

**LOTUS ALIANUS, A NEW SPECIES FROM CABO VERDE
AND NOMENCLATURAL NOTES ON LOTUS
SECTION PEDROSIA (FABACEAE)**

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Abstract

Lotus alianus J.H. Kirkbr., sp. nov., is described and illustrated. It is a rare endemic species from the Republic of Cape Verde, and is found in dry habitats on just two islands, Ilhas de Santo Antão and São Vicente. In addition, two species names are synonymized with *L. creticus* L., and a lectotype is designated for *L. pseudocreticus* Maire, Weiller & Wilczek. The distribution of *L. jacobaeus* L. is clarified as endemic to Cape Verde, and a neotype is designated for *L. linearis* Walp. *Lotus oliveirae* A. Chev. is the correct name for the species previously known as *L. latifolius* Brand.

Introduction

I first met Professor Doctor Syed Irtifaq Ali at the University of Karachi at the end of March, 1985. Professor Ali and Professor Eugene Nasir, as co-editors of the *Flora of West Pakistan*, received a series of grants through US Public Law 480, also known as *Food for Peace*, to support their work and that of their collaborators on the *Flora* and its publication. I was sent to Pakistan to review their individual projects, which were so well managed and productive that the reviews were very easy and a great pleasure to carry out. My seven-year association with Professor Ali was enjoyable, enriching, and productive. Professor Ali personally prepared the legume treatments for the *Flora of West Pakistan* (Ali, 1973a, 1973b, 1977), treating 106 genera and 539 species on 477 pages. I have used his Pakistani legume treatments numerous times, and can attest to their clarity and ease of use. They are key elements in our understanding of South Asian legumes and the legumes of the world.

While reviewing the members of *Lotus* L. sect. *Pedrosia* (Lowe) R.P. Murray, I discovered a new, endemic *Lotus* species from two islands in Cabo Verde and several nomenclatural issues for species from Morocco and Cabo Verde. The new species is described below, followed by a discussion of these nomenclatural issues.

I take great pleasure in dedicating this article to Prof. Ali and publishing the following new species in his honor.

***Lotus alianus* J.H. Kirkbr., sp. nov.-(Figs. 1 and 2)**

Types: Cabo Verde. Ilha de Santo Antão, no leito da Ribeira de Tarrafal, 23 Mar 1956, L.A. Grandvaux Barbosa 6977 (holotype: LISC!); Ilha de São Vicente, 1866, R.T. Lowe s.n. (paratype: K!).



Fig. 1. *Lotus alianus* (from L.A. Grandvaux Barbosa 6977, LISC): Habit.

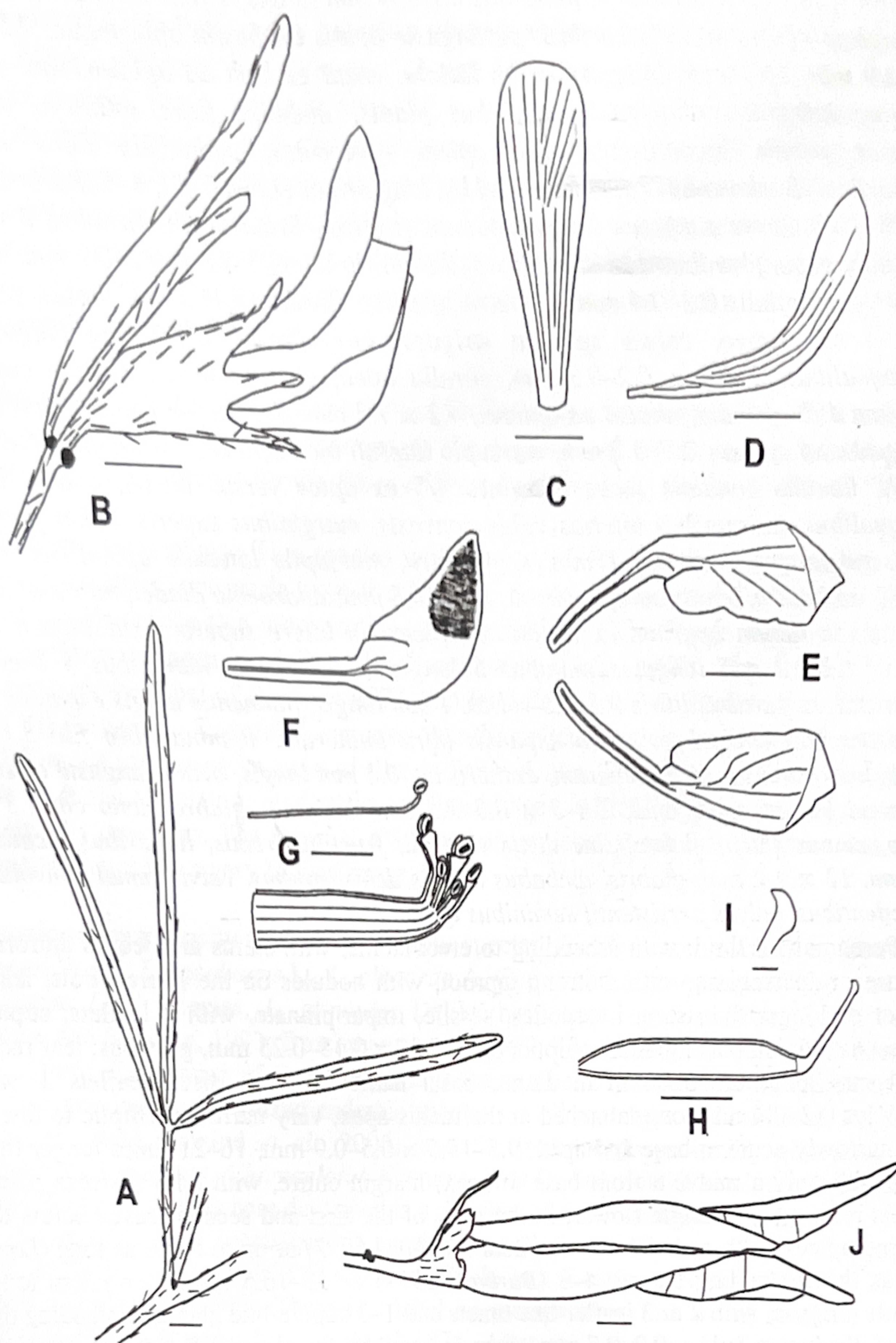


Fig. 2. *Lotus alianus* analysis (A-I from L.A. Grandvaux Barbosa 6977, LISC, J from R.T. Lowes.n., K). A: Leaf, B: Flower, C: Standard flattened, D: Standard in profile, E: Wing petals, F: Keel, G: Androecium, H: Ovary and style, I: Stigma, J: Fruit. Scale bars (A-H, J) = 1 mm, except stigma (I) scale bar = 0.1 mm.

Subfrutex perennis caulibus ascendibus vel erectis, caulibus et foliis antrorse strigosis vel sparsim antrorse strigosis, radice crassa descendente, nodulis in radicibus lateralibus; foliis caulum internodiis brevioribus vel longioribus, sessilibus, imparinnatis, trifoliolatis; stipulis glandiferis rubronigris, ellipticis, 0.25-0.35 × 0.15-0.25 mm, glabris; foliorum rhachidis 1.5-4 mm longa, 0.2-0.4 mm diametro; sine foliolis

basalibus; foliolis distalibus 3, petiolulis 0.2–0.4 mm longis, affixis ad rhachidis apicem, peranguste ellipticis ad linearibus, peranguste acutis ad basim apicemque, 9.5–15.5 × 0.5–0.9 mm, 16–21-plo longiore quam latiore, costa ex basi ad apicem, sine venulis, margine integra, ambabus superficiebus planis; umbellis flore solitario, in axilla foliorum primis secundisque infra apices crescentes, pedunculo foliis subtentis brevioribus (Barbosa 6977) vel usque ad bis longioribus (Lowe s.n.), 4–8 (Barbosa 6977) vel 13–16.5 (Lowe s.n.) mm longo, sparsim strigoso, bracteis foliiformibus 2 vel 3 et glandulis stipuliformibus 1–3 subtentis pedicello, bracteis 3–11 × 0.2–0.7 mm, sparsim strigosis, glandulis 0.2–0.4 mm diametro, glabris; floribus 5–5.5 mm longis, pedicello 0.4–0.5 mm longo, calyce sparsim strigoso, tubo basali 1–2.2 mm longo, lobis subaequalibus, 1–1.7 × 0.2–0.3 mm, corolla lutea, glabra, vexillo sursum curvo ad angulum 45°, obovato, obtuso ad apicem, 4.2 × 1.3 mm, alis ungue 2 mm longo, lamina late acuta ad apicem, 2.7–1.2 mm, marsupio laterali inconspicuo, carina unguibus 2 mm longis, laminis connatis secus margines 4/5 ex apice versus basim, ovatis, latibus inaequalibus, marginibus infernis valde convexis, marginibus superis leviter concavis, acutis ad apicem, 2.5 × 1.1 mm, sine rostro, marsupiiis lateralis apicalibus, ovatis, obtusis ad basem, acutis ad apicem, ca. 1.2 × 0.8 mm; androecio diadelpho staminibus 9 connatis in tubum apertum ex basim ad apicem in latere supero juxta stamen libro, glabro, tubo 3 mm longo, staminibus 5 longis alternantibus staminibus 4 brevibus, filamentorum partibus libris 0.3–0.5 vel ca. 1 mm longis, filamentis longis expansis infra antheram, filamentis brevis non expansis infra antheram, stamina libro filo 3.1 mm longo, non expanso infra antheram, antheris ca. 0.3 mm longis, ovario anguste oblongo, acuto ad basem apicemque, 2.8–3 × 0.3–0.5 mm, brunneo, glabro, stylo ca. 1.3 mm longo, cinnamomeo, glabro, sine dente ventrali; fructibus rectis; linearibus, acutis ad apicem, 12 × 1.2 mm, glabris, ambabus suturis dehiscentibus, valvis semel convolutam ostendentibus, calyce persistenti; seminibus ignotis.

Perennial subshrub with ascending to erect stems, with stems and leaves antrorsely strigose or sparsely so, with a strong taproot, with nodules on the lateral roots; leaves shorter or longer than stem internodes, sessile, imparipinnate, with 3 leaflets; stipules present as reddish black glands, elliptic, 0.25–0.35 × 0.15–0.25 mm, glabrous; leaf rachis 1.5–4 mm long, 0.2–0.4 mm in diam.; basal leaflets absent; distal leaflets 3, with petiolules 0.2–0.4 mm long, attached at the rachis apex, very narrowly elliptic to linear, very narrowly acute at base and apex, 9.5–15.5 × 0.5–0.9 mm, 16–21 times longer than wide, with only a midvein from base to apex, margin entire, with both surfaces plane; umbels reduced to a single flower, in the axils of the first and second leaves below the growing apices, with peduncle shorter than (Barbosa 6977) or up to twice as long (Lowe s.n.) as the subtending leaves, 4–8 (Barbosa 6977) or 13–16.5 (Lowe s.n.) mm long, sparsely strigose, with 2 or 3 leaflet-like bracts and 1–3 stipule-like glands subtending the pedicel, the bracts 3–11 × 0.2–0.7 mm, sparsely strigose, the glands 0.2–0.4 mm in diam., glabrous; flowers 5–5.5 mm long, with the pedicel 0.4–0.5 mm long, calyx sparsely strigose, with basal tube 1–2.2 mm long, with the lobes subequal, 1–1.7 × 0.2–0.3 mm; corolla yellow, glabrous, standard curved upwards to 45° angle, obovate, obtuse at apex, 4.2 × 1.3 mm, wing petals with claw 2 mm long, with the blade obovate, broadly acute at the apex, 2.7 × 1.2 mm, lateral pocket inconspicuous, keel petals with claws 2 mm long, with blades fused along 4/5s of the lower edges from apex towards base, ovate, unequally sided, with lower edges. Stamens, the free portion of filaments 0.3–0.5 or ca. 1 mm long, the long filaments expanded below anthers and the short filaments not expanded below anthers, the upper free stamen with the filament 3.1 mm long, not expanded below anther,

the anthers ca. 0.3 mm long; ovary narrowly oblong, acute at base and apex, $2.8-3 \times 0.3-0.5$ mm, brown, glabrous, the style ca. 1.3 mm long, tan, glabrous, without a ventral tooth; fruit straight, linear, acute at apex, 12×1.2 mm, glabrous, dehiscent along both sutures, the valves twisted in 1 complete spiral, with calyx remnants persistent; seeds unknown, strongly convex and upper edges slightly concave, acute at apex, 2.5×1.1 mm, without a beak, with the lateral pocket apical, ovate, obtuse at base, acute at apex, ca. 1.2×0.8 mm; androecium diadelphous with nine stamens fused into a tube open along its length on upper side next to 1 free stamen, glabrous, the tube 3 mm long with 5 long stamens alternating with 4 short.

Etymology: This species is named in honor of Professor Doctor Syed Irtifaq Ali. Professor Ali has made outstanding contributions to the legumes of South Asia, including his excellent legume treatments for the *Flora of West Pakistan* (Ali, 1973a, 1973b, 1977).

Distribution and ecology: This species is endemic to Cabo Verde, and is known from just two collections, one each from the Ilhas de Santo Antão and São Vicente. These adjacent islands are the two most northwesterly islands of Cabo Verde, and are members of the northern element as defined by Brochmann *et al.* (1997). The limited habitat description on the label of *Barbosa 6977*, "no leito da Ribeira de Tarrafal [in the stream bed of the Ribeira de Tarrafal]", suggests that the collection was made near the Vila do Tarrafal on the southwestern coast of Ilha de Santo Antão. This is a very dry area with no forests or moist vegetation evident in satellite images, which suggests that this species inhabits very dry areas. The *Barbosa 6977* herbarium label states that the plant was rare, suggesting that it has a very limited range.

Discussion: Traditionally five endemic *Lotus* species, *L. arborescens* Lowe ex Cout., *L. brunneri* Webb, *L. jacobaeus* L., *L. oliveirae* A. Chev., and *L. purpureus* Webb, and one introduced *Lotus* species, *L. glinoides* Delile, have been reported from Cabo Verde (Hansen and Sunding, 1993; Brochmann *et al.*, 1997; Sánchez-Pinto *et al.*, 2005; Sandral *et al.*, 2006). Publication of *L. alianus* brings the number of endemic *Lotus* species to six. The five previously recognized endemic species are all members of *Lotus* sect. *Pedrosia* (Sokoloff, 2003; Sandral *et al.*, 2006), and the introduced species, *L. glinoides*, is a member of *Lotus* sect. *Chamaelotus* Kramina & D.D. Sokoloff (Kramina and Sokoloff, 2003). The new species here described is a member of *Lotus* sect. *Lotus*.

Lowe tentatively identified his specimen as *Tephrosia* Pers. or *Leptis* E. Mey ex Eckl. & Zeyh. (= *Lotononis* (DC.) Eckl. & Zeyh. sect. *Leptis* (E. Mey ex Eckl. & Zeyh.) Benth. [Van Wyk, 1991]). There is a label on the specimen that it was received by the Royal Botanic Gardens, Kew in April 1875. After the specimen was mounted, it was tentatively identified as *Lotus* L., and remained as an unidentified *Lotus* specimen until now. Barbosa identified his collection as *Indigofera* L., and J.E.M. Ormonde re-identified it as *Lotus brunneri* Webb in 1982. Ormond probably identified the collection as *L. brunneri* because that species has 3–5 leaflets and is endemic to Cabo Verde (Brochmann *et al.*, 1997; Sandral *et al.*, 2006). *Lotus brunneri* has leaflets (1.5–)3–6 mm wide (versus *L. alianus* 0.5–0.9 mm wide), umbels 1–7-flowered (versus 1-flowered), calyx 6–7 mm long (versus 2–3.9 mm long), corolla 11–13 mm long (versus 4.2 mm long), and style with a ventral tooth (versus without a ventral tooth).

Nomenclatural notes on *Lotus* sect. *Pedrosia*

Lotus creticus L. Sp. pl. 775. 1753.

Type: George Clifford Herbarium no. 372.10 (lectotype [designated by Heyn and Herrstadt, 1967: 307]: BM 000646731, online at the Natural History Museum, Department of Botany, London).

Lotus commutatus Guss., Fl. Sicul. Prodr. 2: 545. 1828–1832.

Type: Sicily. Trapani nell Isola del Ronciglio, Maggio, Gussone s.n. (lectotype [designated by Heyn and Herrstadt, 1967: 301]: NAP).

Lotus salzmännii Boiss. & Reuter, Pugill. Pl. Afr. Bor. Hispan. 37. 1852.

Types: Morocco. Circa Tingidem [Tangier] in arena pura maritima, E. Salzmann s.n. (syntype: G-BOISS). Spain. Santa Cathalina près Puerto Santa Maria, 8 Mar 1849, E. Bourgeau 139 (syntypes: G, FI-W!, K!, LE).

Lotus pseudocreticus Maire, Weiller & Wilczek, Bull. Soc. Hist. Nat. Afrique N. 26: 120. 1935, **syn. nov.**

Type: Morocco. In arenosis ad ostium fluminis Sous, 2 Apr 1934, R. Maire and E. Wilczek s.n. (lectotype, **here designated:** MPU!; isoelectotypes: P!, RAB!).

Lotus digii Chrtková, Pl. Syst. Evol. 155: 307. 1987, **syn. nov.**

Type: Morocco. Restinga, in locis arenosis maritimis situ orient. a pago Tetuan, 1970, M. Žertová s.n. (holotype: PR).

Distribution: Widely distributed in the Mediterranean basin near the sea on sandy beaches, also on sandy, eastern Atlantic beaches in Portugal, Spain, and Morocco, and on beaches in the Azores.

Discussion: Maire *et al.*, (1935) described 13 new taxa collected by Maire and Wilczek in Morocco in 1934, including *L. pseudocreticus*. For each taxon they gave its collection locality and a brief description of the habitat. There was no indication of the collectors' names, collectors' number, specific date of collection, or herbarium in which the specimens were deposited. Art. 37.3 and Art. 37 Note 2 of the *International Code of Botanical Nomenclature* (ICBN; McNeill *et al.*, 2006) stipulate that citation of a single specimen or gathering is required for indication of the type and that citation of a locality does not constitute citation of a single specimen or gathering. Citation of a single specimen or gathering requires concrete details, such as the collector's name or collecting number or date. Therefore Maire *et al.*, (1935) did not indicate a type for *L. pseudocreticus* when they published it. The herbarium labels of Maire & Wilczek s.n., 2 Apr 1934, have the name written as "*Lotus pseudo-creticus* n.sp." and the locality as, "In arenosis ad ostium fluminis Sous". Thus this gathering with duplicates at P, MPU, and RAB are part of the original material used by Maire *et al.*, (1935) when they described *L. pseudocreticus* (Art. 9 Note 2, McNeill *et al.*, 2006), and therefore can be used for designation of a lectotype. Sandral *et al.*, (2006) cited the type of *L. pseudocreticus* as, "Holotypus: Maire & Wilczek s.n., in arenosis ad oustium fluminis Sous, 2 Apr. 1934 [P!]". Use of the erroneous type term "Holotypus" could be corrected under Art. 9.8 of

the ICBN (McNeill *et al.*, 2006), but under Art. 7.11 after 1 January 2001 a type designation must include the phrase "designated here" or its equivalent. Unfortunately Sandral *et al.*, (2006) did not include this phrase, so their type citation cannot be corrected to designation of a lectotype. The specimen at MPU has an original label and is an excellent, complete specimen, so I am here designating it as lectotype.

Maire *et al.*, (1935) described *L. pseudocreticus* as a member of *Lotus* sect. *Pedrosia* because it had a distinct, conspicuous ventral tooth on the style, and used the epithet *pseudocreticus* for it because it closely resembled *L. creticus*. Kramina and Sokoloff (1999) carried out a detailed study of *Lotus* style teeth, and discovered that *L. creticus* does have a ventral style tooth, which varies from short to very short, or just a ventral bump on the style. In 1989, personnel of the USDA Agricultural Research Service and collaborators carried out a germplasm collecting trip in Morocco for legumes with special concentration on the genus *Lotus*, and I participated in that trip. We visited beaches from Tetouan south to Agadir to examine populations of *L. creticus*. There is minor variation between populations, but in my opinion, they are all members of *L. creticus*. The separation of *L. creticus* and *L. pseudocreticus* is an artificial one based on a single, erroneous character, the lack of a ventral tooth on the style of *L. creticus*. Therefore I am here synonymizing these two epithets, which represent extremes in the variation of the species.

A special effort was made to visit various sandy beaches near Tetouan, the type locality of *L. digii* (Chrtová, 1987). I found no characteristics to distinguish *L. creticus* on Mediterranean beaches from that on Atlantic beaches. Furthermore, the plants on the beaches near Tetouan could not be distinguished from those on any other sandy beaches in Morocco. Therefore I am also here synonymizing *L. digii* with *L. creticus*.

Lotus jacobaeus L., Sp. pl. 775. 1753.

Type: George Clifford Herbarium no. 372.7 (lectotype [designated by Wijnands, 1983: 165]: BM 000646728, online at the Natural History Museum, Department of Botany, London).

Lotus lugubris Salisb., Prodr. stirp. Chap. Allerton 333. 1796, nom. illeg.

Lotus tristis Moench, Suppl. Meth. 53. 1802, nom. illeg.

Lotus anthylloides Vent., Jard. Malmaison 2: tab. 92. 1805; non *Lotus anthylloides* Boiss. & Noë, 1856, nom. illeg.

Type: Cultivated in Jardin de la Malmaison, É.P. Ventenat s.n. (holotype: W [Brochmann *et al.*, 1997]).

Lotus atropurpureus DC., Cat. pl. horti monsp. 121. 1813.

Type: Cultivated in Conservatoire et Jardin botaniques de la Ville de Genève from seeds ex Jardin des Plantes, Montpellier (holotype: G-DC (microfiche) [Brochmann *et al.*, 1997]).

Lotus linearis Walp., Linnaea 13: 518. 1839.

Type: Lalande [P.A. Delalande] in hb. Kunth (holotype: B, destroyed [Brochmann *et al.*, 1997]; Cabo Verde. Top of a Juan in the valley of St. Domingo, alt. 2,000 ft. [610 m.], St. Jigo [Santiago], 29 Jan 1832, C.R. Darwin 153 (neotype, **here designated**: BM!).

Lotus melilotoides Webb in Hooker, Niger Fl. 118. 1849.

Type: "Capvert. Herbar rapporté du Portugal en 1808 par M. Geoffrey St. Hilaire" [1784–1787, *Silva Feijão s.n.*] (holotype: P! [Brochmann *et al.*, 1997]).
Lotus jacobaeus L. var. *luteus* A. Chev., Rev. Bot. Appl. Agric. Trop. 15(170–171): 968. 1935.

Type: Cabo Verde. Fogo: Curral Fundo sur Ribeira Lomba, 1,000 m. alt., A.J.B. Chevalier 45194 (holotype: P!).
Lotus jacobaeus L. var. *villosus* A. Chev., Rev. Bot. Appl. Agric. Trop. 15(170–171): 968. 1935.

Type: Cabo Verde. Fogo: Chupadeiro, 1,000–1,200 m. alt., A.J.B. Chevalier *s.n.* (holotype: P!).

Distribution: Endemic to Cabo Verde on the Ilhas de Fogo and Santiago.

Discussion: Brochmann *et al.*, (1997) reported that the holotype of *Lotus linearis* Walp. (*Lalande* [P.A. Delalande] in hb. Kunth) was destroyed at B. Walpers (1839: 519) cited the collector and location as, "In promontorio bonae spei [Cape of Good Hope] legit Lalande. v.s. in Hb. Kunthiano." Brand (1898) undoubtedly had access to the holotype in Berlin, identified it as *L. jacobaeus*, and therefore synonymized *L. linearis* with this species. The collection locality is obviously erroneous because *L. jacobaeus* does not occur in South Africa (Nkonki, 2003) and is endemic to Cabo Verde (See the discussion below of the Mungo Park collection, a similar erroneous collecting locality.). At BM, there is a collection that has the following handwritten annotation on the sheet, "= *Lotus linearis*, Walp.! Compared with Walpers type specimen in Kunth's Herbarium! (now in the Berlin Herbm.) Sept 21st 1883 N.E. Brown." Since this specimen was compared to the holotype of *L. linearis* prior to its destruction, verified as being the same, and is a member of *L. jacobaeus*, I have chosen it as neotype for *L. linearis*.

The original description of *Lotus jacobaeus* L. var. *villosus* A. Chev. (Chevalier, 1935) has the following specimen citations: "**Fogo:** Chupadeiro 1,000–1,200 m. alt.! sans no. Monte Nhucó (Lowe, sub. nom. *L. hirtulus* Lowe). N'est pas *L. hirtulus* ci-dessus." Two collections were cited, and neither one was indicated as the holotype. The first collection was made by A.J.B. Chevalier at Chupadeiro, and the second by R.T. Lowe on Monte Nhucó. Chevalier placed the symbol '!' with his collection citation, but not with that of Lowe. On page 869 of his publication, Chevalier defined the symbol '!' as, "Signe de certitude; après un nom de collecteur signifie que nous avons vu un spécimen authentique de ce collecteur." Chevalier examined his own specimen, but not a specimen of the Lowe collection from Monte Nhucó. Chevalier cited only one specimen as examined by him, his own specimen, which therefore is the holotype of the variety.

In various publications dealing with tropical African legumes (Baker, 1926; Gillett, 1958; Hepper, 1958), *Lotus jacobaeus* has been cited as occurring on mainland Africa. This was based on a single collection deposited at the Natural History Museum (BM), London: Gambia, 1805, *Mungo Park s.n.* (BM000551125). Mungo Park did collect in Gambia and Senegal in 1805 and 1806 (Vegter, 1983). The herbarium sheet has two plants and a fragment mounted on it, and on the verso is written "Gambia, M. Park, 1805"; there is no collection label attached to the sheet. In the early 19th Century, European sailing vessels always stopped for fresh water and provisions at one or more of the Macaronesian islands on their way south. During these stops, the naturalists always

disembarked to study and collect the biota and other natural phenomena. Undoubtedly Park's sailing vessels also did this. Since no other collection of *L. jacobaeus* has been made on mainland Africa, Park's collection was probably made during a stop in the Cabo Verde archipelago, either on his way to Africa or his return. Therefore, *L. jacobaeus* is endemic to the Cabo Verde archipelago and not known from Africa.

Lotus oliveirae A. Chev., Rev. Bot. Appl. Agric. Trop. 15(170–171): 966. 1935.

Type: Cabo Verde. S. Antão, Cova sur les contreforts du volcan, 1,350 m, A. Chevalier 45585 (holotype: P!).

Lotus latifolius Brand, Bot. Jahrb. Syst. 25: 202. 1898, nom. illeg., non Sm., 1813.

Type: Cabo Verde. S. Antoine, 1853, C.A. Bolle s.n. (holotype: G-BOISS).

Distribution: Endemic to Cabo Verde on the Ilha de Santo Antão.

Discussion: Recent treatments of this species have identified and given its accepted name as *L. latifolius* Brand (Hansen and Sunding, 1993; Brochmann *et al.*, 1997; Sánchez-Pinto *et al.*, 2005; Sandral *et al.*, 2006). Sibthorp and Smith (1813: 107) transferred *Dorycnium latifolium* Willd. into the genus *Lotus* as *L. latifolius* (Willd.) Sm. According to Art. 53.1 of the ICBN (McNeill *et al.*, 2006) a name is illegitimate if it is a later homonym of another name with the exact same spelling. Therefore *L. latifolius* Brand is illegitimate and cannot be used. Fortunately *L. oliveirae* is an available name that can be used for this species.

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