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# A taxonomic resolution of *Hibbertia acerosa* (Dilleniaceae) in Western Australia

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# Abstract

Close study of the widely-distributed southwestern Western Australian *Hibbertia acerosa* (R.Br. ex DC.) Benth. (Dilleniaceae) has revealed that it comprises four distinct, parapatric or narrowly sympatric species differing in leaf morphology, sepal indumentum and floral bract shape. One of the segregate species has an earlier name in *Pleurandra*, which is recombined here as *Hibbertia juniperina* (Turcz.) K.R.Thiele. The new species *H. simkiniae* K.R.Thiele and *H. callida* K.R.Thiele are described, the former for a relatively restricted species occurring inland of Kalbarri and the latter for the most widespread segregate from *H. acerosa sens. lat.* The true *H. acerosa sens. str.* is redescribed to account for its narrower circumscription, and a key and distribution maps provided for all taxa.

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# Introduction

*Hibbertia acerosa* (R.Br. ex DC.) Benth., as currently circumscribed, is a widespread species in southwestern Western Australia, from Kalbarri to the vicinity of Esperance. The genesis of the present paper was an observation by Robin Simkin, a keen and knowledgeable wildflower enthusiast, volunteer at the Geraldton Regional Herbarium, and resident of Kalbarri, that *H. acerosa* in the Kalbarri area comprises two clearly distinct species. Subsequent careful assessment of all specimens at the Western Australian Herbarium confirmed this observation and indicated that two further species also need to be segregated, resulting in the recognition of four distinct species within *H. acerosa sens. lat.* 

All the species treated here are characterised by strongly pungent-pointed, needle-like, linear, ericoid leaves (i.e., with the leaf margins strongly revolute and abutting the midrib abaxially so that the true abaxial lamina is largely or completely obscured), pedicellate flowers, and stamens on one side of two pubescent carpels in an arrangement similar to a hand of bananas, with staminodes lateral to the stamens. These features uniquely diagnose *H. acerosa sens. lat.* among Western Australian species. All four species also have uncinate hairs on either or both their sepals and leaves.

The four species differ most consistently in fine details of their abaxial leaf morphology, in the shape of their floral bracts, and somewhat less consistently in leaf and sepal indumentum and the degree of prominence of

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sepal midribs. In the Kalbarri species (named here as H. simkiniae K.R.Thiele) the leaf abaxial midrib is smooth, the abaxial lamina (hidden within the lacunae formed between the leaf margins and the midrib, and visible only by dissection) is densely and minutely pubescent, the leaves have very few uncinate hairs and are earlyglabrescent, and the sepals have numerous uncinate hairs in their lower halves. The three widespread species, H. acerosa sens. str., H. callida K.R.Thiele and H. junipering (Turcz.) K.R.Thiele, have leaves with numerous uncinate hairs and the abaxial leaf lamina within the lacunae is glabrous. They differ consistently in the presence or absence of tubercles on the lateral margins of the abaxial leaf midrib, and in the midrib's prominence. In H. acerosa sens. str. the midrib is quite smooth, while in *H. callida* and *H. juniperina* the margins of the midrib are prominently though minutely tuberculate. In H callida the midribs are not prominent and are usually sunken below the level of the recurved leaf margins, which often recurve to each other at least in dried specimens, while in *H. juniperina* the midribs are prominent and protuberant above the level of the recurved leaf margins. Also useful, though not completely consistent, is sepal indumentum, with *H. acerosa* having numerous uncinate hairs over most of the surface of the outer sepals, while sepals of *H. callida* and *H. juniperina* are usually glabrous or nearly so.

The new species *Hibbertia simkiniae* K.R.Thiele and *H. callida* K.R. Thiele, and the new combination *H. juniperina* (Turcz.) K.R.Thiele, are described below, and *H. acerosa* is recircumscribed. A key and distribution maps to all species are provided.

# Methods

All specimens at PERTH were examined, and field work was conducted during 2021 and 2022. The species described in this paper are included in draft keys to *Hibbertia* in Australia and Western Australia, at https://keybase.rbg.vic.gov.au/keys/show/13127 and https://keybase.rbg.vic.gov.au/keys/show/1762 respectively.

The petiole in the species dealt with in this paper is somewhat indistinct and impossible to accurately measure. For this reason, leaf lengths are measurements in total, not divided into petiole and lamina.

# Discussion

Fine-scale morphology of the abaxial leaf surface is proving to provide important, previously under-utilised diagnostic and taxonomic characters in the many Western Australian species with ericoid leaves and leaf margins that recurve to the midrib. Abaxial leaf indumentum was used to separate the new species *H. fasciculiflora* K.R.Thiele and *H. propinqua* K.R.Thiele (Thiele 2009), and the new *H. subglabra* K.R.Thiele from other species in the *H. polystachya* Benth.-*H. spicata* F.Muell. species group (Thiele 2019). It will also feature prominently in forthcoming papers dealing with the *H. aurea* Steud.–*H. crassifolia* (Turcz.) Benth. and *H. exasperata* (Steud.) Briq. species groups.

All species of Hibbertia are hypostomatous (that is, with stomates restricted to the abaxial leaf lamina surface, excluding the midrib). In species with narrow, linear leaves, the abaxial leaf lamina surface is much-reduced, particularly when (as is often the case) the midrib is wide and robust. In species with ericoid leaves and leaf margins closely abutting the midrib, the stomates are completely hidden within the narrow lacunae formed between the midrib and the recurved margins. It is possible, though speculative pending detailed physiological experiments, that the whole leaf in such species acts in effect as a stomate, with minor movements of the lamina (pressing more or less tightly against the midrib) controlling gas exchange between the lacunae and the outside air, and hence between the leaf mesophyll and the environment (either augmenting or perhaps replacing gas exchange control by the stomate guard cells). Micromorphology of the abaxial lamina surface within the lacunae, and of the surfaces where the midrib and leaf margins abut, may thus be critical to controlling water relations in the semi-arid, strongly summer-dry environments where most species with these morphologies grow. Critical features (showcased in the species dealt with in this paper) are likely to include indumentum within the lacunae and the presence of tubercles or papillae along the leaf and midrib margins. In some ericoid-leaved Western Australian species, flanges from the midrib opposing narrow, scarious margins of the leaf lamina are also likely to be important. Such characters appear to be genetically fixed within species, and hence provide important taxonomic characters as noted.

A practical difficulty with the use of such fine-scale characters to delimit taxa is that the species recognised here, segregated from *H. acerosa sens. lat.*, can rarely be confidently identified from photogaphs. Only close examination of the leaf abaxial surface allows confident allocation of specimens to species, sometimes only after dissection of the leaf if the abaxial surface is not immediately apparent (sepal indumentum helps to some extent, but is not uniquely diagnostic).

This creates challenges given the growing popularity of initiatives such as iNaturalist (https://inaturalist.ala.org.au/home), which are predicated on the idea that most taxa can be recognised from photographs. Even macrophotographs of members of this group are rarely adequate unless they are extremely high resolution, and micrography of the leaf abaxial surface is not practical for such systems or their users. Furthermore, while the species segregated here are geographically patterned they are not allopatric, meaning that location is also unlikely to help.



Figure 1. A---Hibbertia simkiniae (photo: Robin Simkin). B---H. acerosa sens str. (photo: K.R. Thiele). C---H. callida (photo K.R. Thiele).

Despite the inconvenience, it is important for taxonomy that species be delimited to help with the documentation and conservation of biodiversity, and the species recognised in this paper are taxonomically robust. Systems such as iNaturalist may need to adjust, by allowing photographs to be assigned to a species group even when they cannot be allocated to a single species. At the very least, it is important that photographs assigned to *H. acerosa sens. lat.* are not erroneously, following this paper, assigned to *H. acerosa sens. str.* by default.

Despite these challenges, the species delimited here can still be confidently recognised by competent citizen scientists and others interested in plants (although a dissecting microscope may be necessary).

# Taxonomy

# Key to species in the former *Hibbertia acerosa sens. lat.*

 Lateral edges of leaf abaxial midrib with a line of distinct, robust (though small) tubercles (visible in leaves where the margin is slightly retracted from the midrib, but possibly requiring dissection to reveal); sepals usually glabrous or nearly so **2** 

- Lateral edges of leaf abaxial midrib smooth or minutely papillate, if the latter then the papillae grading to minute hairs on the abaxial lamina surface; sepals with numerous uncinate hairs at least in the lower half
- 2 Midrib robust and protuberant above the level of the lamina margins; bract subtending the flower ovate Hibbertia juniperina
- 2 Midrib usually rather weak (sometimes robust), sunken below or at most level with the margins, which often recurve to each other; bract subtending the flower linear to narrowly triangular Hibbertia callida
- 3 Leaves adaxially glabrous except when very young (when sometimes bearing a few hooked hairs); abaxial leaf lamina (may require dissection to reveal) minutely pubescent Hibbertia simkiniae
- **3** Leaves with scattered hooked hairs on the adaxial surface and lateral flanks until very mature; abaxial leaf lamina glabrous

#### Hibbertia acerosa sens. str.

# Hibbertia juniperina (Turcz.) K.R.Thiele,



Map 1. Distribution of *Hibbertia juniperina* in southwestern Western Australia. Stars indicate anomalous specimens with less protuberant midribs, discussed under Notes.

#### comb. nov.

*Pleurandra juniperina* Turcz., Bull. Soc. Imp. Naturalistes Moscou 22(3): 6. Type citation: "Nova Hollandia, Swan-River Drum. coll. III. n. 2." (holo: KW 1000422 image!; iso: K 687504 image!, MEL 666815!).

Low, often dense (rarely diffuse), sometimes prostrate and cushion-like shrubs 0.1–0.3(–0.4) m high; young branchlets glabrous or with few, sparse, white, multiarmed hairs when very young, with obscure tufts of short hairs in the leaf axils. *Leaves* spreading, scattered, linear, (8–)10–15(–25) mm long, 0.6–1 mm wide, the margins revolute and tightly abutting the midrib, which is prominent and protuberant with respect to the margins, the abaxial surface obscured; adaxial surface usually finely and sparsely tuberculate, glabrescent but usually with sparse, hooked hairs until mature, rarely almost glabrous from a young age, with short, multiarmed hairs at the very base; abaxial midrib smooth except for prominent tubercles on the flanks where it meets the lamina, which is glabrous (but is almost or completely hidden within the lacunae formed between the margins and the midrib and usually requires dissection to reveal); petiole abaxially glabrous; apex tapering and pungent-pointed. Flowers pedicellate, from upper leaf nodes or on lateral shoots, the pedicels 5-15 mm long, glabrous or with sparse, minute, stellate hairs below the flower; bract 1, subtending the flower at the apex of the pedicel, ovate, 1.5-2 mm long, abaxially glabrous, adaxially and on the margins minutely pubescent. Sepals ovate-acute and usually apiculate, 3.2-5.2 mm long, herbaceous, glabrous (the inner sepals with minute stellate hairs where overlapped by the outer in bud); midribs absent (or, if present, not prominent); outer and inner sepals similar in size and shape but the inner slightly broader and scarious-margined. Petals 5, yellow, broadly obovate, 5.5-7(-8) mm long, deeply emarginate. Stamens 10(12), all on one side of the gynoecium and curving over it like a hand of bananas; filaments 0.4-0.5 mm long, fused at the base into a robust claw; anthers rectangular, 1.5-2 mm long,

dehiscing by introrse, longitudinal slits. *Staminodes* 2 either side of the stamens, rarely also with a few behind the stamens. *Carpels* 2; ovaries globular, densely pubescent; styles inserted excentrically on the carpel apex, parallel and curved beneath the stamens, 1.2–1.6 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen.

**Selected specimens examined** (all PERTH): between Gingin and Regans Ford (2862921); Boonanarring Nature Reserve (3040895, 6740839); Bullsbrook (2862883); Gingin (3040976, 3041301); Jurien Bay (5799856, 6969356); Lesueur National Park (4067517, 4442636); Midland (2435233); Moore River National Park (3825310, 5895855); Regans Ford (2863162); Wannamal (5684889, 8415412); Yandin Hill (5684781).

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrence/ search?q=qid%3A1695077085933&qualityProfile=ALA&disableQualityFilter=scientificname#tab\_mapView

**Diagnostic features**. Differs from the other species segregated from *H. acerosa* in the abaxial leaf midrib being broad and prominent and usually protuberant above the level of the margins (cf. usually flush with or recessed below the level of the margins), and the bract subtending the flower being ovate rather than linear. The leaves in *H. juniperina* also tend to be rather brighter green and glossy on herbarium sheets, contrasting with duller, greyish-green leaves in the other taxa.

**Phenology**. Flowers between August and November, with a peak in September.

**Distribution & habitat**. Occurs in south-western Western Australia between the vicinity of Mount Lesueur and Chittering, in the northern Swan Coastal Plain and southern Geraldton Sandplains IBRA bioregions (Map 1), with an early collection from Midland Junction near Perth, in shrublands, heaths and woodlands usually dominated by Proteaceae, on lateritic and sandy to light loamy soils.

*Conservation status*. Common and widespread and not considered to be at risk.

**Notes.** Two specimens at the northern end of the range, from the Mount Lesueur area (PERTH 3041115 and 3042081), have somewhat finer, longer leaves, but match typical *H. juniperina* in other respects. In several specimens from the western edge of the range (e.g. PERTH 3040879, 3312348, 5717833) the midribs are not so prominently protuberant, thus being somewhat similar to some specimens of *H. callida*, but in other respects these match *H. juniperina* and are here included within it.

There are three duplicates of *Drummond* III, 2. The K sheet bears a specimen tag with "2/Pleurandra cognata

Steud?/1845/Swan River/Drummond". *Pleurandra cognata* is a synonym of *H. acerosa sens. str.* The KW sheet bears a specimen tag with the number "2" and a sheet label with "Pleurandra juniperina/Nova Hollandia. Swan River/Drum. coll. III n. 2", while the MEL sheet bears the same specimen tag and a sheet label in Mueller's hand with "Hibbertia acerosa Benth./WA/2/J.Dr.". Based on the morphology, all three sheets may come from one gathering. The KW sheet is a holotype (Mosyakin *et al.*, 2019).

# Hibbertia callida K.R.Thiele, sp. nov.

Type: Both sides of Toolbrunup Road, 1.45 km N of its junction with the western terminus of North Stirling Road, 15 Sept. 2001, *J.W. Horn* 4081 (holo: PERTH 6312616; iso: CANB, DUKE).

Low, often dense, sometimes prostrate and cushion-like shrubs 0.1–0.3(–0.7) m high; young branchlets glabrous or with sparse, minute, white, multi-armed hairs when very young, with obscure tufts of short hairs in the leaf axils. Leaves spreading, scattered, linear, 5-10(-18) mm long, 0.6–1.2 mm wide, the margins revolute and tightly abutting the midrib, which is usually rather weak and sunken relative to the margins (rarely robust and level with the margins), or to each other, the abaxial surface obscured; adaxial surface smooth to tuberculate, with sparse, hooked hairs until mature (eventually glabrescent), sometimes also with sparse, minute, antrorse hairs from the tubercles when young (rarely almost glabrous from a young age), with short, multi-armed hairs at the very base; abaxial midrib smooth on the back, prominently tuberculate on the flanks where it meets the lamina, which is glabrous (but is almost or completely hidden within the lacunae formed between the margins and the midrib and usually requires dissection to examine); petiole abaxially glabrous; apex tapering and pungent-pointed. Flowers pedicellate, from upper leaf nodes or on lateral shoots, the pedicels 8–15(–18) mm long, glabrous or rarely with sparse, minute, stellate hairs below the flower; bract 1, subtending the flower at the apex of the pedicel, linear to narrowly triangular, 1.5-3 mm long, abaxially glabrous, adaxially and on the margins minutely pubescent. Sepals ovate-acute, 3.4–4.8 mm long, herbaceous, glabrous or rarely with scattered, weak, hooked hairs mostly towards the base, usually prominently indurate at the base; midribs of outer sepals usually prominent; outer and inner sepals similar in size and shape but the inner slightly broader, scarious-margined, and with minute stellate hairs where overlapped by the outer in bud. Petals 5, yellow, broadly obovate, 4.5-6 mm long, deeply emarginate. Stamens 10, all on one side of the gynoecium and curving over it like a hand of bananas; filaments 0.3–0.4(–0.6) mm long, fused at the base into a robust claw; anthers rectangular, 1.2-2.2 mm long, dehiscing by introrse, longitudinal slits. Staminodes 2 either side of the stamens. Carpels 2; ovaries globular, densely pubes-



Map 2. Distribution of Hibbertia callida in southwestern Western Australia.

cent; styles inserted excentrically on the carpel apex, parallel and curved beneath the stamens, 1–1.5 mm long. *Ovules* 2 per carpel. *Fruiting carpels* usually ovoid (when 1-seeded by abortion) to elongate and slightly constricted in the middle (when 2-seeded); seeds glossy, mid- to red-brown, somewhat broader than long, 1.6–2 mm diam; aril covering 1/4–1/2 of the seed, membranous, sparsely to moderately appressed-pubescent

Selected specimens examined (all PERTH): Alexander Morrison National Park (3040917), Between Pingrup and Lake Grace (2863049), Bremer Bay (5683483), Coorow-Green Head Road (5685885), Eneabba (2982250), Gibson (8438706), Highbury (6593178), Hopetoun (8471126), Jingaring (5816769), Jurien Bay (3040941), Kenmare (8571880), Kojonup (6094902), Meenar Nature Reserve (6096409), Mount Lesueur (2982234), Northampton (3508269), Ravensthorpe-Esperance Road (5683785), Stirling Range (3040852), Tarin Rock (3040968), Waggrakine (5496721), Walkaway (2863081), Wongan Hills (2862867), Woodanilling (8437769), Woogenilup (6312578) For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrence/ search?q=qid%3A1695268306042&qualityProfile=ALA&disableQualityFilter=scientificname#tab\_mapView

**Diagnostic features**. Hibbertia callida is readily distinguishable from *H. acerosa* and its other segregates by the abaxial leaf midrib margins being tuberculate, with the midrib usually sunken below (rarely level with) the lamina margins, the abaxial leaf lamina being glabrous, and the sepals being usually glabrous (rarely with sparse uncinate hairs), with indurate bases and usually prominent midribs.

*Phenology*. Flowers mainly between late June and November, with a peak in September.

**Distribution & habitat**. Widespread in southwest Western Australia from Kalbarri south to Bremer Bay and east to near Esperance, in the Geraldton Sandplains, Avon Wheatbelt and Esperance Sandplains IBRA biore-

gions (Map 2), with outlying occurrences in the far southwest near Busselton and south of Nannup.

*Conservation status*. Common and widespread and not considered to be at risk.

**Etymology**. From the Latin *callidus* (skillful, crafty, cunning), in reference to the recognition that ericoid-leaved species of *Hibbertia* likely have sophisticated mechanisms for the control of gas exchange in addition to the well-understood stomatal guard cells.

**Notes**. Hibbertia callida is the most widespread species in the *H. acerosa* species group. It is sympatric with *H. simkiniae* and narrowly allopatric with *H. acerosa* and *H. juniperina*, occurring generally to the east of the range of those species.

A specimen from coastal dunes north of Geraldton (*E.M. Canning* 3179, PERTH3041298) is unusual in being a shrub to 1.3 m high. Searches at the site have failed to locate further plants; it is provisionally placed here in *H. callida*, but further collections are needed to establish its identity.

#### Hibbertia simkiniae K.R.Thiele, sp. nov.

Type: Ajana-Kalbarri Road, c. 2.3 km W from Hawks Head turnoff, Kalbarri National Park, 29 June 2022, *R. Simkin* RS2707 (holo: PERTH 9513175; iso: AD, CANB).

Erect, openly-branched to dense shrubs to 0.5(-0.7) m high; young branchlets mostly glabrous except for a minute, white pubescence of multi-armed hairs on the very youngest shoots near the leaf bases, with obscure tufts of short hairs in the leaf axils. Leaves spreading, scattered, linear, (12-)15-18(-20) mm long, c. 1 mm wide, the margins revolute and tightly abutting the rather weak midrib (which is usually sunken relative to the margins) or to each other, the abaxial surface obscured; adaxial surface smooth to obscurely tuberculate, glabrous when mature (or sometimes with sparse, minute, antrorse hairs from the tubercles) except for short hairs at the very base, the very youngest leaves sometimes with few, scattered hooked hairs that are soon deciduous; abaxial midrib smooth except for minutely papillate margins that grade into a dense but minute pubescence on the abaxial lamina (which is almost or completely hidden within the lacunae formed between the margins and the midrib and usually requires dissection to examine); petiole abaxially glabrous; apex tapering and pungent-pointed. Flowers pedicellate, from upper leaf nodes or on lateral shoots, the pedicels 6-15 mm long, glabrous or with sparse, minute, stellate hairs below the flower; bract 1, subtending the flower at the apex of the pedicel, linear to narrowly triangular, herbaceous, 1.6–3.5 mm long, abaxially glabrous, adaxially and on the margins minutely pubescent. Sepals ovate-acute, 3.8–5.5 mm long, herbaceous, with scattered hooked hairs mostly towards the base; midribs prominent especially at the base; outer and

inner sepals similar in size and shape but the inner slightly broader, scarious-margined, and with minute stellate hairs where overlapped by the outer in bud. *Petals* 5, yellow, broadly obovate, 6–8.5 mm long, deeply emarginate. Stamens 10, all on one side of the gynoecium and curving over it like a hand of bananas; filaments 0.4–0.6 mm long, fused at the base into a robust claw; anthers rectangular, 1.5–2.2 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 2(3) either side of the stamens, sometimes also with a few behind the stamens. *Carpels* 2; ovaries globular, densely pubescent; styles inserted excentrically on the carpel apex, parallel and curved beneath the stamens, 1–1.8 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen.

*Selected specimens examined* (all PERTH): Kalbarri National Park (1748548, 2862905, 2862972, 3040615, 3040747, 3041174, 3041980, 3042022, 4525787, 5016150, 5046149, 5666023, 5921376); Murchison River [Galena area] (3042065).

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrence/ search?q=qid%3A1695270138329&qualityProfile=ALA&disableQualityFilter=scientificname#tab\_mapView

**Diagnostic features**. Hibbertia simkiniae can be discriminated from *H. acerosa* and its other segregates by the relatively long leaves (12–20 mm) that bear no hooked hairs except when very young, and the minutely pubescent abaxial leaf lamina (hidden within the lacunae formed between the margins and midrib).

*Phenology*. Flowers from August to October with a peak in September.

**Distribution & habitat**. Occurs inland of Kalbarri (mostly within the bounds of Kalbarri National Park), as far east as the Great Northern Highway near the Galena Bridge over the Murchison River (Map 3), in kwongan shrubheath on grey to pale yellow sandplains over laterite.

**Conservation status**. Common in the Kalbarri area (including in Kalbarri National Park), and not considered to be at risk.

**Etymology**. Named in honour of Robin Simkin, a keen and knowledgeable citizen scientist, amateur botanist, and volunteer at the Geraldton Regional Herbarium, who has helped greatly with detailed field observations of the species in the Kalbarri area.

**Notes**. Hibbertia simkiniae was first provisionally segregated among the specimens at PERTH on the basis of its usually erect, open habit, which contrasts sharply with the procumbent, dense cushion-like forms commonly seen in other taxa in *H. acerosa sens. lat.* Further examination provided other critical diagnostic characters, including the minutely pubescent abaxial leaf lamina within the lacunae formed between the midrib and



Map 3. Distribution of Hibbertia simkiniae in southwestern Western Australia.

margins, and having very few (if any) hooked hairs on young leaves. In the Kalbarri area it co-occurs with the widespread *H. callida*, from which it differs noticeably in the field in being a taller, more erect and more open shrub with longer leaves and larger flowers.

# *Hibbertia acerosa* (R.Br. ex DC.) Benth., Fl. Austral. 1: 24 (1863).

*Pleurandra acerosa* R.Br. ex DC., Syst. Nat. [Candolle] 1: 422. Type citation: "Hab. in Novae-Hollandiae ora australi loco Lucky Bay dicto [likely an error for Kings George Sound], R. Brown. (v.s. sp.)." (syn: G 201255; probable syn: NY 428751).

*Pleurandra cognata* Steud., Pl. Preiss. [J.G.C.Lehmann] 1(2): 265 (1845). Type citation: "In fissuris rupium ad latus orientale montis Melville, ditionis Plantagenet, 5. Oct. 1840. Herb. Preiss. No. 2156" (syn: LD 1087556 image!, L2385642!, MEL 666814!, MEL 666813!, S 08-20063 image!).

Low, often spreading, openly-branched to compact shrubs (sometimes cushion-like), 0.1-0.3(-0.5) m high; young branchlets sparsely to moderately and minutely pubescent with white, multi-armed hairs, soon glabrescent, with obscure tufts of short hairs in the leaf axils. Leaves spreading, scattered, linear, (5-)10-15(-20) mm long, 0.6-1 mm wide, the margins revolute and tightly abutting the midrib (which is usually level with or sunken relative to the margins) or to each other, the abaxial surface obscured; adaxial surface smooth to tuberculate, glabrescent but usually with sparse, hooked hairs until mature, sometimes also with sparse, minute, antrorse hairs from the tubercles when young (rarely almost glabrous from a young age), with short, multi-armed hairs at the very base; abaxial midrib smooth including along its flanks; abaxial lamina glabrous (surface almost or completely hidden within the lacuna formed between the margins and the midrib and usually requiring dissection to examine); petiole abaxially glabrous; apex tapering and pungent-pointed. Flowers pedicellate, from upper leaf nodes or on lateral shoots, the pedicels 8-28 mm long, glabrous or with



Map 4. Distribution of Hibbertia acerosa in southwestern Western Australia.

scattered minute stellate hairs; bract 1, subtending the flower at the apex of the pedicel, linear to narrowly triangular, herbaceous, 2-4 mm long, abaxially glabrous to sparsely and minutely hairy, adaxially and on the margins usually minutely pubescent. Sepals ovate-acute, 3-4.5 mm long, herbaceous, with scattered hooked hairs usually along most of the length, mixed with minute stellate hairs; midribs prominent especially at the base; outer and inner sepals similar but the inner slightly broader, scarious-margined and with fewer hooked hairs. Petals 5, yellow, broadly obovate, 6.5-7.5 mm long, deeply emarginate. Stamens 10(12), all on one side of the gynoecium and curving over it like a hand of bananas; filaments 0.4-0.6 mm long, fused at the base into a robust claw; anthers rectangular, 1.4-2 mm long, dehiscing by introrse, longitudinal slits. Staminodes 2 either side of the stamens. Carpels 2; ovaries globular, densely pubescent; styles inserted excentrically on the carpel apex, parallel and curved beneath the stamens, 1.2–1.8 mm long. Ovules 2 per carpel. Fruiting carpels somewhat elongated, usually 2-seeded and slightly constricted between the seeds, which are dark, glossy redbrown and 1.5–2 mm diam; aril covering 1/3–3/4 of the seed, membranous, sparsely to moderately appressed-pubescent.

**Selected specimens examined** (all PERTH): Beenup (3041018), Beverley (5549809), Boddington (3106411), Bowelling, (4742052), Byford (5307864), Cape Riche (8598584), Cranbrook (4598113), Dryandra State Forest (1444646), Kalamunda (2863243), Kojonup, (5888409), Mount Clarence (7762631), Mundaring (3040801), Rocky Gully (8994242), Serpentine (6740049), Stirling Range National Park (2863219), 2863251), Stokes Inlet (2863200), Wungong (7187483), York (3041042)

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrence/

search?q=qid%3A1695269540236&qualityProfile=ALA&disableQualityFilter=scientificname#tab\_mapView

**Diagnostic features**. Hibbertia acerosa is readily distinguishable from the species segregated from it by the abaxial leaf midrib being entirely smooth, including along its flanks, the abaxial leaf lamina being glabrous, and the sepals being usually fairly evenly covered in sparse to mid-dense hooked hairs.

**Phenology**. Flowers from late August to December (and sporadically thereafter), with a peak in late October.

**Distribution & habitat**. Occurs in south-western Western Australia from the vicinity of Julimar south to Cookernup along the edge of the Darling Scarp, with scattered occurrences in the western Avon Wheatbelt bioregion between York and Bowelling, and along the south coast hinterland between Lake Unicup and inland of Cape Riche (Map 4), mostly in jarrah-marri forests and woodlands on sandy to clayey soils. A single collection (*A.E. Orchard* 1195) is from well east of the main range, near Stokes Inlet west of Esperance, and is within the range of *H. callida*. Similar disjunctions along the south coast of Western Australia are not uncommon, and there is no reason to doubt the specimen or its location.

*Conservation status*. Common and widespread and not considered to be at risk.

**Notes.** Hibbertia acerosa was named (as Pleurandra acerosa R.Br. ex. DC.) by De Candolle in 1817, based on material collected by Robert Brown at Bay 1 (Lucky Bay) in 1802. The combination into Hibbertia was effected by Bentham (1863) in Flora Australiensis. At the same time, Bentham placed two prior names, Pleurandra juniperina Turcz. and P. cognata Steud., into synonymy under H. acerosa and erected a variety, var. ulicifolia Benth. (later elevated to species rank as H. ulicifolia (Benth.) J.R.Wheeler). The new combination H. juniperina based on P. juniperina is made in this paper; it is clearly distinct from H. acerosa.

There are three Brown specimens labelled *Pleurandra acerosa* on JSTOR Global Plants and catalogued in Mabberley & Moore (2022). A sheet at NY ex BM (NY 428751) bears a label 'Nova Hollandia Ora Meridionalis, King George's Sound' and has two specimens, both small, much-branched plants with short leaves. A sheet at G-DC bears a label with 'Pleurandra acerosa, Lucky Bay or. Austr.' in Brown's hand, annotated 'm. Rob. Brown 1816' in a different (unknown) hand. The single small specimen on the sheet is a close match to the NY specimen. The annotation indicates that it was sent to De Candolle by Brown in 1816 (possibly as a result of De Candolle's visit to Brown in London in January of that year; Mabberley 1985).

A third sheet, at BM, bears a blue Bennett slip with the number 4886 and an affixed label with 'Curtelloides acerosa/Bay 1 [Lucky Bay] S. Coast' in Brown's hand. A determinavit slip by David Mabberley and David Moore dated 15 July 2011 indicates that this is an isotype of *Pleurandra acerosa*. The specimen, however, is clearly *H. ulicifolia*, which is common at Lucky Bay; *Hibbertia*  *acerosa*, by contrast, does not occur there. The NY and G-DC sheets closely match the protologue of *P. acerosa* in all respects, particularly in being small and muchbranched with glabrous stems (protologue: '[s]uffrutex humillimus ramosissimus; rami glabri').

Taking the locations at face value, only the G-DC specimen matches the location (Lucky Bay) given in the protologue. However, the fact that it does not occur there and the close match with the NY (King George Sound) specimen makes it likely that the G-DC label is in error, making both specimens syntypes. *Hibbertia acerosa* is common around Albany (King George Sound, from where the type of *P. cognata* was also collected by Baxter). It is clear that the Brown 4886 sheet at BM is not a type; it is the first known collection of *H. ulicifolia*.

Three other sheets, of Brown 4885 (K000687507, BM000571219 and E00791174), are also of *H. acerosa*. The BM sheet bears a slip in Brown's hand with 'Curtelloides recurva/K G III<sup>rd</sup> Sound' and a BM Type sticker. These specimens are not regarded as type material.

*Pleurandra cognata* was described by Steudel (1845) based on *Preiss* 2156, collected 'in broad clefts of the cliffs on the east side of Mount Melville, District Plantagenet' ('[i]n fissuris rupium ad latus orientale montis Melville, ditionis Plantagenet') on 5 October 1840. There are two Mounts Melville, one in what is now Albany and one at Cape Riche, further east along the Western Australian south coast and beyond the bounds of Plantagenet County (which was designated in 1829). Preiss collected at both localities, but was in Albany on 5 October 1840, not collecting in the Cape Riche area until 17–26 November of that year (AVH 2022). *Hibbertia acerosa sens. str.* is common in the Albany area, including at Mount Melville and Mount Clarence.

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