Ripogonum caldericola L.Weber (Ripogonaceae), a new species endemic to the high elevation cloud forests of the eastern McPherson Range (northern Wollumbin (Mount Warning) – Tweed Volcanic Caldera), Australia

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Summary

Weber, L.C., Mallee, J. & Forster, P.I. (2026). *Ripogonum caldericola* L.Weber (Ripogonaceae) a new species endemic to the high elevation cloud forests of the eastern McPherson Range (northern Wollumbin (Mount Warning) – Tweed Volcanic Caldera), Australia. ***Austrobaileya* 16: 12–23**. *Ripogonum* comprises scandent vines with one species occurring in New Zealand and five named species distributed across eastern Australia and New Guinea. Detailed analysis of morphology and ecology supports the revision of *R. fawcettianum* F.Muell. ex Benth. *sensu latu* into two taxa, as populations north of the Richmond River type locality differ significantly both morphologically and ecologically. We describe the new species *R. caldericola* L.Weber that is endemic to the high elevation cloud forests of the northern Wollumbin (Mount Warning) – Tweed Volcanic Caldera area on the New South Wales – Queensland border, eastern McPherson range.

Key Words: Ripogonaceae; *Ripogonum*; *Ripogonum caldericola*; *Ripogonum fawcettianum*; Flora of Australia; Flora of New South Wales; Flora of Queensland; taxonomy; new species; Wollumbin (Mount Warning) – Tweed Volcanic Caldera; McPherson Range; cloud forests

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Introduction

The genus *Ripogonum* J.R.Forst. & G.Forst. (Ripogonaceae) currently comprises six named species distributed across Australasia in New Zealand, New Guinea and eastern Australia (New South Wales, Queensland and Victoria). Phylogenetic studies based on molecular data, combined with a suite of unique morphological features such as leaves with 3 to 5 convergent primary veins (basal or suprabasal), reticulate secondary veins that are transverse-percurrent, flowers that disarticulate at the perianth base, and tetrasporangiate anthers (Conran 1998; Conran & Clifford 1985, 1986; Conran *et al*. 2009, 2019) have highlighted the distinctiveness of *Ripogonum* within the monocot order Liliales.

Prior to the widespread application of molecular sequence data to infer phylogenetic relationships within the broader Liliales, the genus *Ripogonum* was generally placed within a broadly defined Smilacaceae, albeit at subfamilial rank (e.g. Conran & Clifford 1986; Conran 1998). Subsequent molecular phylogenetic studies have usually placed Ripogonaceae as sister to Philesiaceae (Givnish *et al*. 2016). A recent study has proposed that Ripogonaceae should be treated as a synonym of Philesiaceae (Do *et al*. 2020).

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The Liliales is thought to have originated in Australia shortly after the Gondwanan split of Antarctica, Australia and South America, when these continents were still partially connected, but with limited links to Zealandia (Givnish *et al*. 2016). The ancestral lineage of Philesiaceae – Ripogonaceae is inferred to have originated in Australia and the Neotropics about 84 million years ago (Mya), with Ripogonaceae and Philesiaceae diverging and appearing in their respective regions about 51.1 Mya (Givnish *et al*. 2016), or possibly earlier (Conran *et al*. 2018). Fossil records have been critical in understanding the evolutionary history of Ripogonaceae with notable examples including the fossil taxa *Ripogonum americanum* R.J.Carp., Wilf, Conran & Cúneo, *R. palaeozeylandiae* Conran, E.M.Kenn. & Bannister and *R. tasmanicum* Conran, R.J.Carp. & G.J.Jord. These leaf fossils have been identified in sediments dating back approximately 50–56 Mya (Conran *et al*. 2009, 2018; Carpenter *et al*. 2014), providing critical calibration points for estimating the divergence of the Ripogonaceae and Philesiaceae (Givnish *et al*. 2016).

The six extant species of *Ripogonum* are primarily found in closed forest habitats, generally associated with different types of rainforest, ranging from more or less constantly moist to seasonally dry. All the species have similar morphological traits *viz*. a shrubby or scandent climbing habit, thick coriaceous leaves with net venation, fleshy fruit suitable for vertebrate dispersal and tolerance of shaded areas. This is postulated to have been a successful, early evolutionary adaptation for low light environments with concerted convergence of morphological traits (Givnish *et al*. 2005).

The species taxonomy of *Ripogonum* has remained relative static with four of the five Australian species being described in the 19th century and other published names long in synonymy (Conran & Clifford 1986). A single new species, *R. brevifolium* Conran & Clifford, was described in the mid-1980s (Conran & Clifford 1986). In subtropical to tropical eastern Australia (Queensland (Qld) and New South Wales (NSW)), *Ripogonum* reaches its greatest diversity and is represented by five named species *Ripogonum album* R.Br., *R. brevifolium*, *R. discolor* F.Muell., *R. elseyanum* F.Muell. and *R. fawcettianum* F.Muell. ex Benth., distributed along the eastern coastline (Conran & Clifford 1986). *Ripogonum papuanum* C.T.White is endemic to New Guinea; at one stage it was relegated to synonymy under *R. album* (Conran & Clifford 1986); however, this taxonomy is not currently adopted at the Queensland Herbarium. *Ripogonum scandens* J.R.Forst. & G.Forst. is endemic to New Zealand.

Ripogonum fawcettianum has been traditionally circumscribed with a distribution in NSW from north of Sydney (Gosford, Woy Woy and Bouddi NP areas) to the Blackwall Range – Richmond River catchment west of Ballina, then with a disjunct northern population in the McPherson Range along the Qld – NSW border (Conran & Clifford 1986). The southern populations occur in wet sclerophyll forest to subtropical or warm temperate rainforest at low elevations between 25 and 700 m. In contrast, the northern population, previously identified as *R. fawcettianum*, occurs in cool temperate rainforests dominated by *Nothofagus moorei* (F.Muell.) Krasser at higher elevations (900–1200 m) which are subject to frequent cloud and mist (**Fig. 1C**).

In 2005, the first author observed that *Ripogonum fawcettianum sensu latu* in the Bonville area of NSW differed noticeably in morphology to those from the McPherson Range along the Qld – NSW border, based primarily on overall plant form and leaf size (larger vs smaller) and venation (predominantly three-veined and with an indistinct tertiary net venation vs five-veined and with strongly developed tertiary net venation) (**Fig. 1A &B**). Further observations in 2013 revealed additional differences in flower and fruit characteristics, notably flowers with short pedicels and red fruits in the Ballina area (NSW), contrasting to flowers with longer pedicels and maroon to black fruits in the McPherson Range. *Ripogonum caldericola* L.Weber is newly described in this paper for the northern population (**Fig. 2**).

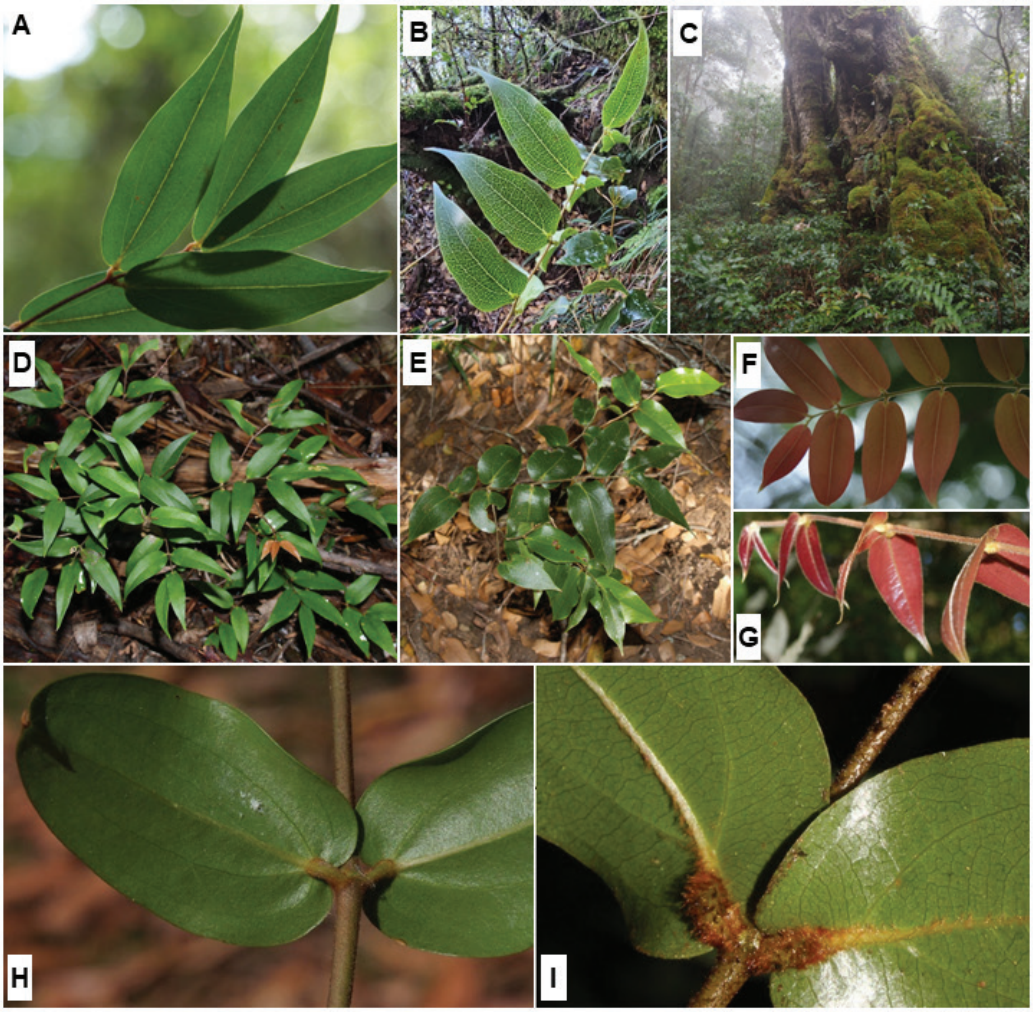


Fig. 1. A, D & H: ***Ripogonum fawcettianum***. **B & C, E–G, I:** ***R. caldericola***. **A & B.** Foliage. **C.** Subtropical montane cloud forest habitat (Cool Temperate Rainforest) with ***R. caldericola*** dominating the ground layer with *Blechnum wattsii* around a massive trunk base of *Nothofagus moorei*. **D & E.** Habit. **F & G.** New shoots; note the dense velvety pale hairs. **H & I.** Leaf pair in abaxial view showing venation and typical indumentum. A & H from Wardell, NSW (unvouchered); B & I from Mt Throakban, Lamington NP, Qld (unvouchered); C from Mt Bithogabel, Lamington NP, Qld; D from Coffs Harbour, NSW (unvouchered); E from Mt Merino, Lamington NP (unvouchered); F & G from Mt Tooloona Lamington NP, Qld (unvouchered). Photos: L.C. Weber.

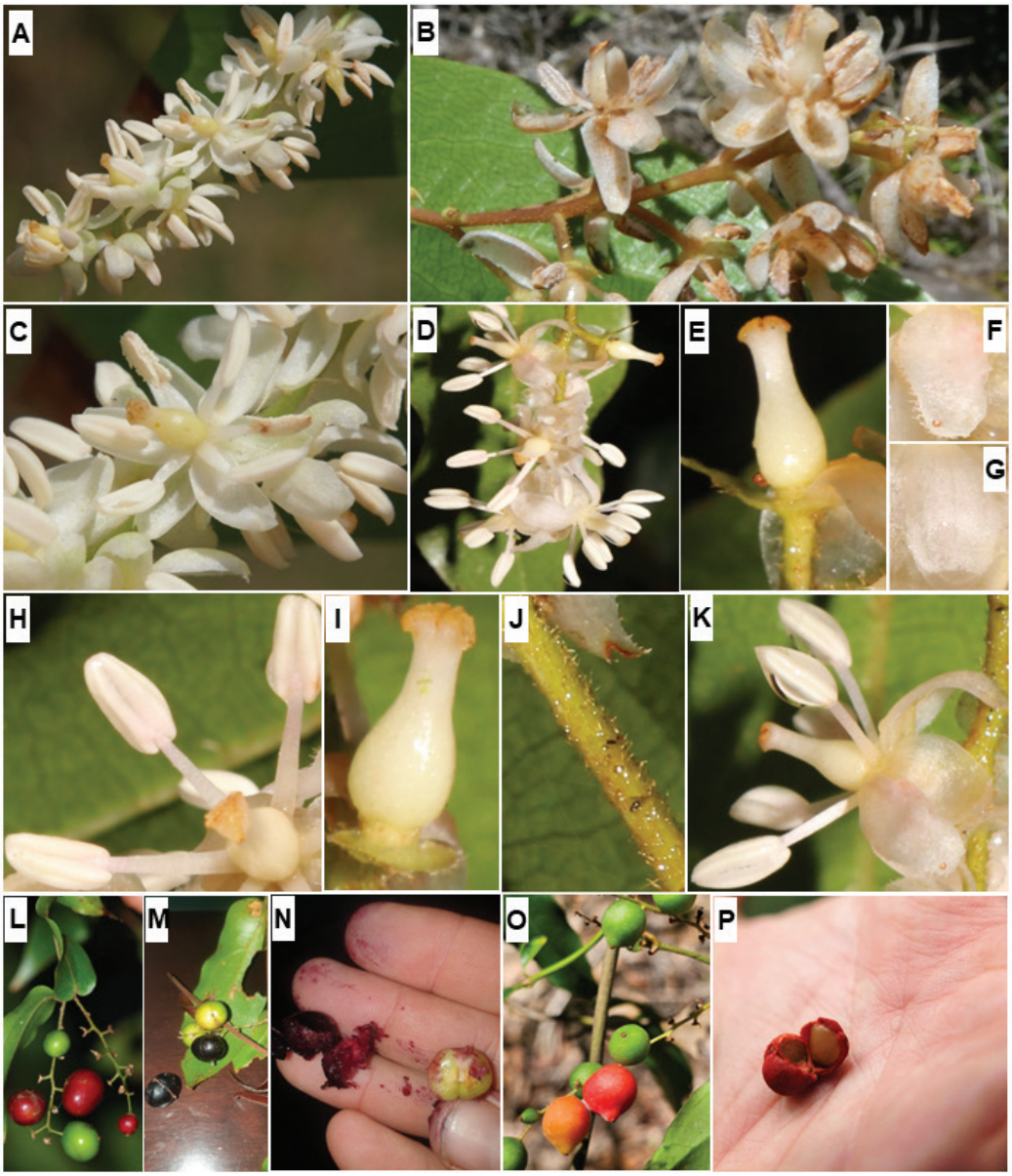


Fig. 2. A, C, I, O & P: ***Ripogonum fawcettianum***. **B, D, E–H, J–N:** ***R. caldericola***. A & B. Flowering inflorescence. **C & D.** Flowers. **E & I.** lateral view of ovary, stigma and style and pedicel. **F.** inner tepal showing hairy margins and pinkish tinge. **G.** outer tepal showing ovate shape and slightly hairy margins. **H.** face view of three stamens, ovary and stigma. **J.** pedicel showing bristly brown hairs. **K.** lateral view of flower showing incurved filaments. **L.** Immature fruit; note the long pedicels, compressed shape of fruit and glossy skin. **M.** Ripe fruit; note the long pedicels and fruit with compressed shape and glossy skin. **N.** Fruit and paired hemispherical seeds. **O.** Fruit; note the short pedicels, fruit that is umbonate and orange-red on maturity. **P.** Fruit with three triangular seeds. A & C from Wardell, NSW (unvouchered); B & D from Mt Throakban, Lamington NP, Qld (unvouchered); E–K all from Best of All Lookout, Springbrook (population voucher: *Leiper s.n*. (BRI, AQ0853404); L–N from Mt Mumjin, near Best of All Lookout, Springbrook McPherson Range, Qld (unvouchered); O & P from Wardell, Bagotville, NSW (unvouchered). Photos: L.C. Weber (A–D; I, L–P), G. Leiper (E–H, J & K).

Materials and methods

This paper is based on field observations and collections in NSW and Qld, as well as examination of herbarium collections at the Queensland Herbarium (BRI) and online images of type material of *Ripogonum fawcettianum* held at the National Herbarium of Victoria (MEL). The species description is based on fresh material, supplemented and cross-referenced with data from herbarium specimens at BRI.

Common abbreviations in the text and specimen citations are Mt (Mount or Mountain as per official place names, QPN 2025), NP (National Park) and NR (Nature Reserve).

Taxonomy

Ripogonum caldericola L.Weber, **sp. nov.**

Differs from *R. fawcettianum sensu stricto* in thicker green stems (*c*. 10 mm vs *c.* 5 mm and reddish brown), that have only scattered vestigial prickles (< 1 mm long) or absent (vs scattered *c*. 2 mm prickles); new growth with long (*c*. 3 mm) silvery hairs (vs shorter (*c*. 1 mm) reddish brown hairs); petioles of mature foliage with longer (*c*. 2 mm) rusty brown hairs (vs 0.5–1 mm red brown hairs); laminae that are broader and more thickly coriaceous, usually with five secondary veins and well-developed pale tertiary net venation (vs three secondary veins and indistinct tertiary venation); inflorescences including pedicels covered in erect rusty brown hairs *c*. 2 mm long (vs pale cream hairs *c*. 1 mm long); flowers more numerous from 9–21 per inflorescence (vs 4–12); flower pedicels longer to 10 mm (vs to 5 mm); gynoecium with a notably (*c*. 45°) flared 3-lobed apex on the short or sessile stigma (vs a slightly (*c*. 20°) flared 3-lobed stigma); fruit oblate to compressed, dark red to orange, ripening to maroon or black, skin glossy and smooth (vs spherical to turbinate, orange red to red, skin matt, sparkling with a cellular texture); seeds hemispherical, usually paired (2) per fruit (vs triangular, usually 3 per fruit).

Type: Australia. Queensland. Moreton District: 6 km from Green Mountains on Border Track, Lamington National Park, 23 January 1996, *P.I. Forster PIF18315, G. Leiper & T. Ryan* (holo: BRI [AQ0603120]; iso: CNS).

Perennial scandent shrub, or weakly twining, to 6m tall when self-supporting. Stems slender, terete, up to 15 mm diameter, green to reddish brown; axillary buds forming paired opposite side branches to 2.5 m long, each having smaller side branches with leaves; with regular slightly swollen joints every 5–10 cm along the stems, each joint with a triangular brown papery bract that wraps around the whole stem joint at the base and forms a triangular apex lying flat against the stem, bracts deciduous on older stems; prickles few and scattered, largely vestigial, < 1 mm long or absent. New foliage dark red to pale salmon-pink, covered in soft, *c*. 3 mm long appressed whitish hairs, matted away from the growing apical bud covering rusty brown hairs below. Petioles 2–5 mm long and covered in erect rusty brown hairs 1–2 mm long, swollen at attachment point to lamina. Leaves simple, opposite or occasionally alternate (each pair arranged in a similar orientation plane to the previous); lamina thickly coriaceous, ovate to lanceolate, 4–10 cm long by 1.8–5 cm wide, base strongly cordate, apex acute to long-acuminate, margins entire; three veined at the base with one main and two paired secondary veins, the next pair of secondary veins closer to the main vein is fused to the main vein for 0.3–1.5 cm before diverging out at 30–45° from the main vein, occasionally the two veins are fused to the main vein for different lengths making them asymmetrical, tertiary veins are very pale forming a dense reticulate network across the whole lamina and easily visible to the naked eye. Inflorescence an axillary spike, 4–12 cm long, green, with 9–21 flowers arranged spirally and with sparse rusty brown hairs 0.8–1 mm long. Flower pedicels 4–9 mm long, with similar rusty brown hairs to the rest of the spike. Flowers bisexual, actinomorphic, 3-merous; six tepals in two whorls, ovate, concave to

convex, opening 80–120°, cream tinged with pale pink, aging to brown; stamens 6, cream tinged with pink, filaments free, 1.8–3 mm long, variously slightly shorter or longer than the anthers; anthers 2-locular, latrorse, dehiscing by longitudinal slits or pores, 2–2.8 mm long; ovary turbinate, 3-locular, creamy pale-yellow, aging to pink especially at base, glabrous; ovules usually 2 per loculus; stigma short or ± sessile, *c*. 1 mm diameter, notably flared and 3-lobed with *c*. 45° angle from the ovary. Fruit oblate to compressed, 8–9 mm long, 7–9 mm diameter, dark red to orange, ripening to maroon or black, skin glossy and smooth; seeds hemispherical, usually paired (2) per fruit. **Suggested Vernacular Name:** Caldera Supplejack. **Fig. 1 & 2.**

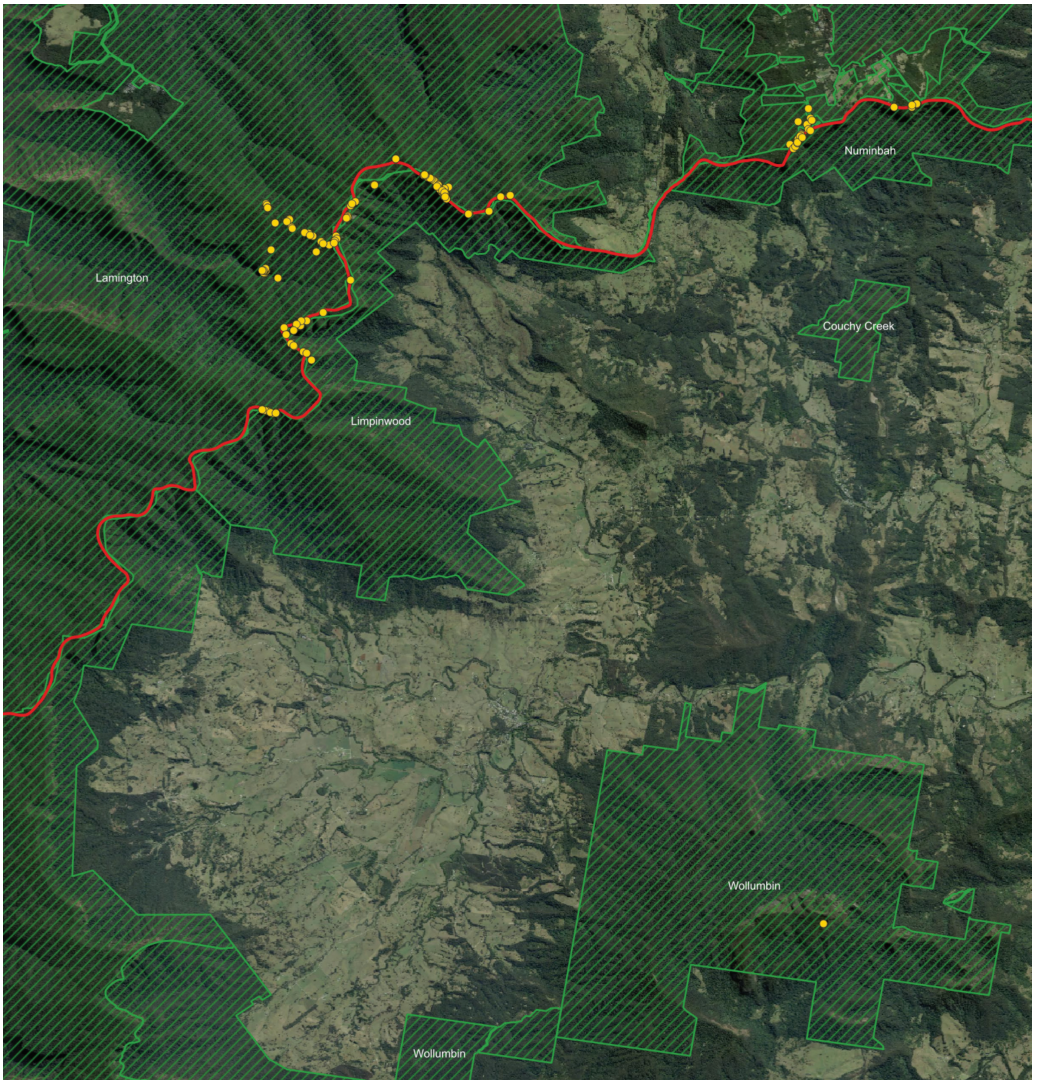
***Additional specimens examined*: Australia. Queensland.** Moreton District: W of Best of All Lookout, Springbrook, Apr 2014, *Leiper s.n.* (BRI [AQ0853404]); Lamington NP, Feb 1976, *Simpson s.n.* (BRI [AQ113790]; Lamington NP, track to Picnic Rock, May 2012, *Forster PIF38706, Leiper & Mathieson* (BRI, US); Mt Merino, Lamington NP, May 1961, *Blake 21504* (BRI, CANB); *ibid*, Feb 1990, *Bean 1385* (BRI); MacPherson [sic] Range, Jan 1912, [?*White s.n.*] (BRI [AQ053567); *ibid*, Jan 1919, *White s.n*. (BRI [AQ053566]).

***Distribution and habitat*:** *Ripogonum caldericola* occurs in both Qld and NSW, where it is found from the Lamington and Springbrook plateaux in the McPherson Range and Wollumbin on the Wollumbin (Mount Warning) – Tweed volcanic caldera (WTVC) at altitudes between 900 and 1200 m (**Map 1**). Most observed locations remain unvouchered, including the Wollumbin occurrence. It reaches its eastern limit on the McPherson Range near Mt Thillinmam on the eastern Springbrook Plateau and it has also been observed from the nearby Billborough Lookout. It is then found again on the Springbrook plateau at Mt Mumdjin and the Best of all Lookout. Further west on the Lamington Plateau the species occurs on Mt Hobwee and Mt Merino. It is found almost continuously (within Lamington NP, Qld and Limpinwood NR, NSW) around the caldera rim from Mt Wanungara to Mt Bithongabel and then reappears in the Echo Point – Mt Worendo area. The southern most limit of distribution is at the head of the Oxley River at Mt Throakban. The species appears to reach its northwestern limit around Picnic Rock in Lamington NP. All these locations are characterised by a basaltic geology derived from the Hobwee basalt lava flows (Ewart *et al*. 1987). The isolated population of this species (unvouchered) below the summit of Wollumbin is on trachyandesite derived soils.

These locations are all part of the Gondwana Rainforests of Australia (UNESCO 2025). These forests represent the highest elevations (700–1230 m) of the remaining WTVC and have undergone a period of up to 20 million years of isolation (Weber *et al*. 2014). Their significance as an area of endemism and vegetation richness has been recognised for nearly a century (White 1930; Herbert 1935, 1951).

The habitats occupied by *Ripogonum caldericola* are typically dominated by *Nothofagus moorei*. These habitats have been variously classified as “Cool Temperate Rainforest” (Harden *et al*. 2023), or “Microphyll Mossy Fern Forest”, “Nanophyll Mossy Thickets” and “Simple Notophyll Vine Forest” (Webb 1968). All these vegetation types fall under the broader category of “Subtropical Montane Cloud Forest” which is dependent on frequent cloud cover and mist for its ecological function (Bruijnzeel *et al*. 2011; Narsey *et al*. 2020).

Mean annual rainfall is exceptionally high, exceeding 3000 mm annually at Springbrook, 2700 mm at Wollumbin, 2500 mm at Lamington and 2300 mm at Border Ranges (Xu & Hutchinson 2013). Canopy level clouds and fogs are most common in summer and least common in spring. There is diurnal variation in fog frequency with a decline in cloudiness around midday. This occult precipitation is intercepted by the cloud forest and can result in an additional 40% moisture above normal rainfall (based on Hutley *et al*. 1997 from sites in Main Range NP).



Map. 1 Distribution of ***Ripogonum caldericola*** (yellow dots). The conservation estate is indicated by the green cross-hatched areas and the Queensland - New South Wales border outlined in red.

Notes*: *Ripogonum caldericola appears to have been first collected in February 1912 by an unknown collector (most likely C.T. White, or an associate of White's, as the label is in White's hand), at "Nearly 4000ft" from the McPherson Range (BRI, AQ0053567). It has been subsequently collected only a handful of times and most observed occurrences (all within National Parks or Nature Reserves) remaining unvouchered (**Map 1**).

Based on morphological similarities, *Ripogonum caldericola* is most similar to *R. fawcettianum* (refer to diagnosis), and a comprehensive comparison is provided in **Table 1**.

The original description of *R. fawcettianum* by Bentham (1878) reads:

"R. fawcettianum, F. Muell. Herb. Branches slender without prickles, sprinkled with a loose rufous pubescence. Leaves on very short petioles or almost sessile, lanceolate, acuminate, cordate at the base 2 to 3 inches long, 3 or fived nerved. Racemes axillary, slender but many flowered. Flowers shortly pedicellate, rather smaller than in *R. album*. Filaments slender, as long as the anthers. Ovary glabrous. (Type) N. S. Wales. Richmond River Fawcett; Macleay River, Fitzgerald"

The description given in the *Flora of Australia* (Conran & Clifford 1986) describes *R. fawcettianum* as "Shrub or climber to c. 4 m; stems rusty tomentose-hirsute, with or without prickles. Leaves opposite, lanceolate, acute to cuspidate, cordate at base; lamina 6–10 cm long, 3–3.5 cm wide; petiole 4–7 mm long. Inflorescence axillary; pedicels 2–5 mm long. Flowers numerous, 10 mm diam., pale cream to white. Sepals c. 4 mm long, 2 mm wide. Petals 4–5 mm long, 2–2.5 mm wide. Stamens 2–3 mm long; filaments 0.5–1 mm long; anthers 1.5–2.5 mm long. Ovary ovoid, 2 mm long, glabrous; style 1–1.5 mm long; stigma capitate. Berry 8–12 mm diam., black. Seeds ovoid, 1 to few, 5–7 mm long, yellow-brown. Small Supplejack."

The lectotype specimen of *Ripogonum fawcettianum* (*Fitzgerald s.n.*, MEL 652842) (Conran & Clifford 1986: 231) is from the "Mackay River" (taken to be from near Wingham, NSW and probably referring to the Manning River; the "Mackay River" was clearly associated with Wingham in media contemporary to the 1880s (TAS 1883). This collection is typical of the small leaved plants in the southern populations. This undated material was probably collected by Robert Desmond Fitzgerald (1830–1892), who eventually became the Deputy Surveyor-General of New South Wales and was an amateur orchidologist and author of orchid species and books on orchids (Lunney & Bohan 2009).

Ripogonum caldericola also shares some morphological features with *R. elseyanum* including similar hairs on the petioles and fused venation above the petiole lamina junction. *Ripogonum elseyanum* in the McPherson Range occurs in lowland to mid elevation rainforests below approximately 900 m altitude. *Ripogonum discolor* and *R. elseyanum* may co-occur with *R. caldericola* and a single putative hybrid vine was observed by LW near Best of All Lookout, Springbrook with three veined leaves and deep maroon new growth. *Ripogonum caldericola* is easily distinguished from these two co-occurring species by the leaf bases being strongly cordate (often slightly cordate in *R. elseyanum*), general lack of prickles on the stems and lack of indumentum on the flower ovary.

A leaf fossil of *Ripogonum americanum* from Patagonia (Laguna del Hunco caldera-lake deposit) with an age of 52 million years (Early Eocene) has an uncanny resemblance to the venation of *R. caldericola* (*cf.* specimen number MPEF-Pb 6439 Fig 2,2; Carpenter *et al*. 2014), while other fossils identified as that species appear more similar to living Australian specimens of *R. album*. Quantitative analysis comparing fossil and living rainforest floristics, has shown that subtropical eastern Australia retains the highest proportion and number of extant Gondwanan plant lineages with a high floristic similarity to the 50-million-year-old fossil rainforests of Patagonia (Kooyman *et al*. 2014).

Table 1. Ecological and morphological comparison of *Ripogonum fawcettianum* and *R. caldericola*

Feature	***R. fawcettianum***	***R. caldericola***
Habitat	wet sclerophyll forest to rainforest in coastal lowlands	cool subtropical to cool temperate rainforest on mountain summits and ridges (**Fig. 1C**)
Habitat elevation	25–700 m	900–1200 m
Soils and geology	metasediments, primarily clay podsols and sandstone, occasionally enriched by overlying basalt	porphyritic basalts derived from the Tweed Volcano of the Hobwee Basalt geological formation comprising red kraznozems and lithic boulder filled soils
Distribution	NSW: from the Blackwall Range SW of Ballina (Richmond River) to the Gosford region north of Sydney, mainly east of the Great Dividing Range and great escarpment	Qld – NSW: from Mt Thillinmam, eastern Springbrook (Springbrook NP and Numinbah NR), SW around the rim of the WTVC rim (McPherson Range) to Mt Throakban, Lost World (Lamington NP and Limpinwood NR) at the source of the Oxley River
Stems (canes)	up to 10 mm thick, irregularly jointed, green, with scattered prickles to 2 mm long	up to 15 mm thick, regularly jointed, green to reddish brown, with occasional vestigial prickles < 1 mm long
Leaf shape	lanceolate to elliptic	ovate to lanceolate
Leaf apex	acute to narrow acuminate	acute to long acuminate
Leaf base	rounded to moderately cordate	slightly to strongly cordate
Indumentum on petioles of mature foliage	shorter (0.5–1 mm long) red brown hairs (**Fig. 1H**)	longer (*c*. 2 mm long) rusty brown hairs (**Fig. 1I**)
Leaf texture	thin coriaceous	thick coriaceous
Secondary venation	usually 2-nerved, but occasionally 4, radiating palmately from the petiole attachment (**Fig. 1H**)	usually 4-nerved, being 3-veined from base at petiole attachment, the next pair fused to the mid vein for 1–2 cm before diverging away from mid vein at 30–45° (**Fig. 1I**)
Tertiary venation	indistinct (**Fig. A & H**)	well-developed (**Fig. B & I**)
Leaf lamina colour	mid green above pale yellow-green and with a semi-matt sparkling cellular texture below (**Fig. 1H**)	dark green above, pale green with a smooth glossy texture below (**Fig. 1I**)
Inflorescence	covered in short pale brown to cream hairs with up to 12 flowers (**Fig. 2A**)	covered in longer rusty brown hairs to 2 mm long; with up to 21 flowers (**Fig. 2 B & J**)
Flower pedicels	2–5 mm long, with short cream hairs to 1 mm	7–10 mm long, with longer rusty brown hairs to 2 mm (**Fig. 2J**)
Tepals	cream tinged with pale green	cream tinged with pale pink (**Fig. 2F & G**)
Anthers	filaments moderately broad with a medium sized hooked point on the apex curved towards the centre of the flower (**Fig. 2H**)	filaments narrow to moderately broad with a small point on the apex straight aligned with the length of the anther, not curved or pointing towards the centre of the flower (**Fig. 2K**)
Gynoecium	notably (*c*. 45°) flared 3-lobed stigma (**Fig. 2I**)	slightly (*c*. 20°) flared 3-lobed stigma (**Fig. 2E**)
Immature fruit	pale green with a sparkling semi matt cellular texture turning orange (**Fig. 2O**)	mid-green glossy with a smooth texture turning dark red (**Fig. 2L & M**)
Mature fruit	spherical to turbinate, with a pointed apex; orange red with a sparkling semi matt, cellular surface texture (**Fig. 2O & P**)	oblate, ovoid to compressed; maroon to black with a glossy, smooth surface texture (**Fig. 2L–N**)

No pollinators have been observed for any Australian species of *Ripogonum*. The fruit of *R. album* have been recorded as a food source for King Parrots and Spotted Catbirds (Cooper & Cooper 2004). "Clouds of insects" were associated with the flowers of the New Zealand *R. scandens*, and its fruit are eaten by a variety of birds, especially pigeons (Macmillan 1972; Burrows 1996). Vivipary has been reported in *R. scandens* and it was speculated that this may be an adaptation to facilitate seedling establishment under dense forest canopies (Burrows 1996).

Key to Australian *Ripogonum* Species

(Adapted from Conran & Clifford 1986)

1 Stems pubescent **2**

1. Stems glabrous..... **4**

2 Ovary pubescent ..... ***R. elseyanum***

2. Ovary glabrous **3**

3 Leaves with indistinct net (tertiary) venation, flower pedicels < 5 mm long, ripe fruit red ..... ***R. fawcettianum***

3. Leaves with distinct net (tertiary) venation easily visible, flower pedicels > 5 mm long, ripe fruit maroon to black ..... ***R. caldericola***

4 Leaves more than 3 times longer than broad..... ***R. discolor***

4. Leaves less than 3 times longer than broad **5**

5 Flowers sessile; leaves acute ..... ***R. brevifolium***

5. Flowers pedicellate; leaves shortly attenuate ..... ***R. album***

***Phenology*:** Flowering period late spring to early summer from November to February. Fruiting season from late Summer to Winter (Feb to July).

***Etymology*:** The species epithet is derived from the Latin *caldera* (cauldron-like hollow landform in a volcano) and *cola* for dwelling, (*cf.* Nicolson 1987) and alludes to the distribution in the McPherson Range on the WTVC.

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Author contributions

LCW − conceived project, collected plant specimens and undertook population estimates, wrote initial text and contributed figures, revised drafts.

JM − collected plant specimens and undertook population estimates, revised drafts.

PIF − supervised project, collected plant specimens, examined and measured herbarium collections, wrote sections of text, revised drafts.