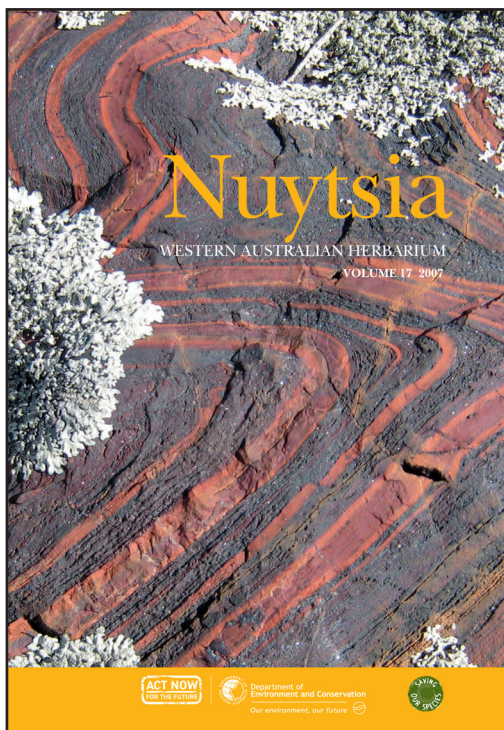


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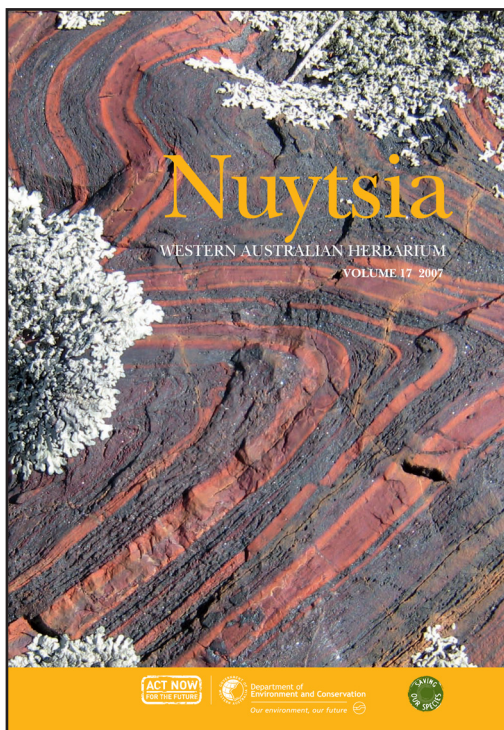
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Caladenia petrensis and *C. saxicola* (Orchidaceae), two new ironstone endemics from south-west Western Australia

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Abstract

Brown, A.P. & Brockman, G. *Caladenia petrensis* and *C. saxicola* (Orchidaceae), two new ironstone endemics from south-west Western Australia. *Nuytsia* 17: 73–80 (2007). *Caladenia petrensis* A.P.Br. & G.Brockman and *C. saxicola* A.P.Br. & G.Brockman are described and illustrated, their relationship with the closely related *C. incensa* Hopper & A.P.Br. is discussed and a key provided. Both species are placed in *Caladenia* R.Br. subg. *Phlebochilus* (Benth.) Hopper & A.P.Br. based on the flowers having long filamentous tepals and the labellum with two rows of broadly anvil-shaped, glossy calli.

Introduction

Following the taxonomic revision of *Caladenia* R.Br. by Hopper and Brown (2001) in which 69 new Western Australian taxa were described, additional study of herbarium material and plants in the field has led the present authors to believe that a further 23 Western Australian taxa warrant recognition. Two of these, *Caladenia petrensis* A.P.Br. & G.Brockman and *C. saxicola* A.P.Br. & G.Brockman, are endemic to banded ironstone hills and gullies and are described here. Both were discovered during field work north-west of Kalgoorlie and east of Perenjori in the 1980s and 90s but were at that time placed in *Caladenia incensa* Hopper & A.P.Br. based on the flowers having long filamentous tepals and the labellum with two rows of broadly anvil-shaped, glossy calli. They differ however in occurring on Banded Iron Formations, rather than the granitic soils preferred by *C. incensa* and in usually having a narrower leaf. Both have smaller, dull cream to pale yellow, rather than glistening white, flowers and a labellum lacking irregular spots and blotches towards the apex. *Caladenia petrensis* also differs from *C. incensa* in usually having pendulous rather than obliquely upcurved petals.

Caladenia petrensis and *C. saxicola* are in what is commonly termed the *C. filamentosa* R.Br. complex, species of which are placed in *Caladenia* subg. *Phlebochilus* (Benth.) Hopper & A.P.Br. These species have flowers with attenuate tepals lacking thickened osmophores, labellum lamina calli in two well spaced rows and the column base with two inconspicuous, linear, opaque to very pale yellow, gland-like structures (Hopper & Brown 2001).

Szlachetko (2001a) erected the new genus *Jonesiopsis* Szlach. to accommodate *J. multiclavia* (Rchb.) Szlach. Jones and Clements (2003) transferred to *Jonesiopsis* species previously placed in *Caladenia*

subg. *Phlebochilus* and erected three subgenera – *Jonesiopsis* subg. *Jonesiopsis*, *J.* subg. *Phlebochilus* (Benth.) D.L.Jones & M.A.Clem. and *J.* subg. *Calonema* (Lindl.) D.L.Jones & M.A.Clem. Following their concepts, *Caladenia petrensis* and *C. saxicola* would be placed in *Jonesiopsis* subg. *Calonema*. However, Jones and Clements persisted with the incorrect view of Jones (2001) and Jones *et al.* (2001) that *Caladenia filifera* Lindl. (a member of the *C. filamentosa* complex and in Hopper and Brown's subg. *Phlebochilus*) is the type of *Caladenia* sect. *Calonema* (Lindl.) Benth. Although they designated it as the lectotype according to the rules of the International Code of Botanical Nomenclature (McNeill *et al.* 2006), this was predated by the valid selection of *Caladenia longicauda* Lindl. as lectotype by Hopper and Brown (2001), thus placing members of subgenus *Calonema* in the *C. longicauda*, rather than the *C. filamentosa* complex as proposed by Jones and Clements. For a full explanation refer to Hopper and Brown (2004).

To add to this confusion, significant differences in generic and some species concepts between Jones and Clements, and Szlachetko, has resulted in many conflicting names. The situation was exacerbated when attempts by Szlachetko (2001b), Jones *et al.* (2002), Jones and Clements (2002, 2003) and Clements and Jones (2002) to rectify mistakes made in their earlier papers, introduced greater complexity resulting in major nomenclatural confusion.

Given the incorrect type citations and nomenclatural upheaval that has followed their differing generic concepts we see little merit in following the generic concepts proposed by Szlachetko or Jones and Clements and there are no compelling phylogenetic reasons for such a split. *Caladenia* has been affirmed in several DNA sequence studies as monophyletic (Kores *et al.* in Hopper & Brown 2001; Jones *et al.* 2001) and we are retaining it in the broad sense with six subgenera, and have placed *C. petrensis* and *C. saxicola* in *Caladenia* subg. *Phlebochilus*.

Key separating *Caladenia petrensis* and *C. saxicola* from *C. incensa*

1. Leaf usually 8–15 mm wide (rarely 6–9 mm wide); flowers 8–14 cm across, bright white; labellum with maroon radiating lines, becoming irregular spots and blotches towards the apex of the lamina **C. incensa**
- 1: Leaf usually 2–8 mm wide (rarely to 11 mm wide); flowers 5–8 cm across, dull cream to pale yellow; labellum with maroon radiating lines, lacking irregular spots and blotches towards the apex of the lamina
2. Flowers usually 5–6 cm across, petals spreading horizontally, then becoming pendulous (when fresh) or more rarely obliquely upcurved; labellum lamina calli creamy-white, sometimes with pale pink markings **C. petrensis**
- 2: Flowers usually 6–8 cm across, petals spreading horizontally, then obliquely upcurved (when fresh) or more rarely downcurved; labellum lamina calli creamy-yellow. **C. saxicola**

Taxonomy

Caladenia petrensis A.P.Br. & G.Brockman, *sp. nov.*

Caladenia incensae Hopper & A.P.Br. affinis sed foliis plerumque angustioribus et maculis irregularibus rubro-purpureis carentibus, floribus parvioribus sordide flavis vel cremeis-flavis, petalis angustioribus

deorsum curvatis vel pendulis, et labello parviore marginibus integris limitatis ad basalis octavum differt.

Typus: north-west of Rothsay Mine and east-north-east of old Karara Station Homestead, north side of road, Western Australia, 26 August 2003, *G. Brockman* 893 (*holo*: PERTH 06733964).

Caladenia sp. Rothsay (G. Brockman GBB404), in FloraBase, <http://florabase.dec.wa.gov.au> [accessed June 2007].

Plant solitary or in small clumps. *Leaf* 3–9 cm × 6–8 (rarely to 11) mm, linear, incurved to flattened, erect, pale green, basal third rarely irregularly blotched with red-purple. *Scape* 17–37 cm tall. *Flowers* 1 or 2, *c.* 5–6 cm across, dull creamy-yellow with maroon lines, spots and blotches; floral odour unknown. *Sepals and petals* linear-lanceolate in basal third to half, then abruptly narrowing to a brownish-black, densely glandular, long-acuminate, filamentous apex lacking a tumescent osmophore, glandular hairs elongate, cylindrical. *Dorsal sepal* 4–7 cm × 2–3 mm, erect and slightly incurved. *Lateral sepals* 5–7 cm × 3–4 mm, spreading obliquely outwards, then becoming pendulous (when fresh), rarely obliquely upcurved. *Petals* 5–6 cm × 2–4 mm, spreading horizontally, then becoming pendulous. *Labellum* with prominent pale to deep maroon radiating lines, stiffly articulated on a claw *c.* 1–2 mm wide; lamina 12–15 × 8–10 mm, narrowly triangular to triangular (rarely rhomboidal) in outline when flattened, obscurely 3-lobed, erect with entire margins in basal eighth, nearly horizontal in middle third, apical third sharply recurved, transverse cross-section at widest point in front view scarcely curved upwards and terminated by slightly ascending margins and calli, distal margins dentate with truncate, forwardly uncinuate, white, marginal calli decrescent towards the apex; lamina calli creamy-yellow or creamy-white, sometimes with pale pink markings, glossy on top, broadly anvil-shaped, the longest *c.* 1.5 mm tall, in 10–16 pairs in two rows extending about two-thirds to three-quarters the length of the labellum, slightly decrescent distally. *Column* 11–14 × 3–5 mm, narrowly winged, opaque cream with pale maroon stripes or more rarely blotches, sparsely hirsute with short glandular hairs on outer surface. *Anther* *c.* 1.5 × 2.5 mm, greenish-yellow. *Pollinia* *c.* 1.5–2.5 mm long, kidney-shaped, flat, yellow, mealy. *Stigma* *c.* 1.5–2.5 mm wide. *Capsule* not seen. (Figure 1A)

Selected specimens examined. WESTERNAUSTRALIA: N side of road to Rothsay minesite, 21 Aug. 1998, *G. Brockman* 404 (PERTH 05216176); 3 km WNW of Canna, 37 km NW of Morawa, 17 Aug. 1983, *S.D. Hopper* 3133 (PERTH 00267961); N side of Great Northern Hwy, 123.8 km NE of Wubin, *c.* 13.4 km NNE of Warriedar Rd, 23 Aug. 1988, *S.D. Hopper* 6505 (PERTH 01669699); S side of road from Warriedar to Wubin, 20 km SE of Warriedar, 27 Aug. 1988, *S.D. Hopper* 6552 (PERTH 01669680); on N side of Mungada Rd, 6.8 km W of Lochada Rd, Kadji Kadji Station, *c.* 29 km E of Morawa, 11 Aug. 1999, *G.J. Keighery & N. Gibson* 5803 (PERTH 06851088).

Distribution and habitat. Occurs from Perenjori northwards to Canna and eastwards to near Paynes Find (Figure 2). Plants are commonly seen in moist soils on or around ironstone hills or along rocky creeks and other seasonally moist habitats, usually under scattered *Acacia* amongst dense low annuals.

Phenology. Flowers from late July to September.

Conservation status. Not currently rare or under immediate threat but occurs in ironstone areas that may be subject to future mining.

Etymology. Named from the Latin *petrensis* (stony), alluding to the rocky habitat of the species.

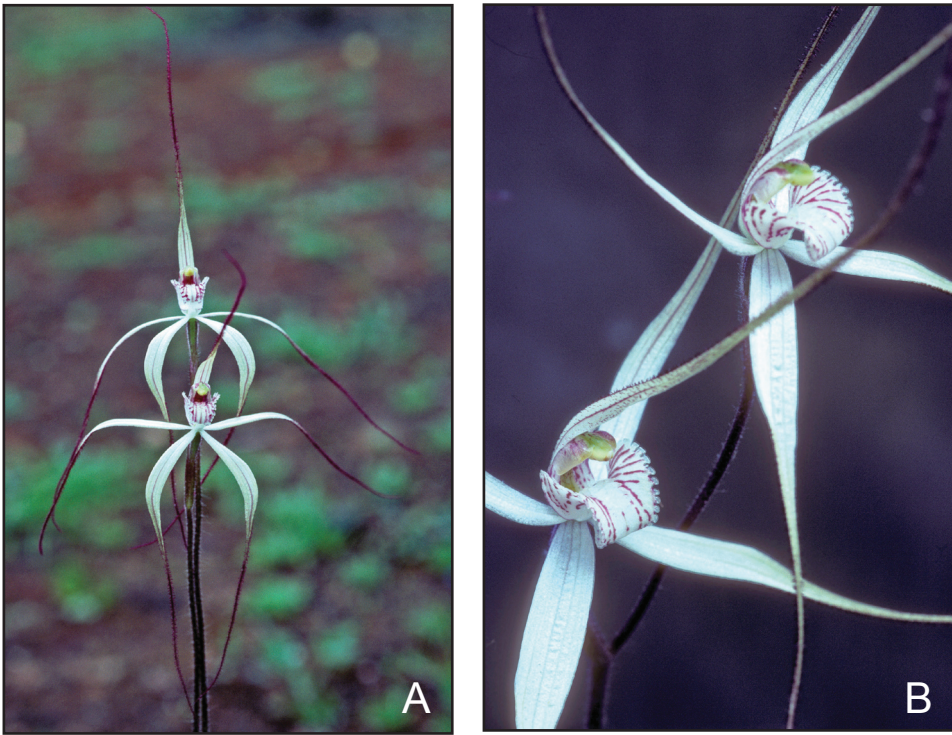


Figure 1. A – *Caladenia petrensis* from road to Rothsay minesite (G. Brockman 404); B – *Caladenia saxicola* from Jaurdi Hills, NW of Coolgardie (G. Brockman 487).

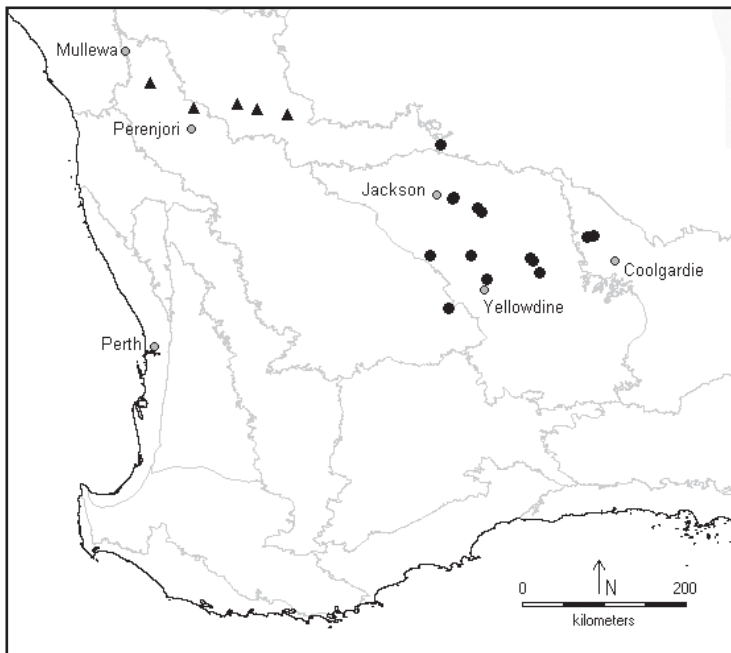


Figure 2. Distribution of *Caladenia petrensis* (▲) and *C. saxicola* (●) in south-west Western Australia.

Notes. *Caladenia petrensis* is locally common on hills and rocky creeklines east of Perenjori where it often grows near to the closely related *C. incensa*. It differs from *C. incensa*, however, in usually inhabiting ironstone rather than granitic soils and in having a generally narrower leaf, smaller, dull, creamy to creamy-yellow flowers with narrower, down-curved to pendulous petals and lateral sepals and a smaller labellum, with entire margins confined to basal eighth. *Caladenia petrensis* is also allied to *C. saxicola* and like that species, inhabits rocky ironstone hills. It differs in having a more north-westerly distribution and smaller flowers with down-curved to pendulous petals and creamy-white labellum lamina calli, often with pale pink markings.

In seasons of good rainfall *Caladenia petrensis* is often locally abundant but is rare or absent in drought years.

Caladenia petrensis occasionally hybridises with *C. pachychila* Hopper & A.P.Br. to produce plants resembling *C. × ericksoniae* Nicholls.

Caladenia saxicola A.P.Br. & G.Brockman, *sp. nov.*

Caladenia incensae Hopper & A.P.Br. affinis sed foliis plerumque angustioribus, floribus parvioribus sordide flavis vel pallide flavis, tepalis angustioribus, et labello parviore puncto atque maculo versus apicem carenti differt.

Typus: Jaurdi Hills, 4 km from road to Mount Burges, Coolgardie District, Western Australia, 1 September 1999, *K.J. Fitzgerald, A.P. Brown, G. Brockman, N. Evans & C.J. French* KJF 177 (*holo:* PERTH 06274536; *iso:* CANB, BRI, MEL, NSW).

Caladenia jaurdiensis Hopper & A.P.Br. ms, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed June 2007].

Plant solitary or in small clumps. *Leaf* 5–13 cm × 2–7 mm, linear, incurved, sometimes flattened, erect, pale green. *Scape* 17–35 cm tall. *Flowers* 1 or 2, c. 6–8 cm across, cream to pale yellow with maroon lines, spots and blotches; floral odour unknown. Sepals and petals stiffly held, linear-lanceolate in basal fifth to quarter, then abruptly narrowing to a purplish-black, glandular, long-acuminate, filamentous apex lacking a tumescent osmophore, glandular hairs elongate, cylindrical. *Dorsal sepal* 6–8 cm × 2–3 mm, erect and slightly incurved. *Lateral sepals* 7–9 cm × 2–4 mm, spreading outwards, then obliquely downwards. *Petals* 4–8 cm × 1–4 mm, spreading horizontally, then obliquely upcurved (when fresh) or more rarely downcurved. *Labellum* with prominent pale maroon radiating lines, stiffly articulated on a claw c. 1.5–2 mm wide; lamina 14–18 × 6–9 mm, narrowly triangular to triangular (rarely rhomboidal) in outline when flattened, obscurely 3-lobed, erect with entire margins in basal third, nearly horizontal in middle third, apical third sharply recurved, transverse cross-section at widest point in front view scarcely curved upwards and terminated by slightly ascending margins and calli, distal margins serrate with cream to pale yellow marginal calli decrescent towards the apex; lamina calli creamy-yellow, glossy on top, broadly anvil-shaped, the longest c. 1.5 mm tall, in 10–16 pairs in two rows extending about two-thirds to three-quarters the length of the labellum, slightly decrescent distally. *Column* 10–12 × 4–6 mm, narrowly winged, opaque pale yellow with pale maroon blotches, sparsely hirsute with short glandular hairs on outer surface near base. *Anther* c. 2 × 2 mm, greenish-yellow. *Pollinia* c. 2–2 mm long, kidney-shaped, flat, yellow, mealy. *Stigma* c. 2 mm wide. *Capsule* not seen. (Figure 1B)

Selected specimens examined. WESTERN AUSTRALIA: hill S of “saddle” (Bungalbin Hill), 8 Sep. 1988, *J.J. Alford* 1139 (PERTH 01668064); Jaurdi Hills, NW Coolgardie, 1 Sep. 1999, *G. Brockman* 487 (PERTH 05533430); 10 km ENE of 13.5 Mile Well, 4 km N of Diemals track, W of Diemals, 5 Sep. 1999, *G. Brockman* 510 (PERTH 05533716); ENE of 13.5 Mile Gnamma Hole, 5 Sep. 1999, *G. Brockman* 511 (PERTH 05533724); Ryans Find Rd, 15 km N of Great Eastern Hwy, 31 Aug. 2003, *G. Brockman* 923 (PERTH 06736122); Ryans Find Rd, SE of Mt Walter, 30 Aug. 2003, *G. Brockman* 928 (PERTH 06734103); track from Ryans Find Rd along the E side of Mt Walter, 30 Aug. 2003, *G. Brockman* 929 (PERTH 06734030); Mt Walter, S of Jaurdi Station on Ryans Find Rd, 30 Aug. 2003, *G. Brockman* 931 (PERTH 06734014); Koolyanobbing – Southern Cross road, W of pull off, 30 Aug. 2003, *G. Brockman* 933 (PERTH 06734006); southern flank of Helena Range, c. 6.5 km NW of Bungalbin Hill, 27 Jul. 1995, *N. Gibson & M. Lyons* 3370 (PERTH 05393280); 12 km NW of Bullfinch, 11 km S of Mt Colreavy, 1 Sep. 1984, *S.D. Hopper* 4002 (PERTH 00331325); Muddarning Hill, 3 km SE of Mt Jackson, 69 km NNW of Koolyanobbing, 1 Sep. 1984, *S.D. Hopper* 4012 (PERTH 00268429); Muddarning Hill, 3 km SE of Mt Jackson, 69 km NNW of Koolyanobbing, 1 Sep. 1984, *S.D. Hopper* 4015 (PERTH 00268445); c. 500 m E of Marda Dam, 5 km NE of Mt Jackson, 70 km NNW of Koolyanobbing, 3 Sep. 1984, *S.D. Hopper* 4028 (PERTH 00268453); Bungalbin Hill SW facing slope, 39 km ESE of Mt Jackson, 49 km N of Koolyanobbing, 3 Sep. 1984, *S.D. Hopper* 4029 (PERTH 00268410); Duladgin Rock Nature Reserve, 35 km ENE of Southern Cross, 4 Sep. 1984, *S.D. Hopper* 4041 (PERTH 00268887).

Distribution and habitat. Occurs from west of Diemals Station homestead, eastwards to the Jaurdi Hills, north of Coolgardie and south-west to Southern Cross (Figure 2). Plants are commonly seen in moist soils on the slopes of banded ironstone hills or along seasonal drainage lines and other seasonally moist habitats nearby, usually under scattered *Acacia*, *Allocasuarina* and *Eucalyptus* species amongst *Alyxia buxifolia*, *Exocarpus sparteus* and *Hibbertia* sp. over low sedges, annuals and perennials.

Phenology. Flowers from late July to early September.

Conservation status. Not currently rare or under immediate threat but is found on ironstone hills that may be subject to future mining.

Etymology. Named from the Latin *saxicola* (rock growing), alluding to the rocky habitat of the species.

Notes. *Caladenia saxicola* is a common species on ironstone hills between Coolgardie and Diemals Station, in this area extending further north-east than all other *Caladenia* species found in Western Australia.

The nearest relatives of *Caladenia saxicola* appear to be *C. incensa* and *C. petrensis* but *C. saxicola* has a more easterly distribution and contains morphological characters that readily distinguishes it from these species. From *C. incensa*, *C. saxicola* differs in its usually narrower leaf, smaller flowers, dull cream to pale yellow, rather than glistening white, colouration and labellum with maroon radiating lines, lacking irregular spots and blotches towards the apex. From *C. petrensis*, *C. saxicola* differs in its larger flowers, horizontally spreading, obliquely upcurved petals and creamy-yellow labellum lamina calli.

Acknowledgements

We are grateful to many colleagues who have shared time in fieldwork, assisted in collections of the species described herein and offered advice in the preparation of this paper. We are especially grateful to many members of the WA Native Orchid Study and Conservation Group who have assisted our research on *Caladenia*, to Virginia Bird, Justin Brown, Greg and Mary Bussell, Nye Evans, Karina Fitzgerald, Chris French, Ian Greeve, Joan Greeve and Joff Start for their company in the field and sharing their considerable knowledge with us, to Paul Wilson for the Latin diagnoses, to the Director and staff of PERTH for access to specimens. The distribution map was compiled by Juliet Wege using DIVA-GIS Version 5.2.0.2 and is based on PERTH specimen data.

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