



## Revision of the Western Australian *Hibbertia cunninghamii* species group (Dilleniaceae)

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**Abstract:** The five species of the *Hibbertia cunninghamii* species group from south-west Western Australia, some of which have been poorly circumscribed and confused in the past, are newly treated. *Hibbertia cunninghamii* is found to be more morphologically variable than in previous flora treatments, while new morphological evidence is presented to support narrower circumscriptions of *H. amplexicaulis* and *H. perfoliata*. Descriptions and a key are provided for all species in the group.

**Keywords:** Dilleniaceae, *Hibbertia*, taxonomy, typification, Western Australia

### Introduction

*Hibbertia* Andrews (Dilleniaceae) includes c. 350 accepted species in Australia (Hammer & Thiele 2022–) and has been the subject of a considerable amount of taxonomic effort in recent years (e.g. Toelken 2023, 2024), including revisions of many species groups that are endemic to south-western Australia (e.g. Hammer & Thiele 2024; Thiele 2019, 2024). The informally named *H. cunninghamii* Aiton ex Hook. group is endemic to the Southwest Floristic Region of Western Australia and hitherto has not been critically evaluated in a recent taxonomic revision. In addition to *H. cunninghamii*, the group comprises *H. amplexicaulis* Steud., *H. nymphaea* Diels, *H. perfoliata* Hügel ex Endl. and *H. porongurupensis* J.R.Wheeler & Hoogland.

Members of the *H. cunninghamii* group are glabrous shrubs or subshrubs with amplexicaul, often auriculate or perfoliate, more or less flat leaves and pedicellate flowers with many stamens arranged around typically 3 or 5 carpels. The species were most recently treated in the *Flora of the Perth Region* (Wheeler 1987) and *Flora of the South West* (Wheeler 2002).

Of the species in the group, there has been the most difficulty in differentiating *H. amplexicaulis*, *H. cunninghamii* and *H. perfoliata*. Wheeler (1987: 121) noted that *H. amplexicaulis* was most similar to *H. cunninghamii* and the two species appeared to intergrade. She defined *H. cunninghamii* by having “linear, only slightly auriculate, entire leaves and sepals less than 10 mm long”, and she considered it restricted

to the southern parts of the south-west (i.e. not reaching as far north as the Perth region). In the *Flora of the South West*, Wheeler (2002: 573) considered that *H. amplexicaulis* was “probably only a variant” of *H. cunninghamii*, differing in its broader leaves and slightly larger flowers. Since these flora treatments, taxonomic confusion has remained between *H. cunninghamii* and *H. amplexicaulis*, and the differences between these species have not been satisfactorily resolved.

Determinations on specimens have also demonstrated confusion between *H. amplexicaulis* and *H. perfoliata*, with specimens with amplexicaul, non-perfoliate leaves assigned to the former, those with clearly perfoliate leaves assigned to the latter, but specimens with sub-perfoliate leaves distributed more or less randomly between these two. Wheeler (2004) provided a useful key to the species of *Hibbertia* known to that date from south-west Western Australia, and divided *H. perfoliata* from the remaining species purely on the basis of it having perfoliate leaves. Our observations have shown that this is inadequate.

By contrast with these three species, *H. nymphaea* and *H. porongurupensis* are taxonomically relatively straightforward and have not been confused with others in the group.

In this study we resolve the taxonomic boundaries between, and recircumscribe, *H. amplexicaulis*, *H. cunninghamii* and *H. perfoliata*, and provide updated descriptions of, and a key to, all five species in the *H. cunninghamii* group.

### Key to the *Hibbertia cunninghamii* species group

1. Stamens 15–40; carpels 3 . . . . . *H. nymphaea*
- 1: Stamens (30–) 40–100; carpels (4) 5 (–8)
2. Staminal filaments closely appressed to and obscuring the ovaries from the side and above, the anthers arranged above the centre of the flower like a fountain; petals dark yellow to amber-coloured (fresh) . . . . . *H. amplexicaulis*
- 2: Staminal filaments erect to slightly spreading, not closely appressed to the ovaries, which are generally visible between the filaments and from above, the anthers rather loosely arranged around the centre of the flower; petals bright yellow (fresh)
3. Leaves broadly elliptic to circular (rarely obdeltoid) . . . . . *H. porongurupensis*
- 3: Leaves broadly ovate to linear
4. Leaves amplexicaul to perfoliate, the margin smooth, irregularly notched or with denticulations usually restricted to the leaf base; erect to spreading plants of dry sites . . . . . *H. cunninghamii*
- 4: Leaves perfoliate, the margin with regular distinct denticulations all around; trailing plants of wet, swampy places . . . . . *H. perfoliata*

### Methods

This study was based on examination of dried specimens at AD and PERTH, including those on loan from CANB to AD, and field observations conducted from 2021 to 2023. Images of type specimens were viewed on JSTOR Global Plants (<https://plants.jstor.org>) or the online database of the *Muséum national d'Histoire naturelle* (Paris, France; <https://science.mnhn.fr/institution/mnhn/collection/p/item/search>).

### Taxonomy

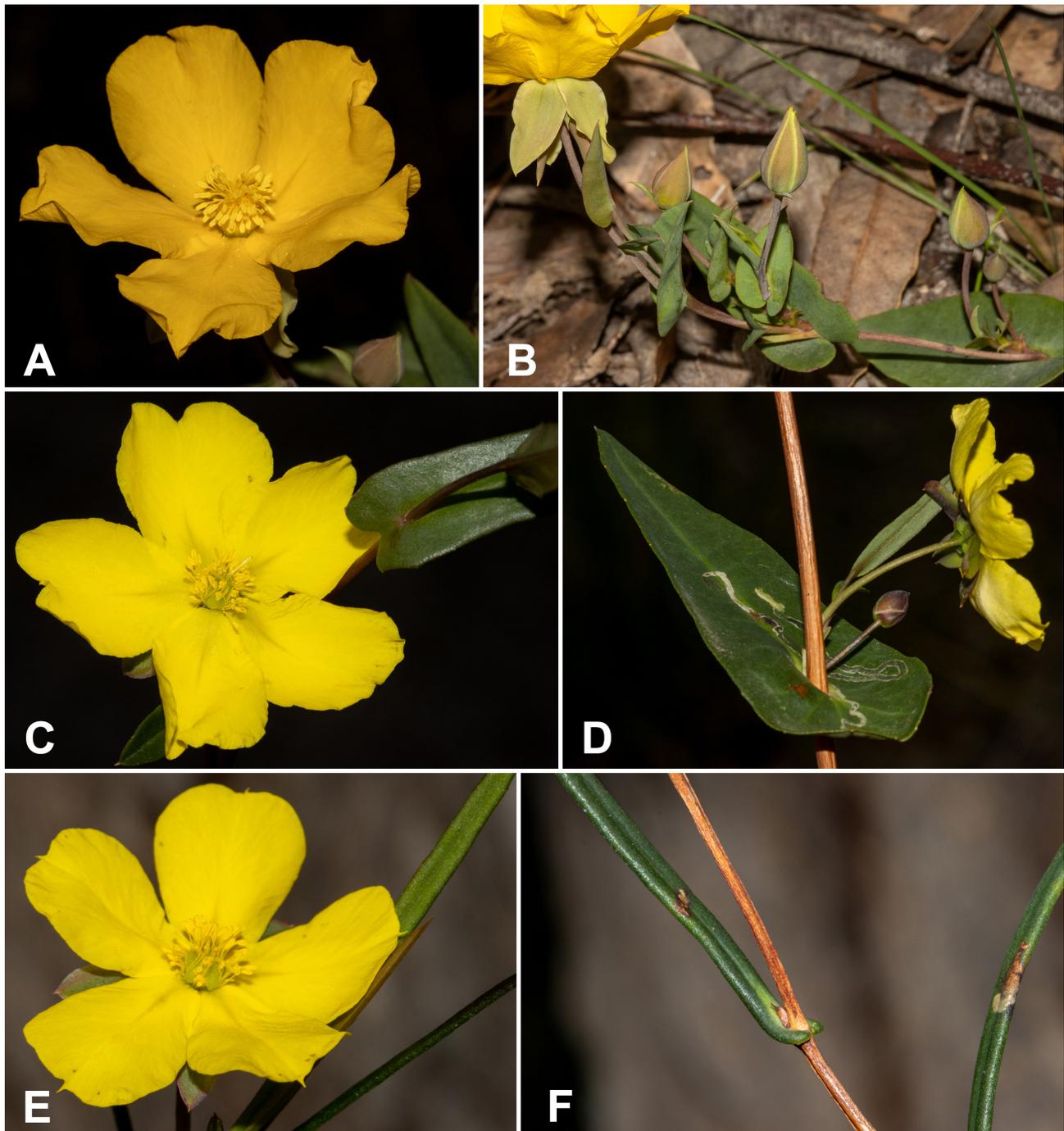
#### *Hibbertia amplexicaulis* Steud.

in Lehmann, *Pl. Preiss.* 1(2): 266 (1845). — *Hibbertia cunninghamii* var. *latifolia* F.Muell., *Fragm.* 11(92): 93 (1880). — **Type citation:** “In limoso calculosis umbrosis sylvaticis prope Mahogany-creek, 13 Sept. 1839. Herb. Preiss. No. 2129”. **Lectotype (here designated):** Western Australia, In limoso calcareis [calculosis] umbrosis sylvaticis prope Mahogany-creek, 13 Sept. 1839, *J.A.L. Preiss 2129* (P00682322 ex Herb. Steudel, image!). **Isolectotypes:** BR0000013462598 image!, HBG507154 image!, LD1243033 image!, M0212925 image!, MEL666816 image!, MEL666817 image!, MO-279490 image!, P00682321 image!, S08-19968 image!

*Shrubs* 0.2–0.5 m high, with few to several, usually erect (rarely decumbent) stems from the base, the stems ± ridged and rarely zigzagging. *Vestiture* absent. *Leaves* amplexicaul or perfoliate (on young plants or near the base of strong new shoots), ovate to ovate-elliptic, (20–) 25–45 (–60) mm long, 10–22 (–30) mm wide, folded longitudinally when young; base of amplexicaul leaves auriculate to cordate; margin entire or crenate and slightly recurved (at least when dry); adaxial surface usually with a narrow, shallow groove along the midrib,

the secondary veins scarcely visible and ± raised (at least when dry); abaxial surface with a raised midrib, often distinctly greyish when dried, the secondary veins not or scarcely visible; apex acute or obtuse, the midrib excurrent as a ± straight point 0.5–1 mm long. *Flowers* single, leaf-opposed on pedicels (10–) 20–28 (–55) mm long, which become ± pendulous in fruit. *Bract* subtending the calyx, narrowly ovate, 6–10 (–16) mm long, the midrib with a narrow crease adaxially; margin entire; apex acute to acuminate or apiculate. *Sepals* (10–) 12–17 mm long; outer sepals ovate to elliptic, acute to acuminate (due to folding of the margin); inner sepals oblong to obovate, obtuse and minutely apiculate. *Petals* 5, dark yellow to amber-yellow (when fresh), broadly obovate, (10–) 14–20 mm long, emarginate. *Stamens* (50–) 60–100, tightly packed in ring around and almost completely obscuring the gynoecium from the sides; filaments free, unequal, 2–4 mm long, tightly appressed to the ovaries and meeting together above them (thereby ± obscuring them from above) and then spreading like a fountain from the centre of the flower; anthers narrowly oblong-elliptic, (0.8–) 1–1.5 mm long, dehiscing by marginal, longitudinal slits; many outermost stamens reduced to staminodes. *Carpels* 5; ovaries ovoid; styles ascending and scarcely protruding through the fountain of stamens (± hidden amongst the anthers), 2–4 mm long. *Ovules* 3–5 per carpel. *Seeds* orange-brown, shiny, almost globular, c. 3 mm long, c. 2.5 mm wide; aril small, scarious, white-translucent. **Fig. 1A, B.**

**Diagnostic features.** *Hibbertia amplexicaulis* is characterised by having leaves ovate to ovate-elliptic and amplexicaul (or rarely perfoliate), sepals (10–) 12–17 mm long, petals dark- to amber-yellow, and stamens (50–) 60–100, free, tightly appressed to and obscuring the five ovaries from the sides and above.



**Fig. 1.** Flowers and leaves of *Hibbertia amplexicaulis* (A, B) and *H. cunninghamii* (C–F). Photos: T.A. Hammer.

**Phenology.** Flowers July to November, with a peak in September and October.

**Distribution and habitat.** *Hibbertia amplexicaulis* occurs from east of Perth to south of Busselton in the Jarrah Forest and Swan Coastal Plain IBRA regions (Fig. 2A). Around Perth it is usually found on and east of the Darling Scarp. It typically occurs in open jarrah-marri forests and mixed shrublands on brown loams and sands over granite and laterite.

**Conservation status.** Not conservation-listed.

**Notes.** The most reliable character to discriminate *H. amplexicaulis* from other species in this group is the arrangement of stamens, best seen in fresh flowers but also observable in pressed specimens. Viewed from above or from the side, the carpels are largely or completely hidden; from above they are obscured beneath a ‘fountain’ of stamens with only ends of the styles visible, while from the side they are obscured by the staminal filaments, which closely hug the gynoecium and are free of gaps (Fig. 1A). When growing with other species (e.g. *H. cunninghamii*), the petals of *H. amplexicaulis* are also noticeably a richer yellow.

See under *H. cunninghamii* and *H. perfoliata* for more differences with those species.

**Typification.** Of the type material available, the specimen P00682322 has been designated as the lectotype, as it is from Steudel's herbarium and with a label written in his hand. The specimen shows the diagnostic floral and vegetative morphology of the species, having an open flower, partially visible from side-view, with the characteristic 'fountain' stamen arrangement described above.

### **Selected specimens examined.**

WESTERN AUSTRALIA. Site 10, Rosedale Rd, 3.5 km NW of Chidlow, 8 Nov. 1996, *M.G. Allen 408* (PERTH); 25.4 km from Collie towards Williams, 1 Oct. 1968, *E.M. Canning WA/68 3835* (CBG, PERTH, NSW); 14.7 km E of Capel on Capel-Donnybrook Rd, 3 Oct. 2000, *R.J. Cranfield 15439* (PERTH); plot FC26 Lesley forest block (F.B.), W of Poison Gully, N off Brookton Hwy, 6 Oct. 2003, *R.J. Cranfield FC 475* (PERTH); E side of Nanga Rd, 1 km S of Pinjarra-Williams Rd, 24 Sep. 2023, *T.A. Hammer 428 & R.W. Davis* (AD, PERTH); c. 2.5 miles [km] W of Dwellingup, along rd from Pinjarra, 13 Nov. 1974, *R.D. Hoogland & G.L. Stebbins 12509* (CANB); E side of Sues Rd, 6.5 km S of its junction with the Vasse Hwy (Highway 104), 12 Sep. 2001, *J.W. Horn 4065* (PERTH); between Mundaring and Berakin, 26 Sep. 1963, *E.R.L. Johnson s.n.* (PERTH03041638); site 85, 19 km WNW of Balingup, 6 Sep. 1997, *P.A. Jurjevich 1456* (PERTH); powerline track, 100 m from Mundaring Weir Rd, 5 Sep. 2001, *K. Macey 384* (PERTH); Bodhinyana Monastery, 216 Kingsbury Dve, Serpentine, 23 Sep. 2002, *B. Nyanatusita 181* (PERTH); plot FC16, Asquith Rd, Yourdamung F.B., N of Collie, 8 Oct. 2002, *B.G. Ward & R.J. Cranfield FC 327* (PERTH); plot FC18, Hunter Rd, Chalk F.B., N of Collie, 8 Oct. 2002, *B.G. Ward & R.J. Cranfield FC 377* (PERTH); plot MAR03 in Marrarup Nature Reserve (Nat. Res.), 13 Aug. 2005, *Wildflower Society of WA MAR 3/RC 5* (PERTH); Sues Rd, 3.3 km N of junction with Mowen Rd (S of Busselton), 8 Sep. 1983, *J.R. Wheeler 2168* (PERTH); Boddington, Worsley Alumina Mine, 29 Sep. 1983, *J.R. Wheeler 2219* (PERTH).

### ***Hibbertia cunninghamii* Aiton ex Hook.**

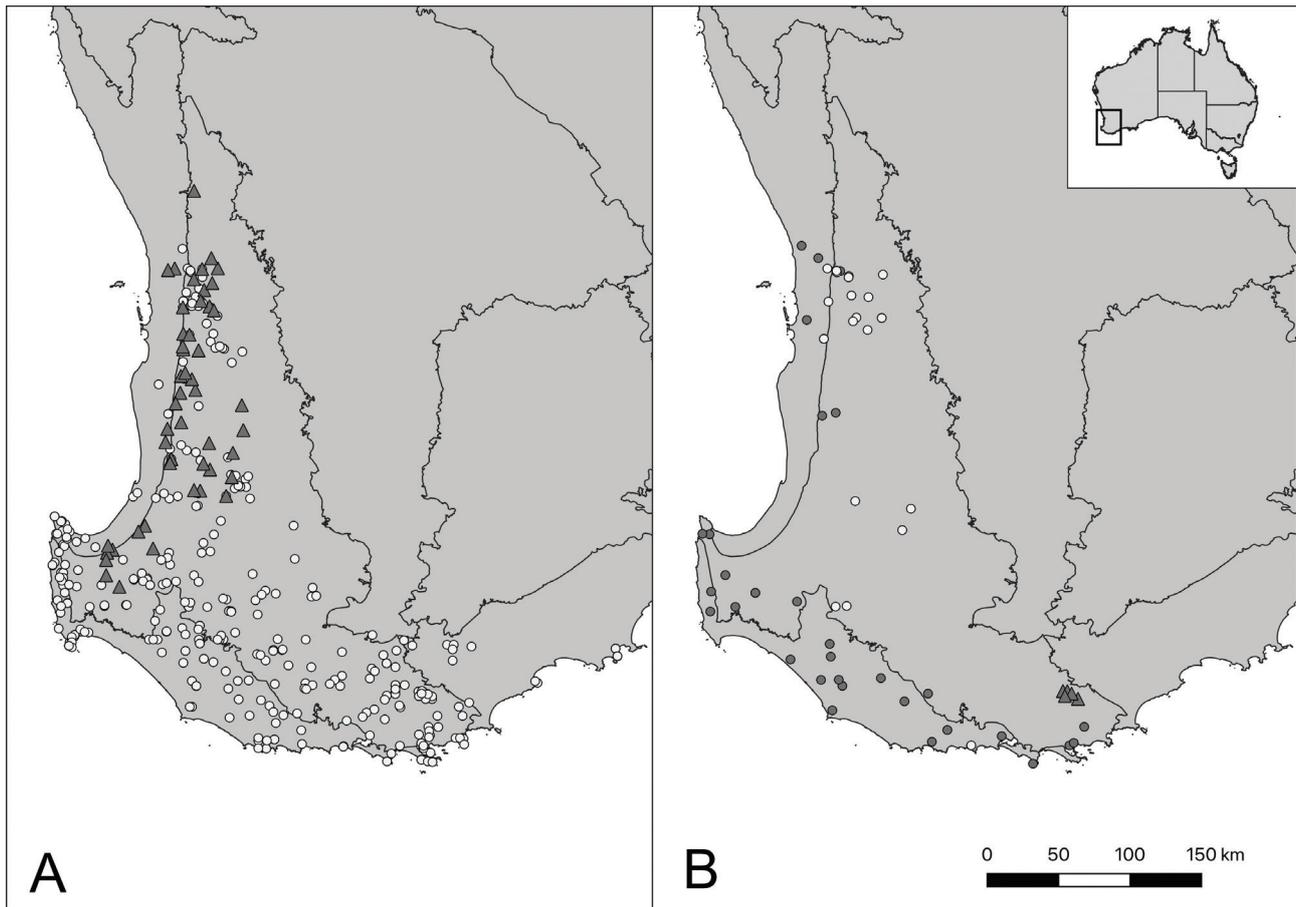
*Bot. Mag.* 59: Tab. 3183 (1832). — *Candollea cunninghamii* (Aiton ex Hook.) Maund, *Botanist* 2: t. 85 (1838). — **Type citation:** "King George's Sound". **Syntypes:** Western Australia, King George Sound, Dec. 1821, *A. Cunningham 240* [9<sup>th</sup> Despatch, 4<sup>th</sup> King Voyage] (K000700137 image!, MEL666915 image!, BM, K700135, K700353, *n.v.*, *fide* Orchard & T.A.Orchard, *A. Cunn. Pl. Spec. Annot. Cat.* 376, 2020).

*Hibbertia bracteosa* Turcz., *Bull. Soc. Nat. Moscou* 25(Part 2: 3): 140 (1852). — **Type citation:** "Nov. Holl. Drum. V. n. 287". **Lectotype:** Western Australia, *s.dat.*, *Drummond 5th collection: 287* (KW001000414 image!), *fide* N.G.Marchant in P.S.Short, *Hist. Syst. Bot. Australas.* 123 (1990), Tab. I, as "holotype". **Isolectotypes:** MEL666823 image!, PERTH06723519 image!

*Hibbertia hastata* Steud. in Lehmann, *Pl. Preiss.* 1(2): 266 (1845). — *Hibbertia cunninghamii* var. *hastata* (Steud.) Benth., *Fl. Austral.* 1: 39 (1863). — **Type citation:** "In Australasia occidentali-meridionali. Herb. Preiss. No. 2128". **Lectotype (here designated):** Western Australia, *s.dat.*, *L. Preiss 2128* (P02371161 ex Herb. Steudel, image!). **Isolectotypes:** LD1242733 image!, MEL666828 image! (fragment in pocket).

*Hibbertia lactucifolia* Steud. in Lehmann, *Pl. Preiss.* 1(2): 267 (1845). — **Type citation:** "In sublimosis sylvaticis districtus Sussex, 23. Dec. 1839. Herb. Preiss. No. 2161 et in umbrosis sylvaticis prope Albany, districtus Plantagenet, 22. Sept. 1840. No. 2173". **Lectotype (here designated):** Western Australia, Sussex District, 23 Dec. 1839, *J.A.L. Preiss 2161* (P02371162 ex Herb. Steudel, image!). **Isolectotypes:** LD1096772 image!, MEL666829A image!, MEL666830 image!, P02371163 image!, S08-20140 image!. **Remaining syntypes:** Western Australia, Plantagenet District, 22 Sep. 1840, *J.A.L. Preiss 2173* (MEL666829B image!, LD1002338 image!, P02371160 ex Herb. Steudel, image!).

Erect-spreading *shrubs* 0.2–0.5 m high with few to many stems from the base, the young stems ± ridged and often slightly to distinctly zigzagging. *Vestiture* absent. *Leaves* amplexicaul or occasionally perfoliate (if so then usually in young plants or near the base of strong new shoots), linear to linear-elliptic, narrowly lanceolate or narrowly ovate to ovate, 30–85 (–100) mm long, (2–) 4–26 (–35) mm wide (the apical leaves often narrower than more basal ones), folded longitudinally when young; base of amplexicaul leaves slightly to distinctly auriculate (rarely slightly hastate) or ± rounded (only if perfoliate); margin entire or occasionally with minute, soft, distant teeth (usually only basally), often slightly recurved or revolute (when dry); adaxial surface usually with a narrow, shallow groove along the midrib, the secondary veins scarcely or not visible; abaxial surface with a raised midrib, the secondary veins scarcely or not visible; apex acute to acuminate, the midrib excurrent as a ± straight (rarely slightly deflexed) point 0.5–1.2 mm long. *Flowers* single, leaf-opposed on pedicels (5–) 10–50 mm long, which become ± pendulous in fruit. *Bract* subtending the calyx, lanceolate to ovate or broadly ovate, 3.5–7.5 mm long; midrib with a narrow crease adaxially, ± raised adaxially (at least apically); margin entire; apex acute to acuminate, the midrib usually excurrent as a ± straight point 0.4–1 mm long. *Sepals* 8–15 mm long; outer sepals ovate, acute to acuminate (due to folding of the margin); inner sepals oblong, obtuse and minutely apiculate. *Petals* 5, yellow, broadly obovate, 8–20 mm long, emarginate. *Stamens* (30–) 40–50 (–60), arranged in an interrupted ring around and not obscuring the ovaries; filaments free, unequal, 2–4 mm long, loosely arranged and ± spreading; anthers narrowly oblong-elliptic, (0.8–) 1–1.2 mm long, dehiscing by marginal, longitudinal slits; several outermost stamens reduced to staminodes. *Carpels* (4) 5 (–8); ovaries ovoid; styles ascending and protruding through the stamens, 2.5–4 mm long. *Ovules* 3–5 per carpel. *Seeds* orange-brown, shiny, almost globular,



**Fig. 2.** Distribution maps: **A** *Hibbertia amplexicaulis* (triangles) and *H. cunninghamii* (circles); **B** *H. porongurupensis* (triangles), *H. perfoliata* (dark circles) and *H. nymphaea* (light circles).

2.7–3 mm long, 1.8–2.5 mm wide; aril small, scarios, white-translucent. **Fig. 1C–F.**

**Diagnostic features.** *Hibbertia cunninghamii* is characterised by having leaves linear to linear-elliptic, narrowly lanceolate or narrowly ovate to ovate and amplexicaul or occasionally perfoliate, sepals 8–15 mm long, petals bright yellow, and stamens (30–) 40–50 (–60) and loosely surrounding (4) 5 (–8) carpels, which are visible between the stamens and from above.

**Phenology.** Flowers August to December with a peak in October.

**Distribution and habitat.** *Hibbertia cunninghamii* is widespread and common in south-west Australia, occurring from east of Perth to Albany, with records as far east as Bremer Bay and as far west as Leeuwin-Naturaliste National Park (Fig. 2A). It can be found in the Avon Wheatbelt, Esperance Plains, Jarrah Forest, Swan Coastal Plain and Warren IBRA regions (Department of Agriculture, Water and the Environment 2024–). It is recorded from jarrah and marri woodlands, seasonally wet shrublands and coastal heath on brown, grey or reddish sand or loam, sometimes including gravel, over granite.

**Conservation status.** Not conservation-listed.

**Notes.** *Hibbertia cunninghamii* is here circumscribed more broadly than by previous authors (e.g. Wheeler 1987, 2002, 2004). With this broader circumscription it occurs further north than was previously considered and includes plants with broader leaves (e.g. Figs 1D, 2A). There is some indication that plants from the southern parts of its range tend to have narrower leaves than plants from the north of the range (e.g. Fig. 1F), and old plants tend to have narrower leaves than younger plants.

As discussed under *H. amplexicaulis*, the most reliable means of identification from these otherwise similar species is the arrangement of the stamens. In *H. cunninghamii* the staminal filaments only loosely hug the carpels, are rather spreading rather than closely appressed, and tend to have gaps along the carpel radii (Figs 1C, E). The anthers form a loose ‘mop’ rather than a distinct ‘fountain’ as in *H. amplexicaulis* (Fig. 1A), and the bodies of the carpels (ovaries) are clearly visible both from above and from the side. While this difference is most readily observed in fresh flowers, with practice it can also be used to discriminate pressed specimens. In the field, when both *H. cunninghamii* and *H. amplexicaulis* are found growing together, the former has lighter

and brighter yellow petals than the latter (e.g. the specimens *T.A. Hammer 428* & *R.W. Davis* and *T.A. Hammer 429* & *R.W. Davis*).

See under *H. perfoliata* for differences with that species.

**Typification.** *Hibbertia hastata* Steud. is here lectotypified to P02371161, which is from E.G. von Steudel's herbarium and contains a label written by his hand. The specimen consists of three flowering stems with leaves, one of the flowers open and well-displayed.

*Hibbertia lactucifolia* Steud. is here lectotypified to P02371162, a specimen from Steudel's herbarium that contains a label written by his hand. The specimen consists of one flowering stem with leaves.

### Selected specimens examined.

WESTERN AUSTRALIA. W of Lower King Rd, 5 Oct. 2012, *G. Byrne 4440* (PERTH); E of Vasse Hwy, c. 100 m S of corner with Seven Day Rd, 42 km S of Nannup, 4 Sep. 2022, *T.A. Hammer 272* & *L.T. Williamson* & *R.W. Davis* (AD, PERTH); Narrikup Nat. Res., c. 20 m W of William St, c. 120 m S of Hannan Way, c. 900 m W of Albany Hwy, Narrikup, 5 Sep. 2022, *T.A. Hammer 279* & *L.T. Williamson* & *R.W. Davis* (AD, PERTH); E side of Nanga Rd, 1 km S of Pinjarra-Williams Rd, 24 Sep. 2023, *T.A. Hammer 429* & *R.W. Davis* (AD, PERTH); SW corner of Wildwood Rd and O'Donnell St, 6 Oct. 1999, *J.W. Horn 2735* (PERTH); Buckley's Breakaway Nat. Res., Karlgarin Rd South, 45 km E of Kulin, 21 Oct. 1997, *G.J. Keighery* & *N. Gibson 2747* (PERTH); Scott National Park (N.P.), East Augusta, 9 Nov. 2008, *N. Marchant, D. Bradshaw* & *J. Gathe 22* (PERTH); Mt Roe N.P., c. 46 km W of Mt Barker and ca. 18 km ESE of Rocky Gully, 3 Nov. 2013, *R. Meissner, C. McCormack* & *M. Langley 6269* (PERTH); Coastal Track, Meelup Res., Dunsborough, 5 Sep. 2006, *O. Green BNC 1005* (PERTH); Muir Hwy between Albany and Manjimup, at Frankland River Bridge W of Rocky Gully, 12 Dec. 1974, *R. Pullen 9990* (PERTH); c. 4 km SSE of Margaret River, at junction of road to Leeuwin estate and Bussell Hwy, 6 Sep. 1983, *J.R. Wheeler 2135* (PERTH); Willyung Hill, c. 12 km N of Albany, 25 Sep. 1986, *J.R. Wheeler 2448* (PERTH).

### *Hibbertia nymphaea* Diels

*Bot. Jahrb. Syst.* 35: 384 (1904). — **Type citation:** “in distr. Darling juxta rivi Serpentine Riv. ripam inter saxa in arenoso-argillaceis flor. et fructifer. m. Febr. (D. 2570); eodem fere loco F.v. MÜLLER in hb. Melbourne sub “*H. Cunninghamii* var. *minor*” msc.” **Lectotype (here designated):** Western Australia, Serpentine [River], 23 Feb. 1901, *L. Diels 2570* (PERTH04430646 image!). **Isolectotype:** PERTH04430638 image! **Remaining syntypes:** Western Australia, Serpentine River, 1 Dec. 1877, *F. Mueller s.n.* (MEL666576 image!, MEL666577 image!, MEL666578 image!, MEL666579 image!).

*Hibbertia cunninghamii* var. *debilis* F.Muell., *Fragm.* 11(92): 93 (1880). — **Type citation:** “[...] detexi ad cataractas fluvii Serpentine-River”. **Lectotype (here designated):** Western Australia, Serpentine River, 1 Dec. 1877, *F. Mueller s.n.* (MEL666578 image!).

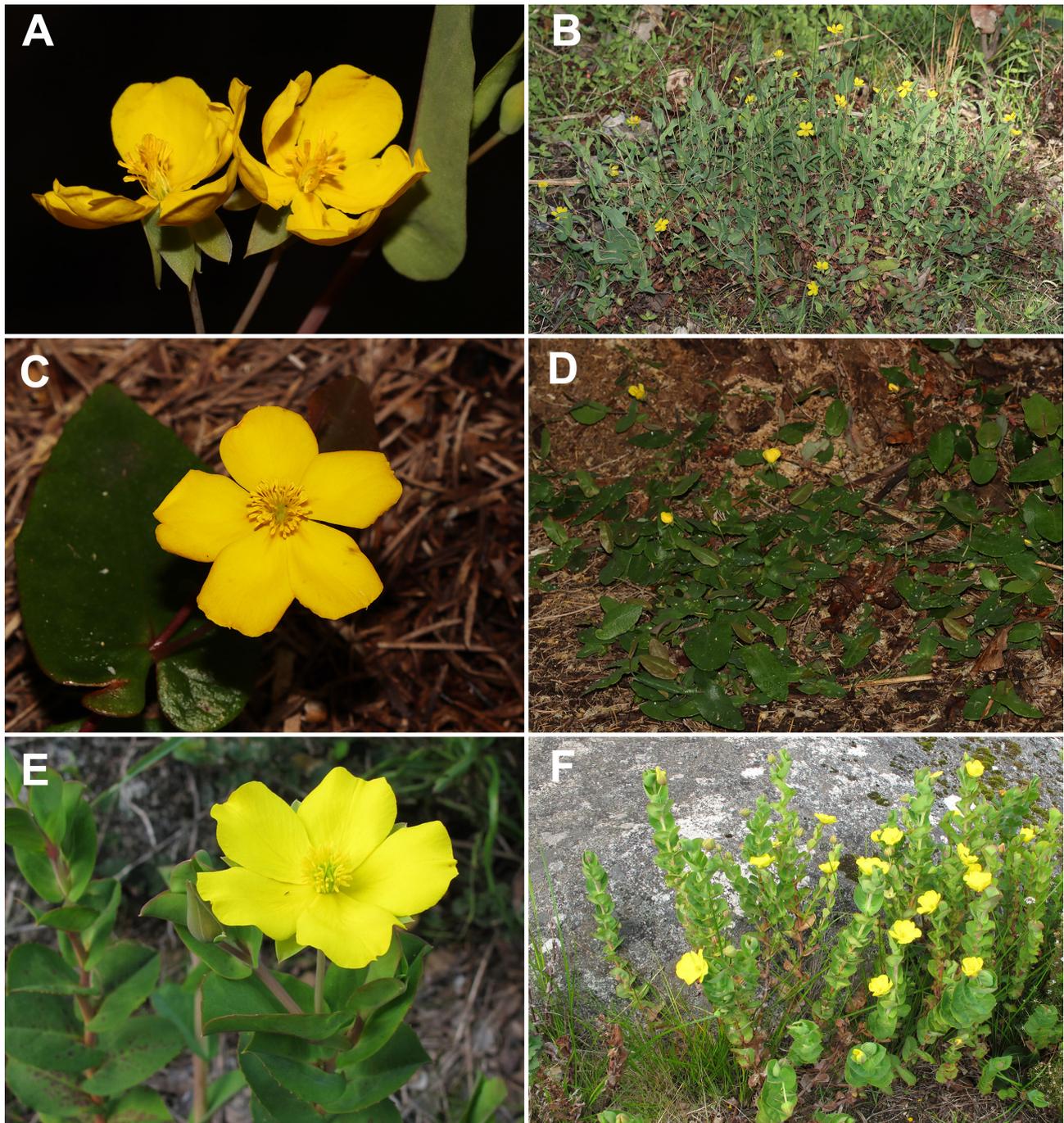
**Isolectotypes:** MEL666576 image!, MEL666577 image!, MEL666579 image!).

Procumbent to decumbent, rather weak-stemmed, softly herbaceous *subshrubs* (0.1–) 0.3–0.4 (–0.5) m high (sometimes scrambling amongst other shrubs and supported by them), the stems ± ridged and sometimes zigzagging. *Vestiture* absent. *Leaves* amplexicaul to rarely perfoliate, thin- and soft-textured, ovate to lanceolate or elliptic, (10–) 20–30 (–40) mm long, 5–10 (–14) mm wide, folded longitudinally when young; base auriculate; margin entire; adaxial surface usually with a narrow, shallow groove along the midrib, the secondary veins not visible; abaxial surface with a raised midrib, the secondary veins not visible; apex obtuse or rarely broadly acute, shortly apiculate, ± straight or slightly deflexed. *Flowers* single, leaf-opposed on slender pedicels (15–) 20–50 (–65) mm long, which become ± pendulous in fruit. *Bract* subtending the calyx, narrowly oblong to narrowly ovate, 2.5–3.5 (–4) mm long, the midrib ± prominent; margin entire; apex acute. *Sepals* 4–7 mm long; outer sepals ovate, acute and minutely apiculate; inner sepals oblong, obtuse and minutely apiculate. *Petals* 5, yellow, obovate, (5–) 7–11 mm long, emarginate. *Stamens* 15–40, arranged in a ring around the gynoeceum with the ovaries clearly visible between the filaments; filaments free, unequal, 1–2 mm long, tightly appressed to the ovaries (but not obscuring them) and meeting together above them and then spreading in a fountain from the centre of the flower; anthers narrowly oblong-elliptic, 0.5–1 mm long, dehiscing by marginal, longitudinal slits; few outermost stamens reduced to staminodes or staminodes absent. *Carpels* 3; ovaries ovoid; styles ascending and protruding through the ring of stamens, 1–1.5 mm long. *Ovules* 2 per carpel. *Seeds* orange-brown, shiny, almost globular, 1.8–2 mm long, 1.5–1.6 mm wide; aril small, scarious, white-translucent. **Fig. 3A, B.**

**Diagnostic features.** Plants of *Hibbertia nymphaea* are rather weak-stemmed, softly herbaceous shrubs with leaves ovate to lanceolate or elliptic and amplexicaul (rarely perfoliate), sepals 4–7 mm long, petals bright yellow, and stamens 15–40 arranged around 3 carpels, which are visible between the stamens and from above.

**Phenology.** Flowers September to December, with a peak in November, sometimes extending to February when conditions are suitable.

**Distribution and habitat.** *Hibbertia nymphaea* occurs mostly east of Perth, with scattered occurrences southeast of Collie, south of Bridgetown and west of Denmark (Fig. 2B). It is found in the Jarrah Forest, Swan Coastal Plain and Warren IBRA regions (Department of Agriculture, Water and the Environment 2024–). It grows in shrublands and woodlands, especially with *Eucalyptus rudis*, *E. patens* and *Melaleuca* spp., on riverbanks and in swampy drainage areas in seasonally wet sandy or loamy soils.



**Fig. 3.** Flowers (left) and habits (right) of *Hibbertia nymphaea* (A, B), *H. perfoliata* (C, D) and *H. porongurupensis* (E, F). Photos: R. Davis (A–D) and P. Maurice (E, F).

**Conservation status.** Not conservation-listed.

**Notes.** *Hibbertia nymphaea* has a stamen arrangement which is similar to *H. amplexicaulis*, with the staminal filaments appressed to the carpels and the anthers spreading from above the centre of the flower like a fountain (Fig. 3A). Unlike *H. amplexicaulis*, the ovaries in *H. nymphaea* are visible between the stamens. *Hibbertia nymphaea* can be additionally differentiated from *H. amplexicaulis* by its more diminutive habit, having fewer stamens [15–40 vs. (50–) 60–100], 3 carpels (vs. 5) and occupying seasonally wet habitats (vs. dry habitats).

**Typification.** There are only two known specimens of *L. Diels* 2570, both of which reside at PERTH. The original specimen in Diels' herbarium at B is presumed lost when this herbarium was destroyed in World War II (Hiepko 1987). The specimens at PERTH are duplicates of the original material that were gifted by Diels to C.A. Gardner (Government Botanist of Western Australia) when he visited Berlin in 1937 (Underwood 2011).

*Hibbertia nymphaea* is lectotypified here on the specimen PERTH04430646, which bears a label indicating that it originated from B, and the specimen consists of three small flowering branches. The isolectotype

(PERTH04430638) consists of several stems without flowers that are bundles and noticeably pruned at the apex. It is likely the flowering stems presented on the lectotype are pruned from the apex of the stems on the isolectotype. The isolectotype has a determination label that is presumably in L. Diels' own hand.

*Hibbertia cunninghamii* var. *debilis* F.Muell. is lectotyped here on the specimen MEL666578, which consists of five flowering stems with leaves and bears a label written in the hand of F. von Mueller.

### **Selected specimens examined.**

WESTERN AUSTRALIA. 3.15 km W along Wagelup Rd from intersection with Carter Rd, 18 Feb. 1997, *C. Day & T. Annels MJ 11.3* (PERTH); Denmark Shire, Quarrum Nat. Res., N of boundary 0.5 km W from the end of Plozza Rd, 18 Nov. 2002, *B.G. Hammersley 3225* (PERTH); Christmas Tree Well, Brookton Hwy, Beverley, 26 Sep. 2005, *F. Hort & J. Hort 2626* (PERTH); Ashendon State Forest, Armadale, 27 Nov. 2009, *F. Hort 3545* (PERTH); Helena River, York, 26 Oct. 2013, *F. Hort & J. Hort 3824* (PERTH); near Mundaring Weir, 7 Nov. 1974, *R.D. Hoogland & G.L. Stebbins 12471* (CANB, PERTH); Helena River, near Midland Junction, 21 Dec. 1907, *A. Morrison s.n.* (CANB223262, PERTH03038106); Canning River near crossing of Ashendon Rd, 4 Dec. 1974, *A.E. Orchard 4285* (CANB, PERTH); Helena Valley, 16 Oct. 1977, *J. Seabrook 353* (CANB); Christmas Tree Well on Brookton Hwy, 26 Oct. 2014, *K.R. Thiele 5138* (PERTH).

### ***Hibbertia perfoliata* Hügel ex Endl.**

*Enum. Pl.* 3 (1837). — **Type citation:** “*In paludosis ad Swan-River.* (Hügel)”. **Holotype:** Western Australia, In paludosis ad Swan River, *s.dat.*, *C.A.A. von Hügel s.n.* (W0046812 image!).

Prostrate or procumbent *shrubs* (0.1–) 0.3–0.4 (–0.5) m high, the stems  $\pm$  ridged and rarely zigzagging. *Vestiture* absent. *Leaves* perfoliate to slightly amplexicaul, thin-textured, broadly ovate to elliptic, (25–) 30–60 (–90) mm long, 15–35 (–50) mm wide, folded longitudinally when young; base rounded to emarginate; margin with distinct denticulations, sometimes slightly recurved and crenulate; adaxial surface with or without a shallow crease along the midrib, the secondary veins faintly visible; abaxial surface with the midrib very slightly raised or  $\pm$  flush with the lamina, the secondary veins faintly visible or rarely not visible; apex obtuse, shortly apiculate,  $\pm$  straight or slightly deflexed. *Flowers* single, leaf-opposed on slender pedicels 25–45 mm long, which become  $\pm$  pendulous in fruit. *Bract* subtending the calyx, narrowly oblong to narrowly ovate, 4–5 mm long, the midrib  $\pm$  prominent; margin entire; apex acuminate. *Sepals* (4–) 6–12 mm long; outer sepals ovate, acute and minutely apiculate; inner sepals oblong, obtuse and minutely apiculate. *Petals* 5, yellow, obovate, 8–12 mm long, emarginate. *Stamens* 40–60, arranged in a ring around and not obscuring the carpels; filaments free, unequal, 2–4 mm long, loosely arranged; anthers narrowly

oblong-elliptic, 0.5–1 mm long, dehiscing by marginal, longitudinal slits; several to many outermost stamens often reduced to staminodes. *Carpels* (4) 5; ovaries ovoid; styles ascending and protruding through the ring of stamens, 1–1.5 mm long. *Ovules* 3 or 4 per carpel. *Seeds* not seen. **Fig. 3C, D.**

**Diagnostic features.** *Hibbertia perfoliata* is characterised by being prostrate or procumbent and having leaves broadly ovate to elliptic and perfoliate (occasionally amplexicaul), with minute marginal teeth, petals bright yellow, and stamens 40–60 arranged around (4) 5 carpels, which are visible between the stamens and from above.

**Phenology.** Flowers sporadically throughout the year, with a peak in October to December.

**Distribution and habitat.** *Hibbertia perfoliata* occurs around Perth, from Wanneroo to south of Dwellingup, and from Dunsborough to Albany (Fig. 2B). It can be found in the Jarrah Forest, Swan Coastal Plain and Warren IBRA regions (Department of Agriculture, Water and the Environment 2024–). It typically occurs in shrublands and woodlands in or near winter-wet drainage lines and wetlands, on brown loams or humus-rich sands. Plants may be submerged during winter. This is a very unusual habitat for *Hibbertia*.

**Conservation status.** Not conservation-listed.

**Notes.** The name *Hibbertia perfoliata* has been assigned in the past to many specimens with clearly perfoliate leaves, with other diagnostic characters largely ignored. While its leaves are perfoliate, other taxa (e.g. *H. amplexicaulis* and *H. cunninghamii*) may sometimes be so too, especially on young plants or strongly growing shoots. Across its range, leaves of *Hibbertia perfoliata* are consistent in being broadly ovate to elliptic with distinct denticulations on the margin all around the leaf. *Hibbertia amplexicaulis* lacks denticulations, while some denticulations occasionally occur in *H. cunninghamii*, but are usually restricted to the leaf bases and do not occur all around the margin in regular pattern. Notches may be visible on the leaf margin of all these species due to an irregularly recurved margin. When in flower, *H. perfoliata* can be distinguished from *H. amplexicaulis* by having carpels that are readily visible between the loosely arranged stamens. Additionally, *H. amplexicaulis* and *H. cunninghamii* are more erect plants of drier sites, rather than usually prostrate plants of winter-wet areas.

### **Selected specimens examined.**

WESTERN AUSTRALIA. Southern slope of Mt Roe, c. 70 km SE of Manjimup, 7 Nov. 1995, *A.R. Annels & R.W. Hearn ARA 5539* (PERTH); near the top of Bennett Brooke, Whiteman Park, 28 Nov. 2008, *B. Arthur & S. Turner 423* (PERTH); Nornalup, between Walpole and Denmark, E of Albany, Dec. 1929, *W.E. Blackall s.n.* (PERTH03092240); Yallingup, 32 km E of Busselton, Dec. 1930, *W.E. Blackall s.n.* (PERTH03092070); sandy track, D'Entrecasteaux N.P., 23

Dec. 2002, R.J. Cranfield & L. Sage RJC 18737 (PERTH); 2 km from intersection of Lewis Rd and Richardson Rd, 4 Feb. 1997, C. Day & D. Bright P 42.2 (PERTH); Donnelly River, c. 4.5 miles [7.2 km] S of Nannup-Pemberton Rd, 5 Mar. 1960, A.S. George 640 (PERTH); Deep River, Dec. 1912, S.W. Jackson s.n. (PERTH03092127); Neaves Rd, Wanneroo, 4 Feb. 1997, Keighery 14569 (PERTH); West Cape Howe, W of Albany, 6 Mar. 1956, R.D. Royce 5404 (PERTH).

### *Hibbertia porongurupensis* J.R.Wheeler & Hoogland

*Nuytsia* 13(2): 395 (2000). — **Holotype:** Western Australia, At the base of Devil Slide, Porongurup Range, 32 Oct. 1971, R.D. Hoogland 12186 (PERTH1058649 image!). **Isotypes:** CANB232812.1, CANB232812.2, CANB232813.2, K?, L?.

Robust, erect or erect-spreading multi-stemmed shrubs 0.3–0.6 (–1.5) m high, the stems ± ridged and sometimes zigzagging. *Vestiture* absent. *Leaves* amplexicaul, broadly elliptic to circular or rarely obdeltoid, 15–55 mm long, 12–55 mm wide, folded longitudinally when young; base auriculate; margin with very small, shallow, distant teeth; adaxial surface with a narrow groove along the midrib, the secondary veins not or scarcely visible; abaxial surface with a raised midrib and usually visible secondary veins; apex rounded to truncate, the midrib usually excurrent as a short deflexed mucro. *Flowers* single, leaf-opposed on pedicels 15–35 mm long, which become ± pendulous in fruit. *Bract* subtending the calyx, narrowly oblong to oblong-elliptic, 7–10 mm long; adaxial surface with a groove along the midrib; abaxial surface with the midrib raised; margin entire; apex often folded and acuminate. *Sepals* 10–15 mm long; outer sepals ovate, acute; inner sepals oblong, obtuse and minutely apiculate. *Petals* 5, yellow, broadly obovate, 10–20 mm long, emarginate. *Stamens* 40–80, arranged in an interrupted ring around the carpels; filaments free, unequal, 2–4 mm long, loosely arranged; anthers narrowly oblong-elliptic, 1–1.5 mm long, dehiscing by marginal, longitudinal slits; several outermost stamens often reduced to staminodes. *Carpels* 5; ovaries ovoid; styles ascending and protruding through the ring of stamens, c. 2 mm long. *Ovules* 3–5 per carpel. *Seeds* orange-brown, shiny, almost globular, c. 3 mm long, c. 2 mm wide; aril small, scarious, white-translucent. **Fig. 3E, F.**

**Diagnostic features.** *Hibbertia porongurupensis* is a distinctive species, characterised by leaves that are broadly elliptic to circular (rarely obdeltoid) and amplexicaul, with minute marginal teeth, petals bright yellow, and stamens 40–80 arranged around 5 carpels, which are visible between the stamens and from above.

**Phenology.** Flowers August to January, with a peak in October.

**Distribution and habitat.** *Hibbertia porongurupensis* is restricted to the Porongurup Range in the Jarrah Forest IBRA region (Department of Agriculture, Water and the Environment 2024–) (Fig. 2B). It occurs in mixed

shrublands on granite slopes and in brown loam or mossy patches in crevices between granite rocks.

**Conservation status.** Listed as Priority Four under the Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–).

**Notes.** *Hibbertia porongurupensis* is quite distinct for its very broad (becoming nearly circular) leaves, which can be readily distinguished from the southern narrow-leaved form of *H. cunninghamii*, the only other species in the group known from the Porongurup Range.

**Typification.** The catalogue number specified in the protologue was erroneously cited as “PERTH 1058185”, which corresponds to the specimen G.J. Keighery 8415. The specified holotype in the protologue (i.e. R.D. Hoogland 12186) has the catalogue number PERTH1058649. This error is corrected here.

### *Selected specimens examined.*

WESTERN AUSTRALIA [localities withheld for conservation reasons]. Porongurup Range area: 27 Oct. 1994, S. Barrett 308 (PERTH); 4 Jan. 2004, J.A. Cochrane & T. Friend JAC 4870 (PERTH); 20 Oct. 1984, E.J. Croxford 4031 (PERTH); 10 August 1964, A.S. George 6380 (PERTH); 21 Oct. 1991, W. Greuter 23058 (PERTH); 23 Oct. 1971, R.D. Hoogland 12187 (CANB, PERTH; K, L, n.v.); 7 Oct. 1987, S.D. Hopper 6208 (PERTH); 15 Dec. 1987, G.J. Keighery 8415 (PERTH); 27 July 1992, C.J. Robinson 863 (PERTH); 23 Sep. 1999, J.R. Wheeler 3969 (PERTH).

## Names of uncertain application

### *Hibbertia bupleurifolia* Lehm.

*Neue Allg. Deutsche Garten- Blumenzeitung* 7: 322 (1851). — **Type citation:** “Habitat in Nova Hollandia austro-occidentali”. **Type:** unknown.

### *Hibbertia disticha* Lehm.

*Neue Allg. Deutsche Garten- Blumenzeitung* 7: 323 (1851). — **Type citation:** “Habitat in Nova Hollandia austro-occidentali”. **Type:** unknown.

*Hibbertia bupleurifolia* Lehm. and *H. disticha* Lehm. were described by Lehmann (1851) as originating from south-western Australia, the old botanical garden in Hamburg, Germany (Alter Botanischer Garten Hamburg) having received them from English commercial gardens (“aus englischen Handelsgärten”; p. 324) under the name *H. perfoliata*. The type specimens, if any were preserved, were not found in a search of HBG by the herbarium curator, and we have been unable to locate them from other online herbarium databases. From the descriptions, these names obviously refer to one or more species of the *H. cunninghamii* group, based on being glabrous plants with amplexicaul or perfoliate leaves with numerous stamens around the carpels. The descriptions are consistent with the variable and widespread *H. cunninghamii*, yet we

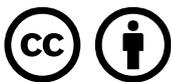
cannot rule out their application to another species in the group (e.g. *H. amplexicaulis* or *H. perfoliata*) due to the descriptions lacking sufficient detail.

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