidea, brunnea. Trama hymenophori non-gelatinosa, mediotrato colorato. Pileipellis hyphis septalibus brunneis levibus c.8.25µm crassis, implexis vel repentibus, granulis cyanescentibus in alkali. Prope *Eucalyptum*.

Type: Queensland, Cooloola, Noosa River Soil Landscape (Wolvi 985167), in rain forest, 29 viii 1980, JECA 80/580 [BRIP 9175] (holo. BRIP).

Tylophilus olivaceoporus T.-H. Li, Watling & N.M. Gregory, *sp. nov.* = **Tylophilus olivaceoporus** Watling & N.M. Gregory, nom. prov. in Proc. Roy. Soc. Queensland 99: 23 (1989).

Pileus 100–110mm latus, asperatus, minute rimosus (atro-hinnuleus), squamis vel cuticula rimoso obscura, purpurateo-spadiceus vel purpurateo-badius, subvinaceo-

brunneus versus margine leviter impendenti, siccus. Tubuli ≤ 7 mm longi, sepiacei vel fere fusco-niger; pori concolores, 1–2.5 per mm, angulares. Stipes 90–100 \times 24–30mm, angustatus vel aequalis sursum, tumidus ad basis (≥ 40 mm), punctis minutis collabentibus, atroargillaceo-bubalinus vel fere niger, furfuraceus. Contextus sordido-cremeus vel argillaceo-bubalinus, cyanescentibus. Sporae 10.5–16 \times 3.5–4.8 μ m. Trama hymenophori parallela vel divergens. Pileipellis hyphis septalibus hyalinis vel brunneis laevibus, 5–10 μ m crassis, contractis ad septas, raro fibulatis, implexis. Hyphae partiales ad tramam hymenophori et pileipellem caeruleae et granulatis caeruleis. Terrestris.

Type: Queensland, Cooloola N.P., Harry's Hut Road, on side of dead tree trunk, 11 vi 1986, *C. Sandercoe & J. Milne*, JECA 86/79 [BRIP 19810] (holo. BRIP).

This species is characterised by the bluish encrustations in alkaline solution and the dark squamulose or rimose cuticle.

***Tylophilus parachromapes* T.-H. Li & Watling, sp. nov.**

Pileus ≤ 37 mm latus, vinaceus margine cum coloratione salmonea vel avellanea, tomentellus vel leviter squamulosus. Pori et tubi incarnati vel rosati. Stipes 25 \times 5mm (base 10mm), bubalinus vel luteolus, chromaticus (luteus) vel lutescens ad base, scabrosus et reticulatus cum punctis roseolis vel rubris. Caro dilute citrino, subpelle incarnato. Basidiosporae 10.5–16.5 \times 4.5–6 μ m, hyalinae, laeves. Basidia 25–35 \times 8–12 μ m, clavata. Pleurocystidia (pseudocystidia) 35–45 \times 9–12 μ m. Hyphae pileipellis 2.5–5 μ m latae. Caulocystidia 35–40 \times 7–9 μ m, fasciculata. Prope *Casuarina*.

Type: New South Wales, Sydney, Royal National Park, near Loftus, edge of *Casuarina* strip, 10 iv 1974, *Watling* 10965 (holo. E).

***Tylophilus subvinaceipallidus* T.-H. Li & Watling, sp. nov.**

Pileus 160mm latus, salmoneus cum coloratione vinacea, cutifractus. Tubi vinaceo-incarnati; pori argillaceo-incarnati. Stipes superne leviter reticulatus, vinaceus vel dilute vinaceo-castaneus, deorsum mosaicus punctis spadiceis vel castaneis, mycelio albo. Contextus albus, incarnato-bubalinus, leviter felleus. Sporae 8.5–12.5(–14.5) \times 3.5–5 μ m, hyalinae. Pleurocystidia 35–60 \times 4–13 μ m. Trama hymenophori subparallela. Pileipellis trichodermate vel subpalisadica, elementis terminalibus 3–5 μ m latis.

Type: New South Wales, Mount Tomah, *A. Young* [*Watling* 11007] (holo. E).

NEW COMBINATIONS

***Meiorganum olivaceoflavidus* (Cooke & Masee) T.-H. Li & Watling, comb. nov.**

Basionym: *Panus olivaceoflavidus* Cooke & Masee in Cooke, in *Grevillea* 18: 1 (1887).

Syn.: *Paxillus olivaceoflavidus* (Cooke & Masee) D.A. Reid in *Kew Bull.* 1955: 644.

Rubinoboletus caespitosus (Cleland) T.-H. Li & Watling, **comb. nov.**

Basionym: *Boletus caespitosus* Cleland in Trans. Proc. Roy. Soc. South Australia 48: 247 (1924).

Syn.: *Gyroporus caespitosus* (Cleland) Cleland, *Toadstools and Mushrooms of South Australia* 1: 186 (1934).

REFERENCES

- HAWKSWORTH, D. L., KIRK, P. M., SUTTON, B. C. & PEGLER, D. N. (1995). *Ainsworth & Bisby's Dictionary of the Fungi*, 8th edn. Wallingford: CAB International.
- LANGDON, R. (1996). John Errol Chandos Aberdeen 1913–1996. *Austr. Pl. Path.* 25: 2.
- THIERS, H. D. (1989). *Gastroboletus* revisited. *Mem. New York Bot. Garden* 49: 355–359.
- WATLING, R. & GREGORY, N. M. (1986). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. *Proc. Roy. Soc. Queensland* 97: 97–128.
- WATLING, R. & GREGORY, N. M. (1988a). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. Part 2A. Smooth-spored taxa – introduction, keys and references. *Proc. Roy. Soc. Queensland* 99: 45–63.
- WATLING, R. & GREGORY, N. M. (1988b). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. Part 2B. Smooth-spored taxa of the family Gyrodontaceae and the genus *Pulveroboletus*. *Proc. Roy. Soc. Queensland* 99: 65–76.
- WATLING, R. & GREGORY, N. M. (1989a). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. Part 2C. Smooth-spored taxa – Strobilomycetaceae. *Proc. Roy. Soc. Queensland* 100: 13–30.
- WATLING, R. & GREGORY, N. M. (1989b). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. Part 2D. Smooth-spored taxa – Boletaceae, Xerocomaceae. *Proc. Roy. Soc. Queensland* 100: 31–47.
- WATLING, R. & GREGORY, N. M. (1991). Observations on the Boletes of the Cooloola Sand-mass, Queensland and notes on their distribution in Australia. Part 3. Lamellate taxa. *Edinb. J. Bot.* 48: 353–392.
- WATLING, R. & LI TAI-HUI. (ined.). *A Preliminary Account of Australian Boletes* with particular reference to those of the Cooloola Sand-mass, Queensland. Edinburgh.

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