Australian Journal of Taxonomy
Open-access, online, rapid taxonomy
https://doi.org/10.54102/ajt

Two new Western Australian species related to *Hibbertia priceana* (Dilleniaceae)

K.R. Thiele [1*] & T.A. Hammer [2,3]

[1] School of Biological Sciences, University of Western Australia, 35 Stirling Hwy, Crawley, Western Australia 6009, Australia
[2] State Herbarium of South Australia, Hackney Road, Adelaide, South Australia 5000, Australia
[3] The University of Adelaide, North Terrace, Adelaide, South Australia 5000, Australia
*Corresponding author: kevin.thiele@uwa.edu.au
K.R. Thiele https://orcid.org/0000-0002-6658-6636; T.A. Hammer https://orcid.org/0000-0003-3816-7933

Abstract

Hibbertia priceana is a rare species found in two localised areas in southern south-western Western Australia, near Ongerup and in the vicinity of Wickepin and Harrismith. Two new species that are morphologically similar to *H. priceana* but are disjunct and distinct from it are described in this paper. *Hibbertia hapalophylla* is a new, potentially geographically restricted and rare species first collected during botanical surveys for a mining project near Mount Holland in the Western Australian Goldfields. It was initially collected from, and only known from, disturbed areas on an active mine site, but larger populations were subsequently discovered on a nearby sandplain, from where is was likely introduced to the mine site on sand transported for construction purposes. The second new species, *Hibbertia remanens*, appears to be restricted to small areas of remnant vegetation near Cunderdin and Kellerberrin in the Western Australian wheatbelt. The three species differ mainly in their leaf shapes in section, with *H. priceana* having flat leaves with the abaxial lamina fully exposed, *H. remanens* having recurved leaf margins with the abaxial shallowly grooved either side of the midrib, and *H. hapalophylla* having strongly revolute margins with the abaxial lamina surface concealed within lacunae formed between the margins and midrib.

Cite this paper as: Thiele KR & Hammer TA (2023). Two new Western Australian species related to *Hibbertia priceana* (Dilleniaceae). *Australian Journal of Taxonomy* 29: 1–8. doi: https://doi.org/10.54102/ajt.cr6ch

Introduction

Hibbertia priceana J.R.Wheeler was described in 2002 based on specimens from a small area in the southern Western Australian wheatbelt near Ongerup (Wheeler 2002). It is morphologically most similar to *H. depressa* Steud., *H. helianthemoides* (Turcz.) F.Muell. and *H. desmophylla* (Benth.) F.Muell., which, together with *H. fitzgeraldensis* J.R.Wheeler, were regarded as comprising the '*H. depressa*' species group by Wheeler (2002). This group is characterised within *Hibbertia* subgen. *Hibbertia* by having flowers with three or five carpels and five groups of stamens, at least some of which have fused filaments. The species with three carpels (i.e. all except *H. depressa*) usually have eleven stamens in a regular pattern of nine stamens in three bundles of three each,

This paper was submitted on 11 June 2023 and published on 10 July 2023 (2023-07-09T22:12:29.306Z). It was reviewed by John Huisman and Geoff Cockerton, and edited by Tom May. Kevin Thiele is an Editor of the Australian Journal of Taxonomy. He did not at any stage have access to the manuscript while in peer review, and had no influence on its acceptance or handling, as is standard practice for manuscripts submitted by editors. Australian Journal of Taxonomy. ISSN: 2653-4649 (Online).

united by their filaments, with two stamens free. Counting the stamen bundles in order around the gynoecium, the stamens are arranged in a (3)+(3)+1+(3)+1 pattern, but counting around the phyllotactic spiral the arrangement is (3)+(3)+(3)+1+1 (i.e., the single stamens are the innermost). This staminal arrangement is shared by *c.* 30 species in subgen. *Hibbertia* in Western Australia, all of which are likely to be closely allied based on the partial phylogeny of Horn (2005). The *H. depressa* group is characterised within the larger group of species with this staminal arrangement by their more or less softly hairy leaves, glabrous or mostly glabrous sepals, and inconspicuous floral bracts.

Following its publication, *H. priceana* was listed as Threatened in Western Australia due to its limited range of occurrence in a mostly cleared region, with no known populations in conservation reserves. However, further specimens that match it closely were subsequently collected from the Wickepin-Harrismith area, disjunct by >150 km from the Ongerup area and including populations protected in several nature reserves (Map 1). The discovery of these new populations is likely to trigger a reappraisal of the conservation status of the species.

While assessing these specimens to confirm that they match *H. priceana*, several collections from more distant locations were accessioned into the Western Australian Herbarium. One set of these came from an active mine site near Mount Holland in the Western Australian goldfields. Initially known from a few plants at a highly disturbed location within the mine's operations area, subsequent surveys found a large population in undisturbed vegetation on a sandplain adjacent to the mining tenement. A borrow pit within this population had previously been used as a source of bedding sand for buildings and other constructions at the mine, and it is likely that the species had been transported with the sand from its original site. It is currently known only from these two adjacent locations, and may be highly localised. This species is described here as *H. hapalophylla* K.R.Thiele & T.Hammer.

The second new species occurs in remnant vegetation in the wheatbelt near Cunderdin and Kellerberrin, widely disjunct from both *H. priceana* and the Mount Holland species (Map 1). The species was first collected in 1957 and 1960 by a Mrs McNeil, with the locality given simply as 'Kellerberrin', and subsequently from north of Cunderdin in 2007. Comparisons in the herbarium and the field with *H. priceana* and the Mount Holland plants shows that this also is morphologically distinct; it is described here as *H. remanens* K.R.Thiele & T.Hammer.

All three species discussed have almost identical flowers (sepals, stamens and gynoecium) and differ only in the leaf characters discussed below. Nevertheless, each is consistent and consistently different from the others and this, in combination with their geographic and ecological disjunctions, indicates that they merit recognition as distinct species. Both *H. priceana* and *H. remanens* occur themselves in somewhat disjunct populations, but in each case they are morphologically highly consistent between these populations; it is possible that in both cases their populations have become disjunct due to extensive habitat loss in the wheatbelt areas where they occur, making it impossible to now estimate their original distributions. The habitat near Mount Holland, where *H. hapalophylla* occurs, is more contiguous, and further surveys may show that it is more widespread than is currently known.

Hibbertia priceana, *H. hapalophylla* and *H. remanens* differ principally in leaf morphology, best seen in cross section (Fig. 1). Such differences appear to be highly significant in those species of *Hibbertia* that have narrow, linear leaves, and undoubtedly reflect adaptations that control and likely reduce water loss. The stomates in *Hibbertia* are borne entirely on the abaxial leaf lamina, which in those species with narrow leaves is often protected and enclosed within the lacuna formed between the midrib and the margins. The three species dealt with here occupy increasingly dry habitats (*H. priceana* wettest, *H. hapalophylla* driest and *H. remanens* intermediate) and it is perhaps not surprising that the abaxial stomatal surface of *H. priceana* is fully exposed on its flat leaves, that of *H. hapalophylla* is fully enclosed and protected by its tightly recurved margins, and that of *H. remanens* is somewhat protected in narrow (though shallow) grooves that do not fully enclose a lacuna.

It is very likely that the three species are closely related, but their relationships will only become clear when a robust phylogeny of the genus becomes available.

High resolution scans of the type sheets for the new taxa will be available soon after publication via the Atlas of Living Australia (https://www.ala.org.au/) - search for the species name and view the "Gallery".

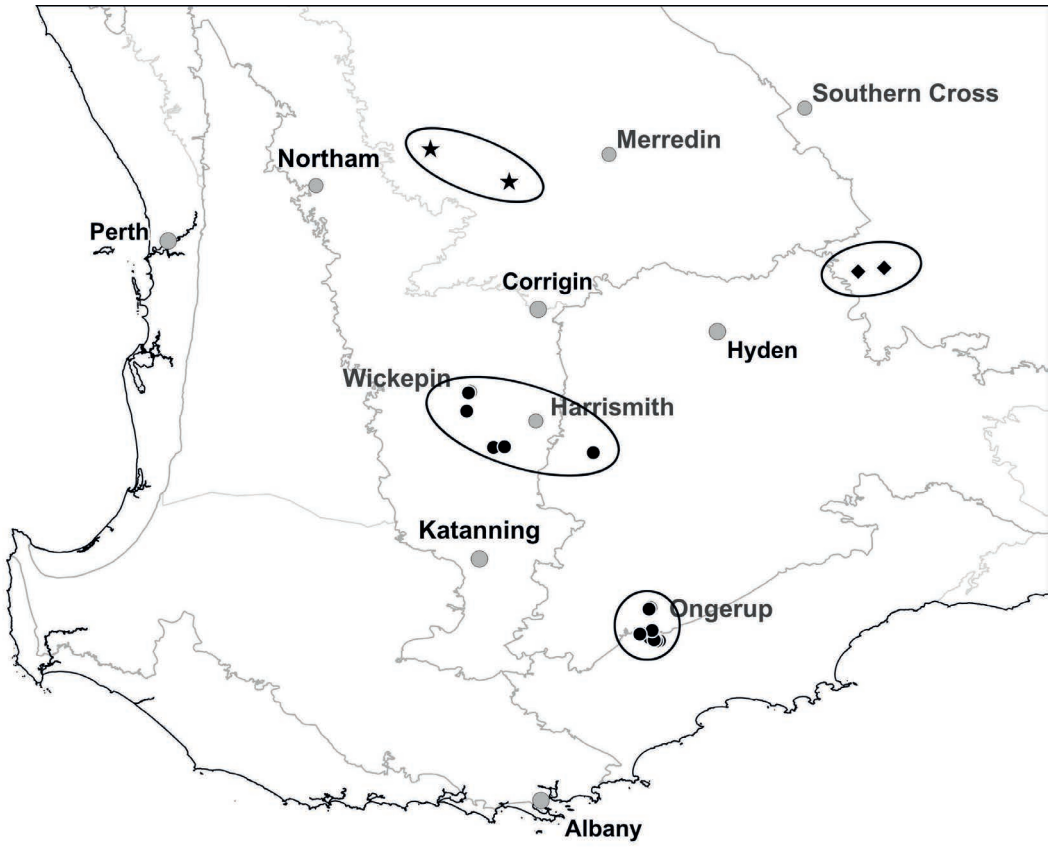
Taxonomy

Hibbertia hapalophylla K.R.Thiele & T.Hammer, *sp. nov.*

Type: Near Mount Holland [precise locality withheld for conservation reasons], 16 Sept. 2020, *G. Cockerton & S. Cockerton* WB 40349 (holo: PERTH 9259708; iso: AD, CANB).

Hibbertia sp. Mt Holland (B. Ellery BE 1437)

Shrubs 0.2–0.3(–0.4) m high, erect to sprawling, single- to few-stemmed at base and probably reseeding after fire; branchlets grey-pubescent with short curled hairs when young, soon ± glabrous. *Leaves* spreading-erect, tending to be fascicled on short-shoots, linear to very narrowly obovate, (5–)8–12 mm long, 0.8–1(–1.2) mm wide, the margins strongly recurved to the midrib so that the leaf appears two-grooved beneath; both surfaces and midrib beneath densely grey-hoary with short, curled



Map 1. Distributions of *Hibbertia priceana* (filled circles), *H. hapalophylla* (filled diamonds) and *H. remanens* (filled stars) in south-west Western Australia.

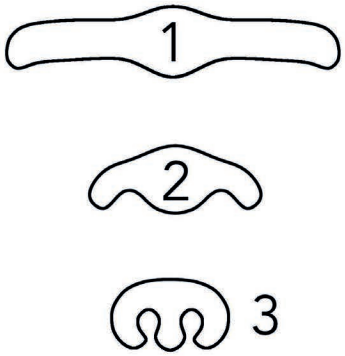


Figure 1. Leaf sections. 1—*Hibbertia priceana*; 2—*H. remanens*; 3. *H. hapalophylla*.

hairs (old leaves sometimes glabrescent); apex obtuse. *Flowers* sessile, mostly terminating short-shoots; flower-subtending bracts 4–6, broadly ovate to almost orbicular, pale-scarious, 0.8–1.5 mm long, obtuse to subacute, the lower ones sometimes with reduced leaf blades, glabrous except for short, curled hairs towards the apex. *Sepals* broadly ovate, obtuse, 4–5 mm long, glabrous, thin-textured; midribs not prominent. *Petals* 5, yellow, broadly obovate, 6–7 mm long, emarginate. *Stamens* 11(12), in three groups of three (rarely four) stamens each fused by their filaments, with two innermost stamens free; filaments 1.2–1.5 mm long; anthers ovoid, 1.4–1.5 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* absent. *Carpels* 3; ovaries compressed-globular, glabrous; styles excentrically spreading-erect from the carpel apex, *c.* 2 mm long. *Ovules* 1 per carpel. *Fruiting carpels* and seeds not seen.

Figure 2. *Hibbertia hapalophylla*. Photos: Geoff Cockerton.

Other specimens examined (numbers are PERTH sheet numbers): Near Mount Holland (9204237, 9259686, 9259694).

More details for these specimens are available at https://doi.org/10.26197/ala.08a4fa6e-3d1d-4b50-a815-1ad7ed6f1ba0.

Diagnostic features. Hibbertia hapalophylla can be discriminated from all other Western Australian *Hibbertia* species by the combination of linear to very narrowly obovate, abundantly curled-pubescent leaves with margins strongly recurved to the midrib so that there are two narrow and deep grooves either side of it, sessile flowers with glabrous, obtuse sepals, and usually 11 stamens (nine of which are in three bundles of three each with fused filaments and two of which are single and free), with the anthers 1.4–1.5 mm long.

Phenology. Has been collected flowering in July and September.

Distribution & habitat. Only known from a small area near Mount Holland in the Western Australian Goldfields. In its native habitat *H. hapalophylla* grows in fine white siliceous sand over laterite gravel, in mallee shrubland with *Leptospermum*, *Acacia* and *Baeckea* spp. The first-collected specimens were in loamy soil in disturbed areas on a mine site, but these are likely to have been transported as seeds to the site and to be out of their native habitat.

Conservation status. Known only from two sites and likely to be rare and localised (although probably somewhat more widespread than currently known); not known to occur in any area reserved for conservation.

Etymology. From the Greek *hapalos* (soft, tender) and *phyllon* (a leaf), in reference to the soft-textured leaves, which contrast sharply with the hard, sclerophyllous, ericoid leaves of most species of *Hibbertia* (and other plants) with which it co-occurs.

Notes. Hibbertia hapalophylla is morphologically similar to *H. priceana* and *H. remanens,* differing from both principally in leaf characters: *H. priceana* has broader, elliptic leaves with a more distinct lamina without recurved margins, and a sparser indumentum, while in *H. remanens*, which shares densely grey-hoary linear leaves, the narrow lamina is not so strongly recurved so that the groove either side of the midrib below tends to be broader and shallower. Anthers in *H. hapalophylla* are significantly shorter (1.4–1.5 mm long) than in *H. remanens* (1.8–2.2 mm long).

Hibbertia remanens K.R.Thiele & T.Hammer, *sp. nov.*

Type: Private property north of Cunderdin [precise locality withheld for conservation reasons], 5 August 2021, *K.R. Thiele* 5684 (holo: PERTH 9427783; iso: AD, CANB, MEL).

Erect *shrubs* to 0.45 m high, single- to few-stemmed at base and probably reseeding after fire; branchlets grey-pubescent with short, curled hairs when young, the indumentum persisting on older stems until the bark decorticates. *Leaves* spreading-erect, tending to be fascicled on short-shoots, linear to very narrowly obovate, 6–10 mm long, *c.* 1 mm wide, appearing ± terete but with a shallow groove either side of the midrib so that the leaf is obscurely two-grooved beneath; both surfaces and midrib beneath grey-hoary with short, curled hairs, the oldest leaves tardily glabrescent; apex obtuse to bluntly apiculate, usually slightly recurved. *Flowers* sessile, mostly terminating short-shoots; flower-subtending bracts 1–4, broadly ovate to ± triangular, herbaceous to somewhat scarious, 1–1.4 mm long, subacute, pubescent with short, curled hairs, the lower ones grading into leaves. *Sepals* broadly ovate, obtuse to subacute, 4.5–5.5 mm long, glabrous, thin-textured; midribs not prominent. *Petals* 5, yellow, broadly obovate, 7–8 mm long, emarginate. *Stamens* 11, in three groups of three stamens each fused by their filaments, with two innermost stamens free; filaments 1.4–1.8 mm long; anthers rectangular, 1.8–2.2 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* absent. *Carpels* 3; ovaries compressed-globular, glabrous; styles excentrically spreading-erect from the carpel apex, *c.* 2.5–3 mm long. *Ovules* 1 per carpel. *Fruiting carpels* and seeds not seen.

Other specimens examined (numbers are PERTH sheet numbers): Kellerberrin (3030822, 3030830), North of Cunderdin (7831161).

More details for these specimens are available at https://doi.org/10.26197/ala.7dfb524b-d0aa-4ad2-b4c0-b929201e511e

Diagnostic features. Hibbertia remanens can be discriminated from all other Western Australian *Hibbertia* species by the combination of linear to very narrowly obovate, abundantly curled-pubescent leaves with two shallow grooves either side of the midrib, sessile flowers with glabrous, obtuse sepals, and 11 stamens (nine of which are in three bundles of three each with fused filaments and two of which are single and free), with the anthers 1.8–2.2 mm long.

Phenology. Has been collected flowering in July, August and September.

Distribution & habitat. The only modern collections are from a single patch of remnant vegetation on a farm north of Cunderdin in the Western Australian Wheatbelt. Two collections from 1957 and 1960 are labeled simply 'Kellerberrin'; there are no modern collections from this location, although little searching has been done. The landscapes in this part of the Wheatbalt are very substantially cleared for agriculture.

Conservation status. Hibbertia remanens should be listed as a conservation priority taxon in Western Australia.

Figure 3. *Hibbertia priceana* (K.R. Thiele 5533, Dongolocking Nature Reserve). Photo: K.R. Thiele

Unless targeted searches discover substantial new populations, it should be considered for listing as Threatened.

Etymology. From the Latin *remaneo* (to stay or remain behind) in reference to the species' persistence in remnants of an otherwise cleared landscape.

Notes. Hibbertia remanens and *H. hapalophylla* are superficially very similar, sharing linear to very narrowly obovate, abundantly curled-pubescent leaves, and almost identical flowers. The species differ consistently, however, in the cross-section of the leaf. In *H. hapalophylla* the leaf margins are clearly recurved to the midrib, on either side of which are two narrow, deep grooves, with the true leaf abaxial surface (bearing the stomates) not visible externally except by dissection. In *H. remanens*, by contrast, the leaves are almost sub-terete, without distinct lamina margins that recurve to the midrib, and instead with two grooves that are shallow when fresh or rehydrated (somewhat deeper when dried) and with the stomate-bearing abaxial leaf-surface externally exposed. *Hibbertia priceana* is different again, with its narrowly elliptic leaves that are flat, with the abaxial surface fully exposed and not protected by recurved margins.

The leaves of *H. remanens* are superficially similar to those of species such as *H. rupicola* and *H. hibbertioides*, which share the same staminal and carpal arrangement, but leaves in these species are always glabrous.

Hibbertia priceana J.R.Wheeler, *Nuytsia* 15:136–138 (2002)

Type: Ongerup area, Western Australia [precise locality withheld for conservation reasons], 31 July 2001, *J.R. Wheeler* 4063 (holo: PERTH 6231047; iso: AD, CANB, K).

Compact or sometimes sprawling *shrubs* (0.05–)0.1–0.2(-–0.3) m high. *Young stems* moderately to densely pubescent to tomentose with tangled, ± crisped simple hairs. *Leaves* alternate, sessile, erect or ascending, oblong-elliptic, 4.5–10.5 mm long, 1.5–3 mm wide, moderately pubescent on both surfaces with fine, long, spreading or somewhat curled simple hairs; margins flat, ± thickened; apex obtuse. *Flowers* solitary, mostly terminating short-shoots, sessile; flower-subtending bracts 1–3, broadly ovate to ± triangular, herbaceous to somewhat scarious, 1–2.5 mm long, subacute, glabrous or rarely with a few simple hairs towards the apex, the lower ones grading into leaves. *Sepals* 4–6 mm long, herbaceous, glabrous; midribs not prominent; outer sepals broadly elliptic, subacute to obtuse; inner sepals similar in size and texture to the outer, obtuse to very shallowly emarginate. *Petals* 5, yellow, broadly obovate, 6–9 mm long, emarginate. *Stamens* usually 11, in three bundles each of 3 stamens united by their filaments, the remaining 2 stamens single; filaments 1–1.5 mm long; anthers elliptic, 1.5–1.8 mm long, dehiscing by introrse longitudinal slits; staminodes absent. *Carpels* 3; ovaries obovoid-globular, glabrous; styles horizontal then spreading-erect, 1–2 mm long. *Ovule* 1 per carpel. *Seeds* brown, oblong-ellipsoid, c. 2.2 mm long; aril basal, scarious, white-translucent.

Other specimens examined (numbers are PERTH sheet numbers): Dongolocking Nature Reserve (8058466, 8838003). Harrismith (6287883), Ongerup (3320804, 4387716, 4387724, 4569741, 6231071, 6231098, 6331165, 7444605, 7459564, 8013543, 8013551, 8014191, 8014205, 8386722, 8386870), Wickepin (4388348).

More details for these specimens are available at https://doi.org/10.26197/ala.0da67072-1c73-45fb-8e46-bd4dc7c29891.

Diagnostic features. Hibbertia priceana can be discriminated from all other Western Australian species of *Hibbertia* by the combination of softly pubescent to villous, oblong-elliptic leaves 4.5-10.5 mm long with flat margins, sessile flowers with glabrous, subacute to obtuse sepals, 11 stamens in three bundles each of 3 stamens united by their filaments, with 2 stamens single, and anthers 1.5–1.8 mm long.

Phenology. Flowers from June to October with a likely peak in late August.

Distribution & habitat. Occurs in two broadly disjunct areas, one near Ongerup and the other between Dongolocking, Wickepin and Harrismith.

Notes. Hibbertia priceana differs from *H. hapalophylla* and *H. remanens* in having flat, narrowly elliptic leaves with the abaxial lamina clearly visible either side of the broad midrib. The abaxial lamina tends to be greyish in dried specimens, contrasting somewhat with the greenish, rather obscure midrib. While the leaves of all three species bear an indumentum of curled hairs, in *H. priceana* these are less dense and longer than in the other two species.

Acknowledgments

We thank the Curator and staff at the Western Australian Herbarium for allowing access to the collection, and Brian Ellery and Geoff Cockerton for helpful conversations about *H. hapalophylla*.

References

Horn, J.W. (2005). The Phylogenetics and Structural Botany of Dilleniaceae and *Hibbertia* Andrews. PhD thesis, Duke University.

Wheeler, J.R. (2002). A revision of *Hibbertia depressa* and its allies (Dilleniaceae) from Western Australia. *Nuytsia* 15(1): 127–138.