

New taxa in *Goodenia* (Goodeniaceae) from the Kimberley region of Western Australia

L.W. Sage

Western Australian Herbarium, Department of Conservation and Land Management,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
Present address: Forest Management Branch, Department of Conservation and Land
Management, North Boyanup Road, Bunbury, Western Australia 6230

Abstract

Sage, L.W. New taxa in *Goodenia* (Goodeniaceae) from the Kimberley region of Western Australia. *Nuytsia* 13 (3): 529–536 (2001). Three new *Goodenia* species, *G. crenata* Carolin & Sage, *G. inundata* Sage & Pigott and *G. psammophila* Sage & M.D. Barrett, are described and illustrated. The subspecies of *G. psammophila* subsp. *hiddinsiana* Sage & M.D. Barrett is also described. *G. crenata*, *G. inundata* and both *G. psammophila* subspecies are recommended for listing as priority flora for conservation.

Introduction

Wheeler (1992) described and illustrated three unnamed species of *Goodenia* in her treatment of the family Goodeniaceae for “Flora of the Kimberley Region”. Each of these taxa occurs in the Northern Botanical Province (Kimberley) and one extends into the far north of the Eremaean Botanical Province of Western Australia. Further studies and investigations by the author and the species co-authors have revealed that all three taxa require species level recognition, and that one, *G. psammophila*, should be recognized as consisting of two subspecies.

This paper gives descriptions of the four new taxa and updates the key to *Goodenia* species given in the “Flora of Australia” (Carolin 1992). Three of the four new taxa have conservation priority although future surveys may find them to be more common than the current collections at the Western Australian Herbarium (PERTH) reflect due to the poorly collected regions in which they occur.

Taxonomy

Goodenia crenata Carolin & Sage, *sp. nov.*

Species haec ab *Goodeniae stellatae* Carolin praecipue differt pilis non-stellatis et alis loborum corollae latioribus.

Typus: Glass Hill, East Kimberley [precise locality withheld for conservation purposes], Western Australia, 7 June 1999, D.J. Edinger 1416 (*holo*: PERTH 05373255).

Perennial herb with stout tap-root and an ascending rosette of basal leaves. *Stems* prostrate to decumbent, up to 10 cm long, terete or slightly angled, pubescent-hirsute with long simple hairs and some minute glandular hairs. *Leaves basal*, oblong-elliptic to narrowly obovate, 6–8 cm long, 1–2 cm wide, pubescent-hirsute, crenate, obtuse, tapering very gradually into an indistinct petiole with a slightly broadened base usually obscuring the tuft of short axillary hairs; *cauline leaves* smaller and more distinctly sessile. *Inflorescence* a leafy raceme; bracts leaf-like but smaller and broader; peduncles 5–15 mm long, pubescent-hirsute, articulate immediately below the ovary; bracteoles absent. *Sepals* lanceolate, c. 4 mm long, 0.5 mm wide, pubescent with simple hairs, entire, obtuse to acute. *Corolla* yellow, c. 15 mm long, pubescent with simple hairs outside and with a few scattered simple hairs inside; anterior pouch c. ½ as long as the ovary: tube c. 3 mm long; lobes unequal; superior lobes narrowly oblong, c. 9 mm long, 0.5–0.8 mm wide with a wide (c. 2 mm) wing on either side the lower wing passing into a long ± barbulate distinct auricle; inferior lobes oblong-elliptic, c. 5 mm long, c. 1.5 mm wide with a broad (c. 2 mm) wing on either side just over ½ as long as the lobe and making an obtuse angle at the apex with each other. *Stamen filaments* linear, c. 2 mm long. *Anthers* oblong, c. 1 mm long, c. 0.5 mm wide. *Ovary* pubescent; style c. 6 mm long almost glabrous, indusium truncate-obdeltoid, c. 1.5 mm long, c. 1.5 mm wide, brownish, convex above with a slight keel, with a slightly curved orifice beset with white bristles scarcely 0.5 mm long on both lips. *Fruit* broadly ovoid c. 6 mm diam., seeds circular, 3.5–4 mm long including the narrow wing, wing c. 0.5 mm wide, ± smooth, black or very dark brown. (Figure 1A,B)

Other specimens examined. WESTERN AUSTRALIA: Slaty Creek, north Tanami Desert, K.F. Kenneally 11997 (PERTH); Halls Creek, G.W. Carr 3503 & A.C. Beauglehole 47281 (PERTH); Nicholson Homestead, T.E.H. Aplin 5379 (PERTH).

Distribution. Known only from scattered collections in the Ord–Victoria Plains and Central Kimberley Interim Botanical Regions of the Northern Botanical Province (Halls Creek, Nicholson Station and Slaty Creek) and the Tanami Interim Biogeographic Region of the Eremaean Botanical Province (Thackway & Cresswell 1995). (Figure 2A)

Habitat. Found mostly beside water holes, creeks and rocky outcrops in red sand.

Flowering period. Collected flowering in May and July.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Three. Though occurring in a poorly collected region of Western Australia, the few collections, and preference for water bodies, subject it to the threat of ‘water point’ degradation by station cattle.

Etymology. From Latin – *crenatus*, referring to the rounded teeth (crenate) of the leaf margins.

Notes and affinities. This species was treated as *Goodenia* sp. C in “Flora of the Kimberley Region” (Wheeler 1992) and has been allocated the phrase name *Goodenia* sp. Halls Creek (G.W. Carr 3503).

Related to *G. stellata* Carolin but distinguished by simple rather than stellate hairs and wider corolla lobe wings. Vegetatively similar to *G. cycloptera* R. Br. but the sepals are broader in shape and the anterior pouch of the corolla is very much shorter and not at all prominent.

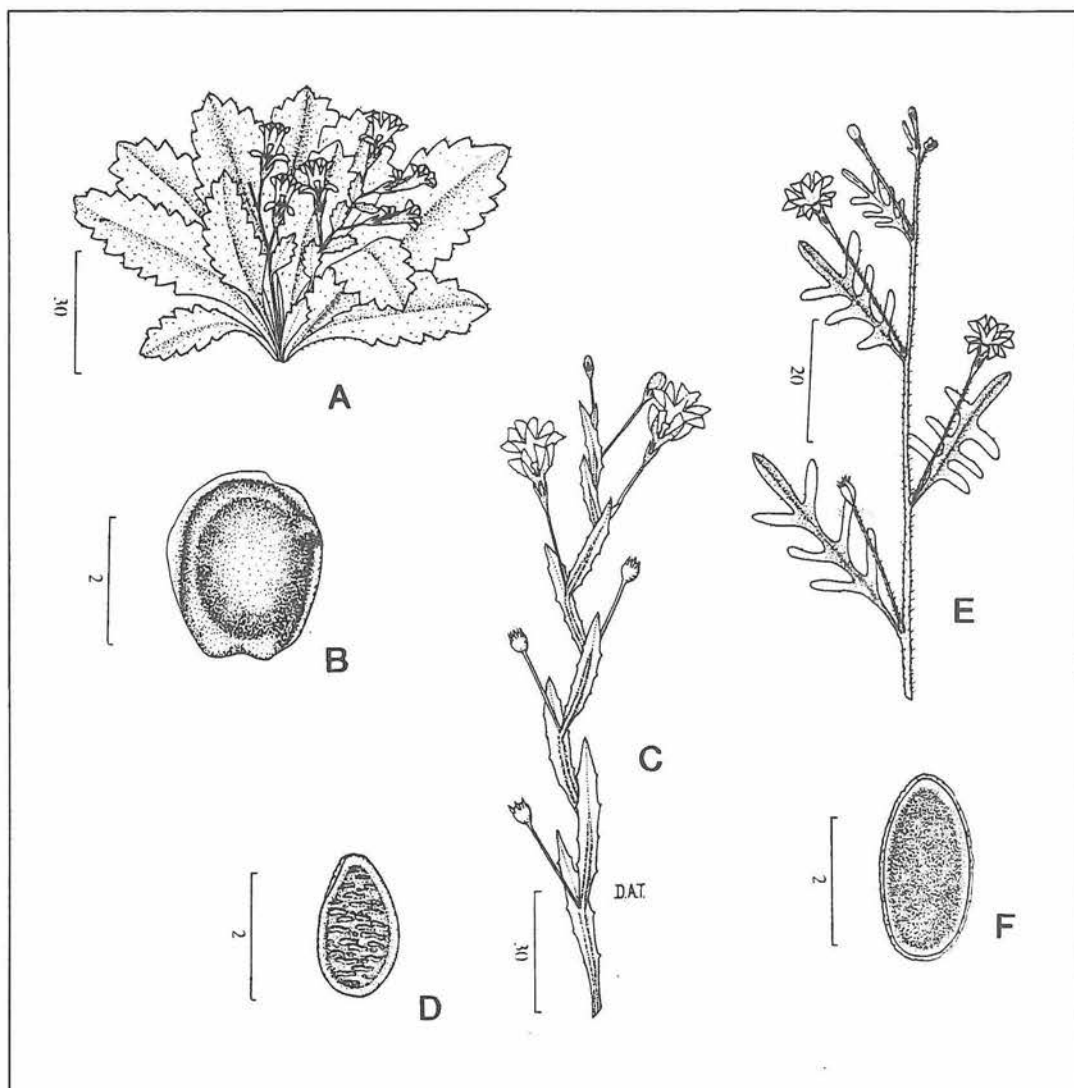


Figure 1. A,B. *Goodenia crenata* A – habit; B – seed. C,D. *Goodenia inundata* C – habit; D – seed. E,F. *Goodenia psammophila* E – habit; F – seed. Reproduced with permission from Wheeler *et al.* (1992): Figures 274–276. Scale bars are in mm.

The senior author, Dr Roger Carolin, previously of the John Ray Herbarium (SYD), is an eminent authority on the Goodeniaceae family.

Goodenia inundata* Sage & Pigott, *sp.nov.

Goodeniae malvinae Carolin affinis sed caulis fractiflexis per basibus foliorum decurrentibus semper alatis, et seminibus minoribus testis rugosis.

Typus: Kalumburu Road [precise locality withheld for conservation purposes], Western Australia, 21 June 1993, I. Cowie & L. Craven IC 4188 (*holo*: PERTH 04063759; *iso*: DNA, MEL).

Erect ephemeral or annual herb, 15–34 cm high, with scattered, simple appressed hairs to almost glabrous. *Stems* single to multiple, flexuose, winged by decurrent leaf bases. *Leaves* cauline, decurrent, leaf with free part narrowly ovate, 15–30 mm long, 4–9 mm wide, becoming smaller up the stem, sparsely hairy to glabrous, entire to minutely toothed. *Inflorescence* a leafy panicle; pedicels 10–25 mm long, with sparse appressed hairs, ebracteolate. *Sepals* narrowly elliptic-triangular or narrowly ovate, 3.0–5.1 mm long, sparsely hairy, apex acute. *Corolla* purple or maroon with a yellow centre, 14–18 mm long, articulate below ovary; tube 3.7–4.1 mm long; pouch obscure or obsolete; sparsely hairy outside, dense patch of simple hairs inside, calli present. *Abaxial corolla lobes* 4.7–6.3 mm long, 1.3–2.2 mm wide, fused for 3.5–4.1 mm further than the adaxial corolla lobes; wings 5.3–7.3 mm long, 1.8–2.2 mm wide, erose. *Adaxial corolla lobes* c. 9 mm long, c. 1.5 mm wide, 'kinked' below auricle, auricle 2.2–2.8 mm long, 1.6–2.2 mm wide; wings 5.7–7.0 mm long, 2.0–2.2 wide above auricle, 1.9–2.5 mm wide opposite auricle. *Stamen filaments* linear, 2.9–3.6 mm long. *Anthers* c. 1.5 mm. *Ovary* c. 3 mm long; septum about the same length as ovary; ovules c. 12, in 2 rows in either side of septum; scattered hairs along sepal bases. *Style* c. 6.0 mm long, glabrous or with scattered simple hairs; indusium broader than long, with a long tuft of simple hairs underneath to c. 2 mm and simple hairs above and below, bristles on upper lip c. 0.2 mm long, bristles on lower lip c. 1 mm. *Fruit* globular, 3.5–4 mm long, 3.5–4 mm wide, very sparsely hispid. *Seeds* elliptic, c. 2 mm long, c. 1 mm wide, thick; body rugose with a smooth margin; wing obsolete. (Figure 1C,D)

Other specimens examined. WESTERN AUSTRALIA: Gibb River–Kalamburu Mission road, McDonald Creek, A.C. Beauglehole ACB 52186 (PERTH); 25 km WSW of Theda turnoff, N Kimberley, D.J. Edinger 756 (PERTH); King Edward River, c. 100 km S of Kalumburu, G.J. Keighery 9043 (PERTH); King Edward River, c. 100 km of Kalumburu, G.J. Keighery 9089 (PERTH); "Dog Leg Swamp", 35 km SE of Amax Campsite on Theda Station road, W Kimberley, K.F. Kenneally 6727 (PERTH, CANB, K,L); King Edward River Crossing campsite, K.F. Kenneally 11450 (PERTH, DNA); c. 1 km NW of Kalumburu Mission c. 200 m W of EW strip of the aerodrome, A.A. Mitchell 3941 (PERTH, BROOME, NSW); camping area near Mitchell Plateau road crossing of King Edward River, N Kimberley, A.A. Mitchell 4382 (PERTH, BROOME, NSW).

Distribution. Occurring in seasonally inundated areas in the north west of the Northern Kimberley Interim Botanical Region (Thackway & Cresswell 1995), of the Northern Botanical Province, between the Mitchell River and Theda Station. (Figure 2A)

Habitat. Found in herb fields on shallow pockets of soil on temporarily inundated areas of sandstone along watercourses.

Flowering period. Collected flowering in May, June and August.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Two. Known from only four populations and may prove to be more common than is apparent from the current collections due to its occurrence in a very poorly collected region.

Etymology. From the Latin – *inundatus*, alluding to the seasonally inundated habitat of the species.

Notes and affinities. Closely related to and previously included within the concept of *Goodenia malvina* Carolin but treated as *G. sp. A* in the "Flora of the Kimberley Region" (Wheeler 1992) and subsequently known by the informal name *Goodenia sp. A* Kimberley Flora (G.J. Keighery 9043). Readily distinguished from *G. malvina* by having flexuose stems always winged by decurrent leaf bases and smaller seeds which are scarcely winged.

The co-author, Julian Patrick Pigott, formerly of the Western Australian Herbarium, is currently employed by the Weeds Cooperative Research Centre in Frankston, Victoria.

Goodenia psammophila* Sage & M.D. Barrett, *sp. nov.

Goodeniae coronopifoliae R.Br. affinis sed corolla minore et seminibus minoribus et vix alatis.

Typus: east of Mt Agnes, West Kimberley [precise locality withheld for conservation purposes], Western Australia, 19 March 1998, *M.D. Barrett* 401 (*holo*: PERTH 05518180; *iso*: DNA, K).

Prostrate or erect *annual herb*, sparsely hispid, sometimes with dark-headed glandular hairs. *Stems* multiple, terete. *Leaves* narrowly lanceolate to narrowly obovate, 10–91 mm long, 3–22 mm wide, entire to denticulate to pinnatisect, sparsely hairy, cauline leaves becoming linear and entire towards apex, apex \pm acute, base attenuate. *Inflorescence* a leafy raceme; pedicels 11–37 mm long, sparsely hairy with hairs sometimes concentrated on one side, ebracteolate. *Sepals* narrowly elliptic to linear, *c.* 1–2.1 mm long, glabrous or sparsely hairy mostly on margins, \pm equal, apex rounded to acute. *Corolla* yellow with brownish-purple or white-yellow adaxial lobes, 6.5–9.2 mm long, articulate immediately below ovary; pouch obscure or obsolete; dense, long simple hairs inside the throat and scattered simple hairs outside; long simple hairs on the corolla lobe margins. *Abaxial corolla lobes* *c.* 3 mm long, *c.* 1.3 mm wide, fused for a further *c.* 3 mm than adaxial corolla lobes; wings 2.6–3.6 mm long, *c.* 1.5 mm wide, entire. *Adaxial corolla lobes* *c.* 5 mm long, *c.* 1 mm wide; wings *c.* 2–2.7 mm long, 0.7–1.2 mm wide, wing above auricle and opposite \pm equal. *Stamen filaments* linear, *c.* 1.5 mm long; anthers *c.* 1 mm long. *Ovary* *c.* 1 mm long, sparsely hispid; ovules *c.* 2. *Style* \pm glabrous; indusium *c.* 1 mm long, *c.* 1.5 mm wide, with a double groove above, long simple hairs above and below with one tuft of long simple hairs below, bristles on lips *c.* 0.2 mm long and \pm equal. *Fruit* ellipsoid, 3.5–5 mm long, sparsely hairy. *Seeds* elliptic, *c.* 3 mm long, *c.* 1.5 mm wide, thick, reticulate-foveate, brown/tan, rim raised but not discriminated from body, scarcely winged or wing obsolete. (Figure 1E,F)

Etymology. From the Greek –*psammophilus* (sand loving), for the occurrence of the species in sand, mostly on sandstone pavement.

Notes and affinities. Treated as *Goodenia* sp. B in “Flora of the Kimberley Region” (Wheeler 1992) and subsequently known as *Goodenia* sp. B Kimberley Flora (*K.F. Kennelly* 7751). Superficially similar to *G. coronopifolia* R.Br. but distinguished by a lower number of ovules (2 instead of 4–8), fruit that is ellipsoid rather than globular and seeds that are elliptic rather than orbicular. It is distinctive because of the indusium that has a double groove and seeds that are thick and scarcely winged or obsolete. The typical subspecies occurs on sand flats over sandstone pavements, while subspecies *hiddinsiana* is found mostly in tall grasslands.

The co-author, Matthew D. Barrett, of the Kings Park Botanic Garden (KPBG), was previously of Beverley Springs Station in the Kimberley Region.

Key to subspecies of *Goodenia psammophila*

- 1 Long eglandular hairs only; basal (or near basal) leaves lobed to pinnatisect; habit prostrate subsp. **psammophila**
1. Dark headed glandular hairs present on pedicels and ovary; basal (or near basal) leaves mostly entire to lobed; habit mostly erect subsp. **hiddinsiana**

Goodenia psammophila Sage & M.D. Barrett subsp. *psammophila*

Prostrate herb with eglandular hairs. *Basal (or near basal) leaves* lobed, toothed to pinnatisect. *Adaxial corolla lobes* brownish-purple.

Selected specimens examined. WESTERN AUSTRALIA: N of Charnley River crossing, *M.D. Barrett* 42 (PERTH); N of the junction of Youwanjela Creek and Prince Regent River, Kimberley Region, *M.D. Barrett* 613 (PERTH); Bachsten Creek Gorge, *M.D. Barrett* 697 (PERTH); Bachsten Creek, *M.D. Barrett* 728 (PERTH); NW of Mitchell River Falls, Mitchell Plateau, N Kimberley, *K.F. Kenneally* 7751 (PERTH, SYD).

Distribution. Known from the Edkins Range north through to the Prince Regent River and the Mitchell Plateau in the North Kimberley Interim Biogeographic Region (Thackway & Cresswell 1995). (Figure 2B)

Habitat. Known from sandy flats on sandstone pavement and sandstone ridges.

Flowering period. Collected in flower in January, February and March.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Three. May prove to be more common than is currently apparent.

Goodenia psammophila subsp. *hiddinsiana* Sage & M.D. Barrett, *subsp. nov.*

A subsp. *psammophila* pilis glandularibus fuscis-capitatis ornatis, lobis adaxialibus corollae luteis vel albis, habito plerumque erecto, foliis basalibus plerumque integris differt.

Typus: Bachsten Creek [precise locality withheld for conservation purposes], Western Australia, 4 February 1999, *M.D. Barrett* 782 (*holo:* PERTH 05518172; *iso:* DNA, K)

Erect herb with dark-headed glandular hairs on the pedicels and ovary. *Basal (and near basal) leaves* mostly entire to lobed. *Adaxial corolla lobes* mostly yellow or white (brownish purple).

Selected specimens examined. WESTERN AUSTRALIA: Prince Regent River Reserve, *M.D. Barrett* 748 (PERTH); Edkins Range, N of Beverley Springs Homestead, *R.L. Barrett* 644 (PERTH); E of Beverley Springs Homestead, *R.L. Barrett* 924 (PERTH); mouth of the Berkley River, *K.F. Kenneally* 11306 (PERTH, NSW).

Distribution. Currently known only from the vicinity of the Beverley Springs Station homestead, Edkins Range and Bachsten Creek in the Northern Kimberley Interim Biogeographic Region (Thackway & Cresswell 1995) of the Northern (Kimberley) Botanical Region. (Figure 2C)

Habitat. Occurs in tall, sandy grasslands besides creek lines or below sandstone ridges.

Flowering period. Known to flower from December to February.

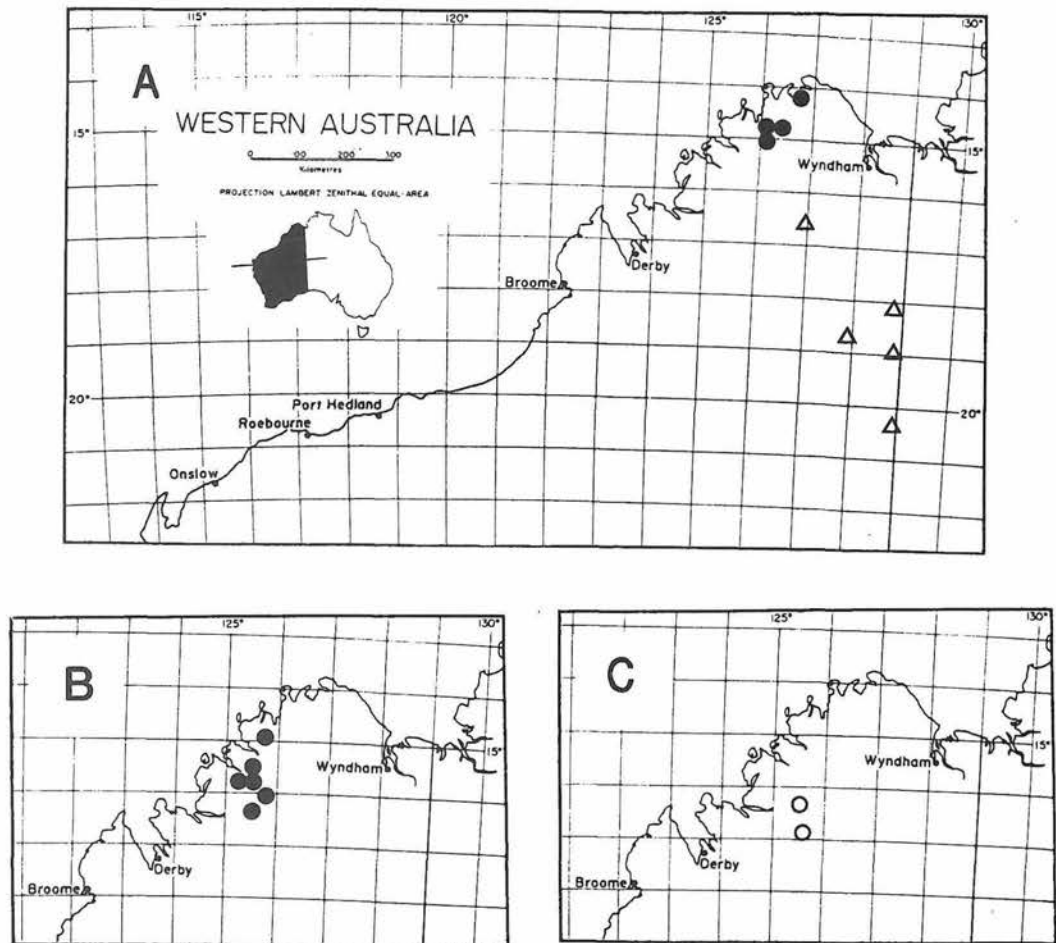


Figure 2. Distribution maps. A – *Goodenia crenata* Δ and *G. inundata* ●; B – *G. psammophila* subsp. *psammophila*; C – *Goodenia psammophila* subsp. *hiddinsiana*.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Two. Known from only three collections, all over a range of less than 100 kilometres. Collected only by the second author and his brother, requiring further surveys to locate other possible populations.

Etymology. The epithet honours Major Les Hiddins (also known as The Bush Tucker Man) of the Australian Army, soldier, bushman, historian and explorer.

Notes. Distinguished from the typical subspecies by an erect habit, dark headed glandular hairs on the pedicels and ovary, basal (and near basal) leaves mostly entire to lobed and adaxial corolla lobes mostly yellow or white (brownish purple). Found mostly in tall grasslands rather than the sandy flats on sandstone pavement and sandstone ridges the typical subspecies occurs on.

Amendments to key to *Goodenia* species in "Flora of Australia"

For *Goodenia crenata* the key should be altered to read from couplet 20 in Group 7 (Carolin 1992: 162–163).

- 20 Leaves entire, dentate or crenate (sometimes lobed towards the base in *G. iyouta*)
 20a Leaves crenate **G. crenata**
 20a: Leaves entire or dentate

For *G. inundata* the key should be altered to read from couplet 18 in Group 6 (Carolin 1992: 159–160).

- 18 Corolla 6–7 mm long; sepals adnate to ovary only near the base **G. salmoniana**
 18: Corolla over 8 mm long; sepals adnate to ovary for at least ½ its length
 18a Corolla yellow; leaf bases not decurrent **G. lunata**
 18a: Corolla purple or maroon with a yellow centre; leaf bases decurrent **G. inundata**

For *G. psammophila* the key should be altered to read from couplet 1 in Group 7 (Carolin 1992: 162–164). This species may also key out to couplet 28. See the treatment above for the key to subspecies.

- 1 Indusium notched, with a furrow or a double groove on the upper surface
 2 Indusium folded with a furrow on upper surface **G. odonnellii**
 2: Indusium notched or with a double groove, not folded
 3 Corolla 12–25 mm long **G. mimuloides**
 3: Corolla less than 10 mm long
 3a Ovules 4–6; SW Australia **G. pusilliflora**
 3a: Ovules c. 2; Kimberley Region **G. psammophila**

Acknowledgements

The author is grateful to Paul Wilson for assistance with the Latin diagnoses, Dr Barbara Rye for her assistance with the manuscript, Dr Roger Carolin for his thoughts and insight (senior author of *Goodenia crenata*), Patrick Pigott for his continual support and encouragement (co-author of *G. inundata*) and Matthew Barrett (co-author of *G. psammophila* and subspecies) for his cooperative work.

References

- Carolin, R.C. (1992). *Goodenia*. In: "Flora of Australia." Vol. 35, pp. 149–166. (Australian Government Publishing Service: Canberra.)
 Thackway, R. & Cresswell, I.D. (1995). An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, version 4. (Australian Nature Conservation Agency: Canberra.)
 Wheeler, J.R. (1992). Goodeniaceae. In: Wheeler, J.R., Rye, B.L., Koch, B.L. & Wilson, A.J.G. "Flora of the Kimberley Region." pp. 884–904. (Western Australian Herbarium, Department of Conservation and Land Management: Perth.)