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Studies in the genus *Lotononis* (Crotalarieae, Fabaceae). VIII. A new species of the *L. corymbosa* group and notes on the taxonomy of the section *Lipozygis*

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The section *Lipozygis* (E. Mey.) Benth. of *Lotononis* (DC.) Eckl. & Zeyh. is shown to be an artificial group that should be divided into two distinct and geographically isolated sections. *L. pentaphylla* (E. Mey.) Benth., *L. polycephala* (E. Mey.) Benth. and other annuals from the western Cape Province are to be excluded from the section. The remaining species [*L. corymbosa* (E. Mey.) Benth. and its allies] are all perennial pyrophytes from grassland areas along the eastern parts of southern Africa. A new species of this group, *L. difformis* B-E. van Wyk, is described. The unusual inflorescence of the new species provides a possible explanation for the evolutionary origin of the inflorescence structure in *Lipozygis sensu stricto* and related groups.

Daar word aangetoon dat die seksie *Lipozygis* (E. Mey.) Benth. van *Lotononis* (DC.) Eckl. & Zeyh. 'n kunsmatige groep is wat in twee duidelik onderskeibare en geografies geïsoleerde seksies verdeel behoort te word. *L. pentaphylla* (E. Mey.) Benth., *L. polycephala* (E. Mey.) Benth. en ander jaarplante van die westelike Kaapprovinsie sal uitgesluit word van die seksie. Die oorblywende spesies [*L. corymbosa* (E. Mey.) Benth. en verwante spesies] is almal meerjarige pirofiete van grasveldgebiede langs die oostelike dele van suider-Afrika. 'n Nuwe spesie van hierdie groep, *L. difformis* B-E. van Wyk, word beskryf. Die ongewone bloeiwyse van die nuwe spesie bied 'n moontlike verklaring vir die evolusionêre ontwikkeling van die bloeiwyse-struktuur in *Lipozygis sensu stricto* en verwante groepe.

Keywords: Fabaceae, *Lotononis* section *Lipozygis*, sectional limits, taxonomy

Introduction

The section *Lipozygis* (E. Mey.) Benth. of *Lotononis* (DC.) Eckl. & Zeyh. was originally described to include species with terminal capitate inflorescences, oblong standard petals and obtuse keel petals. The habit and fruit of many of the species were not known before, so that the sectional characters of Bentham (1843) and Dümmer (1913) now appear to be superficial similarities rather than indications of a direct relationship. This study has shown that two distinct groups can be distinguished within the section.

A summary of differences between the two groups within *Lipozygis* is given in Table 1. It is clear that the infrageneric classification can be improved by excluding *L. pentaphylla* (E. Mey.) Benth. and related species from the section. As shown in Figure 1, these species are geographically isolated from the rest of the section and form a very natural group. It is the only group in *Lotononis* with truly capitate inflorescences, sessile flowers and indehiscent, wind-dispersed pods. The *L. pentaphylla* group will be discussed in more detail elsewhere.

The morphology of *L. corymbosa* (E. Mey.) Benth. and its close relatives appears to be related to a grassland habitat (see Figure 1) and also shows them to be a natural group. All of these species are suffrutescent herbs which produce annual flowering branches from a persistent, woody base. The morphology of the flowers and fruit are remarkably uniform, varying only in size and degree of pubescence. A very useful diagnostic character is the position of the bracts. Bracts are normally inserted at the base of the pedicel. In all species in the *L. corymbosa* group, the bracts are situated halfway up the pedicel, presumably as a result of fusion.

A study of the inflorescence structure in the *L. corymbosa* group has shown it to be quite different from the

Table 1 Summary of differences between the *L. corymbosa* and *L. pentaphylla* groups of section *Lipozygis*

	L. corymbosa group (10 species*)	*L. pentaphylla* group (9 species**)
Habit	perennial	annual
Inflorescence	racemose	capitate
Pedicel	present, often very long	absent
Bract position	on pedicel	on rachis
Bracteoles	often present	totally absent
Leaves	invariably 3-digitate	3- and/or 5-digitate
Petiole	much shorter than the leaflets	as long or longer than the leaflets
Stipules	foliaceous, similar to leaflets	much smaller than the leaflets
Pod – size	longer than the calyx	very small, included within the calyx
– shape	compressed	oval in cross-section
– dehiscence	dehiscent	indehiscent
Distribution	eastern parts of southern Africa	western coastal areas of the Cape Province

**L. corymbosa* (E. Mey.) Benth., *L. eriantha* Benth., *L. lanceolata* (E. Mey.) Benth., *L. foliosa* H. Bol., *L. spicata* Compton, *L. sutherlandii* Dümmer, *L. grandis* Dümmer, *L. pulchra* Dümmer, *L. procumbens* H. Bol. and *L. difformis* B-E. van Wyk

***L. pentaphylla* (E. Mey.) Benth., *L. polycephala* (E. Mey.) Benth., *L. anthylloides* Harv., *L. rosea* Dümmer, *L. bolusii* Dümmer and four as yet undescribed species

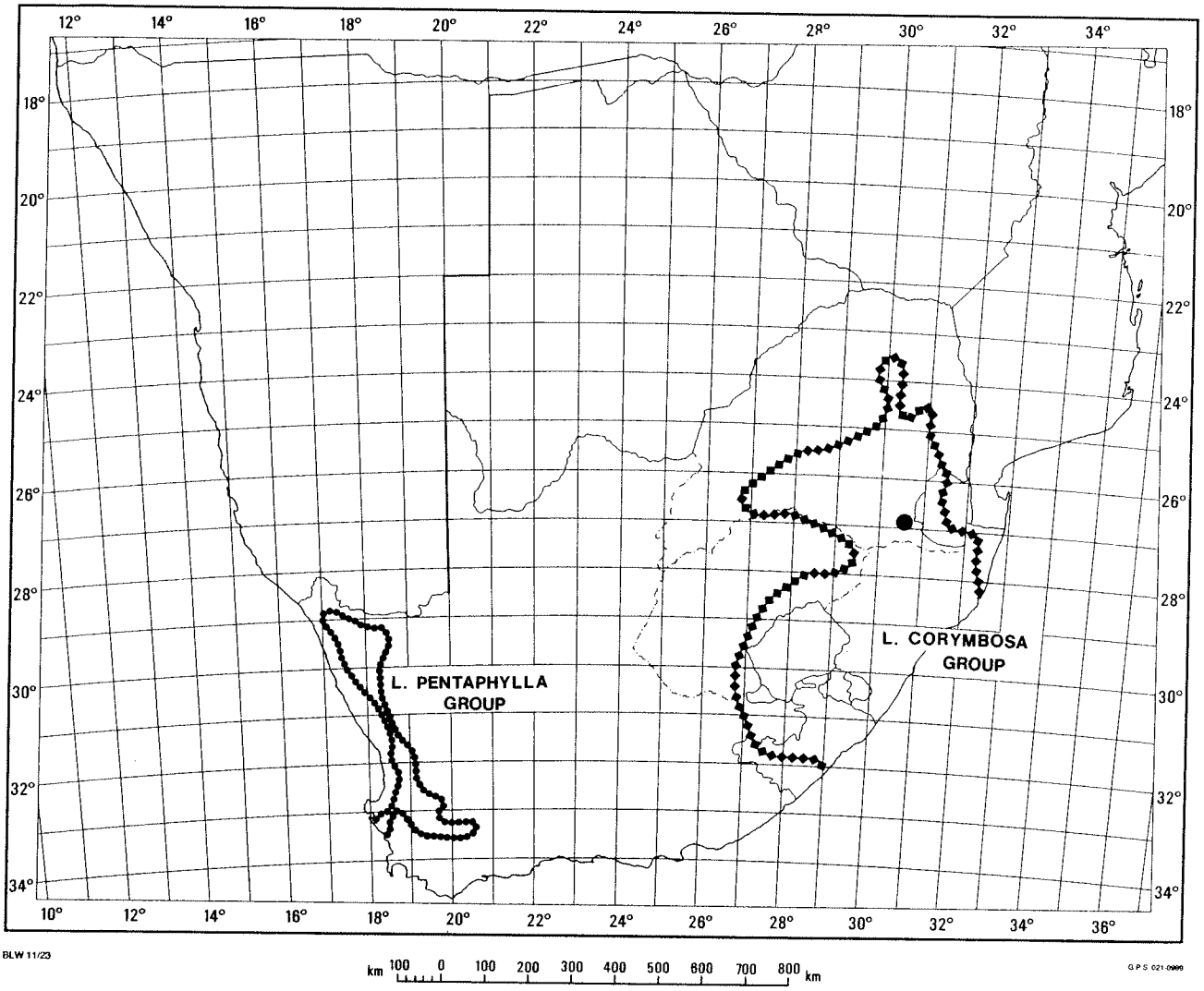

Figure 1 Approximate geographical distribution of the two groups of *Lotononis* section *Lipozygis* and the known distribution of *L. difformis* (●).

rest of the genus. This study has also shown the presence of an undescribed species with some unusual morphological features. The inflorescence structure of the new species indicates a direct relationship between *L. procumbens* H. Bol. [previously included in the section *Polylobium* (Eckl. & Zeyh.) Benth.] and the *L. corymbosa* group. *L. procumbens* is a prostrate suffrutescent shrub with umbellate inflorescences and a floral structure almost identical to that of the *L. corymbosa* group. *L. procumbens* and the new species both have very large, foliaceous bracts and well-developed bracteoles. A possible evolutionary sequence for the development of the inflorescence structure in the *L. corymbosa* group is given in Figure 2. This hypothesis suggests a progressive shortening of the rachis, a fusion of bracts to the pedicel and a gradual loss of bracteoles. It also provides a logical explanation for the origin of a group of the section *Leptis* (Eckl. & Zeyh.) Benth. [*L. mucronata* Conr. and related species]. This group differs from the *L. corymbosa* group mainly by the more herbaceous habit and the few-flowered inflorescences. *L. stolzii* Harms, a localized endemic from central Africa, has an inflorescence structure exactly intermediate between the many-flowered 'corymbosa'-type and the sparse 'leptis'-type as shown in Figure 2. Therefore, I suggest that the *L. corymbosa* group (*Lipozygis sensu stricto*) and species of the *L. mucronata* group (*Leptis sensu stricto*) are sister groups in a phylogenetic sense and that the capitate inflorescence in the *L. pentaphylla* group is a separate development.

The similarities between *L. procumbens* and the new species described below clearly show the former to be misplaced in section *Polylobium* and that both should be included in section *Lipozygis sensu stricto*.

Lotononis difformis *B-E. van Wyk* sp. nov.

Procumbenti H. Bol. similis, sed haec specie habitu minus lignoso, axe inflorescentiae longo, bracteis late dispersis, conjunctione bractearum et pedicellorum atque lobis duobus summis calycis, quae valde breviores tribus inferis calycis sunt (lobi summi inferis similes in *L. procumbente* et speciebus aliis omnibus sectionis *Lipozygis*). Etiam *L. corymbosae* (E. Mey.) Benth. et speciebus affinibus, *L. difformis* similis est, sed ab illis fabrica inflorescentiae, bracteis maximis foliaceis atque fabrica calycis differt.

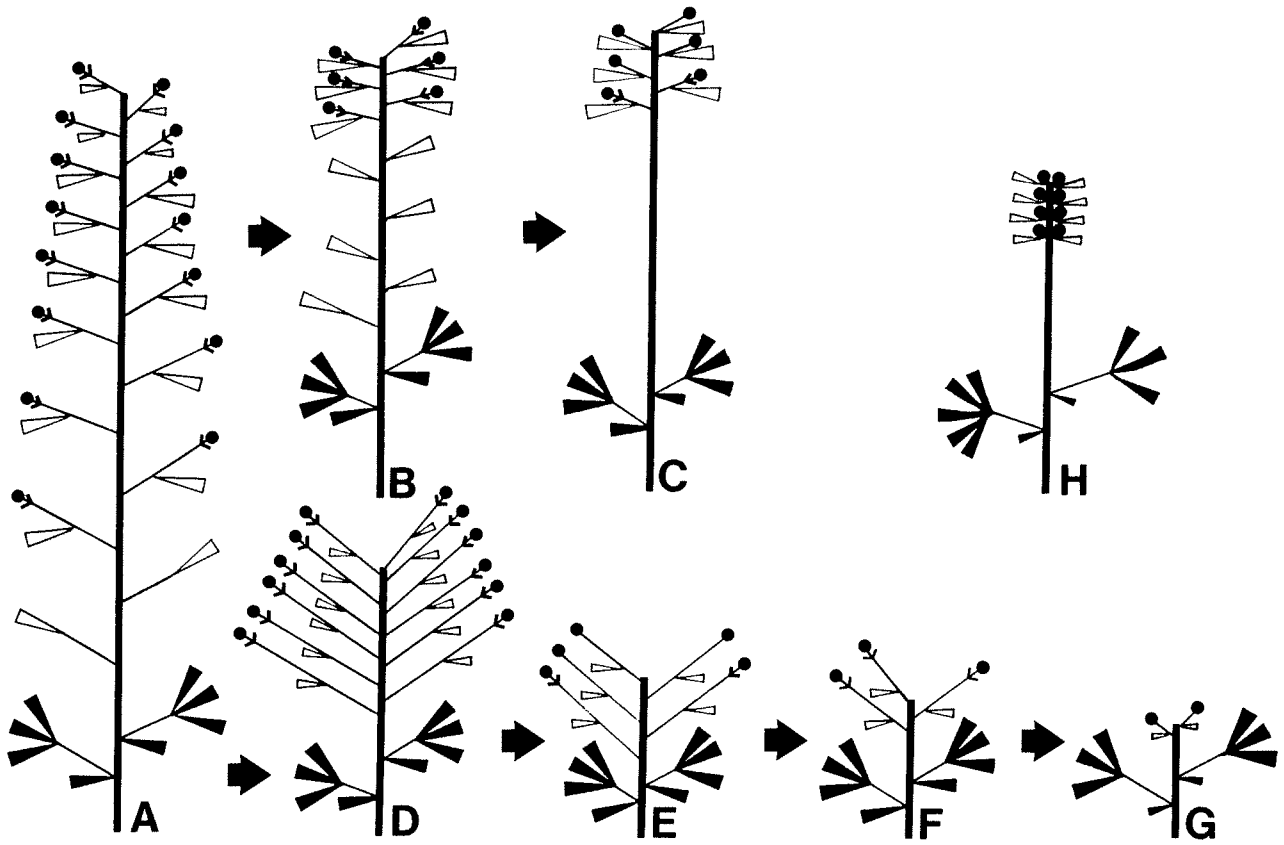

Figure 2 Inflorescence structure in *Lotononis* sections *Lipozygis* and *Leptis*. A hypothetical sequence of development is shown schematically (note the position of bracts and the presence or absence of bracteoles). Inflorescence structure in: A, hypothetical ancestor; B, *L. difformis (Lipozygis sensu stricto)*; C, *L. procumbens (Lipozygis sensu stricto)*; D & E, *L. corymbosa* and related species (*Lipozygis sensu stricto*); F, *L. stolzii (Leptis*, intermediate); G, *L. mucronata* and related species (*Leptis sensu stricto*); H, *L. pentaphylla* and related species (to be excluded from *Lipozygis*).

TYPUS.— Transvaal: Carolina, Piet Retief District, Iswepe, 06/03/1949, *Sidey 1609* (PRE, holotypus; S, isotypus).

Procumbent herbaceous perennial up to 0.18 m high and 0.5 m in diameter. Branches slender, densely leafy, woody at the base only. All mature parts sparsely pilose. *Leaves* trifoliolate, (10–)14–26 mm long; petiole much shorter than the terminal leaflet, 2–7 mm long, the lateral leaflets slightly assymetrical; leaflets relatively large, thin in texture, broadly oblanceolate to elliptic, (6–)8–18(–20) mm long, (2–)4–6(–9) mm wide, sparsely pilose on both surfaces; midrib distinct on abaxial surface, invisible on adaxial surface. *Stipules* single at each node, foliaceous, similar to the leaflets but slightly smaller, 5–15 mm long, 1–3.5 mm wide. *Inflorescences* terminal, with large, foliaceous bracts along the lower part of the main axis, 4–12-flowered; peduncle (including the rachis) (15–)24–40(–60) mm long, usually thick and rigid in the fruiting stage; bracts large and foliaceous, broadly obovate, 6–14 mm long, 3–6 mm wide, the lower ones widely separated on the rachis and not subtending flowers, occasionally petiolate, the upper ones inserted ± halfway up the pedicel; bracteoles large, narrowly oblanceolate to linear, 4–6 mm long, 0.5–1 mm wide. *Flowers* subumbellately arranged at the apex of the inflorescence, relatively small, 10–12 mm long, yellow; pedicel 1–4 mm long. *Calyx* with the upper two lobes shorter than the lower three lobes, the lateral sinuses slightly shallower than the upper and lower sinuses; lobes relatively short and broad, ± as long as the tube, apices broadly triangular, acute. *Standard* broadly oblong, as long as the keel; claw ± 4 mm long; lamina 6–7 mm long, ± 4 mm wide, lobed at the base, apex acuminate, abaxially densely pubescent over the whole surface. *Wing petals* subtriangular, shorter than the keel, conspicuously auriculate, pubescent along the lower side; apex rounded to truncate; sculpturing in 5 rows of intercostal lunae, with a few large transcostal lamellae towards the auricle. *Keel petals* obovate-oblong, only slightly auriculate; claw slightly shorter than the lamina; lamina pubescent over most of the surface, apex rounded. *Androecium* with the stamens fused high up into a narrow sheath; anthers dimorphic, the basifixed ones oblong and slightly longer than the ovate dorsifixed ones, carinal anther similar to the dorsifixed anthers. *Gynoecium* subsessile; pistil oblong, pubescent; style with only the terminal part curved upwards; stigma small, directed to the front. *Pods* obovate-oblong, 6–7 mm long, 3 mm wide, compressed and not laterally inflated, upper suture smooth, 3–4-seeded, funicles 1–1.5 mm long. *Seeds* (immature) suborbicular, ± 1.5 mm in diameter, testa sparsely and minutely tuberculate.

(Figure 3).

L. difformis is known only from two collections from the south-eastern Transvaal (Figure 1). It is similar to *L. procumbens* H. Bol. but differs from this species by the less woody habit, the long inflorescence axis, the widely spaced bracts, the fusion of the bracts to the pedicels and by the upper lobes of the calyx. The upper lobes of *L. difformis* are much shorter than the lower three (upper lobes are similar to the lower ones in *L. procumbens* and in all other species of *Lipozygis*). It is also similar to *L.*

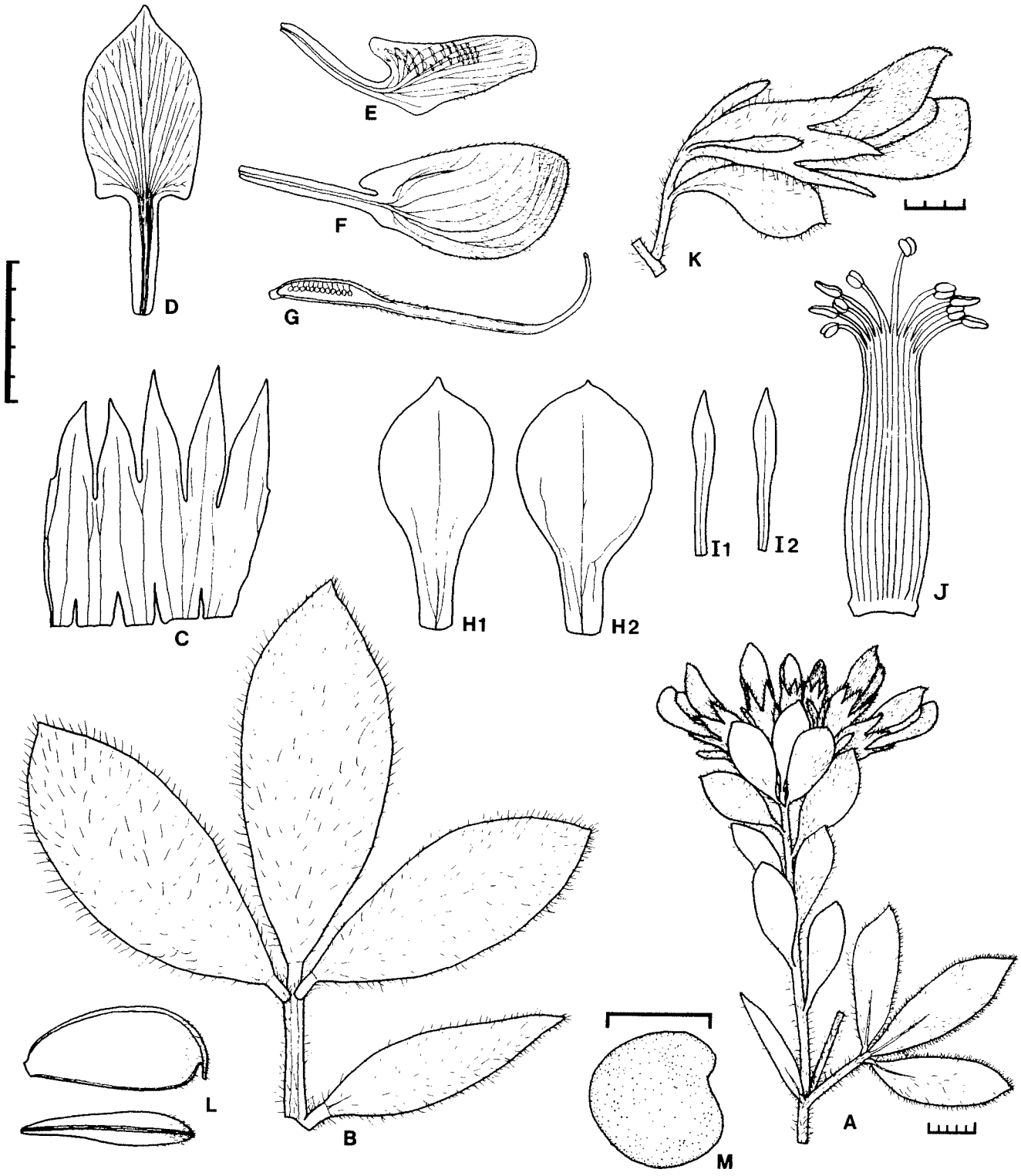

Figure 3 *Lotononis difformis*. A, inflorescence, showing the foliaceous bracts and a leaf in abaxial view; B, leaf and stipule in adaxial view; C, calyx opened out with the upper lobes to the left; D, standard petal; E, wing petal; F, keel petal; G, pistil; H1 & H2, bracts; I1 & I2, bracteoles; J, androecium; K, flower in lateral view, showing the position of the bract and bracteoles and the vestiture of the calyx and corolla; L, pods in lateral and top view; M, immature seed in lateral view. All from *Sidey 1609*. Scales in mm, the vertical one applies to all the drawings except a, k and m.

corymbosa (E. Mey.) Benth. and related species, but differs from these by the structure of the inflorescence (Figure 2), the very large foliaceous bracts, the large bracteoles and the structure of the calyx as mentioned above.

Specimens examined

—**2630** (Carolina): Piet Retief District, Iswepe (–DC), *Sidey 1609* (PRE, S), *Sidey 1579* (PRE).

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