

## A revision of the *Hibbertia hypericoides* species group (Dilleniaceae)

Kevin R. Thiele<sup>1</sup> and Geoff Cockerton<sup>2</sup>

<sup>1</sup>Western Australian Herbarium, Department of Parks and Wildlife,  
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

<sup>2</sup>Western Botanical, PO Box 3608, Midland, Western Australia 6056

<sup>1</sup>Corresponding author, email: kevin.thiele@dpaw.wa.gov.au

### Abstract

Thiele, K.R. & Cockerton, G. A revision of the *Hibbertia hypericoides* species group (Dilleniaceae). *Nuytsia* 25: 285–300 (2015). The *Hibbertia hypericoides* (DC.) Benth. species group comprises four species endemic in Western Australia. *Hibbertia hypericoides* is the most widespread species of *Hibbertia* Andrews in Western Australia, and exhibits significant and complex variation. The new subspecies *H. hypericoides* subsp. *septentrionalis* K.R. Thiele & Cockerton is described to accommodate a long-recognised form that occurs in the northern part of its range. The new species *H. cockertoniana* K.R. Thiele, previously included in *H. hypericoides*, is described. Descriptions are also provided for *H. hypericoides* subsp. *hypericoides*, *H. silvestris* Diels and *H. furfuracea* (R.Br. ex DC.) Benth., the other taxa in the group.

### Introduction

The *Hibbertia hypericoides* (DC.) Benth. species group comprises a small number of closely related taxa in south-west Western Australia, mostly in moderately high-rainfall areas, characterised by linear to obovate, obtuse leaves with margins that vary from slightly recurved with the densely stellate-pubescent abaxial surface more or less exposed to strongly recurved and obscuring the abaxial lamina and midrib, pedicellate flowers with a single, herbaceous primary bract at the apex of the pedicel and no secondary bracts, stamens all on one side of two densely pubescent carpels, and staminodes in bundles lateral to and opposite the stamens (Figure 1). *Hibbertia diamesogenos* (Steud.) J.R. Wheeler is superficially similar but lacks the staminodes opposite the stamens and the stellate-hairy leaf undersurface, and is here not considered to be related. Most species of the group are also characterised by an unusual leaf indumentum, with simple and/or stellate hairs borne on prominent tubercles formed from several large, radially arranged epidermal cells (Figure 2A). Two species in the group, *H. hypericoides* and *H. furfuracea* (R.Br. ex DC.) Benth., were included in a molecular phylogeny of *Hibbertia* Andrews by Horn (2005), where they formed a clade with 100% bootstrap support in subgen. *Hemistemma* (DC.) J.W. Horn.

The group comprises (in addition to *H. hypericoides*) *H. furfuracea*, *H. silvestris* Diels and the new species *H. cockertoniana* K.R. Thiele described here. *Hibbertia hypericoides* and *H. furfuracea* were described in *Pleurandra* Labill. by de Candolle (1817), and transferred to *Hibbertia* by Benth. (1863) when the genera *Pleurandra*, *Hemistemma* Juss. ex Thouars and *Hibbertia* were merged. Benth. placed the species in sect. *Hemipleurandra* Benth. on the basis of a combination of stamens all on one side of the two carpels (shared with sect. *Pleurandra* (Labill.) Benth.) and staminodes present (absent in sect. *Pleurandra*).

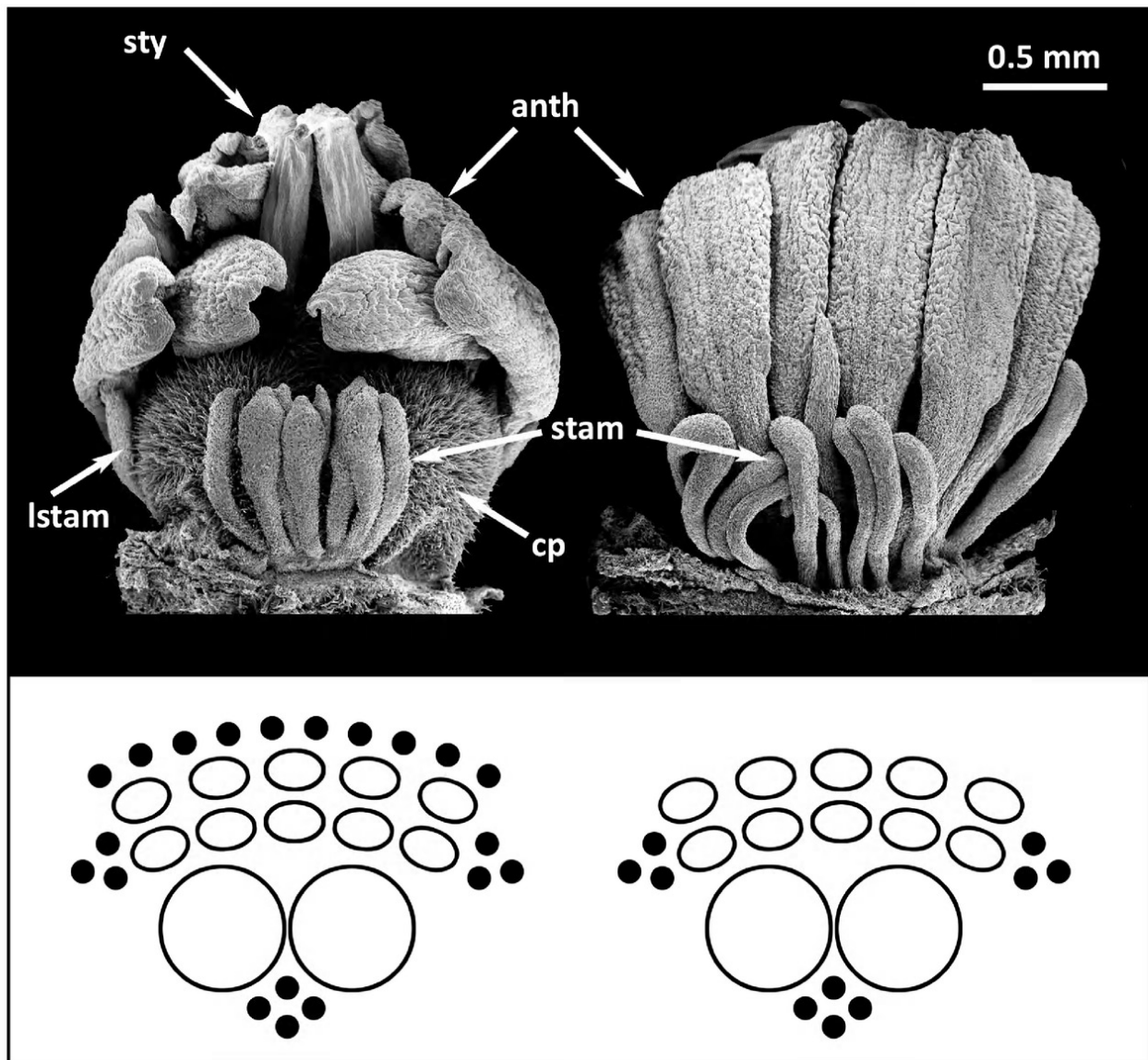


Figure 1. Staminode patterns in the *Hibbertia hypericoides* group. Above: two views of *H. cockertoniana* androecium and gynoecium from opposite sides, showing staminode cluster opposite the stamens (left) and a row of staminodes behind the stamens (right); sty – styles; anth – fertile anthers; cp – carpels; stam – staminodes; l-stam – lateral staminodes (from PERTH 03036588). Below: staminode pattern in *H. cockertoniana* (left) and other members of the *H. hypericoides* group (right); open circles – carpels; open ellipses – fertile stamens; closed circles – staminodes.

*Hibbertia hypericoides*, the most common member of the group, is widespread in south-west Western Australia from Kalbarri to Augusta. Wheeler (1987) first noted that plants from the northern part of its range are often densely stellate-hairy, and that specimens from the Eneabba, Three Springs and Mt Lesueur areas have wider leaves than is typical in other parts of the range. A ‘northern variant’ of *H. hypericoides* was segregated at the Western Australian Herbarium (PERTH) to accommodate these atypical specimens, and included in the key to species provided by Wheeler (2004) although it was never formally phrase-named. Assessment of all material held at PERTH shows that the northern variant can, with few exceptions, be consistently discriminated from typical *H. hypericoides*; accordingly, it is here described as *H. hypericoides* subsp. *septentrionalis* K.R.Thiele & Cockerton.

The second new taxon described here was first recognised as distinct from both typical *H. hypericoides* and the ‘northern variant’ by the second author following botanical surveys associated with a mine development at Mt Gibson in the Yalgoo IBRA bioregion (Department of the Environment 2013).

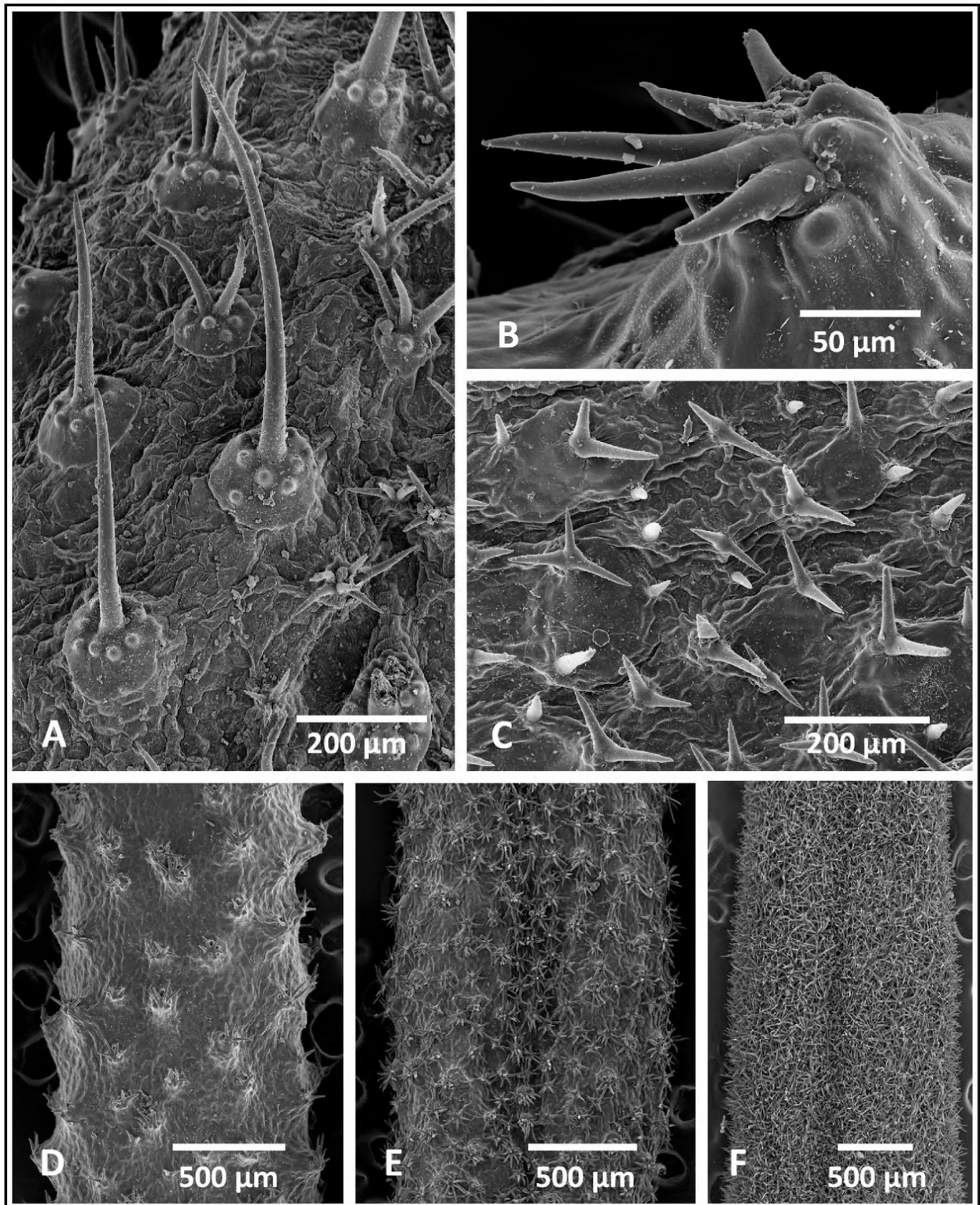


Figure 2. Adaxial leaf indumentum in members of the *Hibbertia hypericoides* species group. A – tubercle-based, simple hairs in *H. hypericoides* subsp. *hypericoides*, showing the characteristic tubercle formed from several, radially arranged cells; B – forward-directed, tubercle-based stellate hair in *H. hypericoides* subsp. *hypericoides*; C – twinned or few-armed, erect hairs characteristic of *H. furfuracea*; D – *H. hypericoides* subsp. *hypericoides*, with a mix of tubercle-based, simple and forward-directed, stellate hairs intermixed with sparse, radiately stellate hairs; E – *H. hypericoides* subsp. *hypericoides*, an individual with more densely stellate hairs; F – *H. hypericoides* subsp. *septentrionalis*, with dense, stellate indumentum. Images from PERTH 06315658 (A, B), PERTH 03072118 (C), PERTH 07544138 (D), PERTH 05134021 (E) and PERTH 03035360 (F).

Assessment of specimens at PERTH revealed that, in addition to a number of collections made from ridgelines and hilltops immediately adjacent to Mt Gibson, the taxon had been previously collected from other hilltop sites in the vicinity as well as from the Billeranga Hills west of Morawa and from near Canna; these localities are all inland of and disjunct from the distribution of *H. hypericoides*, as first noted by Meissner and Caruso (2008). The plants are morphologically distinctive, and are here described as *H. cockertoniana*.

### Key to taxa in the *Hibbertia hypericoides* species group

A complete key to all Western Australian species of *Hibbertia* at [rbg.vic.gov.au/keybase](http://rbg.vic.gov.au/keybase) has been updated to include the new taxa.

1. Leaves and stems abundantly pilose with long, soft, tubercle-based, simple hairs over very small, stellate ones; leaves elliptic to obovate, (5–)8–15 mm long ..... **H. silvestris**
- 1: Leaves and stems stellate-pubescent with or without sparse, short, straight or hooked simple hairs, or (in *H. furfuracea*) the leaf adaxial surface with short, stiff, simple or twinned hairs; leaves linear to elliptic or obovate, (7–)12–40(–55) mm long ..... **2**
2. Leaves narrowly obovate to elliptic, (15–)25–40(–55) mm long, usually ±flat with scarcely recurved margins (margins occasionally revolute and then the leaves ±linear), the adaxial surface coarsely hairy with stiff, erect, tubercle-based, few-armed (often twinned) hairs; ovules 4 per carpel ..... **H. furfuracea**
- 2: Leaves linear, elliptic or obovate, (7–)12–18(–35) mm long, the margins usually strongly revolute, the adaxial surface glabrous or sparsely to densely hairy with stellate and/or simple hairs which are rarely twinned; ovules 2 per carpel ..... **3**
3. Plants erect, sparingly branched, without a woody rootstock and usually single-stemmed at ground level; young branches sparsely to (rarely) moderately pubescent, soon glabrous; staminodes lateral to, opposite, and behind the row of stamens ..... **H. cockertoniana**
- 3: Plants spreading (rarely erect), much-branched, multi-stemmed from a fire-resistant woody rootstock; young branches ±densely and persistently stellate-hairy; staminodes lateral to and opposite the row of stamens ..... **4**
4. Leaves glossy dark green, linear to narrowly elliptic, the margins usually strongly recurved, with widely scattered, simple, hooked or stellate tubercle-based hairs; outer sepals sparsely to moderately stellate-hairy usually with at least some long, overtopping simple hairs ..... **H. hypericoides** subsp. **hypericoides**
- 4: Leaves dull grey-green, linear and with recurved margins to elliptic with ±flat margins, densely stellate-hairy, the hairs without or with obscure tubercles; outer sepals densely stellate-hairy usually without long, overtopping simple hairs ..... **H. hypericoides** subsp. **septentrionalis**



## Taxonomy

### ***Hibbertia cockertoniana*** K.R. Thiele, *sp. nov.*

*Type:* Mount Gibson Range, Western Australia [precise locality withheld for conservation reasons], 5 August 2015, *G. Cockerton & S. Cockerton* WB 37642 (*holo:* PERTH 08618410; *iso:* AD, CANB).

*Hibbertia* sp. Mt Gibson (R.D. Hoogland 12002), Western Australian Herbarium, in *FloraBase*, <http://florabase.dpaw.wa.gov.au/> [accessed 15 June 2015].

Erect *shrubs* 0.4–1(–1.3) m high, single- or few-stemmed at the base; young branchlets reddish, sparsely to moderately pubescent with pale, few- and finely-branched, stellate hairs, soon glabrous; older stems with smooth, pale grey bark decorticating in strips and flakes. *Leaves* spreading-erect, scattered, linear, (7–)12–18(–35) mm long, 0.8–1.2 mm wide, the margins strongly recurved and often meeting the midrib below, thus completely or largely obscuring the abaxial lamina; adaxial surface finely to coarsely tuberculate, glabrous to sparsely pubescent when young with forward-directed, simple or few-branched stellate hairs, sometimes also with spreading, hooked hairs; abaxial midrib not prominent, with indumentum as for adaxial lamina; abaxial lamina (when visible) densely stellate-hairy; apex obtuse,  $\pm$ straight. *Flowers* pedicellate, single in upper leaf axils; pedicels 7–22 mm long,  $\pm$ erect at and after anthesis, glabrous to sparsely stellate-hairy; *primary bract* at apex of the pedicel, green and herbaceous, linear to very narrowly triangular, 2.5–4.2 mm long, acute, with indumentum as for leaves; *secondary bracts* absent. *Sepals* broadly ovate to almost orbicular, 5.2–6.5 mm long, moderately pubescent abaxially with tubercle-based stellate hairs mixed with short,  $\pm$ straight or hooked, simple hairs, adaxially densely and finely stellate-pubescent; midribs not prominent; outer sepals obtuse; inner sepals broadly similar in size, apex shape and indumentum to the outer sepals but broader, less tuberculate and often lacking the simple hairs. *Petals* yellow, obovate, 8–14 mm long, emarginate. *Stamens* (7–)10(–16), all on one side of the gynoecium; filaments 0.8–1.5 mm long, shortly fused at the base; anthers rectangular, 1.5–2.2 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 14–28, in bundles lateral to, opposite, and behind the fertile stamens, the lateral group and those behind the stamens often merging into a continuous band. *Carpels* 2; ovaries compressed-globular, densely pubescent; styles erect, curved excentrically from the carpel apex, *c.* 1.5 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen. (Figure 3)

*Diagnostic features.* *Hibbertia cockertoniana* may be distinguished from all other *Hibbertia* species in Western Australia by its unique pattern of staminodes, comprising a small number lateral to the row of stamens, a cluster opposite the stamens between the carpels, and a cluster or palisade-like row behind the stamens. It may also be readily separated from other taxa in the *H. hypericoides* complex by its sparsely pubescent and glabrescent young stems.

*Selected specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 18 Oct. 2003, *G. Byrne* 599 (PERTH); 5 Aug. 2015, *G. Cockerton & S. Cockerton* WB 37640 (PERTH); 5 Aug. 2015, *G. Cockerton & S. Cockerton* WB 37641 (PERTH); 5 Aug. 2015, *G. Cockerton & S. Cockerton* WB 37643 (PERTH); 10 Sep. 2007, *R. Davis* 11240 (PERTH); 24 July 2005, *J. Docherty* 326 (PERTH); 1952, *C.A. Gardner s.n.* (PERTH); 3 Aug. 2000, *M. Hislop* 2089 (PERTH); 21 Sep. 1971, *R.D. Hoogland* 12002 (CANB, K, L, PERTH); 28 July 1986, *S.D. Hopper* 4937 (PERTH); 26 Aug. 2001, *J.W. Horn* 4016 (PERTH); 17 Aug. 1997, *F. Keast* opp M1A (PERTH); 22 Apr. 1997, *F. Keast* M1B 023 (PERTH); 7 Aug. 2005, *R. Meissner & Y. Caruso* 25 (PERTH); 15 Sep. 2005, *R. Meissner & Y. Caruso* 22 (PERTH); 16 Sep. 2005, *R. Meissner & Y. Caruso* 23 (PERTH); 3 Sep. 1994, *Morawa Tree Society* 1500 (PERTH).

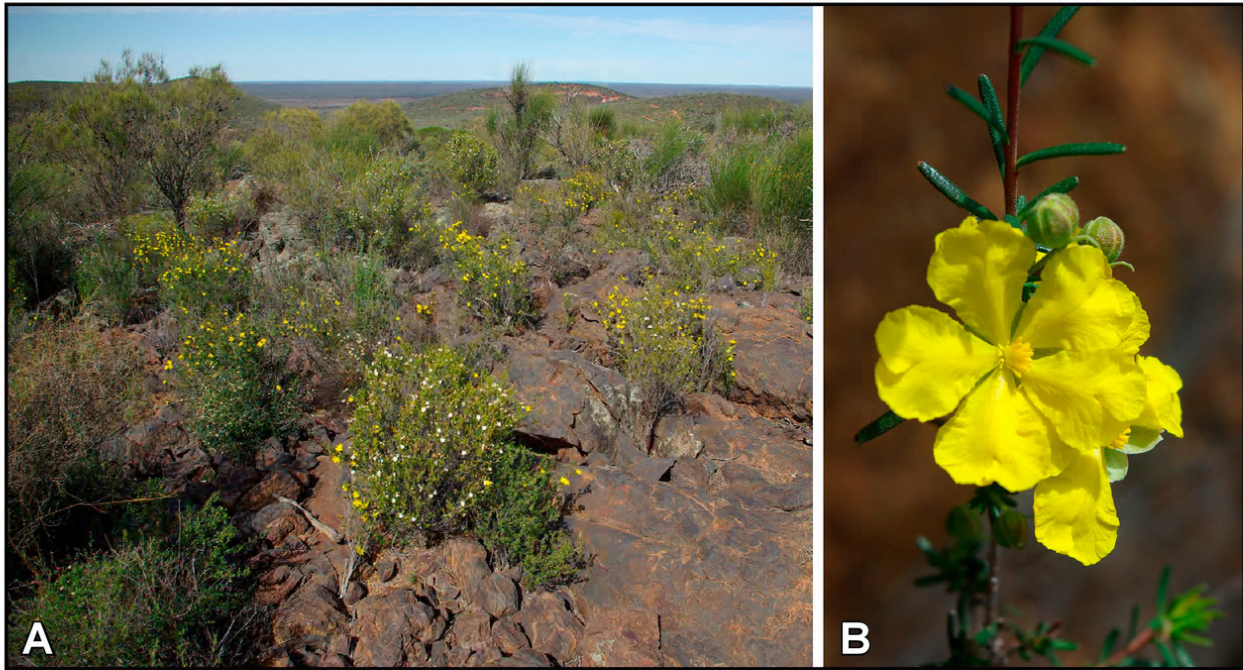


Figure 3. *Hibbertia cockertoniana*. A – habit and habitat (flowering shrubs amongst banded ironstone, Extension Hill); B – flowering shoot. Photos: G. Cockerton.

**Phenology.** Flowering specimens have been collected from July to September.

**Distribution and habitat.** Occurs in three small, disjunct areas in the Geraldton Sandplains and adjacent Yalgoo IBRA bioregions, in the vicinity of Mt Gibson, the Billeranga Hills, and Canna (Figure 4A), growing on banded ironstone, laterite, at the edge of granite outcrops and (near Canna) on sand over laterite, in shrublands dominated by *Calycopeplus paucifolius*, *Acacia* spp., *Melaleuca* spp., *Thryptomene* spp. and *Allocasuarina* spp.

**Conservation status.** *Hibbertia cockertoniana* is listed by Jones (2014) as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora, under the name *H. sp. Mt Gibson* (R.D. Hoogland 12002). It occurs in nature reserves, on private land, and on mining tenements and areas of active mining.

**Etymology.** Named in honour of Mr Geoff Cockerton, who first recognised the species as distinct and brought it to the attention of the senior author. Geoff has worked for many years as a seed collector and consultant botanist including with the company Western Botanical, which he founded. He has contributed significantly to the Western Australian Herbarium's collection, and has brought to our attention many taxonomic novelties (and difficulties).

**Notes.** When present, the arrangement of staminodes in *Hibbertia* species provides useful diagnostic features; indeed, Bentham (1863) regarded the presence or absence of staminodes as a sectional character. In Western Australia, staminodes are principally found in species in subgen. *Hemistemma* that have stamens arranged in two rows on one side of the two carpels. In most of these (e.g. *H. aurea* Steud., *H. crassifolia* (Turcz.) Benth.) the staminodes are few in number and only occur lateral to the stamens, apparently developing from stamen initials in the same general position as the stamens but with arrested development. In the *H. hypericoides* species group there is also a distinct cluster of staminodes opposite the stamens (on the midline between the two carpels; Figure 1). *Hibbertia*



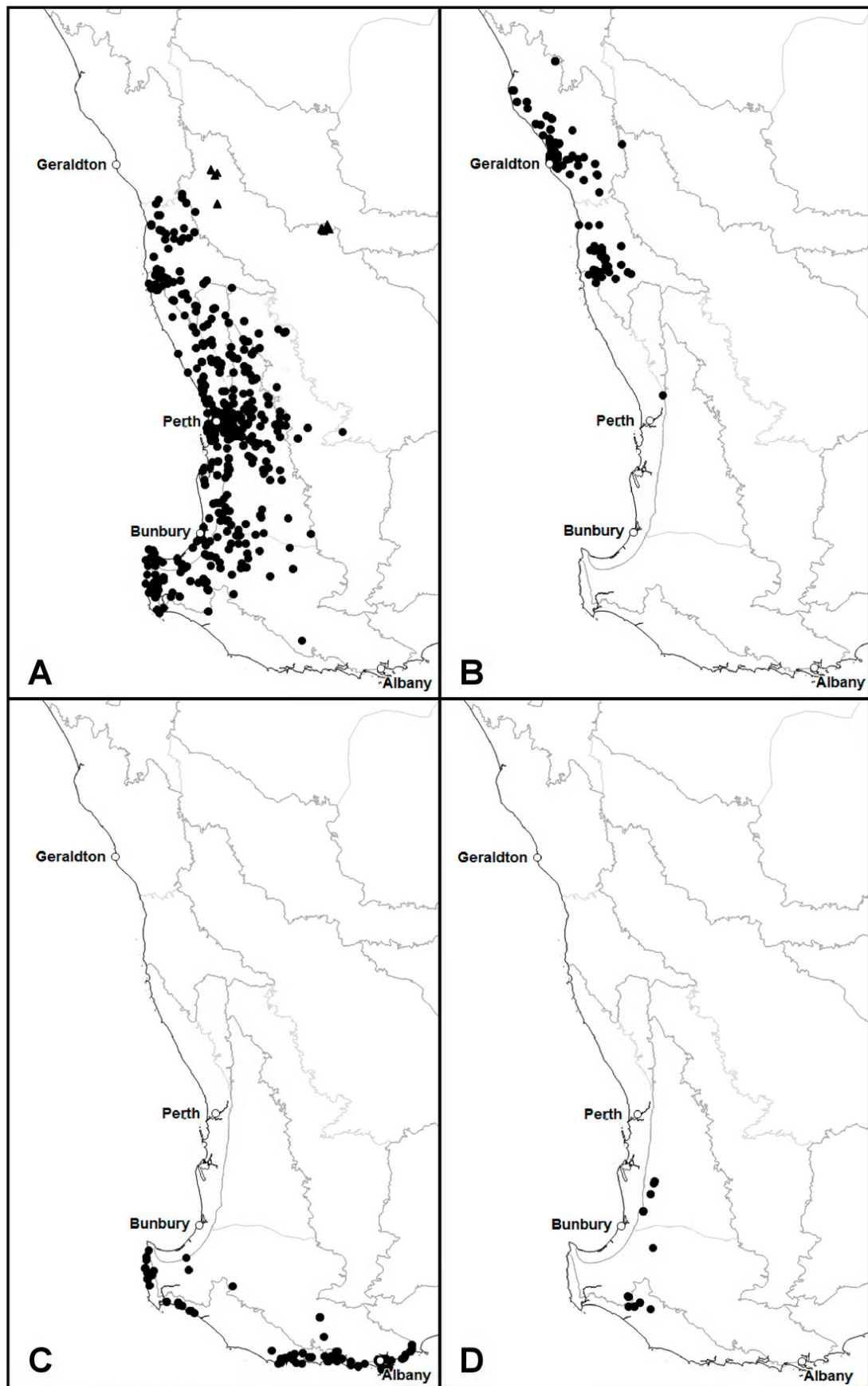


Figure 4. Distribution of members of the *Hibbertia hypericoides* species group. A – *H. cockertoniana* (triangles), *H. hypericoides* subsp. *hypericoides* (circles); B – *H. hypericoides* subsp. *septentrionalis*; C – *H. furfuracea*; D – *H. silvestris*. Pale grey lines are boundaries of IBRA bioregions (Department of the Environment 2013).

*cockertoniana* has both these clusters and, in addition, a more or less complete, palisade-like row of staminodes behind the row of stamens, as though formed by arrested development of a third staminal row. This pattern of staminodes is unique in the genus; species in the *H. lineata* Steud. species group sometimes have staminodes behind as well as lateral to the stamens, but these lack the cluster of staminodes opposite the stamens.

*Hibbertia cockertoniana* also differs from *H. hypericoides* in being a more upright, sparingly branched plant with one or few stems from ground level. *Hibbertia hypericoides* is usually lower and more spreading in stature, is abundantly branched at the base, and is known to resprout following fire from a woody rootstock that may also divide or fissure with age, potentially forming clonal clumps (Bell *et al.* 1984). While the fire response of *H. cockertoniana* is unknown, its habit and growth form suggest that it is a fire-killed, obligate seeder.

***Hibbertia furfuracea*** (R.Br. ex DC.) Benth., *Fl. Austral.* 1: 23 (1863). *Pleurandra furfuracea* R.Br. ex DC., *Syst. Nat.* 1: 417 (1817). *Type citation*: ‘Hab. in Nova-Hollandia loco King’s Georges Sound anglie dicto. R. Brown, Lechenault (v.s. sp.).’ (*syn*: BM 00055136 image!, G 00201267 image!, K 000687445 image!, MEL 666908!, MEL 666909!, NY 00428759 image!).

*Hibbertia astrophylla* Steud., in Lehm., *Pl. Preiss.* 1(2): 270 (1845). *Type citation*: ‘In rupestribus ad latus occidentale montis Clarence, districtus Plantagenet, 28 Sep. 1840. Herb. Preiss. No. 2167.’ (*syn*: HBG 507149 image!, LD 1242913 image!, M 0212905 image!, MEL 666848!, MEL 666849!, MO 279489 image!, S 08-19978 image!).

*Hemistemma asperifolium* F.Muell., *Fragm.* 1(7): 161 (1859). *Type citation*: ‘In tractu Stirling’s terrace, Novae Hollandiae austro-occidentalis Maxw.’ (*syn*: MEL 666850!).

Erect *shrubs* usually 1–2.5 m high, single- or multi-stemmed at base; young branchlets coarsely stellate-hairy with dull brownish to pale hairs; older stems with rough, flaky, fissured brown bark. *Leaves* spreading, scattered, narrowly obovate (rarely  $\pm$ elliptic, or appearing linear through loose recurvation of the margins), (15–)25–40(–55) mm long, (2–)4–8(–12) mm wide, the margins usually scarcely and narrowly recurved (sometimes more strongly revolute, the leaves then appearing linear); adaxial surface hispid with few- and erect-branched, tubercle-based stellate hairs (often with two arms, sometimes 1-armed and appearing simple), overlying very short stellate hairs, the indumentum persistent to older leaves; abaxial surface coarsely stellate-hairy with dull brownish to pale hairs; apex obtuse,  $\pm$ straight. *Flowers* pedicellate, borne singly in upper leaf axils; pedicels 8–20 mm long, stellate-hairy, not reflexed after anthesis; *primary bract* at apex of the pedicel, green and herbaceous, linear to narrow-lanceolate, (3–)5–9 mm long, acute, with indumentum as for leaves; *secondary bracts* absent. *Sepals* ovate, 6.5–9 mm long, coarsely and densely brownish stellate-hairy, with distinct midribs; outer sepals acute, often somewhat leaf-like; inner sepals similar in size, shape and indumentum to the outer but broader and less acute. *Petals* yellow, obovate, 10–12 mm long, emarginate. *Stamens* 10–12, all on one side of the gynoeceum; filaments 1.2–1.5 mm long, shortly fused at the base; anthers rectangular, 1.8–2.5 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 9–18, in bundles lateral to and opposite the fertile stamens. *Carpels* 2; ovaries compressed-globular, densely pubescent; styles erect, curved excentrically from the carpel apex, c. 2 mm long. *Ovules* 4 per carpel. *Fruiting carpels* globular, densely pubescent; seeds globose-reniform, 3.2–3.5 mm diam., glossy, dark reddish brown, loosely covered at base by a translucent, lacerate aril.

*Diagnostic features.* *Hibbertia furfuracea* may be distinguished from other members of the *H. hypericoides* species group by its tall stature, usually large, obovate leaves with scarcely recurved



margins, an adaxial indumentum of erect, tubercle-based, few-armed (often twinned) stellate hairs (Figure 2C), and an abaxial indumentum of large, coarse, dull-coloured stellate hairs.

*Selected specimens examined.* WESTERN AUSTRALIA: Boulder Hill, Two Peoples Bay, 6 Oct. 1992, *A.R. Annels* ARA 2609 (PERTH); 7 km ENE of Mount Hopkins (Sandy Beach), 8 Sep. 1995, *R.J. Cranfield* 10384 (PERTH); S boundary of Reserve A8430, 1.6 km from the coast, between two firebreaks, Leeuwin-Naturaliste National Park, 13 Jan. 1990, *N. Gibson & M. Lyons* 326 (PERTH); along South Coast Highway, c. 1 mile E of Kenton, 24 Oct. 1971, *R.D. Hoogland* 12192 (PERTH); both sides of Tanah Merah Road, 0.5–1 km E of junction with the Bussell Highway, 6 Oct. 1999, *J.W. Horn* 2748 (PERTH); both sides of Rainbow Cave Road, 0.9–1.2 km W of junction with Caves Road, Shire of Augusta-Margaret River, 6 Oct. 1999, *J.W. Horn* 2770 (PERTH); both sides of Milyeannup Coast Road, 0.55 km SW of Scott River crossing and 7.3 km SW of its junction with Governor Broome Road, Shire of Nannup, 8 Oct. 2001, *J.W. Horn* 4159 (PERTH); 25 km E of Augusta, 16 Sep. 1976, *R. Story* 8249 (PERTH); on S side of track in NE corner of private property loc. 928, 400 m S along Judd Road from junction with Cullen Road, 13 Sep. 2002, *A. Webb* 2075 (PERTH); Margaret River, Carters Road, 1.8 km from Bussell Highway, 8 Sep. 1983, *J.R. Wheeler* 2157 (PERTH); Mount Clarence, Albany, 25 Sep. 1986, *J.R. Wheeler* 2454 (PERTH); between Peaceful Bay and Bow Bridge, 16 Oct. 1991, *J.R. Wheeler* 2808 (PERTH); Walpole-Nornalup National Park, Bow bridge, track between Peaceful Bay Road and South West Highway, to the W of Peaceful Bay Road, 11 Aug. 1992, *J.R. Wheeler* 3123 (PERTH).

*Phenology.* Flowers between July and December with a peak in October.

*Distribution and habitat.* Widely distributed and common in near-coastal areas, in two apparently disjunct areas from Cape Naturaliste to the mouth of the Donnelly River, and between Broke Inlet and the Waychinicup River, with two outlying occurrences further inland near Nannup and Bridgetown (Figure 4C). Occurs in coastal heaths and near-coastal Jarrah, Marri, Bullich and Karri forests, often associated with *Agonis flexuosa*, *Hibbertia cuneiformis*, *Trymalium odoratissimum*, *Spyridium globulosum*, *Leucopogon verticillatus* and *Pteridium esculentum*.

*Conservation status.* Common and widespread, including in many nature reserves, and not considered to be under threat.

*Notes.* Some specimens (e.g. *N. Gibson & M. Lyons* 340, *C.A. Hortin* 1024, *A. Webb* AW 2075), particularly when growing in exposed positions, have small, relatively narrow leaves with loosely recurved margins, thus appearing almost linear. These could be mistaken for large-leaved specimens of *H. hypericoides*; they can always be discriminated by the adaxial leaf indumentum of erect, stiff, few-armed (often twinned) stellate hairs and the abaxial leaf indumentum which is coarser and dull-coloured, the leaves hence not distinctly discoloured.

***Hibbertia hypericoides*** (DC.) Benth., *Fl. Austral.* 1: 23 (1863). *Pleurandra hypericoides* DC., *Syst. Nat. [Candolle]* 1: 421 (1817). *Type citation*: ‘Hab. in Novae-Hollandiae ora orientali, ad rivum Cygnorum. Lechenault. (v.s. sp. in h. Mus. Par.).’ (*syn*: P 00337373 image!, P 00337374 image!, P 00337375 image!).

Spreading to (rarely) erect *shrubs* 0.3–0.8(–2) m high, resprouting from the rootstock after fire; young branchlets densely stellate-hairy; older stems with fissured, grey bark. *Leaves* spreading-erect, scattered or somewhat fascicled, linear to elliptic or obovate, (6–)15–25 mm long, 1–8 mm wide, the

margins varying from scarcely and narrowly recurved to strongly revolute and obscuring the abaxial lamina and midrib; adaxial surface smooth or tuberculate, pubescent when young with a sparse to dense indumentum of radiately stellate hairs and/or short, forward-directed, tubercle-based, simple or few-branched stellate hairs, sometimes also with long, flexuose simple hairs or shorter, hooked hairs, the indumentum persistent to older leaves or soon glabrescent; abaxial midrib glabrous or with indumentum as for adaxial lamina; abaxial lamina densely and closely whitish stellate-pubescent sometimes with sparse, longer, spreading, simple hairs; apex obtuse,  $\pm$ straight. *Flowers* pedicellate, borne singly in leaf axils or terminating short shoots; pedicels 4–12(–18) mm long,  $\pm$ erect at anthesis, reflexed after anthesis; *primary bract* at apex of the pedicel, green and herbaceous, linear to very narrowly triangular or obovate, 4.5–6 mm long, acute, with indumentum as for leaves; *secondary bracts* absent. *Sepals* ovate, 5.5–6.8 mm long, sparsely to densely hairy with stellate and/or straight or hooked hairs; midribs not prominent; outer sepals acute; inner sepals broadly similar in size, apex shape and indumentum to the outer but usually broader and more obtuse. *Petals* yellow, obovate, 10–13(–15) mm long, emarginate. *Stamens* (9–)10–15(–18), all on one side of the gynoecium; filaments 1.2–1.6 mm long, shortly fused at the base; anthers rectangular, 1.8–2.2 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 7–20, in bundles lateral to and opposite the fertile stamens. *Carpels* 2; ovaries compressed-globular, densely pubescent; styles erect, curved excentrically from the carpel apex, c. 2 mm long. *Ovules* 2 per carpel. *Seeds* globular, red-brown, glossy, c. 4 mm long, covered at base by a thin, translucent, lacerate-margined aril c. half the length of the seed.

*Diagnostic features.* *Hibbertia hypericoides* may be distinguished from other members of the *H. hypericoides* species group by its usually low, spreading habit, densely stellate-hairy young stems, and leaves that are either glossy dark green or grey-green adaxially with a prominent indumentum of whitish, stellate hairs beneath.

*Phenology.* Flowers usually between June and October, with occasional flowering as early as May in the north of its range and as late as January in the south.

*Distribution and habitat.* Widely distributed and common between Kalbarri and Augusta, extending inland to Wongan Hills and near Arthur River, mostly in the Geraldton Sandplains, Swan Coastal Plain and Jarrah Forest IBRA bioregions and adjacent western-most parts of the Avon Wheatbelt and Warren bioregions. Occurs in a range of habitats including Jarrah-Marri forest and Wandoo woodlands on laterites and granite, *Banksia* woodlands on acid coastal sands, and *Acacia* shrublands on coastal limestone.

*Notes.* There are three type specimens at P collected in New Holland during the French expedition led by Baudin, on which J.-B. Leschenault de la Tour was a botanist. All are labelled as collected by Baudin. Both Baudin and Leschenault collected specimens during the voyage, and some specimens collected by others were attributed to Baudin (George 2009). The specimens are labelled ‘Hawkesburg’ (P00337373; 2 branchlets), ‘Riviere des Cygnes’ (P00337374; 3 branchlets) and ‘Baie du Géographe et riviere des Cygnes’ (P00337375; 2 branchlets). I have seen only low-resolution images of these specimens, and while not all features could be seen there is no reason to doubt that they are *H. hypericoides*.

*Hibbertia hypericoides* is one of the most widespread, and probably the most common, *Hibbertia* species in Western Australia.

***Hibbertia hypericoides* subsp. *hypericoides***

*Hibbertia cinerascens* Steud., in Lehm., *Pl. Preiss.* 1(2): 271 (1845). *Type citation*: ‘In limosis ad praerupta vallis Cataractae, ditionis Perth, 25 Jul. 1839. Herb. Preiss. No. 2140.’ (*syn*: MEL 2283110!).

*Hibbertia hypericoides* var. *typica* Domin, *Věstn. Král. České Společn. Nauk. Tř. Mat.-Přír.* 2: 67 (1923), *nom. inval.*

*Hibbertia hypericoides* var. *pilifera* Domin, *Věstn. Král. České Společn. Nauk. Tř. Mat.-Přír.* 2: 67 (1923). *Type citation*: ‘Mallet, A.A. DORRIEN-SMITH.’ (?*holo*: K 000686996 image!).

*Hibbertia proxima* Steud., in Lehm., *Pl. Preiss.* 1(2): 271 (1845). *Type citation*: ‘In sublimoso-glareosis umbrosis jugi montium Darling’s range, ditionis Perth, 9. Aug. 1839. Herb. Preiss. No. 2147.’ (*syn*: LD 1243093 image!, MEL 2283150!, MEL 2283151!).

*Hibbertia trachyphylla* Steud., in Lehm., *Pl. Preiss.* 1(2): 271 (1845). *Type citation*: ‘In arenosi prope oppidulum Perth, 31. Mart. 1839. Herb. Preiss. No. 2132.’ (*syn*: BR 0000013462536 image!, HBG 507146 image!, LD 1243213 image!, M 0212900 image!, MEL 2283153!, MEL 2283154!, MEL 2283155!, MEL 2283156!, MEL 2283157!, S 08-20948 image!).

[? *Hibbertia aspera* auct. non DC.: E.G. Steudel, in Lehm. *Pl. Preiss.* 1(2): 270 (1845)].

*Leaves* adaxially glossy dark green, linear to narrowly oblong, sometimes elliptic or obovate, (6–)10–15(–25) mm long, 0.8–2(–3) mm wide; adaxial surface usually distinctly tuberculate, pubescent when young with a sparse to moderate indumentum usually of short, forward-directed, tubercle-based, simple or few-branched stellate hairs, sometimes also with sparse to moderate radiately stellate hairs, long, flexuose simple hairs or shorter, hooked hairs, the indumentum not usually persistent to older leaves. Outer sepals abaxially usually with a mix of sparse to moderately dense stellate hairs and at least some long, simple hairs overtopping the stellate ones.

*Diagnostic features.* May be distinguished from subsp. *septentrionalis* by its dark green, glossy and glabrescent leaves, and outer sepals almost always with at least some long, simple hairs overtopping the stellate ones.

*Selected specimens examined.* WESTERNAUSTRALIA: Cape Naturaliste, 18 Oct. 1978, *T.E.H. Aplin* 6552 (PERTH); Jandakot Road (Perth), Aug. 1939, *W.E. Blackall s.n.* (PERTH); 8 km SE of Mingenew, 15 July 1998, *A. Carr* 520 (PERTH); Sues Road 1.5 km S of junction of Blackwood Road, 21 Oct. 1998, *R. Davis* 7787 (PERTH); old seismic track to N of shire boundary, c. 5 km E of Cockleshell Gully road, 8 Sep. 1994, *B. Evans* WE 854 (PERTH); 6 km W of junction of Eneabba-Three Springs Road with Kangaroo Road, 7 Sep. 1979, *E.A. Griffin* 2180 (PERTH); Bibby Road 7.3 km E of Munbinea Road junction [SW of Badgingarra], 30 July 2004, *M. Hayes* BRTA 145 (PERTH); along road to Burns Beach (NW of Wanneroo), 11 Sep. 1971, *R.D. Hoogland* 11929 (PERTH); along main road from Gingin to Dongara at crossing with Mullering Brook, 15 Sep. 1971, *R.D. Hoogland* 11970 (PERTH); near Piawaning (SE of Moora), 27 Sep. 1971, *R.D. Hoogland* 12027 (PERTH); Mount Lesueur Reserve, 20 Aug. 1985, *N. Hoyle* 7 (PERTH); 8 km S of Witchcliffe, 21 Aug. 1997, *P.A. Jurjevich* 348 (PERTH); Mount Adam Road, 1 km W of tower, 22 July 1994, *E.D. Kabay* 227 B (PERTH); Elliott Road, Keysbrook, 3 Oct. 1998, *J. Milner, J. Neiman, D. Betts & B. Moyle* MET 20729 (PERTH); 3 km S of Reagans Ford at Moore River, 26 Sep. 1989, *B. Nordenstam & A. Anderberg* 38 (PERTH);

Star Swamp Bushland Reserve, North Beach, 25 July 1987, *J.P. Pigott s.n.* (PERTH); Ellenbrook, 16 Aug. 1999, *M. Trudgen & M. Trudgen* MET 20356 (PERTH); 1 km N of Kirup, 10 Sep. 1999, *J.E. Wajon* 80 (PERTH).

*Phenology.* Flowers mainly from June to October, with a few flowering collections as early as April and as late as January.

*Distribution and habitat.* Occurs from the vicinity of Dongara and Mingenew south to Augusta and east to the Wongan Hills and near Arthur River (Figure 4A). A specimen labelled 'Stirling Sandplain' (*M. Cambridge* 7, 5 Aug. 1968, PERTH 03036308) would be substantially disjunct if correct. As no other collections have been made in or near the Stirling Range, the location may be in error. The collector believes that the specimen was probably collected as part of a student herbarium project (*M. Cambridge* pers. comm.). The possibility that it was collected in the Perth suburb of Stirling appears to be unlikely. The specimen is morphologically typical for *H. hypericoides* subsp. *hypericoides*.

Between Dongara, Jurien Bay and Big Soak Plains, subsp. *hypericoides* and subsp. *septentrionalis* are broadly sympatric. This overlap, with relatively little evidence of hybridisation, could be taken as evidence that the taxa should be recognised at species rank. However, a small number of specimens (e.g. *R.D. Hoogland* 12027, *R.D. Hoogland* 11970, *B. Evans* WE 854) are difficult to determine, and subspecies rank is preferred for this reason.

Found in a range of habitats from Jarrah-Marri and Wandoo forests and woodlands on laterite and *Banksia* woodlands on acid sands to near-coastal heaths and *Acacia* shrublands on limestone.

*Conservation status.* Common and widespread, including in many nature reserves, and not considered to be under threat.

*Notes.* While most specimens of *H. hypericoides* subsp. *hypericoides* have narrow, more or less linear leaves with strongly revolute margins obscuring all or most of the abaxial surface, some specimens (e.g. *R. Helms* s.n. PERTH 03036669, *M.G. Allen* 323) have broader leaves with only narrowly revolute margins, the densely stellate-pubescent abaxial surface then contrasting with the dark green and glossy adaxial surface. Unlike in subsp. *septentrionalis* (see below), these specimens are geographically scattered throughout the range of the subspecies; they may represent strongly suckering, post-fire regrowth.

In general, leaves of subsp. *hypericoides* are sparsely hairy, mostly with short, forward-directed, tubercle-based, simple or few-armed stellate hairs intermixed with sparse, smaller, radiately stellate hairs (Figure 2D). Some specimens have a somewhat denser indumentum of radiately stellate hairs (Figure 2E); however, these never approach the density of subsp. *septentrionalis* (Figure 2F), and do not obscure the glossy leaf surface.

***Hibbertia hypericoides* subsp. *septentrionalis*** K.R.Thiele & Cockerton, *subsp. nov.*

*Type:* Well Road, 3.2 km west of Nabawa-Northampton Road, c. 12 km direct line south-east of Northampton, Western Australia, 12 August 2014, *K.R. Thiele* 5093 (*holo:* PERTH 08641692; *iso:* AD, CANB, K).

*Leaves* dull greyish green, linear to elliptic or obovate, (6–)10–20(–25) mm long, 0.8–8 mm wide; adaxial surface ±smooth, densely stellate-hairy with fine, evenly distributed stellate hairs that usually



±obscure the surface. Outer sepals abaxially densely and closely stellate-pubescent, usually without (rarely with a few) long, simple hairs overtopping the stellate ones.

*Diagnostic features.* May be distinguished from subsp. *hypericoides* by its dull greyish green, persistently densely stellate-hairy leaves and outer sepals that usually lack long, simple hairs overtopping the stellate ones.

*Selected specimens examined.* WESTERN AUSTRALIA: Spalding Park N of Geraldton, 30 Aug. 1965, *A.C. Burns* 9 (PERTH); South Eneabba Road, 15 July 1980, *R.J. Cranfield* 1472 (PERTH); Eneabba, adjacent S.E.C. switchyard, 19 July 1988, *B. Dixon* D 20/88 (PERTH); Cliff Head-Dongara, 20 Sep. 1973, *R. Edmiston* E 420 (PERTH); White Peak, 2 Sep. 1947, *C.A. Gardner* 8554 (PERTH); Alexander Morrison National Park, W of Coorow, 7 Sep. 1979, *E.A. Griffin* 2197 (PERTH); E side of Great Northern Highway immediately S of junction with Sounness Drive, 7 Sep. 1999, *J.W. Horn* 2262 (PERTH); both sides of the North West Coastal Highway, 8 km S of junction with Ogilvie East Road and 9.5 km S of crossing of the Hutt River, 11 Sep. 1999, *J.W. Horn* 2394 (PERTH); Burma Road Nature Reserve, c. 45 km NW of Mingenew, 13 Aug. 1999, *G.J. Keighery & N. Gibson* 4602 (PERTH); Big Soak Plains, Shire of Coorow, 21 Sep. 2005, *K. Pearce* KP 7 (PERTH); 0.5 km from Yerina Springs road and West Binnu crossroads on western link to Kalbarri, 15 Aug. 1985, *N. Sammys.n.* (PERTH); c. 36 km N of Galena Bridge on North West Coastal Highway, 20 July 1967, *E.B.J. Smith s.n.* (PERTH); 16 km S of Northampton along highway to Geraldton, 30 Aug. 1974, *G.L. Stebbins & G. Keighery* A-16 (PERTH); 5.1 km along track to Mount Lesueur from Jurien Road, 4 Sep. 1984, *J.R. Wheeler* 2352 (PERTH).

*Phenology.* Flowers between late May and early November, with a peak in September.

*Distribution and habitat.* Occurs primarily in two disjunct areas in the Geraldton Sandplains IBRA bioregion, the northern area between Kalbarri and inland of Dongara (in the Geraldton Hills IBRA subregion), and the southern area from the Arrowsmith River to Coomallo Creek and inland to the Big Soak Plains (in the Lesueur Sandplain subregion; Figure 4B). The disjunction, while relatively narrow, appears to be real rather than being a collecting gap, and is occupied by *H. hypericoides* subsp. *hypericoides*. A northern disjunct population is represented by two collections (*R. Blake* S.2236, *E.B.J. Smith s.n.*) from c. 35 km north of the Galena Bridge on the North West Coastal Highway; a second possibly disjunct inland record (*W.E. Blackall & C.A. Gardner* 697) from the 'Mullewa Plains' cannot be accurately georeferenced.

A single specimen collected from near Bullsbrook (*J.W. Horn* 2262) is well south of the range of the subspecies, but appears typical for plants from the Eneabba-Coomallo Creek area, with broadly elliptic leaves and scarcely recurved margins contrasting with the narrow and strongly revolute leaves of most plants from the vicinity. It was collected from the edge of the Great Northern Highway, and may represent an introduction from the main range of the subspecies.

Typically occurs on laterite breakaways and ironstone hills, and in sandplains associated with or adjacent to laterite, in kwongan and *Banksia* woodlands. Near Geraldton it is common on Tamala Limestone formations, indicating a wide tolerance for soil acidity.

*Conservation status.* Common and widespread, including in a number of nature reserves, and not considered to be under threat.

*Etymology.* From the Latin *septentrionalis* (north, northern), in reference to the northerly distribution of the subspecies.

*Notes.* See under *H. hypericoides* subsp. *hypericoides* for differences between the subspecies. There is some morphological differentiation between the northern and southern disjunct areas of distribution (Figure 5). In the northern area, leaves are consistently very narrow (length:width ratio (4.4–)6–10(–17.0)) with strongly revolute margins, while in the southern area, many specimens have substantially broader leaves (length:width ratio (2.1–)3–4(–12.0)) with more or less flat margins. However, some plants in the southern area are morphologically identical to plants from the north, and leaf shapes vary continuously between the extremes. No other observable differences between plants in the two areas have been noted.

**Hibbertia silvestris** Diels, in L. Diels & E. Pritzel, *Bot. Jahrb. Syst.* 35(2–3): 386 (1904). *Type citation*: ‘in distr. Darling in montibus Darling-Range pr. Collie River juxta Lunenberg in silvarum subumbrosis fruticulosis solo glareoso subhumoso flor. et fructif. m. Jan. (E. PRITZEL Plant. Austr. occ. 195, D. 2160 in hb. Berl.).’ *Type specimens*: L. Diels 2160 (*syn*: PERTH 04430670!, PERTH 04430654!, PERTH 04430662!); E. Pritzel 195 (*syn*: GH 00348733 image!, K 000700342 image!, M 0212918 image!, NSW 500085 image!, S G-3195 image!).

Prostrate to ±erect or spreading *shrubs* 0.2–0.5(–1) m high; young branchlets pilose with long, soft, spreading, greyish, simple hairs over short, stellate ones, the indumentum persisting to older stems until the development of smooth, reddish, flaky bark. *Leaves* spreading, scattered, elliptic to obovate, (5–)8–10(–15) mm long, 3–5 mm wide, the margins scarcely and narrowly recurved; adaxial surface pilose with long, soft, tubercle-based, simple hairs over very small, stellate hairs, the indumentum persistent to mature leaves; abaxial lamina densely and closely greyish stellate-pubescent overtopped by long, soft, simple hairs; apex obtuse, straight to slightly retrorse. *Flowers* pedicellate, borne singly in leaf axils; pedicels 7–15 mm long, with indumentum as for young stems, reflexed after anthesis; *primary bract* at apex of the pedicel, green and herbaceous, narrowly lanceolate, 5–7 mm long, acute, with indumentum as for leaves; *secondary bracts* absent. *Sepals* ovate, 4.5–5.5 mm long, with abaxial indumentum as for leaves, adaxially finely and minutely stellate-hairy; midribs not prominent; outer sepals acute to acuminate; inner sepals broader and more obtuse. *Petals* yellow, obovate, 6–8 mm long, emarginate. *Stamens* (6–)7–10, all on one side of the gynoecium; filaments *c.* 1 mm long, shortly fused at the base; anthers rectangular, 1.4–1.6 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 5–12, in bundles lateral to and opposite the fertile stamens. *Carpels* 2; ovaries globular, densely pubescent; styles spreading excentrically from the carpel apex, 1.2–1.5 mm long. *Ovules* 2 per carpel. *Fruiting carpels* globose, densely pubescent; mature seeds not seen.

*Diagnostic features.* *Hibbertia silvestris* may be distinguished from all other members of the *H. hypericoides* species group by its small, elliptic to obovate leaves and the indumentum on all parts of long, soft, spreading, simple hairs over small, stellate ones.

*Selected specimens examined.* WESTERN AUSTRALIA: Strickland Fire Plots, 29 Nov. 1985, A.R. Annels STR 80 (PERTH); Pemberton, 27 Aug. 1997, S. May 702 (PERTH); Bibbulman Track, 8 Nov. 1998, M. Hislop 1180 (PERTH); Dwellingup, 13 Nov. 1974, R.D. Hoogland & G.L. Stebbins 12510 (PERTH); near Wagerup, 5 Sep. 1979, P. van der Moezel 10 (CANB, PERTH); Donnelly River Valley, 8 Dec 1999, V.L. Tunsell, R. Cranfield & R. Hearn 118 (PERTH); Carey Brook, 4 Sep. 1983, J.R. Wheeler 2107 (PERTH); Mornington Mills, 1932, R.F. Williams 75 (PERTH).

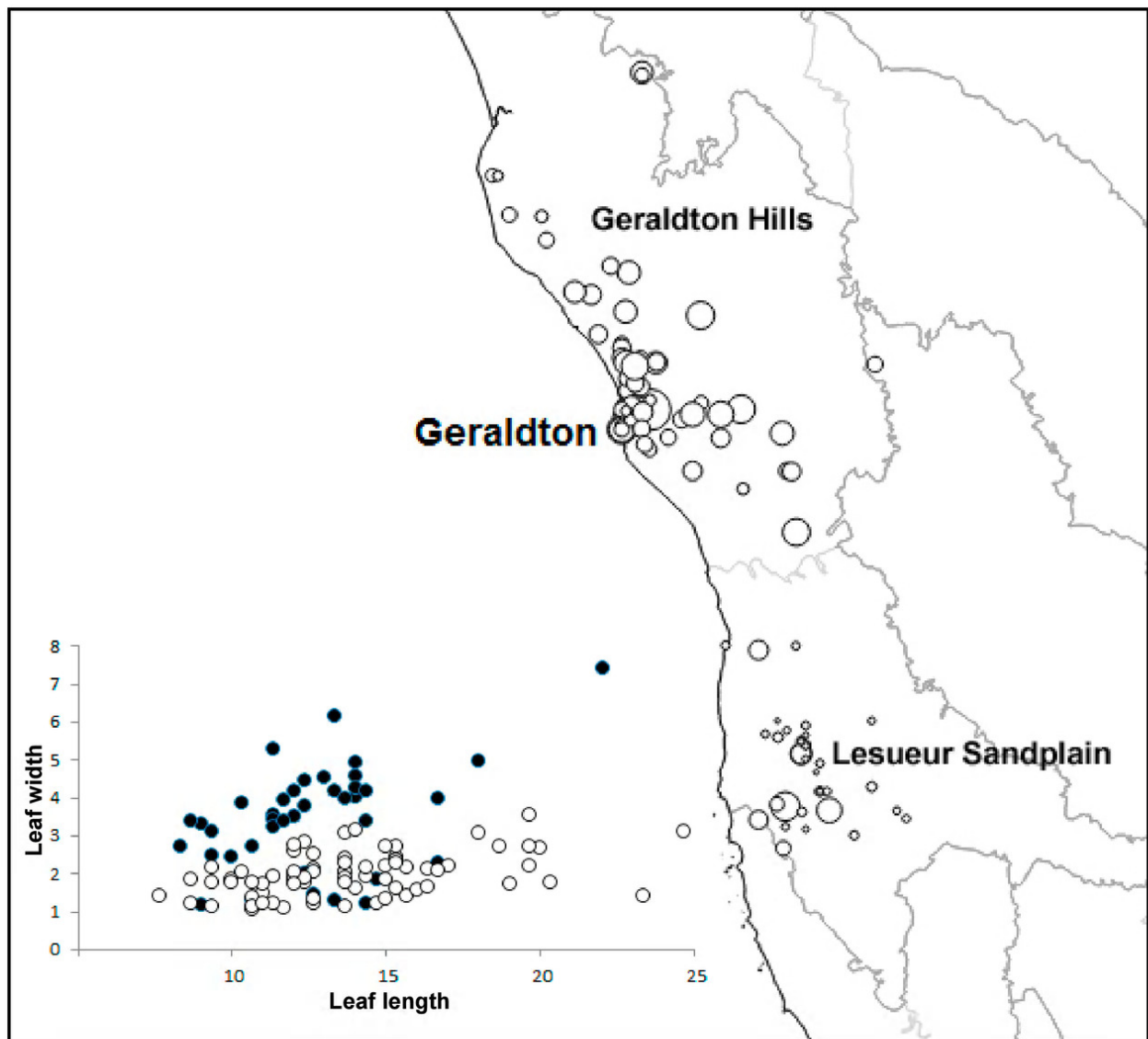


Figure 5. Leaf length and width of all PERTH specimens of *Hibbertia hypericoides* subsp. *septentrionalis*. Map symbols are sized in proportion to the leaf length:width ratio. IBRA 7 subregions are named. Inset scatter plot shows leaf lengths and widths. Open symbols – specimens from Geraldton Hills subregion; filled symbols – specimens from Lesueur Sandplain subregion.

**Phenology.** Flowers from September to December.

**Distribution and habitat.** Occurs on the southern Darling Range in two apparently disjunct areas, between Dwellupup and Grimwade, and around the lower Donnelly River, with an outlying occurrence near Denmark (Figure 4D), in moist Jarrah-Marri and Karri forest on loamy soils.

**Conservation status.** Relatively common and widespread, including in a number of nature reserves, and not considered to be under threat.

**Notes.** The only known sheets of *Diels* 2160 are at PERTH; the specimen at B was presumably destroyed during World War II. PERTH 04430670 bears a relatively large branch with a single old flower, and a label indicating that it belonged in W.E. Blackall's collection. The two other sheets bear fragments only; PERTH 04430654 has two sterile fragments, while PERTH 04430662 bears two packets each with a small flowering sprig and a determinavit slip signed by C.A. Gardner. A number of broken

branches on PERTH 04430670 indicate that these fragments may well have been removed from that specimen. The labels indicate that the specimens were collected at Collie ('Lunenburg'). All sheets of *Pritzel* 195 are larger and have more and younger flowers. They bear labels indicating that they were collected 'in silvis umbrosis montium Darling Range'.

*Hibbertia silvestris* is relatively morphologically uniform throughout its range.

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