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Short communication

Taxonomic notes on the genus *Otoptera* (Phaseoleae, Fabaceae) in southern Africa

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Abstract

A taxonomic study of the genus *Otoptera* (tribe Phaseoleae) is presented. This distinct genus consists of two species, *O. burchellii* in southern Africa (Namibia, Botswana, South Africa and Zimbabwe) and *O. madagascariensis* endemic to Madagascar. The two species differ in the shape and size of leaflets, size and orientation of the spur located at the base of the wing petal, and also by size of the pod. A key to the two species is provided. This study focuses mainly on the southern African *O. burchellii* DC., which is described and illustrated. The species name is lectotypified and the known geographical distribution is recorded for the first time.

Keywords: Fabaceae; *Otoptera*; Phaseoleae; Phaseolinae; Southern Africa; *Vigna*

1. Introduction

The generic name *Otoptera* DC. is derived from the large spur located at the base of each of the wing petals (from the Greek *oto* = ear and *ptero* = wing). *Otoptera* belongs to the tribe Phaseoleae (Fabaceae). The genus is traditionally placed in the subtribe Phaseolinae (Lackey, 1981), but recent molecular studies have revealed that it, together with the genus *Psophocarpus* Neck. ex. DC. are rather closer to genera of the subtribe Glycininae (Wojciechowski et al., 2004). The Phaseolinae and Glycininae differ mainly on presence or absence of appendages on the face of the standard petal, features of the style and whether the hilum of the seed is covered with spongy tissue (see Table 1 for details). In *Otoptera*, the style tip is expanded and spoon–like and the hilum is covered with white spongy tissue (as in the Phaseolinae), but the style is unbearded and the face of the standard petal has no appendages (as in Glycininae).

Otoptera was placed under the genus *Vigna* Savi by Harvey (1862) and Baker (1871), suggesting close affinities between the two genera. The genus was reinstated by the younger Baker (1929) and has been accepted ever since (e.g. Hutchinson, 1964; Schreiber, 1970). In both genera, the stipules are peltate (or at least with a smaller portion below point of attachment in *Vigna*), the two upper lobes of the calyx are connate (though not always so in *Vigna*) and the lowest lobe is the longest. *Otoptera* can be distinguished from *Vigna* by the features of the style tip, style direction and the stigma (Table 2). *Vigna* also lacks the main diagnostic character of *Otoptera*, namely the spurred wing base. Molecular studies indicate that *Otoptera* is closely related to *Psophocarpus* (Lewis et al., 2005), with which it shares peltate stipules and a prominent spur at the base of the wing (sometimes relatively large and variously shaped in *Psophocarpus*).

Otoptera consists only of two species, one in southern Africa (Botswana, Namibia, South Africa, and Zimbabwe), and the other (*O. madagascariensis* R.Vig.) endemic to South-West and West Madagascar (Lewis et al., 2005). As part of a wider study of southern African Phaseoleae, we here present a brief taxonomic review of the only southern African species (*O. burchellii* DC.), including the correct nomenclature, typification and geographical distribution.

Key to the species of *Otoptera*:

Leaflets lanceolate, up to 100 mm long; spur at the base of the wing petal large, pointing upwards and interlocking with the standard petal; pods up to 120 mm long; ovaries up to 15 mm long ..... *O. burchellii.*

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Table 1
Differences between the subtribes Phaseolinae and Glycininae.

Character	Phaseolinae	Glycininae
1. Appendages on face of standard petal	One or two to four	Absent
2. Style	Bearded	Not bearded
3. Style tip	Expanded, flattened, coiled or equipped with specialised hairs	Not expanded, flattened, coiled nor equipped with specialised hairs
4. Spongy tissue on hilum of seed	Present	Absent

Leaflets ovate, up to 60 mm long; spur at the base of the wing petal small, pointing downwards and interlocking with the keel; pods up to 60 mm long..... *O. madagascariensis.*

2. Taxonomic treatment

2.1. Otoptera

DC. Mém. Lég.: 249 (Oct. 1825); Prodr. 2: 240 (Nov. 1825); Harms in Engler, Pflanzenw. Afrikas 3: 689, fig. 313 (1915); Baker f. in Leg. Trop. Afr.: 418 (1929); Burtt Davy, Man. Fl. Pl. and Ferns of Transvaal: 412 (1932) (in *Vigna* but with footnote recognising *Otoptera*); Hutchinson, The genera of Flowering Plants: 430 (1964); Schreib. in FSWA 60: 94 (1970); R.A. Dyer, Genera of southern African Flowering Plants: 274 (1975); Germishuizen in O.A. Leistner, *Strelitzia* 10: 292 (2000); Verdc. in Flora Zambesiaca 3(5): 67 (2001); Lewis *et al*., Legumes of the World: 414 (2005). Type species: *O. burchellii* DC.

Vigna Savi: 7 (1824); Harv. in Harv. & Sond., Flora Capensis 2: 239 (1862); Baker in Fl. Trop. Afr. 2: 194 (1871); *pro parte*.

Prostrate climbing shrubs up to 0.5 m high and 0.8 m wide. *Leaves* glaucous, trifoliolate, with a pair of stipules at the base of each leaf; stipules peltate, lanceolate, striate; leaflets lanceolate, with four stipels (one at the base of each lateral leaflet and a pair at the base of the terminal leaflet); petiole much shorter than the leaflets. *Inflorescences* axillary, 2–4-flowered; bracts ovate-triangular; bracteoles lanceolate. *Calyx* tube campanulate, glabrous, upper lobes completely connate to the tips; lowest lobe the longest. *Corolla* deep pink, mauve or purple, standard ovate, with callosites at the base; wings and keel almost as long as the standard, wing with a prominent spur at the base; spur oblong, directed upwards or downwards, interlocking with the standard petal or the keel petals. *Stamens* monoadelphous with the tube slit halfway down, anthers uniform. *Ovary* linear, thinly pubescent along margins, 10 × 15 mm; style geniculate at the base, with the apex broadened into a flat, spoon-shaped structure; stigma bilabiate, very oblique on inner side of style. *Fruits* narrow, linear-lanceolate, glabrous; seeds kidney-shaped or ellipsoid, dark brown or black.

Table 2
Differences between *Otoptera* and *Vigna*.

Character	*Otoptera*	*Vigna*
1. Wing base	Spurred	Not spurred
2. Style tip	Expanded, spoon-like	Not expanded
3. Style direction	Not coiled	Coiled
4. Stigma	Bilabiate	Entire

2.2. Diagnostic characters

Otoptera can be distinguished by a large spur at the base of the wing, the flattened, spoon-shaped tip of the style and the bilabiate stigma.

2.3. Otoptera burchellii

DC., Mém. Lég.: 250 (April, 1826), t. 42 (Oct. 1825); Prodr. 2: 240 (Nov. 1825); Harms in Engl., Pflanzenw. Afr. 3: 689, fig. 313 (1915), Baker f., Legum. Trop. Afr.: 418 (1929); Burtt Davy, Man. Fl. Pl. and Ferns of Transvaal: 421 (1932); A. Schreib. in FSWA 60: 94 (1970); Drummond in Kirkia 8: 224 (1972); Lock, Leg. Afr. Checklist: 420 (1989); Verdc. in Flora Zambesiaca 3(5): 67 (2001). Type: South Africa, "Between Kruman Peak Station and Little Klibbollikhónni" [Kuruman, **2723 AD**] *Burchell 2436* (G-DC!, lectotype, designated here).

Vigna burchellii (DC.) Harv. in Harv. & Sond., Fl. Cap. 2: 239 (1862); Baker : 196 (1871). Type as above.

Prostrate climbing shrubs up to 0.5 m high and 0.8 m wide. *Leaflets* lanceolate or narrowly triangular to ovate, 35–75 × 10–25 mm; stipules 4–10 × 1–2 mm; stipels linear to narrowly lanceolate, 1–2 mm long; petiole much shorter than leaves, 5–15 mm long. *Flowers* 13–20 mm long; bracts ovate, 1.5–5.0 × 1–2 mm, bracteoles 3–4 × 1–2. *Calyx* upper lobes 9–12 mm long; lower lobes 6–11 mm long (Fig. 1). *Corolla* deep pink, mauve or purple (Fig. 2); standard broadly orbicular, 12–22 × 10–19 mm, claw 2–3 mm long, lamina with a prominent yellowish green nectar guide at the base (Fig. 2); wings 10–20 × 5–6 mm, narrower than the keel, claw 3–4 mm long, spur oblong, large, ca. 2–3 mm long, directed upwards, interlocking with the standard petal; keel equal to the wings, 10–20 × 5–6 mm, with an obliquely incurved beak, claw 5–6 mm long. *Ovary* linear, thinly pubescent along margins, (6–) 10–15 mm long, 5–6-ovuled; style geniculate at the base, the apex broadened into a flat spoon-like structure; stigma bilabiate. *Fruits* linear, oblong, glabrous, 60–120 × 3–6 mm, 4-seeded; seeds oblong, kidney-shaped, 7–8 mm long, dark brown (Figs. 1 and 2).

2.4. Diagnostic characters

The two species of *Otoptera* differ mainly in the orientation and size of the spur at the base of the wing. In *O. burchellii* it is

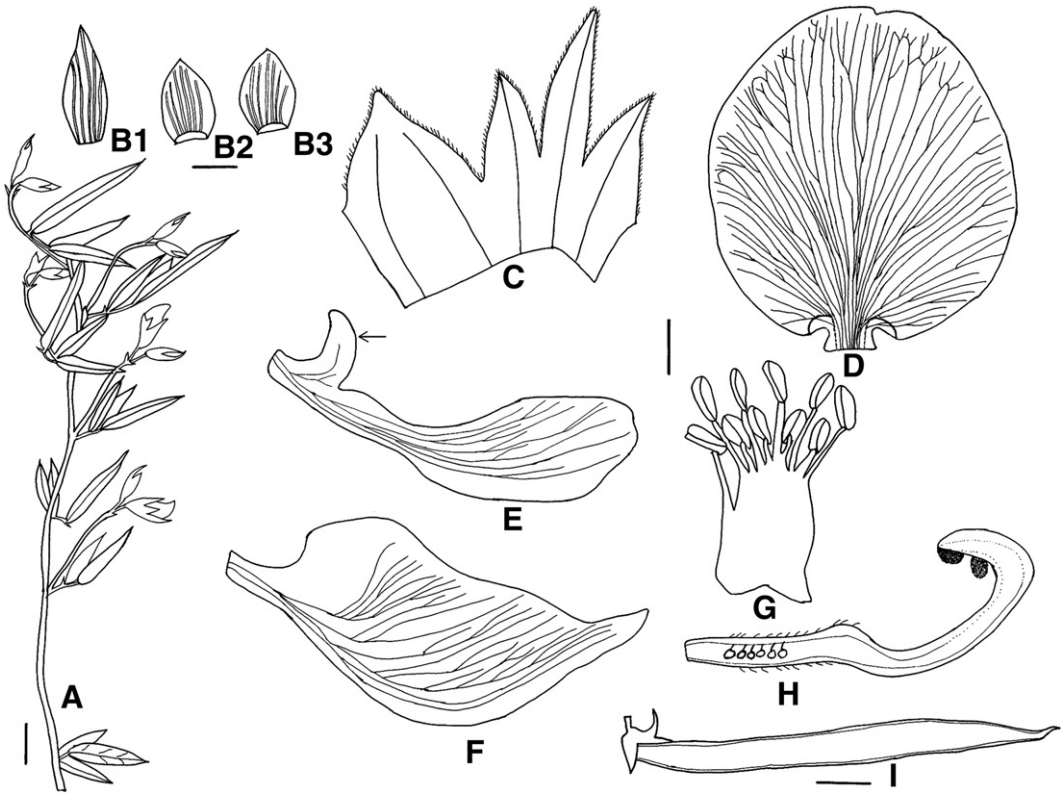

Fig. 1. Vegetative and reproductive morphology of *Otoptera burchellii*: (A) flowering branch; (B1) abaxial view of bracts; (B2 & B3) abaxial view of bracteoles; (C) calyx opened out with upper lobes to left; (D) standard petal; (E) wing petal (note the prominent spur, indicated by arrow); (F) keel petal; (G) staminal tube showing anthers; (H) lateral view of ovary; (I) lateral view of pod. Vouchers: A–C, from *N. van Rooyen* and *Bredenkamp* (PRE); d–h from *Peeters, Gericke* and *Burelli 278* (PRE); I, from *R. Story 3237* (PRE). Scale bars: A, B1, 1 mm; B2, B3–H, 2 mm; i, 10 mm.

large, points upwards and interlocks with the standard, while in *O. madagascariensis* it is smaller, points downwards and interlocks with the keel (Verdcourt, 2001). *O. burchellii* also differs from *O. madagascariensis* in having much larger leaflets (up to 75 mm as opposed to 50 mm in the latter), longer fruits (up to 120 mm long versus 60 mm) and flowers, and shorter petioles (up to 15 mm long compared to 30 mm in *O. madagascariensis*).

2.5. Distribution and habitat

O. burchellii is widely distributed in Namibia, Botswana, South Africa and Zimbabwe. In South Africa it occurs in Limpopo, Northern Cape, North-West, and Gauteng Provinces (Fig. 3). Vegetation types in which this species occurs, based on Mucina and Rutherford (2006), include Sourish Mixed Bushveld, Mountain Sourveld and Mopani Veld, where it

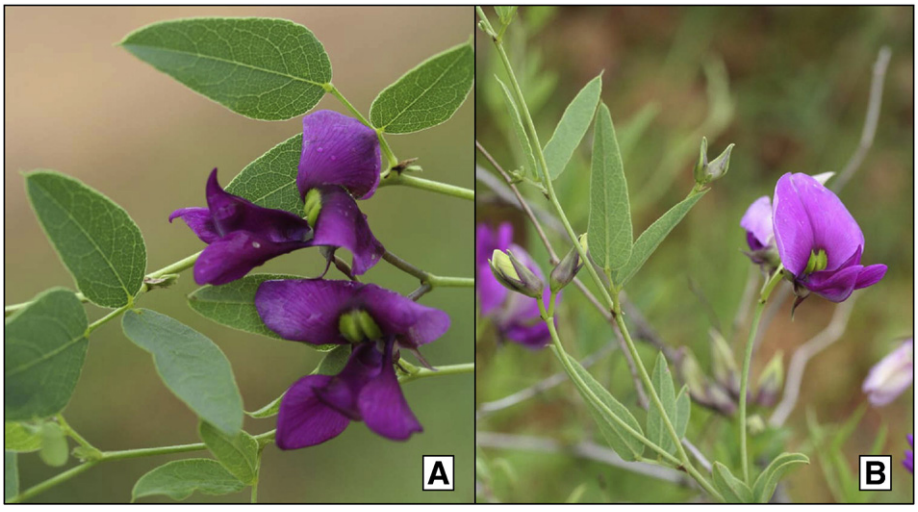

Fig. 2. Leaves and flowers of *Otoptera burchellii* showing the pink (A) to purple (B) colour of the flowers and the prominent nectar guide at the base of the standard petal. Photographs: B–E. Van Wyk.

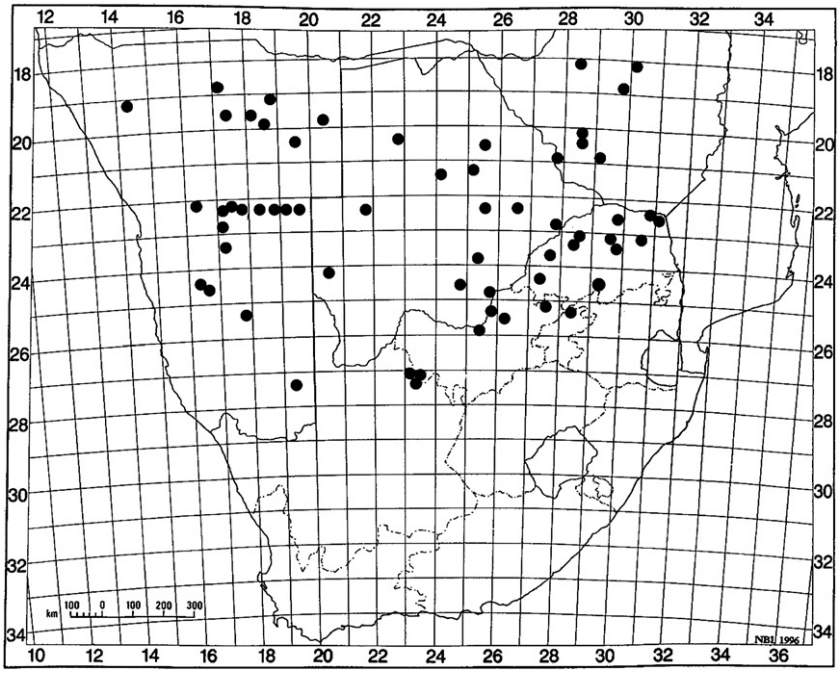

Fig. 3. The known geographical distribution of *Otoptera burchellii*.

grows in the open or sometimes in semi-shade, in flat areas or on slopes, often in broken veld, open Acacia woodland or along water courses or roadsides, at altitudes of 1200–1670 m. The substrate varies from rocky and sandy calcareous soil to brown sandy loam or red Kalahari sand.

3. Specimens examined

Namibia:

1817 (Tsintsabis): Road from Leeudrink to entrance gate, along boundary fence (–CC), 10 Feb. 1985, *S. Brown & H. Kolberg 263* (PRE).
1819 (Karakuwisa): Cigarette, E of Karakuwisa (–DC), 11 Feb. 1953, *B. Maguire 2500* (PRE).
1914 (Kamanjab): 40 km east of Otjowasandu (–AB), 3 May 1973, *Le Roux 525* (PRE).
1917 (Tsumeb): Otavi, (–CB), *R.G. Wall 5375* (PRE).
1920 (Tsumkwe): 100 m east of Nam-tsoha Pan (–CD), 23 Feb. 1985, *C.J.H. Hines 304* (PRE).
2019 (Eiseb): Otjinene district (–BC), 12 May 2001, *M. M. Uiras MU358* (PRE).
2116 (Okahandja): Okahandja – Otjivarongo road, farm Omutazu–Ohunbunguru 42, 30 km N of Okahandja (–DD), 27 Mar. 1968, *H. & H.E. Wanntorp 409* (PRE).
2216 (Otjimbingwe): Farm Okomitundu (–AB), 06 Dec. 1967, *R. Seydel 5549* (PRE).
2217 (Windhoek): South of Windhoek (–BA), 23 Feb. 2000, *E. G. Ellinger Ell1/27* (PRE); 11 m east of Seeis (–BC), 21 Nov. 1949, *L.E. Codd 5821* (PRE); Vollblüte (–CA), 08 Aug. 1965, *R. Seydel 4141* (PRE); 43 km from Windhoek to Rehoboth (–CC), 07 Feb. 1974, *N. Grobbelaar 1876* (PRE).
2218 (Gobabis): 5 km west of Witvlei on main road to Windhoek (–AD), 08 Mar. 1983, *G. Germishuizen 2689* (PRE); 55.6 miles NW of Gobabis on Okahandja road (–BD), 22 Feb. 1985, *B. de Winter 2453* (PRE).
2219 (Sandfontein): Farm Halma 411, along main road to Botswana (–AC), 08 Mar. 2002, *M.M. Uiras MU503* (PRE).
2416 (Maltahöhe): Kyffhauser Farm (–AD), 07 Jan. 1995, *L.L. Dreyer 441* (PRE), 11 miles east of Maltahöhe (–DA), 10 Mar. 1965, *H. Tölken & D.S. Hardy 649* (PRE).
2517 (Gibeon): 21 m SE of Asab Station (–BD), *J.P.H. Acocks 15621* (PRE).
2719 (Tranental): Karasberg (–AD), Jan. 1974, *W.P. Auret 5600* (PRE).

Zimbabwe:

1828 (Gokwe): Sengwa Research Station (–AB), 12 Jan. 1969, *N. Jacobsen 4160 (369)* (PRE).
1829 (Kwekwe): Kwekwe (–DD), Feb. 1935, *Mrs H. Mc Leod 36* (PRE)
1830 (Hartley): Hartley District, Pickstone Mine (–AA), 28 Aug. 1965, *H. Wild 7469* (PRE).
2027 (Bulalima): Bulalima, Mangwe Distr. (–DD), 10 Apr. 1942, *H. J. Feiertag 45362* (PRE).
2028 (Bulawayo): Bulawayo, Luveve, T.T.T. College (–BA), 23 Nov. 1960, *E.M. Norman R57* (PRE); Matobo, Hope Fountain Mission, (–BC), 18 Nov. 1973, *G. Morrgrann 409* (PRE).
2029 (Gwanda): N of Tuli Police Post (–CC), 17 Dec. 1956, *R. M. Davies 2324* (PRE).

Botswana:

2025 (Mumpswe): Makarikari flats, on edge of road from Maun to Francistown (–DA), Jan. 1970, *V. van der Spuy 4* (PRE).
2026 (Nata): Makgadigadi floor (–AA), 02 Mar. 1991, *I. Barnard 668* (PRE).
2124 (Rakops): E boundary Central Kalahari Game Reserve (–AC), 24 Mar. 1979, *A. R. Kreulen 651* (PRE).
2225 (Mokatini): N of Lephephe, 100 km W of Serowe (–BC), Feb. 1982, *Snyman & Noailles 216* (PRE).
2325 (Lephephe): Matlolakgang Ranch (–CD), 16 Feb. 1977, *O. J. Hansen 3037* (PRE).
2420 (Union's end): Kalahari Park, east of Swartpan (–BA), Feb. 1978, *P.T. van der Walt 5742* (PRE).

South Africa:

2229 (Water Poort): Alldays, Farm Leliesrus – 30 km WNW of Alldays (–DB), *N. van Rooyen & G.J. Bredenkamp 300* (PRE).
2231 (Pafuri): Kruger National Park, Klopperfontein (–CA), *H.P. van der Schijff 1723*, *3326* (PRE).
2328 (Baltimore): Baltimore, Morgenzon Farm 138 LR; Hill Ga-Mathula. (–AD), *S. Venter 11885* (PRE).
2329 (Pietersburg): Mara, Zoutpansberg (–BA), Dec. 1918, *F. A. Rogers 22266* (PRE).
2429 (Zebediela): Potgietersrust, 15.4 miles from Roedtan on road to Grass Valley (–CA), 06 April 1961, *H.P. van der Schijff 5328* (PRE).
2525 (Mafikeng): Gopane 25 miles W of Zeerust (–BD), *J.W. Snyman 134* (PRE); Molopo Nature Reserve (–CD), *Peeters, Gericke & Burelli 199* (PRE).
2526 (Zeerust): Zeerust (–CA), *Thode A1397* (PRE).
2527 (Rustenburg): Rustenburg, near P.O. Assen – near Crocodile River (–**BA**), Dec. 1927 – Jan. 1928, *J.J. van Nouhuys 31042* (PRE).
2528 (Pretoria): Hammanskraal-Rust de Winter, M^{c} Lachlan Bros. farm (–AD), 09 Feb. 1960, *R.G. Strey 3172a* (PRE).
2723 (Kuruman): Elford Farm (–AA), *A.A. Gubb 133/22* (PRE); Colville farm (–**AB**), 26 Feb. 1982, *A.A. Gubb 256/40* (PRE); Buta Asbestos Mine (–AD), *Peeters, Gericke & Burelli 278* (PRE).
2724 (Thabazimbi): Armoed's Vlakte (–AB), 09 April 1912, *R.R. Sharpe 7469* (PRE); Tiger Kloof (–BB), *A.E. Brueckner 272* (PRE).

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