Studies in the genus *Lotononis* (Crotalarieae, Fabaceae). 12. Four new species of the *L. falcata* group, section *Leptis*

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**ABSTRACT**

The taxonomic position of *Lotononis falcata* (E. Mey.) Benth. and related species is briefly discussed. These species were previously included in the section *Leptis* (Eckl. & Zeyh.) Benth. but new information indicates an affinity with the section *Oxydium* Benth. Four new species of this group are described: *L. fruticoides* B-E. van Wyk, *L. pachycarpa* Dinter ex B-E. van Wyk, *L. linearifolia* B-E. van Wyk and *L. schreiberi* B-E. van Wyk. The known geographical distribution and diagnostic characters of the new species are given.

**INTRODUCTION**

A study of *Lotononis falcata* (E. Mey.) Benth. and its allies [previously included in the section *Leptis* (Eckl. & Zeyh.) Benth.] has shown the presence of four undescribed species. The purpose of this paper is to describe the new species and to show that the *L. falcata* group is better placed in the section *Oxydium* Benth. than in *Leptis*.

The original concept and limits of the genus *Oxydium* Eckl. & Zeyh. were considerably broadened by Bentham (1843) when he included it as a section within *Lotononis* (DC.) Eckl. & Zeyh. As presently circumscribed (Düömer 1913), *Leptis* is undoubtedly an artificial group. It appears to have been used as a convenient position for species that did not seem to fit comfortably elsewhere.

Similarities and differences between the section *Oxydium* and various groups of the section *Leptis* are given in Table 1. The *L. laxa* and *L. falcata* groups clearly have more in common with *Oxydium* than with *Leptis sensu stricto*. This is indicated by chemical similarities as well as the subequally lobed calyx, the basally dilated standard petal, the strongly dimorphic anthers and the keel petals, which are often beaked. In the *L. falcata* group however, the keel petals are usually not distinctly beaked but all the other characters are typical for *Oxydium*. The panduriform shape of the standard petal (see Figures 1, 3—5) is a useful diagnostic character for the *L. falcata* group and the annual habit also distinguishes this group from *L. laxa* and related species.

**Lotononis fruticoides** B-E. van Wyk, sp. nov., *L. falcatae* valde affinis sed habitu valde robustiore (planta annua fruticiformis 0,3—0,6 m alta), pedunculis longis (*L. falcata* pedunculis ± absentibus), inflorescentiis plurumque 3-floris (plurumque 1-vel rarius 2-floris in *L. falcata*), foliolis angustioribus acutis, leguminibus valde brevioribus, distributione magis orientali differt.


Robust annual up to 0,6 m high and wide. Branches divaricate, rigid, sparsely leafy, glabrescent. All mature parts (except the corolla) sparsely and minutely strigillose. *Leaves* trifoliolate, (6—)12—25 (—36) mm long; petiole ± half as long as the terminal leaflet; leaflets very narrowly elliptic to linear, (4—)10—20 (—30) × (0,5—)1—2 mm, sparsely and inconspicuously strigillose on both surfaces. *Stipules* absent or when very rarely present then single at each node, linear, 1 mm long. *Inflorescences* leaf-opposed, distinctly pedunculate, umbellate (1—3) (—5) flowered; peduncle short, (3—)5—10 (—27) mm long; bracts minute, linear, ± 0,5 mm long; bracteoles absent. *Flowers* 8—10 mm long, yellow; pedicel short, 1—1,5 mm long. *Calyx* subequally lobed but with the lower lobe narrower than the upper four, the sinuses of equal depth; lobes narrowly triangular, acute. *Standard* panduriform, as long as the keel; claw much dilated at the base, 2,5—3 × 1—1,5 mm at the base, with a small central callosity; lamina 5—7 × 4—5 mm, without lobes or callosities, glabrous but with a few minute hairs dorsally along the middle, often with a reddish brown line along the midrib. *Wing petals* oblong, slightly shorter than the keel, folded into a long shallow pocket near the base, glabrous; apex rounded; sculpturing indistinct or absent. *Keel petals* half oblong-elliptic, auriculate, glabrous; apex acute but not beaked. *Androecium* with the anthers markedly dimorphic; basifixed anthers linear, more than 2× longer than the small ovoid dorsifixed anthers; carinal anther intermediate in size and shape. *Gynoecium* subsessile; pistil ovoid-oblong, sparsely pubescent; style only slightly curved. *Pods* subsessile, shortly oblong, 10—14 × 2,5—3,5 mm,
FIGURE 1—Lotonomis fruticoides. A, inflorescence and flower; B, leaf in adaxial view (note absence of stipules); C1 & C2, calyces opened out with the upper lobes to the left; D1 & D2, standard petals, showing the panduriform shape, dilated claw and central callosity; E, wing petal (note absence of sculpturing); F, keel petal; G, pistil; H1 & H2, pods: H1, in lateral view, H2, in top view; I1, I2 & I3, anthers: I1, basifixed anther, I2, carinal anther, I3, dorsifixed anther; J, seed, showing the tuberculate surface. All from Van Wyk 2020 except C2 & D1 from Schutte 220. Scales in mm.
TABLE 1.—Summary of similarities and differences between Lotononis sect. Oxydium and various groups of the section Leptis

<table>
<thead>
<tr>
<th>sect. Oxydium</th>
<th>L. falcata group</th>
<th>sect. Leptis</th>
<th>L. calycina group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit</td>
<td>annual or perennial</td>
<td>annual</td>
<td>perennial</td>
</tr>
<tr>
<td>Juvenile leaves</td>
<td>often unifoliolate</td>
<td>trifoliolate</td>
<td>unifoliolate</td>
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<tr>
<td>Calyx</td>
<td>subequally lobed</td>
<td>subequally lobed</td>
<td>subequally lobed</td>
</tr>
<tr>
<td>Wing petals</td>
<td>rarely pubescent</td>
<td>glabrous</td>
<td>pubescent</td>
</tr>
<tr>
<td>Cyanogenesis</td>
<td>mostly cyanogenic</td>
<td>invariably cyanogenic</td>
<td>mostly cyanogenic</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>pyrrolizidine</td>
<td>pyrrolizidine</td>
<td>pyrrolizidine</td>
</tr>
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compressed, glabrous, apex somewhat cuspidate, upper suture ± smooth, ± 6-seeded, the seeds on 1.5—2 mm long funicles. Seeds subtriangular, ± 1.5 mm in diameter; testa pale yellow, often with dark purple marks, densely but minutely tuberculate (Figure 1).

*L. fruticoides* is closely related to *L. falcata*, but differs in the much more robust habit (a shrub-like annual of 0.3—0.6 m high), the long peduncles (peduncles ± absent in *L. falcata*), the predominantly 3-flowered inflorescences (usually 1- or rarely 2-flowered in *L. falcata*), the narrower and acute leaflets, the much shorter pods and in the more eastern distribution. A form of *L. falcata* from the Calvinia-Sutherland area is rather similar to *L. fruticoides* and may be confused with it, but in this form the leaflets are broadly obovate to oblongoblate and the habit totally different. *L. fruticoides* has been recorded only from the south-eastern regions of the Cape Province, where it appears to be very common (Figure 2). It is highly cyanogenic (Van Wyk 1989), and stock losses reported from the Beaufort West area (Burtt Davy 1912) may be due to this species rather than *Dichilus gracilis* Eckl. & Zeyh., with which it is often confused. The chromosome number of *L. fruticoides* (2n = 18) has been reported by Van Wyk & Schutte (1988) and the presence of pyrrolizidine alkaloids by Van Wyk & Verdoom (1989).

CAFE.—3125 (Steynsburg); Middelburg division, Bangor Farm (~AC), Bolus s.n. sub BOL 14075 (BOL); 3222 (Beaufort West): ± 80 km west of Beaufort West, back of the mountain on Farm Ezels Kom, adjoining the Farm Layton (~AB), Shearing 2272 (JRAU); Kano National Park, rocky plateau just above Wagenpad Dam (~AD), Bengis 734 (PRE); start of Molteno Pass near Beaufort West (~BA), Von Wyk 2137 (JRAU, NBG, PRE); start of Molteno Pass (~BC), Schutte 219 (GRA, JRAU, K, MO, NBG, PRE), 220 (BOL, GRA, JRAU, PRE, SAAS, STE), 3223 (Richards-Borgia 6722); 3224 (Graaff-Reinet); Naardenberg Pass, 39 km from Graaff-Reinet (~BA), Von Wyk 2020 (PRE, holo.; JRAU, K, MO, NBG, iso.), 2021 (GRA, JRAU, PRE, S, SAAS); 2022 (JRAU, NBG, PRE), 2023 (BOL, BLFU, JRAU, STE), 2024 (JRAU, KMG, PRE, STE), 2025 (JRAU, M, NH, WIND), 2026 (JRAU); C. M. van Wyk s.n. (JRAU).


*L. linearifoliae* valde affinis, sed foliolis oblongo-lanceolatis vel obovatis (non linearibus), stipulis valde majoribus, pube patentior, leguminibus ovoidibus turgidibus. *L. curtii* forma magnitudineque florium, vexilla panduri-formi, pedicellis longioribus atque forma leguminum differt. Etiam cum *L. leptoloba* confusa est, sed species altera pedicellis brevissimos in pedunculis longis (pedicellus longus, pedunculo ± deficiente in *L. pachycarpa*) et flores omnino dissimilis magnitudine et forma habet. *L. leptoloba* habet alas valde longiores, vexillam valde maiorern omnino forma dissimilcem, leguminina oblongos (non ovoides), et distributionem geographicum dissimilem.

TYPE.—Namibia, 2615 (Lüderitz): Halenberg, 29.08.1929, Dinter 6648 (PRE, holo.; BM, BOL, K, M, SAM, STE, iso.).

![Figure 2](https://via.placeholder.com/150)

FIGURE 2.—The known geographical distribution of Lotononis fruticoides, ○; *L. pachycarpa*, ·; *L. linearifolia*, ▲; and *L. schreiberi*, ■.
Small annual up to 0.1 m high and up to 0.3 m wide. Branches divaricate, slender, sparsely leafy. All mature parts (except the corolla) densely but minutely silky-strigillose. Leaves trifoliolate, (6—8—16—26) mm long; petiole long or longer than the terminal leaflet; leaflets ob lanceolate to obovate, (2—4—8—14) × (1—2—3) mm, sparsely silky-strigillose on both surfaces. Stipules single at each node, small, lanceolate, 1—3(—4) mm long. Inflorescences leaf-opposed, invariably single-flowered; peduncle ± absent, up to 0.5 mm long; bracts very small, linear, up to 1.5 mm long; bracteoles absent. Flowers small, 4.5—7 mm long, yellow; pedicel long and slender, as long or longer than the calyx, up to 10 mm long. Calyx subequally lobed but with the lower lobe a little narrower than the upper four and the lateral sinuses slightly shallower than the upper and lower ones; lobes triangular, acute. Standard broadly panduriform, as long as the keel; claw very short, slightly dilated at the base, 1—2 × ± 1 mm, without callosities; lamina 4—5 × 3—4 mm, without lobes or callosities, glabrous but with a few hairs dorsally along the middle. Wing petals oblong, slightly shorter than the keel; apex rounded; sculpturing in ± 3 rows of intercostal lunae fading into a few transcostal lamellae towards the auricle. Keel petals subtriangular, auriculate, glabrous; apex acute but not beaked. Androecium with the anthers markedly dimorphic; basifixed anthers oblong, more than 3x longer than the small ovoid dorsifixed anthers; carinal anther slightly larger than the dorsifixed anthers. Gynoecium sub sessile; pistil ovoid-oblong, pubescent; style only slightly curved. Pods sub sessile, small, ovoid, 6—10 × 3—4 mm, much inflated laterally, minutely silky-strigillose, apex obtuse, upper suture minutely but distinctly verrucose, 8—15 seeded, the seeds on up to 2 mm long funicles. Seeds suborbicular, ± 1.5 mm in diameter; testa brown, densely but minutely tuberculate (Figure 3).

*L. pachycarpa* is closely related to *L. linearifolia*, but differs in the ob lanceolate (not linear) leaflets, the much
large stipules, the more spreading vestiture and the ovoid, turgid pods (Figure 3). From L. curtii it differs in the shape and size of the flowers, the panduriform standard petal, the longer pedicels and also in the shape of the pods. It has also been confused with L. leptoloba (Schreiber 1970) but the inflorescence structure is only superficially similar (a long pedicel with the peduncle ± absent in L. pachycarpa; a short pedicel on a long peduncle in L. leptoloba). The flowers are also totally different in size and structure. L. leptoloba has much longer wing petals, a much larger and differently shaped standard petal, oblong (not ovoid) pods, and a different geographical distribution. L. pachycarpa occurs in southern Namibia (Figure 2), whereas L. leptoloba has been recorded only from the western and northern-western parts of the Cape Province.


TYPE.—Cape Province, 2282 (Glen Lyon): Hay 0.303 [see map in Wilman (1946)], 09.07.1936, Acocks 506 (PRE, holo.; BOL, KMG, PRE, iso.).

Very small annual up to 0.1 m high and 0.25 m wide. Branches procumbent, slender, sparsely leafy. All mature parts (except the corolla) densely but minutely strigillose. Leaves trifoliolate, slender, (12—)18—28—(42) mm long; petiole usually very much longer than the terminal leaflet; leaflets very narrowly oblong or usually linear, (4—)6—14—(18) x (0.5—)1—2 mm, densely but minutely strigillose on both surfaces. Stipules single at each node, inconspicuous, linear, up to 1 mm long. Inflorescences leaf-opposed, invariably single-flowered; peduncle ± absent, up to 0.5 mm long; bracts very small, linear, up to 1 mm long; bracteoles absent. Flowers small, 4.5—7 mm long; yellow; pedicel long and slender, as long or much longer than the calyx, up to 8 mm long. Calyx subequally lobed but with the lower lobe a little narrower than the upper four and the lateral sinusae slightly shallower than the upper and lower ones; lobes triangular, acute. Standard broadly panduriform, as long as the keel; claw short, slightly dilated at the base, ± 1.5 x 1 mm, with a central callosity; lamina ± 4.5 x 3 mm, without lobes or callus, glabrous but with a few hairs dorsally along the middle. Wing petals oblong, slightly shorter than the keel; apex rounded; sculpturing in ± 3 rows of intercostal lunae fading into a few transcostal lamellae towards the auricle. Keel petals slightly oblong, auriculate, glabrous; apex acute but not beaked. Androecium with the anthers markedly dimorphic; basified anthers oblong, more than 3 X longer than the small ovoid dorsifixed anthers; carinal anther slightly longer than the dorsifixed anthers. Gynoecium subsessile; pistil oblong, pubescent; style curved upwards. Pods subsessile, oblong to linear, (8—)10—14 x 2.5—3 mm, not inflated laterally, minutely strigilllose, apex obtuse, upper suture distinctly and evenly verrucose, 10—15-seeded, the seeds on up to 1.5 mm long funicules. Seeds suborbicular, ± 1.2 mm in diameter; testa brown, densely but minutely tuberculate (Figure 4).

A distinct species, similar to L. pachycarpa but differs in the slender, linear leaflets, the inconspicuous stipules, the shorter and more closely appressed vestiture and the oblong-linear and only slightly inflated pods. It is also similar to L. falcata, but differs from this and related species in the long slender pedicel (much longer than the calyx) and the linear, densely silky-strigillose leaflets (Figure 4).

L. linearifolia B.-E. van Wyk, sp. nov., L. pachycarpea similis, sed foliolis gracilibus linearibus, stipulis inconspicuis, pube breviori plus arete appressa ac leguminibus oblongo-linearibus tantum parum inflatis differt. Etiam similis est L. falcatae, sed ab illa speciebusque affinitatis, pedicello longo gracili (calyce longiore) ac foliolis anguste linearibus, plus dense sericeo-strigillosatis different.

TYPE.—Cape Province, 2282 (Glen Lyon): Hay 0.303 [see map in Wilman (1946)], 09.07.1936, Acocks 506 (PRE, holo.; BOL, KMG, PRE, iso.).

L. schreiberi B.-E. van Wyk, sp. nov., species distincta sine affinitatibus manifestis. L. leptolobaee superficialiter similis, sed stipulis perpusillis inconspicuis, pedunculo subnullo, vexillo panduriformi (non late cordato) conspicue striato pubescenti, apice acuto (non obtuso) basi dilatato, antheris plus valde dimorphis, leguminibus breviter ellipticis (non oblongis) cum ± 12—15 seminibus (non ± 30 seminibus) differt. Etiam L. falcatae speciebusque affinitatis similis, sed ab illis speciebusque omnibus sectionis Oxysidei alis carinisque pubescentibus differt.

TYPE.—Namibia, 2113 (Cape Cross): Cape Cross, about 0.5 km from the coast, 2904.1965, Giess 8707 (PRE, holo.; K, M, WIND, iso.).

Small annual up to 0.1 m high and 0.3 m wide. Branches prostrate, divaricate, often densely leafy. All mature parts densely to sparsely pubescent. Leaves trifoliolate, variable in size, (7—)10—20—(28) mm long; petiole as long or often much longer than the terminal leaflet; leaflets oblong to obovate, (3—)5—10—(14) x (2—)3—5—(7) mm; vestiture very variable, densely to sparsely pubescent on both surfaces, adaxial surface glabrescent and often totally glabrous at maturity. Stipules single at each node, minute and inconspicuous, linear, up to 2 mm long. Inflorescences leaf-opposed, single-flowered, very rarely 2-flowered; peduncle ± absent, up to 0.5 mm long; bracts very small and inconspicuous, linear, up to 1 mm long; bracteoles absent. Flowers 9—11 mm long, yellow;
pedicel short, 2–3 mm long. Calyx subequally lobed; lobes long, very narrowly triangular, acute. Standard broadly panduriform, as long as the keel; claw short, slightly dilated at the base, ± 2 × ± 1.5 mm, often with an inconspicuous central callosity; lamina 7–9 × 4–5 mm, without lobes or callosities, strongly striated, dorsal surface densely pubescent; apex tapering to an acuminate tip. Wing petals narrowly oblong, slightly shorter than the keel, distinctly auriculate, pubescent along the lower margin; apex rounded; sculpturing in ± 5 rows of intercostal lunae. Keel petals oblong, distinctly auriculate, pubescent along the lower half, strongly striated; apex obtuse. Androecium with the anthers markedly dimorphic; basifixed anthers oblong, more than 2 × longer than the ovoid dorsifixed anthers; carinal anther slightly larger than the dorsifixed anthers. Gynoeonium subsessile; pistil oblong, densely pubescent; style long and slender, upper part curved upwards. Pods subsessile, shortly oblong, 8–10 × 3–3.5 mm, only slightly inflated laterally, pubescent, apex obtuse, upper suture distinctly verrucose, 12–15-seeded, the seeds on up to 1.5 mm long funicles. Seeds suborbicular, ± 1.2 mm in diameter; testa brown, densely tuberculate (Figure 5).

This species (named after Dr Annelis Schreiber of the Botanische Staatssammlung München) was listed as L. spec. (no. 18) in the Prodromus einer Flora von Südwestafrika (Schreiber 1970). L. schreiberi is a very distinct new species and has no obvious affinities. The relatively large flowers, pubescent and striated petals and single-flowered inflorescences are useful diagnostic characters (Figure 5). It is superficially similar to L. leptoloba, but differs in the very small, inconspicuous stipules, the panduriform (not broadly cordate) and conspicuously striated, pubescent standard petal, with an acute (not obtuse) apex and a dilated base, the more markedly dimorphic anthers, the shortly elliptic (not oblong) pods that are ± 12–15-seeded (not ± 30-seeded). It is also superficially similar to L. falcata and related species, but
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differs from these and all other species of the section *Oxydium* in the pubescent wing and keel petals (*L. arenicola* Schltr. is the only species of *Oxydium* with pubescent wing and keel petals but the morphology of this species is totally different). Several collections of *L. schreiberi* have been made in the north-western parts of Namibia, where it appears to be quite common (Figure 2).

NAMIBIA.— 2013 (Unjab Mouth): Skedelkuspark (—AC), Venter 9025 (BLFU); 23 km SE of Torra Bay (—AD), Giess 8020 (M, PRE, WIND); 14 miles [22,4 km] E of Torra Bay (—AD), Giess, Hölk & Bleijson 6277 (M, PRE, WIND); 15 miles [24 km] SE of Torra Bay (—AD), Nordenstam 3789 (M). 2014 (Welwitsch): Welwitsch, Damaraland (—BD), Galpin & Pearson sub Galpin 7547 (PRE, SAM); koppies S of Ugab River Station (—DD), Müller & Loutit 1096 (M, WIND). 2113 (Cape Cross): flats a few miles inland on road to Brandberg West Mine (—BD), Olive & Müller 6660 (PRE, partly), Cape Cross, about 0,5 km from the coast (—DD), Giess 8707 (PRE, holo.; K, M, WIND, iso.). 2114 (Uis): S of the Messumberge ± 12 miles [19,2 km] E of the coast (—BA), Giess 3576 (PRE, WIND). 2214 (Swakopmund): track from Goanicontes to Rossing Mountain (—DB), Kers 1311 (WIND). 2215 (Trekkopje): Farm Nordenberg, Swakop River at Taavischab (—CA), Kers 4 (WIND); Swakop River, along the track from Swakop at Taavischab to Farm Nordenberg and Karibib (—CA), Kers 1532 (WIND). 2315 (Rostock): Kuiseb River, SE of Hope Mine, on the Namib plain between Hope Mine and Garob Mine (—CB), Kers 1580, 1586 (WIND).

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