



## Description of *Hibbertia hesperia* (Dilleniaceae), a new species from the Kimberley region, and a new regional key to species

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**Abstract:** As part of forthcoming treatments for the *Flora of Australia*, available specimens of *Hibbertia* from the Kimberley, Western Australia, were examined. Among these was a specimen from Sale River that was clearly separable from all other species in the genus. This specimen is compared to its presumed close relatives and formally described here as *H. hesperia* T.Hammer. An identification key to all *Hibbertia* taxa currently known to occur in the Kimberley is presented.

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

### Introduction

*Hibbertia* Andrews (Dilleniaceae) is a large and diverse genus in Australia with currently over 300 species accepted on the Australian Plant Census (APC 2023). The genus is actively being researched and many recent taxonomic revisions and new species descriptions have been published (e.g., Hammer 2022a, 2022b; Hammer *et al.* 2022; Thiele 2019), with many more in preparation by Hellmut Toelken, Kevin Thiele and myself (both independently and in collaboration). We are also preparing a treatment of the genus for the *Flora of Australia* online platform (Hammer & Thiele 2022).

Toelken (2010) revised the diverse tropical group *Hibbertia* § *Tomentosae* Benth. (designated by Bentham without rank; see Toelken 2010) in *H.* subg. *Hemistemma* (Juss. ex Thouars) J.W.Horn. Species within this group are readily recognisable by having dense, scale-like hairs covering the ovaries (these hairs are also usually present on the outside of the sepals and sometimes on the stems and leaves) and having stamens arranged all around the gynoecium. Toelken (2010) defined two informal morphological species groups (the *H. melhanioides* F.Muell. and *H. tomentosa* R.Br. ex DC. species groups) and described 39 new species within these groups (bringing the total to 52 spp.); collectively species of these two groups will be referred to here as *Tomentosae* for brevity. Several of the species described by Toelken (2010) were based on limited material, mostly due to sparse collections from remote Northern Australia. Many of the characters that were used by Toelken (2010) as important in distinguishing taxa in *Tomentosae* are fine differences in the vestiture, making species identification within the group difficult for non-experts.

While examining specimens of *Tomentosae* held at PERTH and not viewed by Toelken for his revision, I recognised that a specimen (*K.F. Kenneally* 9594) from Sale River in the western Kimberley (Fig. 1) did not match any currently recognised species. A temporary sorting slip on the specimen by Judy Wheeler in 1993 placed it as “*Hibbertia* sp. aff. *oblongata*”. In her treatment of the genus for the *Flora of the Kimberley Region*, Wheeler (1992) did not mention this anomalous specimen. Toelken (2010) described a series of new taxa that now include specimens previously determined as *H. oblongata* R.Br. ex DC. The specimen *K.F. Kenneally* 9594 does not match the current circumscription of *H. oblongata* (Toelken 2010).

This paper erects the new species *Hibbertia hesperia* T.Hammer for the specimen *K.F. Kenneally* 9594. It can be unambiguously differentiated from all other species in *Tomentosae* based on multiple morphological characters. No other specimens of *H. hesperia* are currently known from the Kimberley or elsewhere in northern Australia. To aid in future identification of specimens from the Kimberley, a key is provided to the 18 taxa (16 species) that are currently known to occur in the region. Four of the species belong to groups outside of *Tomentosae*; these are *H. sphenandra* (F.Muell. & Tate) J.W.Horn and *H. paranthera* K.R.Thiele in *H.* subg. *Pachynema* (R.Br. ex DC.) J.W.Horn (Hammer 2022b) as well as *H. hooglandii* J.R.Wheeler and *H. ledifolia* Benth. in the *H. banksii* R.Br. ex DC. species group in *H.* subg. *Hemistemma*. A draft key to all currently recognised taxa of *Hibbertia* in Australia can be found on KeyBase as part of the *Flora of Australia* project (<https://keybase.rb.gov.au/keys/show/11717>).

## Methods

All relevant herbarium specimens at AD were examined, including those on loan from BRI, CANB, CNS, DNA and PERTH and used for the preparation of Toelken's (2010) revision of *Tomentosae*, and specimens recently loaned from PERTH. Terminology for hair types follows Toelken (2010), and the species description is written to be consistent with those in the forthcoming *Flora of Australia* treatment (see Hammer & Thiele 2022).

## Taxonomy

***Hibbertia hesperia* T.Hammer, *sp. nov.***

**Holotypus:** Sale River, West Kimberley, Western Australia [precise locality withheld for conservation reasons], 13 May 1986, *K.F. Kenneally* 9594 (PERTH 04509021!).

Sprawling *subshrubs*. *Young stems* ± ridged, densely villous with erect to spreading rosette-like fascicled hairs (the arms to c. 1.8 mm long); intrapetiolar tufts of hairs

**Key to *Hibbertia* species and subspecies in the Kimberley region, W.A.**

Taxa marked with an asterisk appear more than once in the key.

1. Plants usually leafless at maturity (cauline leaves reduced to scales); petals pink or red; stamens 2–9. . . . . (*H. subg. Pachynema*)
2. Stems ± terete; petals red, persistent; stamens 7–9, encircled by a membranous sheath (corona). . . . . *Hibbertia sphenandra*
- 2: Stems triquetrous; petals pink, caducous; stamens 2, lacking a corona . . . . . *Hibbertia paranthera*
- 1: Plants leafy at maturity; petals yellow; stamens > 10 . . . . . (*H. subg. Hemistemma*)
3. Scale-like hairs absent on the carpels and sepals; fertile stamens all on one side of the gynoecium
4. Leaves linear, < 1 mm wide, the margins strongly revolute and abutting the midrib (almost terete); inflorescences comprising a solitary flower. . . . . *Hibbertia hooglandii*
- 4: Leaves linear-elliptic to rarely oblong, 2–3 (–10) mm wide, the margins recurved to revolute but not abutting the midrib (at least some of the abaxial lamina visible); inflorescences comprising 3–8 flowers in a pseudo-cincinnus. . . . . *Hibbertia ledifolia*
- 3: Scale-like hairs present on the carpels and sepals (and sometimes also elsewhere on the plant); stamens arranged around the gynoecium
5. Indumentum on the abaxial leaf surface mostly or entirely comprising of ciliate-peltate or entire-peltate scales
6. Leaf margins incurved; outer sepal apex spreading to recurved
7. Leaves with 3–10 peltate scales across the adaxial surface (count at widest point), U-shaped in cross-section, without a distinct abaxial midrib . . . . . *Hibbertia lepidota*
- 7: Leaves with 20–30 ciliate-peltate scales or rosette-like fascicled hairs across the adaxial surface, V-shaped in cross-section, with a distinct abaxial midrib. . . . . *Hibbertia ciliolata*
- 6: Leaf margins flat to recurved; outer sepal apex not spreading, ± appressed to inner sepals
8. Leaf axils with a few brownish hairs, especially at the base of the pedicel; marginal cilia on the sepals brownish; carpels with a distinct gynophore to 3 mm long in fruit . . . . . *Hibbertia echiifolia* subsp. *echiifolia*
- 8: Leaf axils without brownish hairs; marginal cilia on the sepals pale-coloured; carpels lacking a gynophore in fruit
9. Carpels 2 . . . . . *Hibbertia brevipedunculata*\*
- 9: Carpels 3
10. Leaves with 11–15 scales across the adaxial leaf surface (count at widest point), the largest scales 0.5–0.7 (–0.9) mm in diameter . . . . . *Hibbertia persquamata* subsp. *ampliata*
- 10: Leaves with 22–26 (–32) scales across the adaxial leaf surface, the largest scales 0.3–0.35 mm in diameter . . . . . *Hibbertia persquamata* subsp. *persquamata*
- 5: Indumentum on the abaxial leaf surface comprising rosette-like or cactiform fascicled hairs (peltate scales absent)
11. Margins of at least some (usually the largest) leaves shallowly toothed . . . . . *Hibbertia scopata*
- 11: Margins of all leaves entire
12. Leaves densely to sparsely hirsute, pubescent or velutinous, the fascicled hairs with arms < 0.5 mm long

- 13.** Outer sepals longer than inner sepals
- 14.** Leaves  $\pm$  concolorous; adaxial leaf surface very densely to densely covered with erect-spreading fascicled hairs, the arms 3–5 times as long as the diameter of the basal tubercle. . . . . *Hibbertia oblongata* subsp. *brevifolia*
- 14.** Leaves discolorous; adaxial leaf surface  $\pm$  sparsely covered with short-branched fascicled hairs, the arms <2.5 times as long as the diameter of the basal tubercle. . . . . *Hibbertia oblongata* subsp. *oblongata*
- 13.** Outer sepals shorter than inner sepals
- 15.** Carpels 3 . . . . . *Hibbertia axillaris*
- 15.** Carpels 2
- 16.** Floral bract ovate, 1.1–1.3 mm long; stamens (17–) 20–22; anthers 0.9–1.1 mm long . . . . . *Hibbertia scabrifolia*
- 16.** Floral bract narrowly lanceolate, oblong-elliptic or triangular-ovate, 1.5–2.2 mm long; stamens  $\geq$  30; anthers 1.5–2.6 mm long
- 17.** Leaf apex apiculate, the midrib excurrent and with unilaterally enlarged fascicled hairs; pedicels filiform, slightly compressed to terete, (6.5–) 8–12 (–14.6) mm long . . . . . *Hibbertia suffrutescens*
- 17.** Leaf apex acute to obtuse, occasionally mucronate, but then without unilaterally enlarged fascicled hairs; pedicels robust,  $\pm$  angular, 4–8 mm long . . . . . *Hibbertia brevipedunculata*\*
- 12.** Leaves densely and softly long-villous, the fascicled hairs with arms to 1.5 mm long
- 18.** Carpels 3; pedicels robust, 4.2–5.6 mm long; floral bract 3.6–4.2 mm long. . . . . *Hibbertia mollis*
- 18.** Carpels 2; pedicels filiform, (5–) 8–12 (–15) mm long; floral bract 2.5–3 mm long . . . . . *Hibbertia hesperia*

apparently absent. *Leaves* petiolate, spreading; petiole 0.5–1.5 mm long, with indumentum as for the stems; lamina elliptic to broadly elliptic or elliptic-obovate, (8–) 20–30 (–35) mm long, (5–) 7–10 (–15) mm wide,  $\pm$  discolourous, gradually tapering to the petiole, entire, densely and softly villous on both surfaces with erect to spreading, rosette-like fascicled hairs (the arms to 1.5 mm long), the hairs somewhat more prominent along the midrib; secondary veins not visible; apex obtuse, often mucronate with the midrib excurrent by c. 0.5 mm. *Flowers* single, terminal on short-shoots (appearing “axillary”), pedicellate; pedicels (5–) 8–12 (–15) mm long, filiform,  $\pm$  terete, densely villous like the stems, elongating and slightly recurved in fruit; buds  $\pm$  spherical. *Bract* herbaceous, subtending the calyx, oblong to oblanceolate, 2.5–3 mm long, 1.2–1.5 mm wide, densely hirsute-pubescent, acute. *Sepals* unequal; outer sepals broadly ovate to obovate, 4.5–5.2 mm long, 2.5–3 mm wide, slightly shorter than the inner ones, abaxially densely pubescent with antrorse to spreading rosette-like fascicled hairs over ciliate-peltate scales, the hairs on the margins unilaterally enlarged to form cilia, adaxially glabrous, the apex obtuse; inner sepals broadly obovate, 4.8–5.4 mm long, 3.5–4 mm wide, abaxially with dense ciliate-peltate to entire-peltate scales, adaxially glabrous, the apex rounded. *Petals* 5, yellow, obovate, 5–7 mm long, emarginate. *Stamens* 29–31, arranged around the carpels, subequal; filaments thread-like, scarcely connate basally, 1–1.5 mm long; anthers obloid, 1–1.2 mm long, dehiscent by  $\pm$  introrse longitudinal slits; staminodes absent. *Carpels* 2; ovaries obovoid, densely scaly; styles

curved with the stigmas placed just above the anthers, c. 1.5 mm long, glabrous. *Ovules* 2 per carpel. *Seeds* black,  $\pm$  globular, c. 3.2 mm long; aril membranous, lobed, covering the lower half of the seed. **Fig. 1.**

**Diagnostic features.** *Hibbertia hesperia* can be readily distinguished from all other species of *Hibbertia* by the following combination of characters: indumentum on the stems and leaves densely soft-villous and comprising erect to spreading rosette-like fascicled hairs, the longest arms of which are  $\leq$  1.8 mm long; flowers single, on filiform,  $\pm$  terete pedicels (5–) 8–12 (–15) mm long; bracts oblong to oblanceolate, 2.5–3 mm long; outer sepals with dense rosette-like fascicled hairs over ciliate-peltate scales on the abaxial surface, slightly shorter than the inner sepals; stamens c. 29–31, arranged around the gynoeceium; carpels 2, densely scaly.

**Phenology.** Flowering and fruiting in May.

**Distribution.** Currently only known from a single collection from the Sale River in the Shire of Derby/West Kimberley, W.A. No frequency data was recorded with the specimen.

**Habitat.** Occurs “in sandstone fissures with *Acacia gonocarpa*” (K.F. Kenneally 9594).

**Conservation status.** Not conservation listed. As the new species is currently only known from a single record from 1986, it is recommended that its conservation status be urgently assessed.





Fig. 1. Holotype of *Hibbertia hesperia* (PERTH 04509021; precise locality obscured for conservation reasons).

**Etymology.** From the Latin *hesperius* (western), in reference to the new species being from the western Kimberley in Western Australia.

**Notes.** *Hibbertia hesperia* can be readily identified as a member of the *H. tomentosa* group *sensu* Toelken (2010) in *H.* subg. *Hemistemma* based on having scale-like hairs on the sepals and carpels and the stamens arranged around the gynoeceum, and it can be distinguished from members of the allied *H. melhanioides* species group *sensu* Toelken (2010) by having subequal (*vs.* unequal) anthers, lacking hairs or scales on the style base (*vs.* hairs/scales from ovary continuing up style for some length), and having  $\pm$  spherical (*vs.* ovoid to ellipsoidal) flower buds.

Within the *H. tomentosa* group, *H. hesperia* is most similar to four species that were first described by Toelken (2010) and included in his informal *H. alopecota* Toelken and *H. oblongata* subgroups: *H. axillaris* Toelken, *H. circularis* Toelken, *H. mollis* Toelken and *H. suffrutescens* Toelken. *Hibbertia circularis*, the only one of these four species that does not occur in W.A., is endemic to the Top End, N.T. All four species are poorly known and represented by one to a few specimens. The differences between *H. hesperia* and these four species is discussed below and listed in Table 1.

*Hibbertia hesperia* is morphologically most similar to *H. mollis*, which also has a long, soft indumentum composed of rosette-like fascicled hairs with arms to 1.5 mm long that cover the leaves and stems and lacks visible secondary veins on the leaves (i.e. only

the midrib is visible). It can be differentiated from *H. hesperia* by having narrowly elliptic-oblong (*vs.* elliptic to broadly elliptic or broadly elliptic-obovate) leaves, robust pedicels to 5.6 mm long (*vs.* filiform pedicels to 12 (–15) mm long), outer sepals that are 7.2–7.5 mm long and longer than the inner sepals (*vs.* outer sepals 4.5–5.2 mm long and slightly shorter than the inner ones), the bract 3.6–4.2 mm long (*vs.* 2.5–3 mm long), and 3 (*vs.* 2) carpels. Toelken (2010) described the gynoeceum of *H. mollis* as having (2) 3 carpels, but this is likely an error; my examination of the holotype (the only known specimen) has shown that the gynoeceum is consistently 3-carpellate.

*Hibbertia circularis* also shares with *H. hesperia* a long and soft indumentum on the stems and leaves, at least some broadly elliptic leaves, and long, filiform pedicels. It can be differentiated from *H. hesperia* by its less dense indumentum on the abaxial leaf surface, with the secondary veins and intramarginal veins prominent (*vs.* the indumentum very dense and the secondary veins not visible), 2 or 3 (4) flowers in a bundle on each axillary short shoot (*vs.* flowers solitary), and a broadly ovate bract that is 1.1–1.6 mm long (*vs.* oblong to oblanceolate bract 2.5–3 mm long).

*Hibbertia hesperia* is also somewhat similar to *H. axillaris* and *H. suffrutescens*, especially in having long and fine pedicels. These two species can be readily differentiated from *H. hesperia* by having very short and appressed or reflexed fascicled hairs on the leaves (the indumentum sometimes very sparse in *H. suffrutescens*), and visible lateral and intramarginal leaf veins.

**Table 1.** Comparison between *Hibbertia hesperia* and the four most similar species.

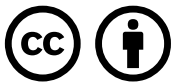
	<i>H. hesperia</i>	<i>H. mollis</i>	<i>H. circularis</i>	<i>H. axillaris</i>	<i>H. suffrutescens</i>
<b>State distribution</b>	W.A.	W.A.	N.T.	W.A.	W.A.
<b>Subgroup (<i>sensu</i> Toelken 2010)</b>		Alopecota	Alopecota	Oblongata	Oblongata
<b>Leaf length (mm)</b>	(8–) 20–30 (–35)	(22–) 25–40 (–53)	(9–) 15–25 (–30)	(11.8–) 25–40 (–48.6)	(8.3–) 15–25 (–39.4)
<b>Leaf width (mm)</b>	(5–) 7–10 (–15)	4–8 (–11.2)	(9–) 15–21 (–25)	(4.7–) 6–9 (–11.2)	(2.8–) 3–6 (–7.6)
<b>Leaf shape</b>	elliptic to broadly elliptic or elliptic-obovate	narrowly elliptic-oblong	elliptic to almost orbicular	elliptic-oblanceolate	narrowly oblanceolate or rarely linear-elliptic
<b>Leaf indumentum</b>	dense long hairs	dense long hairs	dense long hairs	dense short hairs	sparse to dense short hairs
<b>Secondary veins on abaxial leaf surface</b>	not visible	not visible	visible	visible	visible
<b>Flowers per leaf axil</b>	one	one	2 or 3 (4)	one	one
<b>Pedicel thickness</b>	filiform	robust	filiform	filiform	filiform
<b>Pedicel length (mm)</b>	(5–) 8–12 (–15)	4.2–5.6	(4.5–) 10–15 (–18)	7.5–10 (–14.8)	(6.5–) 8–12 (–14.6)
<b>Bract length (mm)</b>	2.5–3	3.6–4.2	1.1–1.6	1.8–2.3	(1.5–) 1.7–2.0
<b>Bract shape</b>	oblong to oblanceolate	oblong-oblanceolate	broadly ovate	linear-triangular	narrowly lanceolate to triangular
<b>Carpel number</b>	2	3	2	3	2

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