Zieria abscondita P.I.Forst. (Rutaceae), a new and restricted species from south-east Queensland

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Summary

Forster, P.I. (2020). *Zieria abscondita* P.I.Forst. (Rutaceae), a new and restricted species from south-east Queensland. ***Austrobaileya* 10(4): 621–627**. The new species *Zieria abscondita* is described and compared to *Z. furfuracea* R.Br. ex Benth. *Zieria abscondita* is restricted to rhyolite substrates at a single location and differs in the foliage gland and indumentum composition and cover, flower colour and size from *Z. furfuracea*. The new species is illustrated with line drawings and habitat photographs. *Zieria abscondita* is considered to be Critically Endangered based on its single location and very restricted extent of occurrence and area of occupancy. New combinations are *Zieria euthadenia* (J.A.Armstr.) P.I.Forst. comb. & stat. nov. and *Z. gymnocarpa* (J.A.Armstr.) P.I.Forst. comb. & stat. nov., both based on taxa previously included as subspecies of *Z. furfuracea*. Revisions to the identification key for Queensland *Zieria* are provided to accommodate the three additional species.

Key Words: Rutaceae; *Zieria*; *Zieria abscondita*; *Zieria euthadenia*; *Zieria furfuracea*; *Zieria gymnocarpa*; Australia flora; Queensland flora; new species; taxonomy; identification key; conservation status; critically endangered

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Introduction

The genus *Zieria* Sm. currently comprises 62 species of which 61 are endemic to Australia and one to New Caledonia (George *et al*. 2013; Barrett *et al*. 2014, 2018; Duretto 2019). Taxonomy of the numerous species complexes has not been easy to resolve with many widespread species being highly variable as reflected in the genetic sequence data that has been analysed so far. The species have been defined from a morphological perspective, by sorting of character states based on differences in glandular and indumentum development on both the foliage and reproductive structures, as well as floral, fruit and seed characters.

Hypotheses on speciation in *Zieria* have been previously presented (Duretto & Forster 2007), with the concept from a genetic perspective of incomplete lineage sorting being proposed by Barrett *et al*. (2018) as an explanation in part for the complex radiation and incongruence that has occurred.

Thirty-seven species of *Zieria* have been previously recognised for Queensland (Duretto & Forster 2007; George *et al*. 2013; Duretto 2019). In the current paper a further species is added that was discovered during fieldwork in 2017, and two subspecies are raised to species rank, thus bringing the total to forty.

Materials and methods

The results and conclusions in this paper are based on study of specimen collections at the Queensland Herbarium (BRI) and habitat fieldwork for all three species. Measurements in descriptions are inclusive, i.e. 1.0–1.7 is given as 1–1.7.

Taxonomy

Zieria abscondita P.I.Forst. **sp. nov.** Similar to *Zieria furfuracea* but differing in the leaflets with obvious venation below due to less indumentum, the inflorescences with fewer flowers and the smaller flowers that have corolla lobes lacking an inflexed mucro.

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Typus: Queensland. Moreton District: Bloodwood Creek Nature Refuge, Crossdale, 6 December 2017, *P.I. Forster PIF45381 & G. Leiper* (holo: BRI [2 sheets]; iso: CNS, MEL, NSW, US).

Shrub to 2 m tall, forming an open straggly bush. Stems erect, wiry; branches without decumbent leaf bases, sparsely glandular verrucose, densely tomentose with an indumentum admixture of stellate and simple trichomes that are persistent on the leafy stems. Leaves palmately trifoliate; petioles 5–12 mm long, 0.4–0.5 mm diameter, sparsely (though very noticeably) glandular verrucose and densely tomentose with an indumentum admixture of stellate and simple trichomes, pale green; terminal leaflets narrowly elliptic, 13–36 mm long, 4–7 mm wide, lateral leaflets similar to terminal leaflets but smaller, leaflet length/width ratio: 3.3–7.3, adaxially with venation largely obscure, sparsely glandular verrucose and with scattered indumentum of bifid, simple and stellate trichomes, matt mid green, abaxially with 8–10 lateral (secondary) veins obvious and some interlateral (tertiary) veins visible, sparsely glandular verrucose and with dense indumentum of simple and stellate trichomes, silver-green, tip acute to obtuse, margins entire and somewhat sinuate, recurved becoming strongly revolute when drought stressed. Inflorescence axillary, shorter than the subtending leaf, 3–12+flowered, sparsely glandular verrucose and with a sparse indumentum of simple and stellate trichomes with the latter mainly restricted to the glands; peduncle 4–14 mm long, bracts linear, 0.6–0.8 mm long, *c.* 0.1 mm wide, caducous, secondary peduncles 1–5 mm long. Flower pedicels 1.2–2 mm long, not glandular verrucose, with sparse indumentum of simple and stellate trichomes; sepals ovate-triangular, weakly imbricate in bud, 0.7–1 mm long, 0.7–0.8 mm wide, tip acute, adaxially weakly but obviously glandular verrucose and with scattered indumentum of simple and stellate trichomes, abaxially with dense indumentum of simple and stellate trichomes, the latter particularly near the margins; petals elliptic, valvate, 1.8–2.2 mm long. 0.7–1.3 mm wide, white to somewhat cream on drying, tips acute and not with an inflexed mucro, not obviously glandular verrucose, both adaxially and abaxially with dense indumentum of stellate trichomes; staminal filaments dilated basally, 1–1.2 mm long, glabrous, eglandular; anthers *c.* 0.5 mm long, apiculum absent; gynoecium glabrous. Fruit cocci 2.6–3 mm long, 1.7–1.8 mm wide, weakly glandular verrucose, glabrous. Seeds not seen. **Figs. 1 & 2**.

***Additional specimens examined*: Queensland.** Moreton District: Bloodwood Creek Nature Refuge, Crossdale, Sep 2017, *Forster PIF45321 et al.* (BRI); *ibid*, Sep 2017, *Forster PIF45334 et al.* (BRI, MEL).

***Distribution and habitat*:** *Zieria abscondita* is known from a single location at Crossdale (**Fig. 3**) where it occurs more or less continuously for at least 500 m in a thin linear strip along an incised waterway carved through rocky terrain derived from a large rhyolitic intrusion (Leven 1977). The vegetation comprises a low woodland dominated by an overstorey of *Eucalyptus dura* L.A.S.Johnson & K.D.Hill and *Lophostemon confertus* (R.Br.) Peter G.Wilson & J.T.Waterh. with a midstorey and understorey thicket of *Bertya opponens* (F.Muell. ex Benth.) Guymer, *Grevillea banksii* R.Br., *Eucalyptus exserta* F.Muell., *Kunzea flavescens* C.T.White & W.D.Francis and *Z. abscondita*, as well as numerous vinethicket elements.

***Notes*:** Relationships for *Zieria abscondita* can be sought with *Z. furfuracea* R.Br. ex Benth. as the two species share many similarities. The molecular sequence work of Barrett *et al*. (2018) indicated that the current taxonomy of *Z. furfuracea* with three subspecies was not monophyletic with the inference that the subspecies are worthy of specific rank which is formally undertaken below. That observation has also influenced the decision to describe this taxon at specific rank rather than adding it as a further subspecies of *Z. furfuracea*. There are no known intermediate populations between *Z. abscondita* and the three previously recognised subspecies of *Z. furfuracea* with all taxa being very disjunct

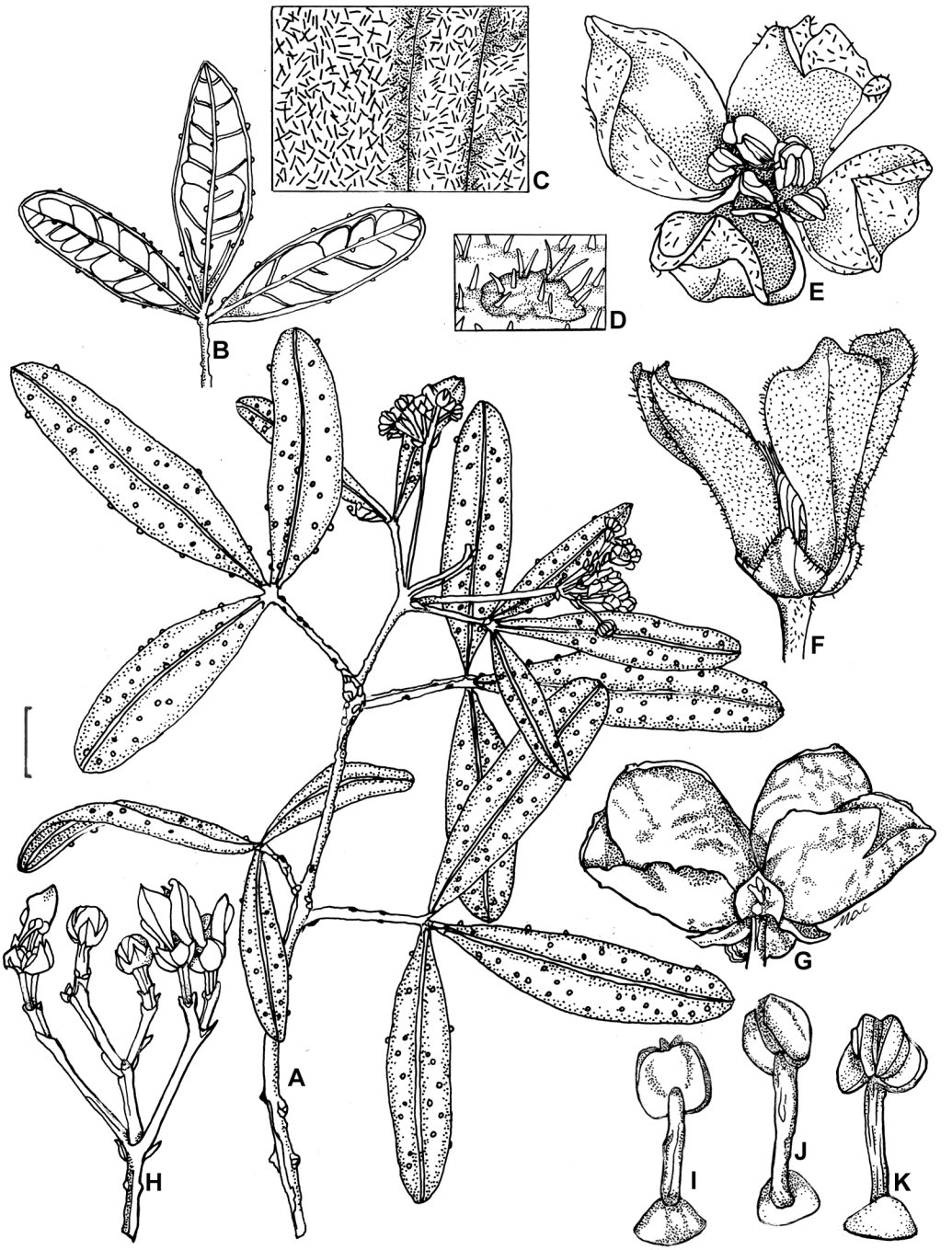

Fig. 1. ***Zieria abscondita***. A. habit of flowering branchlet ×1.5. B. abaxial view of leaf showing venation ×2. C. indumentum cover on abaxial leaf surface ×30. D. inflorescence with flowers ×4. E. side view of flower ×10. F. face view of flower ×18. G, H, I. revolving views of the stamen showing the basal dilation ×20. J. fruit comprising two dehisced cocci ×10. A–D, J from *Forster PIF45334 et al.* (BRI); E–I from *Forster PIF45381 & Leiper* (BRI). Scale bar = 10 mm ×1 magnification. Del. N. Crosswell.

Fig. 2. ***Zieria abscondita***. Flowering branchlet (*Forster PIF45381 & Leiper*, BRI). Photo: G. Leiper.

Fig. 3. Habitat of ***Zieria abscondita*** (*Forster PIF45381 & Leiper*, BRI). Photo: G. Leiper.

from one another with populations of *Z. euthadenia* (J.A.Armstr.) P.I.Forst. *c*. 60 km northeast and *Z. gymnocarpa* (J.A.Armstr.) P.I.Forst. *c*. 70 km east-southeast distant. Both *Z. euthadenia* and *Z. gymnocarpa* occur near the coast in much higher rainfall areas with the former on substrates derived from metamorphics and sandstones, and the latter on sandstones. *Zieria furfuracea s.str.* is endemic to north-east New South Wales at least 260 km to the south.

That aside, *Zieria abscondita* differs from *Z. furfuracea s.l.* in the abaxial leaflet venation being evident (this is mainly due to the sparser and considerably shorter indumentum cover), the few flowered inflorescences (3–12 versus 20–125) and the smaller flowers (corolla petals 1.8–2.2 mm long and lacking an inflexed apical mucro, versus 2.3–3.5 mm long and with an inflexed apical mucro (Armstrong 2002)). It is not noticeably aromatic presumably due to the reduced development of the foliar glands and their much smaller size (although still visible to the naked eye, **Fig. 2**), and is much less velvety hairy, whereas all the previously recognised subspecies of *Zieria furfuracea* are noticeably aromatic and velvety hairy. The fruit of *Zieria abscondita* are glabrous, whereas both *Z. furfuracea* and *Z. euthadenia* are very hairy and both have valvate corollas. In comparison *Z. gymnocarpa* has glabrous fruit and an imbricate corolla. It should be noted most of these characters are relatively minor in the overall scheme of classification and reinforces my earlier comment that the species are examples of 'non-adaptive radiation' accompanied by a 'high lineage diversification rate' (Duretto & Forster 2007). In simpler terms this means that the taxa under discussion are defined by combinations of variations in foliage, size, gland development and indumentum cover and mixture, rather than markedly striking morphological differences.

Zieria abscondita is also somewhat similar to *Z. cytisoides* in terms of its general appearance and shares with that species the distinctively raised lateral venation in the abaxial surface of the leaflets. The two species differ most noticeably in the glandular verrucose foliage (versus not) and the small cream flowers of *Z. abscondita* (versus large pink flowers with sepals 2.5–3 mm long, and a corolla with petals 3.6–6 mm long).

The characters of *Zieria abscondita* will confound the key to Queensland *Zieria* species (Duretto & Forster 2007) at couplet 6 for *Z. graniticola* and *Z. inexpectata*. *Z. abscondita* will key if that couplet is replaced with the following.

6 Terminal leaflets to 7 mm long . . . . . **Z. inexpectata**
6. Terminal leaflets greater than 7 mm long. **6a**

6a Leaf petioles 5–12 mm long; terminal leaflets 4–7 mm wide; petals 1.8–2.2 × 0.7–1.3 mm, white to somewhat cream . . . . . **Z. abscondita**
6a. Leaf petioles 1–3 mm long; terminal leaflets 1.5–4 mm wide; petals (2.5–)3.5–4.5 × 2–2.5 mm, pale pink . . . . . **Z. graniticola**

***Conservation status*:** *Zieria abscondita* is known from a single location where it is locally abundant and wholly within the Bloodwood Creek Nature Refuge. The total extent of occurrence is less than 1 km^2 and the area of occupancy is much less. The population appeared in good condition in 2017 with many seedlings evident. At least several hundred adult plants were observed.

While there are no obvious threats, using the IUCN (2012) criteria, the species can be assessed as being **Critically Endangered** under **B1a, c(ii,iv), 2a, c(ii,iv)** and **C2(a)(ii)**. Ongoing threatening processes at the location include intermittent drought and wildfires, both likely to be exacerbated under climate change projections of a hotter and drier climate

with increasing severe fire weather (Dowdy *et al*. 2015; Hoffman *et al*. 2019). The *Zieria* is restricted to a very narrow band of vegetation along the creek bank and is not found upslope or on the surrounding hillsides; presumably there is some moisture dependency along the creek line. The habitat periodically burns although is actively managed for fires. Under extreme to catastrophic fire conditions, the *Zieria* habitat is likely to be completely burnt and any regeneration would be from a soil seed bank if the species is not a resprouter.

The location has one other listed threatened plant present, namely *Plectranthus leiperi* P.I.Forst. (Vulnerable), although it does not co-occur with the *Zieria*.

***Etymology*:** The specific epithet is from the Latin *absconditum* (hidden, concealed) and alludes both to the occurrence of this species in a rocky gorge and to its late discovery subsequent to many published works on the genus.

New combinations

1. Zieria euthadenia (J.A.Armstr.) P.I.Forst., **comb. et stat. nov.**; *Zieria furfuracea* subsp. *euthadenia* J.A.Armstr., *Austral. Syst. Bot.* 15: 362 (2002). **Type:** Queensland. Moreton District: Kin Kin, January 1917, *C.T. White s.n.* (holo: BRI [AQ318532]).

Zieria furfuracea subsp. (Kin Kin V.K. Moriarty 134); Forster (2002: 181).

2. Zieria gymnocarpa (J.A.Armstr.) P.I.Forst., **comb. et stat. nov.**; *Zieria furfuracea* subsp. *gymnocarpa* J.A.Armstr., *Austral. Syst. Bot.* 15: 363 (2002). **Type:** Queensland. Moreton District: Belmont, 10 September 1887, *J.H. Simmonds s.n.* (holo: BRI [AQ318534]).

Zieria furfuracea subsp. (Belmont Scrub Unknown AQ152898); Forster (2002: 181).

The key to the Queensland species of *Zieria* (Duretto & Forster 2007: 476) may be amended at couplet 3 to accommodate these two species, *viz.*

3 Abaxial surface of leaves stellate tomentose; fruit glabrous or hirsute **3b**
3. Abaxial surface of leaves glabrous to hirsute but not stellate tomentose; fruit glabrous **4**

3b Leaf lamina margin entire or somewhat sinuate with poorly developed marginal glands; petals valvate in bud . . . . . **Z. euthadenia**
3b. Leaf lamina margin crenate with well developed marginal glands; petals imbricate in bud . . . . . **Z. gymnocarpa**

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