Towards a taxonomically curated checklist of lichens from biological soil crusts in Australian drylands

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ABSTRACT – Lichen-dominated biological soil crusts are particularly abundant in a large area extending from East to West across the southern half of Australia. Ecological studies have historically contributed to the knowledge on the diversity and distribution of lichen species found in biocrust communities. A 1996 study of biocrusts in New South Wales recorded 48 lichen species. Subsequently, in 2021, 52 terricolous lichen species were listed across the Australian Capital Territory and the surrounding areas of New South Wales. Ongoing taxonomic studies have since refined our knowledge of biocrust lichens. Here we review the ecological and taxonomic literature and compile the first version of a checklist of lichens from biocrusts in Australian drylands. A total of 127 taxa in 44 genera are reported, with their distribution drawn mostly from the literature. This first version of the checklist contains both yet-to-be confirmed species and yet-to-be revised groups, and will likely evolve as more taxonomic studies are carried out. It aims to provide baseline biodiversity data which will aid the development of new species identification tools for cryptogams from biocrust communities.

KEYWORDS – biocrusts, Australian rangelands, terricolous lichens

Introduction

Biological soil crusts are microbiotic communities which colonise soil surfaces in arid, semi-arid and alpine areas across the world (Belnap & Lange 2003). They are formed of cyanobacteria, microalgae, microfungi and, in their mature stages, lichens and bryophytes (mosses and liverworts). Their species composition, diversity and abundance vary depending on various factors, including soil type, climate, elevation, stage of development and level of human disturbance (Eldridge & Tozer 1997). They play important ecological roles in these water-limited ecosystems, contributing to carbon and nitrogen fixation, ensuring water and nutrient availability, and protecting soils from water and wind erosion. On the Australian mainland, biocrusts occur extensively in low-rainfall areas of natural habitats as well as in pastoral land. Very fragmented, simple examples of such biocrusts also occur in the drier parts of Tasmania.

As biocrusts mature over long period of time, their species composition increases and lichens become more abundant, at least on certain types of soils. Lichen-dominated biocrust communities occur over a large area in mainland Australia, extending from southern Queensland, New South Wales, South Australia and southern Western Australia (Eldridge & Tozer 1997). Critically, biocrusts are a vegetation community, and the lichen species involved need not necessarily be crustose lichens. Indeed, the constituent species display a variety of growth forms, ranging from crustose to squamulose to small-foliose to even shortly fruticose. An early ecological study recorded 48 different terricolous lichen species from biocrusts in New South Wales (Eldridge 1996), but many ecological studies since then have contributed additional knowledge on the diversity and distribution of lichen species in these communities

(e.g., Eldridge & Tozer 1997, Hodgins & Rogers 1997, Eldridge 1998, Eldridge & Koen 1998, Thomson et al. 2006). Due to the complex taxonomy of some of these groups, and the lack of field-applicable identification tools, ecologists have, however, often used morphogroups (or groups of species with similar morphology) instead of taxonomic units in their studies (Eldridge & Rosentreter 1999, Read et al. 2014), thus limiting any contribution to the knowledge on diversity and distribution of lichens themselves. This complex taxonomy would be less challenging for ecologists if conversion tables are developed which identify the taxa and synonyms within each morphogroup, and if those tables are updated regularly, both taxonomically, and as new information is learned.

As new, field-applicable tools allowing non-taxonomic specialists to make relatively accurate species identifications are developed (e.g., mobile sequencing, AIML image recognition apps), knowledge on the diversity and distribution of lichens from biocrusts is set to increase, improving ecological assessments and surveys of these important communities. However, for these tools to be accurate, current knowledge on biocrust lichens needs to be reassessed and updated. Since the publication of the first list of biocrust lichens from New South Wales (Eldridge 1996), several groups have been taxonomically revised, existing taxa have been reassessed, and additional species new to science have been described (e.g., McCarthy 2001, Trinkaus et al. 2001, Elix & Lumbsch 2005, Lumbsch & Mangold 2007, Gueidan & Elix 2022). For example, McCarthy & Elix (2021) presented an outline of the lichen communities from consolidated siliceous soils from the Australian Capital Territory and surrounding areas, listing 52 species.

In the present paper, the taxonomic and ecological literature is reviewed to update and extend the list to all Australian lichens recorded from biocrusts in Australian drylands (including Tasmania). It is intended to further update this first version as new distribution and taxonomic data become available.

Methods

The ecological literature was reviewed to generate a list of lichen species commonly found in biocrusts in Australian drylands. The data are derived primarily from the following 15 publications: Eldridge (1995, 1996, 1998, 1999), Eldridge & Kinnell (1997), Eldridge & Koen (1998), Eldridge & Tozer (1997), Eldridge et al. (2006), Hodkins & Rogers (1997), Hyde (1994), Read et al. (2014), Rogers (1974), Rogers & Lange (1972), Scott (1982) and Thomson et al. (2006). *Index Fungorum* (https://www.indexfungorum.org), the *Flora of Australia* (Filson 1992) and the *Checklist of the Lichens of Australia and its Island Territories* (McCarthy 2023) were then used to update the names of the listed species.

We then applied our own observations and knowledge, and reviewed the Australian National Herbarium Specimen Information Register (ANHSIR; http://www.cpbr.gov.au/cgi-bin/anhsir) and taxonomic literature to include additional species, as well as to exclude species based on doubtful or erroneous records. The taxonomic publications used to consolidate the list were: Archer (1992), Breuss (2001), Büdel (2001), Elix (1999, 2009, 2020), Elix & Armstrong (1983), Elix & Kantvilas (2013), Elix & Lumbsch (2005), Elix & McCarthy (2019, 2020, 2021), Filson (1992), Filson & Rogers (1979), Gueidan & Elix (2022), Kantvilas (1998, 2013, 2018, 2019), Kantvilas & Coppins (1997, 2019). Kantvilas et al. (2014, 2020), Kistenich et al. (2018), Kondratyuk et al. (2007a, 2007b, 2009, 2010), Lumbsch (1999), Mangold et al. (2009), McCarthy (1991, 2023), McCarthy & Elix (2021), McCarthy & Kantvilas (2014), Rambold (1989), Sammy (1992), Timdal (1992), Trinkaus et al. (2001), Verdon (1990) and Weber (1977).

The resulting checklist of lichens that occur in biocrust communities in Australian drylands is presented below, together with names used in previous publications (synonyms or misidentifications), as well as their distribution data obtained from McCarthy (2023). Abbreviations for distributions follow McCarthy (2023): Australian Capital Territory (ACT), Christmas Island (CI), Heard Island (HI), Lord Howe Island (LHI), Macquarie Island (MI), New South Wales (NSW), Norfolk Island (NI), Northern Territory (NT), Queensland (QLD), South Australia (SA), Tasmania (TAS), Victoria (VIC), Western Australia (WA) and outside Australia (Extra-Aust.). State distribution records not drawn from McCarthy (2023) are indicated in the list with an asterisk. An Excel version of the table including ecological and taxonomic literature data for each species is available from the CSIRO Data Access Portal (https://data.csiro.au/collection/csiro:61138).

Results and discussion

The total of 127 taxa in 44 genera is listed together with their distribution, mostly drawn from the literature. Four species reported in the ecological literature were excluded. *Caloplaca subpyracella* (Nyl. ex Hasse) Zahlbr., which had been recorded from New South Wales and South Australia by Rogers & Lange (1972) and Eldridge (1996), was already excluded from the Australian lichen checklist by Filson (P.M. McCarthy, pers. comm.). Records of the seemingly ubiquitous (New South Wales, Northern Territory, South Australia, Victoria) species *Synalissa symphorea* (Ach.) Nyl. (Eldridge 1996; Eldridge & Koen 1998; Read et al. 2014; Rogers 1974; Rogers & Lange 1972; Scott 1982) require confirmation as this species has never been reported reliably from Australia in the taxonomic literature. The record of *Lempholemma chalazanum* (Ach.) B. de Lesd. (VIC; Read et al. 2014) has been provisionally excluded from the Australian checklist for the same reason. Finally, *Placynthium nigrum* (Huds.) Gray, which was recorded by Hodgins & Rogers (1997), is generally considered to be a saxicolous species in both the taxonomic literature and our observations.

Some species display different ecological behaviour in different locations or in different habitats, and so the inclusion of a species in the inventory does not imply that it always behaves as a biocrust across its entire distribution. For example, *Acarospora citrina* can be terricolous in arid Australia, but in other areas it is a typical saxicolous species. Similarly, the widespread and variable *Cladia aggregata* may occur as an epiphyte in wet forest, as a saxicolous species, or as a cushion- or sward-forming terricolous species, as well as being a biocrust component. This study also specifically excludes soil-binding species from higher-rainfall or montane environments, notably in Tasmania, where a whole suite of completely unrelated taxa may be fulfilling an analogous ecological role; examples include species of *Siphula*, *Parasiphula*, *Coccotrema*, *Bryobilimbia* and *Pertusaria* sens. lat. It is also worth mentioning that a whole suite of sterile *Cladonia* spp., present as squamules only, are quite common in biocrusts in the Australian drylands, but they have never been identified due to lack of podetia.

The checklist represents the current state of taxonomic knowledge. Although some of the groups have recently been revised using morphological, chemical and/or molecular data (e.g., *Trapelia*; Kantvilas et al. 2014 and Gueidan & Elix 2022), others are still in need of a revision. The checklist will therefore require regular updates as further lichen taxa are revised. Additions to the checklist will also be likely as more areas of Australia drylands are explored for their lichen diversity.

Checklist of lichens from biological soil crusts in Australian drylands – version 1

Acarospora citrina (Taylor) Zahlbr.
Name in previous publications: *A. schleicheri* (Ach.) A. Massal.
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Acarospora nodulosa (Dufour) Hue
Names in previous publications: *A. nodulosa* var. *reagens* (Zahlbr.) Clauzade & Cl. Roux, *A. reagens* Zahlbr., *A. ferdinandii* (Müll. Arg.) Hue
Distribution: WA, SA, NSW, VIC, Extra-Aust.

Acarospora novae-hollandiae H. Magn.
Distribution: WA, NT, SA, QLD, VIC

Acarospora tasmaniensis K. Knudsen & Kocourk.
Name in previous publications: *Polysporina terricola* Kantvilas
Distribution: NSW, ACT, TAS

Acarospora veronensis A. Massal.
Distribution: SA, NSW, ACT, TAS, HI, Extra-Aust.

Arthonia* aff. *fusca (A. Massal.) Hepp
Distribution: NSW

Bibbya australis (Timdal) Timdal, in Kistenich et al.
Name in previous publications: *Toninia australis* Timdal
Distribution: WA, SA, TAS*, Extra-Aust.

Blennothallia crispa (Hudson) Otálora, P.M. Jørg. & Wedin
Name in previous publications: *Collema crispum* (Hudson) Weber ex F.H. Wigg.
Distribution: TAS, Extra-Aust.

Buellia dijiana Trinkaus
Name in previous publications: reported as *B. epigea* (Pers.) Tuck. in biocrust literature
Distribution: WA, SA, NSW

Buellia eldridgei Elix
Distribution: QLD

Buellia epigaella Elix & Kantvilas
Distribution: SA, QLD, NSW

Buellia georgei Trinkaus, H. Mayrhofer & Elix
Name in previous publications: reported as *B. epigea* (Pers.) Tuck. in biocrust literature
Distribution: WA, SA, NSW, ACT, VIC, TAS, Extra-Aust.

Buellia lobata Trinkaus & Elix
Name in previous publications: reported as *B. epigea* (Pers.) Tuck. in biocrust literature
Distribution: WA, SA

Buellia subcoronata (Müll. Arg.) Malme
Distribution: WA, NT, SA, NSW

Buellia suttonensis Elix & A. Knight
Distribution: SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Caloplaca arandensis Elix, S.Y. Kondr. & Kärnefelt
Distribution: ACT

Caloplaca cinnabarina (Ach.) Zahlbr.
Name in previous publications: *Neobrownliella cinnabarina* (Ach.) S.Y. Kondr., Upreti & A. Thell
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Caloplaca jerramungupensis S.Y. Kondr., Kärnefelt & Elix
Distribution: WA, SA

Caloplaca marchantii S.Y. Kondr. & Kärnefelt
Distribution: WA, NSW, VIC

Caloplaca rexfilsonii S.Y. Kondr. & Kärnefelt
Distribution: WA, NT, SA, QLD, NSW, LHI, ACT, VIC, TAS, Extra-Aust.

Candelariella vitellina (Hoffm.) Müll. Arg.
Distribution: HI, WA, SA, NSW, LHI, NI, ACT, VIC, TAS, Extra-Aust.

Catapyrenium cinereum (Pers.) Körb.
Distribution: NSW, Extra-Aust.

Circinaria calcarea (L.) A. Nordin, Savić & Tibell
Name in previous publications: *Aspicilia calcarea* (L.) Körb.
Distribution: WA, SA, NSW, Extra-Aust.

Circinaria contorta (Hoffm.) A. Nordin, Savić & Tibell
Name in previous publications: *Aspicilia contorta* (Hoffm.) Körb.
Distribution: SA, NSW, VIC, Extra-Aust.

Cladia aggregata (Sw.) Nyl.
Distribution: WA, SA, QLD, NSW, LHI, NI, ACT, VIC, TAS, MI, Extra-Aust.

Cladia corallaizon F. Wilson ex Filson
Name in previous publications: *Pulchrocladia corallaizon* (F. Wilson ex Filson) S. Stenroos, Pino-Bodas & Ahti
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Cladonia enantia Nyl. ***var. enantia***
Distribution: WA, SA, NSW, ACT, VIC, TAS, Extra-Aust.

Cladonia floerkeana (Fr.) Flörke
Distribution: SA, QLD, NSW, NI, ACT, VIC, TAS, Extra-Aust.

Cladonia macilenta Hoffm.
Distribution: WA, SA, QLD, NSW, NI, ACT, VIC, TAS, Extra-Aust.

Cladonia neozelandica (A.W. Archer) Kantvilas
Name in previous publications: *Cladonia sulcata* A.W. Archer
Distribution: SA, ACT, VIC, TAS, Extra-Aust.

Collema flaccidum (Ach.) Ach.
Distribution: NSW, ACT, VIC, TAS, Extra-Aust.

Diploschistes bartlettii (Lumbsch) Lücking
Name in previous publications: *D. muscorum* subsp. *bartletii* Lumbsch
Distribution: WA, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Diploschistes conceptionis Vain.
Distribution: WA, Extra-Aust.

Diploschistes diacapsis (Ach.) Lumbsch
Distribution: NSW, SA, Extra-Aust.

Diploschistes elixii Lumbsch & Mangold
Distribution: WA, SA

***Diploschistes henssenia*e** Lumbsch & Elix
Distribution: WA, SA, NSW, VIC, TAS, Extra-Aust.

***Diploschistes sarcogynoide*s** Elix & P.M. McCarthy
Distribution: ACT

Diploschistes scruposus (Schreb.) Norman
Distribution: SA, NSW, ACT, VIC, TAS, Extra-Aust.

Diploschistes thunbergianus (Ach.) Lumbsch & Vězda
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Enchylium coccophorum (Tuck.) Otálora, P.M. Jørg. & Wedin
Name in previous publications: *Collema coccophorum* Tuck.
Distribution: WA, NT, SA, QLD, NSW, VIC, TAS, Extra-Aust.

Endocarpon aridum P.M. McCarthy
Distribution: WA, NT, SA, NSW, Extra-Aust.

Endocarpon crassisporum P.M. McCarthy & Filson
Distribution: SA, VIC, TAS

Endocarpon helmsianum Müll. Arg.
Distribution: WA, NT, SA, NSW, ACT, VIC, TAS

Endocarpon macrosporum P.M. McCarthy
Distribution: WA

Endocarpon pallidum Ach.
Distribution: WA, SA, QLD, NSW, ACT, Extra-Aust.

Endocarpon pusillum Hedw.
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Endocarpon robustum P.M. McCarthy
Distribution: SA

Endocarpon rogersii P.M. McCarthy
Distribution: NSW, SA

Endocarpon simplicatum* var. *bisporum P.M. McCarthy
Distribution: WA, SA, QLD, NSW, VIC, TAS, Extra-Aust.

Endocarpon simplicatum* var. *simplicatum (Nyl.) Nyl.
Distribution: WA, SA, NSW, ACT, VIC, TAS, Extra-Aust.

Fuscopannaria subimmixta (C. Knight) P.M. Jørg.
Distribution: SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Glonium circumserpens (Nyl.) Kantvilas & Coppins
Distribution: TAS

Gyalidea psammoica (Nyl.) Lettau ex Vězda
Distribution: NSW, ACT, Extra-Aust.

Gyalolechia bracteata (Hoffm.) A. Massal.
Name in previous publications: *Fulgensia bracteata* (Hoffm.) Räsänen
Distribution: WA, VIC, Extra-Aust.

Gyalolechia cranfieldii (S.Y. Kondr. & Kärnefelt) Søchting, Frödén & Arup
Name in previous publications: *Fulgensia cranfieldii* S.Y. Kondr. & Kärnefelt
Distribution: WA, SA, NSW, VIC

Gyalolechia subbracteata (Nyl.) Søchting, Frödén & Arup
Name in previous publications: *Fulgensia subbracteata* (Nyl.) Poelt
Distribution: WA, SA, NSW, VIC, not in TAS*, Extra-Aust.

Heppia despreauxii (Mont.) Tuck.
Distribution: WA, NT, NSW, Extra-Aust.

Heppia lutosa (Ach.) Nyl.
Distribution: QLD, Extra-Aust.

Heterodea beaugleholei *Filson*
Name in previous publications: *Cladia beaugleholei* (Filson) Parnmen & Lumbsch
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC

Heterodea muelleri (Hampe) Nyl.

Name in previous publications: *Cladia muelleri* (Hampe) Parnmen & Lumbsch
Distribution: WA, SA, QLD, NSW, LHI, ACT, VIC, TAS, Extra-Aust.

Heteroplacidium contumescens (Nyl.) Breuss
Distribution: SA, Extra-Aust.

Lecanora pseudistera Nyl.
Distribution: WA, NT, SA, QLD, NSW, NI, ACT, VIC, TAS, Extra-Aust.

Lecidea ochroleuca Pers.
Name in previous publications: *L. planata* Müll. Arg.
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Lecidea sarcogynoides Körb.
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Lecidea terrena Nyl.
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Lepraria coriensis (Hue) Sipman
Distribution: WA, SA, NT, QLD, NSW, NI, VIC, TAS, Extra-Aust.

Micarea almbornii Coppins
Distribution: NSW, ACT, TAS, Extra-Aust.

Micarea deminuta Coppins
Distribution: NSW, TAS, Extra-Aust.

Micarea humilis P.M. McCarthy & Elix
Distribution: ACT, NSW, TAS

Micarea melaenida (Nyl.) Coppins
Distribution: SA, TAS, Extra-Aust.

Myriospora smaragdula (Wahlenb. ex Ach.) Nägeli ex Uloth
Name in previous publications: *Acarospora smaragdula* (Wahlenb. ex Ach.) A. Massal.
Distribution: WA, SA, ACT, Extra-Aust.

Notocladonia cochleata (Müll. Arg.) S. Hammer
Distribution: WA, SA, QLD, NSW, VIC, TAS, Extra-Aust.

Paraporpidia glauca (Taylor) Rambold
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC

Paraporpidia leptocarpa (C. Bab. & Mitt.) Rambold & Hertel
Distribution: WA, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Peltula imbricata Filson
Distribution: NT

Peltula obscurans (Nyl.) Gyeln.
Name in previous publications: *P. subglebosa* (Müll. Arg.) Filson
Distribution: WA, NT, SA, QLD, Extra-Aust.

Peltula patellata (Bagl.) Swinscow & Krog
Name in previous publications: *P. australiensis* (Müll. Arg.) R. Filson
Distribution: WA, NT, SA, QLD, NSW, Extra-Aust.

Peltula radicata Nyl.
Distribution: WA, SA, QLD, Extra-Aust.

Placidium lacinulatum (Ach.) Breuss
Names in previous publications: *Catapyrenium lacinulatum* (Ach.) R. Sant., *Clavascidium lacinulatum* (Ach.) M. Prieto
Distribution: NT, SA, QLD, NSW, Extra-Aust.

Placidium pilosellum (Breuss) Breuss
Name in previous publications: *Catapyrenium pilosellum* Breuss

Distribution: WA, NT, SA, QLD, NSW, VIC, Extra-Aust.

Placidium squamulosum (Ach.) Breuss
Name in previous publications: *Catapyrenium squamulosum* (Ach.) Breuss
Distribution: WA, NT, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Placopyrenium trachyticum* var. *trachyticum (Haszl.) Breuss
Distribution: SA, NSW, Extra-Aust.

Psora crenata (Taylor) Reinke
Distribution: NT, SA, NSW, VIC, Extra-Aust.

Psora crystallifera (Taylor) Müll. Arg.
Names in previous publications: *Eremastrella crystallifera* (Taylor) Gotth. Schneid.
Distribution: WA, NT, SA, QLD, NSW, VIC, TAS, Extra-Aust.

Psora decipiens (Hedw.) Hoffm.
Distribution: WA, NT, SA, QLD, NSW, VIC, TAS, Extra-Aust.

Psora globifera (Ach.) A. Massal.
Distribution: SA, Extra-Aust.

Rinodina conradii Körb.
Distribution: WA, NSW, TAS, Extra-Aust.

Sarcogyne porphyricola P.M. McCarthy & Elix
Distribution: NSW, ACT

Sarcogyne regalis P.M. McCarthy & Elix
Distribution: NSW

Sarcogyne terrulenta P.M. McCarthy & Elix
Distribution: QLD, NSW, ACT

Sarcogyne tholifera P.M. McCarthy & Elix
Distribution: QLD, NSW, ACT

Siphula coriacea Taylor ex Nyl.
Distribution: WA, SA, QLD, NSW, VIC, Extra-Aust.

Thalloidima sedifolium (Scop.) Kistenich, Timdal, Bendiksby & S. Ekman
Names in previous publications: *Toninia sedifolia* (Scop.) Timdal; *Toninia caeruleonigricans* (Lightf.) Th. Fr.
Distribution: WA, SA, QLD, NSW, VIC, Extra-Aust.

Thysanothecium hookeri Mont. & Berk.
Distribution: WA, NSW, ACT, VIC, TAS, Extra-Aust.

Toninia scorigena (Müll. Arg.) Lumbsch & Messuti
Distribution: VIC

Toniniopsis aromatica (Sm.) Kistenich
Distribution: SA, QLD, NI, VIC

Toniniopsis bagliettoana (A. Massal. & De Not.) Jatta
Distribution: TAS, Extra-Aust.

Trapelia atrocarpa Elix & P.M. McCarthy
Name in previous publications: *T. terrestris* Elix & P.M. McCarthy
Distribution: SA, NI, NSW, ACT, VIC

Trapelia coarctata (Turner) M. Choisy
Distribution: WA, NT, SA, QLD, NSW, NI, ACT, VIC, TAS, MI, Extra-Aust.

Trapelia concentrica Elix & P.M. McCarthy
Distribution: NSW, ACT, TAS

Trapelia crystallifera Kantvilas & Elix
Distribution: WA, SA, NSW, ACT, VIC, TAS

Trapelia pruinosa Elix & P.M. McCarthy
Name in previous publications: *T. rosettiaeformis* Elix & P.M. McCarthy
Distribution: WA, SA, NSW, VIC, TAS

Verrucaria kowenensis P.M. McCarthy
Distribution: NSW, ACT

Verrucaria* aff. *nigrescens Pers.
Distribution: SA, NSW, ACT, VIC, TAS, Extra-Aust.

Xalocoa ocellata (Fr.) Kraichak, Lücking & Lumbsch
Name in previous publications: *Diploschistes ocellatus* (Vill.) Norman
Distribution: WA, SA, QLD, NSW, not in TAS*, Extra-Aust.

Xanthoparmelia alternata Elix & J. Johnst.
Distribution: WA, SA, NSW, VIC, Extra-Aust.

Xanthoparmelia amphixantha (Müll.Arg.) Hale
Distribution: SA, NSW, VIC, TAS, Extra-Aust.

Xanthoparmelia bellatula (Kurok. & Filson) Elix & J. Johnst.
Distribution: WA, SA, NSW, VIC, Extra-Aust.

Xanthoparmelia constipata (Kurok. & Filson) Elix & J. Johnst.
Distribution: WA, NT, SA, QLD, NSW

Xanthoparmelia convoluta (Kremp.) Hale
Distribution: SA, VIC

Xanthoparmelia eilifii Elix & J. Johnst.
Distribution: WA, SA, QLD, NSW, VIC

Xanthoparmelia eldridgei (Elix) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Name in previous publications: *Neofuscelia eldridgei* Elix
Distribution: SA, VIC

Xanthoparmelia flavescentireagens (Gyeln.) D.J. Galloway
Distribution: WA, SA, QLD, NSW, LHI, ACT, VIC, TAS, Extra-Aust.

Xanthoparmelia norconvoluta (Elix) Elix & J. Johnst.
Distribution: SA, VIC

Xanthoparmelia pseudoamphixantha (Elix & P.M. Armstr.) Elix & J. Johnst.
Distribution: SA, NSW, VIC

Xanthoparmelia pulla (Ach.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Name in previous publications: *Neofuscelia pulla* (Ach.) Essl.
Distribution: WA, SA, QLD, NSW, LHI, ACT, VIC, Extra-Aust.

Xanthoparmelia reptans (Kurok.) Elix & J. Johnst.
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Xanthoparmelia semiviridis (F. Muell. ex Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Name in previous publications: *Chondropsis semiviridis* (F. Muell. ex Nyl.) Nyl. ex Cromb.
Distribution: WA, SA, QLD, NSW, ACT, VIC, Extra-Aust.

Xanthoparmelia subdistorta (Kurok.) Hale
Distribution: WA, SA, NSW, VIC

Xanthoparmelia subprolixa (Nyl. ex Kremp.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Distribution: WA, SA, QLD, NSW, ACT, VIC, TAS

Xanthoparmelia substrigosa (Hale) Hale
Distribution: WA, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Xanthoparmelia taractica (Kremp.) Hale

Distribution: WA, SA, QLD, NSW, ACT, VIC, TAS, Extra-Aust.

Xanthoparmelia tasmanica (Taylor) Hale
Distribution: WA, SA, QLD, NSW, LHI, ACT, VIC, TAS, Extra-Aust.

Xanthoparmelia terrestris (Kurok. & Filson) Elix & J. Johnst.
Distribution: WA, SA, QLD, NSW, VIC, Extra-Aust.

Xanthoparmelia verrucella (Essl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch
Name in previous publications: *Neofuscelia verrucella* (Essl.) Essl.
Distribution: WA, NT, SA, QLD, NSW, NI, ACT, VIC, TAS, Extra-Aust.

Xanthoparmelia versicolor (Müll. Arg.) Hale
Distribution: WA, SA, QLD, NSW, VIC

Xanthoparmelia willisii (Kurok. & Filson) Elix & J. Johnst.
Distribution: WA, SA, QLD, NSW, TAS

Acknowledgements

The authors would like to thank Patrick McCarthy, Jack Elix, Roger Rosentreter, Simone Louwhoff and David Eldridge for providing advice or feedback on the checklist, and Chris Cargill for her help with the biocrust literature.

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