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Hibbertia doleritica (Dilleniaceae), a new Tasmanian species related to *H. basaltica*

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Abstract

Populations of a Tasmanian endemic and range-restricted *Hibbertia* (Dilleniaceae) that are close to but consistently different in morphology from the endangered *H. basaltica* A.M.Buchanan & Schah. are described as the new species *Hibbertia doleritica* Schah. While separated geographically by at most *c.* 20 kilometres, and growing at their closest approach only *c.* 3 km apart, the two species occur on different substrates and are likely to provide a case study in ecological speciation driven by adaptation to specific soil types. Both species are range-restricted and occur in areas that have been largely cleared of native vegetation.

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Introduction

Hibbertia basaltica A.M.Buchanan & Schah. was described in 2005 to accommodate plants from a small area of basalt native grasslands bordering a *c.* 7 km stretch of the Jordan River near Pontville (Map 1), *c.* 20 km north of Hobart (Buchanan & Schahinger 2005). At the time, the species was known from three small subpopulations, mostly on private land, with an extent of occurrence of *c.* 3 km^2. *Hibbertia basaltica* is listed as Endangered under the Tasmanian *Threatened Species Protection Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. One subpopulation is now conserved in the Jordan Nature Reserve, but others are on unprotected private lands.

At the time of description of *Hibbertia basaltica*, a population that closely resembled it, but was morphologically slightly different, was known from dolerite substrates near Richmond, *c.* 13 km from Pontville. Buchanan and Schahinger did not include this population in their circumscription of *H. basaltica*. It was instead given the informal name '*H.* sp. Richmond dolerite (R.Schahinger HO528055)' at the Tasmanian Herbarium and subsequently utilised in the Tasmanian Government's 'Natural Values Atlas' database; the name, however, was not

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used in publications and was not taken up on the Australian Plant Name Index (Council of Heads of Australasian Herbaria 2006–).

Hibbertia basaltica and '*H.* sp. Richmond dolerite' have an unusual stamen arrangement within the genus, with three to five stamens on one side of the two carpels and usually one on the other. Only one other species, *H. dispar* Toelken, shares this arrangement (Toelken 2013). In Tasmania, *H. dispar* is only known from Flinders Island. It also occurs in Victoria and N.S.W.

In describing *H. dispar*, Toelken (2013) also treated *H. basaltica*, into which he chose to include the dolerite subpopulation near Richmond, without discussion. Additional subpopulations on dolerite have been found in the interim, at Tea Tree (3.2 km from the Pontville subpopulation of *H. basaltica*), Dulcot, Mount Direction and Flagstaff Hill. Extensive field observations by one of us (RS) between 2005 and the present, and by KT and RS in 2024, indicate that the dolerite and basalt populations are consistently morphologically different, and the differences cannot be adequately explained by simple environmental variation. Accordingly, the dolerite populations are here described as *Hibbertia doleritica* Schah., and the circumscription of *H. basaltica* again restricted to the Pontville basalt populations only.

Taxonomy

Key to species of *Hibbertia* with three to five stamens on one side of two carpels and usually one on the other

1. Adaxial leaf surface and abaxial midrib with simple hairs only; undersurface of leaves usually not visible between central vein and revolute margins. (Furneaux Group, Tas.; eastern Vic., southeastern N.S.W.) ***Hibbertia dispar***

1. Adaxial leaf surface and abaxial midrib with mixed simple and fascicled hairs; undersurface of leaves usually visible between central vein and revolute margins. (southeastern Tas.) **2**

2. Pedicels usually > 6 mm long; petals 7.5–10 mm long × 6.5–8 mm wide, overlapping (sepals usually not visible from above at anthesis); consistently with 4–5 stamens on one side of the ovaries and 1 on the other side ***Hibbertia basaltica***

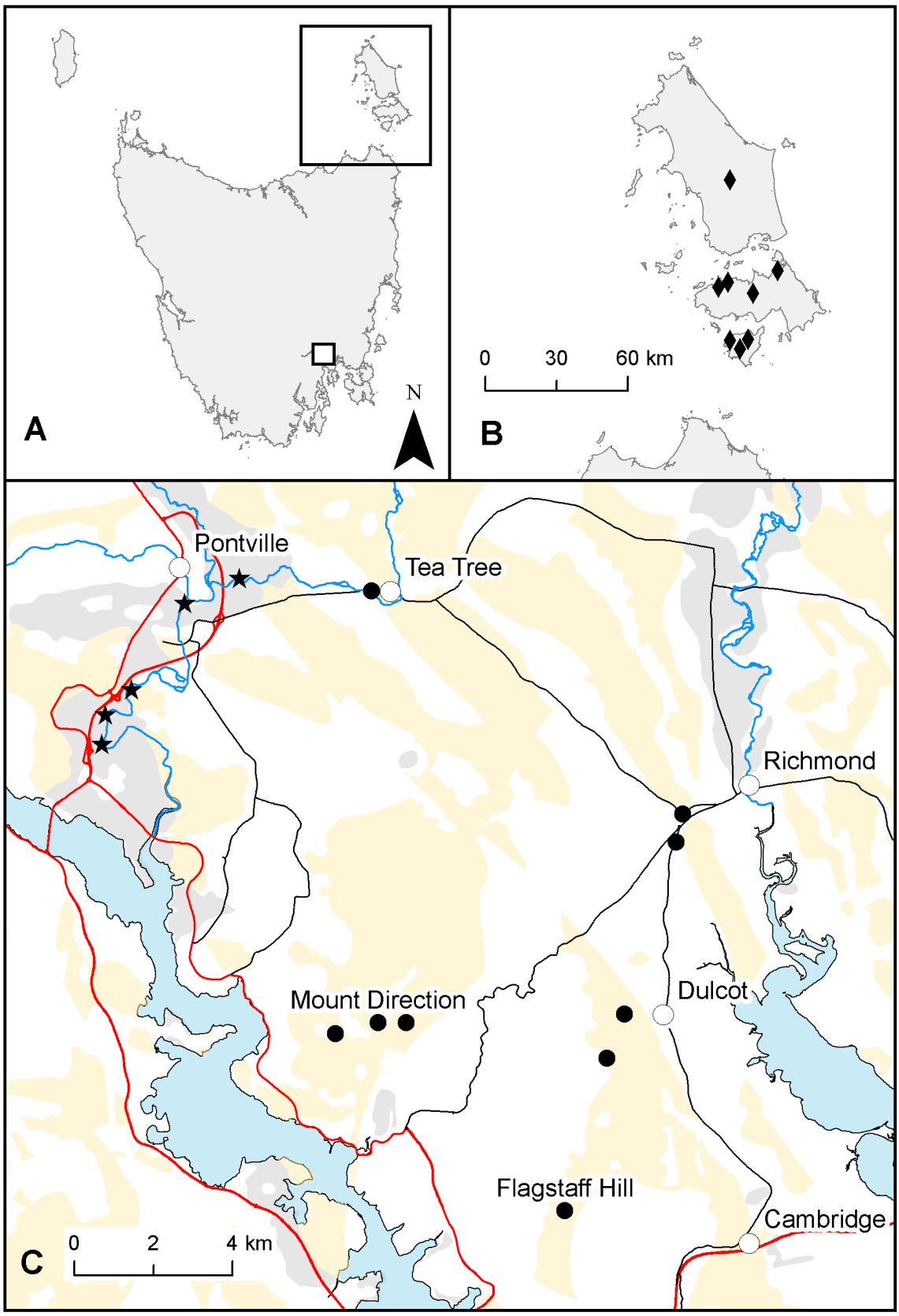
2. Pedicels usually < 4 mm long; petals 5–6(–8) mm long × 2–3.5(–4.5) mm wide, not overlapping (sepals visible from above at anthesis); (1)2–5(−7) stamens on one side of the ovaries and 0 or 1 on the other side ***Hibbertia doleritica***

Hibbertia doleritica Schah., *sp. nov.*

Type: Tasmania, Middle Tea Tree Road at southeastern foot of Jones Sugarloaf, 30 Oct. 2024, *R.B. Schahinger* s.n. (holo: HOBART 620878; iso: AD, CANB).

Prostrate to procumbent or decumbent subshrubs to 35 cm high, multi-stemmed at base and resprouting from a woody rootstock after fire or browsing. Branches to 60 cm long, with a dense covering of short fascicled hairs and scattered simple hairs to 1.5 mm long. Leaves scattered, shortly petiolate, linear-oblong, 3–7 mm long × 1–1.6 mm wide, with moderately dense forward-directed simple acicular hairs to 1.2 mm long and occasional smaller forked hairs adaxially, becoming glabrescent with age; axillary hair-tufts to 0.8 mm long; abaxial midrib confluent with the apical margins, with scattered short simple and fascicled hairs; abaxial lamina densely fascicled-tomentose; margins recurved to the midrib but usually not tightly appressed to it; apex blunt with a terminal tuft of hairs. Flowers solitary, terminating lateral short-shoots, pedicellate; pedicels 2.5–4(–10) mm long, recurved and lengthening at fruiting stage, with moderately dense short fascicled hairs and occasional longer simple hairs; bract single, attached in the lower to middle third of the pedicel, flat, narrowly elliptic, 2.5–3.0 mm long, with vestiture as per leaves. Sepals imbricate, spreading, persistent, the two outer lanceolate to narrow-ovate, distinctively ridged, 4.5–5.5 mm long ×1.5–2.5 mm wide, the three inner similar to the outer but scarcely ridged, and broader (to 3.5 mm wide); exposed outer surfaces of sepals (i.e., prior to anthesis) bearing numerous long simple and short fascicled hairs, the membranous marginal surfaces glabrous; unexposed outer surfaces with a dense cover of short fascicled hairs; inner surfaces mostly glabrous but with scattered short fascicled and simple hairs distally. Petals 5 (rarely 4), yellow, 5–6(–8) mm long, 2–3.5(–4.5) mm wide, caducous, obovate to oblong or cuneate, bilobed, the margins often irregularly lobed, not overlapping so that the sepals are visible between them when viewed from above at anthesis. Stamens erect, (1)2–5(–7) on one side of the carpels and 0 or 1 on the other; filaments and anthers ± equal, their combined length 3–3.5 mm; anthers narrowly rectangular, dehiscing by longitudinal slits; one or more outermost stamens rarely reduced and not producing fertile anthers. Carpels 2(3), free; ovaries globular, shortly pubescent; styles attached at the dorsal apex of each ovary, spreading and erect, 2–3 mm long. Ovules 4–6 per carpel. *Seeds* subglobular, 1.6–2.0 x 1.2–1.5 mm, reddish brown, smooth; aril with fleshy attachment, surmounted by a lobed membranous cup covering the lower third of the seed. **Dolerite guinea flower.**

Other specimens examined (All HO). TASMANIA: 2 km W of Richmond at SE foot of Jones Sugar Loaf, 17 Feb. 1985, *A.M. Buchanan 5664* (HO 406643); N end of Butchers Hills, 2 km W of Richmond, 10 Nov. 1991, *P. Collier 5302* (HO 411284); SE foot of Jones Sugarloaf. 2 km W of Richmond, 15 Oct. 2004, *R.B. Schahinger* s.n. (HO 528055); S boundary of 1319 Richmond Road, 31 May 2004, *A.J. North* s.n. (HO 527814); Dulcot. c. 420 m southeast of the sealed end of George Street, 17 Oct 2013, *M.F. de Salas 420* (HO 571198); Tea Tree. Tea Tree Road,



Map 1. Distributions of *Hibbertia basaltica*, *H. doleritica* and *H. dispar* in Tasmania. A—base map showing locations of detailed maps; B—distribution of *H. dispar* (diamonds) in Tasmania (also occurs in Victoria and NSW); C—distributions of *H. basaltica* (stars) and *H. doleritica* (closed circles). Shaded areas are Tertiary basalt (grey) and dolerite (pale yellow). Roads are shown as red (major) and black (minor) lines.

Figure 1. *Hibbertia doleritica*: Mount Direction Conservation Area.

c. 700 m W of Merriworth Road intersection, 17 Oct 2013, *M.F. de Salas 414* (HO 571203); Richmond, Middle Tea Tree Road, c. 900 m W of Richmond Road, 17 Oct 2013, *M.F. de Salas 416 & 417* (HO 571204, HO 571205); Tea Tree. Tea Tree Road, c. 700 m W of Merriworth Road intersection, 30 Oct 2013, *M.F. de Salas 425–427* (HO 572646–572648); Road cutting west of Tea Tree, 14 Nov. 2014, *A.J. North* s.n. (HO 579180); Upper eastern flanks of Mount Direction, 25 Oct. 2024, *R. Schahinger* s.n. (HO 620879); Mount Direction Conservation Area, track to Gunners Quoin, 3 Nov. 2024, *R. Schahinger* s.n. (HO 620877); Dulcot, SW corner of George Street & Boldrewood Court junction, 5 Nov. 2024, *R. Schahinger* s.n. (HO 620876); Flagstaff Hill (upper western slopes), 13 Nov. 2024, *R. Schahinger* s.n. (HO 620963); Southern boundary of 1319 Richmond Road, 15 Nov. 2024, *R. Schahinger* s.n. (HO 620962).

Diagnostic features. Prostrate to procumbent or decumbent subshrubs to 0.35 m high; stems with axillary hair tufts to 0.8 mm long; leaves linear-oblong, the margins revolute and usually not completely obscuring the abaxial surface, with antrorse simple and few-branched fascicled hairs adaxially and on the abaxial midrib (protruding tubercles absent), the abaxial lamina densely tomentose; flowers pedicellate, the pedicels 2.5–4 (–10) mm long, the primary bract below the middle of the pedicel; sepals pubescent to hirsute, with simple hairs overtopping short fascicled hairs; petals 5–6(–8) mm long × 2–3.5(–4.5) mm wide, narrowly obovate to oblong to cuneate, not overlapping at anthesis; stamens (1)2–5(–7) on one side of the carpels and 0 or 1 on the other; carpels 2(3), pubescent, 4(–6)-ovulate.

Phenology. Flowering September–November, peaking in late October; mature seeds from mid-November.

Distribution & habitat. Currently known from five locations in southeastern Tasmania (Richmond, Tea Tree, Dulcot, Mount Direction, Flagstaff Hill; Map 1), with a linear range of 16.5 km, extent of occurrence 85 km^2, and altitude range 25–345 m above sea level. *Hibbertia doleritica* grows on shallow dolerite soils, in grassland or open grassy shrubland at Richmond and Tea Tree, and in open grassy or shrubby woodland at the higher altitude Dulcot, Mount Direction and Flagstaff Hill sites; a single very small patch is also known from deep sands along Richmond Road immediately downslope of a dolerite hillside. Associated species: *Eucalyptus viminalis*, *E. pulchella, E. globulus*, *Acacia mearnsii*, *Bursaria spinosa*, *Allocasuarina verticillata*, *Ozothamnus scutellifolius*, *Hibbertia hirsuta*, *Styphelia humifusa*, *Poa rodwayi*, *Themeda*

Figure 2. *Hibbertia doleritica*: flower detail (from the type locality along Middle Tea Tree Road). Note the narrow, clearly separated petals, with the sepals visible from above at anthesis.

triandra, *Lomandra longifolia*. The annual rainfall in the area is 500–600 mm.

Conservation status. Reserved in Mount Direction Conservation Area; the Flagstaff Hill site is on private land covered by a Conservation Covenant under the Tasmanian *Nature Conservation Act 2002*. The Richmond, Dulcot and Tea Tree sites occur mostly within roadside easements, the one at Tea Tree being managed by Tasmania's Department of State Growth as part of their Roadside Conservation Sites Program; plants extend onto private land adjoining each of these roadside sites to an unknown distance. Total number of plants in the population currently estimated to be in the order of 1000 to 1500, though large areas of potential habitat—mostly on private land—remain to be surveyed. Further field surveys are required to determine the conservation status of *Hibbertia doleritica*.

Etymology. From the taxon's preferred substrate, Jurassic dolerite.

Notes. Hibbertia doleritica is closely related to *H. basaltica,* a taxon restricted to basalt soils along the rocky slopes of the Jordan River near Pontville (Buchanan & Schahinger 2005; Threatened Species Section 2013). It differs from that species in having shorter pedicels, much hairier branchlets, leaves and sepals, and smaller flowers with narrower (and sometimes irregularly shaped) petals, with the sepals clearly visible at anthesis between adjacent petals. By contrast, *H. basaltica* has longer pedicels, less hairy branchlets, leaves and sepals, and broadly obovate petals that overlap at anthesis, obscuring the sepals when viewed from above. In addition, *H. doleritica* has (1)2–5(−7) stamens on one side of the ovaries and 0 or 1 on the other side, whereas *H. basaltica* consistently has 4–5 stamens on one side of the ovaries and 1 on the other side.

Figure 3. *Hibbertia doleritica*: leaf detail.

The variability in stamen numbers in *Hibbertia doleritica* is similar to that noted for the closely allied *H. dispar* Toelken (Toelken 2013). Specifically, some *H. doleritica* subpopulations have the majority of flowers with a single stamen on one side of the ovaries and a cluster of stamens on the other, while in other subpopulations the single stamen may be missing in most flowers. Flowers with three ovaries are quite common in some *H. doleritica* subpopulations. Toelken (2013) postulated that such variation in *H. dispar* '... could present a developmental link from flowers of the *H. vestita* group with usually 3 ovaries and 5 groups of stamens to 2 ovaries and 1 group of stamens in most species of the subg. *Hemistemma'*. However, preliminary (unpublished) genus-wide molecular phylogenies do not support such a relationship between these morphological traits.

We considered, and rejected, including populations of *H. doleritica* under a more broadly circumscribed *H. basaltica*, as we believe the pattern of variation between populations supports the recognition of both as distinct species. The Tea Tree population of *H. doleritica* is only 3.2 km from the Pontville population of *H. basaltica*, but is more similar to the most distant population of *H. doleritica* (at Flagstaff Hill) than it is to *H. basaltica*. That is, there is no indication that the variation is clinal. Populations of each species are morphologically consistent in petal width and pedicel length, with no indication that the differences are plastic responses to different micro-environments. Nevertheless, the close proximity of these two, clearly closely-related species, is remarkable. We speculate that this may be a case of ecological speciation, where each species has adapted to its substrate, hybridisation is disadvantageous because the substrates do not grade into each other and hybrids would have reduced fitness on either substrate, and hence breeding barriers have evolved to reduce the chances of hybridisation, leading to the genetic and evolutionary separation of lineages (i.e., speciation). Careful and detailed genetic and breeding studies would be needed to confirm this scenario.

Figure 4. *Hibbertia doleritica*: wiry subshrub habit at the type locality on Middle Tea Tree Road.

Hibbertia basaltica A.M.Buchanan & Schah.

Type: Tasmania, old quarry near ford, Ford Rd, Pontville, 8 Oct. 2004, *A.M.Buchanan* s.n. (holo: HO527774; iso: AD).

Prostrate to procumbent subshrubs, multi-stemmed at base and resprouting from a woody rootstock after fire or browsing. Branches to 40 cm long, with a sparse covering of short fascicled hairs with or without scattered simple hairs. Leaves scattered, shortly petiolate, linear-oblong, 3–8.5 mm long × 1–1.8 mm wide, with scattered forward-directed simple acicular hairs to 0.5 mm long and occasional smaller fascicled hairs adaxially, becoming glabrescent with age; axillary hair-tufts to 0.7 mm long; abaxial lamina densely fascicled-tomentose; abaxial midrib confluent with the apical margins, with sparse, short, simple and fascicled hairs; margins recurved to the midrib but not tightly abutting it; apex blunt with a terminal tuft of hairs. Flowers solitary, terminating lateral short-shoots, pedicellate; pedicels 6–14(–20) mm long, recurved and lengthening at fruiting stage, with moderately dense short stellate hairs and very occasional longer simple ones to 0.7 mm long. Bract 1(2) attached in the middle to lower third of the pedicel, flat, narrowly elliptic, 1.5–3.0 mm long, with vestiture as per the leaves. Sepals with numerous long simple and short fascicled hairs on surfaces that are exposed before anthesis, the inner sepals densely and shortly fascicled-pubescent where covered by the outer in bud; outer sepals narrowly ovate-acuminate with prominent midribs, 4.5–5.5 mm long, 2.5–3 mm wide; inner sepals similar to the outer but scarcely ridged, less acuminate and broader, with glabrous membranous margins; inner surfaces mostly glabrous except for scattered short fascicled and simple hairs distally. Petals 5 (rarely 4), yellow, 7.5–10 mm long, 6.5–8 mm wide, obcordate, overlapping and largely covering the sepals when viewed from above at anthesis. Stamens erect, (3)4 or 5(–7) on one side of the carpels and 1 (rarely 0) on the other; filaments and anthers ± equal, their combined length *c.* 3.5 mm; anthers narrowly rectangular, dehiscing by longitudinal slits. Carpels 2(3), free; ovaries globular, shortly pubescent; styles attached at the dorsal apex of each ovary, spreading and erect, c. 3 mm long; ovules 4(5) per carpel. Seeds subglobular, 1.5–2 mm diam., smooth, reddish brown. **Basalt guinea flower.**

Other specimens examined (All HO). **TASMANIA**: Old quarry near ford, Ford Rd, Pontville, 8 Oct. 2004, *A.M. Buchanan 16138 & 16139* (HO 527774, HO 527775); S of ford across Jordan River, Pontville, 13 Oct. 2004, *R. Schahinger* s.n. (HO 530838, HO 530839); Bagdad Rivulet, upstream of ford across Jordan River, 26 Oct. 2004, *R. Schahinger* s.n. (HO 530837); 'Horses Head', E side of the Jordan River, c. 2 km SSW of Brighton, 27 Oct. 2004, *R. Schahinger* s.n. (HO 529454); 1 km S of Brighton, on slopes above Jordan River (E side), 6 Dec. 2004, *R. Schahinger* s.n. (HO 529455); Pontville, crown land block adjacent to river, 3 Dec. 2007, *M. Visoiu 371* (HO 546533); Crown Land Reserve, Brighton. Near river crossing on

Figure 5. *Hibbertia doleritica*: prostrate/procumbent habit at Mount Direction.

Ford Road, 3 Oct. 2011, *M.L. Baker 2587, A.M. Gray* & *M.F. de Salas* (HO 563848) .

Diagnostic features. Prostrate to procumbent subshrubs; stems with axillary hair tufts to 0.7 mm long; leaves linear-oblong, with scattered antrorse simple and few-branched fascicled hairs adaxially and on the abaxial midrib (protruding tubercles absent), the abaxial lamina densely tomentose; margins revolute and not completely obscuring the abaxial surface; flowers pedicellate, the pedicels 6–14(–20) mm long, the primary bract below the middle of the pedicel; sepals sparsely pubescent, with simple hairs overtopping short fascicled hairs; petals 7.5–10 mm long × 6.5–8 mm wide, obcordate, usually overlapping at anthesis; stamens (3)4 or 5(–7), all on one side of the carpels except for 1 that is opposite the others; carpels 2 (rarely 3), pubescent, 4(5)-ovulate.

Phenology. Flowering September–November, peaking in late October.

Distribution & habitat. Hibbertia basaltica is known from the Pontville–Brighton–Bridgewater area in southeastern Tasmania (Map 1), where it is associated with rocky basalt outcrops on slopes adjacent to the Jordan River (Buchanan & Schahinger 2005). Several patches have been recorded along a 7 km stretch of river, with an altitude range of 15 to 45 m. The species occurs in native grassland dominated by *Themeda triandra, Poa rodwayi* and *Austrostipa* spp., with the occasional tall *Bursaria spinosa*. Annual rainfall in the area is 500–600 mm.

Conservation status. Reserved in Jordan Nature Reserve (includes the type locality). Currently listed as Endangered under the Tasmanian *Threatened Species Protection Act 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Notes. See Notes on *H. doleritica* for key differences between the two species and justification for the treatment of *H. doleritica* as distinct from *H. basaltica*.

Disclosures

The authors have nothing to declare.

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References

Buchanan, A.M. & Schahinger, R.B. (2005). A new endemic species of *Hibbertia* (Dilleniaceae) from Tasmania. *Muelleria* 22: 105–109.

Council of Heads of Australasian Herbaria (2006–). *National Species List*. https://biodiversity.org.au/nsl/ [accessed 28 Nov 2024].

Figure 6. *Hibbertia basaltica* at Jordan Nature Reserve, Pontville.

Toelken, H.R. (2013). Notes on *Hibbertia* subgen. *Hemistemma* (Dilleniaceae). 9. The eastern Australian *H. vestita* group, including *H. pedunculata* and *H. serpyllifolia*. *Journal of the Adelaide Botanic Gardens* 26: 31–69.

Toelken, H.R. (2014). Notes on *Hibbertia* (Dilleniaceae). 10. *Hibbertia hirsuta* (subgen. *Hemistemma*: *H. vestita* group) does occur in South Australia and Tasmania. *Journal of the Adelaide Botanic Gardens* 27: 35–39.

Threatened Species Section (2013). Listing Statement for *Hibbertia basaltica* (basalt guineaflower), Department of Primary Industries, Parks, Water & Environment, Tasmania.

Figure 7. *Hibbertia basaltica:* flower detail. Note the broad, overlapping petals that obscure the sepals from above at anthesis.

Figure 8. *Hibbertia basaltica:* leaf detail.

Figure 9. *Hibbertia basaltica* habitat at Jordan Nature Reserve, Pontville.
