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Goodenia valdentata (Goodeniaceae), a new rare species endemic to Davenport Range, South Australia

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Abstract

A new arid zone species endemic to Davenport Range in South Australia is formally described as *Goodenia valdentata* P.J.Lang. It belongs in subsection *Goodenia* and fits within a group of species allied to *G. grandiflora* Sims. Previously, *G. valdentata* has been confused with *Goodenia saccata* Carolin and *G. chambersii* F.Muell., and characters distinguishing the three species are tabulated. *Goodenia valdentata* appears most closely related to *G. chambersii*, with *G. saccata* a more distant relative strongly linked to *G. albiflora* Schldl. by the synapomorphies of crenulate-laciniate corolla wing margins and flattened, short, white hairs inside the corolla. Based on its restricted range *G. valdentata* warrants listing as rare in South Australia.

Keywords: biodiversity, new species, taxonomy, Australia, *Goodenia* subsect. *Goodenia*.

This new species of *Goodenia* Sm. was first collected by B.G. (Bruce) Andrews¹ in October 1968 on Nilpinna Station. It is represented by nine collections in the State Herbarium of South Australia (AD), all from the vicinity of Davenport Range, a small isolated range on the boundary between Nilpinna and Peake Stations, c. 750 km NNW of Adelaide. Six of the existing AD collections have hitherto been identified as *Goodenia saccata* Carolin and the other three as *G. chambersii* F.Muell. (State Herbarium of South Australia 2013). Although related to these species, comparison of herbarium material shows that the new taxon is consistently and clearly distinct from both.

Goodenia valdentata P.J.Lang, sp. nov.

Typus: F.J.Badman per W.R.Barker 5267, 28 Aug. 1986, 0.5 km SE of Levi Springs Bore, 28°22'35"S 136°09'32"E, Lake Eyre Region, South Australia, (holo.: AD 99524087; iso.: CANB, K).

Goodenia saccata auct. non Carolin: Jessop, List Vasc. Pl. S. Austral. ed 4, 87 (1993), as to LE occurrence.

Perennial, erect-stemmed *subshrub* to 80 × 80 cm. *Stems* branched, with a fine, velvety indumentum of dense, short, simple hairs and sparse, short, glandular hairs; prominently ridged, becoming woody. *Leaves* usually with 1–6 widely spaced, patent, narrow petiolar lobes or pinnae 2–5 mm long, arising along the petiole 7–20 (–25) mm long; *lamina* narrowly ovate to ovate, 16–36 (–46) × 9–25 mm, deeply and coarsely dentate with 14–25 (–29) teeth (including 1–9 (–13) secondary teeth), primary teeth 1.5–5 mm long with an elongated terminal tooth, 2.5–7.5 (–9) mm long, forming

an acute to acuminate apex; midrib prominent on abaxial surface, strongly and sharply raised at base, gradually shallower towards apex and disappearing near base of the terminal tooth (but continuing almost to the apex in upper inflorescence leaf-bracts); mid vein only weakly evident in lower two thirds of adaxial surface; both surfaces finely velvety with patent, stiff, short, fine, simple hairs, c. 0.1 mm long, and obscure, sparse, short glandular hairs. *Inflorescence:* flowers solitary, or rarely 2-flowered, in axils of upper stems, forming weakly differentiated leafy racemes or rarely thyrses; *bracts* leaf-like, becoming more elongate and deeply-toothed up the stem; *peduncles* 1–1.5 mm long; *bracteoles* very narrowly lanceolate, 6–10.5 × 0.8–1.2 mm, with mid-rib on abaxial side; *pedicels* angular, 5–11 mm long, persistent, articulate 1.2–2 mm below base of ovary. *Hypanthium* with 5 prominent, velvety ribs continuous with calyx lobes and covered in dense, simple hairs, intervening areas with mid-dense, short, glandular hairs, 5–7.8 mm long, grading into a basal stalk, 1.2–2 mm long. *Calyx lobes* green, leafy, narrow-lanceolate, 5.7–8 × 1.1–1.5 mm, with a midrib in the lower 1/2–2/3, often with 1–3 (–4) weak teeth. *Corolla* a bright, rich yellow, often with purple veining inside on the lower part, 25–30 mm long, articulate; *outside* pubescent with dense, patent, short, fine, simple hairs; *inside* glabrous apart from fine, soft hairs at base of the tube, rows of prominent enations present in basal parts; *pouch* on upper 1/3–1/2 of the hypanthium, 2.5–4.5 mm long, shallow; *lobes* distinct from wings, lanceolate to narrow-triangular, with apices acute to acuminate, with a narrow blunt tip extending a little beyond the wings; *wings* entire, with sparse, marginal setae 0.4–0.7 mm long, not projected beyond lobe apex but gradually, or abruptly, narrowed apically to form a

¹ B.G. Andrews was briefly working in the area for North Broken Hill Ltd and developed an interest in the local flora; he submitted a total of 79 collections to the State Herbarium, all made in 1968.



Fig. 1–3. *Goodenia valdentata*. 1 habit and habitat: flowering shrub on sandstone outcrop; 2 flowers and foliage; 3 detail of leaves. — *D.E.Murfet 7034 et al.* Photos: D.J. Duval, S.A. Seed Conservation Centre.



Fig. 4. *G. valdentata*. Flowers, showing tapered corolla wings, and style with fine spreading hairs visible on the upper part. — D.E.Murfet 7034 et al. Photo: D.J. Duval, S.A. Seed Conservation Centre.

combined acute to obtuse apex. *Adaxial corolla lobes* diverging from fused corolla at 7–10 mm from base, 12–18 mm × 1.9–2.5 mm; wings ± equal, 7–12 × 1.4–2 mm; lacking distinct auricles. *Abaxial corolla lobes* separating at a further 3.5–6.5 mm past divergence of adaxial lobes, 10.5–16 × 2.5–3.5 mm; wings 7–9 × 1.5–2.8 mm. *Stamen* filaments linear, 7–7.5 mm long; anthers narrowly oblong to linear, 2.2–3.7 × 0.5–0.7 mm, apiculate, with small, ovate extension 0.3–0.6 mm long. *Style* 16–21 mm long, pale cream with some short, glandular hairs and soft, fine, spreading hairs, 0.5–1 mm long, for almost its entire length, but becoming purple and with longer hairs to 1.5 mm near junction with indusium. *Indusium* inclined forwards at almost right-angles to style, pale purplish-grey, obovoid-trapezoid, 2–2.6 mm long, dorsiventrally compressed, with apical margin lightly convex from above and 3.8–4.1 mm wide, base 2.1–2.5 mm wide, glabrous except for some long hairs in a darker, purplish zone at its base, orifice beset with dense, white bristles 0.4–0.6 mm long. *Fruit* ellipsoid, 10–14 × 5–7 mm, tapered at base into a short stalk, 0.5–2.5 mm long, 2-valved; *valves* extending 2–3 mm beyond attachment of calyx lobes, apices rostrate and usually bifid, sometimes splitting towards base and giving the appearance of a 4-valved fruit; septum 2/3–3/4 the length of loculus. *Seeds* light brown, broadly elliptic, 3.6–4.1 × 2.3–2.6 mm, papillulose, surrounded by a raised thickened margin with a squared-off edge. **Fig. 1–4, 7, 10.**

Diagnostic features. The new species has bracteolate pedicels and falls in subsection *Goodenia* (Carolin 1992), comprising over 53 species. Within this subsection it belongs with a loose group of species allied to *G.*



Fig. 5. *G. chambersii*. Flowers, showing the abruptly terminated corolla wings and absence of hairs around the style apex. — D.J.Duval 1888 & M.J.Thorpe. Photo: D.J. Duval, S.A. Seed Conservation Centre.

grandiflora Sims, a widespread and variable species extending from coastal N.S.W. and Qld to the ranges of central Australia in N.T., and W.A. The group also includes *G. brunnea* Carolin, *G. kingiana* Carolin, and *G. macmillanii* F.Muell., as well as *G. chambersii*, *G. saccata* and possibly *G. albiflora* Schltld., all species that have been previously treated as *G. grandiflora* or varieties thereof. Species of this group are shrubby perennials (excepting *G. albiflora* which is a resascent rhizomatous perennial), and they are usually long-lived, and found on rocky substrates. *Goodenia valdentata* is clearly distinct from all these species, but is most like *G. grandiflora*, *G. chambersii* and *G. saccata* in its general appearance. It differs from *G. grandiflora* by its narrower leaves that are never cordate at the base, the more deeply serrate leaf margin, and consistently ciliate corolla wings (with long sparse setae) that taper to the lobe apex. *Goodenia valdentata* most closely resembles the two South Australian endemic species, *G. chambersii* and *G. saccata*, with which it has been previously confused. Diagnostic characters separating these three taxa are summarised in Table 1.

Goodenia valdentata has distinctive corolla wings that are gradually to steeply tapered apically (Fig. 4) rather than abruptly terminated. Combined with the main body of the lobe this produces an obtuse to acute apex. In contrast, the combined apex in *G. chambersii* is truncate (Fig. 5) or often emarginate where the wings are angled forwards beyond the apex; in *G. saccata* it is truncate with the lobe apex protruding as a short acute extension.

The three species can also be separated on leaf characters alone. The leaves of *Goodenia valdentata* are distinctive by their longer lateral teeth (to > 3 mm)



Fig. 6. Isotype of *G. saccata* (detail), showing short white flattened hairs on inside of corolla and crenulate-laciniate wing margins. — HJ. Eichler 12676 (MEL 23070). Photo: JSTOR Global Plants.

and the attenuate terminal tooth that is especially pronounced on the upper leaf-bracts (Fig. 3 & 10). They are consistently more elongate than the ovate-orbicular leaves of *G. chambersii* and approach those of *G. saccata* in their general shape, but differ by their deeper, more regular teeth. By contrast *G. saccata* has more secondary teeth, producing a somewhat irregular almost bidentate margin. The leaves of both *G. valdentata* and *G. saccata* are strictly speaking pinnatisect and bear 1–6 small petiolar pinnae. The pinnae in *G. valdentata* are narrower and less well developed than in *G. saccata*, while in *G. chambersii* they are always absent.

An unusual feature of *G. valdentata* is the development of 1–3 weak teeth on many of the calyx lobes. This was observed in four of the six collections of *G. valdentata* with flowers but in only seen once in *G. saccata* (on the holotype), and not at all in *G. chambersii*.

Affinities. *Goodenia valdentata* is geographically situated between *G. chambersii* and *G. saccata* species (Fig. 13) and shares some morphological features of each. *Goodenia chambersii* is found on breakaways in gypseous landscapes around Coober Pedy, Arckaringa and Evelyn Downs, and also extends southwards in an arc on residuals of the Stuart Range, well to the west of the range of *G. valdentata*. *Goodenia saccata* is endemic to the northern Flinders Ranges and occurs as three discrete major populations on basement rocks, in the Arkaroola-Yankaninna, Blinman-Parachilna-Moolooloo and Leigh Creek-Beltana areas.

Goodenia valdentata matches *G. chambersii* in its larger, bright yellow flowers with a mostly glabrous indusium, prominent enations on the inside of the corolla, and entire wings that are distinctly ciliate with widely-spaced setae, particularly in their lower part. The latter character was among three highlighted by Carolin (1992) in justifying the recognition of *G. chambersii* as distinct from *G. grandiflora*. This status is supported by the molecular phylogenetic analysis of Goodeniaceae by Jabaily et al. (2012) where *G. chambersii* and *G.*



Fig. 7. *G. valdentata* seed. — LHS: BS69-25204; RHS: B. Andrews, 10 Oct. 1968.

grandiflora emerged as well separated sister species. The distinctive seed features of *G. chambersii* (more prominent sculpturing and a smoother, more tapered rim) are not shared by *G. valdentata* or *G. saccata*, which both have seeds with a squared rim typical of other species in the *G. grandiflora* group (Fig. 7–9). *Goodenia valdentata* is close to *G. saccata* in general leaf shape, presence of petiolar pinnae, its seed characters and in having spreading hairs distributed over the entire length of the style. However, *G. saccata* differs by its lighter and slightly glaucous foliage, predominantly white flowers (see Notes, p. 54), larger corolla tube pouch, and sweet scent (noted as especially strong in the late afternoon). A similar set of features is found in *G. calcarata* F. Muell.² and *G. albiflora* and is indicative of a pollination syndrome, possibly for night-flying insects, such as moths. More importantly, *Goodenia saccata* has two distinctive apomorphic features that are absent in *G. valdentata*, but shared with *G. albiflora*: stiff, short, white, flattened-clavate (to narrow-oblongeolate) hairs on the inside of the corolla, and irregularly crenulate-laciniate corolla wing margins (Fig. 6). Its closest relationship appears to be with *G. albiflora* rather than *G. valdentata*.

Overall, the new species appears more closely related to *G. chambersii* than to *G. saccata*, despite the obviously divergent leaf morphology of the former.

Distribution. *Goodenia valdentata* is endemic to Davenport Range and associated drainage lines, in the Lake Eyre Region of South Australia (Fig. 13 & 14). It is not to be confused with the Davenport Range of Northern Territory, but is part of a system generally referred to as the Peake and Denison Ranges (Twidale 2007, Ambrose et al. 1981), comprising small isolated remnants of the Adelaide Geosyncline fold belt, from which the Mt

² *Goodenia calcarata* (F. Muell) F. Muell. exhibits a similar pollination syndrome, but has the pouch extended into a prominent nectary spur. However, it appears less closely related and also differs by its ephemeral habit, entire corolla wing margins, and stiff purple hairs on the inside of the corolla that are slightly thickened but not flattened as in *G. saccata* and *G. albiflora*.



Fig. 8. *G. chambersii* seed. — LHS: *B.Lay* 638; RHS: *E.H.Ising*, 22 Oct. 1955.



Fig. 9. *G. saccata* seed. — LHS: *K.H.Brewer* 640; RHS: *L.D.Williams* 11722.

Lofty and Flinders Ranges were formed. The range straddles the boundary of Nilpinna Station and The Peake Station, and populations of *G. valdentata* occur on both properties.

Habitat. The major rock type in the Davenport Range is sandstone of the Burra Group from the Late Proterozoic (S.A. Dept Mines and Energy 1982). Collectors' field notes describe *G. valdentata* as occurring on rocky outcrops or hill slopes (4 collections) or watercourses (5 collections). In all but one case, mention is made of the substrate being rocky or having a moderate to dense cobble strewn. It is recorded as growing in: crevices of deep red-brown rocks, skeletal brown soil, clayey sand, and silty clay loam. The vegetation of Davenport Range is mostly Open Woodland dominated by mulga and chenopods (Gee et al. 1996). For the two collections

from Biological Survey of S.A. quadrats, data on surrounding vegetation indicate a very sparse tree or shrub stratum dominated by *Acacia* species (*A. ligulata*, *A. salicina* and *A. tetragonophylla*) or red gum (*Eucalyptus camaldulensis*) in the watercourses.

Conservation status. The known range of *G. valdentata* spans 21 × 13 km, based on the seven more precisely located collections (Fig. 14). With such a restricted extent, it clearly warrants listing as a Rare species. There are no obvious immediate threats to the conservation of this species, but it could also qualify as Vulnerable if its distribution within this area is found to be only sparse and patchy. Using the IUCN 2001 categories as adopted by the National Parks and Wildlife Council (2003), a plant may be assigned Vulnerable (VU) status under criterion D2 for a restricted area of occupancy (as

Amended key to South Australian ± shrubby, cauline-leaved species of subsection *Goodenia* ('Group B' of Carolin & Cooke 1986)

- 1: Leaves with petiolar pinnae (these often reduced)
 - 2: Leaf lamina lanceolate, viscid, with simple hairs almost absent *G. brunnea*
 - 2: Leaf lamina narrowly to broadly ovate (-triangular), finely velvety, with abundant short, simple hairs
 - 3: Leaf margin irregularly dentate/bidentate, longest lateral teeth 1–3 mm long; corolla mostly off-white with crenate-laciniate wing margins *G. saccata*
 - 3: Leaf margin strongly and evenly dentate, longest lateral teeth 3–5 mm long; corolla yellow with ± entire wing margins *G. valdentata*
- 1: Leaves simple, with petioles lacking pinnae, or sessile
 - 4: Leaves and stems with plentiful glandular and/or non-glandular hairs
 - 5: Leaves petiolate, with abundant simple hairs
 - 6: Leaves broadly ovate to orbicular, green, with fine short erect hairs *G. chambersii*
 - 6: Leaves linear to narrowly elliptic, silvery-grey, with appressed T-shaped hairs *G. mueckeana*
 - 5: Leaves sessile and stem-clasping, with abundant glandular hairs
 - 7: Leaves strongly stem clasping, mostly > 3 cm long; indusium entire *G. amplexans*
 - 7: Leaves weakly stem clasping, mostly < 3 cm long; indusium notched *G. benthamiana*
 - 4: Leaves and stems glabrous or glabrescent, without conspicuous hairs
 - 8: Leaves strongly glaucous, flowers white *G. albiflora*
 - 8: Leaves green, flowers yellow
 - 9: Leaves narrowly elliptic to oblanceolate; corolla with minute simple hairs outside *G. vernicosa*
 - 9: Leaves ovate to elliptic, rarely narrower; corolla lacking simple hairs
 - 10: Leaves thick; sepals 2–4 mm long; bracteoles to 1.5 mm long *G. varia*
 - 10: Leaves thin; sepals 3–11 mm long; bracteoles to 6 mm long *G. ovata*



Fig. 10. *Goodenia valdentata*. Holotype, F.J.Badman per W.R.Barker 5267.

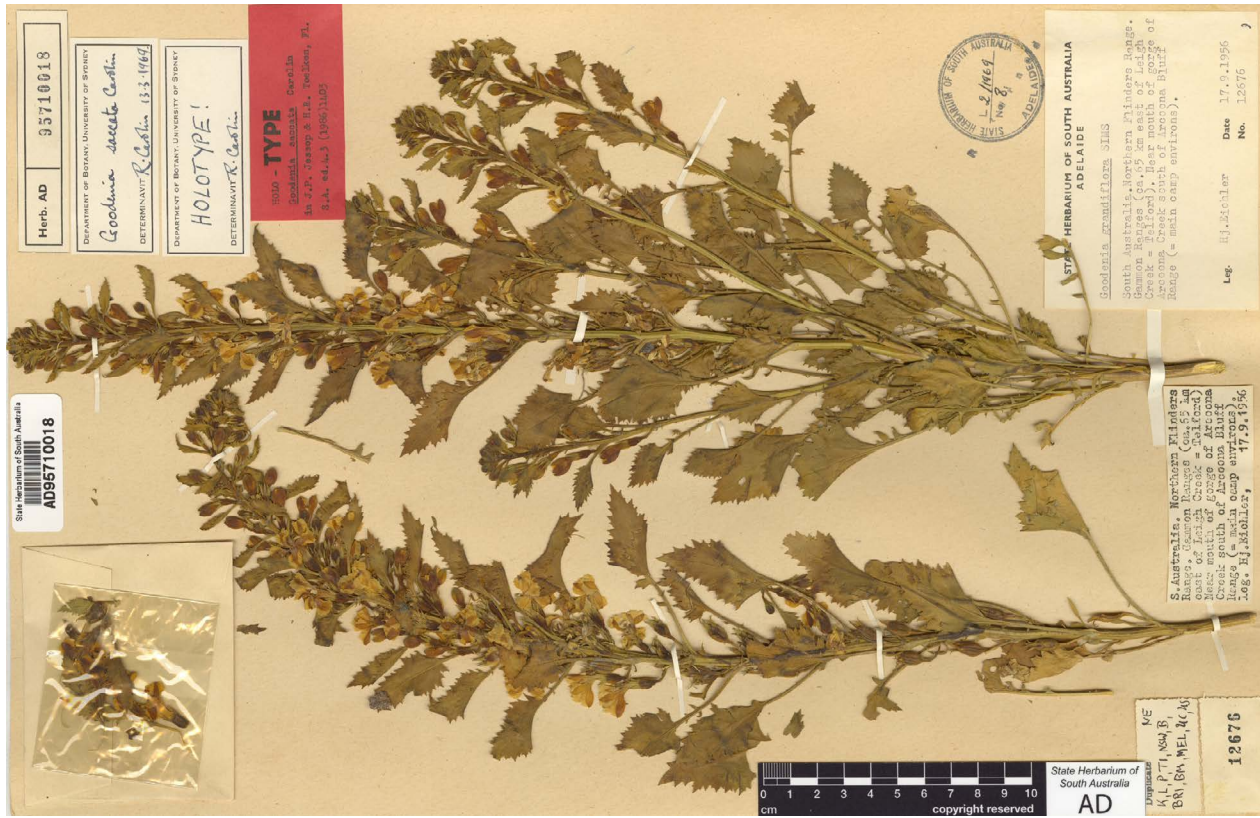


Fig. 12. *Goodenia saccata*. H.J. Eichler 12676, holotype.



Fig. 11. *Goodenia chambersii*. E.H. Ising 3626A, a paratype of *G. helenae* Ising.

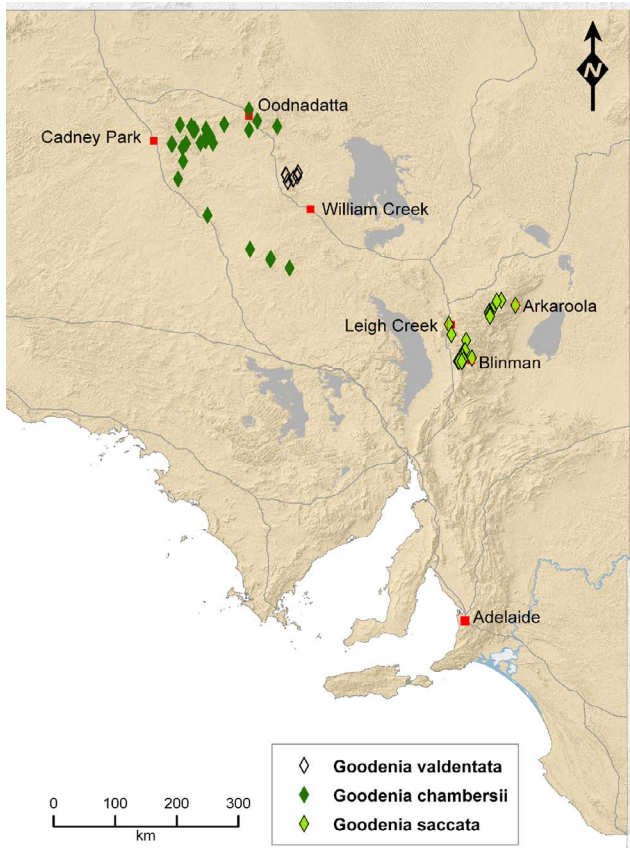


Fig. 13. Distribution of *Goodenia valdentata*, *G. chambersii* and *G. saccata*, based on AD collections.

opposed to extent) of “typically less than 20 km²”. Currently there is insufficient information to estimate the area of occupancy. Collectors’ field notes merely describe it as [locally] moderately common or common (5 collections). To ascertain whether it qualifies as Vulnerable, details on population sizes and their coverage within the range area are required, so at this stage only Rare status is recommended.

Etymology. The epithet *valdentata* is formed from a contraction of the Latin words *valde*, strongly, and *dentatus*, toothed, and refers to the leaf margin with prominent teeth, which are more pronounced than in related species.

Notes. One factor contributing to the confusion of *G. valdentata* with *G. saccata* is the description of white or yellow flower colour for the latter. *Goodenia saccata* appears to be a consistently white-flowered species, but its flowers were first described as “cream to yellow” (Carolin 1986), and later as “yellow or off-white” (Carolin 1992). It is unlikely that Carolin would have seen fresh material and these descriptions are probably based on the uniform yellowish tinge to the corolla seen on some herbarium specimens, which is probably an artefact of drying and aging.

Flowers of the holotype sheet (Fig. 12) appear particularly yellowish, but on other plants from the

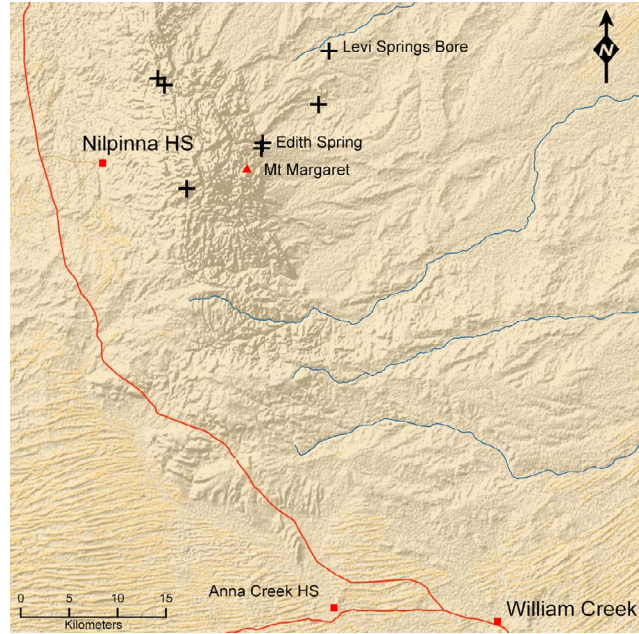


Fig. 14. Detail of *Goodenia valdentata* distribution (+) based on the seven collections with a resolution of 1 km or better.

same collection (e.g. the isotype, MEL 23070) they are clearly white. The possibility of yellow-flowered variants within the population cannot be eliminated completely, but it seems unlikely given the absence of field-based records of yellow-flowered forms, and the following evidence. More common species known in the field to be consistently white-flowered such as *G. albiflora* and *G. calcarata* do sometimes produce dried specimens with a yellowish tone on the flowers (e.g. *R.Taylor 507* and *D.J.Duval 1544*, respectively). Also, one herbarium specimen of *G. saccata* with yellowish flowers (*K.H.Brewer 546*) has field notes describing the flowers as white. In the four other AD collections of *G. saccata* with field notes that refer to flower colour, it is also given as white. Further support is provided by recent field observations of the two eastern populations, one by the author and several by K. Brewer, who reported that the flowers were always predominantly white or “off-white”, although sometimes suffused with yellow towards the base.

Goodenia valdentata collections examined other than type, all from AD

SOUTH AUSTRALIA. **Lake Eyre:** *B.Andrews*, 10 Oct. 1968, Nilpinna Station; *F.J.Badman 5148*, 18 Apr. 1992, Peake Station, Edith Spring (Dups: BRI, NY); *F.J.Badman 7051*, 12 Aug. 1993, 13 km NW of Mt Margaret, Peake Station; *F.J.Badman 7070*, 12 Aug. 1993, 12 km NW of Mt Margaret, Peake Station; *R.Bates 59193*, s.dat. [c. 15 Aug. 2001 based on adj. nos.], Davenport Range (SW gorge), Nilpinna (Dups: MA, SIU); *J.L.Chivell & A.Shalekoff BS69-25204*, 1 Mar. 1996, 15.7 ENE Nilpinna; *D.E.Murfet 7034*, *D.J.Duval & T.S.Te*, 9 Oct. 2010, Davenport Range, c. 10 km ESE of Nilpinna Station; *A.C.Robinson & S.A.Bemmer BS69-28610*, 1 Mar. 1996, 23 km ENE Nilpinna Homestead.

Table 1. Diagnostic characters distinguishing *Goodenia chambersii*, *G. valdentata* and *G. saccata*.

	<i>G. chambersii</i>	<i>G. valdentata</i>	<i>G. saccata</i>
Indumentum of stems & leaves			
simple hairs	mid-dense	very dense	mid-dense
glandular hairs	sparse to mid-dense, conspicuous	sparse, inconspicuous	mid-dense, prominent
Petiolar pinnae			
number	none	1–6	1–6
shape	—	narrowly oblong	narrowly triangular to triangular
Lamina			
shape	broadly ovate to orbicular	narrowly ovate to ovate	(narrowly-) ovate to broadly ovate-triangular
length/width ratio	0.9–1.3	1.4–2.0	1.0–2.2
Leaf margins			
	crenate-dentate	prominently & acutely dentate elongate terminal tooth	irregularly compound-dentate
number of teeth	9–20	14–25	18–45
secondary teeth	rare	few	many
lateral tooth length (max.)	0.8–3 mm	3–5 mm	1–3 mm
terminal tooth length	to 4.5 mm	to 7.5 mm	to 4 mm
Flowers per axil			
	1–3	1 (–2)	1–3
Corolla			
colour	yellow	bright yellow	mostly off-white
pouch	shallow, on upper 1/2 of hypanthium	shallow, on upper 1/3–1/2 of hypanthium	prominent, on upper 2/3–3/4 of hypanthium
enations	yes	yes	absent, or a few weak ones
vestiture inside	pilose in lower 1/3–1/2	pilose only near base	hispid, flattened straight white hairs in lower 2/3–3/4
wing margins	entire	entire	crenulate-laciniate
wing marginal setae	yes	yes	no
wing termination	not tapered apically, often projecting beyond lobe	gradually to steeply tapered apically, not exceeding lobe	usually abruptly terminated short of lobe apex
lobe & wing apex	truncate or emarginate	acute or obtuse	truncate with protruding tip
Style			
spreading hairs	only in lower 1/2–2/3, and near base of indusium	entire length	entire length
indusium surface	mostly glabrous	mostly glabrous	hirsute with soft hairs
Seed			
mature colour	mid to dark (reddish-) brown	pale brown	pale brown
margin	flush or slightly raised	strongly raised,	strongly raised,
rim	tapered or rounded	flat with squared-off edges	flat with squared-off edges
sculpture	papillose-verrucose	papillulose	papillulose

Goodenia chambersii, selected specimens (of 27 seen), all from AD (except otherwise indicated)

SOUTH AUSTRALIA. **Lake Eyre:** *D.J.Duval* 1888, 1 Sep. 2010, 4 km E Arckaringa Station; *E.H.Ising* 3626A, 15 Oct. 1950, Evelyn Downs, 90 miles SW of Oodnadatta (Dups: MEL, K, BM, P, TI, US, CANB); *E.H.Ising*, 22 Oct. 1955, Evelyn Downs, Oodnadatta; *P.J.Lang* BSOP-438, 12 May 2000, Just inside western boundary of Arckaringa Station; *B.Lay* 638, 11 Oct. 1971, Residuals of Stuart Range, c. 80 km NW of Millers Creek Station, Balta Baltana; *J.McDouall Stuart* (expedition), 1859, N.W. interior of South Australia (lectotype: MEL 23048; isotype: K; images seen); *T.Webb* 9, 21 Sep. 2010, c. 10 km E of Coober Pedy; *H.P.Vonow* 3535 et al., 14 Dec. 2010, Arckaringa Station, S of Wurlley Hole; *J.H.Willis*, 23 Jul. 1979, Allandale Homestead, SE of Oodnadatta (Dup. of MEL 2118360).

Goodenia saccata, selected specimens (of 25 seen), all from AD

SOUTH AUSTRALIA. **Flinders Ranges:** *H.W.Andrew*, Aug. 1920, Mt Bayley, near Beltana; *K.H.Brewer* 546 & *T.S.Te*, 26 Nov. 2010, Glass Gorge road, c. 5 km from Parachilna Gorge; *K.H.Brewer* 640 & *K.Waugh*, 9 Dec. 2011, between Yankaninna Homestead and the outstation at Owieandana; *P.E.Conrick* AD28, Aug. 1979, Arkaroola; *Hj.Eichler* 12676, 17 Sep. 1956, Gammon Ranges, near mouth of gorge of Arcoona Creek, south of Arcoona Bluff Range (holotype: AD 95710018; isotypes: MEL 23070, B, L, images seen; BRI, NSW, BM, K, NE, P, TI, UC, US, n.v.); *Hj.Eichler* 12997, 26 Sep. 1956, Aroona Dam, 6.5 km SW of Copley (Dup.: CAL); *E.H.Ising* 511, 7 Oct. 1918, Witchen's Well, Moolooloo; *D.N.Kraehenbuehl* 23, 5 Oct. 1958, Near junction of Moolooloo and Parachilna roads (Dup.: RSA); *D.E.Symon*

6762, 5 Sep. 1969, W end of Parachilna Gorge (Dups.: NSW, K, B, L); *L.D. Williams 11722*, 4 Nov. 1980, 12.2 km [N of] Yankaninna HS.

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