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New taxa and new reports of Australian *Pertusaria*
(lichenized Ascomycota, Pertusariaceae)

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**New taxa and new reports of Australian *Pertusaria*
(lichenized Ascomycota, Pertusariaceae)**

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Abstract: *Pertusaria albopunctata* A.W.Archer & Elix, *P. alectoronica* var. *thiophanica* Kantvilas, Elix & A.W.Archer, *P. georgeana* var. *methylstenosporica* A.W.Archer & Elix, *P. georgeana* var. *occidentalis* Elix & A.W.Archer, *P. minispora* A.W.Archer & Elix and *P. tjaetabensis* A.W.Archer & Elix are described as new to science. The new name *Pertusaria malmei* A.W.Archer & Elix is proposed for *Pertusaria quassiae* (Fée) Nyl. var. *sordida* Malme. *Pertusaria subradicans* Müll.Arg. and *P. malmei* are reported for the first time from Australia.

As part of a continuing study of the genus *Pertusaria* in Australia (Archer & Elix 2009; Elix & Archer 2007a, 2007b; Elix *et al.* 2008; Kantvilas & Elix 2008), a number of specimens from various regions of Australia have been examined and found to include several new taxa or new records for Australia.

The chemistry of the species was studied by thin-layer chromatography (Elix & Ernst-Russell 1993), high-performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

The new taxa

Pertusaria albopunctata A.W.Archer & Elix, *sp. nov.*

Fig. 1

Similaris *Pertusaria scaberula* sed acidum sticticum continens vice acidum thamnolicum.

Type: Australia. *Queensland:* Zillie Falls, 12 km by road NE of Millaa Millaa, 17°28'29"S, 145°39'22"E, alt. 705 m, on fallen tree in remnant rainforest near falls, *J.A. Elix* 39499, 29.vii.2006 (BRI – holotype).

Thallus pale olive-green, thin, somewhat discontinuous, surface smooth and dull, lacking isidia, sorediate, the soredia in well-defined soralia, corticolous. *Soralia* white, scattered, sessile, becoming subhemispherical, sometimes forming sterile, sorediate discs, 0.3–0.8 mm diam. *Apothecia* not seen.

Chemistry: Stictic acid (major), constictic acid (minor), peristictic acid (trace), cryptostictic acid (trace), ± substictic acid (trace), ± hypostictic (trace) and norstictic acid (trace).

Etymology: The specific epithet is derived from the Latin *albus*, white, and *punctatus*, dotted, in reference to the scattered white soralia.

Remarks:

The new species is characterized by the sorediate thallus, the absence of apothecia and the presence of the stictic acid chemosyndrome. It resembles *P. scaberula* A.W.Archer in morphology, but that species contains thamnolic acid.

This new species occurs on branches of trees in and at the margins of montane tropical and subtropical rainforest in eastern Queensland. Associated species include *Haematomma africanum* (J.Steiner) C.W.Dodge, *Heterodermia japonica* (Sato) Swinscow & Krog, *Hypotrachyna osseocalba* (Vain.) Y.S.Park & Hale, *Lecanora achroa* Nyl., *Lobaria discolor* (Bory) Hue, *Megalospora melanodermia* var. *purpurea* Elix, *Pertusaria velata* (Turner) Nyl., *P. verdonii* A.W.Archer & Elix, *Pseudocyphellaria pickeringii* (Tuck.) D.J.Galloway, *P. rigida* (Müll.Arg.) D.J.Galloway, *P. sayeri* D.J.Galloway and *Usnea rubicunda* Stirt.

SPECIMENS EXAMINED

Queensland: • Bunya Mountains National Park, Cherry Plains Picnic Area, along track to Westcott Picnic Area, 26°51'03"S, 151°33'43"E, alt. 1025 m, on exposed root in margin of rainforest, *J.A. Elix* 38810, 7.v.2005 (CANB); • Millaa Millaa Falls, 4 km S of Millaa Millaa, 17°29'44"S, 145°36'41"E, alt. 750 m, on fallen branches in remnant rainforest near falls, *J.A. Elix* 39311, 29.vii.2006 (CANB).

Pertusaria alectoronica* var. *thiophanica Kantvilas, Elix & A.W.Archer, *var. nov.* Fig. 2
Similaris *Pertusaria alectoronica* var. *alectoronica* sed acidum thiophanicum continens differt.

Type: Australia. *Tasmania:* Flinders Island, summit of Mt Killiecrankie, 39°49'S, 147°52'E, alt. 310 m, on *Banksia marginata* in sheltered scrub among large boulders, *G. Kantvilas* 28/06, 22.i.2006 (HO – holotype).

Thallus pale grey-green to grey-white, thick, cracked-areolate, corticolous, surface verrucose, dull to slightly shiny, lacking soredia, isidiate. *Isidia* numerous, simple and cylindrical at first, ultimately becoming densely coralloid-branched, dark grey-green, the apices ±swollen and becoming dark brown to black-tipped, 0.2–2.0 mm tall, 0.08–0.18 mm diam. *Apothecia* and *pycnidia* not seen.

Chemistry: Alectoronic acid (major), thiophanic acid (minor), methyl pseudoalectoronate (trace), and beta-alectoronic acid (trace).

Etymology: The varietal name refers to the occurrence of thiophanic acid in this taxon.

Remarks:

This taxon is characterized by the pale grey-green to grey-white thallus, the isidiate upper surface and the presence of alectoronic and thiophanic acids. It is morphologically identical to *P. alectoronica* var. *alectoronica* Elix & A.W.Archer, but the latter differs chemically in containing 4,5-dichlorolichexanthone (minor) in addition to alectoronic acid (major), and it occurs on lignin rather than bark (Elix & Archer 2007a).

At present this distinctive new variety is known from only the type locality, where it occurs on the bark of *Banksia marginata*. Commonly associated species include *Hypogymnia lugubris* (Pers.) Krog, *H. mundata* (Nyl.) Oxner ex Rassad., *Menegazzia pertransita* Stirt., *Maronea constans* (Nyl.) Hepp, *Mycoblastus coniophorus* (Elix & A.W.Archer) Kantvilas & Elix, *Pannoparmelia wilsonii* (Räsänen) D.J.Galloway, *Tasmidella variabilis* Kantvilas, Hafellner & Elix, *Usnea oncodes* Stirt., and *U. rubrotincta* Stirt.

Pertusaria georgeana* var. *methylstenosporica A.W.Archer & Elix, *var. nov.* Fig. 3
Similaris *Pertusaria georgeana* var. *georgeana* sed acidum 2-O-methylstenosporicum continens.

Type: Australia. *New South Wales:* Goonoo State Forest, Denmire Creek, 32 km ESE of Gilgandra, 31°55'43"S, 148°59'32"E, alt. 370 m, on dead branch of *Eucalyptus* in open *Eucalyptus* woodland, *J.A. Elix* 38214, 12.x.2005 (CANB – holotype).

Thallus crustose, greyish white to pale olive-green, corticolous, thin, sometimes discontinuous, somewhat shiny, isidiate, lacking soredia. *Isidia* numerous, inconspicuous, often abraded and present only in sheltered cavities in the substratum, concolorous with the thallus, 0.1–0.2 mm tall, 0.05 mm diam., becoming coarsely sorediate with age. *Apothecia* not seen.

Chemistry: 4,5-dichlorolichexanthone (minor), 2-O-methylperlatolic acid (major) and 2-O-methylstenosporic acid (submajor).

Etymology: The name is derived from 2-O-methylstenosporic acid, a major compound in this new variety.

Remarks:

Pertusaria georgeana var. *methylstenosporica* is characterized by the isidiate thallus and the chemistry (see discussion under var. *occidentalis*).

At present it is known from only the type locality on the central-western slopes of New South Wales, where associated species include *Hypogymnia billardierei* (Kremp.) Filson, *Pannoparmelia wilsonii* (Räsänen) D.J.Galloway, *Parmelia pseudotenuirima* Gyeln., *Parmelina conlabrosa* (Hale) Elix & J.Johnst., *Punctelia subalbicans* (Stirt.) D.J.Galloway & Elix, *Pyrrhospora arandensis* Elix, *Ramboldia brunneocarpa* Kantvilas & Elix and *Tephromela alectronica* Kalb.

Pertusaria georgeana* var. *occidentalis Elix & A.W.Archer, *var. nov.* Fig. 4
Similis *Pertusaria georgeana* var. *georgeana* sed acidum 2-*O*-methylconfluenticum continens differt.

Type: Australia. *Western Australia:* Brookton Highway Nature Reserve, Darling Plateau, 25 km W of Brookton, 32°23'50"S, 116°44'03"E, alt. 285 m, on dead wood in open *Eucalyptus* woodland, J.A. Elix 38727, 5.iv.2006 (PERTH – holotype; CANB – isotype).

Thallus crustose, off-white to dull fawn or pale olive-green, corticolous or lignicolous, surface dull, smooth or subtuberculate, somewhat shiny, isidiate. *Isidia* inconspicuous, numerous, concolorous with the thallus, 0.1–0.2 mm tall, 0.05 mm diam., globose at first, proliferating or becoming blastidiate and coarsely sorediate with age. *Apothecia* and *pycnidia* not seen.

Chemistry: 4,5-dichlorolichexanthone (minor) and 2-*O*-methylconfluentic acid (major), planaic acid (minor or trace).

Etymology: The name refers to the occurrence of this variety in Western (Latin, *occidentalis*) Australia.

Remarks:

This taxon is characterized by the off-white to dull fawn or pale olive-green thallus, the isidiate-blastidiate upper surface, and the presence of 4,5-dichlorolichexanthone, 2-*O*-methylconfluentic acid and minor or trace amounts of planaic acid. It is morphologically identical to *P. georgeana* var. *georgeana* A.W.Archer & Elix, but the latter differs chemically in containing 4,5-dichlorolichexanthone (minor) and 2-*O*-methylperlatolic acid (major), and it has a broader distribution (Queensland, New South Wales and the Australian Capital Territory) (Archer 2004, Elix & Archer 2007b).

Pertusaria georgeana var. *occidentalis* occurs on dead wood or on the bases of *Eucalyptus* trees in open *Eucalyptus* woodland. At present this new variety is known from only the type locality, where associated species include *Hertelidea pseudobotryosa* R.C.Harris, Ladd & Printzen, *Hypocenomyce australis* Timdal, *H. isidiosa* Elix, *Ochrolechia africana* Vain., *Parmelina pseudorelicina* (Jatta) Kantvilas & Elix, *Ramboldia subnexa* (Stirt.) Kantvilas & Elix and *Usnea inermis* Motyka.

SPECIMEN EXAMINED

Western Australia: • Type locality, on dead wood, J.A. Elix 38720, 5.iv.2006 (CANB, HO, PERTH).

Pertusaria minispora A.W.Archer & Elix, *sp. nov.* Fig. 5
Similis *Pertusaria pertractata* sed acidum perlatolicum continens vice acidum 2'-*O*-methylperlatolicum.

Type: Australia. *Victoria:* Bemm River Scenic Reserve, 45 km E of Orbost, 37°37'30"S, 148°53'12"E, alt. 65 m, on *Pomaderris* in margin of warm-temperate rainforest and *Eucalyptus* woodland, J.A. Elix 38692, 15.iv.2008 (MEL – holotype).

Thallus off-white to pale olive-green, thin, surface smooth and dull, lacking isidia and soredia, corticolous. *Apothecia* verruciform, scattered, flattened-hemispherical, 0.5–1.0 mm diam. *Ostioles* pale, inconspicuous, 1–2 per verruca. *Ascospores* 8 per ascus, hyaline, ellipsoid, smooth, 36–46 µm long, 14–17 µm wide.

Chemistry: 4,5-dichlorolichexanthone (major) and perlatolic acid (major).

Etymology: The epithet is derived from the Greek *minys* (little) and *spora* (seed), a reference to the small ascospores.

Remarks:

This new species is characterized by the small ascospores and the presence of perlatolic acid and 4,5-dichlorolichexanthone. It resembles the common *P. pertractata* Stirt. in appearance and ascospore morphology, but is distinguished by the presence of perlatolic rather than 2'-*O*-methylperlatolic acid. Perlatolic acid derivatives are common in the genus *Pertusaria*, but the parent compound is rarely found as a major substance (although it can occur in minor or trace amounts). Perlatolic acid is found as a major compound together with norstictic acid (in *P. hartmannii* Müll.Arg. from Australia and *P. subobductans* Nyl. from Japan), with glomelliferic acid (in *P. corrugata* Kremp. from Brazil) and with thiophaninic acid (in *P. injuneana* A.W.Archer & Elix from Australia).

At present this new species is known from only the type locality in eastern-coastal Victoria, where associated species include *Chrysothrix sulphurella* (Räsänen) Kantvilas & Elix, *Hypogymnia pulverata* (Nyl.) Elix, *Lepraria lobificans* Nyl., *Megalaria grossa* (Pers. ex Nyl.) Hafellner, *Parmelina pseudorelicina* (Jatta) Kantvilas & Elix, *Phlyctis subuncinata* Stirt., *Phyllopsora foliata* (Stirt.) Zahlbr. and *Usnea rubrotincta* Stirt.

Pertusaria tjaetabensis A.W.Archer & Elix, *sp. nov.* Fig. 6
Similis *Pertusaria ceylonica* sed ascoporis minoribus et acidum 2-*O*-methylperlatolicum continens.

Type: Australia. *Northern Territory:* Litchfield National Park, Greenant Creek, trail to Tjaetaba Falls, 60 km SW of Batchelor, 13°12'04"S, 130°42'03"E, alt. 60 m, on dead wood in monsoon vine forest, with *Carallia* and *Calophyllum*, J.A. Elix 38407, 5.viii.2005 (CANB – holotype).

Thallus off-white to pale olive-green, thin, the surface subtuberculate and shiny, cracked, lacking isidia and soredia, corticolous. *Apothecia* verruciform, scattered, rarely confluent, flattened-hemispherical, 0.3–1.2 mm diam. *Ostioles* inconspicuous, black, 1(–2) per verruca. *Ascospores* ellipsoid, hyaline, smooth, (2–)3(–4) per ascus, 70–88(–100) × 26–34 µm.

Chemistry: 2,4,5-trichlorolichexanthone (minor), 2,5-dichlorolichexanthone (minor), 2,4-dichlorolichexanthone (trace), 2-*O*-methylperlatolic acid (major), 2-*O*-methylhyperlatolic acid (minor), planaic acid (minor), methyl planaiate (minor), stictic acid (major), constictic acid (minor), cryptostictic acid (trace) and peristictic acid (trace).

Etymology: The epithet *tjaetabensis* is derived from Tjaetaba Falls, the type locality.

Remarks:

This new species is characterized by asci with predominantly 3 ascospores, and the presence of 2,4,5-trichlorolichexanthone, 2-*O*-methylperlatolic and stictic acids as major compounds. It is distinguished from the somewhat similar *P. ceylonica* Müll.Arg. (Müller 1884a) by its shorter ascospores [(75–)95–125(–135) µm long in *P. ceylonica*] and the presence of 2-*O*-methylperlatolic acid and other perlatolic acid derivatives, substances that are absent in *P. ceylonica*. The new species is also morphologically and chemically similar to *P. aquilonia* A.W.Archer & Elix (Archer 1997), a species with 3(–4) ascospores per ascus and containing 2,4,5-trichlorolichexanthone (minor), 2,5-dichlorolichexanthone (minor), 2-chlorolichexanthone (minor), 2,4-dichlorolichexanthone (trace), 2-*O*-methylperlatolic acid (major), 2'-*O*-methylperlatolic acid (trace), and planaic acid (trace), but lacking stictic acid and its derivatives. Whereas *P. aquilonia* occurs in Queensland and *P. ceylonica* in Queensland, the Northern Territory, Sri Lanka, Indonesia and Papua New Guinea, this new species is known from only the type locality in the Northern Territory.

Commonly associated species include *Chrysothrix xanthina* (Vain.) Kalb, *Coccocarpia palmicola* (Spreng.) Arv. & D.J.Galloway, *Coenogonium luteum* (Dicks.) Kalb & Lücking, *Cratiria lauricassiae* (Fée) Marbach, *Cryptothecia faveomaculata* Makhija & Patw., *Dirinaria consimilis* (Stirt.) D.D.Awasthi, *D. picta* (Sw.) Schaer. ex Clem., *Fellhanera tropica* Elix, *Hafellia rechingeri* (Zahlbr.) Marbach, *Letrouitia leprolytoides* S.Kondr. & Elix and *Pertusaria velata* (Turner) Nyl.

SPECIMEN EXAMINED

Northern Territory: • Type locality, on dead wood, J.A. Elix 38410, 5.viii.2005 (CANB).

New Records for Australia

Pertusaria malmei Elix & A.W.Archer, *nom. nov.*

Fig. 7

Basionym: *Pertusaria quassiae* (Fée) Nyl. var. *sordida* Malme, *Ark. Bot.* **28A**, 13 (1936)

Type: Brazil. Matto Grosso: Cuyabá, G. Malme 2086, 7.xii.1895 (S – holotype).

Thallus off-white to greyish green, surface smooth and dull, cracked, lacking isidia and soredia, corticolous. *Apothecia* verruciform, numerous, rarely confluent, flattened-sub-spherical to flattened-hemispherical, 0.5–1 mm diam. *Ostioles* inconspicuous, pale grey, translucent, 1 per verruca. *Ascospores* 4 per ascus, elongate-ellipsoid, hyaline, smooth, 80–94 × 25–36 µm.

Chemistry: 4,5-dichlorolichexanthone (major), 4-chlorolichexanthone (trace) and 2-O-methylperlatolic acid (major).

Etymology: The epithet *malmei* honours the original collector, the Swedish botanist G.O.A. Malme.

Remarks:

Pertusaria malmei is morphologically similar to *P. quassiae* var. *quassiae*, but is chemically distinct. Whereas *P. quassiae* var. *quassiae* contains arthothelin, 6-O-methylarthothelin, stictic and constictic acids as major compounds (K. Kalb *in litt.*), *P. malmei* (*P. quassiae* var. *sordida*) contains 4,5-dichlorolichexanthone and 2-O-methylperlatolic acid. As a consequence, we have raised var. *sordida* to species level under the name *P. malmei* (the epithet *sordida* is already taken as *P. sordida* A.W.Archer (1991), hence the need for a new name). Malme himself suggested that his variety might be a new species, “Forsan species autonoma” (Malme *loc. cit.*)

Pertusaria malmei is chemically and morphologically similar to the Australian *P. doradorensis* Elix & A.W.Archer, but that species has longer ascospores [(82–)95–125 µm] and contains additional planaic acid (Elix *et al.* 1997).

Pertusaria malmei was previously known from Brazil, but it is new to Australia.

SPECIMEN EXAMINED

New South Wales: • Cookamidgera State Forest, 3.5 km SSW of Cookamidgera, 33°13'43"S, 148°16'54"E, alt. 345 m, on dead stump in *Eucalyptus* woodland, J.A. Elix 39075, 4.viii.2008 (CANB).

Pertusaria subradians Müll.Arg., *Flora* **67**, 463 (1884)

Fig. 8

Ceylon [Sri Lanka], *s. loc.*, G. Thwaites *s.n.*, 1876 (G – holotype).

Thallus greyish green, surface smooth and shiny, cracked, lacking isidia and soredia, corticolous. *Apothecia* verruciform, inconspicuous, scattered, sometimes confluent, very flattened-hemispherical 0.5–1.0(–1.5) mm diam. *Ostioles* inconspicuous, pale grey, translucent, 1 per verruca. *Ascospores* 2 per ascus, elongate-ellipsoid, hyaline, smooth, 100–115 × 24–30 µm.

Chemistry: 4,5-dichlorolichexanthone (minor), 2'-O-methylperlatolic acid (major), stictic acid (major), constictic acid (minor) and traces of peristictic, cryptostictic and substictic acids.

Remarks:

This species is characterized by asci with 2 smooth-walled ascospores per ascus, and a distinctive chemistry. It is morphologically similar to *P. pseudococcodes* Müll. Arg. (Müller 1884b), which also occurs in Sri Lanka, but the ascospores in the latter are shorter and wider [82–105 × 30–37 µm], and it differs chemically in lacking 2'-O-methylperlatolic acid. *Pertusaria subradians* is also morphologically similar to *P. pycnothelia* Nyl. from New Caledonia (Nylander 1868), but the ascospores in that species are larger [95–125 × 30–37 µm], and it differs in lacking stictic acid.

SPECIMEN EXAMINED

Queensland: • Girringun National Park, Yamanie Section, 14 km WNW of Abergowrie, 18°24'49"S, 145°46'18"E, alt. 55 m, on dead branch in remnant rainforest along Herbert River, J.A. Elix 38500, 26.vii.2006 (CANB).

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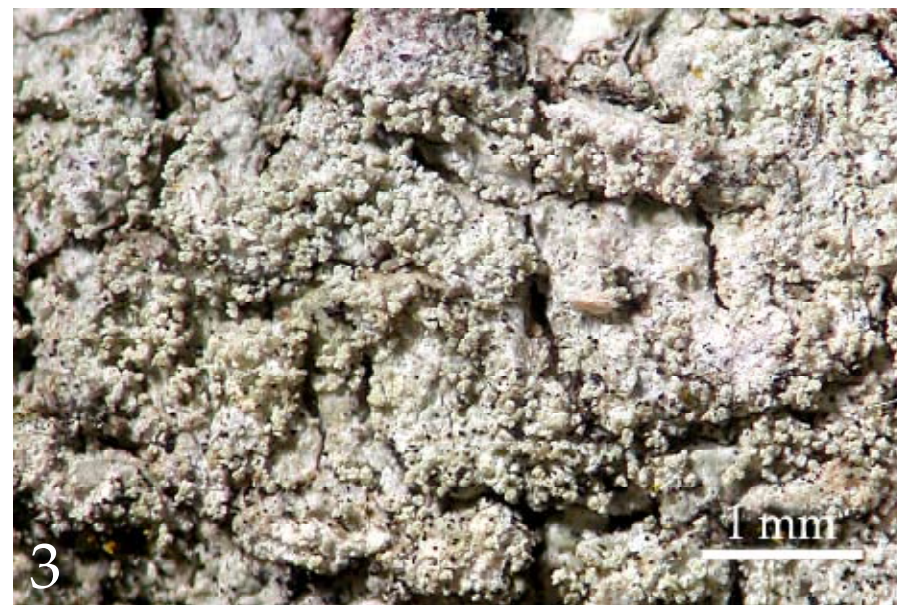


Figure: 1. *Pertusaria albopunctata* (holotype in BRI); 2. *Pertusaria alectoronica* var. *thiophanica* (holotype in HO).

3. *Pertusaria georgeana* var. *methylstenosporica* (holotype in CANB); 4. *Pertusaria georgeana* var. *occidentalis* (holotype in PERTH).



5. *Pertusaria minispora* (holotype in MEL); 6. *Pertusaria tjaetabensis* (holotype in CANB).



7. *Pertusaria malmei* (J.A. Elix 39075 in CANB); 8. *Pertusaria subradians* (J.A. Elix 38500 in CANB).