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Resolving nomenclatural ambiguity in South American *Tephrosia* (Leguminosae, Papilionoideae, Millettieae), including the description of a new species

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Abstract. Taxonomic studies of *Tephrosia* Pers. (Leguminosae, Papilionoideae, Millettieae) in South America have highlighted the need to resolve some nomenclatural issues. Five new synonyms are proposed and a new species is described. Nine lectotypes of accepted names and synonyms, and one neotype, are here designated. An identification key to the taxa occurring in South America is also presented.

Additional keywords: Fabaceae, lectotypification, synonymy, systematics, taxonomy.

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Introduction

Tephrosia Pers. (Leguminosae–Papilionoideae) comprises ~350 pantropically distributed species, occurring mainly in seasonally dry tropical woodlands, bushlands, thickets and grasslands, often in open and disturbed sandy or rocky areas (Schrire 2005). It comprises two subgenera, namely, *Tephrosia* subgenus *Barbistyla* Brummitt and *Tephrosia* subgenus *Tephrosia*. *Tephrosia* subg. *Barbistyla* has a pubescent style and a glabrous stigma, whereas *T.* subg. *Tephrosia* has a pubescent stigma (Brummitt 1980). According to Schrire (2005), the highest diversity for this genus is in Africa and Madagascar (~170 species), Australia (~90 spp.), Central and Tropical North America (~45 spp.) and Asia (~40 spp.). In South America, 18 taxa are recognised (Queiroz 2012).

Most treatments of the species of *Tephrosia* in South America are in regional floras, e.g. Argentina (Burkart 1952), Brazil (Bentham 1862; Queiroz and Tozzi 2009, 2011; Brazilian Flora Group 2015), Paraguay (Hassler 1919), Peru (Macbride 1943), Suriname (Amshoff 1939), and Venezuela (Pittier 1944). Queiroz (2012) produced the only complete account of this genus in South America, where *Tephrosia* subgenus *Barbistyla* is represented by four species (*Tephrosia candida* DC., *T. nitens* Benth., *T. sinapou* (Buc'hoz) A.Chev., and *T. vogelii* Hook.f.), and *Tephrosia* subg. *Tephrosia* comprises 14 taxa (*T. adunca* Benth., *T. cinerea* (L.) Pers., *T. domingensis* (Willd.) Pers., *T. egregia* Sandwith, *T. fertilis* R.T.Queiroz & A.M.G. Azevedo, *T. guaranitica* Chodat & Hassl., *T. hassleri* Chodat, *T. macbrideana* R.T.Queiroz, G.P.Lewis & A.M.G.Azevedo, *T. marginata* Hassl., *T. noctiflora* Bojer ex Baker, *T. purpurea* (L.) Pers. subsp. *purpurea*, *T. senna* Kunth, *T. sessiliflora* (Poir.) Hassl., and the new species described here, *T. chaquenha* R.T.Queiroz & A.M.G.Azevedo).

The species of *Tephrosia* in South America are shrubs or subshrubs with imparipinnate, multifoliolate, trifoliolate or unifoliolate leaves. Inflorescences are terminal, axillary or leaf-opposed pseudoracemes; the calyx is campanulate; the corolla is red, pinkish, purple, yellow, or white; and the ovary has 2–13 ovules. The fruit is a typical legume (Queiroz 2012). Bentham (1862) and Burkart (1952) noted that *Tephrosia* can be easily recognised by its linear, elliptical, oblong or obovate leaflets with numerous, parallel, oblique secondary veins.

Several species of *Tephrosia* are reported to have economic importance. According to Forbes (1948), ~22 species have been recorded as fish-poison plants. Wood (1949) noted that many species of this genus produce rotenone, a substance used to produce insecticides that are poisonous to invertebrates but not to most vertebrates, and Dzenda *et al*. (2007) reviewed the ethnomedical and veterinary uses of *T. vogelii*, and mentioned eight other species of *Tephrosia* with therapeutic properties. Compounds isolated from this genus include deguelin, rotenone,

tephrosin, quercetin and rutin, which are reported as antimicrobial and potentially able to kill molluscs, fish, insects and helminths (Dzenda *et al*. 2007).

During his revision of *Tephrosia* in South America, the first author analysed more than 3000 accessions in North American, Brazilian and European herbaria. Materials from the following herbaria were studied: B, BAB, BHCB, BM, BR, C, CEN, CGMS, COL, E, EAC, EAN, ESA, F, FHI, G, GH, GOET, HAL, HAS, HB, HEPH, HNBU, HRB, HRCB, HRJ, HST, HUEFS, HUFMS, HUFU, IAC, IBGE, ICN, INPA, IPA, JPB, K, L, LP, M, MA, MBM, MG, MICH, MO, MOSS, NX, OUPR, OXF, NY, P, PH, PAMG, PEUFR, RB, S, SI, SING, SP, SPF, SPFR, TCD, TEPB, UB, UC, UEC, UFG, UFMT, UFRJ, UFRN, UFP, UPCB, U, US, W and WU (codes follow Index Herbariorum, New York Botanical Garden's Virtual Herbarium, see http://sweetgum.nybg.org/science/ih, accessed 22 February 2017).

This work has brought several nomenclatural issues to light. As a result, we are here describing one new species, proposing nine lectotypes, one neotype, and five new synonyms. In addition, an identification key to the taxa occurring in South America is presented.

Nomenclatural novelties

Tephrosia Pers., *Syn. pl*. 2(2): 328 (1807), *nom. cons*.

Type: *Tephrosia villosa* (L.) Pers.
Cracca L., *Sp. pl*. 2: 752 (1753), *nom. rej., non* Hill (1756), *nec* Medik. (1787), *nec* Benth. (1853).

Type: *Cracca virginiana* L.
Colinil Adans., *Fam. Pl*. 2: 327 (1763).

Type: none.
Erebinthus Mitch., *Diss. Brev. Bot. Zool*. 32 (1769), *nom. rej*.

Type: *Tephrosia spicata* (Walter) Torr. & A. Gray (*fide* C.Wood, *Rhodora* 51: 292 (1949)).
Needhamia Scop., *Intr. Hist. Nat*. 310 (1777), *nom. rej*.

Type: *Vicia littoralis* Jacq.
Reineria Moench, *Suppl. Meth*. 44 (1802), *nom. rej.*

Type: *Reineria reflexa* Moench.
Kiesera Reinw. ex Blume, *Catalogus*, 93 (1823).

Type: *Kiesera sericea* Reinw.
Xiphocarpus C.Presl, *Symb. Bot*. 1: 13 (1830).

Type: *Xiphocarpus martinicensis* C.Presl.
Apodynomene E.Mey., *Comm. Pl. Afr. Austr*. 111 (1836).

Type: *Apodynomene grandiflora* (L'Hér. ex Aiton) E.Mey.
Macronyx Dalzell, *Hooker's J. Bot. Kew Gard. Misc*. 2: 35 (1850).

Type: *Macronyx strigosus* Dalzell.

Key to species of *Tephrosia* in South America

1. Leaves 3-foliolate, rarely 5-foliolate; rachis <2 cm long; corolla yellow; flowers in pairs on the inflorescence; calyx not persistent in fruit ..... ***T. sessiliflora***
1: Leaves rarely 3-foliolate, usually ≥5-foliolate; rachis >2 cm long; corolla white, purple or pink; inflorescence a pseudoraceme; calyx usually persistent in fruit 2
2. Branches thick, strigose to densely strigose; hairs present on the style but absent at the base of the stigma; aril present on the seed 3
3. Branches smooth, indumentum greyish; lenticels present on the branches; stipules 7–10-veined; leaflets oblanceolate; pseudoracemes laxly flowered ..... ***T. nitens***
3: Branches striate, indumentum rusty brown; lenticels absent on the branches; stipules 5-veined; leaflets oblong, elliptic to narrowly elliptic; pseudoracemes with flowers congested 4
4. Leaflets elliptic to narrowly elliptic; bracts ovate, caducous; calyx 4-lobed, calyx tube shorter than the lobes; standard 2.5–2.6 × 3.0–3.2 cm, indumentum present on its abaxial surface; legumes 10–20 mm wide, lanate ..... ***T. vogelii***
4: Leaflets narrowly oblong to oblong; bracts subulate to narrowly triangular, persistent; calyx with 5 lobes, calyx tube longer than the lobes; standard 1.1–2.3 × 1–2.4 cm, indumentum absent on its abaxial surface; legumes 3–10 mm wide, strigose to sparsely velutinous 5
5. Leaves with 13–21 leaflets; these acute at the apex, and abaxially pubescent; inflorescence axis always longer than the leaf length; pseudoraceme with up to 50 flowers; pedicel 0.8–1.5 cm long; calyx lobes rounded at apex; style apex straight; fruits laterally flattened, 0.8–1 cm wide ..... ***T. candida***
5: Leaves with 27–39 leaflets; these retuse at the apex, and pubescent on both surfaces; inflorescence axis shorter than the leaf length; pseudoraceme with more than 50 flowers; pedicel 0.3–0.6 cm long; calyx lobes acute at apex; style apex curved; fruits cylindrical, 4–5 mm wide ..... ***T. sinapou***
2: Branches slender; strigilose, hirsute, sericeous, sparsely sericeous, pilose, or glabrescent; style and stigma glabrous; aril absent on seed 6
6. Branches with a greyish indumentum or glabrescent 7
7. Branches sparsely sericeous to glabrescent; calyx lobes the same length as the calyx tube 8
8. Pseudoraceme laxly flowered; calyx 4–5 mm long; corolla with dots; wings narrowly elliptic; leaflets rounded to acute at apex ..... ***T. domingensis***
8: Pseudoraceme with flowers congested; calyx 5–7 mm long; corolla without dots; wings elliptic, falcate or obovate; leaflets retuse at apex 9
9. Rachis 5 mm long; bracts over 3 mm long; wings 3-veined, claw over mm long; leaflets inserted 1.5–2.2 cm apart, secondary veins salient on the abaxial surface ..... ***T. senna***
9: Rachis 10–80 mm long; bracts up to 3 mm long; wings 2-veined, claw under 3 mm long; leaflets inserted 0.6–1 cm apart, secondary veins not salient on the abaxial surface ..... ***T. purpurea*** subsp. ***purpurea***
7: Branches with a dense indumentum [except in *T. chaquenha*]; calyx lobes twice the length of the calyx tube 10
10. Branches hirsute; leaflets over 4.7 cm long, tomentose abaxially; pseudoraceme congested; calyx lobes 9–14 mm long; standard 1.3–1.5 cm long; keel petals 1.3 cm long; staminal tube 1.1 cm long; fruit laterally compressed, hirsute ..... ***T. hassleri***
10: Branches sericeous, pilose, tomentose, sparsely sericeous to glabrescent; leaflets up to 4.5 cm long, sericeous abaxially; pseudoraceme laxly flowered; calyx lobes 1–7 mm long; standard 0.5–1.3 cm long; keel petals 0.6–1.1 cm long; staminal tube 0.6–1 cm long; fruit cylindrical, sericeous to tomentose 11
11. Leaflets retuse at apex; calyx tube over 2 mm long, pubescent to tomentose, lobes 4–7 mm long; seeds square ..... ***T. egregia***

11: Leaflets acute to rounded at apex; calyx tube under 2 mm long, sericeous or hirsute, lobes 1–4 mm long; seeds oval to oblong 12

12. Leaflets narrowly oblanceolate to oblanceolate or obovate; stipules 0.5–1 mm wide; bracts 1/2 the pedicel length; standard 0.6–1 cm long ..... ***T. cinerea***

12: Leaflets narrowly elliptic, elliptic, narrowly oblanceolate, or linear; stipules 0.5 mm wide; bracts approximately equally the length of the pedicel; standard 1.2–1.3 cm long 13

13. Pseudoraceme 20–50 cm long; plant an erect subshrub; indumentum strigilose; stipules 8–9 mm long; flowers 10–12 mm long ..... ***T. macbrideana***

13: Pseudoraceme up to 13 cm long; plant a decumbent subshrub; indumentum sericeous; stipules 2–7 mm long; flowers 15–15.5 mm long ..... ***T. chaquenha***

6: Branches with a rusty brown indumentum 14

14. Plant an erect subshrub; adaxial surface of the leaflets glabrous; calyx gibbous; ovary up to 6 mm long; fruit villous; seeds with a rugose testa, ochre-coloured ..... ***T. noctiflora***

14: Plant a decumbent subshrub; adaxial surface of the leaflets sparsely sericeous, pilose, setose, or glabrescent; calyx campanulate; ovary over 6 mm long; fruit pubescent, sericeous or tomentose; seeds with a smooth testa, brown 15

15. Branches hirsute or pubescent; stipules linear; leaflets 2.2–2.8 cm wide; more than 25 pairs of veins per leaflet ..... ***T. guaranitica***

15: Branches pilose or sericeous; stipules narrowly triangular; leaflets up to 2 cm wide; less than 25 pairs of veins per leaflet 16

16. Leaflets linear to narrowly elliptic, never oblanceolate; marginal vein prominent; standard 1.4 × 1.8 cm, transversally elliptic; wings 1.5–1.6 cm long; keel petals 1.1 cm long; ovary 1 cm long ..... ***T. marginata***

16: Leaflets oblanceolate, narrowly oblong, elliptic, or narrowly elliptic; marginal vein not prominent; standard 0.7–1.2 × 0.8–1.4 cm, elliptic, widely depressed-ovate to oblong; wings 0.8–1.1 cm long; keel petals 0.6–1.0 cm long; ovary 0.7–0.9 cm long 17

17. Pedicel 1.5× shorter than the bracts; standard broadly depressed-ovate, standard claw 1.2 mm long; keel petals 10 mm long ..... ***T. fertilis***

17: Pedicel twice the bract length; standard elliptic, broadly obovate or oblong, standard claw 1.7–4 mm long; keel petals 6–9 mm long ..... ***T. adunca***

1. *Tephrosia adunca* Benth., *Ann. Nat. Hist.* 3: 432 (1839)

Type: Brazil. Minas Gerais: in desertorum pascuis ad S. Isabel, *s. dat., Pohl s.n.* (lecto, here designated: K 502599; isolecto: NY 623410). *Cracca adunca* (Benth.) Kuntze, *Revis. Gen. Pl.* 1: 174 (1891).

Tephrosia penicillata Benth., *Ann. Nat. Hist.* 3: 431 (1839).

Type: Guyana [British Guiana], *s. dat., R.Schomburgk 678* (holo: K 502605; iso: BR 5792504, F 59923F, F 360659F, G 367963, G 367977, G 367990, NY 33832, TCD 4328, TCD 4329).

Tephrosia rufescens Benth., *Linnaea* 22: 513 (1849); *Cracca villosa* var. *rufescens* (Benth.) Kuntze, *Revis. Gen. Pl.* 1: 174 (1891); *Tephrosia adunca* var. *rufescens* (Benth.) Hassl., *Repert. Spec. Nov. Regni Veg.* 16: 165 (1919), syn. nov.

Type: Brazil. Minas Gerais, 1848, *A.F.Regnell 78* (lecto, here designated: K 502608; isolecto: R 64353, R 64353a, M (not seen), MO 1737286 (image seen). Remaining syn: Brazil, Nov. 1833, *Riedel 1565* (P 2949532). Probable syn: Brazil., Minas Gerais. Caxoeira do Campos, 1839, *P.Claussen & B.Delessert 4* (K 502607).

Tephrosia adunca var. *intermedia* Chodat & Hassl., *Bull. Herb. Boissier* sér. 2, 4: 839 (1904).

Type: Paraguay, Canindeyú, Yerbales. In regione Yerbalium de Maracayú Paraguaria euro-astra, Serra de Maracayú, *E.Hassler 4643* (lecto, here designated: G 448507; isolecto: BM 538080, G 448505, G 448506, G 448506a, G 448507-a, G 448507-b, G 448507-c, G 448507-days, G 448508, G 448508-a, K 502603, UC 934893).

Tephrosia adunca f. *glabrior* Chodat & Hassl., *Bull. Herb. Boissier*, sér. 2, 4: 839 (1904).

Type: Paraguay. In dumeto pr Bellavista in regione cursus superioris fluminis Apa, Oct. 1901–1902, *E.Hassler 7843* (holo: G 448504).

Tephrosia rufescens var. *paraguayensis* Ulbr., *Repert. Spec. Nov. Regni Veg.* 2: 12 (1906); *Tephrosia adunca* f. *paraguayensis* (Ulbr.) Hassl., *Repert. Spec. Nov. Regni Veg.* 16: 165 (1919).

Type: Paraguay, 20–25 Feb. 1903, *K.Fiebrig 903* (lecto, here designated: G 400050; isolecto: K 502609, M 233384).

Tephrosia adunca var. *subglabrata* Hassl., *Repert. Spec. Nov. Regni Veg.* 16: 165 (1919).

Type: Paraguay. Zwischen Rio Apa und Rio Aquidaban, Nov. 1908–1909, *K.Fiebrig 4229* (lecto, here designated: G 448503; isolecto: G 448503-a, G 440502, G 440502-a, G 440502-b, G 440502-c. Remaining syn: Paraguay. Cordillera de Altos, 1903, *K. Fiebrig 938* G 448500, G 448500-a, G 448501, G 448501-a).

Tephrosia adunca f. *pseudomarginata* Hassl., *Repert. Spec. Nov. Regni Veg.* 16: 165 (1919).

Type: Paraguay. Prope Caaguazú in campis combustis, 1905, *E.Hassler 8908* (holo: G 448441).

Notes

Tephrosia adunca has a wide geographical distribution (Argentina, Boliva, Brazil, the Guianas, Venezuela and Uruguay) and presents a large morphological variation. It is morphologically similar to *T. fertilis*, but the latter can be recognised by its thick, curved branches (*v.* straight and

thinner branches in *T. adunca*). The indumentum of *T. adunca* is always rust-coloured. The leaf has a curved rachis when the leaflets are closed, and the leaflets are variable in form and covered by a sparse to medium sericeous indumentum. A diagnostic character of the species is that the pedicel is approximately twice the length of the bract.

The protologue of *T. adunca* cites a syntype collection: 'Dr Pohl in the desert pastures of S. Isabel', and a second gathering from Minas Gerais. We have located only two specimens collected by Dr Pohl from S. Isabel (K 502599 and NY 623410). As the specimen at K includes an original Pohl label, we are designating it as the lectotype of *Tephrosia adunca* Benth.

In the protologue of *Tephrosia rufescens*, Bentham (1862, p. 513) cited three syntypes: 'Ad Caldas prov. Miñas Geräes A. Regnell. ser. 2. n.78; Caxoeiras do Campos, Claussen; ad San Paulo, Riedel'. According to Stafleu and Cowan (1976), George Bentham's herbarium and types are housed at K, where we found two collections: Brazil, Minas Gerais, Caxoeira dos Campos, 1839, *P.Claussen & B.Delessert 4* (K 502607) and Brazil, Minas Gerais, ad Caldas, 1848, *A.F.Regnell 78* (K 502608). Both specimens are on the same sheet. An additional specimen, *A.F.Regnell II-78* (K 858670, M 0233383), was also located; however, the label data indicate that this specimen was collected in Uberaba municipality, instead of Caldas, as cited in the protologue. Duplicates of *Regnell 78* collected at Minas Gerais, Caldas, were located at R (R 64353 and R 64353a). A probable syntype, *L.Riedel 1565*, is housed at P (P 2949532). Because Bentham cited the number 78 for the Regnell collection in the protologue, and did not cite either the co-collector B. Delessert or the number 4 for the Claussen collection (therefore, we are not sure whether the Claussen specimen is indeed even a syntype), we are here designating K 502608 as the lectotype of *Tephrosia rufescens* Benth.

In the protologue of *Tephrosia adunca* var. *intermedia*, Chodat and Hassler (1904, p. 834) cited 'in campo pr. flumen Jejui guazu, Sept., no. 4643'. Ten duplicates of *Hassler 4643* were found at G. The following five of these specimens are annotated as the holotype: G 448507, G 448507-a, G 448507-b, G 448507-c, G 448507-d; and the other five as isotypes: G 448505, G 448506, G 448506-b, G 448508-a, G 448508-b. All the specimens fit the protologue and are eligible for selection as the lectotype. Five of these sheets carry a specimen label (G 448505, G 448506, G 448507, G 448507-d and G 448508) and are equally informative. We opted to follow the G labels, which annotate G 448507 as the holotype, and we designate this as the lectotype of the name *T. adunca* var. *intermedia*.

In the protologue of *Tephrosia adunca* var. *subglabrata*, Hassler (1919, p. 165) cited the following three syntypes: 'Paraguay: Hassler 7843; Fiebrig 938, 4229'. According to Stafleu and Cowan (1979), the largest set of Émile Hassler's Paraguayan specimens is housed at G, the second largest set at K, and other major sets at B (no longer extant), P, S and W. Material of all cited syntypes is held at G. To avoid confusion, material of *Hassler 7843* was excluded from consideration for lectotype selection, as it is type material of the name *Tephrosia adunca* f. *glabrior* Chodat & Hassl. Four duplicates of *Fiebrig 938* and six of *Fiebrig 4229* are held at G. *Fiebrig 4229* has flowers and fruits, whereas *Fiebrig 938* has only flowers. Among the *Fiebrig 4229* duplicates, G 448502, G 448502-a, and G 448503 have flowers and fruits and we, here, designate *K.Fiebrig 4229* (G 448503) as the lectotype of *Tephrosia adunca* var. *subglabrata* Hassl. In the protologue of *T. rufescens* var. *paraguayensis*, Ulbrich (1906, p. 165) cited 'K. Fiebrig, Plantae Paraguayenses no. 903'. Ulbrich's herbarium is housed at B (partly extant; Stafleu and Cowan 1976). We did not locate any specimens that could be considered original material of *Tephrosia adunca* var. *paraguayensis* Hassl. at B, but three specimens were located at G, M, and K. The specimen located at M (M 233384) is sterile. Both K 502609 and G 400050 have flowers and fruits, in accordance with the protologue. Because G 400050 is the most informative specimen (it has mature fruits, whereas the other specimen has immature fruits), we are designating this as the lectotype of *Tephrosia rufescens* var. *paraguayensis* Ulbr.

2. *Tephrosia chaquenha* R.T.Queiroz & A.M.G.Azevedo, sp. nov.

Type: Paraguay, Ciges Couchées, Villa Rica, sur les collines inculte, 6 Oct. 1874, *B.Balansa 1539* (holo: BM 538072; iso: BR 5020184238698) (Fig. 1, 2).

Tephrosia cinerea f. *pseudoadunca* Hassl., *Repert. Spec. Nov. Regni Veg*. 16: 166 (1919).

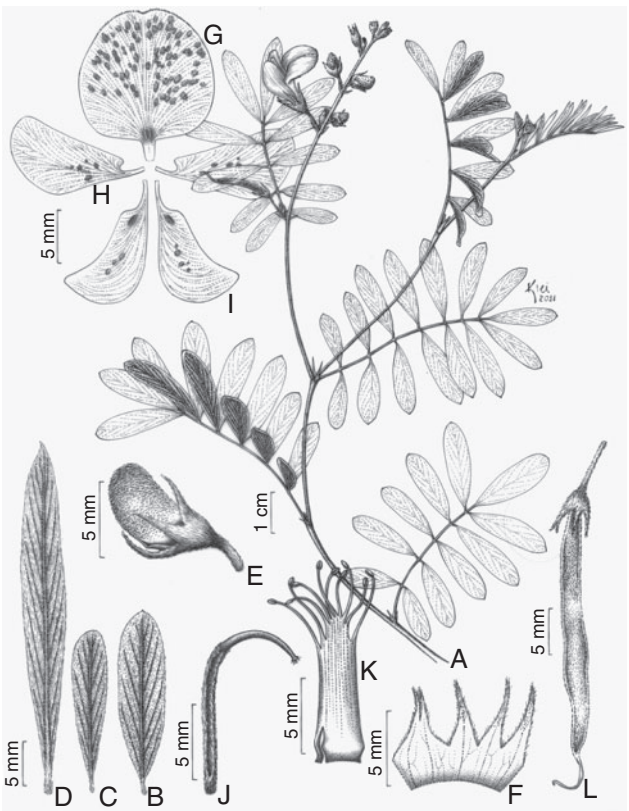

Fig. 1. *Tephrosia chaquenha*. A. Branch. B–D. Distinct leaflets. E. Bud. F. Calyx. G. Standard. H. Wings. I. Keel petals, J. Gynoecium, K. Staminal tube. L. Young fruit with persitent calyx. Voucher *Schinini et al. 19043* IAC-24649. Drawn by Kley Souza.

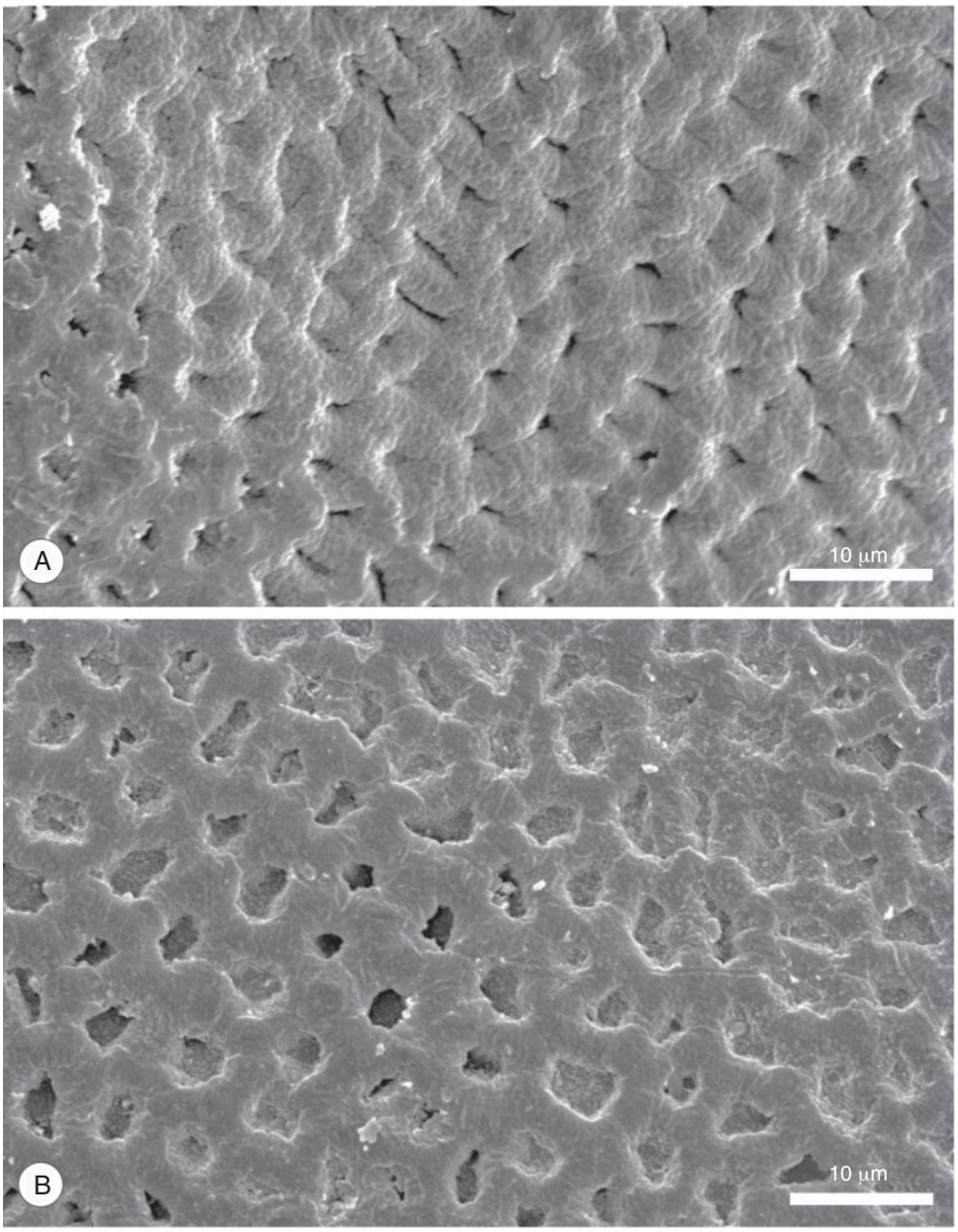

Fig. 2. Scanning electron micrographs of the testa of two species of *Tephrosia.* A. *T. chaquenha* (simple-reticulate papillate testa). B. *T. cinerea* (simple-reticulate smooth testa).

Type: Paraguay, Gran Chaco, Loma Clavel, *E.Hassler 2591* (holo: G 229579; iso: G 229578, G 229580, G 400028, MPU 024206, P 02950680 US 00003906).

Haec species *Tephrosiae cinereae* (L.) Pers. similis, sed ab ea praecipue foliolis adaxialitre glabris, floribus longioribus in partibus omnibus majoribus atque petalis organis secretoriis praeditis distinguitur.

Decumbent subshrub up to 80 cm tall, *indumentum* sparsely grey sericeous to glabrous. *Leaves* imparipinnate, 5–19-foliolate; *stipules* 2–7 × ~0.5 mm, with 1–3 veins, narrowly triangular to linear; petiole 3–20 mm long, sulcate; rachis 5–50 mm long, sulcate; petiole, stipule, and rachis scattered sericeous; *leaflets* 10–45 × 3–7 mm, elliptic or narrowly elliptic to narrowly oblanceolate or linear; base acute to cuneate, apex rounded to acute; upper surface glabrous, lower surface scattered sericeous; secondary veins 7–9 pairs; all petiolules 1–2 mm long, sericeous. *Inflorescence* a terminal or axillary pseudoraceme 2.5–13 cm long; peduncle 3–5 cm long, cylindrical, scattered sericeous to glabrous; *bracts* 2–5 × 0.4–1 mm, narrowly triangular; pedicels 3–5 mm long. *Flowers* pink, 15–15.5 mm long; *calyx* 5–6 mm long, campanulate, bilabiate, scattered sericeous, teeth 2.8–4 × ~1 mm, narrowly triangular, subulate; *standard* petal 12–13 × 12–15 mm, broad ovate, retuse at apex, dorsal surface scattered sericeous to tomentose, claw 2–2.5 × 1–1.5 mm; *wings* 12–14 × 6–7 mm, asymmetrically obovate, apex rounded, claw 2–2.5 × 0.3–0.5 mm; *keel* petals

9–10 × 2–5 mm, connate, cucullate, apex acute, secretory structures present, claw 2.5–2.8 × 0.2–0.3 mm; *staminal tube* 8–10 × 2.5–3 mm, free portion of filaments 3–4 mm long; annular disk present at base of sessile ovary; *ovary* 7–9 mm long, oblong, indumentum sericeous, ovules 8–10; *style* ~6 mm long, laterally compressed, glabrous; *stigma penicillate* with translucent trichomes. *Fruit* a legume 43–60 × 3–4 mm, coriaceous, plane, linear, apex and base asymmetric, brown with scattered sericeous, greyish indumentum, and persistent calyx; *seeds* 7–10 × 2.8–3.8 × 1.8–2.2 mm, oblong, ochraceous, testa speckled, hilum excentric, aril absent.

Phenology

Flowers and fruits are reported from November to January.

Conservation status

Tephrosia chaquenha is currently recorded from Argentina, Brazil and Paraguay. The extent of occurrence (EOO) for the species is 235 906.527 km^2 (which equates to a conservation status of *Least Concern*, LC). Its area of occupancy (AOO) is 24.000 km^2 (which would give it an *Endangered* status, EN). We have little information about the quality of the habitats where the species grows in each country, and because of the current paucity of specimens and habitat data, we assess *Tephrosia chaquenha* to be *Data Deficient* (DD) following IUCN 2017 criteria (IUCN 2017).

Etymology

The species is named in reference to its distribution in chaco vegetation (in Brazil and Paraguay). The habitat of this species in Argentina is presently unknown.

Notes

Tephrosia chaquenha morphologically resembles *T. cinerea* and shares the same habit, grey-coloured indumentum and similar linear fruits. The species can be distinguished by the characters presented in Table 1. Moreover, another noteworthy character is that *Tephrosia cinerea* presents a reticulate-smooth testa, whereas it is reticulate-papillate in *T. chaquenha* (Fig. 2).

Specimens examined

ARGENTINA. Corrientes: Lavalle, 2 km N de Cerrito sobre ruta 152, 23 Nov. 1979, *A.Schinini 19043*, *R.Vanni & G.Norrmann* (fl., fr.) (IAC); entre Rios: Colón, 13 Nov. 1979, *N.S.Troncoso 2675* (fl.) (SI); Colón, Palmar, a 13 km E de R 14, barrancas del rio Uruguay hasta el arenal, lat. 32°0′S, long 58°10′W, 17 Jan. 1976, *C.Romanczuk 23* (fl., fr.) (BAB). BRAZIL. Mato Grosso do Sul: Porto Murtinho, Fazenda das flores 21°43′01″S, 57°53′57″W, 15 Dec. 2009, *R.T.Queiroz 1439* (fl.) (UEC). PARAGUAY. Paraguay Centralis, in regione lacus Ypacaray, Dec. 1913, *E.Hassler 12410* (fl.) (BM, G, SI); Zwischen Rio Apa und Rio Aquidaban, 1909, *K.Fiebrig 4229* (G, K).

3. *Tephrosia cinerea* (L.) Pers., *Syn. Pl.* 2: 328 (1807)

Galega cinerea L., *Syst. Nat*., 10th edn, 2: 1172 (1759). *Cracca villosa* var. *cinerea* (L.) Kuntze, *Revis. Gen. Pl*. 1: 173 (1891); *Cracca cinerea* (L.) Morong, *Ann. New York Acad. Sci*. 7: 79 (1892); *Colinil cinereum* (L.) C.H.Hitchc., *Rep. (Annual) Missouri Bot. Gard*. 4: 75 (1893).

Type: [no specimen data] (lecto: LINN HL-924.2, designated by W.Fawcett and A.B.Rendle, *Fl. Jamaica* 4: 20 (1920)).

Vicia littoralis Jacq., *Enum. Syst. Pl*. 27 (1760). *Galega littoralis* (Jacq.) L., *Syst. Nat*., 12th edn, 2: 497 (1767); *Tephrosia littoralis* (Jacq.) Pers., *Syn. Pl*. 2: 328 (1807); *Tephrosia cinerea* var. *littoralis* (Jacq.) Benth. in C.F.P. von Martius (ed.), *Fl. Bras*. 15(1A): 48 (1859); *Cracca littoralis* (Jacq.) Rydb., in N.L.Britton *et al*. (eds), *N. Amer. Fl*. 24(3): 178 (1923).

Type: [no specimen data] (lecto, here designated: LINN HL-924.3).

Tephrosia venustula Kunth., *nov. gen. sp*., 4th edn 6: 459 (1823).

Type: Guyana. Bordones, *s. dat.*, *F.Humboldt & A.Bonpland 420* (holo: P 660150).

Orobus domingensis Spreng., *Syst. Veg*., 16th edn, 3: 261 (1826).

Type: Republica Dominicana. Santo Domingo, En terreno abandonado, común, cerca del Jardim Botânico, Santo Domingo, 20 Sept 1973, *A.H.Liogier 20188* (neo, here designated: NY 1652524).

Tephrosia procumbens Macfady., *Fl. Jamaica* 1: 256 (1837).

Type citation: 'Galega No. 2, *Browne*, 289.'

Type: not seen.

Table 1. Characters used to distinguish *Tephrosia cinerea* from *T. chaquenha*
SEM, Scanning Electron Microscopy

Character	*T. cinerea*	*T. chaquenha*
Indument	Pilose	Scattered sericeous or glabrous
Leaflets	Oblanceolate or narrowly oblanceolate	Elliptic or narrowly elliptic to narrowly oblanceolate or linear
Upper surface of leaflets	Sericeous	Glabrous
Inflorescence	Solitary, axillary, flower,	Terminal pseudoraceme,
Flower length	0.8–15 mm	15–15.5 mm
Calyx length	0.5–5 mm	5–6 mm
Calyx symmetry	Actinomorphic	Bilabiate
Standard petal length	6–10 mm	12–13 mm
Petal secretory structures	Absent	Present
Standard claw length	1–2 × 0.2–0.3 mm	2–2.5 × 1–1.5 mm
Wing petal claw length	0.9–1.1 × 0.2–0.4 mm	2–2.5 × 0.3–0.5 mm
Keel petal claw length	1.2–2 mm	2.5–2.8 mm
Testa of seed at SEM (Fig. 2B)	Simple-reticulate, smooth	Simple-reticulate, papillate

Tephrosia gynothrix Miq., *Linnaea* 18: 29 (1844).

Type: Suriname. In plantatione de Zwarigheid, Vredenburger Kreek, Oct. 1842, *H.C.Focke 666* (holo: U 3650).

Tephrosia scopulorum Brandegee, *Univ. Calif. Publ. Bot*. 6: 181 (1915).

Type: Mexico. San Geronimo, Oaxaca, July 1914, *C.A.Purpus 7151* (holo: UC 175091; iso: F F0059920F, GH (not seen), MO 125154, NY 33816, US 3953).

Tephrosia cinerea var. *typica* Hassl., *Repert. Spec. Nov. Regni Veg*. 16: 166 (1919), *nom. inval.*

Notes

This species has a subshrubby habit, with decumbent and thin branches. In general, the branches, leaves and fruits are covered by grey indumentum. All material from Caatinga vegetation has axillary fascicles of flowers with long, slender pedicels. The length of the pedicel is a character that facilitates the recognition of this species. Furthermore, its fruits are usually very long and arched. Owing to the slenderness of the pedicel, the fruits are always orientated downward. The calyx lobes are strongly subulate, especially in fruit. The species is morphologically similar in appearance to *T. chaquenha*, but is easily distinguished by the above suite of characters

The protologue of *Vicia littoralis* Jacq. (1760) cited neither specimens nor illustrations. Because Jacquin's specimens are known to be in numerous herbaria (D'Arcy 1970; Stafleu and Cowan 1979), searches for original material were undertaken at B, BM, CGE, H, JE, LINN, LIV, OXF, UPS and W. We located only one specimen (LINN HL-924.3) annotated '*Vicia littoralis mea Jacquin*' in Jacquin's handwriting (Burdet 1979), and, therefore, it is likely that it was seen by Jacquin. Accordingly, we designate this specimen as the lectotype of *Vicia litoralis* Jacq. An additional four specimens held at LINN (LINN HS-1214.10, LINN HS-1214.11, LINN HS-1214.12, and LINN HS-1214.14) lack locality or date information, and each is annotated as *Galega cinerea* L. These specimens are unlikely to represent the original material of *Vicia littoralis*. The other specimen located in one of the herbaria that may hold Jacquin material is W 29662, also lacking location or date, with the name *Galega littoralis* L. written on it.

Orobus domingensis Spreng. was described on the basis of a Carlo Bertero collection from Hispaniola in Santo Domingo. The protologue provides neither a description nor an illustration. Searches for original material of this name in B, BHU, BM, G, K, M, P and W were unsuccessful. Therefore, the specimen NY 1652524 is here proposed as a neotype for *Orobus domingensis*.

4. *Tephrosia domingensis* (Willd.) Pers., *Syn. Pl.* 2(2): 330 (1807)

Galega domingensis Willd., *Sp. Pl*., 4th edn, 3(2): 1249 (1802); *Cracca domingensis* (Willd.) Rydb., in N.L.Britton *et al*. (eds), *N. Amer. Fl*. 24 (3): 181 (1923).

Type: Dominica. . . . St. Domingo. . ., *s. dat., F.Bredemeyer s.n.* (holo: B-W 13942-010).

Tephrosia ascendens Macfady., *Fl. Jamaica*, 1: 257 (1837).

Type: Jamaica, *s. dat*., *J.Macfadyen s.n.* (holo: K 502616).

Tephrosia tenella A.Gray, *Smithsonian Contr. Knowl*. 5(6):36 (1853). *Cracca tenella* (A.Gray) Rose, *Contr. USA Natl. Herb*. 12(7): 271 (1909).

Type: United States. San Pedro: Sonora, 8 Sep. 1851, *C.Wright 966*, (lecto, here designated: GH 107070; isolecto: GH 63573, GH 63572, K 848919, K 848920, MO 217373, MO 277489, NY 33799, PH 30249, US 3979).

Tephrosia leptostachya var. *leptophylla* Benth. in C.F.P. von Martius (ed.), *Fl. Bras*. 15(1A): 49 (1862), syn. nov.

Type: Brazil. Goiás: Alegre, *s. dat.*, *Pohl s.n.* (holo: K 921500).

Cracca rusbyi Rydb. in N.L.Britton *et al*. (eds), *N. Amer. Fl*. 24(3): 181 (1923).

Type: Mexico. Santa Catarina, Oaxaca, 14 July 1910 *H.H.Rusby 69* (holo: NY 6596).

Notes

The name *Tephrosia domingensis* dropped into disuse after Bentham (1862) treated it as a synonym of *T. leptostachya* DC. and published *T. leptostachya* var. *leptophylla* Benth., on the basis of material of *T. domingensis*. After that, all South American collections were treated as *T. leptostachya*. After reviewing the type specimen of *T. domingensis*, we consider that the South American material treated as *T. leptostachya* is better considered as a separate species, *T. domingensis.*

Tephrosia domingensis is recognised by its decumbent habit, but in some situations it may become ascendant. Its branches are slender, strongly lignified, sometimes wine red in colour, and glabrescent. The leaves have very narrow and glabrescent leaflets with the apex usually acute, but occasionally round. The pseudoracemes are long with few flowers. Their legumes are plane, with the edges of the valves prominent and with a persistent calyx; the calyx lobes are very delicate. The seeds are usually flattened, and become dark and grey-speckled when old.

In the protologue of *Tephrosia tenella*, Gray (1853) stated '. . .near the San Pedro, Sonora; Sept. (966)'. Stafleu and Cowan (1976) stated that the herbarium, types, original manuscripts, archives and correspondence of Asa Gray are at GH. Three specimens of *C.Wright 966* were located at GH (GH 63572, GH 63573, and GH 107070). The protologue describes flowers and fruits, and all the three specimens fit the protologue. The specimen GH 107070 has a label on it (certainly not prepared by Gray), identifying it as the holotype. However, on the same sheet, there are two different collections, namely, GH 107070 (two plants on right half of sheet) and GH 263484 (two plants on left half of sheet, with the collection number *929* on the label). Because GH 107070 is the most informative specimen, with both flowers and well-developed fruit, it is here formally designated as the lectotype of *T. tenella* A.Gray.

5. *Tephrosia marginata* Hassl., *Repert. Spec. Nov. Regni Veg*. 16: 162 (1919), *nom. nov.*

Type: Paraguay. In valle fluminis Y – acá. in campo glareoso, pr. Pirihebuy, Dec. 1900, *E.Hassler 6721* (holo: G 400037).

Tephrosia nervosa Chodat & Hassl., *Bull. Herb. Boisser*, sér. 2, 4: 839 (1904), *nom. illeg., non* Pers. (1807). *Tephrosia adunca* var. *acutifolia* Chodat & Hassl., *Bull. Herb. Boissier*, sér. 2, 4: 879 (1904), syn. nov.

Type: Paraguay, Iter ad Yerabales montium Sierra de Maracayu, in regione flumis Capibari, 1900, *E.Hassler 4381* (lecto, here designated: G 400034; isolecto: G 400033, G 400035, G 448509, G [no barcode accession number].

Tephrosia marginata var. *pseudorufescens* Hassl., *Repert. Spec. Nov. Regni Veg*. 16: 163 (1919).

Type: Paraguay. In campo Nandurucay Sierra de Maracayu, 1898–1899, *E.Hassler 4346* (lecto, here designated: G 400038; isolecto: G 400036, G 400044, NY 33830). Remaining syn: Paraguay. In regione Yerbalium de Maracayú, *E.Hassler 4381*, BM 538077, G 400033, G 400034, G 400035, K 502595, NY 33831; Paraguay, Prope Caaguazú in campis combustis, *E.Hassler 9126*, G 400026).

Tephrosia marginata var. *cinerascens* Hassl., *Repert. Spec. Nov. Regni Veg*. 16: 163 (1919), *nom. inval*.

Notes

Chodat and Hassler (1904) described this species as *Tephrosia nervosa* on the basis of material collected in Paraguay. However, this name was an illegitimate later homonym, and Hassler (1919) subsequently published the replacement name *T. marginata* and used characters of the indumentum to describe two varieties, namely, *Tephrosia marginata* var. *cinerascens* Hassl., *nom. inval.* and *T. marginata* var. *pseudorufescens* Hassl. However, the diagnostic characters used to separate the varieties are tenuous, and these taxa are not accepted here. *Tephrosia marginata* var. *cinerascens* is invalid under ICN Art. 26.2 (Turland *et al*. 2018; known informally as 'The Shenzhen Code' or simply 'the Code', see http://www.iapt-taxon.org/nomen/main.php) because one of the cited syntypes (*Hassler 6721*) is the type of *T. nervosa* (= *T. marginata*).

This species morphologically resembles *Tephrosia chaquenha* regarding the shape of the leaflets. However, *T. marginata* is the only species with linear leaflets with a prominent marginal rib. Besides this, *T. marginata* has a ferruginous indumentum, long pseudoraceme (8–20 cm long), and wine red-coloured flowers, whereas *T. chaquenha* presents a grey indumentum, short pseudoraceme (2.5–13 cm long) and pink flowers.

In the protologue of *Tephrosia adunca* var. *acutifolia*, Chodat and Hassler (1904) did not cite any collection. Nevertheless, Chodat and Hassler (1907, p. 826) published a correction to their original protologue citing *E.Hassler 4381* as the type collection. We are confident, therefore, that this is the original collection analysed by the authors when describing their new taxon. Four specimens under this number were located at G (G 400033, G 400033a, G 400034, G 400035, and G 448509). We are designating G 400034 as the lectotype of *T. adunca* var. *acutifolia* Chodat & Hassl., because this is the most informative specimen, having flowers and young fruits (other duplicates have only flowers). Moreover, the original description and the type collection present no morphological characters that differentiate the taxon from *T. marginata*; therefore, we are synonymising *T. adunca* var. *acutifolia* under *T. marginata*.

In the protologue of *Tephrosia marginata* var. *pseudorufescens*, Hassler (1919, p. 163) cited the syntypes 'Hassler 4346, 4381 id. in campis siccis Caaguazú Hassler 9126'. Several specimens were located at BM, G, K, and NY. Among the specimens at G (where the Hassler types are housed), G 400038 has only fruits, whereas the others have both flowers and fruits. Because the protologue describes fruits but does not mention flowers, we are here designating G 400038 as the lectotype of *Tephrosia marginata* var. *pseudo-rufescens* Hassl.

6. *Tephrosia vogelii* Hook. f., *Niger Fl*. 296 (1849)

Cracca vogelii (Hook. f.) Kuntze, *Revis. Gen. Pl*. 1: 175 (1891).

Type: Nigeria. Niger, *s. dat.*, *Vogel s.n.* (holo: K 262618).

Tephrosia megalantha Micheli, *Bull. Soc. Roy. Bot. Belgique* 36: 57 (1897), syn. nov.

Type: Democratic Republic of the Congo. Lusambo, *s. dat*., *E.Laurent s.n.* (lecto, here designated: BR 8947048).

Tephrosia periculosa Baker, *Bull. Misc. Inform. Kew. 1897* 128–129: 258 (1897), syn. nov.

Type: Malawi. Kondowe to Karonga, *s. dat*., *A.Whyte 324* (holo: K 262825).

Notes

Tephrosia vogelii is a well-circumscribed species. In the vegetative stage, its branches are strongly grooved. Both the branches and the leaves are densely covered by strigose and rufous trichomes. The species can be recognised more easily in the reproductive state by its caducous bracts, a character that is absent in other South American species. The flowers have a tomentose indumentum on the calyx lobes, and the standard has indumentum on its dorsal surface; these characters are present only in this species. The indumentum of the fruit is woolly, which is another exclusive character of this introduced species in South America.

Tephrosia vogelii was introduced to South America probably because of its ornamental potential and ichthyotoxic properties. Most likely, the species originated in Central Africa. It is grown in Africa for the extraction of insecticidal substances. In South America, *T. vogelii* is infrequently encountered and only a small number of collections exist in herbaria.

In the protologue of *Tephrosia megalantha*, M. Micheli (Leguminosaceae, cited in Chalon *et al*. 1897, pp. 53–77) cited 'Congo (Dewèvre n. 520)' and 'Lusambo (Laurent).' According to Stafleu and Cowan (1981), the herbarium and types of Marc Micheli are housed at G, but no original material was located in this herbarium. One specimen of *E.Laurent s.n.* was located at BR. Therefore, we are designating BR-8947048 as the lectotype of *Tephrosia megalantha* Micheli.

Conflicts of interest

The authors declare that they have no conflict of interest.

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References

Amshoff GJH (1939) Papilionaceae subfamily Papilionatae. In 'Flora of Suriname. Vol 2(2)'. (Ed. A Pulle) pp. 163–167. (Koloniaal Institute: Amsterdam, Netherlands)

Bentham G (1862) Leguminosae I. Galegeae. In 'Flora Brasiliensis. Vol. 15(2)'. (Eds CFP Martius, AG Eichler) pp. 45–49. (Lipsiae, F. Fleischer: Munich, Germany)

Brazilian Flora Group(2015) Growing knowledge: an overview of seed plant diversity in Brazil. *Rodriguésia* **66**, 1085–1113. doi:10.1590/2175-7860201566411

Brummitt RK (1980) Reconsideration of the genera *Ptycholobium, Caulocarpus, Lupinophyllum* and *Requienia* in relation to *Tephrosia. Kew Bulletin* **35**, 459–473. doi:10.2307/4110015

Burdet HM (1979) 'Auxilium ad Botanicorum Graphicem.' (Conservatoire et Jardin Botaniques: Genève, Switzerland)

Burkart A (1952) 'Las Leguminosas Argentinas Silvestres y Cultivadas', 2nd edn. (ACME: Buenos Aires, Argentina)

Chalon J, Durand T, De Wildeman É (1897) Assemblée générale du 2 mai 1897; liquides conservateurs pour échantillons botaniques en bocaux; matériaux pour la flore du congo: premier fascicule. *Bulletin de la Société Royale de Botanique de Belgique* **36**, 37–97.

Chodat R, Hassler E (1904) Plantae Hasslerianae soit enumeration des plantes récoltées au Paraguay par le Dr Émile Hassler D'Aarau (Suisse) de 1885 á 1902. *Bulletin de l'Herbier Boissier, sér. 2* **4**(8), 824–839.

Chodat R, Hassler E (1907) Plantae Hasslerianae soit enumeration des plantes récoltées au Paraguay par le Dr Émile Hassler D'Aarau (Suisse) de 1885 á 1902 (*suite*). *Bulletin de l'Herbier Boissier, sér. 2* **7**(10), 795–826.

D'Arcy WG (1970) Jacquin names, some notes on their typification. *Taxon* **19**, 554–560. doi:10.2307/1218948

Dzenda T, Ayo JO, Adelaiye AB, Adaudi AO (2007) Ethnomedical and veterinary uses of *Tephrosia vogelii* Hook. f. (Fabaceae): a review. *Nigerian Veterinary Journal* **28**, 24–39.

Forbes HML (1948) A revision of the South African species of the genus *Tephrosia. Bothalia* **4**, 951–1001. doi:10.4102/abc.v4i4.1738

Gray A (1853) Plantae Wrightianae Texano–Neo-Mexicanae Part II. *Smithsonian Contributions to Knowledge* **5**, 6–119.

Hassler E (1919) Ex herbario Hassleriano: novitates paraguariensis XXIII. *Repertorium Specierum Novarum Regni Vegetabilis* **16**, 161–166.

IUCN (2017) Guidelines for Using the IUCN Red List Categories and Criteria, Version 13. Prepared by the Standard and Petition Subcommittee. (International Union for Conservation of Nature) Available at http://www.iucnredlist.org/documents/RedListGuidelines.pdf [Verified 16 March 2019].

Macbride JF (1943) Leguminosae. *Field Museum of Natural History, Botanica Serbica* **13**, 3–507.

Pittier H (1944) 'Leguminosas de Venezuela I. Papilionaceae.' (Ministério da Agricultura y Cria, Elite: Caracas, Venezueala)

Queiroz RT (2012) Revisão taxonômica das espécies do gênero *Tephrosia* Pers. (Leguminosae, Papilionoideae, Millettieae) ocorrentes na América do Sul. PhD thesis, Universidade Estadual de Campinas, Campinas, Brazil.

Queiroz RT, Tozzi AMGA (2009) *Tephrosia*. In 'Plantas da floresta Atlântica'. (Eds JR Stehmann, RC Forzza, A Salino, M Sobral, DP Costa, LHY Kamino) p. 281. (Jardim Botânico do Rio de Janeiro: Rio de Janeiro, Brazil)

Queiroz RT, Tozzi AMGA (2011) *Tephrosia*. In 'Lista de Espécies da Flora do Brasil'. (Eds RC Forzza, JFA Baumgratz, CEM Bicudo, AA Carvalho Jr, A Costa, DP Costa, M Hopkins, PM Leitman, LG Lohmann, LC Maia, G Martinelli, M Menezes, MP Morim, MA Nadruz Coelho, AL Peixoto, JR Pirani, J Prado, LP Queiroz, VC Souza, JR Stehmann, LS Sylvestre, BMT Walter, D Zappi) p. 1097. (Jardim Botânico do Rio de Janeiro: Rio de Janeiro, Brazil) Available at http://floradobrasil.jbrj.gov.br/2011/FB023204 [Verified 5 March 2019].

Schrire BD (2005) Tribe Millettieae. In 'Legumes of the World'. (Eds G Lewis, B Schrire, B Mackinder, M Lock) pp. 367–387. (Royal Botanic Gardens, Kew: London, UK)

Stafleu FA, Cowan RS (1976) 'Taxonomic Literature, Vol. I: A–G', 2nd edn. (Bohn, Scheltema & Holkema: Utrecht, Netherlands). doi:10.5962/bhl.title.48631

Stafleu FA, Cowan RS (1979) 'Taxonomic Literature, Vol. II: H–Le', 2nd edn. (Bohn, Scheltema & Holkema: Utrecht, Netherlands). doi:10.5962/bhl.title.48631

Stafleu FA, Cowan RS (1981) 'Taxonomic Literature, Vol. III: Lh–O', 2nd edn. (Bohn, Scheltema & Holkema: Utrecht, Netherlands). doi:10.5962/bhl.title.48631

Turland NJ, Wiersema JH, Barrie FR, Greuter W, Hawksworth DL, Herendeen PS, Knapp S, Kusber W-H, Li D-Z, Marhold K, May TW, McNeill J, Monro AM, Prado J, Price MJ, Smith GF (Eds) (2018) 'International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code)', adopted by the Nineteenth International Botanical Congress, July 2017, Shenzhen, PR China. *Regnum Vegetabile* 159. (Koeltz Botanical Books: Glashutten, Germany). doi:10.12705/Code.2018

Ulbrich OE (1906) Leguminosae andinae I. *Repertorium Specierum Novarum Regni Vegetabilis* **2**(14–15), 1–13. doi:10.1002/fedr.19060021402

Wood CE (1949) The American barbistyled species of *Tephrosia* (Leguminosae). *Rhodora* **51**, 193–231.

Handling editor: Ashley Egan