

Two new species of *Poecilanthe* (Leguminosae: Papilionoideae: Brongniartieae) from Bolivia and Brazil

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Abstract. Two new legume species, *Poecilanthe goiasana* G.P.Lewis from Brazil and *Poecilanthe boliviana* G.P.Lewis from Bolivia, are described and illustrated. Previously seven species of the genus were recorded from Brazil, and one from Bolivia. A summary is given of the current circumscription of the papilionoid legume tribe Brongniartieae Hutch., to which *Poecilanthe* belongs.

Additional keywords: Fabaceae, Neotropics, taxonomy.

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Introduction

The Neotropical, predominantly Brazilian (Meireles 2010) genus *Poecilanthe* Benth. was first described by Bentham (1860, p. 80) who recognised the following three species: *P. grandiflora* Benth. (now known to occur in caatinga and Mata Atlântica vegetation in the Brazilian states of Alagoas, Bahia, Ceará, Maranhão, Minas Gerais, Paraíba and Pernambuco), *P. subcordata* Benth. (found in cerrado (savanna) in the Brazilian states of Bahia, Minas Gerais, and Piauí) and *P. parviflora* Benth. (in Mata Atlântica and gallery forest, in Argentina, Uruguay, on the Paraguay–Brazil border, and in the Brazilian states of Paraná, Rio Grande do Sul, Santa Catarina and São Paulo). All three species are retained within the current circumscription of *Poecilanthe* (Meireles 2007; Meireles and de Azevedo Tozzi 2007; Meireles *et al.* 2014).

Since Bentham's publication (Bentham 1860), another eight species have been transferred into the genus or have been described as new species within it. Heringer (1952) transferred *Pterocarpus falcatus* Vell. into *Poecilanthe*, making the combination *Poecilanthe falcata* (Vell.) Heringer (a species growing in sandy soils of Espírito Santo and Rio de Janeiro states). *Poecilanthe ulei* (Harms) Arroyo & Rudd was moved into the genus by Rudd (1973) after its tentative placement in *Machaerium* Pers. by Harms (1908). The species occurs in Alagoas and Bahia in caatinga or open arboreal steppe ('estepo arborea aberta') vegetation. Lewis (1989) added *Poecilanthe itapuana* G.P.Lewis, described from 'restinga' vegetation (in the Mata Atlântica biome) on the stabilised white sand dunes near Salvador, Bahia, Brazil. The most

recently described, and very distinctive, new species to have been added to the genus is *Poecilanthe fluminensis* Meireles & H. C.Lima (Meireles and de Lima 2013), which is endemic to montane and lowland forest in the Brazilian state of Rio de Janeiro. The remaining four species that were at one time considered to belong to *Poecilanthe* are now placed in either the reinstated monospecific genus *Amphiodon* Huber, or the recently described genus *Limadendron* Meireles & A.M.G. Azevedo (Meireles and Azevedo Tozzi 2014, 2015; Meireles *et al.* 2014). *Poecilanthe effusa* (Huber) Ducke (1932) has been reinstated as *Amphiodon effusus* Huber (1909, pp. 398–400), and *Poecilanthe ovalifolia* Kleinhoonte (1925) is now treated as a synonym of it (Meireles and Azevedo Tozzi 2014). *Poecilanthe amazonica* (Ducke) Ducke (1932) and *P. hostmannii* (Benth.) Amsh. (Amshoff 1939), both having originally been described in the genus *Cyclolobium* Benth., are now recognised as *Limadendron amazonicum* (Ducke) Meireles & A.M.G. Azevedo and *L. hostmannii* (Benth.) Meireles & A.M.G. Azevedo respectively (Meireles and Azevedo Tozzi 2015).

Poecilanthe belongs to the papilionoid legume tribe Brongniartieae Hutch. (Ross and Crisp 2005), which has undergone significant expansion since Kalin Arroyo (1981) circumscribed it, to comprise the two amphitropical American genera, *Brongniartia* Kunth and *Harpalyce* DC. It expanded to five after Crisp and Weston (1987) formally included the Australian genera *Hovea* R.Br., *Lamprolobium* Benth., *Plagiocarpus* Benth. and *Templetonia* R.Br. This repositioning of the 'Templetonia group' of genera has been supported by a series of phylogenetic studies (Crisp and Weston

1987; Crisp *et al.* 2000; Kajita *et al.* 2001; Thompson *et al.* 2001; Wojciechowski *et al.* 2004; Cardoso *et al.* 2012, 2013), and is confirmed by several morphological traits that are shared by the American and Australian genera. Ross (2001) added to the number of genera in the Brongniartieae by segregating the monospecific genera *Cristonia* J.H.Ross and *Thinicola* J.H. Ross from *Templetonia*. Various studies also supported the transfer of the neotropical genera *Cyclolobium* and *Poecilanthe* to the Brongniartieae (Hu *et al.* 2000, 2002; Wojciechowski *et al.* 2004; de Queiroz *et al.* 2010; Cardoso *et al.* 2012, 2013; Meireles *et al.* 2014). The recently described Brazilian monospecific genus *Tabaroa* L.P.Queiroz, G.P.Lewis & M.F.Wojc. was also unequivocally placed in the Brongniartieae (de Queiroz *et al.* 2010). The first, and to date only, African genus to be associated with the tribe is *Haplormosia* Harms, which is resolved as sister to the American–Australian Brongniartieae clade (Cardoso *et al.* 2017) and is the long-anticipated African ‘missing link’ between the neotropical and Australian genera. Meireles and co-workers reinstated the genus *Amphiodon* (Meireles and Azevedo Tozzi 2014; Meireles *et al.* 2014) and segregated the new genus *Limadendron* from *Poecilanthe* (Meireles and Azevedo Tozzi 2015; Meireles *et al.* 2014). The most recent addition to the tribe is the Cuban-endemic, monospecific genus *Behaimia* Griseb. (de Queiroz *et al.* 2017), which was formerly placed in the tribe Millettieae (Geesink 1984; Lewis 1988; Schrire 2005). As a result of all these taxonomic realignments, the tribe Brongniartieae now comprises 15 genera.

The species described here as *Poecilanthe goiasana* G.P. Lewis was first noticed in a gift of legume duplicate herbarium specimens from IBGE to K. The combination of trifoliolate leaves with large elliptic to widely elliptic leaflets, together with its large flowers, and the geographical location of the collection suggested a novelty. To date, no second collection of the species has been made and the fruits remain unknown.

Specimens of the small tree described here as *Poecilanthe boliviana* G.P.Lewis were first collected by one of us (JRIW) in flower in November 2007, again in flower in November 2010, and in fruit in March 2011. The specimens did not match the only known species of the genus recorded for Bolivia, nor any previously published species in the genus. The species is presently known from a very restricted area in the Department of Santa Cruz. Analysis of the foliage, flowers and fruits left no doubt that the collections together represent another species new to science.

A preliminary maximum-parsimony analysis of a nuclear DNA ITS dataset of a sample of taxa from tribe Brongniartieae by M. F. Wojciechowski (pers. comm., 2009) included specimens of the two new species described here. It placed a representative of the first new species, *Mendonça et al.* 2881 (K), as sister to *Poecilanthe falcata*, and the two together as sister to a clade that included a representative of the second new species, *Wood et al.* 23849 (K), as sister to *P. parviflora*. Meireles *et al.* (2014) also recognised two distinct clades in the genus and placed *P. grandiflora* and *P. ulei* with *P. falcata*. Although including fewer species in their studies, Cardoso *et al.* (2017) and de Queiroz *et al.* (2017) presented the same relationship between these two clades of *Poecilanthe*, but neither study included specimens of the two new species proposed here.

Taxonomy

Poecilanthe goiasana G.P.Lewis, sp. nov.

Type: Brazil, Goiás, Município de Niquelândia, estrada entre Niquelândia e a Companhia de Niquel Tocantins, 14°22'14"S, 48°23'15"W, 20 Oct. 1996 (fl.), R.C.Mendonça, R. Marquete, A.M.S.F.Vaz, M.L.Fonseca & G.Gomes 2881 (holo: IBGE 40976!; iso: HUEFS 29488 n.v., K!, RB 398799!).

Diagnosis

In leaflet number per leaf and leaflet size, *P. goiasana* most resembles *P. ulei*, but the elliptic to broadly elliptic leaflets of *P. goiasana* differ from the generally ovate to broadly lanceolate leaflets of *P. ulei*. In addition, the flowers of *P. goiasana* are 3–3.3 cm long and the corolla white, whereas the flowers of *P. ulei* are <1.1 cm long and the corollas purplish. *Poecilanthe goiasana* differs from *P. grandiflora* and *P. falcata* in having fewer leaflets per leaf (3 v. 6–9) and white (v. purplish) corollas, as well as an elongate raceme (v. a pyramidal raceme or panicle). Flowers of *P. falcata* can attain a length of 3 cm, i.e. almost the maximum length of the flowers of *P. goiasana*.

Heliophytic, saxicolous *shrub* (only known from regrowth material) up to 60 cm tall; bark smooth. *Leaves* compound, petiole 9 cm long, densely tomentose, leaf rachis 8 cm long, densely tomentose, three subsessile alternate *leaflets*, these 10.5–14 × 9–13 cm, elliptic (longer than broad) to widely elliptic (broader than long), apex rounded to obtuse to acute, base shallowly cordate, upper surface of leaflets moderately pubescent, lower surface sparsely pubescent, venation brochidodromous, with 6–7(–9) pairs of secondary veins, main vein prominent on the lower surface of leaflets, main vein and secondaries densely pubescent with spreading hairs on both surfaces of the leaflets, tertiary veins reticulate. *Inflorescence* racemose, leaf-opposed, 17 cm long (including a 1-cm-long peduncle). *Flowers* 3–3.3 cm long, pedicellate, pedicel 10–12 mm long, a persistent, lanceolate, 3-mm-long bract at the pedicel base, a persistent 2-mm-long bracteole inserted on the pedicel 2 mm below the 10–12 × 7-mm calyx tube, calyx teeth 5–7 mm long, the lowest tooth slightly longer than the other 4, the upper 2 teeth partially fused, their free tips 2–2.5 mm long, the calyx rusty-tomentose externally; *corolla* white, *standard petal* ~30 × 20 mm (including an 8-mm-long thickened claw), *wing petals* 25–30 × 7–10 mm (including an 8–12-mm claw), *keel petals* loosely fused (and easily separated), 17–20 × 3–5 mm (including an 8-mm-long claw); *staminal sheath* apparently diadelphous, 9 + 1 (although because of the lack of available material to dissect, and floral insect damage, it is possible that the sheath is monadelphous, or variable), *anthers* alternately long and short, the longer anthers ~2 mm long, dehiscing by longitudinal slits, *ovary* 7 mm long, style 8 mm long, stigma capitate, terminal. *Fruits* unknown. (Fig. 1.)

Distribution

Apparently endemic to the state of Goiás, Brazil.

Habitat and ecology

Growing in undulating terrain of ‘campo sujo’ (a form of open, herbaceous and shrubby cerrado (savanna) vegetation) in



Fig. 1. *Poecilanthe goiasana*. A. Leaf. B. Detail of indumentum on leaflet upper surface. C. Detail of indumentum on leaflet lower surface. D. Inflorescence. E. Calyx opened out, outer surface. F. Standard petal. G. Wing petal. H. Keel petals. J. Staminal sheath opened out, showing dimorphic anthers. K. Gynoecium. Scale bars: 10 mm (A, D), 1 mm (B, C) and 5 mm (E–K). All from *Mendonça et al.* 2881 (K). Drawn by Margaret Tebbes.

lateritic soil at 720-m elevation; the area recently burnt at the time of collection.

Phenology

The single known collection of the species was collected in flower in October.

Conservation status

Because the species is known from only a single gathering, it is considered *Data Deficient* (DD) in respect to its conservation status, following IUCN Red List categories and criteria (IUCN 2012).

Etymology

The species epithet alludes to this being the only *Poecilanthe* known to occur in the Brazilian state of Goiás at the time of publication.

Notes

Six of the seven previously recognised species of *Poecilanthe* have compound leaves; only the recently described *P. fluminensis* (Meireles and de Lima 2013) is simple-leaved. Within the compound-leaved *Poecilanthe*, Meireles *et al.* (2014) recognised two well supported clades. One clade comprises *P. falcata*, *P. grandiflora* and *P. ulei* and is characterised by flowers with a monadelphous androecium and unpaired axillary racemes; the other clade contains the species *P. itapuana*, *P. parviflora* and *P. subcordata*, all having paired axillary racemes and an androecium varying from monadelphous to diadelphous within the same plant. Morphologically, *P. goiasana* apparently bridges these two clades in having an unpaired raceme but diadelphous androecium. A different fruit type also separates the two clades; however, fruits are not known for the new species. We predict that, if found, the fruits will be woody and dehiscent, and release their seeds explosively by twisting of the two valves (as in *P. falcata*, *P. grandiflora* and *P. ulei*). Preliminary molecular data placed *P. goiasana* as sister to *P. falcata* (M. F. Wojciechowski, pers. comm., 2009). If additional collections of the new species become available, variation in foliage, flower size and possibly colour might also become apparent, and some reconsideration of morphological similarities will be necessary.

Specimens examined

Currently only known from the type collection.

Poecilanthe boliviana G.P.Lewis, sp. nov.

Type: Bolivia, Santa Cruz, Chiquitos, approx. 42 a 43 km de Taperas a San Juan, 17°46'07"S, 60°02'47"W, 24 Nov. 2010 (fl.), J.R.I.Wood & D.Soto 26966 (holo: USZ!, iso: K [3 sheets]!, LPB!, UB!).

Diagnosis

Poecilanthe boliviana is morphologically similar in appearance to *P. parviflora*. Both species are medium-sized trees with pinnate leaves, with the terminal leaflet largest, but *P. boliviana* differs by the cordate leaflet bases (v. cuneate or

rounded in *P. parviflora*), the young leaflets moderately to densely pubescent on both surfaces (v. almost entirely glabrous, except for a few scattered hairs on the pulvinus, the base of the main vein and on the leaflet margin), its slightly larger flowers with longer petal claws (2–2.5 v. 1.5 mm long), the standard petal wider than long and laterally elliptic (v. equally as long as wide and broadly ovate, wider at its base than in the middle), the standard blade apex emarginate (v. obtuse to shallowly retuse), the upper two calyx teeth fused for their entire length or almost so to their retuse apex (v. the two upper lobes with free tips 0.5–1 mm long), the ovary pubescent to hirsute along both sutures (v. densely pubescent along the upper suture, and the lower suture glabrous or almost so), and by its different fruit shape, broader near the apex than the base, slightly falcate and scimitar-shaped (v. subelliptic, broader near the middle and with an abruptly narrowed short base).

Deciduous tree, 5–15 m tall; bark dark grey to coffee-coloured-greyish, breaking off in small woody plates, inner bark yellow; young stems pubescent. *Leaves* imparipinnate, 5-foliolate, the terminal leaflet largest, petiole 1.4–1.7 cm long, pubescent, rachis 2.3–4 cm long, pubescent, *leaflets* alternate to subopposite, terminal leaflet 3.3–6.2 × 2.0–4.7 cm, basal leaflets 2.2–3.8 × 1.4–3.4 cm, all leaflets with a 2–3-mm-long pulvinule, leaflet lamina lanceolate to ovate to broadly ovate, apex obtuse to acute to retuse, base deeply to shallowly cordate to rounded, young leaflets densely appressed pubescent on both surfaces, hairs white, or basally brown and apically white, the main vein and secondaries clearly demarcated by a concentration of brown hairs, mature leaflets lustrous on upper surface, less so below, moderately pubescent to glabrescent on upper surface, except for the persistently pubescent main and secondary veins, pubescence denser on lower surface, leaflet margin slightly thickened and ciliate, leaflet venation brochidodromous, the main vein prominent on lower surface, tertiary and quaternary veins reticulate and clearly visible on the lower surface. *Inflorescence* a subsessile, solitary, lateral, or less often axillary, raceme, or the racemes occasionally in pairs, each ~10–15-flowered, most flowering occurring on the woody growth of the previous year, and below the current-season young flush foliage, racemes 2–3 cm long, much shorter than the leaves, peduncle and rachis pubescent, peduncle 1–1.5 mm long. *Flowers* 5.5–8 mm long, pedicellate, the pedicels 0.75–1.5 mm long, pubescent; a densely pubescent, persistent, ovate, 1-mm-long bract at the pedicel base, persistent densely pubescent bracteoles at the calyx base, *calyx* appressed pubescent externally, the acuminate 2.5–3 mm long, slightly inrolled teeth subequalling the 2.2–3-mm tube, the upper two teeth fused their entire length, or almost so to their retuse apex (the calyx thus appearing 4-lobed), the three lower narrowly triangular teeth acute; *corolla* white, the standard petal with a central-basal yellowish-green blotch on the inner face, this surmounted by a corona of purplish insect guide lines, the keel with a pale-purplish tip, *standard petal* 7–8.5 (including a 2–2.5-mm-broad thickened claw) × 8–9 mm, the petal blade wider than long, laterally elliptic, the apex emarginate, *wing petals* 8 (including a 2-mm-long claw) × 2–3 mm, *keel petals* 6.5–8 (including a 2–2.5-mm claw) × 2–3 mm, their blades partially fused for half their length from the apex; *stamens* diadelphous (9 + 1) or the vexillary stamen united with the

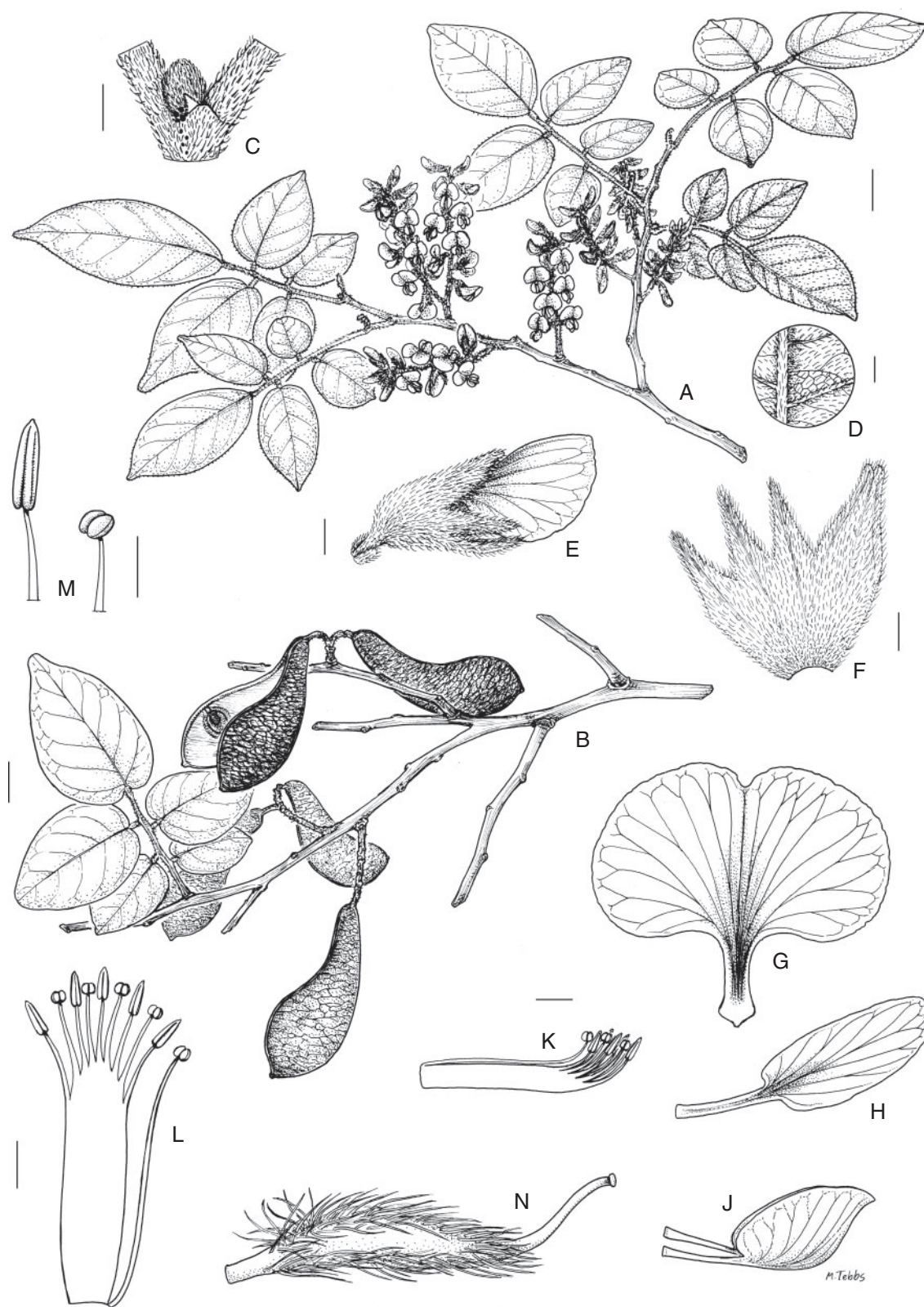


Fig. 2. *Poecilanthe boliviana*. A. Flowering branch. B. Fruiting branch. C. Axillary resting bud. D. Indumentum on leaflet lower surface. E. Flower bud. F. Calyx opened out, outer surface. G. Standard petal. H. Wing petal. J. Keel petals. K. Staminal sheath unopened. L. Staminal sheath opened out, showing dimorphic anthers. M. Two anther types. N. Gynoecium. Scale bars: 10 mm (A, B), 1 mm (C–L, N) and 0.5 mm (M). A and C–N from Wood 26966 (iso; K), B from Wood & Soto 27146 (K). Drawn by Margaret Tebbs.



Fig. 3. *Poecilanthe boliviana*. A. Young tree. B. Bark of older tree. C. Foliage and inflorescences. All photographs by J. R. I. Wood.

other 9 for half its length from the base (pseudo-monadelphous), staminal sheath 5–5.5 mm long, free portion of the filaments 1–2 mm long, both staminal sheath types present on the same specimen, *anthers* alternately longer (1 mm) and lanceolate, or shorter (0.3 mm) and ovate, the vexillary stamen with a shorter anther; *ovary* pubescent to hirsute along both margins, 3–3.5 mm long, 2–4-ovuled, style 1.5 mm long, stigma capitate, terminal. *Fruits* woody, dehiscent, broader near the apex and narrower at the base, 3.3–4.2 × 1.4–1.6 cm, the upper suture slightly ridged, glabrous, stipitate, the stipe 1.5–2 mm long, 1- or 2-seeded, mature seeds unknown. (Fig. 2, 3.)

Distribution

Poecilanthe boliviana is known from a single population beside the road from Taperas to San Juan in Chiquitos Province, in the Department of Santa Cruz, Bolivia.

Habitat and ecology

The species is a component of a seasonally dry forest, in the area where the Cerrado–Chaqueño vegetation is in transition to Chiquitano Dry Forest at ~335-m altitude. It grows in an area of plain, with somewhat compacted sandy clay soil, which is water-retentive during the rainy season.

Phenology

Collected in flower in November and in fruit in March.

Conservation status

Poecilanthe boliviana is common in forest over an area of ~1 km². No individuals were seen outside this area despite searching and, as currently known, it is a rare species. Because this is an accessible area on a flat plain, it is at risk of clearance for cattle ranching. On the basis of its rarity and the risk of deforestation, the species might be tentatively classified as *Critically Endangered* (CR) following IUCN guidelines (IUCN 2012). However, it must be emphasised that the whole area is botanically unexplored apart from passages along the road by one of us (JRIW) and perhaps by one or two other passing botanists. There is every hope, therefore, that additional populations will be found when the region is more thoroughly explored.

Etymology

The species epithet refers to the taxon being a narrowly restricted endemic in Bolivia. Its sister species *P. parviflora* has a much wider distribution in South America, including a single collection from Bolivia (see *Notes*).

Notes

A fruiting collection, *Vargas et al.* 3450 (K), from 18°12'747"S, 59°27'036"W, growing at 200-m elevation in the Valle de Tucavaca, 20 km north-east of Santiago de Chiquitos, was cited under *P. parviflora* in the *Catálogo de las Plantas Vasculares de Bolivia* (Jørgensen *et al.* 2014) and is the only collection of *Poecilanthe* included in the Catalogue. We confirm that identification. The habitat of *Vargas et al.* 3450 is given as

‘bosque de llanura de inundación a los márgenes del Río Tucavaca’, a vegetation type distinct from that of the new species, *P. boliviana*. As the two species are morphologically similar and molecularly shown to be sister taxa, more collections from the field and a detailed analysis of the relationship between the two in Bolivia are desirable.

Specimens examined

BOLIVIA. Departamento Santa Cruz, Provincia Chiquitos, 41 km de Taperas en el camino a San Juan, 17°46'04"S, 60°03'56"W, 10 Nov. 2007 (fl.), J.R.I. Wood *et al.* 23849 (K, LPB, USZ, UB); *ibid.*, 42 km de Taperas hacia San Juan, 17°46'40"S, 60°03'55"W, 5 Mar. 2011 (fr.), J.R.I. Wood & D. Soto 27146 (K [2 sheets], LPB, USZ).

Conflicts of interest

The authors declare that they have no conflicts of interest.

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