

## Two new species of *Hibbertia* (Dilleniaceae) from near Ravensthorpe in Western Australia

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### Abstract

Wege, J.A. & Thiele, K.R. Two new species of *Hibbertia* (Dilleniaceae) from near Ravensthorpe in Western Australia. *Nuytsia* 19(2): 303–310 (2009). Two new and geographically restricted species allied to *Hibbertia hamulosa* J.R.Wheeler and *H. mucronata* (Turcz.) Benth. are newly described. *Hibbertia abyssa* Wege & K.R.Thiele is distinctive for its long, slender and more or less glabrous peduncles, and sepals with both uncinata and minute stellate hairs on the outer surface. This species, which occurs on shallow soils with siltstone outcropping, is known from a single population adjacent to the nickel mine on Bandalup Hill and has recently been nominated for listing as Declared Rare Flora. *Hibbertia atrichosepala* Wege & K.R.Thiele is readily distinguished from allied species by its completely glabrous sepals. It is a narrow-range endemic of rocky, lateritic habitats in the Ravensthorpe Range and is listed as having Priority One conservation status.

### Introduction

Recent floristic surveys and inventories of the Ravensthorpe Range and Bandalup Hill in southern Western Australia have resulted in the discovery and subsequent description of a number of new and geographically restricted species (e.g. Nicolle 2002; Orthia *et al.* 2005; Rye 2006; Barrett 2007; Toelken & Craig 2007; Wege 2007; Wilkins *et al.* 2009), with a number of additional taxa awaiting formal description (Western Australian Herbarium 1998–). This region is a biologically important area of south-west Western Australia, supporting a wide variety of habitat types and a species-rich flora with significant levels of endemism (Beard 1973; Craig 1995; Craig *et al.* 2007; Kern *et al.* 2008). Despite this, little land in this region is allocated to the conservation estate: it is predominantly unallocated Crown Land, most of which is covered by mining tenements (Harris *et al.* 2008). The area has a varied terrain and complex geology, including greenstone and banded ironstone, and is highly prospective for minerals such as nickel, magnesite, iron, gold, copper, silver and spongolite (Beard 1973; Thom *et al.* 1977).

Surveys of the Ravensthorpe Range and Bandalup Hill in 2007 (Kern *et al.* 2008) revealed two new species of *Hibbertia* Andrews (Dilleniaceae) from the *H. mucronata* (Turcz.) Benth. species complex. This small species complex, recently revised by Wheeler (2000), also includes *H. axillibarba* J.R.Wheeler, *H. carinata* J.R.Wheeler, *H. charlesii* J.R.Wheeler, *H. hamulosa* J.R.Wheeler, *H. stowardii* S.Moore and *H. ulicifolia* (Benth.) J.R.Wheeler. Species in the complex are characterised by their more or less linear leaves with tightly revolute margins meeting or covering a prominent abaxial midrib and



straight, strongly pungent apices, outer sepals with acuminate or hardened, pungent apices, and flowers with less than 12 stamens arranged on one side of the two hairy carpels. Staminodes are absent except in *H. charlesii* which has 5–10 staminodes arranged on both sides of the stamens.

Both new species are narrow-range endemics and are potentially threatened by mining-related activities. Their recognition highlights not only the importance of ongoing floristic survey to biodiversity conservation in Western Australia, but of subsequent taxonomic study of anomalous collections.

## Methods

This study is based upon the examination of specimens at the Western Australian Herbarium (PERTH) and supplementary field photographs. Precise locality statements have been withheld in view of the rarity of these species.

## Taxonomy

***Hibbertia abyssa*** Wege & K.R.Thiele, *sp. nov.*

*Ex Hibbertiae hamulosae* foliis effusis et pedunculi longioribus et glabrae differt.

*Typus*: Bandalup Hill, Western Australia [precise locality withheld for conservation reasons] 6 November 2008, A. Markey & J. Allen 6216 (*holo*: PERTH 08021937; *iso*: AD, CANB, HO, K, MEL, NSW).

*Hibbertia* sp. Bandalup Hill (G.F. Craig 3479), Western Australian Herbarium, in *FloraBase*, <http://www.florabase.dec.wa.gov.au> [accessed 4 March 2009].

Upright, single- or multi-stemmed *shrub* to 1.2 m high with sprawling lower stems; young branchlets distinctly ribbed from the base of each petiole, densely stellate-hairy between the  $\pm$  glabrous ribs. *Leaves* spirally arranged, crowded, ascending when young, spreading to slightly more than 90° to the stem; petioles 0.5–1 mm long, with a dense indumentum of simple and/or stellate hairs on the adaxial surface and margin, glabrous abaxially; lamina linear to subulate, (4–)6–11(–14) mm long, 0.9–1.4(–1.6) mm wide, subterete, with the margin tightly recurved to a prominent, thickened midrib; upper surface with sparse tubercles, occasionally with very sparse, antrorse simple and/or stellate hairs; apex a strong, straight, pungent mucro. *Flowers* solitary in the axils; peduncles ascending, straight or sigmoidally curved, 6–14 mm long, glabrous or with sparse uncinata hairs distally; bract subtending the flower narrowly triangular, 1.5–2 mm long, acute to acuminate with ciliolate margins. *Sepals* 5, green with dark red markings, elliptic to narrowly ovate, 3.5–5 mm long; outer sepals with a short, indurate, pungent apex, outer surface with moderately dense uncinata hairs and sparse minute stellate hairs, inner surface with minute stellate hairs apically; inner sepals obtuse, outer surface with sparse uncinata and stellate hairs, the margins membranous and glabrous, inner surface glabrous. *Petals* 5, yellow, obovate, 6–8.5 mm long, emarginate. Stamens 5, all on one side of the carpels, connate basally; filaments *c.* 0.5 mm long; anthers narrowly ovate to oblong, 2–2.2 mm long, dehiscing by longitudinal slits; staminodes absent. *Carpels* 2, broadly ellipsoid, densely hairy; ovules 2 per carpel. *Fruiting carpels* not seen. (Figure 1)



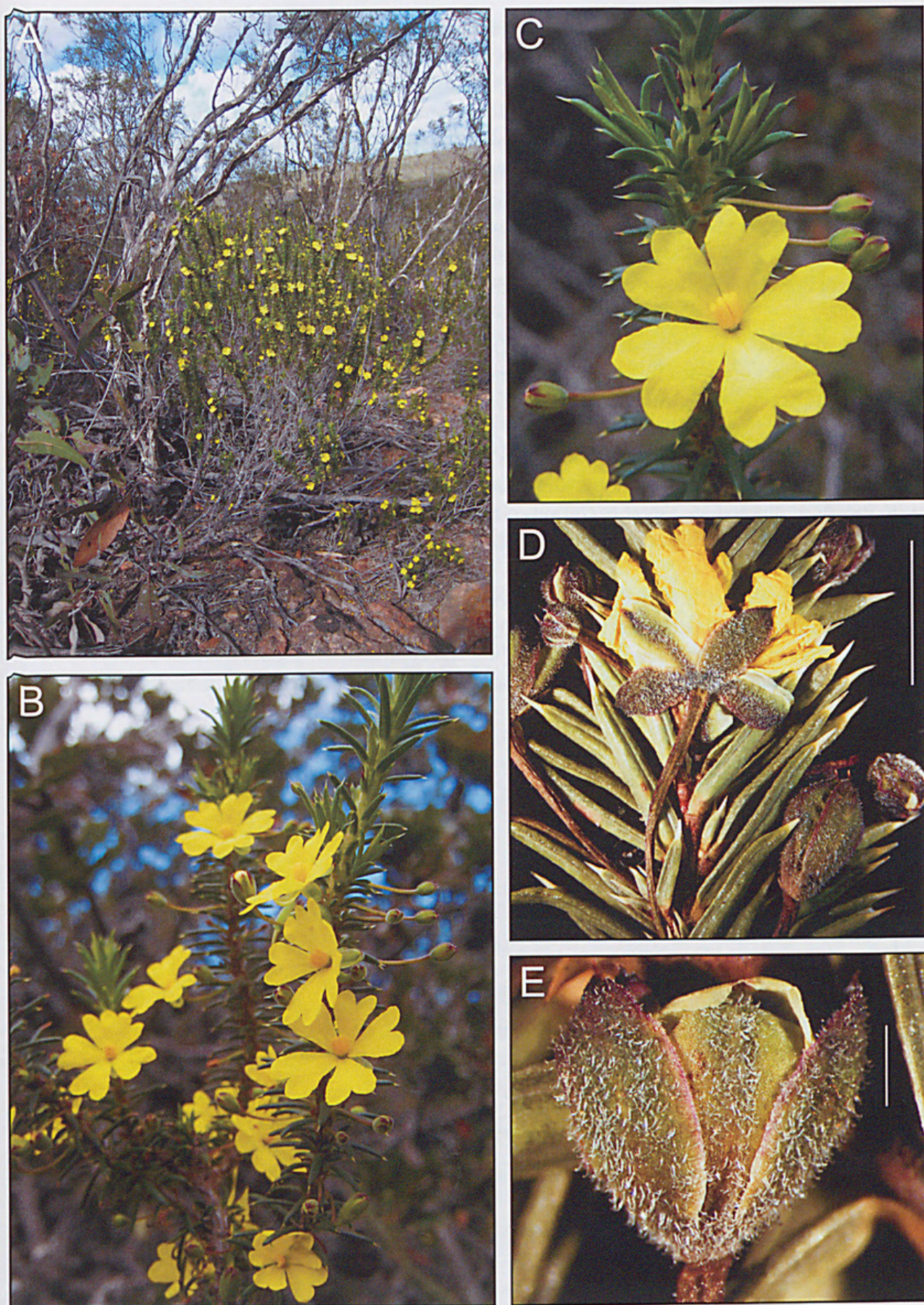


Figure 1. *Hibbertia abyssa* (A. Markey & J. Allen 6216). A – habit; B – stem portion showing ascending young leaves, spreading mature leaves and axillary flowers on long peduncles; C – flower, with stamens arranged on one side of the carpels; D – portion of herbarium specimen showing the pungent leaves and long  $\pm$  glabrous peduncles, scale 5 mm; E – bud, showing the uncinete-hairy sepals, scale 1 mm. Field photographs (A–C) by Adrienne Markey.



*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons], 16 Feb. 1998, G.F. Craig 3479 (PERTH); 9 Oct. 2007, S. Kern & R. Jasper RR 2211 (PERTH); 6 Nov. 2008, A. Markey & J. Allen 6217 (AD, CANB, PERTH).

*Distribution and habitat.* Known only from Bandalup Hill, east of Ravensthorpe and the Jerdacuttup River on the south coast of Western Australia (Figure 2). Occurs on rocky outcrops in shallow red-brown light clay with surface siltstone fragments in *Eucalyptus pleurocarpa* and *E. lehmannii* subsp. *parallela* open mallee shrubland with *Banksia lemanniana* and *Melaleuca pentagona* var. *latifolia*.

*Phenology.* Flowers have been recorded in October, November and February.

*Conservation status.* Currently listed as Priority One under Department of Environment and Conservation (DEC) Conservation Codes for Western Australia Flora under the name *H. sp. Bandalup Hill* (G.F. Craig 3479) (Atkins 2008), although has been nominated for listing as Declared Rare Flora. *Hibbertia abyssa* is known from a single population on Bandalup Hill which is situated adjacent to the BHP Billiton nickel mine. Part of the population was cleared in 2008. The mine was subsequently closed in January 2009 as a result of an economic downturn and concomitant fall in nickel prices. Whilst mining is no longer an immediate threat to the survival of this species, it may be impacted by dieback and potentially by dust from the adjacent pit. It will again be threatened by mining if the mine reopens.

*Etymology.* The epithet is derived from the Latin *abyssus* (f.; an abyss, a bottomless pit) and the adjectival suffix -a (indicating place of growth), in reference to its position at the edge of a mine pit and also at the edge of extinction.

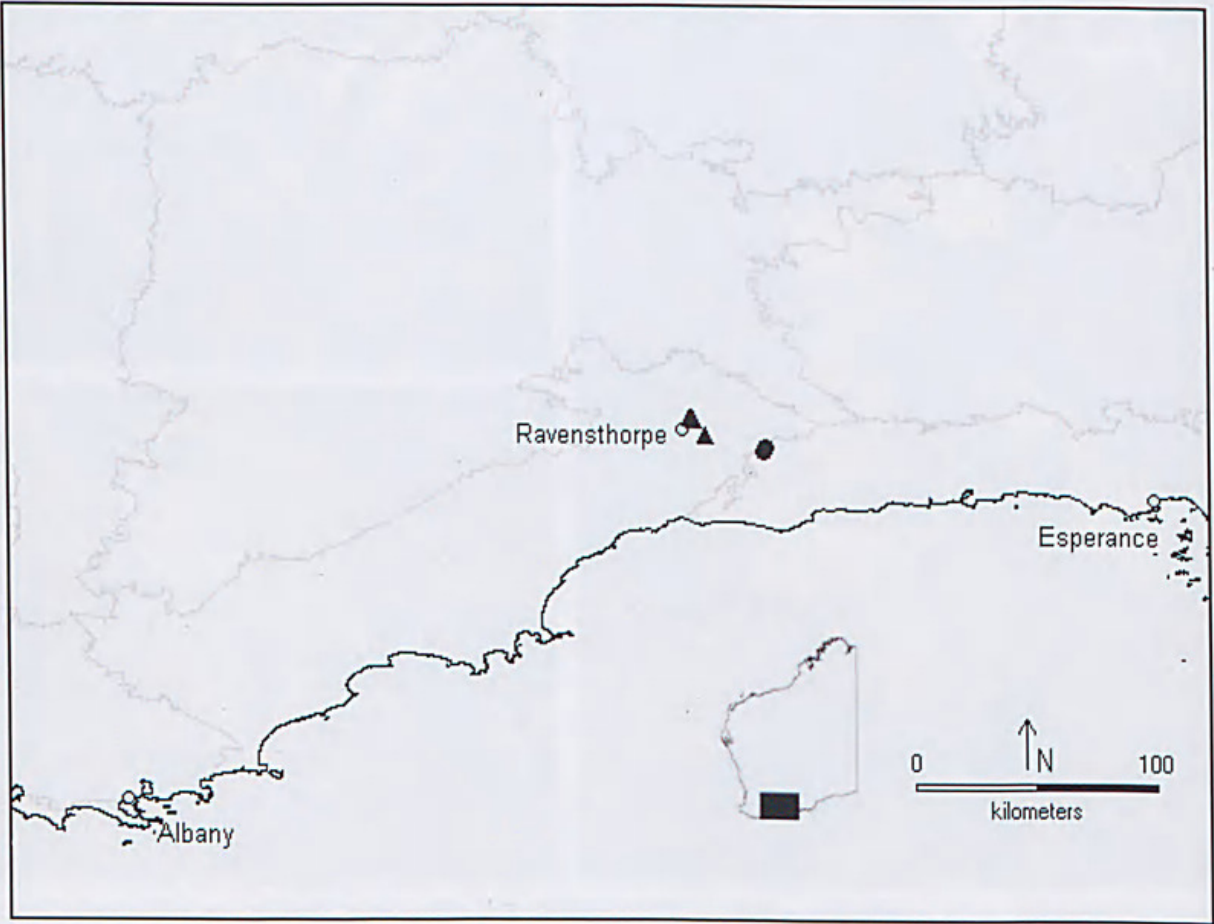


Figure 2. Distribution of *Hibbertia abyssa* (●) and *H. atrichosepala* (▲) in south-west Western Australia, with Version 6.1 IBRA regions (Department of the Environment, Water, Heritage and the Arts 2008) indicated in grey.



**Affinities.** The long, slender and more or less glabrous peduncles of *H. abyssa* differentiate it from allied taxa. The combination of uncinata and stellate hairs on the outer sepals of *H. abyssa* suggests an affinity to *H. hamulosa*, a species also known from rocky habitats, in Fitzgerald River National Park to the south-east of Bandalup Hill. This species differs most obviously from *H. abyssa* in having densely stellate-hairy rather than glabrous stem ribs, shorter (2–4 mm long) and densely stellate-hairy peduncles, and mature leaves which tend not to spread beyond 45 degrees to the stem.

*Hibbertia abyssa* may also be confused with *H. atrichosepala* and *H. mucronata* which are also known from the Ravensthorpe region, although neither species is recorded east of the Jerdacuttup River. *Hibbertia atrichosepala* can be readily differentiated from *H. abyssa* by its shorter peduncles (3.5–7 mm long), and glabrous sepals. It also tends to have larger petals and more prominently pungent outer sepals. Both species occur in rocky habitats, however, *H. abyssa* is restricted to skeletal soils over siltstone, whereas *H. atrichosepala* occurs on deeper loam soils over lateritic gravels. *Hibbertia mucronata* differs from *H. abyssa* in having stems, peduncles and young leaves with simple, pilose hairs, shorter peduncles (to 2 mm long), and sepals with stellate hairs and no uncinata hairs. *Hibbertia mucronata* is recorded in sand or loam over a variety of substrates including quartzite, spongolite, limestone and granite.

Like *H. abyssa*, *H. ulicifolia* has relatively long (4–8 mm) peduncles, however, they are stellate-hairy rather than more or less glabrous. *Hibbertia ulicifolia* differs further from *H. abyssa* in having nine stamens and stellate-hairy sepals. It grows in coastal granite habitats well east of Bandalup Hill.

**Notes.** Observations on plants growing in an area burnt in c. 2003 indicate that *H. abyssa* has the ability to resprout after fire (A. Markey, pers. comm.).

***Hibbertia atrichosepala*** Wege & K.R.Thiele, *sp. nov.*

Ex *Hibbertiae mucronatae* indumento caulium juvenalium stellato-piloso, pedunculi longioribus, sepalis exterioribus glabris differt.

**Typus:** Ravensthorpe Range, Western Australia [precise locality withheld for conservation reasons], 10 September 2008, R. Butcher & A. Markey RB 1276 (*holo*: PERTH 08021945; *iso*: AD, CANB, MEL, NSW).

*Hibbertia* sp. Ravensthorpe Range (E. Tink 335), Western Australian Herbarium, in *FloraBase*, <http://www.florabase.dec.wa.gov.au> [accessed 4 March 2009].

Upright, apparently single-stemmed *shrub* to 1.2 m high with sprawling lower stems; young branchlets distinctly ribbed from the base of each petiole, densely stellate-hairy between the  $\pm$  glabrous ribs. *Leaves* spirally arranged, crowded, ascending when young, spreading up to 90 degrees to the stem; petioles 0.3–1 mm long, with dense, simple hairs on the adaxial surface, glabrous abaxially; lamina linear to subulate, (4–)7–13(–15) mm long, 0.8–1.4 mm wide, subterete, with the margin tightly recurved to a prominent, thickened midrib; upper surface with sparse tubercles and  $\pm$  sparse, antrorse simple hairs; apex a strong, straight, pungent mucro. *Flowers* solitary in the axils; peduncles  $\pm$  straight, ascending, 3.5–7 mm long, glabrous aside from minute stellate hairs at the very base; bract subtending the flower narrowly triangular, 1.5–2.5 mm long, acute to acuminate, with simple hairs on the adaxial surface. *Sepals* 5, green  $\pm$  tinged red, elliptic to ovate, 4.5–6 mm long, glabrous; outer sepals strongly acuminate and pungent; inner sepals obtuse, the margin membranous. *Petals* 5, yellow, obovate, 8–10 mm long, emarginate. Stamens 5, all on one side of the carpels, connate



basally; filaments *c.* 0.5 mm long; anthers narrowly ovate to oblong, 2–2.5 mm long, dehiscing by longitudinal slits; staminodes absent. *Carpels* 2, ellipsoid to ovoid, densely hairy; ovules 2 per carpel. *Fruiting carpels* dry, one or two developing to maturity, subglobular, *c.* 3 mm long, 2.5 mm wide; mature seed not seen. (Figure 3)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 15 Sep. 2008, R. Butcher & A. Markey RB 1300 (PERTH); 18 Apr. 2007, S. Kern, R. Jasper & D. Brassington RR 0616 (PERTH); 2 Oct. 2007, S. Kern, R. Jasper & H. Hughes RR 1946 (PERTH); 21 Nov. 2008, A. Markey & J. Allen 6218 (AD, PERTH); 21 Nov. 2008, A. Markey & J. Allen 6219 (CANB, PERTH); 24 Oct. 1998, E. Tink 335 (PERTH).

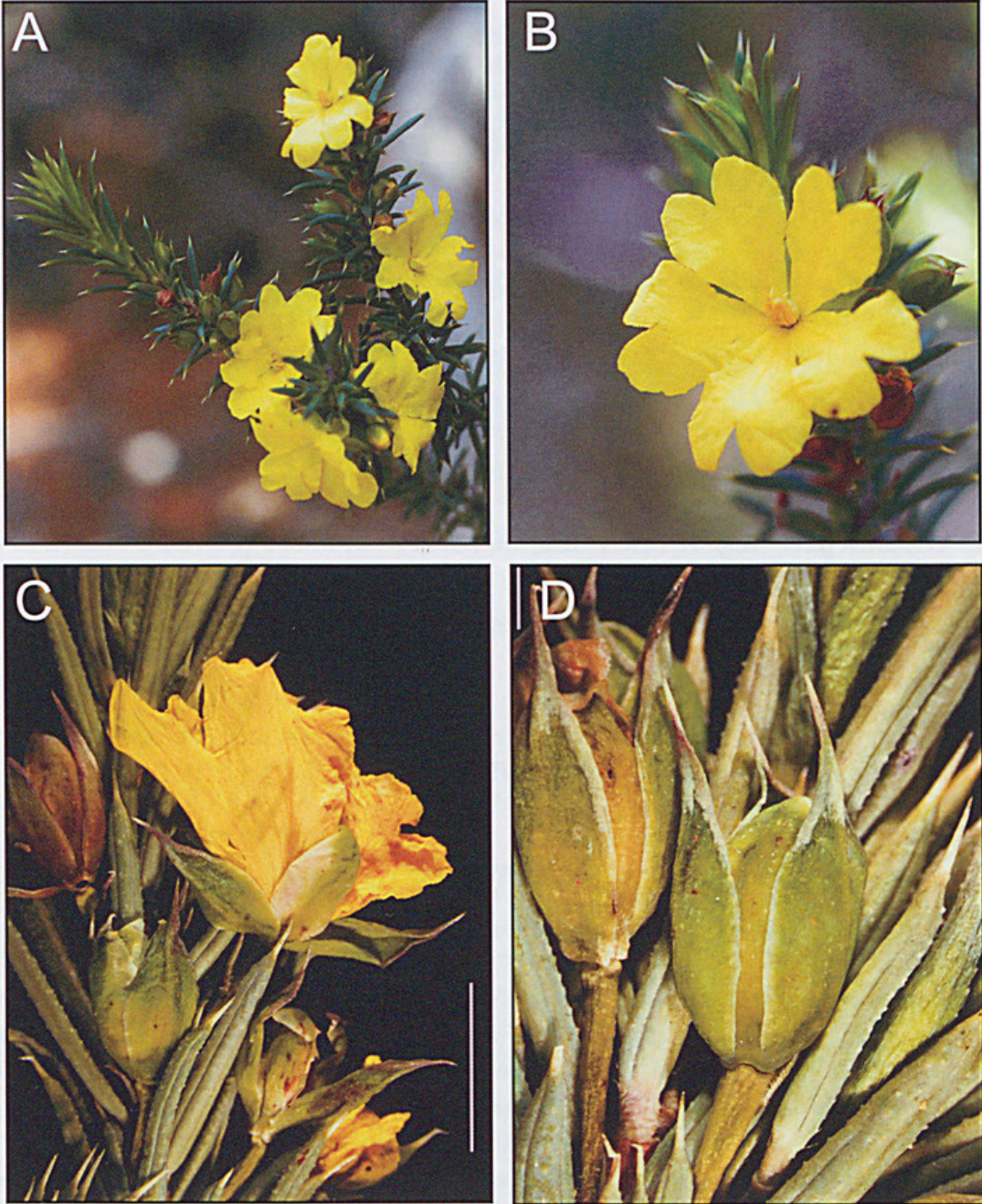


Figure 3. *Hibbertia atrichosepala* (R. Butcher & A. Markey RB 1276). A – stem portion; B – flower, with stamens arranged on one side of the carpels; C – portion of herbarium specimen showing the pungent leaves and glabrous sepals, scale 5 mm; D – buds, showing the moderately long peduncles and the strongly acuminate, glabrous outer sepals, scale 1 mm. Field photographs (A–B) by Ryonen Butcher.



**Distribution and habitat.** Known only from rocky hill slopes in the Ravensthorpe Range (Figure 2), where it grows in clay loams with laterite fragments at the surface. Recorded in *Eucalyptus falcata* subsp. *falcata* and *E. pleurocarpa* mallee woodland, *E. lehmannii* subsp. *parallela* and *E. falcata* subsp. *falcata* mallee woodland, and *Acacia* sp. Ravensthorpe (R.S. Cowan & B.R. Maslin RSC A-760), *Banksia laevigata* and *Hakea multileneata* very tall shrubland.

**Phenology.** Flowering specimens have been collected from September to November and in April.

**Conservation status.** Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. This species is a narrow-range endemic that is not currently protected within the State's conservation estate.

**Etymology.** The epithet is derived from the Greek *atrachos* (without hair) and refers to the distinctive, glabrous sepals of this species.

**Affinities.** *Hibbertia atrichosepala* may be confused with *H. mucronata*, *H. hamulosa* and *H. abyssa* which are all known from the Ravensthorpe region. It differs most obviously from these taxa in having glabrous sepals. *Hibbertia mucronata* differs further from *H. atrichosepala* in having shorter peduncles (to 2 mm long) with simple hairs, and young stems with densely pilose rather than stellate hairs. Unlike *H. atrichosepala*, *H. hamulosa* has densely stellate-hairy rather than glabrous stem ribs, shorter (2–4 mm long) and densely stellate-hairy peduncles, and mature leaves which tend not to spread beyond 45 degrees to the stem. A comparison with *H. abyssa* is provided in the affinities under that species. *Hibbertia carinata*, a poorly known species recorded between Hatters Hill and Esperance, has more or less glabrous sepals but can be readily differentiated from *H. atrichosepala* by its sessile flowers with 9–12 stamens.

### Acknowledgements

We thank Rosemarie Jasper and the Ravensthorpe Range survey team for bringing these two new species to our attention; Adrienne Markey for her persistent efforts in obtaining material and photographs of *H. abyssa* and for her assistance in preparing the Declared Rare Flora nomination for this species; Ryonen Butcher for her observations, type gathering and photographs of *H. atrichosepala*; Jess Allen and Damien Rathbone for field survey; Geoff Cockerton for providing additional survey data; and Judy Wheeler for her previous taxonomic work on *H. mucronata* and allies, which made taxonomic assessment of these two new species a relatively straightforward endeavour. This paper was supported by the Department of Environment and Conservation's *Saving our Species* biodiversity conservation initiative.

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