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A synopsis of the genus *Dichilus* (Fabaceae — Crotalarieae)

Anne Lise Schutte* and B-E. van Wyk

Department of Botany, Rand Afrikaans University, P.O. Box 524, Johannesburg, 2000 Republic of South Africa

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The genus *Dichilus* DC. comprises five distinct species, namely *D. gracilis* Eckl. & Zeyh., *D. lebeckioides* DC., *D. pilosus* Conrath ex Schinz, *D. strictus* E. Mey. and *D. reflexus* (N.E. Br.) A.L. Schutte. The nomenclature, complete synonymy and typification, as well as a short diagnosis and the geographical distribution of each species are given.

Die genus *Dichilus* DC. bestaan uit vyf duidelik onderskeibare spesies, naamlik *D. gracilis* Eckl. & Zeyh., *D. lebeckioides* DC., *D. pilosus* Conrath ex Schinz, *D. strictus* E. Mey. en *D. reflexus* (N.E. Br.) A.L. Schutte. Die nomenklatuur, volledige sinonimie en tipifikasie, asook 'n kort diagnose en die geografiese verspreiding van elke spesie word aangegee.

Keywords: Crotalarieae, *Dichilus*, Fabaceae, taxonomy

*To whom correspondence should be addressed

Introduction

Dichilus DC. is a genus of common papilionoid suffrutices endemic to southern Africa. It forms part of the redefined tribe Crotalarieae (Polhill 1976, 1981), which differs from the Genisteae *sensu stricto* in the fusion of the stamens into a sheath open on the upper side. The relationship of *Dichilus* amongst other genera with bilabiate calyces is not clear. It may be distinguished from *Melolobium* Eckl. & Zeyh. and *Polhillia* C.H. Stirton by the extreme reduction of stipules, the strongly reflexed standard and the wing petals, which are much shorter than the keel. It is also remarkably similar to some species of *Argyrolobium* Eckl. & Zeyh. (Genisteae), but the chromosome number and other details seem to indicate convergence rather than a close evolutionary relationship. A detailed discussion of generic relationships is in preparation.

The purpose of this preliminary paper is to revise the taxonomy and nomenclature of the genus and to fascilitate the identification of the five species that are recognized.

Dichilus *DC.*, Prodromus systematis naturalis 2: 136 (1825) & Mèmoires sur la familles des Lègumineuses, 201, t. 35 (1826); Spreng.: 263 (1827) [as '*Dichilos*'],: 478 (1831); Eckl. & Zeyh.: 183 (1836); E. Mey.: 36 (1836); Meisn.: 82 (1837); Harv.: 79 (1838); Endl.: 1263 (1840); Steud.: 502 (1841); Benth.: 353 (1844); Harv.: 77 (1862); Benth. & Hook. f.: 479 (1865); Harv.: 74 (1868); Taubert: 225 (1893); Baker: 22 (1926); Phillips: 408 (1951); Hutch.: 361 (1964); Schreiber: 31 (1970); Dyer: 252 (1975); Polhill: 327 (1976): 402 (1981). Type species: *D. lebeckioides* DC.

Calycotome E. Mey.: 113 (1836), *non Calycotome* Link (1808).

Melinospermum Walp.: 527 (1839).

Key to *Dichilus* and some other genera:

Calyx with trifid lower lip (lateral sinuses deeper than the lower ones):
- Stipules semi-sagittate or semi-cordate at the base; glandular tubercles often present ..... ***Melolobium***
- Stipules, if present, not lobed; glandular tubercles absent:
  - Stipules conspicuous ..... ***Argyrolobium*** and ***Polhillia***
  - Stipules inconspicuous, less than 1 mm long, rarely absent .... ***Dichilus***

Calyx without trifid lower lip (lateral sinuses may be wider than the lower ones, but not deeper) ..... ***Lebeckia*** and ***Wiborgia***

Diagnostic characters

Stipules inconspicuous or absent, up to 1 mm long, usually caducous when present. *Calyx* distinctly shorter than the corolla, 2-lipped, upper lip bifid, lower lip trifid. *Standard* oblong to suborbicular, sharply reflexed, auriculate; claw well developed, with callosities at the apex. *Wing petals ca.* 2/3 the length of the keel, with distinct elongated auricles. *Keel* slightly shorter than the standard, much longer than the wings, auriculate. *Stamens* monadelphous; staminal tube split along upper side. *Fruit* narrowly oblong to linear, laterally compressed between the seeds. *Seed* without an aril; funicles short. Chromosome number (for all five species): 2n = 28!

Despite superficial similarities with species of *Lebeckia* Thunb. and various other genera, we have little doubt that the genus represents a monophyletic group. The extreme reduction in stipule size appears to be a unique character state in the Crotalarieae. This reduction is probably not directly comparable to the situation in *Lebeckia* and other genera where there is often a total loss of stipules but no clear trend towards a reduction in size. Other unique character states that support monophyly include the uniform flower structure, the spurred wing petals, the fusion of the upper calyx lobes, as well as the distinctive combination of alkaloids (van Wyk *et al.* 1988). To these may be added the chromosome number [shared only by some species of *Lotononis* (DC.) Eckl. & Zeyh.] and the petiole anatomy (a group of fibres above the main vascular bundle is a character shared only by *Melolobium*).

Regional isolation appears to have very little effect and different populations of a species are morphologically surprisingly similar. The species are quite distinct, but the diagnostic characters tend to be rather subtle. Figure 1 illustrates the most conspicuous morphological differences and may serve as a key to the five species enumerated below.

Key to the species of *Dichilus*:

Inflorescences terminal on lateral branches; peduncles with leaves at their bases; flowers often more than 3 per inflorescence; stipules very rarely present:
- Calyx short (less than half the length of the keel), with short acute lobes; standard pubescent at the apex ..... ***D. strictus***
- Calyx long (more than half the length of the keel), with long acuminate lobes; standard ± glabrous ..... ***D. reflexus***

Inflorescences leaf-opposed on lateral branches; peduncles leafless; flowers rarely more than 3 per inflorescence; stipules rarely absent:
- Leaves of flowering branches opposite ..... ***D. gracilis***
- Leaves of flowering branches alternate:
  - Vestiture of long spreading hairs ..... ***D. pilosus***
  - Vestiture of short appressed hairs ..... ***D. lebeckioides***

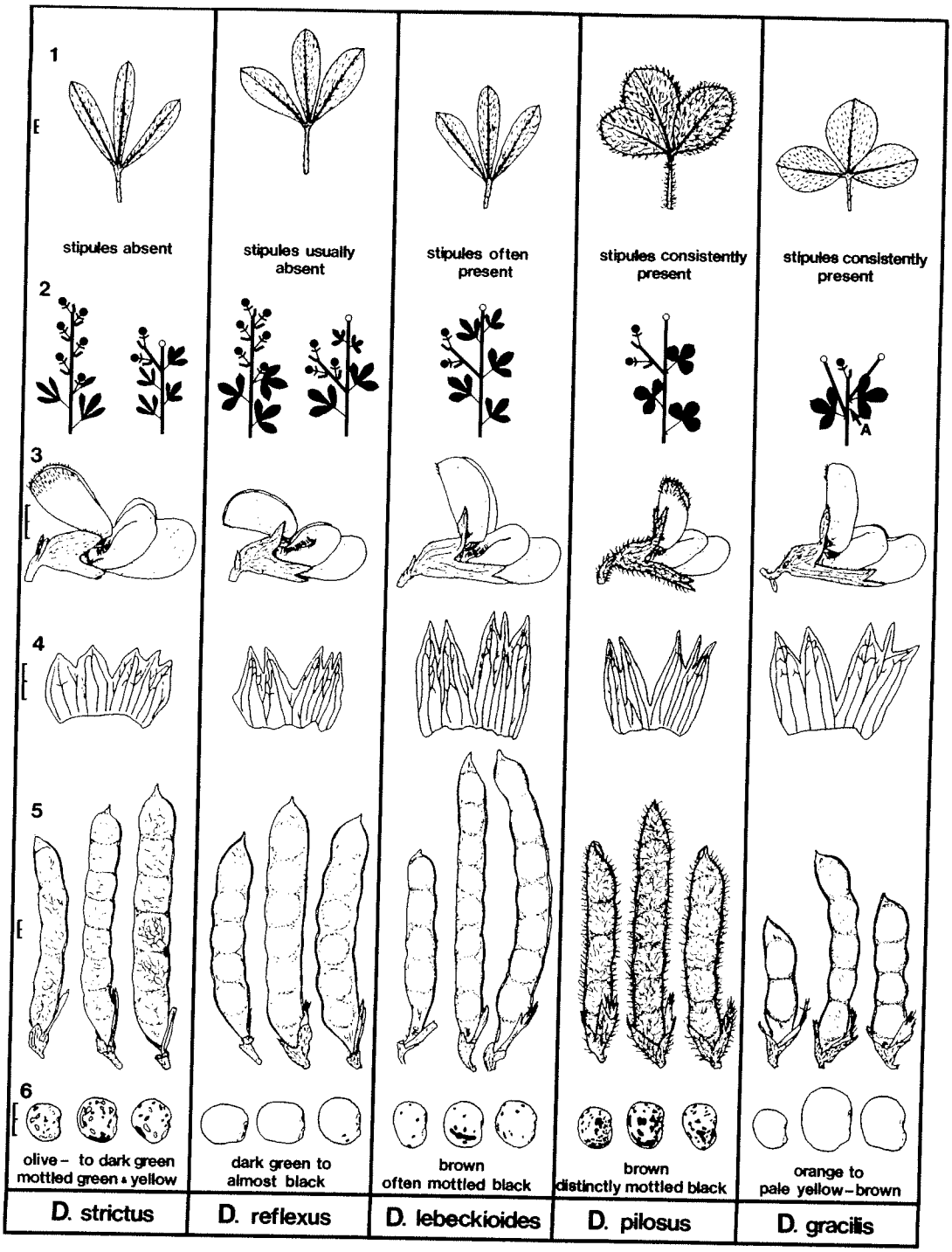

Figure 1 Illustrated key to the species of *Dichilus*. 1, leaves, showing vestiture and leaflet shape. 2, schematic representation of inflorescence structure, showing the position of vegetative buds (open circles), flowers (dots), bracts and bracteoles. In *D. gracilis*, the internode (A) directly below a flower is always totally suppressed so that floral leaves are opposite and not alternate as in vegetative shoots. 3, flowers, showing the strongly reflexed standard, relatively short wings and bilabiate calyx. Note the differences in vestiture and the length of the calyx. 4, calyx opened out, showing variation in length and degree of fusion of the lobes (vestiture not shown). 5, fruit, showing variation in shape and vestiture. 6, seeds, showing the differences in size, shape and surface colouration.

1. Dichilus strictus *E. Mey.*, Commentariorum de Plantis Africae Australioris 1(1); 36 (1836); Walp.: 608 (1842); Benth.: 353 (1844); Harv.: 77 (1862). Type: In praeruptis montium Witbergen, altit. 6400–7000 ped., *Drège s.n.* (K, lecto.!, here designated; BM!, G!, MO 2013864!, P!, PRE 26638!).

Since Meyer's personal herbarium in B was destroyed, we here choose the K isosyntype specimen as lectotype. This sheet was annotated by Meyer, leaving little doubt that he had seen the specimen.

Diagnostic characters

Inflorescence a terminal raceme, very rarely leaf-opposed, 2–5(–10)-flowered. *Calyx* short, 3–4 mm long, scarcely bilabiate, with short acute lobes. *Leaves* 3–5-digitate; leaflets narrowly oblanceolate, appressedly pubescent. *Stipules* absent. *Fruit* linear, 2,5–4 mm wide, (3–)5(–7)-seeded. *Seed* round to oblong in lateral view, olive-green to dark green, often mottled yellow and green.

Flowering time: November to March.

Distribution: Transvaal highveld, Orange Free State, Natal and eastern Cape (Figure 2).

2. Dichilus reflexus *(N.E. Br.) A.L. Schutte* comb. nov.

Argyrolobium reflexum N.E. Br. in Kew Bulletin 1906: 18 (1906). Type: Province of Zululand; Ungoya, at 305 – 610 m., *Wylie s.n. sub Wood 5688* (K, lecto.!, here designated; NH!).

Dichilus lebeckioides DC. *sensu* Ross: 198 (1972).

Since N.E. Brown was based at Kew, we here choose the K isosyntype specimen as lectotype.

The inflorescences, leaflets, fruit and seeds of *D. reflexus* are quite different from those of *D. lebeckioides* and it is also geographically isolated from the latter (see Figure 2). Previous authors (Wood 1907; Wood 1909; Bews 1921; Burtt Davy 1932; Compton 1976; Ross 1972) were apparently unaware of the differences between the two species and listed *D. reflexus* under *D. lebeckioides*. Burtt Davy however, cited *Galpin 1247* under *D. lebeckioides* but noted that it is not typical.

Diagnostic characters

Inflorescence a terminal raceme, rarely leaf-opposed, 2 – 3 (– 11)-flowered. *Calyx* 4 – 6 mm long, deeply bilabiate, with acuminate lobes. *Leaves* 3(– 5)-digitate; leaflets oblanceolate to broadly oblanceolate, appressedly pubescent. *Stipules* usually absent (if present, then at insertion of leaf-opposed inflorescences only). *Fruit* broadly linear, 4,5 – 5,5 mm wide, (2 –)5(– 7)-seeded. *Seed* round to transversely oblong in lateral view, uniform dark green to almost black.

Flowering occurs throughout the year.

Distribution: eastern Zimbabwe, eastern Transvaal, Natal and northern Transkei (Figure 2).

3. Dichilus lebeckioides *DC.*, Prodromus systematis naturalis 2: 136 (1825) & Mèmoires sur la famille des Lèguminneuses, 201, t. 35 (1826); Benth.: 353 (1844); Sond.: 28 (1850); Harv.: 77 (1862); Baker: 22 (1926). Type: Cap. de Bonne-Espèrance, *Burchell 2614* (G-DC, lecto., here designated, microfiche!; G!, K!, P!, PRE!).

The Burchell specimen in G-DC is obviously the topotype of the illustration (t. 35) accompanying the species description in De Candolle (1826). For this reason it is here chosen as lectotype.

Diagnostic characters

Inflorescence a strictly leaf-opposed raceme, 1 – 2(– 4)-flowered. *Calyx* long, 5 – 8 mm long, deeply bilabiate, with acuminate lobes. *Leaves* 3-digitate; leaflets narrowly oblanceolate, appressedly pubescent. *Stipules* often present. *Fruit* linear, 3 – 4 mm wide, (3 –)7(– 9)-seeded. *Seed* round to oblong in lateral view, brown, often mottled black.

Flowering time: October to April.

Distribution: western Zimbabwe, South West Africa, Botswana, Transvaal highveld, Orange Free State and northern Cape (Figure 2).

4. Dichilus pilosus *Conrath ex Schinz* in Vierteljahrschrift der Naturforschenden Gesellschaft in Zürich 52: 429 (1907). Type: Südafrika (Transvaalkolonie), *Conrath 137* (Z, lecto.!, here designated; GZU!, K!).

D. pilosus Kensit: 148 (1909). Type: Transvaal colony; near Johannesburg, approx. alt. 1800 m, Dec., *Tucker s.n.* (BOL 11059, holo.!)

D. pilosus Conrath ex Schinz var. *multiflorus* Burtt Davy *in sched.*

D. multiflorus Burtt Davy: xxi & 391 (1932). Type: Zoutpansberg district, Messina, *Rogers 21826* (K, lecto.!, here designated; Z!).

D. lebeckioides DC. var. *mollis* Schlechter *in sched.*

A drawing of flower parts and a full description in Conrath's hand is attached to the K specimen, but Schinz probably never saw this specimen. We have to assume that Schinz used the isosyntype in Z, where he was Professor of Botany at the time. This specimen is therefore selected as lectotype.

According to Gunn & Codd (1981), Burtt Davy retired to England in 1919, where he started working at Kew on 'A manual of the flowering plants and ferns of the Transvaal with Swaziland'. Therefore the K specimen of *D. multiflorus* is chosen as lectotype. *D. multiflorus* as a species is quite untenable. The diagnostic characters (up to 5-flowered; glabrous standard) are entirely within the range of variation found in *D. pilosus*.

D. pilosus Kensit appears to be a later homonym of *D. pilosus* Conrath ex Schinz. There is no evidence to suggest otherwise. The pilose vestiture of this species is very distinct and probably explains why Kensit used the same specific epithet.

Diagnostic characters

Inflorescence a strictly leaf-opposed raceme, 1 – 2(– 5)-flowered. *Calyx* long, 5 – 6 mm long, deeply bilabiate, with acuminate lobes. *Leaves* 3 – 5-digitate; leaflets broadly oblanceolate to obovate, pilose. *Stipules* consistently present. *Fruit* linear, 3 – 4 mm wide, (2 –)5(– 6)-seeded, conspicuously pilose. *Seed* oblong in lateral view, brown, distinctly mottled with black.

Flowering time: October to April.

Distribution: Transvaal highveld (Figure 2).

5. Dichilus gracilis *Eckl. & Zeyh.*, Enumeratio plantarum Africae Australis extratropicae: 183 (1836, Jan.); Walp.: 608 (1842); Benth.: 354 (1844); Harv.: 77 (1862). Type: In locis graminosis et humidis (altit. II) ad radices montis 'Chumiberg', tum prope 'Fort Beaufort' ad flumen 'Katrivier' (Ceded territory), *Ecklon & Zeyher 1300* (S, lecto.!, here designated; G!, K!, MO 1848731!, P!, S!).

D. patens E. Mey.: 36 (1836, Feb. or later). Type: In rupestribus siccis ad Vischrivier, altit. 400 ped., *Drège s.n.* (K, lecto.!, here designated; BM!, G!, MO 3282947!, P!, PRE 9374!, S!).

Calycotome pusilla E. Mey.: 113 (1836, Feb. or later), excluding synonyms *Tephrosia pusilla* Pers. and *Galega pusilla* Thunb. Type: Steelkloof, altit. 3500 ped., *Drège s.n.* (K, lecto.!, here designated; G!, MO 2014210!, S!).

Melinospermum pumilum (E. Mey.) Walp.: 527 (1839): 651 (1842), excluding synonym *Tephrosia pusilla* Pers. Type as for *Calycotome pusilla* E. Mey.

Dichilus pusillus (E. Mey.) Benth.: 354 (1844). Type as for *Calycotome pusilla* E. Mey.

D. gracilis Eckl. & Zeyh. var. *pusillus* (Benth.) Harv.: 77 (1862). Type as for *Calycotome pusilla* E. Mey.

According to Nordenstam (1980), the most complete collection of Ecklon & Zeyher is housed at S. There are two isosyntype specimens in S, both with printed Enumeratio labels, but the one which also has a handwritten label in Ecklon's hand is chosen as lectotype.

For the same reasons as in the case of *Dichilus strictus*, we designate the Drège specimens of *D. patens* and *Calycotome pusilla* in K as lectotypes.

Diagnostic characters

Inflorescence 1-flowered (rarely 2-flowered), inserted at opposite leaves. *Calyx* long, 4,5 – 7 mm long, deeply bilabiate, with acuminate lobes. *Leaves* 3-digitate; leaflets obovate,

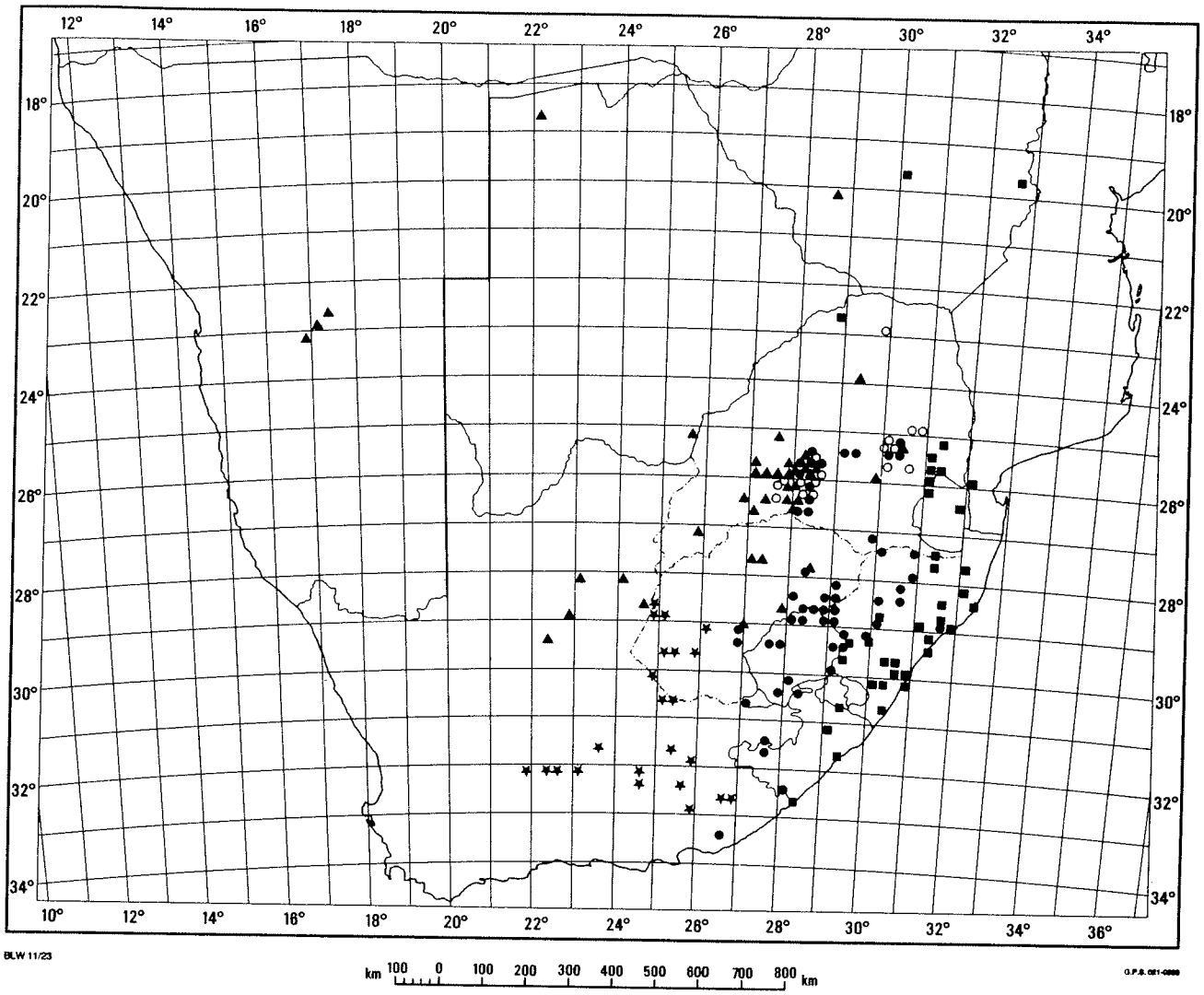

Figure 2 The recorded geographical distribution of the genus *Dichilus*. *D. strictus* (●), *D. reflexus* (■), *D. lebeckioides* (▲), *D. pilosus* (○), *D. gracilis* (★).

minutely pubescent. *Stipules* consistently present. *Fruit* broadly linear, 4 – 5,5 mm wide, (2 –)4(– 5)-seeded. *Seed* round to oblong in lateral view, orange to pale yellow-brown.

Flowering time: April to November.

Distribution: Orange Free State and Karroo (Figure 2).

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