



Hibbertia radians (Dilleniaceae), a new combination from South Australia

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Abstract: *Hibbertia empetrifolia* (DC.) Hoogland currently comprises subsp. *empetrifolia* from New South Wales, Tasmania and Victoria and subsp. *radians* Toelken from South Australia. These subspecies are critically re-evaluated. Evidence is presented to support the recognition of *H. empetrifolia* subsp. *radians* as a distinct species, for which the new combination *Hibbertia radians* (Toelken) T.Hammer is formally made. Descriptions and illustrations are provided for both species.

Keywords: Dilleniaceae, *Hibbertia empetrifolia*, South Australia, taxonomy

Introduction

Hibbertia Andrews (Dilleniaceae) is a diverse genus with currently over 300 species in Australia (Hammer & Thiele 2022–). To efficiently address the challenges posed by such a diverse genus, past and ongoing taxonomic revisions have focused on groups of species that share specific morphological features (e.g. Thiele 2017, 2019; Toelken 2010). One such species group is the *H. aspera* DC. group belonging to *H.* subg. *Hemistemma* (Juss ex. Thouars) J.W.Horn, which was revised by Toelken (1998). Members of this group possess leaves with a broad and ± flat lamina (i.e. not ericoid), stalked single flowers, an androecium that is to one side of the gynoecium with the stamens curved over to conceal the two ovaries and short styles (often referred to as “hand-of-banana” stamens; see Fig. 1), and they lack staminodes. As circumscribed by Toelken (1998), the *H. aspera* group comprises 11 species distributed across New South Wales, Queensland, South Australia, Tasmania and Victoria.

Hand-of-banana stamens are more common among species of *H.* subg. *Hemistemma* in Western Australia (c. 50 species), where they typically also have staminodes that are lateral to or opposite the fertile stamens. Only a few of these Western Australian species lack staminodes (e.g. *H. ancistrotricha* J.R.Wheeler and *H. gracilipes* Benth.), but can otherwise be differentiated from the *H. aspera* group by their linear ericoid leaves with margins that tightly abut the abaxial midrib. Another group of species that occurs across tropical Australia, known as the *H. banksii* (R.Br. ex DC.) Benth. group, also have hand-of-banana stamens, but can be readily differentiated from the other groups by having a row of staminodes behind the fertile stamens (on the side

distal to the carpels) and by their multi-flowered inflorescences (except for *H. hooglandii* J.R.Wheeler). Most other species of *H.* subg. *Hemistemma* in eastern Australia do not have hand-of-banana stamens, and their stamens are either erect to one side of the carpels, on two sides of the carpels, or all around the carpels. In these species, if the stamens are slightly curved or leaning on the carpels, then the styles are long, usually widely spreading, and not obscured by the stamens.

Hibbertia empetrifolia (DC.) Hoogland is a widespread species in the *H. aspera* group, occurring from north-eastern New South Wales to Tasmania, and in South Australia on Kangaroo Island and the Fleurieu Peninsula (Fig. 2). As part of his treatment to the *H. aspera* group, Toelken (1998) erected the subspecies *H. empetrifolia* subsp. *uncinata* Toelken and *H. empetrifolia* subsp. *radians* Toelken from New South Wales and South Australia, respectively. Toelken (1998) distinguished subsp. *uncinata* from subsp. *empetrifolia* based on its combination of hooked hairs on the adaxial leaf surface and calyx, and fascicled hairs with 1–4 arms on the stems (as “stellate hairs”, but actually individual hairs in a cluster that appears stellate), compared to subsp. *empetrifolia* with fascicled hairs with (4) 5–14 arms on the stems and hooked simple hairs that occur mostly on the abaxial leaf surface. *Hibbertia empetrifolia* subsp. *radians* was differentiated by Toelken (1998) from the other two subspecies by being mostly prostrate (vs. spreading to decumbent in the other species) and by having robust tuberculate fascicled hairs on the leaves with 6–14 radiating arms. *Hibbertia empetrifolia* subsp. *uncinata* is not currently accepted on the Australian Plant Census (APC 2023) and has been reduced to a synonym¹ of *H. empetrifolia* subsp. *empetrifolia* on the Census in 2011.

¹ As reason for this synonymisation, the Flora of New South Wales Online states: “*H. empetrifolia* (DC.) Hoogland subsp. *uncinata* Toelken has been described as a separate subspecies occurring in woodland in the Kulnura-Mangrove Mtn area, north of Sydney (CC). Flowers Sept.–Apr. This taxon is insufficiently understood and is sometimes difficult to recognise as the hairs on the upper surface of the leaf wear off and it is therefore difficult to see the characteristic hairs. As there are no recent collections (last collected 1965), it is felt that this subspecies needs further investigation.” (PlantNET 2023).



Fig. 1. **A, B** *Hibbertia radians* (formerly *H. empetrifolia* subsp. *radians*): **A** flowering morphology, **B** habit. **C–F** *H. empetrifolia*: **C, E** flowering morphology; **D, F** habit. — A, B T.A. Hammer 331, A.E. McDougall & A. Žerdoner Čalasan (AD); C, D T.A. Hammer 349 & A.E. McDougall (AD); E, F T.A. Hammer 338 & A.E. McDougall (AD). Photos: T.A. Hammer.

After examining specimens and conducting field observations of the subspecies of *H. empetrifolia*, I postulated that *H. empetrifolia* subsp. *radians* may be sufficiently different in morphology to warrant recognition at species rank. The current paper critically re-evaluates the taxonomic status of *H. empetrifolia* subsp. *radians*.

Methods

This study was based on examination of dried specimens at AD, including those on loan from CANB, HO, MEL and NSW, and on field observations made in New South Wales during 2022 and in South Australia in 2021–2022.

Results & Discussion

The examination of specimens across the geographic range of *H. empetrifolia* revealed that its subspecies can be distinguished by morphological characters (Table 1), with no intermediate specimens found.

Hibbertia empetrifolia subsp. *radians* differs in habit from *H. empetrifolia* subsp. *empetrifolia* and other relatives in the *H. aspera* group by being a small, usually prostrate, plant with multiple stems growing along the ground to reach only 35 cm in length (Fig. 1B). It can appear as a dense mat if growing in a cluster or amongst other low-growing plants, with which it often gets entangled. Even when flowering, *H. empetrifolia* subsp. *radians* can be easily overlooked due to its very diminutive nature. Its horizontally growing stems can get quite stiff and woody at the base. Young or resprouting plants of *H. empetrifolia* subsp. *radians* can be somewhat decumbent, especially when growing in shade or propped up by neighbouring plants. On the other hand, *H. empetrifolia* subsp. *empetrifolia* is not prostrate and typically has multiple stems that start as erect-spreading and become decumbent and often scramble over neighbouring plants (Fig. 1D, F). It is larger than *H. empetrifolia* subsp. *radians*, usually growing to 0.5 m, or rarely, 1 m high.

Hibbertia empetrifolia subsp. *radians* and *H. empetrifolia* subsp. *empetrifolia* can also be differentiated by the size and shape of certain floral organs. The petals of subsp. *radians* are narrowly obtriangular with acutely angled lobes (Fig. 1A), while *H. empetrifolia* subsp. *empetrifolia* has \pm obovate petals with rounded lobes (Fig. 1C, E). Additionally, the petals of subsp. *radians* are noticeably shorter and narrower ($3\text{--}3.8 \times 1.3\text{--}2$ mm) than those of *H. empetrifolia* subsp. *empetrifolia* ($4.2\text{--}6.5 \times 2.7\text{--}4.5$ mm). Although the ranges for the number of stamens in each subspecies overlap, subsp. *radians* has typically narrower and consistently shorter anthers

($0.4\text{--}0.8 \times 0.3\text{--}0.5$ mm) than subsp. *empetrifolia* ($1.1\text{--}1.4 \times 0.4\text{--}0.7$ mm). Similarly, subsp. *radians* typically has shorter styles ($0.3\text{--}0.6$ mm long) than *H. empetrifolia* subsp. *empetrifolia* ($0.6\text{--}1$ mm long).

Previous studies on the taxonomy of *Hibbertia* have emphasized the importance of indumentum characteristics in species delimitation (e.g. Thiele 2017, Toelken 2010). As noted by Toelken (1998), the predominant hair type on the young leaves and sepals of *H. empetrifolia* subsp. *radians* are robust fascicled hairs with 6–14 radiating arms and a basal tubercle (Fig. 3A, B), while the leaf indumentum of subsp. *empetrifolia* is predominantly composed of simple, straight hairs with a basal tubercle (Fig. 3C). Small, fine, usually antrorse, fascicled hairs (2–4 (–7)-armed) and hooked simple hairs, both of which lack a basal tubercle, are found on both subspecies. When simple hairs are present on subsp. *radians*, they are only the hooked type and are very sparse on the leaf margin, abaxial leaf lamina and the sepals. The differences between the indumentum of subsp. *radians* and subsp. *empetrifolia* are most noticeable on young growth, which is more densely covered in hair; these hairs tend to wear off with age, but are more persistent on the abaxial midrib and margin of leaves. It is noteworthy that *H. truncata* Toelken from Victoria also has robust tuberculate fascicled hairs like those found on *H. empetrifolia* subsp. *radians* (see Notes below for differences between these two taxa).

Simple hairs are the principal hair type in the indumentum of *H. appressa* Toelken from Victoria and Tasmania and *H. decumbens* Toelken from New South Wales. These species overlap in distribution with *H. empetrifolia* subsp. *empetrifolia* and are more similar and more readily confused with it than subsp. *radians*. *Hibbertia appressa* can chiefly be distinguished from *H. empetrifolia* by the tubercle-based simple hairs on the stems, leaves and calyx that are coarse and distinctly appressed. *Hibbertia decumbens* is very similar to

Table 1. Comparison of the morphological characters discussed for *Hibbertia empetrifolia*, *H. radians* (formerly *H. empetrifolia* subsp. *radians*) and their presumed close relatives.

	<i>H. radians</i>	<i>H. empetrifolia</i>	<i>H. decumbens</i>	<i>H. appressa</i>	<i>H. truncata</i>
Distribution	SA	NSW, Vic., Tas.	NSW	Vic., Tas.	Vic.
Habit	Prostrate or occasionally decumbent	Decumbent or scrambling or occasionally erect-spreading	Decumbent	Decumbent, scrambling	Decumbent to prostrate
Max. stem length (m)	0.35	0.6	0.4	c. 0.5	0.4
Tuberculate hair type	Fascicled (6–14 arms), radial	Simple, spreading	Simple, spreading	Simple, appressed	Fascicled (5–20 arms), radial
Petal shape	Narrowly obtriangular	Obovate	Obovate	Obovate	Obovate
Petal length (mm)	3–3.8	4.2–6.5	4–7.2	3.6–9.4	6–10.6
Stamen number	(3–) 5–7	(4–) 5–7 (–9)	9–12 (–15)	(7–) 9–12	10–12
Anther length (mm)	0.4–0.8	1.1–1.4	1–1.2	(0.8–) 0.9–1.1 (–1.6)	1.6–1.8
Style length (mm)	0.3–0.6	0.6–1	c. 1.2	c. 0.7	1.8–2.1

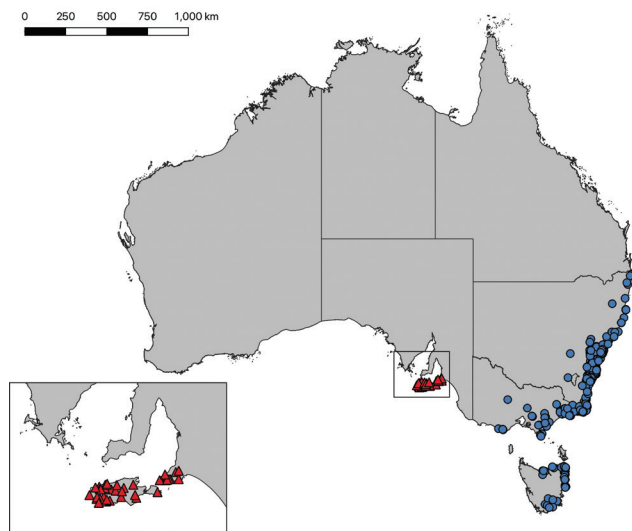


Fig 2. Distribution of *Hibbertia empetrifolia* (blue circles) and *H. radians* (formerly *H. empetrifolia* subsp. *radians*) (red triangles), based on occurrences from the Australasian Virtual Herbarium (<https://avh.chah.org.au/>).

H. empetrifolia, especially the formerly recognised subsp. *uncinata*, and both are from the Sydney area. *Hibbertia decumbens* is distinguished from *H. empetrifolia* subsp. *empetrifolia* by the numerous hooked hairs on the adaxial leaf surface (vs. none or few), having 9–12 (–15) stamens (vs. 4–9), and stem indumentum with erect few-branched fascicled hairs and hooked hairs (vs. fine fascicled hairs with 2–6 arms). *Hibbertia empetrifolia* subsp. *uncinata* was originally described to accommodate specimens of *H. empetrifolia* that have hooked hairs on the adaxial leaf surface (Toelken 1998), a character that could suggest an intergrade with *H. decumbens*. The other characters that differentiate *H. decumbens* from *H. empetrifolia* overlap, with some specimens of *H. empetrifolia* having up to 9 stamens (e.g. T.A. Hammer 338 & A.E. McDougall; Fig. 1E). As these species potentially intergrade, a detailed molecular study is needed to ascertain their taxonomic boundaries and assess the taxonomic status of subsp. *uncinata*.

Discrete morphological differences between *H. empetrifolia* subsp. *radians* and subsp. *empetrifolia* are evident, and both are readily recognisable as distinct entities without intermediates. *Hibbertia empetrifolia* subsp. *empetrifolia* bears a closer resemblance to *H. decumbens* and *H. appressa* than it does to *H. empetrifolia* subsp. *radians*. These morphological differences together with the geographic disjunction between *H. empetrifolia* subsp. *radians* and subsp. *empetrifolia* are good indication that these taxa represent independent evolutionary lineages, consistent with a definition of species under a modern unified species concept (e.g. Oberprieler 2022). Therefore, *H. empetrifolia* subsp. *radians* is here raised to the rank of species as the new combination *Hibbertia radians* (Toelken) T.Hammer. An identification key to all currently described species of *Hibbertia* is available online (Hammer & Thiele 2022–).

Taxonomy

Hibbertia radians (Toelken) T.Hammer, *comb. et stat. nov.*

Hibbertia empetrifolia subsp. *radians* Toelken, *J. Adelaide Bot. Gard.* 18(2): 143, Figs 2E, 7J–L (1998).

— **Holotype:** South Australia, 4 km SSW Parawa, 28 Sep. 1997, H.R. Toelken 8681 (AD291001!). **Isotypes:** K!, MO!, NSW!, PERTH!

Hibbertia sp. B: Toelken in Jessop, *List Vasc. Pl. S. Austral. Ed. 4*, 28 (1993).

Prostrate or occasionally decumbent multi-stemmed shrubs, branches to 0.35 m long. Branchlets slightly ridged, sparsely to moderately pubescent with fine or robust tubercle-based, radially spreading, fascicled hairs with 6–14 arms. Leaves shortly petiolate, spreading; petiole 0.5–1 mm long; lamina elliptic to obovate, narrowly elliptic to oblanceolate or rarely ovate, (3–) 3.8–9.2 (–13) mm long, (0.7–) 1.4–3 (–5) mm wide; margins entire, ± raised, weakly to strongly recurved to revolute and usually not obscuring most of the abaxial surface (rarely obscuring all but the midrib); adaxial surface distinctly to obscurely tuberculate, glabrescent, sparsely to moderately pubescent with short tubercle-based antrorse 2–4 (–7)-armed fascicled hairs, occasionally with tubercle-based, radially spreading fascicled hairs, and rarely with hooked simple hairs on the margin; abaxial surface glabrescent, the raised midrib with more persistent hairs that are typically robust and radially spreading fascicled hairs (6–14 arms), the lamina with sparse to very sparse finer and less persistent fascicled hairs (2 or 3 arms) or hooked simple hairs, rarely mostly hidden beneath the strongly recurved margins; apex obtuse or rarely acute, often terminated by ± antrorse fascicled hairs. Flowers single, terminal on short-shoots (appearing “axillary”), pedicellate; pedicels 4.5–10 (–12) mm long, filiform, with the indumentum as for branchlets; bract immediately below the calyx, linear-triangular, 1.7–2.1 mm long, herbaceous, with fine and robust fascicled hairs. Sepals 5, unequal; outer sepals ovate, 3–4.4 mm long, 1.3–2.3 mm wide, abaxially ± ridged and sparsely pubescent with robust tubercle-based radially spreading fascicled hairs mostly near the central ridge and fine spreading to antrorse fascicled hairs throughout or occasionally with a few scattered hooked simple hairs, adaxially glabrous except for a few fine hairs towards the apex, the apex acute to acuminate and with a few terminal hairs; inner sepals oblong to obovate, 2.5–4 mm long, 1.5–2.2 mm wide, abaxially sparsely to moderately pubescent with fine spreading fascicled hairs, adaxially glabrous except for a few fine hairs towards the apex, the apex obtuse or acute (due to folding of margins), shortly and bluntly mucronate. Petals 5, yellow, narrowly obtriangular, 3–3.8 (–4) mm long, 1.3–2 mm wide, deeply emarginate. Stamens (3–) 5–7, all on one side of the gynoecium, curving over and ± obscuring the gynoecium, unequal; filaments fused for ± half their length, the fused portion 0.3–0.7 mm long, the free portion 0.2–0.5 mm long;

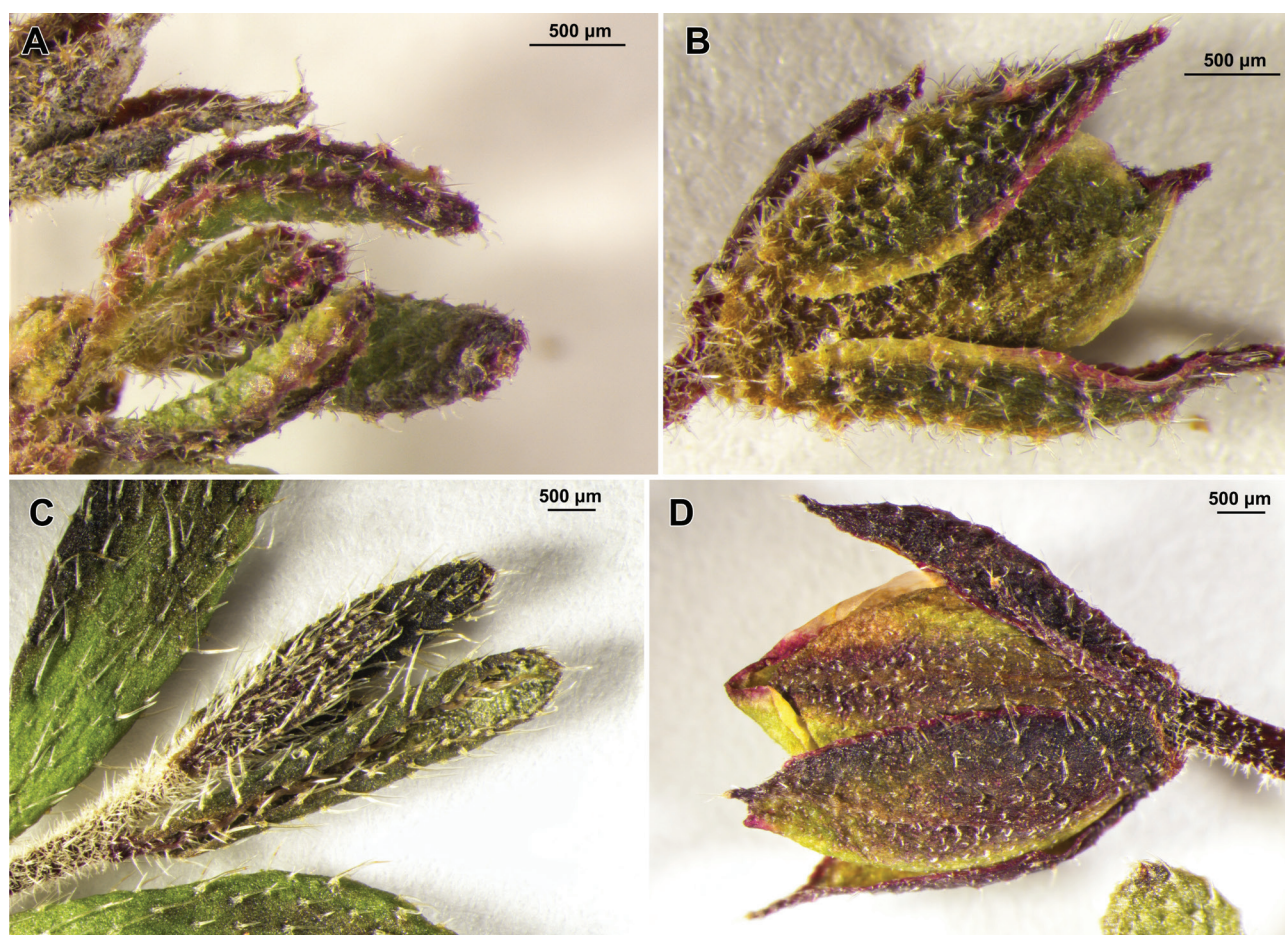


Fig 3. Differences in indumentum. **A, B** *Hibbertia radians* (formerly *H. empetrifolia* subsp. *radians*): **A** young leaves; **B** flower. **C, D** *H. empetrifolia*: **C** young leaves; **D** flower. — A, B T.A. Hammer 331, A.E. McDougall & A. Žerdoner Čalasan (AD); C, D T.A. Hammer 346 & A.E. McDougall (AD).

anthers oblong, 0.4–0.8 mm long, 0.3–0.5 mm wide, dehiscent by introrse, longitudinal slits; *staminodes* absent. *Carpels* 2; ovaries compressed-ovoid, 0.7–1 mm long, densely hirsute to pubescent, the hairs denser and longer near the apex; styles 0.3–0.6 mm long, ascending and curved away from the stamens. *Ovules* 2 per carpel. *Seeds* black to dark brown, glossy, compressed-globular, 2.5–3 mm long, 2–2.5 mm wide; aril membranous, irregularly lobed, covering approximately the lower half of the seed. **Figs 1A, B & 3A, B.**

Diagnostic features. *Hibbertia radians* can be distinguished from all other species of *Hibbertia* by the following combination of characters: prostrate to decumbent shrubs; indumentum mainly composed of fine fascicled hairs overtopped by larger tubercle-based fascicled hairs; leaves weakly recurved to revolute; flowers pedicellate with (3–) 5–7 fertile stamens to one side of and curving over two hairy carpels; *staminodes* absent.

Phenology. Flowers from August to January.

Distribution and habitat. Endemic to South Australia, occurring on the southern Fleurieu Peninsula from around Myponga to near Cape Jervis and on Kangaroo

Island (Fig. 2). It is restricted to the Kanmantoo IBRA7 Region (DAWE 2023). It commonly grows on slopes or ridges in eucalypt woodlands or forests or in scrub on shallow sandy or clayey soils, occasionally with laterite.

Conservation status. Not conservation listed or considered to be at risk. The species is locally common in the Flinders Chase National Park and Ravine Des Casoars Wilderness Protection Area, Deep Creek National Park and a few smaller conservation parks.

Notes. Within South Australia, *H. radians* is most similar to two other members of the *H. aspera* species group, *H. pallidiflora* Toelken and *H. cinerea* Toelken. *Hibbertia radians* can be readily differentiated from all other *Hibbertia* species in South Australia by the characters that define the *H. aspera* species group (discussed above).

Hibbertia pallidiflora occurs on southern Yorke Peninsula, Kangaroo Island and south-eastern South Australia (and across the border in Victoria). Like *H. radians*, *H. pallidiflora* is a small shrub, but it is more scrambling and with an indumentum composed of small fascicled hairs (i.e. lacking the distinctly robust fascicled hairs on a broadened tubercle). It can

be readily distinguished from *H. radians* by its unique pale-yellow petals that are shorter than the sepals and remain semi-closed (i.e. appearing nearly tubular), and by having styles that are much longer than the stamens so that the stigmas are placed near the opening of the perianth.

Hibbertia cinerea occurs mostly on the southern Eyre Peninsula near Port Lincoln and with one record from Kangaroo Island (B.M. Overton 2897). It differs from *H. radians* by being an erect shrub to 1.2 (–2) m high (vs. prostrate or rarely decumbent) and having dense indumentum of fascicled hairs covering the leaves and sepals and rendering them greyish (vs. indumentum not dense and ± dark green) and 9–12 stamens with anthers 1.2–1.7 mm long (vs. 3–7 stamens with anthers 0.4–0.8 mm long).

Hibbertia radians is also similar to *H. truncata*, which is a prostrate to decumbent shrub that occurs in Victoria. Both species have robust tuberculate fascicled hairs on their stems, leaves and calyx, but *H. truncata* can be distinguished by having an abaxial leaf lamina with dense fascicled hairs (vs. sparse to nearly glabrous), the leaf apex being usually truncate (vs. obtuse or acute) and having 10–12 stamens (vs. 3–7).

Hibbertia radians might be confused with the South Australian species *H. glebosa* Toelken, since both species have stalked flowers and robust tuberculate fascicled hairs on the stems, leaves and calyx (see Fig. 3A, B). *Hibbertia glebosa* subsp. *oblonga* Toelken overlaps with the distribution of *H. radians* on Kangaroo Island where it differs by being a more or less erect shrub and having linear leaves with margins revolute to the midrib and completely obscuring the abaxial lamina, erect stamens that do not obscure the carpels, and the usually long, spreading styles.

Selected specimens examined

SOUTH AUSTRALIA. Deep Creek, 29 Aug. 1959, R. Schodde 1136 (AD; CANB, *n.v.*); c. 3 km W of Flinders Chase National Park (N.P.) headquarters, Kangaroo Island, 8 Oct. 2008, D.J. Duval, T.S. Te & T.D. Jury 1242 (AD); Deep Creek, 16 Aug. 1970, M. Fagg 783 (AD; CANB, *n.v.*); firebreak in Spring Mount Conservation Park (C.P.), 20 m W of Mount Alma Rd, 500 m south of Thompson Rd, c. 13 km NW of Victor Harbor, 19 Aug. 2021, T.A. Hammer 127 (AD, CANB, PERTH); on tk 270 m S of Black Bullock Rd, 1.3 km SW of Stringybark Campsite, Deep Creek N.P., 22 Oct. 2022, T.A. Hammer 331, A.E. McDougall & A. Žerdoner Čalasan (AD, CANB, NSW); 4 km NW of Parndana, Kangaroo Island, 19 Nov. 1989, P.J. Lang & A. Maguire NPKE 30846 (AD); roadside, Kangaroo Island, 3 Oct. 1970, P. Martenz 325 (AD; CANB, MEL, *n.v.*); Yulte C.P., 17 Jan. 1993, D.E. Murfet 1723a & R.L. Tapin (AD); Karatta, near Kelly Hill Caves, Kangaroo Island, 1 Oct. 1986, B.M. Overton 2205 & M. McKelvey (AD); intersection [of] West End Hwy and Playford Hwy, opposite N boundary of Flinders Chase N.P., Kangaroo Island, 30 Oct. 1992, B.M. Overton 2206 (AD).

Hibbertia empetrifolia (DC.) Hoogland

Kew Bull. 29: 155 (1974), p.p. — *Pleurandra empetrifolia* DC., *Regn. Veg. Syst. Nat.* 1: 420 (1817). — **Type citation:** “Hab. in Nova-Hollandia. Herot. (v. s. sp. in h. Lambert.)”. **Holotype:** n.[ova] holl.[andia] [Australia], *s. dat.*, *s. coll.* (G-DC G00201262 image!), *fide* Toelken, *J. Adelaide Bot. Gard.* 18(2): 141 (1998).

Hibbertia empetrifolia subsp. *uncinata* Toelken, *J. Adelaide Bot. Gard.* 18(2): 142, fig. 7G–I (1998). — **Holotype:** New South Wales, 4 miles [c. 6.4 km] SW Mangrove Mountain, R.D. Hoogland 12243 (CANB226041.2). **Isotypes:** CANB226041.1, CANB 226040, K, L, NSW.

Decumbent to scrambling or occasionally erect-spreading multi-stemmed shrubs (0.2–) 0.3–0.5 (–1) m high, branches to 0.6 m long, resprouting after fire. Branchlets slightly ridged, sparsely to moderately pubescent with fine radially spreading fascicled hairs and a few longer simple hairs (to 1 mm long). Leaves shortly petiolate, spreading; petiole 0.2–0.7 mm long; lamina narrowly oblong-elliptic to oblanceolate or obovate or rarely broadly elliptic, 3.2–10 (–16) mm long, (1.2–) 2–4.8 (–6) mm wide; margins entire, weakly to strongly recurved to revolute and usually not obscuring most of the abaxial surface; adaxial surface distinctly to obscurely tuberculate, glabrescent, sparsely to moderately pubescent with tubercle-based simple hairs (to 1 mm long), occasionally with finer antrorse to radially spreading fascicled hairs and rarely with few scattered hooked simple hairs; abaxial surface glabrescent, the raised midrib and margins with more persistent hairs that are typically robust simple hairs and finer fascicled hairs, the lamina glabrous or with sparse to very sparse hooked simple hairs or rarely with a fine fascicled hairs; apex obtuse or rarely acute, often terminated by ± antrorse fascicled hairs. Flowers single, terminal on short-shoots (appearing “axillary”), pedicellate; pedicels 2–9 (–18) mm long, filiform, with the indumentum as for branchlets; bract immediately below the calyx, linear-triangular, (1–) 1.9–3.3 mm long, herbaceous, with mostly robust simple hairs. Sepals 5, unequal; outer sepals elliptic-ovate, 4–4.8 mm long, 1.5–2.3 mm wide, abaxially ± ridged and sparsely hirsute with robust tubercle-based simple hairs over fine spreading to antrorse fascicled hairs, adaxially glabrous except for a few fine fascicled hairs towards the apex, the apex acute to acuminate and with a few terminal hairs; inner sepals oblong to oblong-elliptic, 3.6–4 mm long, 2–2.5 mm wide, abaxially sparsely pubescent with fine, spreading fascicled hairs and a few robust simple hairs mostly near the midrib, adaxially glabrous, the apex obtuse, shortly and bluntly mucronate. Petals 5, yellow, obovate to broadly obovate, 4.2–6.5 mm long, 2.7–4.5 mm wide, emarginate. Stamens (4–) 5–7 (–9), all on one side of and curving over and ± obscuring the gynoeceum, unequal; filaments fused for usually less than half of the length, the fused portion 0.3–0.6 mm long, the free portion 0.5–0.7 mm long; anthers oblong, 1.1–1.4 mm long, 0.4–0.7 mm wide, dehiscent by introrse, longitudinal slits; staminodes absent. Carpels

2; ovaries compressed-ovoid, 0.8–1.2 mm long, hirsute, the hairs denser and longer near the apex; styles 0.6–1 mm long, ascending and curved away from the stamens. *Ovules* 2 per carpel. *Seeds* dark brown, glossy, compressed-globular, c. 2.5 mm long, c. 2.5 mm wide; aril membranous, irregularly lobed, covering approximately the lower half of the seed. **Figs 1C–F & 3C, D.**

Diagnostic features. *Hibbertia empetrifolia* can be distinguished from all other species in the genus by the following combination of characters: indumentum mainly composed of fine fascicled hairs overtopped by larger tubercle-based simple hairs; leaves weakly recurved to revolute (not obscuring the abaxial lamina); flowers pedicellate with (3–) 5–7 (–9) fertile stamens to one side of and curving over two hairy carpels; staminodes absent.

Phenology. Flowers mostly September to March, with a peak in October, but with occasional records in the intervening months.

Distribution and habitat. Occurs from north-eastern NSW to southern Victoria, and in eastern Tasmania (Fig. 2). Found in a variety of habitats, including dry sclerophyll forests, open woodlands, heathlands and coastal sand dunes, and often on sandy or loamy soil with gravel, occasionally associated with sandstone.

Conservation status. Not conservation listed or considered to be at risk.

Notes. Apart from the similarities to *H. appressa* and *H. decumbens* discussed above, *H. empetrifolia* is most commonly confused with *H. aspera*, which occurs from northern Queensland to Victoria (Toelken 1998). *Hibbertia empetrifolia* and *H. aspera* both have 4–9 stamens, but they can be differentiated by *H. aspera* having a tomentose indumentum of predominately spreading fascicled hairs on the abaxial leaf lamina (vs. glabrescent with some hooked hairs or rarely a few fine fascicled hairs). Toelken (1998: 131) identified a few specimens that might be hybrids between *H. aspera* and *H. empetrifolia* based primarily on abnormal pollen. Further work is needed to investigate possible hybridism in these taxa.

Selected specimens examined

NEW SOUTH WALES. Trail leading to Curra Moors, c. 1 km ENE of trail head on E side of Sir Bertram Stevens Dve, Royal N.P., 26 Oct. 2001, *J.W. Horn* 4228 (AD; DUKE, NSW, *n.v.*); along trail, c. 0.2 km N of trailhead at N terminus of Stuarts Rd in Katoomba, 28 Oct. 2001, *J.W. Horn* 4248 (AD; DUKE, NSW, *n.v.*); 800 m S along fire trail from end of Greens Rd, Warrimoo, 22 Mar. 2003, *A.E. Orme* 339 & *L.M. Orme* (AD; CANB, NSW, *n.v.*); c. 8 km N of Colo River crossing on Putty Rd, Parr State Conservation Area, 27 Feb. 2010, *A.E. Orme* 827 (AD; CANB, BRI, MEL, NE, NSW, *n.v.*); tk parallel to Tableland Rd, E of the rd, 800 m S of Great Western Hwy on Tableland Rd, 11 Nov. 2022, *T.A. Hammer* 337 & *A.E. McDougall* (AD, CANB, NSW); Guula Ngurra N.P., on Mount Penang walking trail,

c. 1 km SE of Tugalong Rd, 12 Nov. 2022, *T.A. Hammer* 346 & *A.E. McDougall* (AD, CANB, NSW); on E fire trail in reserve off of William St., Balmoral Village, 150 m NE of gate on William St., 12 Nov. 2022, *T.A. Hammer* 349 & *A.E. McDougall* (AD, CANB, NSW); c. 1 mile [1.6 km] SE of Mt Irvine, along Bilpin Rd, Blue Mountains, 11 Sep. 1972, *R.D. Hoogland* 12249 (CANB; NSW, K, L, *n.v.*); along Nowra-Currarong rd between Crookhaven River and Coonemia Creek, 14 Sep. 1972, *R.D. Hoogland* 12265 (AD, CANB; NSW, K, L, HBG, *n.v.*).

VICTORIA. 21.5 km SSE of Gormandale post office, 2 Oct. 1975, *A.C. Beauglehole* 50272 (CANB, MEL, NSW); Darlimurla Lyrebird Walk area, c. 5 km from Mirboo N on the rd to Morwell in Central Gippsland, 7 Nov. 1997, *R. Carley s.n.* (AD); 5 km NW Mallacoota, 21 Oct. 1991, *J.H. Ross* 3499 (AD, CANB, HO, MEL, NSW).

TASMANIA. St Marys Pass State Reserve, 2 Jun. 1983, *A. Moscal* 2470 (AD, HO, MEL); Reeves Creek, Picnic Rocks, 13 Sep. 1983, *A. Moscal* 2670 (AD, HO, MEL); near St Helens, 16 Nov. 1960, *M.E. Phillips* CBG 24005 (CANB, NSW).

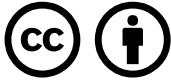
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References

- Australian Plant Census [APC] (2023). Centre for Australian National Biodiversity Research, Council of Heads of Australasian Herbaria. <https://biodiversity.org.au/nsl/services/apc> [accessed: 1 May 2023].
- Department of Agriculture, Water and the Environment [DAWE] (2023). *Australia’s bioregions (IBRA)*, IBRA7, Commonwealth of Australia. <https://www.awe.gov.au/agriculture-land/land/nrs/science/ibra> [accessed: 1 May 2023].
- Hammer, T.A. & Thiele, K.R. (2022–). *Hibbertia*, in P.G. Kodala (ed.), *Flora of Australia*. Australian Biological Resources Study, Department of Climate Change, the Environment and Water: Canberra. <https://profiles.ala.org.au/opus/foal/profile/Hibbertia> [accessed: 1 May 2023].
- Oberprieler, C. (2022). The Wettstein tesseract: A tool for conceptualising species-rank decisions and illustrating speciation trajectories. *Taxon* 72(1): 1–7.
- PlantNET (2023). *Hibbertia empetrifolia* (DC.) Hoogland subsp. *empetrifolia*. In: *The NSW Plant Information Network System*. (Royal Botanic Gardens and Domain Trust: Sydney). <https://plantnet.rbgsyd.nsw.gov.au> [accessed: 28 June 2023].
- Thiele, K.R. (2017). A revision of the *Hibbertia lineata* (Dilleniaceae) species group. *Nuytsia* 28: 173–191.

- Thiele, K.R. (2019). A revision of the *Hibbertia commutata* (Dilleniaceae) species group. *Australian Systematic Botany* 32: 71–109.
- Toelken, H.R. (1998). Notes on *Hibbertia* (Dilleniaceae) 2. The *H. aspera* – *empetrifolia* complex. *Journal of Adelaide Botanic Gardens* 18(2): 107–160.
- Toelken, H.R. (2010). Notes on *Hibbertia* (Dilleniaceae) 5. *H. melhanioides* and *H. tomentosa* groups from tropical Australia. *Journal of the Adelaide Botanic Gardens* 23: 1–117.



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