



Four new small-flowered species of Western Australian *Hibbertia* (Dilleniaceae)

K.R. Thiele¹ & T.A. Hammer^{2,3}

¹ School of Biological Sciences, University of Western Australia, 35 Stirling Hwy, Crawley WA 6009

² Botanic Gardens and State Herbarium of South Australia, Hackney Road, Adelaide, South Australia 5005

³ School of Biological Sciences, The University of Adelaide, North Terrace, Adelaide, South Australia 5000

Corresponding author: kevin.thiele@science.org.au

K.R. Thiele  <https://orcid.org/0000-0002-6658-6636>; T.A. Hammer  <https://orcid.org/0000-0003-3816-7933>



© Copyright of this paper is retained by its authors, who, unless otherwise indicated, license its content under a CC BY 4.0 license

Abstract

Herbarium and field assessments of the Western Australian *Hibbertia diamesogenos* (Steud.) J.R.Wheeler (Dilleniaceae) have shown that it comprises three distinct, sympatric species, two of which, *H. parvula* K.R.Thiele and *H. xenandra* K.R.Thiele, are described here as new. The segregation of *H. parvula* and *H. xenandra* from *H. diamesogenos* resolves the morphology of the latter, which is now substantially less variable than previously believed. It is likely that the three species are not closely related. Two further new species, *H. micrantha* K.R.Thiele & T.Hammer and *H. humilis* K.R.Thiele, are also described as new here, both segregated from material previously determined as *H. avonensis* J.R.Wheeler. All these species are characterised by very small flowers. A new description is also provided for *H. diamesogenos*, which is recircumscribed to exclude *H. parvula* and *H. xenandra*.

Cite this paper as: Thiele KR & Hammer TA (2024). Four new small-flowered species of Western Australian *Hibbertia* (Dilleniaceae). *Australian Journal of Taxonomy* 53: 1–12. doi: <https://doi.org/10.54102/ajt.ojb72>

Introduction

Pleurandra diamesogenos Steud. was described by Steudel (1845) based on *Preiss* 2141, collected near Busseton in south-west Western Australia. The specific epithet is from the Greek *dia-* (across), *meso-* (middle) and *genos* (a kind, in the sense of genus; Sharr & George 2019), indicating Steudel's uncertainty as to whether the species should be placed in *Pleurandra* Labill. or *Hibbertia* Andrews, which at that time were recognised as separate genera following De Candolle (1817), Meisner (1837) and Endlicher (1839). Bentham (1863) subsequently treated *Pleurandra* as a section of *Hibbertia*, but

placed Steudel's *P. diamesogenos*, as a variety (var. *parviflora* Benth.) of *Hibbertia lineata* Steud., in his sect. *Hemipleurandra* Benth. rather than in sect. *Pleurandra* (Labill.) Benth.

Neither of these names (*Pleurandra diamesogenos* or *Hibbertia lineata* var. *parviflora*) were taken up in Western Australia, with the later name *Hibbertia rhadinopoda* F.Muell. being used instead for the species by Green (1985), Wheeler (1987) and Paczkowska & Chapman (2000). Wheeler (2004) recognised that the earlier name has priority and made the combination *Hibbertia diamesogenos* (Steud.) J.R.Wheeler. She described *H. diame-*

This paper was submitted on 31 October 2023 and published on 7 March 2024 (2024-03-06T21:19:04.688Z). It was reviewed by Tony Bean and Frank Zich, and edited by Tom May. Kevin Thiele and Tim Hammer are Editors of the Australian Journal of Taxonomy. They did not at any stage have access to the manuscript while in peer review, and had no influence on its acceptance or handling, as is standard practice for manuscripts submitted by editors. Australian Journal of Taxonomy. ISSN: 2653-4649 (Online).

sogenos as variable in habit, leaf and flower size, indumentum, and in the presence or absence of staminodes. The latter is surprising, as staminodes have long been regarded as important characters in *Hibbertia*; indeed, it was the presence of staminodes on the type that led Bentham (1863) to place the species in his sect. *Hemipleurandra* (which has staminodes) rather than sect. *Pleurandra* (which does not).

Examination of all material of *H. diamesogenos* at PERTH and in the field in spring 2020 indicated that the species as currently recognised comprised two distinct and broadly sympatric species (one of which matches the type and the other of which is segregated here as *H. parvula* K.R.Thiele), each of which was morphologically relatively consistent throughout its range. The recognition of these two species explains the unusual degree of variability of *H. diamesogenos* as circumscribed by Wheeler (2004), with each species now substantially more morphologically consistent than was *H. diamesogenos sens. lat.*

While there are two heterotypic synonyms of *H. diamesogenos* (*H. rhadinopoda* and *H. kochii* Maiden & E.Betche), both are good matches for its type and are retained as synonyms of that species.

Subsequent to the segregation of *H. parvula*, further significant variation within its initial circumscription became apparent when our colleagues Fred & Jean Hort provided photographs of plants from the Darling Range east of Perth, which showed that the species as originally segregated from herbarium specimens had significant and striking variation in androecium and gynoecium morphology, readily observed in their fresh flowers. Plants from the southern part of the range (of *H. parvula* as initially segregated) have stamens closely parallel and curved over the carpels like a hand of bananas, with the styles short and curving forwards beneath them. However, a photograph of a plant from the northern part of the range showed a flower with much longer stamens, filaments that are free to the base, anthers that are erect and divergent and form an open cluster on one side of the flower, and styles that are long and curve upwards from the carpels on one side of the stamen group. Such differences are highly significant in *Hibbertia*.

Before seeing the photographs, we had not recognised the striking difference in androecium and gynoecium morphology when examining herbarium material of the '*H. parvula*' segregate because it is not readily assessed on dried material. However, closer examination showed that separation between the two morphologies is straightforward if style and stamen lengths are measured: the species with 'hand-of-banana' stamens has distinctly shorter stamens, anthers and styles than the species with divergent, erect stamens. This closer examination also showed that the latter species comprises the northern part of the range of the '*H. parvula*' seg-

regate, between approx. York and Bindoon. With this clarification, *Hibbertia parvula* is here restricted to the widespread southern species with 'hand-of-banana' stamens, while the northern species with an open, erect androecium is described as *H. xenandra* K.R.Thiele.

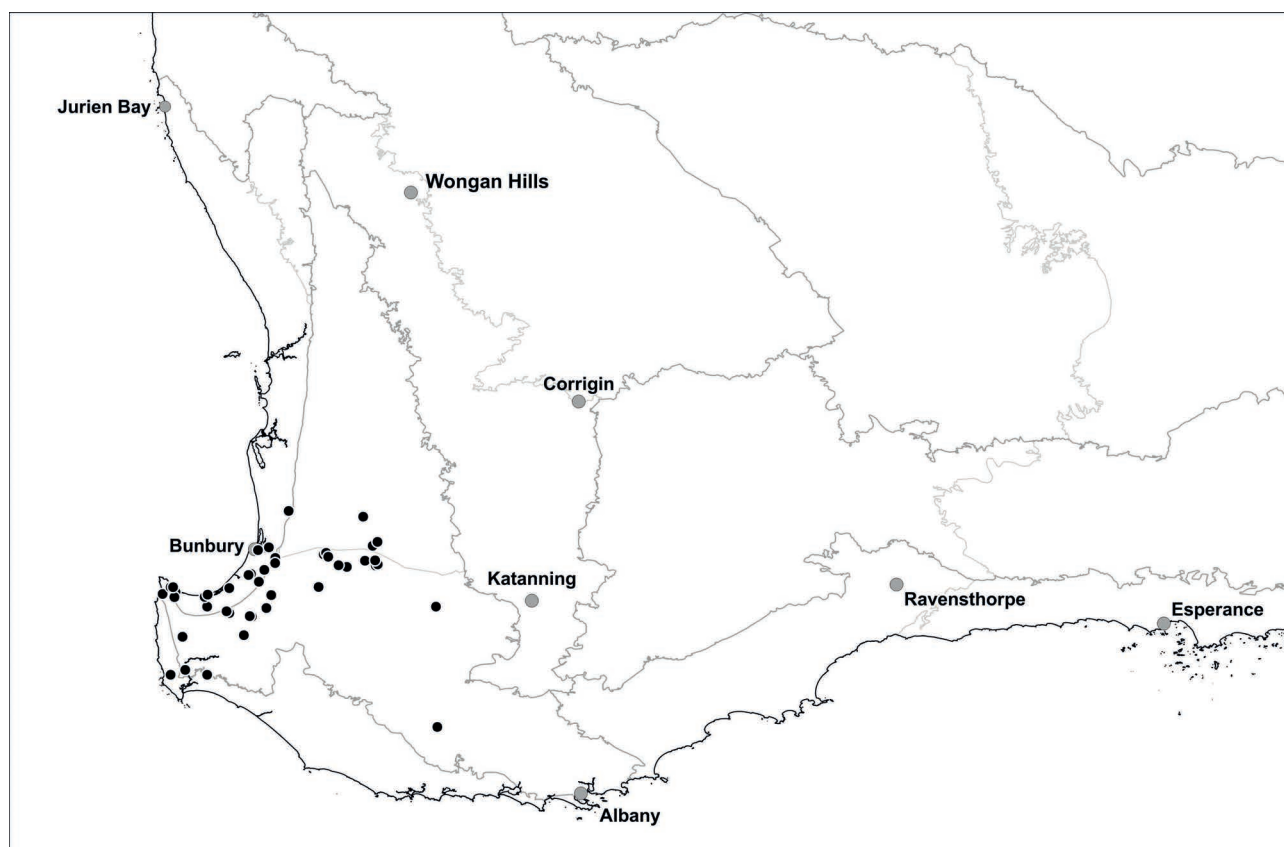
In this paper we also describe two new species segregated from *Hibbertia avonensis* J.R.Wheeler. As circumscribed (Wheeler 2002), *H. avonensis* is reasonably widespread in the Avon Wheatbelt IBRA bioregion in Western Australia (hence the name). It is an erect shrub to 0.6 m, with narrow, ericoid leaves with the margins recurved tightly to the abaxial midrib so that the abaxial lamina is hidden within lacunae formed between the margins and the midrib. The indumentum of the true abaxial leaf lamina is a taxonomically very significant character. In describing the leaves of *H. avonensis* Wheeler noted 'the margin of the midrib apparently papillose' but did not describe the abaxial leaf indumentum further. Close examination shows that, in all but one of the specimens at PERTH determined as this species by Wheeler, the true abaxial leaf lamina is densely pubescent with fine, straight, white hairs; these are quite distinct from, and do not appear to grade into, the marginal papillae described by Wheeler, which are the only abaxial leaf surface feature usually visible without dissection. *Hibbertia avonensis* also has a distinctive, broadly ovate primary bract immediately beneath the calyx, with 1–3 secondary bracts at the base of the pedicel that are similar in size and shape to the primary bract.

Subsequent to Wheeler's description of *H. avonensis*, two specimens collected near Wandering in the Jarrah Forest IBRA bioregion were determined as that species in PERTH, largely because they have similar floral bracts. These, however, are low, almost prostrate shrubs, and dissection shows that their leaves lack pubescence on the abaxial surface, being instead sparsely papillate. They also consistently have 3–6 stamens, rather than the 10(15) stamens described for *H. avonensis*. The Wandering specimens are described here as the new species *H. micrantha* K.R.Thiele & T.Hammer. Likewise, a small group of specimens from west and south-west of Kataning included in *H. avonensis* at PERTH (one of which was determined in that species by Wheeler) are similar in overall morphology to *H. micrantha* and differ from *H. avonensis* in lacking pubescence on the abaxial leaf lamina. They differ from *H. micrantha* in having ten stamens, and are described here as *H. humilis* K.R.Thiele.

Taxonomy

Hibbertia diamesogenos (Steud.) J.R.Wheeler, *Nuytsia* 15(2): 327 (2004).

Pleurandra diamesogenos Steud., *Pl. Preiss.* 1: 265 (1845). – *Hibbertia lineata* var. *parviflora* Benth., *Fl. Austral.* 1: 24 (1863),



Map 1. Distribution of *Hibbertia diamesogenos* in southwestern Western Australia.

based on *P. diamesogenos*. Type: "In turfosis sylvaticis districtus Sussex [Busselton area, Western Australia], 17. Dec. 1839. Herb. Preiss No. 2141" (*syn*: D 1017012 image!, MEL 666864!, MEL 666877!; S 08-20094).

Hibbertia rhadinopoda F. Muell., *Fragm. Phyt. Austral.* 11: 91 (1880). Type: Harvey's [Harvey] River, Western Australia, F. Mueller (*syn*: K 700348, MEL 1010265!, MEL 1010266!).

Hibbertia kochii Maiden & Betche, *Proc. Linn. Soc. New South Wales* 38: 243 (1913). Type: "Lowden, Western Australia (Max Koch; October, 1909)" (*syn*: HBG 507145 image!, MIN 1001330 image!, NSW 155195!, P 682352 image!, K 700347 image!).

Rounded to spreading, often compact (sometimes +/- prostrate) *shrubs* to 0.3(–0.4) m high, single- to several-stemmed at base; branchlets glabrous to sparsely hairy with spreading, simple hairs. *Leaves* spreading, scattered, linear to narrowly ovate or elliptic, (5–)12–20(–25) mm long, (0.6–)1–1.5(–2.2) mm wide, the margins narrowly to strongly recurved to a narrow midrib, the undersurface usually not completely obscured or if so then due to the leaves curling when drying; adaxial surface smooth to obscurely tuberculate, the tubercles sometimes prominently pale and glistening on dried leaves, sparsely pilose at least when young with spreading simple (rarely hooked) hairs that are not usually prominently tuberculate at base, glabrescent, rarely almost entirely glabrous; abaxial surface glabrous or the midrib with indumentum as for the adaxial surface; apex usually subacute, thickened and deflexed, usually with a few small hairs or papillae, rarely obtuse. *Flowers*

in axillary 1(2)-flowered pseudo-cincinnae, when single appearing simply pedicellate; pedicels (15–)25–40(–60) mm long, with indumentum as for the young stems; primary bract immediately below the calyx (when inflorescence single-flowered) or none subtending the lowermost flower and two subtending the uppermost flower (when two-flowered), herbaceous (like a reduced leaf), usually with a distinct midrib and recurved margins, narrowly triangular to narrowly ovate, acute, 3–5(–7) mm long, with indumentum as for the leaves; secondary bracts absent. *Sepals* ovate, 6–7.5 mm long, sparsely to moderately pubescent to pilose with simple, straight or hooked hairs, rarely almost glabrous; midribs prominent; outer sepals acute; inner sepals similar in size and apex shape to the outer but thinner and with an indumentum of minute stellate hairs. *Petals* 5, yellow, broadly obovate, 8–12 mm long, deeply emarginate. *Stamens* 10, all on one side of the gynoecium and curved over it like a hand of bananas; filaments 0.6–0.8 mm long, fused for most of their length into a robust claw; anthers curved-rectangular, 1.8–2.0 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* 2 or 3 either side of the stamens (occasionally with a few more opposite the stamens). *Carpels* 2; ovaries globular, densely pubescent; styles curved forwards beneath the stamens and parallel, 1–1.2 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen. Fig. 1.

Specimens examined (All PERTH): Augusta (3093360, 3093042), Boyanup (3093301), Bunbury (5350263), Bus-



Figure 1. *Hibbertia diamesogenos*. Photos: Rob Davis.

selton (7426453), Capel (7131631), Collie (4087003), Dardanup (3093026), Dunsborough (6611109), Elgin (3093166), Harvey (3093107), Hiker Block (8932107), Karridale (3093328), Kojonup (6094945), Minningup Pool (3093379), Picton Junction (3093123), Sabina (4703448), Waterloo (6418023).

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrences/search?q=qid:1695297456768#tab_mapView

Diagnostic features. May be distinguished from all other Western Australian species of *Hibbertia* by the combination of leaves and young stems with simple hairs only, leaves ericoid and glabrous beneath except on the midrib, pedicels usually >25 mm long, primary bracts with a distinct midrib and recurved margins, and stamens on one side of two pubescent carpels, with lateral staminodes.

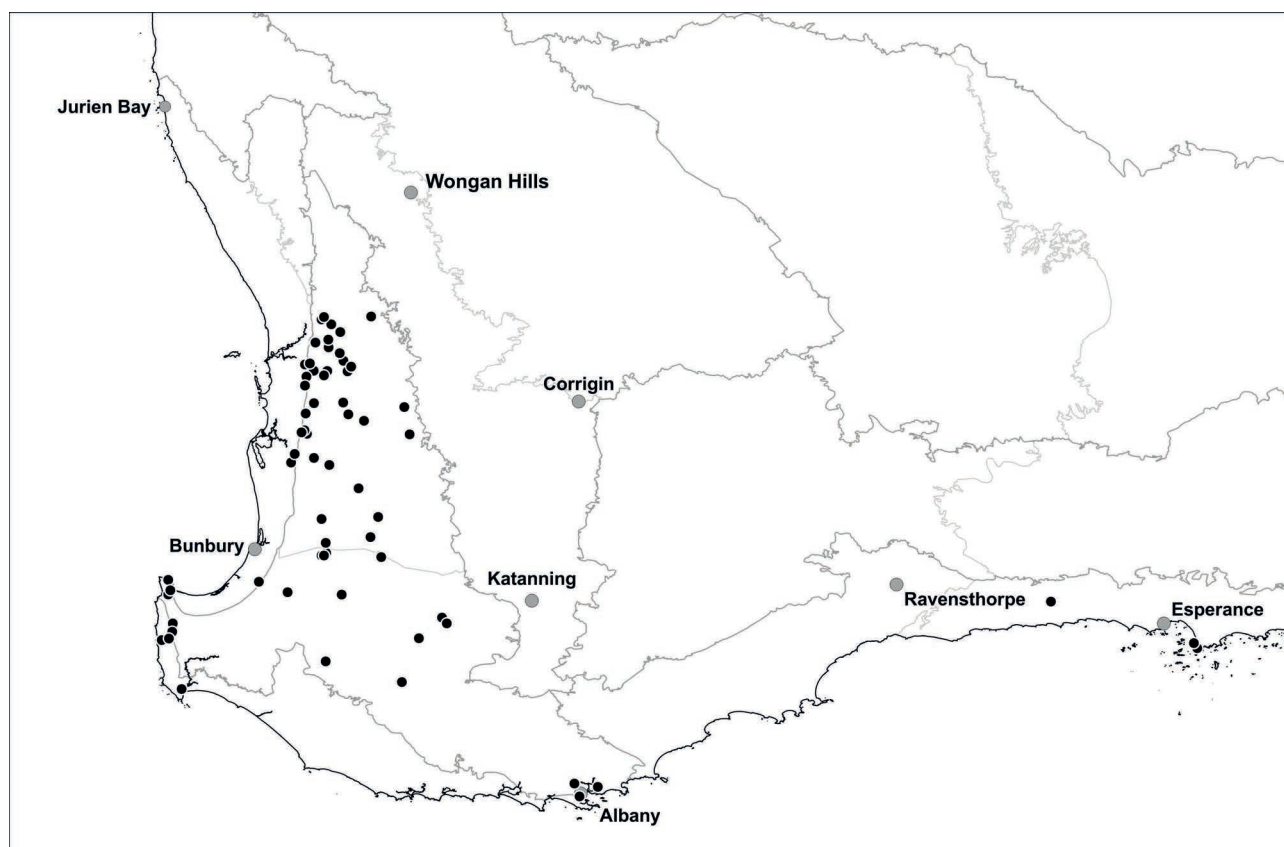
Phenology. Flowers from September to January with a peak in early November.

Distribution & habitat. Occurs in southwest Western Australia, from the vicinity of Millendon south to near Nogerup and Augusta, with a disjunct record c. 50 km N of Walpole (Map 1). Occurs in jarrah-marri forest over laterite or granite.

Conservation status. *Hibbertia diamesogenos* is widespread including in a number of national parks and nature reserves, and is not considered to be under threat.

Typification: Wheeler (2004) designated as 'holotype' specimens of *H. diamesogenos* from LD, *H. rhadinopoda* from MEL and *H. kochii* from NSW, with other duplicates as 'isotypes'. However, under Art. 9.5 of the International Code of Nomenclature for algae, fungi and plants (Turland *et al.* 2018) these are all syntypes, since in all cases the original authors cited only a gathering and did not specify a herbarium. Before 1 January 2001 Wheeler's action would have resulted in an inadvertent lectotypification (see Arts. 7.10, 9.22 & 9.23), but after that date it is simply an error to be corrected. I choose not to lectotypify the names here because doing so would bring little benefit and I prefer to leave lectotypification open to future authors if nomenclatural or taxonomic problems arise that can be solved by lectotypifying.

Notes. The pedicels of *H. diamesogenos* are usually distinctively long. While most pedicels are single-flowered, it is not unusual to find 2-flowered pedicels, the two flowers very close together at the apex. Multi-flowered (pseudo-cincinnate) inflorescences are also characteristic of the *H. polystachya*–*H. spicata* species group. Inflorescences of *H. diamesogenos* are best described as 1(2)-flowered pseudo-cinnate. Thiele (2019), in a revision of the *H. polystachya*–*H. spicata* species group, noted an unusual specimen (J. Liddelow 228, PERTH 8932107), which was placed in *H. polystachya* but had leaves that were abaxially glabrous rather than densely stellate-hairy. The specimen, which has 2-flowered cinnate, can now be confidently placed in *H. diamesogenos*. While this unusual inflorescence could indicate a relationship between *H. diamesogenos* and the *H. poly-*



Map 2. Distribution of *Hibbertia parvula* in south-west Western Australia.

stachya-spicata species group, a detailed understanding of relationships within *Hibbertia* awaits the development of a comprehensive phylogeny.

Hibbertia parvula* K.R.Thiele, *sp. nov.

Type: Brookton Highway 3.9 km E of Karragullen, 25 Oct. 2020, K.R.Thiele 5667 (*holo*: PERTH 9262040; *iso*: AD, CANB, K, MEL).

Prostrate, mat-forming, decumbent, spreading or cushion-like *shrubs* to 0.2(–0.3) m high and spreading to 0.6 m, single- to several-stemmed at base; branchlets with sparse to moderately dense, simple to sub-stellate, spreading hairs. *Leaves* spreading, scattered, linear or rectangular to narrowly ovate or elliptic, (4)–5–8(–10) mm long, 0.6–0.8 mm wide, the margins usually strongly recurved to a midrib that is usually sunken and rather weak, the undersurface usually not completely obscured or if so then due to the leaves curling when drying; adaxial surface prominently scattered-tuberculate, the tubercles often prominently pale and glistening on dried leaves, usually with simple, straight (very rarely hooked), or twinned or sub-stellate hairs that are forward-directed when short, more spreading when long and usually arising from the tubercles, the leaves rarely almost glabrous; abaxial surface glabrous, sometimes papillate along the midrib which is glabrous or has an indumentum as for the adaxial surface; apex usually subacute, thickened and deflexed with a small tuft of

hairs, rarely obtuse. *Flowers* pedicellate, axillary, the pedicels (4)–6–14(–25) mm long, with indumentum as for the young stems; primary bract immediately below the calyx, narrowly triangular, acute, 2.5–3.5 mm long, thin and herbaceous, with indumentum as for the leaves; secondary bracts absent. *Sepals* ovate, 2.5–4 mm long, sparsely pilose with tubercle-based hairs that are sometimes sub-stellate, the shorter ones usually hooked and sometimes retrorse, sometimes also with very short, forward-directed, sub-stellate hairs especially towards the margins and on the inner sepals; midribs clearly present but not prominent; outer sepals obtuse; inner sepals similar in size, apex shape and indumentum to the outer but broader and with thinner margins. *Petals* 5, yellow, narrowly obovate, 3.5–6 mm long, emarginate. *Stamens* 10(11), all on one side of the gynoecium and curved over it like a hand of bananas; filaments c. 0.5 mm long, shortly fused at the base; anthers curved-rectangular, 1.2–1.4 mm long, dehiscing by short, introrse, longitudinal slits near the apex. *Staminodes* absent. *Carpels* 2; ovaries compressed-globular, usually densely pubescent (rarely almost or quite glabrous); styles curving forward beneath the stamens, 0.9–1.3 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen. Fig. 2.

Specimens examined: (All PERTH): Armadale (3093174), Balgarup River (3106403), Beraking (3032019), Bowelling (4932315), Cape Le Grand (3093409), Dunsborough (3106527), Eagle Bay (5632870), Gidgegannup



Figure 2. *Hibbertia parvula*. Photos: Fred & Jean Hort.

(3106578), Helena Valley (3106586, 3106608), Kojonup (5307171), Mount Cooke (6263569), Mount Dale (5751608), Mundaring Weir (3106632), Noggerup (4824822), Roleystone (3106616), Wandering (8289271), York (6692699), Young River (3106519).

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrences/search?q=qid:1709028582117#tab_mapView.

Diagnostic features. May be distinguished from all other Western Australian *Hibbertia* species by the combination of short leaves (<10 mm long), small flowers with narrow petals that usually do not overlap at anthesis, stamens on one side of two carpels in a hand-of-banana arrangement, and the absence of staminodes.

Phenology. Flowers from September to November with a peak in mid-October.

Distribution & Habitat. Occurs in southwestern Western Australia in the Jarrah Forest IBRA region, from near Gidgegannup south to Bowelling and Augusta, with somewhat disjunct occurrences near Kojonup and around Albany and with widely disjunct collections from the Young River on the Ravensthorpe-Esperance Road and at Cape Arid (Map 2). Near Perth it is common on the Darling Range and Scarp but absent from the Swan Coastal Plain. Occurs in jarrah-marri and wandoo woodlands over laterite and granite.

Conservation status. *Hibbertia parvula* is widespread including in a number of national parks and nature reserves, and is not considered to be under threat.

Etymology. A diminutive of the Latin *parvus* (small), in reference to the small leaves and strikingly small flowers.

Notes. *Hibbertia parvula* has distinctively small flowers, which are matched in size among Western Australian *Hibbertia* only by the unrelated other species newly described in this paper, particularly *H. humilis* and *H. micrantha*. The petals in *H. parvula* are also strikingly narrow, often resulting in clear gaps between them at anthesis; more commonly in *Hibbertia* the petals are broadly obovate and overlap laterally at anthesis.

Hibbertia parvula is readily distinguished in the field from *H. diamesogenos*, with which it was formerly included, by its more prostrate or mat-forming habit, smaller leaves and flowers, shorter pedicels, and absence of staminodes.

Differences in leaf indumentum between *H. parvula* and *H. diamesogenos* are somewhat subtle to the casual observer, but are highly significant. Both can be described as sparsely pilose to glabrous. In *H. parvula* the hairs, when present, are reduced stellate hairs – they may be single but are often twinned or arise several together from a common tubercle-base (described here as sub-stellate). When short they are usually forward-directed from the tubercle; when long they are usually more spreading. In *H. diamesogenos*, by contrast, the hairs are always single and simple, and are more spreading, even when short. Leaf hairs in *H. diamesogenos* are also often (but by no means invariably) hooked, especially when relatively short, whereas *H. parvula* very rarely has a few hooked hairs on the leaves. The latter difference is surprising as *H. parvula* often has hooked hairs on the calyx. The significance of hooked hairs in *Hibbertia* is uncertain: in many species they are variably present, while in others they are invariably absent. The presence in *H. parvula* of hooked hairs on the calyces but absence from the leaves is noteworthy.

Several collections from near Collie, Capel and Cowaramup (e.g. *R.D. Royce* 7977, *R.D. Royce* 4897) have carpels that are glabrous or nearly so. While carpel indumentum is usually consistent within species in *Hibbertia*, it is occasionally somewhat variable. These specimens match *H. parvula* in all other respects, may be found growing with plants with pubescent carpels, and are considered here to belong in this species.

Despite being included, unrecognised, within *H. diamesogenos* for many years, *H. parvula* may not be closely related to it; its relationships are not clear, pending a phylogenetic analysis of the whole genus.

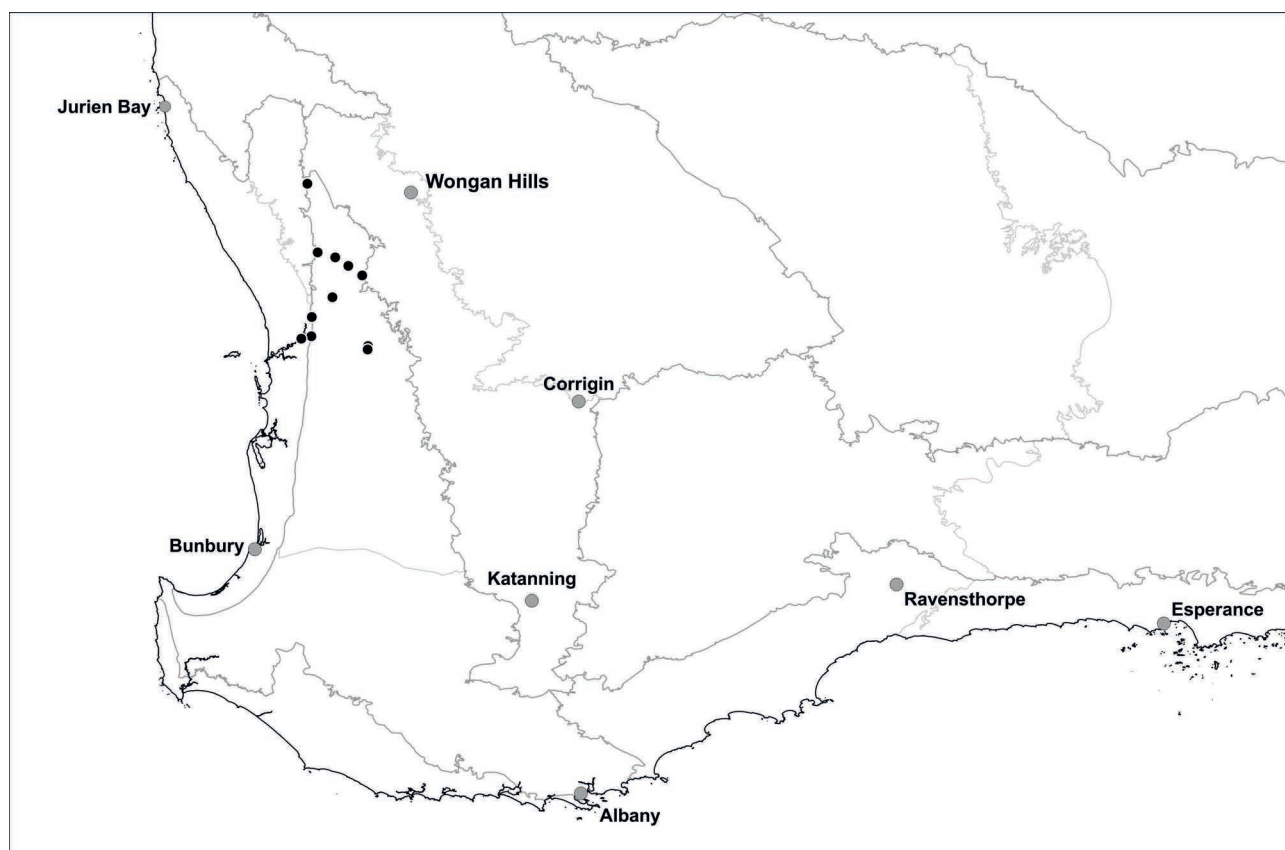
See *Notes* under *H. xenandra* and *H. micrantha* for differences with those species.

***Hibbertia xenandra* K.R.Thiele, sp. nov.**

Type: Poison Gully Nature Reserve, Toodyay, 9 Sept. 2015, *F. Hort* 3968 (*holo*: PERTH8839913; *iso*: AD, CANB, MEL).

Prostrate, mat-forming, decumbent, spreading or cushion-like *sub-shrubs* to 0.2(–0.3) m high, single- to several-stemmed at base; branchlets with sparse to moderately dense, simple to sub-stellate, spreading hairs. *Leaves* spreading, scattered, linear or rectangular to narrowly ovate or elliptic, (4–)5–8(–10) mm long, 0.6–0.8 mm wide, the margins strongly recurved but usually not quite meeting the midrib, which is usually sunken and rather

weak, the undersurface usually not completely obscured or if so then due to the leaves curling when drying; adaxial surface prominently scattered-tuberculate, the tubercles often prominently pale and glistening on dried leaves, with simple, straight, twinned or sub-stellate hairs that are forward-directed when short, more spreading when long and usually arising from the tubercles, the leaves rarely almost glabrous; abaxial surface glabrous, the midrib glabrous or with an indumentum as for the adaxial surface; apex usually subacute, thickened and deflexed with a small tuft of hairs, rarely obtuse. *Flowers* pedicellate, axillary, the pedicels (4–)6–14(–25) mm long, with indumentum as for the young stems; primary bract immediately below the calyx, narrowly triangular, acute, 2.5–3.5 mm long, thin and herbaceous, with indumentum as for the leaves; secondary bracts absent. *Sepals* narrowly to broadly ovate, 4–5.5 mm long, sparsely pubescent with tubercle-based, straight, simple or twinned to sub-stellate hairs; midribs not prominent; outer sepals acute; inner sepals broader and more obtuse than the outer, with thinner margins and fewer hairs. *Petals* 5, yellow, obovate, 6–8 mm long, emarginate. Stamens 10(11), all on one side of the gynoecium, erect and divergent; filaments 1.5–2.5 mm long, shortly fused at the base; anthers narrowly rectangular, 1.4–2 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* absent. *Carpels* 2; ovaries compressed-rectangular, densely pubescent; styles



Map 3. Distribution of *Hibbertia xenandra* in southwestern Western Australia.



Figure 3. *Hibbertia xenandra*. Note the diagnostic androecial arrangement, with erect stamens and divergent anthers. Photos: K.R. Thiele.

excentrically curved-erect, 2.1–3.1 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen. Fig. 3.

Specimens examined: (All PERTH): Avon Valley National Park (3093212); Between Moora and Mogumber (3093417); Near Bindoon (3106489, 3093255, 3106640); Guildford (3106500, 3097862); Millendon (3106357); Mount Billy (4708288); York (6692699).

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%3A1695292379239&qualityProfile=ALA#tab_mapView

Diagnostic features. May be distinguished from all other Western Australian species of *Hibbertia* by the combination of pedicellate flowers with stamens on one side of two pubescent carpels, with both stamens and styles being erect (rather than the stamens curving over the carpels like a hand of bananas), and divergent rather than \pm parallel.

Phenology. *Hibbertia xenandra* flowers from September to November, with a likely peak in late September.

Distribution & habitat. Occurs in the Jarrah Forest IBRA bioregion (and possibly immediately adjacent parts of the Swan Coastal Plain bioregion) from north of Mogumber to the vicinity of Mount Billy, west of York (Map 3), in shrublands and open wandoo woodlands often on moist sites such as river flats, around wetlands and adjacent to exposed granite, on clayey soils.

Conservation status. *Hibbertia xenandra* is relatively widespread including in a number of conservation reserves and is not considered to be under threat.

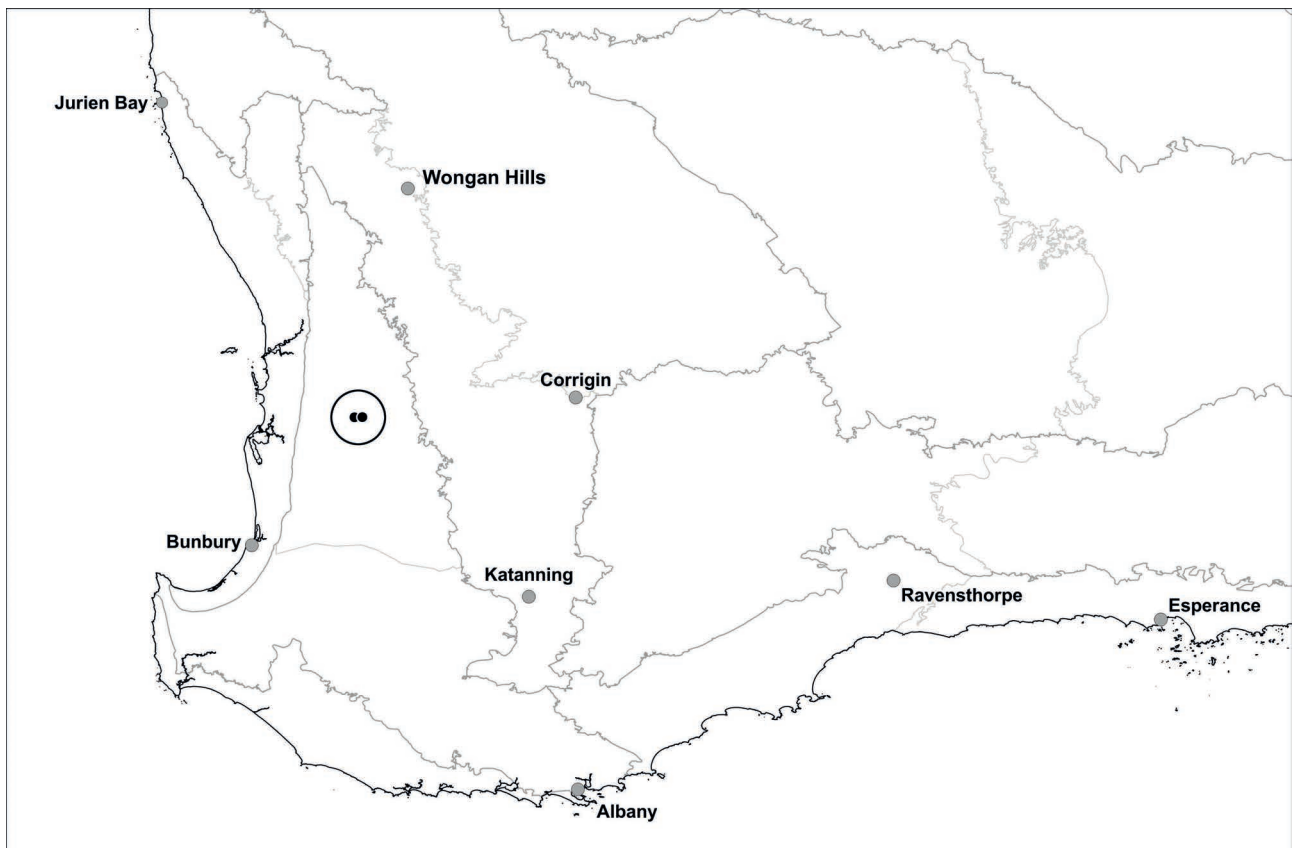
Etymology. From the Greek *xenos* (strange, a stranger) and *andros* (male), in reference to the unusual androecium in this species compared with other broadly similar Western Australian species.

Notes. *Hibbertia xenandra* was initially included in *H. parvula* when that species was first segregated from

H. diamesogenos in the PERTH collection, and was only recognised as distinct when close-up photographs provided by Fred and Jean Hort showed the unusual stamen arrangement in a specimen previously considered to be *H. parvula*. The difference in stamen arrangement, though striking in fresh material, had not been noticed in dried specimens because stamen disposition is hard to assess from pressed material. Subsequent close examination showed that *H. xenandra* can be confidently separated from *H. parvula* on the basis of its disjunctly longer staminal filaments (1.5–2.5 *cf.* 0.8–1.3 mm), anthers (1.4–2.0 *cf.* 1.0–1.3 mm) and styles (2.1–3.1 *cf.* 0.9–1.3 mm).

Part of the reason why initial examinations of specimens of *H. diamesogenos sens. lat.* had failed to reveal *H. xenandra* is that *H. parvula* and *H. xenandra* seem to be identical in all respects other than in their androecia and gynoecia. They cannot be discriminated on leaf size and shape, leaf and young stem indumentum, floral bracts, sepal and petal size, or sepal indumentum.

All but four Western Australian species that have stamens on one side of two carpels have the stamens characteristically arranged like a hand of bananas, as in *H. parvula*. Three of the exceptions are *H. psilocarpa*, *H. oligantha* and *H. tuberculata*, all of which are geographically remote from *H. xenandra*, are vegetatively clearly different, and have glabrous carpels. *Hibbertia xenandra* also differs from those three species in having strongly divergent stamens (in the others the stamens are more or less erect and parallel). That, and the difference in carpel indumentum, indicate that *H. xenandra* is probably not closely related to those species. The fourth species, which has stamens reminiscent of *H. parvula*, is *H. leptotheca*, but that species has the flowers arranged in spike-like pseudo-cincinnae rather than being solitary and axillary; it is also probably not closely related.



Map 4. Distribution of *Hibbertia micrantha* in southwestern Western Australia.



Figure 4. *Hibbertia micrantha*. Photos: Fred & Jean Hort.

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

Western Australia: Pikes Road 2.1 km E of Watershed Road, c. 8 km E of Albany Highway, 16 Oct. 2021, K.R. Thiele 5785 (*holo*: PERTH9525920; *iso*: AD, CANB).

Decumbent to spreading or semi-prostrate *shrubs* to 0.15 m high, branching abundantly from a taproot; branchlets glabrous or with sparse, minute sub-stellate or simple hairs. *Leaves* spreading, rather crowded towards the branch-tips, linear or rectangular to narrowly ovate or elliptic, 4–6 mm long, 0.6–1 mm wide, the margins usually strongly recurved to a midrib that

is usually sunken and rather weak; adaxial lamina scattered-tuberculate, each tubercle bearing a simple, spreading, straight or hooked hair to 0.8 mm long; abaxial lamina (obscured by the recurved margins) glabrous, minutely scattered-papillate especially along the margins of the midrib, which has an indumentum as for the adaxial lamina; apex obtuse with a very short, thickened excurrent point. *Flowers* shortly pedicellate, single in the axils of leaves near the branch tips; pedicels c. 2 mm long, sparsely to moderately pubescent with minute sub-stellate hairs; primary bract immediately below the calyx, broadly ovate to broadly triangular, obtuse to subacute, 1–1.5 mm long, herbaceous, with sparse indumentum as for the leaves and a minutely ciliate margin; secondary bracts 1–3, at the base of the pedicel or the upper ones carried up along it recaulescently, similar to the primary bract in size, shape and indumentum. *Sepals* ovate, obtuse, c. 3 mm long, the outer ones mostly glabrous, the inner ones with sparse, minute, sub-stellate hairs where covered by the outer in bud and with a few minute hairs along the margins; midribs not prominent. *Petals* 5, yellow, narrowly obovate, 3–4 mm long, not or scarcely emarginate. Stamens (3)4(5), all on one side of the gynoeceum and curved over it like a hand of bananas; filaments c. 0.6 mm long, shortly fused at the base; anthers curved-rectangular, c. 1 mm long, dehiscing by short, introrse, longitudinal slits near the apex. *Staminodes* present, 4(5), behind the stamens. *Carpels* 2; ovaries compressed-globular, densely pubescent; styles curved beneath the stamens, c. 0.5 mm long. *Ovules* 2 per carpel. *Fruiting carpels* and seeds not seen. Fig. 4.

Other specimen examined: Wandering, 4 Oct. 2010, F. Hort & M. Pasotti FH 3969 (PERTH 08289301).

Diagnostic features. May be distinguished from all other Western Australian species by the combination of small leaves c. 1 mm wide, pedicellate flowers with a short, broadly ovate to broadly triangular primary bract beneath the calyx (with 1–3 similar secondary bracts at the base of or along the pedicel), and 3–6 stamens on one side of two pubescent carpels, with staminodes forming a row behind the stamens.

Phenology. Both known specimens were flowering in October.

Distribution & habitat. Known from a geographically restricted area in the Jarrah Forest IBRA region near Wandering (Map 4), growing in shrubland and jarrah-marri woodlands on the edge of outcropping granite, with *Petrophile*, *Isopogon*, *Verticordia*, *Hypocalymma angustifolium*, *Hakea trifurcata*, *H. undulata*, *Hibbertia aurea*, *Grevillea manglesii* and *Calytrix*.

Conservation status. Being known from a very small area, *Hibbertia micrantha* should be considered rare and potentially threatened.

Etymology. From the Greek *mikros* (small) and *anthos* (a flower), in reference to the very small flowers of this species.

Notes. *Hibbertia micrantha* has floral bracts like those of *H. avonensis*, and when first collected was included in that species at PERTH. However, the abaxial leaf surface of *H. avonensis* is densely pubescent with fine, \pm straight hairs, quite unlike the sparsely papillate surface of *H. micrantha* (note that, because in both species the abaxial surface is largely hidden by the strongly recurved margins it is usually necessary to dissect the leaf to reveal the indumentum; in *H. avonensis* the edges of the midrib are papillate, but the lamina beneath the margins is pubescent). *Hibbertia avonensis* is also a more robust, erect plant with larger flowers.

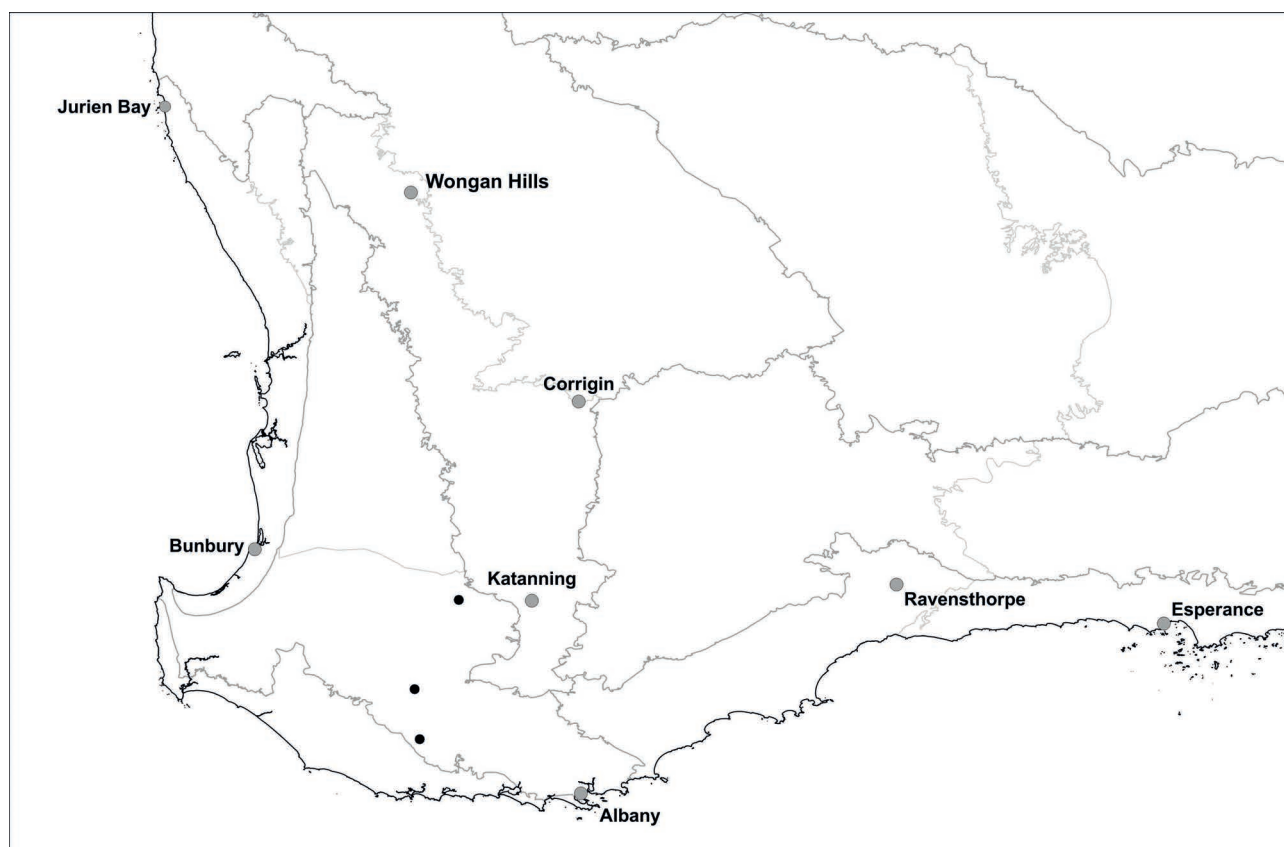
Superficially, *H. micrantha* is very similar to *H. humilis*, which occurs further south near Kojonup, Lake Unicup and Lake Muir. Both species are low, tap-rooted shrubs with small leaves and very small flowers, and have a similar indumentum on all their parts. They differ in that *H. humilis* has ten stamens and lacks staminodes, while *H. micrantha* has usually four stamens and a row of staminodes behind the stamens; this is an unusually low number of stamens for Western Australian species of *Hibbertia*. In *H. humilis* the stamens are in two rows of five each; in *H. micrantha*, the staminodes are clearly homologous with the back row of stamens. Staminode position and number are critical characters in *Hibbertia*: it is a highly fixed trait within taxa and is almost invariant within taxonomic groups. For this reason, despite their close similarity in other respects, *H. humilis* and *H. micrantha* are regarded here as distinct.

Hibbertia micrantha and *H. humilis* are both superficially similar to *H. parvula*, but that species has a narrowly triangular rather than ovate bract, and the pedicels are usually longer. These species may or may not be closely related, but precise relationships of species in *Hibbertia* remain unclear pending a robust phylogeny of the genus.

Hibbertia humilis K.R.Thiele, *sp. nov.*

Type: W of Armstrong Road, 18 km NNW of Kojonup, 11 Sept. 2021, K.R. Thiele 5723 (*holo*: PERTH 9368884; *iso*: AD, CANB).

Prostrate to decumbent or cushion-like, tap-rooted shrubs to 0.3 m high \times 0.3 m wide; young branchlets sparsely and minutely pubescent with simple to sub-stellate, spreading hairs. *Leaves* spreading, scattered, linear or rectangular to narrowly ovate or elliptic, 4–6 mm long \times c.1 mm wide, the margins strongly recurved to each other and mostly obscuring the midrib at least when dried, the midrib sunken and rather weak; adaxial surface obscurely scattered-tuberculate, each tubercle bearing a hooked hair to 0.2 mm long (young leaves sometimes also with scattered long, non-hooked hairs); abaxial surface (obscured by the recurved margins)



Map 5. Distribution of *Hibbertia humilis* in southwestern Western Australia.

glabrous but coarsely papillate especially close to the midrib, sometimes papillate along the midrib which is glabrous or with an indumentum as for the adaxial surface; apex callus-obtuse, straight to slightly deflexed and papillate or with an obscure hair-tuft. *Flowers* pedicellate, axillary, the pedicels 2–5 mm long, with indumentum as for the young stems; primary bract immediately below the calyx, broadly ovate, obtuse, 1–1.2 mm long, herbaceous, glabrous abaxially except for minutely ciliate margins, minutely appressed-pubescent adaxially with sub-stellate hairs; secondary bracts 1–3, at the base of the petiole, similar to the primary bract. *Sepals* broadly ovate, 4–5 mm long, obtuse, with an obscure midrib; outer sepals glabrous, with broad, pale margins; inner sepals similar in size, apex shape and indumentum to the outer but broader, with thinner margins, and minutely appressed-pubescent with sub-stellate hairs. *Petals* 5, yellow, obovate, 4.5–5 mm long, emarginate. *Stamens* 10, all on one side of the gynoeceum and curved over it like a hand of bananas; filaments c. 0.8 mm long, shortly fused at the base; anthers curved-rectangular, 1.5–1.8 mm long, dehiscing by introrse, longitudinal slits. *Staminodes* absent. *Carpels* 2; ovaries compressed-globular, densely pubescent; styles curving forward beneath the stamens, c. 1 mm long. *Ovules* 2 per carpel. Seeds pale tan, globular, c. 1.5 mm diam.; aril covering the basal 1/4 of the seed, sparsely pubescent.

Other specimens examined (all PERTH): SW of Lake Muir (4295161); Near Kojonup (7814240); Near Lake Unicup (6056970).

For full specimen details, see the following batch search of the ALA for the above set of specimens: https://biocache.ala.org.au/occurrences/search?q=qid:1695297668855#tab_mapView

Diagnostic features. May be distinguished from all other Western Australian species of *Hibbertia* by the combination of small leaves <8 mm long, small, pedicellate flowers (sepals 4–5 mm long) with a broadly ovate bract at the apex of the pedicel, ten stamens on one side of two pubescent carpels, and absence of staminodes.

Phenology. Has been collected flowering in late October and November.

Distribution & habitat. Known from three somewhat disjunct localities in the Southern Jarrah Forest IBRA sub-region, NW of Kojonup, near Lake Unicup, and SW of Lake Muir (Map 5). At its known locations it has been collected in an open wandoo woodland on yellow clay-loam, on a granite outcrop, and in a seasonal wetland in brown clay-loam over ironstone.

Conservation status. Two of the three known collections are from private land, while the third (SW of Lake Muir) is in a national park. May be more common and widespread but overlooked.

Etymology. From the Latin *humilis* (lowly, humble), in reference to the small, low habit and small flowers.

Notes. *Hibbertia humilis* is superficially similar to *H. parvula* and *H. micrantha*; see under the latter species for differences. Most specimens have at times been determined as *H. avonensis*, but that is a much more robust, upright plant and has leaves with a more prominent midrib and a densely short-pubescent abaxial lamina (glabrous in *H. humilis*).

Acknowledgments

We thank the Directors and staff of AD and PERTH for access to their collections, and the reviewers and editor for their helpful comments on the manuscript. We particularly thank Fred and Jean Hort, and Rob Davis, for providing photographs of the species described in this paper and for their excellent companionship over many years in the field and herbarium.

References

- Bentham G (1863).** *Flora Australiensis* vol. 1 (L. Reeve and co: London).
- De Candolle AP (1817).** *Regni Vegetabilis Systema Naturale* 1 (Treuttel & Würtz: London).
- Endlicher SFL (1839).** *Genera plantarum secundum ordines naturales disposita* (F. Beck: Vienna).
- Green JW (1985).** *Census of the Vascular Plants of Western Australia* Edn. 2 (Western Australian Herbarium: Perth).
- Meisner CF (1837).** *Plantarum vascularium genera* vol. 2 (Libraria Wiedmannia: Leipzig).
- Paczkowska G. & Chapman AR (2000).** *The Western Australian Flora, a descriptive catalogue* (Western Australian Herbarium: Perth).
- Sharr FA & George AS (2019).** *Western Australian Plant Names and their Meanings: AA Glossary*. (Four Gables Press: Kardinya, W.A.).
- Steudel EG von (1845).** Dilleniaceae. In 'Plantae preis-sianae sive enumeratio plantarum quas in australasia occidentali et meridionali-occidentali annis 1838–1841 collegit Ludovicus Preiss'. (Ed. JGC Lehmann) pp. 264–276. (Sumptibus Meissneri: Hamburg, Germany).
- Thiele KR (2019).** The *Hibbertia polystachya*-*H. spicata* (Dilleniaceae) species group in Western Australia. *Nuytsia* 30: 291–308.
- Turland NJ, Wiersema JH, Barrie FR, Greuter W, Hawksworth DL, Herendeen PS, Knapp S, Kusber W-H, Li D-Z., Marhold K, May TW, McNeill J, Monro AM, Prado J, Price MJ & Smith GF, eds. (2018).** *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159 (Koeltz Botanical Books: Glashütten). doi.org/10.12705/Code.2018.
- Wheeler, JR (1987).** Dilleniaceae. In *Flora of the Perth Region 1* (Eds. NG Marchant, JR Wheeler, BL Rye, EM Bennett, NS Lander & TD Macfarlane) p. 129. (Government Printer: Perth).
- Wheeler, JR (2002).** Miscellaneous new species of *Hibbertia* (Dilleniaceae) from the wheatbelt and pastoral areas of Western Australia. *Nuytsia* 15(1):139–152.
- Wheeler JR (2004).** Nomenclatural notes on two species of *Hibbertia* (Dilleniaceae). *Nuytsia* 15(2): 327–328.



This paper was typeset using Prince

www.princexml.com