The *Rhynchosia totta* complex (Phaseoleae, Fabaceae) in Southern Africa, including the description of a new variety and new species

**Background:** The *Rhynchosia totta* complex is one of three taxonomically complicated African groups in the genus *Rhynchosia*. Numerous southern African species and infraspecific taxa (at least 19 names, 17 species and 2 varieties) have been described by various authors in the past, but were later reduced into synonymy with *R. totta*. Currently, only the typical variety is recognised in Southern Africa.

**Objectives:** To investigate and update the circumscription of the taxa within the *R. totta* complex in southern Africa and to update their synonymies and distribution ranges.

**Methods:** Specimens of *R. totta* at GRA, JRAU, K, NH and PRE were studied and compared, and measurements of characters recorded. Populations were also observed during field studies.

**Results:** The examination of numerous specimens, as well as field investigations, has prompted the recognition of four varieties (one described here as new: *R. totta var. longicalyx*) and a new species (*R. pedunculata*) in southern Africa.

**Conclusions:** A great variation in leaf structure and vestiture occurs within the *R. totta* complex, with the extreme forms easily recognisable. However, the total number of varieties are limited to four ([*R. totta* var. *longicalyx*, *rigidula* and *venulosa*] and a new species described to accommodate specimens with a distinctly prostrate habit and upwardly directed leaves.

**Introduction**

*Rhynchosia* Lour. is a member of the Fabaceae (Leguminosae) subfamily Papilionoideae (Faboideae) tribe Phaseoleae (Lackey 1981). Within the tribe Phaseoleae, taxonomic studies have been completed for a number of southern African genera, for example, *Dipogon* Liebm. (Stirton 1981a), *Macrotyloma* (Wight & Arn.) Verdc. (Verdcourt, Hooker & Halliday 1982), *Bolusafra* Kuntze (Moteetee & Van Wyk 2006), *Dolichos* L. (Moteetee & Van Wyk 2012a), *Sphenostylis* E.Mey. (Moteetee & Van Wyk 2012b), *Ophestia* H.M.L.Forbes (Moteetee & Van Wyk 2012c), and *Canavalia* DC. (Moteetee 2016), while studies on other genera are ongoing. Of particular interest is the genus *Rhynchosia*, in which taxonomic research is ongoing and several new species have already been described (Boatwright & Moteetee 2014; Germishuizen 1998, 2006, 2011; Moteetee, Boatwright & Jaca 2012, 2014). With approximately 230 species (Schrire 2005), *Rhynchosia* is the largest genus in the subtribe Cajaninae with the majority of species widely distributed across Africa. Some of the species are also found in warm temperate and tropical regions of Asia, Australia and America. It is closely related to *Eriosema* (DC.) Desv. within the Phaseoleae. Cajaninae is characterised by the presence of vesicular glands and bulbous-based hairs (Lackey 1981). It comprises eight genera, of which four only occur in southern Africa; that is, *Bolusafra*, *Cajanina* DC. (write out cultivated species), *Eriosema* and *Rhynchosia*. Comprehensive taxonomic studies of the South African species of the genus *Eriosema* are yet to be published; however, a number of studies have been published by Stirton (1977, 1981b, 1981c, 1994).

*Rhynchosia totta* (Thunb.) DC. was first described by Thunberg (1800) in his *Prodromus Plantarum Capensis as Glycine totta* Thunb. (1800). De Candolle (1825) later transferred it to *Rhynchosia*. This species is commonly known as the yellow carpet bean and is widely distributed from South Africa northwards to Somalia (Verdcourt 1971). Its place of origin has been suggested to be South Africa. However, molecular studies are needed to prove this. Thunberg (1800) described this species as having trifoliolate leaves with reticulate, ovate and ciliate leaflets. More detailed descriptions of *R. totta* are given by De Candolle (1825), Harvey (1862), and Verdcourt, Pope & Polhill (2001), who...
have described it as a climbing, twining, ascending perennial herb with a tuberous rootstock and slender stems, with glabrescent to densely pubescent trifoliolate leaves, oblong-lanceolate leaflets acute at the apex, glabrescent to silky pubescent with prominent, reticulate venation, and flowers flushed reddish that are either solitary or a few arranged in very lax inflorescences.

Baker (1923) divided the species into seven variants mainly based on leaf shape and structure, as well as stem and/or leaf vestiture, but other characters such as petiole length and flower size were applied inconsistently. These are *Rhynchosia totta* var. *brevipetiolata* Baker f. (stem pilose or tomentose, petioles short), *R. totta* var. *fenchelii* Schinz (stem grey puberulous, leaves trifoliolate), *R. totta* var. *graciliflora* Harms ex Baker f. (R. *graciliflora* Harms) (leaves trifoliolate, linear-lanceolate, pubescent or nearly glabrous), *R. totta* var. *namaensis* Schinz (leaves trifoliolate, leaflets lanceolate or ovate-lanceolate, grey puberulous), *R. totta* var. *pilosa* Harv. (stem patently pilose, leaves trifoliolate, leaflets of the lower ovate-oblong, upper linear) and *R. totta* var. *unifoliolata* Burtt Davy (leaves unifoliolate or trifoliolate, leaflets ovate, petiole short).

Source: Compiled by M.M. le Roux, original map based on GTOPO30 global digital elevation model

**FIGURE 1:** Combined distribution of *Rhynchosia totta* and its four varieties in southern Africa.
TABLE 1: Historical overview of the development of the concept of the Rhynchosia totta complex.

| Baker (1923) | Verdcourt (1971, 2001) | Current study |
|-------------|-------------------|--------------|
| [Series 25] |                   |              |
| Rhynchosia totta (Thunb.) DC. | R. totta | R. totta |
| var. totta | var. totta | var. totta (synonyms as in Verdcourt (1971) and Verdcourt, Pope, & Polhill (2001), excluding R. rigidula but including those listed below) |
| var. brevipes/tota Baker f. | [=R. humilis Eckl. & Zeyh.] | [=var. unifoliolata] |
| var. fenchelii Schinz | [=R. rigidula] | [=var. graciliflori] |
| var. graciliflori Harms ex Baker f. | [=Copisima paniculatum E.Mey.] |              |
| var. namaensis Schinz | [=R. paniculata (E.Mey) Steud.] | var. longicalyx A.Moteetee & M.M.le Roux |
| var. pilosa (E.Mey) Baker f | [=C. pilosum E.Mey.] |              |
| var. unifoliolata Burtt Davy | [=R. pilosa (E.Mey) Steud.] | var. rigidula (DC.) Moteetee & M.M.le Roux |
| R. longiflora Schinz | [=var. pilosa] | var. namaensis [=R. longiflora] |
| [Series 26] |                   |              |
| R. elegantissima Schinz | var. venulosa (Hiern) Verdc. | [var. fenchelii] |
| [Series 27] |                   |              |
| R. venulosa (Hiern) K. Schum. | [=R. hirsuta Schinz, non illegit.] | R. pedunculata M.M.le Roux & A. Moteetee |
| R. rigidula DC. | [=R. elegantissima] |              |
|              | [=R. cinnamomea Schinz] |              |
|              | [=R. remota Conrath] |              |
|              | [=R. mollis Burtt Davy, non illegit.] | var. elongatifolia Verdc. |

attributes to the typical variant) and those with thicker stems and pubescent to densely velvety leaflets on the other [R. totta var. venulosa (Hiern) Verdc. – which was recognised as a species by Baker (1923)], with several intermediates between these two. He further recognised R. totta var. elongatifolia Verdc. (Verdcourt 1971; Verdcourt et al. 2001). The development of the concept of the R. totta complex is summarised in Table 1. According to the latest checklist of southern African plants (Germishuizen and Meyer 2003), only the typical variant is currently recognised.

Here, we present results of a taxonomic study of the R. totta complex, including correct synonymy and distribution ranges of the taxa of southern Africa. We further describe a new species and a new variety.

Research method and design

Plant material representative of both R. totta and R. capensis (Burm.f.) Schinz was studied from herbarium specimens housed at GRA, JRAU, K, NH and PRE, and during field excursions. Rhynchosia capensis is the closest relative to R. totta (see the discussion under ‘Diagnostic characters and relationships’ of R. totta). Herbarium acronyms are listed according to Thiers (2011). Both Baker (1923) and Verdcourt (1971) mentioned the variation in leaf structure (number and shape of leaflets) and vestiture; therefore, these were examined as well as other characters such as habit, petiole length, floral and fruit morphology. Flowers were rehydrated in boiling water and dissected under a binocular stereomicroscope.

Representative specimens examined are arranged according to the quarter-degree grid reference system (Edwards & Leistner 1971; Leistner & Morris 1976). This system is used to map distribution data of each taxon, whereby the basic unit is the one-degree square of latitude and longitude, designated by a degree reference number (i.e. degrees of latitude and longitude of the north-west corner) and the district name of that square. Some types of specimens were examined online in the JSTOR (2015) database.

Results

The examination of 562 specimens labelled as R. totta at the National Herbarium in Pretoria (PRE), and those housed in GRA, JRAU, K and NH, as well as observations made during field trips, have revealed great morphological variation. Rhynchosia totta is a scrambling perennial herb, although some of the varieties tend to be woody, particularly those occurring farther north in southern Africa. The herbaceous nature can potentially be the result of stems dying back (or burning down) during winter, corresponding to typical environmental circumstances found in grasslands (fire and frost during the winter season) but with the underground, robust tuber remaining undamaged, giving rise to new stems and foliage in spring. Leaves are usually leathery with distinct reticulate venation.

We here recognise four varieties (R. totta vars. totta, longicalyx Moteetee & M.M.le Roux, rigidula (DC.) Moteetee & M.M.le Roux and venulosa (Hiern) Verdc.) in southern Africa. The newly described R. totta var. longicalyx is distinguished by the larger flowers (12 mm – 14 mm long) and elongate, narrowly linear calyx lobes. We also recognise a new species, R. pedunculata M.M.le Roux & Moteetee, characterised by its elongated peduncles and prostrate habit.

Key to the Rhynchosia totta complex and related species

1A. Habit distinctly prostrate, stems never twining; leaflets directed upwards ... R. pedunculata
1B. Habit trailing, semi-erect, spreading or decumbent; stems sometimes twining; leaflets not distinctly directed upwards:

2A. Plants glabrous or minutely downy; leaflet margins slightly revolute; legume glabrous or downy ... *R. capensis*

2B. Plants hispidulous-pubescent or villous to glabrescent; leaflet margins not revolute; legume pubescent ... *R. totta*

3A. Lateral leaflets symmetrical; leaflets usually small and linear-lanceolate or elliptic-ovate [16–40(45) mm long, 3–11(20) mm wide] (if leaflets slightly asymmetrical, then inflorescences up to 16 mm long):

4A. Stems herbaceous; leaves leathery and pubescent; inflorescences 10–40 mm long. ... *R. totta var. rigidula*

4B. Stems woody; leaves soft-textured, densely pubescent; inflorescences 13–16 mm long. ... *R. totta var. venulosa*

5B. Leaflets more or less ovate; calyx approximately as long as flowers with the lobes equal to the tube and not long and slender ... *R. totta var. longicalyx*

### Taxonomic treatment

1. *Rhynchosia totta* (Thunb.) DC., Prodr. 2: 388 (1825); Eckl. & Zeyh., Enum. 2: 253 (1836); Harv. in Fl. Cap. 2: 255 (1862); Baker f. in Bothalia 1: 130 (1923). *Glycine totta* Thunb., Prodr. Pl. Cap.: 131 (1800), 591 (1823). *Copisma tottum* (Thunb.) E.Mey., Comm. Pl. Trop. Afr.: 133 (1836). *Dolicholus totta* (Thunb.) Kunze, Revis. Gen. Pl. 3(3): 62 (1898).

Type: South Africa, Eastern Cape, 3325 (Port Elizabeth), ‘prope Galgebosch’, (–CC), without date, (1898). *Dolicholus totta* (Thunb.) E.Mey., Comm. Pl. Trop. Afr.: 133 (1836). *Dolicholus totto* (E.Mey.) Harv. in Fl. Cap. 2: 256 (1862).

Type: South Africa, Eastern Cape, 3326 (Grahamstown), ‘inter Galebosch’, (–CC), without date, (1898). *Dolicholus totto* (E.Mey.) Harv. in Fl. Cap. 2: 256 (1862).

Type: South Africa, Eastern Cape, 3327 (Port Elizabeth), ‘prope Galgebosch’, (–CC), without date, Zeyher 1669 (S, holo.!).

*Copisma paniculatum* E.Mey., Comm. Pl. Afr. Austr.: 134 (1836). *Rhynchosia paniculata* (E.Mey.) Steud., Nom. Bot.: 454 (1840).

Type: South Africa, Eastern Cape, 3326 (Port Beaufort), ‘Katrivierspoort’, (–DC), without date, Drège s.n. (S, lecto.), designated here; HAL, K, isolecto.). [Syntype: South Africa, Eastern Cape, 3225 (Hermanus), ‘Klein Vischrivier’, (–DB), without date, Drège s.n. (specimen not seen, see taxonomic note (i)).]

*Copisma pilosum* E.Mey., Comm. Pl. Afr. Austr.: 133 (1836). *Rhynchosia pilosa* (E.Mey.) Steud., Nom. Bot.: 454 (1840). *Rhynchosia pilosa* (E.Mey.) Harv. in Fl. Cap. 2: 256 (1862). *Rhynchosia totta var. pilosa* (E.Mey.) Baker f. in Bothalia 1: 131 (1923). Type: South Africa, Eastern Cape, 3325 (Port Elizabeth), ‘Zuurebergen [Zuurberg]’, (–AD), without date, Drège s.n. (specimen not seen).

*Rhynchosia nervosa* var. *petiolarata* Burtt Davy, Man. Flow. Pl. Transvaal: 411 (1932). Type: South Africa, Gauteng, 2627 (Potchefstroom), ‘Buttholm, Vereeniging’, (–AD), Apr 1922, *Burtt Davy* 17655 (K, lecto.!, designated here; PRE, isolecto.!, see taxonomic note (ii)).

*Rhynchosia unifoliolata* Burtt Davy, Man. Flow. Pl. Transvaal: 49 (1932), *syn. nov*. *Rhynchosia totta var. unifoliolata* (Burtt Davy) Baker f. in Bothalia 1: 131 (1923). Type: South Africa, Mpumalanga, 2629 (Bethal), ‘Ermelo’, (–DB), without date, *Burtt Davy* 17403 (K, lecto.!, designated here, see taxonomic note (iii)). [Syntype: South Africa, Mpumalanga, 2729 (Volksrust), ‘Hoogeveel naa Paardekopberg’ (–BA), without date, Rehmann 6836 (specimen not seen)].

*Rhynchosia totta var. graciliflora* Harms ex Baker f. in Bothalia 1: 131 (1923), *syn. nov*. Type: South Africa, Mpumalanga, 2530 (Lydenburg), ‘Lydenburg’, (–AB), Nov 1895, Wilms 367 (Z, lecto.), designated here; K, isolecto.!, see taxonomic note (iv)).

### Description

Vigorous, slender, spreading, twining or climbing herb arising from a woody rootstock. *Stems*: densely puberulous with short, brownish or grey hairs when young, often glabrescent. *Leaves*: pinnately trifoliolate or unifoliolate, leaflets linear, narrowly to broadly elliptic or ovate, sometimes asymmetrical, 15–80(100) × (36)–25(30) mm, glandular, hispidulous-pubescent or villous to glabrescent above, sparingly- to densely-pubescent below, emarginate or mucronate; stipules small, ovate-lanceolate, 3–6 × 0.5–2.0 mm, striated; petiole (3)–6–40 mm long. *Inflorescences*: mostly 1–4-flowered (rarely 5-flowered) in axillary racemes or sessile, 15–125 mm long, sometimes occurring in pairs. *Flowers*: 5–18 mm long, yellow; bracts lanceolate, 1.5–3.0 × 0.2–1.0 mm; bracteoles absent. *Calyx*: bilabiate, usually half the length of the corolla to almost as long as the corolla, vexillary lobes connate for 0.2–0.8(–1.5) mm above the calyx tube, those of the lower lip unequal, oblong-elliptic, carinal lobe longer than lateral lobes, 5–12 mm long, lateral lobes 3–10 mm long. *Corolla*: persistent; standard yellow or yellow and veined red, suborbicular, reflexed backwards, 5–15 × 4–7 mm, slightly emarginate, glabrous, with two callosities on claws; wings oblong, sometimes slightly narrower and shorter than keel, 4–8 × 1–2 mm, spurred at base, without sculpturing; keel obtuse, 4–10 × 2–4 mm, pocketed. *Androecium*: diadephous with nine filaments fused, vexillary stamens free to the base; anthers monomorphic, dorsifixed. *Ovary*: narrowly oblong-elliptic, stipitate, pubescent, 2-ovuled; style curved upwards, glabrous. *Fruit*: narrowly oblong, laterally compressed, 15–20(25) × 4–8 mm, densely pilose, glandular, 2-seeded. *Seeds*: depressed-globular, 3–5 × 1–3 mm, brown, black or mottled brown (Figures 2, 3). *Flowering time*: (Aug) Sep to Apr (May).

### Distribution and ecology

*Rhynchosia totta* is widespread in southern Africa, but is centred mainly in South Africa, from which it extends north through Botswana, Zimbabwe and Mozambique, westwards to Namibia and Angola, eastwards through Zambia, and...
Source: M.M. le Roux

(a), Twining branch with pinnately trifoliolate, greyish-pubescent leaves; (b), Typical fruit; (c–d), Trailing, spreading habit; (e), Flower with wings almost equal in length to the keel; (f), Pinnately trifoliolate leaf with inflorescence, showing the long length of the peduncle in comparison to the leaves; (g), Prostrate, trailing habit with leaves notably upright.

a–c, Rhynchosia totta var. venulosa. d, Rhynchosia totta var. totta. e–g, Rhynchosia pedunculata.

FIGURE 2: Diagnostic features of Rhynchosia totta var. venulosa and totta and R. pedunculata.
across East Africa as far as Somalia (Verdcourt, Pope & Polhill 2001). In South Africa, it occurs widely in all provinces, except in the Western Cape province and is only sparsely distributed in the Northern Cape province (Figure 1). It grows in sandy soil in grasslands, burnt hillsides, rocky outcrops, near streams, and on roadside embankments.

Taxonomic notes
(i) Some of Drège’s syntypes of Copisma tottum, C. paniculatum, and C. pilosum could not be found in any of the probable herbaria (B, P, UPS, W). If they were ever deposited in B, they were most probably destroyed during World War II. (ii) The K specimen of R. nervosa var. petiolata is selected because it is a better-looking specimen with multiple fruits. (iii) The K specimen of R. totta var. unifoliolata is chosen as lectotype because it is the only one available. (iv) The Z specimen of R. totta var. graciliflora is chosen as lectotype because it has both flowers and a fruit and it represents best the twining nature of the taxon.

Diagnostic characters and relationships
Rhyynosia totta resembles R. capensis in its growth form (spreading, twining or climbing herb arising from a woody rootstock), but tends to be more hairy (R. capensis tends to be glabrous or minutely downy), has leaflet margins that are not revolute (leaf margins slightly revolute in R. capensis), and peduncles that are usually laxly 1–4-flowered or sometimes 5-flowered (1–6-flowered, flowers concentrated at the tips of peduncles in R. capensis). According to Harvey (1862), R. capensis also differs from R. totta in having large resinous glands. However, glands do occur in R. totta, but they are much denser in R. capensis.

R. totta var. totta
Description
Leaves: unifoliolate or trifoliolate, leaflets linear-lanceolate, lanceolate, elliptic or ovate, 16–35(45) × 3–11(20) mm, sparsely pubescent above, densely pubescent below; stipules lanceolate, 3–6(8) × 1–2 mm; petiole (6)10–25 mm long.
Inflorescences: 1–3-flowered axillary racemes, occasionally branched, 10–40 mm long, pubescent-glabrescent. Flowers: yellow, 6–10 mm long; bracts 1.0–1.5 × ± 0.2 mm. Calyx: tube 2–3 mm long, upper lobes 3–5 mm long, lateral lobes 2–4 mm long, carinal lobe 5–6 mm. Standard: 6–8 × 4–5 mm; wings 4–5 × 1–2 mm; keel 5–6 × 2–3 mm. Fruits: 15–20 × 5–6 mm, pubescent. Seeds: brown or black, 2–4 × 1–3 mm (Figure 2d and Figure 3).

Distribution and ecology
This variety is widely distributed in South Africa (across the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mпumalanga and North-West provinces), Swaziland and Lesotho (Figure 4), with two specimens found on the border of the Northern Cape province. Specimens from the latter province are sterile and could not be identified with confidence as they share similarities in appearance with R. totta var. rigidula. It grows on sandy soil in grasslands, rocky outcrops, open woodlands and forest margins.

Diagnostic characters and relationships
Rhyynosia totta var. totta differs from var. rigidula in the herbaceous habit, long rachises and leathery, glabrescent leaves (woody with short rachises and often slightly silver-felted leaves that are not leathery are found in R. totta var. rigidula). This variety also resembles the new species, R. pedunculata, but differs in the trailing, twining or spreading habit and inflorescences that are not distinctly longer than the leaves or leaves orientated horizontally (prostrate habit with inflorescences much longer than the leaves and invariably standing upright in R. pedunculata). The typical variety includes those taxa with a woody base and herbaceous stems, and unifoliolate or trifoliolate leaves with leaflets that are ovate to lanceolate in shape. There are some specimens with long petioles and linear-lanceolate leaflets (formerly R. totta var. graciliflora), but, given the lack of any other morphological features to distinguish these collections from the typical form, the variant is included in R. totta var. totta.
Additional specimens seen

SOUTH AFRICA. LIMPOPO.—2230 (Messina): Messina, (–AC), Mar 1918, F.A. Rogers 20807 (PRE). 2327 (Ellisras): Mogol Nature Reserve, wooded slope, (–DD), 1040 m, Feb 1981, S.P. Fourie M 211 (PRE). 2328 (Baltimore): Blouberg, Buffelsloek Farm 261, (–BB), 7 Dec 1990, P.P. J. Herman 1307 (PRE). 2329 (Pietersburg): 42 km from Louis Trichardt on Southern Vivo road en route to Lesheba Farm, (–BA), 25 Mar 1994, H. Joffe 1068 (PRE); Pietersburg Nature Reserve, near gate, (–CD), 7 Feb 1980, G.J. Bredenkamp 364 (PRE); 27.3 mi from Pietersburg on road to Tzaneen, (–DC), 2 Apr 1972, B. Clarke 380 (K, PRE). 2330 (Tzaneen): Letaba, Westfalia Estate, firebreak near road-rail bridge en route to Duiwelskloof, (–CA), 3100 ft, 18 Nov 1960, J.C. Schappers 1049 (K, PRE). 2427 (Thabazimbi): Farm Grootkoek 1246, Western entrance of Waterberg Mountain, (–BC), 7 Apr 1948, E. Codd 3985 (PRE). 2428 (Nyistroom): Sterkriev Dam Nature Reserve, (–BC), 9 Feb 1972, N.H.G. Jacobsen 2053 (PRE). 2429 (Zebediela): between Pietersburg and Chunies Poort, (–AB), 4 Oct 1938, A.H.F. Hafstrom & J.P.H. Acocks 715 (PRE).

NORTH-WEST.—2524 (Vergeleë): Corowa Farm on the Molopo River, (–CA), 21 Mar 2001, J.J. Meyer 3514 (PRE); 2525 (Mafikeng): along Mafikeng-Zeerust road, (–DC), 21 Dec 1982, S. D. Phalatse 103 (PRE). 2526 (Zeerust): Zeerust, (–CA), Jan 1928, Thode A 1399 (NI, PRE). 2527 (Rustenburg): Waagfontein Farm, 20 km from Rustenburg on the road to Pretoria on the mountain’s side of the road, (–CB), 1367 m, 5 Nov 1971, L.A. Coetzee 90 (PRE); Pelindaba, Uitkomst 499 JQ, (–DD), 5000 ft, 5 Jan 1969, B.J. Coetzee 86 (PRE). 2627 (Potchefstroom): Potchefstroom School of Agriculture, on veld preservation experimental plot 2, (–CA), 12 Oct 1927, E.P. Phillips & R.W. Liebenberg 968 (PRE); 16 mi [25.7 km] E of Rustenburg, (–CA), 11 May 1975, A.O.D. Mogg & K.M. Cunliffe 36523 (JRAU); Sterkfontein Caves & Zwartkrans 67, (–DD), 12 Dec 1970, A.O.D. Mogg 35622 (JRAU).
MPUMALANGA.—2430 (Pilgrim’s Rest): Ohrigstad Dam Nature Reserve, (–DC), 5800 ft, 16 Feb 1972, N.H.G. Jacobsen 2287 (PRE); 3 km from Graskop on road from Sabie, (–DD), Mar 1973, T.H. Arnold 342 (PRE); Mapoch Cave, Roossenekal, ca. 7 km NE of Roossenekal, (–BB), 1587 m, 18 Jan 2005, M.K. Masersumule 214 (PRE); Middelburg, Tautesberg, (–BB), 9 Nov 1933, R.G.N. Young A 184 (PRE); ca. 16 km W of Witbank, next to the N4, (–CC), 18 Dec 2003, T. Nkonki 79 (PRE), 2530 (Lydenburg): 16 mi SE of Lydenburg, (–AB), 11 Aug 1966, G.D. Morris 35 (PRE); Dullstroom Caravan Park, in cut grass W of centre of ablation blocks, (–AC), 6 Apr 1994, P.M. Burgoyne 2389 (PRE); Dullstroom, Farm Tonteldoos, (–AC), 2090 m, 8 Mar 1988, P.M. Burgoyne 177 (PRE); Schoemanskloof, Belfast, (–AD), 14 Nov 1933, R.G.N. Young A 349 (PRE); Schoemanskloof, W end, (–AD), 14 Nov 1933, R.G.N. Young A 340 (PRE); De Kuilen Farm, ca. 9 mi SE of Lydenburg, (–BA), 5500 ft, 2 Nov 1975, P.J. Anderson A 58 (PRE); Sabie, Relève no. GB 81098, (–BB), 14 Dec 1981, G.B. Deall 1327 (PRE 18357) (PRE); Weltevrede Farm 268 JT, opposite Weltevrede school, (–BC), 5 Feb 1979, S.P. Fourie 3189 (PRE 58090) (PRE); Dullstroom on the road to Machadodorp, Elands Valley Farm, (–CA), 5 Nov 2001, A.J. Hankey 1346 (PRE); Mac-Mac Nature Reserve, (–CA), 7 Mar 1979, J.P. Kluge 1787 (PRE); 10 km from Machadodorp on road to Badplaas, (–CB), 7 Mar 1989, G. Germishuizen 5011 (PRE); Uitkomst Farm, 18 km from Machadodorp on road to Badplaas, (–CD), 5 Mar 1986, G. Germishuizen 3805 (PRE); 8 km from Badplaas on road to Barberton, (–DC), 5 Mar 1986, G. Germishuizen 3833 (PRE). 2531 (Komatipoort): Kruger National Park, Shabin, (–AA), 20 Nov 1952, H.P. van der Schijff 1384 (PRE); Kruger National Park, Mshahlon spruit [Kruger National Park, Mshahlon stream], (–AB), 11 Nov 1952, H.P. van der Schijff 1265 (PRE); Kangwane, Songimvelo Game Reserve, near camp for training field wardens, (–CC), 10 Dec 1992, G. Germishuizen 5841 (PRE); lower slopes on Saddleback Hill, (–CC), Oct 1890, E.E. Galpin 1108 (K), 1108a (K, PRE); 4 km from Barberton on road to Kaapmuiden, (–CC), 10 Mar 1989, G. Germishuizen 5118 (PRE); 4 km from Barberton on road to Nelspruit, (–CC), 13 Aug 1985, G. Germishuizen 3223 (PRE). 2629 (Bethal): Ca. 0.5 km before ’Schuwekop’ turn-off on Bethal- Hendrina road, (–AD), 21 Feb 1986, B.-E. van Wyk 1819 (JRAU); Davel, Leeuwkuil, (–BC), 2 Dec 1911, W. Wayland s.n. (PRE 6745) (PRE); Ermelo, Spitskop, (–BD), Dec 1915, R. Pott-Leendertz 5276 (PRE 15069) (PRE); Standerton, (–CC), Jan 1912, R. Leendertz s.n. (PRE 11108) (PRE); Nooitgedacht 10, (–DB), 21 Dec 1927, P.E. Potter 1740 (PRE); Nooitgedacht 10, Ermelo, (–DB), 28 Jan 1928, M. Henrici 1757 (PRE). 2630 (Carolina): 25 km from Carolina, (–AA), 12 Feb 1986, B.-E. van Wyk 1833 (JRAU); 13 km from Jessievale on road to Oshoek, (–BA), 9 Mar 1989, G. Germishuizen 5071 (PRE); 50 km from Chrissiesmeer on road to Lochiel, (–BA), 6 Mar 1986, G. Germishuizen 3892 (PRE); Ermelo, Athole Pasture Reserve street, (–CB), 8 Apr 1938, J.H. Peller 137 (PRE); Amersfoort area, Kalkoenkranz, Elsaberg Farm, (–CC), 6 Nov 1984, B.J. Turner 333 (PRE); S of Panbult at Jagdrift Farm, (–CD), 1550 m, 9 Mar 1993, J.P. Coetzee 2204 (PRE); 21 km from Panbult to Amersfoort, (–CD), 12 Jan 1984, G. Germishuizen 2982 (PRE). 2729 (Volksrust): Koppieskraal Farm, Amersfoort area, (–BB), 7 Mar 1986, B.J. Turner 1066 (PRE). 2730 (Vryheid): Amersfoort area, Latemanek, Langberg Farm, (–AA), 1951 m, 18 Feb 1986, B.J. Turner 874 (PRE); Zomershoek Farm, Latemanek, (–AA), 17 Feb 1986, B.J. Turner 858 (PRE); Wakkerstroom, (–AC), 1829 m, 5 Feb 1994, P.P. Swartz 51/84W (PRE).
10 Mar 1987, G. Germishuizen 4393 (PRE). 2827 (Senekal): Willem Pretorius Wildtuin [Willem Pretorius Game Reserve, (–AC), 21 Mar 1966, O.B. Kok s.n. PRE 160 (PRE); top of Senekal Koppie, overlooking town, (–BC), 12 Mar 1987, G. Germishuizen 4445 (PRE). 2828 (Bethlehem): 4 mi SE of Bethlehem on Kestell Drive near boundary of Vogses and Benadia Farms, (–AB), 5500 ft, 17 Mar 1967, J.C. Scheepers 1565 (PRE); Bethlehem, QwaQwa National Park, Avondrust, (–BC), 4 Dec 1995, P.C. Zietsman 3201 (PRE); Clarens, (–CB), Dec 1934, Unknown 375 (PRE); Witzieshoek, (–DB), Feb 1917, H.A. Junod s.n. (17338) (PRE). 2829 (Harrismith): Harrismith, Sterkfontein Dam, (–AC), 1700 m, 28 Nov 1974, M.L. Jacobsz 1440 (PRE). 2926 (Bloemfontein): Bloemfontein, Grant's Hill, (–AA), 13 Apr 1917, G. Potts 2915 (PRE), 21 Oct 1967, W.J. Hanekom 974 (K); Bultfontein/Winburg kruising [Bultfontein/Winburg crossing], (–AA), 3 May 1988, M. du Toit 124 (PRE). 2927 (Bethlehem): Op NI by afbraai na Van Stadensras [on the N1 at the turnoff to Van Stadensrus], (–AA), 15 Dec 1985, B.-E. van Wyk 1584 (JRAU).

KWAZULU-NATAL.—2729 (Volksrust): Amersfoort area, Majuba Power Station, (–BD), 1753 m, 1 Nov 1986, B.J. Turner 1177 (PRE); Farm Dassieklip, 20 km N of Volksrust, (–BD), 27 Dec 1986, B.-E. van Wyk 1986 (JRAU); just past Laingsnek, 28.3 mi from New Castle, (–DA), 25 Oct 1966, J.A. Marsh 70 (PRE); 6 km from Newcastle on road to Memel, (–DB), 24 Oct 1982, C.N. Buthelezi 258 (NH). 2730 (Vryheid): Oshoek, (–AC), 30 Oct 1963, N.J. Devenish 1056 (NH, PRE); Flatfontein/Northrup kruising [Flatfontein/Winburg crossing], (–CA), 1375 m, 19 Oct 2004, A.M. Ngwenya 3014 (NH). 2731 (Vryheid): Vryheid, at the turnoff to Nongoma from Vryheid-Louwsburg road, (–DD), 20 Oct 1982, G. Germishuizen 2306 (PRE). 2731 (Louwsburg): Pongola Bushveld Farm, (–BC), Jan 1972, M.D.S. Nel 196 (PRE); 18 km from Kongolwane on road to Louwsburg, (–CA), 18 Oct 1982, G. Germishuizen 2208 (PRE); Italia Nature Reserve, (–CB), 2200 ft, 1 Jan 1976, Brown & Shapiro 319 (K), 19 Oct 1982, G. Germishuizen 2242 (K); Abaqabula Municipality area, Tygerskloof Plantation adjacent to the Ngome State Forest, (–CD), 7 Nov 2011, A.M. Ngwenya & D.G.A. Styles 4115 (NH). 2732 (Umbogo): turnoff at top of Jozini Pass on gravel road to Umbogo, (–CA), 680 m, 11 Mar 2004, S.P. Bestor 4901 (PRE); Ngweni, along the N2 road NW of Hluhluwe, (–CC), 2 Feb 1982, J. Lambinon & M. Reekmans 82/191 (PRE); 36 km from Mkuze to Mtubatuba, (–CC), 12 May 1981, C.H. Stirton 8195 (NH). 2828 (Bethlehem): Royal Natal National Park, Mont- aux-Sources, (–DB), 5300 ft, 8 Mar 1964, W.R. Transudel 234 (PRE). 2829 (Harrismith): Pfalz Nolens Volens, O van Reenen [Farm Nolens Volens, E of Van Reenen], (–AD), 1700 m, 2 Mar 1976, M.L. Jacobsz 1591 (PRE); Bergville, Natal, (–CB), 14 Nov 1928, E.E. Galpin 9548 (PRE); Royal Natal National Park, Mont-aux-Sources, (–CB), 5000 ft, 10 Mar 1964, W.R. Transudel 235 (PRE); Pieter’s Hill near Ladymith, (–DB), 3300 ft, 27 Nov 1900, Medley Wood s.n. (K); 8 km N of Colenso, (–DB), 20 Apr 1988, B.J. Pienaar 1063 (PRE); 2830 (Dundee): Dundee, Impati Hill, ca. 50 m from Vodacom telecommunications tower at top of hill, (–AA), 1400 m, 15 Mar 1996, C.A. Prentice 32 (NH, PRE); 2832 (Mntubatuba): N Coast, Lake Nhlabane area, eastern side of N Lake, (–CB), 6 m, 23 Jan 1992, J.E. Granger 3658 (PRE); Herbert Farm, 20 km NE from Maclear on the road to Halcyon Drift, (–CD), 1380 m, 31 Oct 1994, S.P. Bestor 3062 (PRE). 3029 (Kokstad): Transkei, 22 km S of Cederville, Kakas Hill, Nungu Mountains, (–CA), 1870 m, 3 Jan 1987, F.A. Bruse 4880 (PRE); Kokstad, (–CB), 8 Jan 1987, F.A. Bruse 4049 (PRE). 3126 (Queenstown): 19 km from Dordrecht on road to Queenstown, (–DB), 13 Jan 1997, G. Germishuizen 8924 (PRE); 50 km from Queenstown to
Dordrecht, 19 km from Dordrecht on the road from Queenstown, (–DB), 1311 m, 13 Jan 1997, A. M. Makwareda 139 (PRE); mountain side, Queenstown, (–DD), 3700–4000 ft, 1893, E. E. Galpin 1547 (K, PRE), 1547a (K). 3127 (Lady Frere): 29 km from Indwe on road to Lady Frere on R396, (–CB), 11 Jan 1997, G. Germishuizen 8788 (PRE). 3128 (Umtata): Drakensberg, Maclear, Farm Rockwater, foothills and higher slopes on SW part of farm, (–AB), 1400 m, 11 Feb 1993, S. P. Bester 64 (PRE); plateau above Mhlahlane Forest Station, (–BC), 25 Jan 1986, B.-E. van Wyk 1750 (JRAU); on the summit of Baziya Mountain, summit of grassy plateau, (–CB), 1670 m, 11 Feb 1988, T. Strever 850 (PRE). 3129 (Port St. Johns): Transkei Coast, Mkambati Nature Reserve, ca. 2 km from Mkambati Waterfall, near road leading to falls, (–BD), 11 Dec 1986, A. Nicholas & L. Smook 2360 (NH, PRE). 3130 (Port Edward): 1.5 mi N of Port Edward post office, (–AA), ca. 500 ft, 22 Feb 1947, J.P.H. Acocks 13346 (PRE). 3225 (Somerset East): Top of Swartpoek Pass, Cradock District, (–BC), 17 Dec 1985, B.-E. van Wyk 1617 (JRAU). 3226 (Port Beaufort): Winterberg Mountain Range, top of Katberg Pass, side of mountain on very steep S-facing slope, (–BC), 1740 m, 25 Apr 1995, J.E. Victor 1101 (PRE); ca. 5 km above Nico Malan Pass, (–BD), 1350 m, 7 Feb 1995, J.E. Victor & D.B. Haore 300 (PRE); Hogsback region, below Gaika’s Kop of pine plantations, (–DB), 22 Dec 1995, J.E. Victor 846 (PRE); Victoria E, Sandle’s Kop near monument, (–DD), 2100 ft, 6 Sep 1935, M.H. Giffen 330 (PRE). 3227 (Stutterheim): Toise River to Cathcart road, about 8 km from Cathcart, (–AC), 22 Mar 1995, J.E. Victor 965 (PRE); Aliisa Farm, near Thomas River, (–CA), 23 May 1996, J.E. Victor 1924 (PRE); near Komgha, (–DB), 1891, H.G. Flanagan 131 (PRE); near the Kei bridge, (–DB), 1800 ft, Jan, H.G. Flanagan 1140, (GRA). 3228 (Butterworth): Ngqaini administratiewe gebied [Ngqaini administrative area], (–AD), 370 m, 1983, Anon 61764 B 316 (PRE). 3324 (Steytlerville): Assegaaibos, (–CD), Apr 1921, H.G. Breijer s.n. (PRE 23321) (PRE); Diepkloof, Mandaryn Boerdery, (–DB), 26 Jan 2003, C.L. Bredenkamp 1633 (PRE). 3325 (Port Elizabeth): Zuurberg National Park, along Brandrug, (–BC), 6 Jan 1986, B.-E. van Wyk & C.M. van Wyk 1061 (JRAU, PRE). 3326 (Grahamstown): Albany, (–AD), Apr 1903, A. Prior s.n. (K); Grahamstown, Atherstone, (–AD), 17 Feb 1955, R.S. Adamson D 288 (PRE); Grahamstown, (–BC), Nov 1867, P. Macowan 462 (K); Grahamstown, 26.8 km van Grahamstown oppad na Kingwilliams Town[ Grahamstown, 26.8 km from Grahamstown on the way to King Williams Town], (–BC), 1 Feb 1979, N. Grooblea 2293 (PRE); Fraser’s Camp, (–BD), 14 Apr 1947, R. Story 2285 (PRE); Thorn Kloof, on Alexandria-Port Elizabeth road, (–CD), 10 Aug 1953, S.M. Johnson 697 (K, GRA, PRE); Kariega Park, ca. 16 km N of Kenton-on-Sea, (–DA), 150 m, 6 Mar 1995, H.H. Burrows 4311 (GRA); Grahamstown, 6 mi from Kowie on Grahamstown road, (–DB), 13 Mar 1970, M.J. Wells 4325 (PRE). 3424 ( Humansdorp): Humansdorp, The Glen, (–BB), 12 Jan 1912, J. Burtt Davy 12088 (PRE).

SWAZILAND.—2631 (Mbabane): Malolotja Nature Reserve, track to Timbileni from upper Malolotja Valley near bottom track, (–AA), 6 Mar 1989, K.P. Braun 815 (PRE); 20 km from Pigg’s Peak, at New Bridge over Nkomati River, (–AA), 4 Mar 1993, G. Germishuizen 6071 (PRE); Nyokane, 14 km from Pigg’s Peak/Mbabane turnoff, on road to Mphalaleleni, Malandzala area, (–AB), 25 Jan 1994, G. Germishuizen 7052 (PRE); hill E of Mbabane, (–AC), 4500 ft, 20 Mar 1962, R.H. Compton 31386 (PRE); Mizimpoufu River, (–DB), 31 Oct 1961, R.H. Compton 30949 (PRE).

LESOTHO.—2828 (Bethlehem): Leribe, (–CC), 5000–6000 ft, Dec 1912, A. Dietterlen 6839 (PRE). 2927 (Maseru): Teytayaneng, (–BA), 29 Dec 1964, A. Jacot-Guillarmod 4755 (GRA, PRE); Maseru, Ha Khotsou, near NW corner of fence line, (–BB), 19 Nov 1971, K. Gormley & H. Barber 36 (PRE); Monethi’s, Berea district, (–BB), 1 Jan 1957, A. Jacot-Guillarmod 3072 (PRE); Korokoro, 15 km from Roma, (–BC), Jul 1980, M.O. Schmitz 9145 (PRE); Maseru Experimental Station, Lesotho, (–BC), 5000 ft, 27 Oct 1969, C. Williams 202 (K); Bushmen’s Pass, foot of pass, (–BD), 10 Dec 1980, M.O. Schmitz 9096 (PRE). 2928 (Marakabei): Bokong, Katse, slope above stream E of Katse Village, SE of Katse Lodge, W side of stream, (–AD), 5 Dec 1995, K.P. Braun 2099 (PRE).

R. totta var. longicalyx

Moteete & M. M. Le Roux, var. nov. Type: South Africa, Limpopo, 2328 (Baltimore), ’Morgenzon Farm 138 L.R. Ga-Mathula Hill’, (–AD), 13 May 1986, S. Venter 11883 (PRE, holotype).

Description

Leaves: trifoliolate, leaflets ovate to lanceolate, 35 – 50 mm × 12 – 25 mm, pubescent-villous above and below; stipules narrowly lanceolate, 3–5 × 0.5–1.0 mm; petiole 12–25 mm long. Inflorescences: 2–5-flowered axillary racemes, 18–55 mm long, villous to pubescent. Flowers: light yellow with red veins, 12–14 mm long; bracts ca. 2 × 1 mm. Calyx: tube 3–4 mm long, upper lobes 5–8 mm long, lateral lobes 5–10 mm long, carinal lobe 10–12 mm long. Standard: 8–15 × 5–6 mm; wings 4–6 × 1–2 mm; keel 5–10 × 3–4 mm. Fruits: 18–25 × 5–8 mm, pubescent. Seeds: brown or black, 3–4 × ca. 2 (Figure 3).

Distribution and ecology

In southern Africa, this variety mostly has a northern distribution occurring from KwaZulu-Natal province north and westwards to the Northern Cape province, Botswana and Namibia (Figure 5). The distribution may stretch into Mozambique and Zimbabwe, but no specimens in PRE were found for these areas. It is common in sandveld and brown sandy loam.

Diagnostic characters and relationships

This variety is close to R. totta var. venulosa, but differs in having relatively large flowers (12–14 mm long), elongated, linear and narrow calyx lobes and often strongly asymmetrical lanceolate-ovate leaves. In R. totta var. venulosa, the flowers are 6–10 mm long, the calyx lobes are narrowly deltoid and the leaves are less strongly asymmetrical and lanceolate in shape.
Additional specimens seen

BOTSWANA.—1923 (Maun): Shorobe, 38 km NE of Maun, (–DD), 19 Mar 1965, H. Wild & R.B. Drummond 7182 (PRE).
2125 (Tlala Mabeli): Orapa Game Park, (–AB), 962 m, 13 Apr 2005, P. Smith, K. Kemoreile, D. Mafokate, K. Mathibidi, E. Mosinangana & S. Dickson 147 (K).
2320 (Urwi): 5 km NNW of Dondong borehole, (–AD), 12 Feb 1977, C. Skarpe S-141 (PRE).
2324 (Kuchwe Pan): A4 Khotse, (–AD), 3000 ft, 25 Apr 1972, M. Coleman 98 (PRE).
2325 (Lephepe): Kweneng, Matlolakgang Ranch, (–CD), 28 Mar 1977, O.J. Hansen 3098 (PRE).
2622 (Tsabong): Kgalagadi, 10 mi NW of Tsabong, (–AB), 25 Feb 1963, O.A. Leistner 3149 (PRE).

NAMIBIA.—1713 (Swartbooisdrif): 3 mi W of Etanga, (–CB), 7 Apr 1957, B. de Winter & O. Leistner 5417 (K, PRE).
1915 (Okaukuejo): Etosha Pan Nature Park, S boundary, 8 km E of Safarihoeck, (–AB), 3 May 1973, Le Roux 533 (PRE).
1916 (Gobaub): Gobaub, about 2 km S of Dunfaries waterhole, on firebreak, (–BB), 12 Feb 1985, S.R. Brown & H.H. Kolberg 739 (PRE).
1917 (Tsumeb): 16.8 mi SE of Tsumeb on road to Grootfontein, (–BD), 23 Mar 1955, B. de Winter 2909 (K, PRE).
1918 (Tsumeb): 16.8 mi SE of Tsumeb on road to Grootfontein, (–BD), 23 Mar 1955, B. de Winter 2909 (K, PRE).
1919 (Tsumeb): 16.8 mi SE of Tsumeb on road to Grootfontein, (–BD), 23 Mar 1955, B. de Winter 2909 (K, PRE).

SOUTH AFRICA. LIMPOPO.—2229 (Waterpoort): ca. 5 km from Pontdrif on road to Alldays, at picnic spot, (–AA), 22 Mar 2003, M. Jordan 4054 (PRE); Langjan Nature Reserve, (–CC), 2600 ft, Dec 1974, S. Zwanziger 410 (PRE); Wyllies Poort, Kidsgrove, 739 MS, (–DD), 3000 ft, 11 Jan 1986, P. Raal & G. Raal 739 (PRE).
2321 (Pafuri): Zoutpansberg, Kruger National Park, Punda Maria, (–CA), Nov 1932, H. Lang s.n. (PRE 32347).
2327 (Ellisras): 50 km to Swartwater from Ellisras, (–CB), 21 Mar 2003, M. Jordan 4054 (PRE); 9 mi from Ellisras on road to Thabazimbi, (–DC), 24 Apr 1971, B. Clarke 199 (PRE).
2328 (Nylstroom): Naboomfontein [Naboomspruit], (–BC), 1290 m, 23 Jan 1894, F.R.R. Schlechter 4299 (PRE); Naboomspruit, Waterberg, (–DA), 13 May 1866, S. Venter 11883 (PRE).
2329 (Pietersburg): 40 km from Louis Trichardt on southern Vivo road en route to Lesheba Farm, (–BA), 25 Mar 1994, H. Joffe 1067 (PRE).
2428 (Nylstroom): Naboomfontein [Naboomspruit], (–BC), 1290 m, 23 Jan 1894, F.R.R. Schlechter 4299 (PRE); Naboomspruit, Waterberg, (–DA), 8 Feb 1919, E.E. Galpin M 95 (PRE).
2429 (Zebediela): Pietersburg area, Atok Mine, ca. 22 km SE of Atok near Matsatsana school, (–BD), 1007 m, 15 Nov 1999, P.M. Burgoyne 7643 (PRE).

NORTH-WEST.—2624 (Vryburg): Vryburg, (–CC), 1 Apr 1921, A.O.A. Mogg 8264B (PRE); Armoedsvlakte, Vryburg, (–DC), 3960 m, 4 Mar 1921, A.O.D. Mogg 8264 A (PRE).
MPUMALANGA.—2529 (Witbank): Langs besproeingskanaal, nabu hoeve H71 tussen Groblersdal en Marble Hall [next to irrigation channel, near smallholding H71 between Groblersdal and Marble Hall], (–AB), 26 Oct 1963, 
* N. Grobbelaar 33 (PRE). 2531 (Komatipoort): Kruger National Park, Pretoriuskop, (–AB), 16 Nov 1954, * H.P. van der Schiff 4050 (PRE); Kruger National Park, Klokwenwene, (–AD), 26 Aug 1952, * H.P. van der Schiff 770 (PRE); Kaapmuiden, (–CB), Dec, 1921, * F.A. Rogers 25091 (PRE).

KWAZULU-NATAL.—2732 (Umbombo): 66 km vanaf Mkuze op pad na Sodwana Baai, Makatiniplakte [66 km from Mkuze on the way to Sodwana Bay, Makatini Flats], (–DA), 28 Dec 1973, * N. Grobbelaar 1834 (K, PRE). 2832 (Mtubatuba): Hluhluwe Game Reserve, (–AA), 900 ft, 16 Oct 1953, C.J. Ward 1549 (PRE); 7 km from main road on turnoff to Fanie’s Island, (–AB), 31 Jul 1973, B. Clarke 530 (PRE).

NORTHERN CAPE.—2723 (Kuruman): 2 mi S of bed of Kuruman River, 78 mi NW of Kuruman, (–AA), 3400 ft, 5 Apr 1961, * O.A. Leistner 2217 (K, PRE).

*R. totta var. rigidula*

(DC.) Moteete & M.M.le Roux, *stat. nov.* *Rhynchosia rigidula* DC., Prodr. 2: 388 (1825); Eckl. & Zeyh., Enum. 2: 255 (1836); Baker f. in Bothalia: 1: 133 (1923). Type: South Africa, Western Cape, ‘ad Cap. B.-Sprei’, without date, *Burchell* 2587 (G-DC-microfiche, holo.!).

*Rhynchosia longiflora* Schinz in Vierteljahrsschr. Nat. Ges. Zurich: 168 (1889); Baker f. in Bothalia 1: 131 (1923). Type: Namibia, ‘Gross Namaland [Great Namaqualand]’, 2 Apr 1885, *Schinz* 793 (Z, holo.!).

*Rhynchosia namaensis* Schinz in Vierteljahrsschr. Nat. Ges. Zurich: 427 (1907). *Rhynchosia totta var. namaensis* (Schinz) Baker f. in Bothalia: 130 (1923). Type: Namibia, 2317 (Rehoboht), ‘an Flussrinnen im Gebirge südlin von Rehoboth’ [channels in mountains S of Rehoboth’], (–AB), 1895, *Fleck* 698 (Z, holo.!).

**Description**

Leaflets: trifoliolate, leaflets lanceolate to elliptic, 22–40 × 3–7 mm, sparsely pubescent above, densely pubescent below; stipules lanceolate, 2–3 × 0.5–1.0 mm; petiole 3–8 mm long. Inflorescences: 1–3-flowered axillary racemes, sometimes in pairs; 13–16 mm long, reddish brown pubescent. Flowers: yellow, 9–18 mm long; bracts 1.5–3.0 × 0.5–1.0 mm. Calyx: tube 3–5 mm long, upper lobes 2–4 mm long, lateral lobes 3–4 mm long, carinal lobe 4–6 mm long. Standard: 9–12 × 4–7 mm, wings 5–8 × 1–2 mm; keel 6–10 × 3–4 mm. Fruits: 20–25 × 5–8 mm, villous-pubescent. Seeds: brown mottled black, ca. 5 × 3 mm.

**Distribution and ecology**

This variety has a northern distribution extending from the central parts of the Northern Cape into KwaZulu-Natal province as well as Swaziland into Botswana, Namibia and farther northwards (Figure 6). It grows in stony hills, well-drained, red-brown sand and banded ironstone rock.

**Diagnostic characters and relationships**

*Rhynchosia totta var. rigidula* closely resembles *R. totta var. venulosa*, but differs in its symmetrical lateral leaflet bases (versus leaflet bases strongly asymmetrical in the latter), shorter peduncles (versus up to 16 mm long, opposed to 125 mm long), the relatively larger flowers (up to 18 mm long versus up to 10 mm long), and calyx that is half the length of the flower (versus calyx sometimes as long as the flower). *Rhynchosia totta var. rigidula* is also similar to the typical variety, but differs in its woody habit, greyish-felted, soft-textured leaves and brown mottled black seeds (versus herbaceous habit, glabrescent, leathery leaves and brown seeds in *R. totta var. totta*).

**Additional specimens seen**

BOTSWANA.—2125 (Tlala Mabeli): Orapa, NE fence, (–AD), 3 Jan 1976, *A.M. Allen* 379 (PRE). 2227 (Palapye): Selebi-Pikwe, (–BB), 900 m, Dec 1977, *Kerfoot & Falconer* 83 (PRE). 2326 (Mahalapye): 2 mi W of Mahalapye near Phutselerengura, (–BB), 27 May 1970, *H.J. van Rensburg* B 4085 (PRE). 2425 (Mafeking): Kanye, Magodudum Dam, (–CD), 26 Feb 1995, R. Candes & E. Vega 1 (PRE). 2525 (Mafikeng): Ootse Mountains, (–BA), 1350–1450 m, 9 Oct 1977, *O.J. Hansen* 3217 (PRE).

NAMIBIA.—1715 (Ondangua): Ovamboland, Oshikango, (–BD), Jul 1936, *G. Boss* s.n. (PRE). 3627 (PRE). 1813 (Ohopoho): 1.6 mi NE of Kaoko Otavi on road to Ohopoho, (–AD), 17 Apr 1957, *B. de Winter & O.A. Leistner* 5534 (K). 1917 (Tsumeb): at Farm Gaub on road to Grootfontein, (–BD), 3 Mar 1995, *G. Germishuizen* 7347 (PRE); at junction of tar road between Otavi and Grootfontein, (–BD), 1524 m, 3 Mar 1995, *G. Germishuizen* 7437 (PRE); just N of Kombat on Farm Gauss, 4 km from campsite, (–DA), 2 Mar 1995, *G. Germishuizen* 7379 (PRE). 2216 (Otjimbingwe): Farm Claratal, 27 mi SW of Windhoek, (–DD), 2 Mar 1955, *B. de Winter* 2574 (K, PRE). 2217 (Windhoek): Avis Dam, Windhoek, (–CA), Jan 1967, L. *Smook* 132 (GRA); Farm Regenstein, W32, (–CA), 19 Mar 1972, *J.W.H. Giess & B. Giess* 11656 (PRE). 2415 (Sossusvlei): Abendruhe, NE of Sossusvlei, (–BB), 11 May 1976, *E.G.H. Oliver, M.A.N. Müller & P. Steenkamp* 6566 (K, PRE). 2616 (Aus): Tiras, on road between Aus and Helmeringhausen, (–BA), 8 May 1976, *E.G.H. Oliver & M.A.N. Müller* 6454 (PRE). 2617 (Bethanie): Great Namaqualand, Seeheim, (–DD), 4000 ft, 9 Feb 1909, *H.H.W. Pearson* 3741 (K, PRE). 2718 (Grünau): Great Karas Mountains, western foothills near Holoog, (–AC), 19 Jan 1916, *Pearson* 9744 (K); Kochena Kee 74 Farm, N of farm house on the other side of the river, Grünau, (–BB), 12 May 1972, *J.W.H. Giess & M.A.N. Müller* 11872 (PRE); Warmbad, Sandmund WAR 270 Farm, Gaibatlab, (–BD), 21 May 1963, *J.W.H. Giess, O.H. Volk & B. Bleissner* 7181 (PRE); Klein Karas, (–CA), 20 Aug 1923, *M.K. Dinter* 4918 (K, PRE); 30 mi S of Narubis on road to Grünau, Great Karas Mountains, (–DC), 29 Apr 1955, B. de Winter 3303 (K, PRE).
2719 (Tranental): At Karasberg, Kral Kluit River bed, (–AD), 23 Dec 1912, Pearson 8286 (K); Karasberg, Numdis, (–AD), Jan 1974, W.P. Auret 5597 (PRE). 2818 (Warmbad): Kopie near curving of the Kalkfontein railway track, (–BB), 3300–3600 ft, 2 Feb 1909, H.H.W. Pearson s.n. (K).

SOUTH AFRICA. LIMPOPO.— 2228 (Maasstroom): Maasstroom, (–CB), 1 May 1961, R.G. Strey & H.-J.E. Schlieben 8663 (PRE).

2229 (Waterpoort): Breslau 2 mi S of farm, (–AC), 1800 ft, 24 May 2001, C.C. Straub 929 (PRE); Breslau 2 mi S of farm (near Pontdrift), (–AC), 26 Jul 2000, C.C. Straub 855 (PRE); Waterpoort, ongeveer 10 km NO van Alldays op plaas Ceon [Waterpoort, ca. 10 km NE from Alldays on Ceon Farm], (–CA), 25 Mar 1978, N. Grobbelaar 2438 (PRE). 2330 (Messina): Messina, near the town, (–AC), 29 May 1927, R.G.N. Young 26490 (PRE); 12.1 mi from Tshipise on road to Messina, (–AC), 21 Apr 1971, B. Clarke 178 (PRE); Vendaland, ca. 5 km S vanaf Matatani [Venda, ca. 5 km S of Matatani], (–BD), May 1977, J.N. Pienaar 1112 (PRE); locality uncertain, Zoutpansberg, (–CC), 2 Feb 1919, F.A. Rogers 22555 (K, PRE).

2327 (Ellisras): Ellisras, on grassy plain on road to Ellisras, (–AB), 1700 ft, 16 May 1949, L.E.W. Codell & B. de Winter 5523 (PRE). 2323 (Pafuri): Kruger National Park, Punda Maria, (–CA), 15 Oct 1952, H.P. van der Schijff 944 (PRE), 1700 ft, 16 May 1949, L.E.W. Codell & B. de Winter 5523 (PRE). 2329 (Pietersburg): Soutpansberg, Llewellyn 35 Farm, (–AB), 1640 m, 4 Jul 1985, S. Venter 10734 (PRE). 2330 (Tzaneen): Zoutpansberg, 2 mi from Mashangani, (–AC), Jul 1916, H.G. Breijers n.s. (PRE 16021) (PRE).

2427 (Thabazimbi): Nylstroom, Nylsvley Nature Reserve, on top of Maroelakop, (–DA), 29 Apr 1975, N. Grobbelaar 2409 (PRE). 2430 (Pilgrim’s Rest): tussen Mica en Phalaborwa [between Mica and Phalaborwa], 9 km from Zebediela, 19 Jan 1955, B. Clarke 384 (PRE): between grass valley and Stavoren Tin Mine, (–CA), 19 Jan 1955, B. de Winter 2301 (K, PRE). 2430 (Pilgrim’s Rest): tussen Mica en Phalaborwa [between Mica and Phalaborwa], 9 km from Zebediela, 19 Jan 1955, B. Clarke 384 (PRE): between grass valley and Stavoren Tin Mine, (–CA), 19 Jan 1955, B. de Winter 2301 (K, PRE).
Phalaborwa], (–BB), 14 Apr 1964, N. Grobbelaar 338 (PRE); 4 km from Gravelotte on road to Mica, (–BB), 7 Nov 1985, G. Germishuizen 3471 (PRE); Hoedspruit, Lissataba Private Nature Reserve, (–BC), 500 m, 1 Jan 1987, F. van Heeren 711 (PRE); Simeoari, Ga-mabins, (–BC), 630 m, 27 Nov 1981, S. Venter 7270 (PRE). 2431 (Acorhnoek): Sheila 10 KU, 14 km S of Phalaborwa, (–AA), 19 Sep 1984, I.M. Retief 194 (K, PRE).

NORTH-WEST.—2523 (Pomfret): Hatherley Farm, Relevé 122, (–CD), 28 Apr 1980, A.A. Gubb 122/54 (PRE). 2524 (Vergeleë): Corowoa Farm on the Molopo River (Botswana border), (–CA), 22 Mar 2001, J.J. Meyer 3558 (PRE). 2525 (Mafikeng): along Mafikeng-Vryheid road, (–DC), 16 Dec 1982, S. Phalatse 75 (PRE). 2527 (Rustenburg): Brits, Beestekraal Game Reserve (PMP Lime), approximately 40 km N of Brits near Atlanta Station, (–BC), 1000 m, 28 May 1989, N.P. Barker 640 (PRE); Bokfontein Farm 647, [Jackson’s Garden], (–DA), 8 Mar 1934, O.A. Leistner 347 (K); A.O.D. Mogg & R.A. Dyer s.n. (PRE); Pretoria, Wonderboom Poort, (–CA), 17 Aug 1935, A.O.D. Mogg 14989 (PRE). 2624 (Vryburg): 32 km from Stella on road to Mafeking, (–DB), 21 Oct 1966, J.B. Gillett 17501 (K).

GUATENG.—2528 (Pretoria): Moloto, 10 mi from Moloto on road to Groblersdal, (–BC), 21 Apr 1969, N. Grobbelaar 1334 (PRE); Pretoria, Wonderboom Poort, (–CA), 17 Aug 1935, A.O.D. Mogg & R.A. Dyer s.n. (PRE 56318) (PRE).

MPUMALANGA.—2531 (Komatipoort): 6 km from Malelane on road to Kaapmuiden, (–CB), 11 Mar 1989, G. Germishuizen 5131 (PRE).

FREE STATE.—2825 (Boshof): Leeuhoogte, Relevé 428, (–AC), 11 May 1996, J.H.L. Smit 1107 (PRE).

KWAZULU-NATAL.—2732 (Umbombo): Kosi Bay, coastal forest reserve between Lalane and Manzengwenya, (–BB), 30 Oct 1994, R.A. Lubbe 390 (NH). 2929 (Underberg): Rockleigh, Estcourt, (–BB), 12 Nov 1987, D.M. Green 452 (NH).

NORTHERN CAPE.—2721 (Tellery Pan): Postmasburg, 1 mi S of Lang Pan (ca. 30 mi W of Korannaberg Mountain), (–DB), ca. 3300 ft, 9 Dec 1960, O.A. Leistner 2077 (K). 2723 (Kuruman): near Kuruman, (–AD), Burchell 2433 (PRE); 3 mi NE of Kuruman, (–AD), 4500 ft, 30 Nov 1957, O.A. Leistner 986 (PRE); 3 mi E of Kuruman, (–AD), 14 Oct 1970, N. Grobbelaar 1113 (PRE); Bophuthatswana, Kuruman, Harvard Farm, (–BC), 27 Feb 1982, A.A. Gubb 259/59 (PRE); Bestwood Farm, Relevé 145, (–CA), 9 Feb 1981, A.A. Gubb 145/77 (PRE); Newstead Farm, gentle slope of hill, (–CB), 14 Mar 1981, A.A. Gubb 185–65 (PRE); Newstead Farm, on level plain at top of hill, (–CB), 14 Mar 1981, A.A. Gubb 184–74 (PRE). 2724 (Taung): Knockbarragh, (–CD), 15 Mar 1945, A.E. Brueckner 240 (PRE). 2820 (Kakamas): Riemvasmaak, edge of Molopo Gorge, Gordonia, (–AD), 2000 ft, 21 May 1952, J.P.H. Acoks 16386 (PRE); Augrabies Falls National Park, Rooipad, (–CB), ca. 2000 ft, 7 May 1969, O.A. Leistner 3343 (K); Augrabies National Park, S side along Rooipad, (–CB), ca. 700 m, 7 May 1969, M.J.A. Werger 347 (PRE); 11 mi W of Augrabies Hotel on Coetzeesputs Road, (–CB), ca. 2400 ft, 21 Feb 1954, D.M. Comins 651 (K); (11 km E of Kakamas on road to Keimoes, (–DC), 31 Jan 1974, G. Davidsle 6148 (PRE). 2822 (Glen Lyon): Slopes of the Langebergen, Hay, Dummary, (–DD), 27 Sep 1939, C. Vigne s.n. (K, NH). 2823 (Griekwastad): Lohathla, army ground, N and S-facing steep slopes and on top of hill, (–AA), 11 May 1981, A.A. Gubb 229–48 (PRE). 2824 (Kimberley): Magersfontein, Relevé 127, (–DC), 17 Dec 1980, A.A. Gubb 127–65 (PRE). 2919 (Pofadder): Pofadder, Boomrivier Farm, Slangberg, (–AB), 952 m, 6 Jun 2005, J.J. Mennogwane 107 (PRE). 2924 (Hopetown): Honeyest Kloof [Honeyest Valley], (–BA), Mar 1920, M. Wilman s.n. (PRE 56346) (PRE). 3021 (Vervyksvlei): Jasper Hills at Buisvlei, (–BB), 10 Nov 1937, J.P.H. Acoks 2558 (PRE).

SWAZILAND.—2631 (Mbabane): St. Philips, (–CD), 6 May 1964, R.H. Compton 32092 (PRE).

R. tota var. venulosa
(Hiern) Verdc. in Kew Bull. 25: 99 (1971). Dolicholus venulosus Hiern, Cat. Afr. Pl. i.: 271 (1896). Rhynchosia venulosa (Hiern) K. Schum. in Just’s Jahresb. xxvii. I: 496 (1901). Type: Angola ‘Hula, between Catumba and Ohay, date unknown’, Welwitsch 4072 (COI, holotype); BM, K, LISU, P, iso.!

Rhynchosia elegansissima Schinz in Vierteljahresschr. Nat. Ges. Zurich: 428 (1907); Baker f. in Bothalia 1: 132 (1923). Type: South Africa, Limpopo, 2429 (Nylstroom), ‘Makapansberg [Makapaansberg], Streypoort’, (–AA), date unknown, Rehmann 5545 (Z, holotype).

Rhynchosia cinnamea Schinz in Vierteljahresschr. Nat. Ges. Zurich: 428 (1907). Type: South Africa, Gauteng, 2528 (Pretoria), ‘im Gebüsch auf dem Magallisberg bei Aapiersivieri [Magaliesberg, near Apies River]’, (–AD), 14 Jan 1894, Schlechter 4162 (Z, holotype); MPU, NSW, iso.!

Rhynchosia tota var. fenclisii Schinz in Vierteljahresschr. Nat. Ges. Zurich: 426 (1907), syn. nov. Type: Namibia, 2618 (Keetmanshoop), ‘Keetmanshoop’, (–CA), 1890, Fenclis 195 (Z, holotype); K, iso.!

Rhynchosia remotata Conrath in Bull. Misc. Inform. Kew 1908: 224 (1908). Type: South Africa, Gauteng, 2628 (Johannesburg), ‘Witpoortjie, near Johannesburg’, (–DC), 3 Apr 1981, Conrath 262 (GZU, holotype).

R. mollis Burtt Davy, Man. Flow. Pl. Transvaal: 411 (1932), nom. illegit. non R. mollis DC., Prod. 2: 388 (1825). Type: South Africa, Limpopo, 2229 (Waterpoort), ‘Waterpoort’, (–DC), Sep 1918, F.A. Rodgers 21543 (K, lectotype, designated here, see taxonomic note (v)).

Description

Leaves: trifoliolate, leaflets lanceolate, 26–100 × (3)9–30 mm, pubescent above, pubescent to densely velvety below; giving a greyish appearance; stipules lanceolate, 4–6 × 0.5–1.0 mm; petiole 23–40 mm long. Inflorescences: 2–4-flowered axillary
racemes, 30–125 mm long, villous-pubescent. Flowers: yellow with red veins, 6–10 mm long; bracts ca. 3 × 0.2 mm. Calyx: tube 2–3 mm long, upper lobes 2–4 mm long, lateral lobes 3–4 mm long, carinal lobe 4–6 mm long. Standard: 5–8 × 4–6 mm; wings 4–5 × 1–2 mm; keel 4–6 × 2–3 mm. Fruits: pubescent, 18–25 × 5–8 mm. Seeds: brown or black, 3–4 × ca. 2 mm (Figure 2a–c).

Distribution and ecology

*Rhynchosia totta* var. *venulosa* is widely distributed throughout southern and East Africa up to Ethiopia. In South Africa, it occurs in Limpopo, North-West, Gauteng, Mpumalanga, KwaZulu-Natal, and Eastern Cape provinces (Figure 7). It grows on heavy alluvium and sandy soils in floodplain grasslands, *Acacia* thickets and wooded grasslands.

Taxonomic notes

(v) The specimen in K is chosen as lectotype because it is the only one available. It is also possible that Burtt Davy based the description of this species on this specimen since he was based there at the time of writing his book.

Diagnostic characters and relationships

This variety differs from the typical variety in having thicker, hairier stems with a tendency of becoming woody, with pubescent to densely velvety leaflets that often have very prominent venation, and the strongly asymmetrical lateral leaflets.

Additional specimens seen

**BOTSWANA.**—2426 (Mochudi): Sikwane, (–BC), Mar 1955, J.L. Reyneke 237 (PRE).

**SOUTH AFRICA. LIMPOPO.**—2230 (Messina): Louis Trichard, Plaas Vreemdeling, westerlike deel van plaas, bo-op heuwel, S-westelike rigting van plaashuis [Louis Trichard, Farm Vreemdeling, western part of farm, on top of hill, SW direction from farm house], (–CC), 1400 m, 26 Mar 1994, G.L. Rossouw 237 (PRE). 2327 (Ellisras): Moordrift, (–DA), Oct 1909, R. Leendertz s.n. (PRE 7324) (PRE). 2329 (Pietersburg): Klipdam, (–CB), 14 Feb 1894, F.R.R. Schlechter 4495 (K, PRE). 2427 (Thabazimbi): Kransberg area in kloof, (–BC), 8 May 1977, G. Germishuizen 246 (K, PRE). 2428 (Nylstroom): Sterkrivier Dam Nature Reserve, (–BD), 4000 ft, 14 Mar 1973,
Prostrate herb arising from a woody rootstock. *Stems*: pubescent-glabrescent. *Leaves*: pinnately trifoliate, leaflets lanceolate-elliptic, slightly asymmetrical, mucronate, 26–100 × (39)–30 mm, pubescent to glabrescent above and beneath, mucronate; stipules small, lanceolate, 2–6 × 0.5–1.0 mm, striated; petiole (5)10–25(34) mm long. *Inflorescences*: (1)2–4-flowered axillary racemes, (30)45–125 mm long, striated; peduncles 6–10 mm long, yellow with red veins, 6–10 mm long; bracts mucronate; stipules small, lanceolate, 2–6 × 0.5–1.0 mm, striated; petiole (5)10–25(34) mm long. *Calyx*: bilabiate, usually half the length of the corolla, lobes of upper lip connate almost to half the length of the lobes, those of the lower lip approximately equal, oblong-acuminate, carinal lobe longer than lateral lobes, tube 13.5–36.0 mm long, upper lobes 2–3 mm long, lower lobe 3–6 mm long, lateral lobes 2–3 mm wide, 6–10 mm long.
2–3 mm long. Corolla: persistent, standard yellow, ovate-oblong, reflexed backwards, 7–9 × 4–5 mm, slightly emarginate, glabrous, with no callosities on the claws; wings oblong-obovate, narrower and approximately as long as keel, 7–8 × 2–3 mm, spurred at base, without sculpturing; keel somewhat rostrate, 7–8 × 2–3 mm, pocketed. Androecium: diadelphous with nine filaments fused, vexillary stamen free to the base; anthers monomorphic, dorsifixed. Ovary: narrowly oblong-elliptic, subsessile, pubescent, 2-ovuled; style strongly curved upwards, glabrous. Fruit: narrowly oblong-elliptic, laterally compressed, 14–23 × 4–6 mm, pubescent, glandular, (1)2-seeded. Seeds: smooth, ca. 1.5 × 0.5 mm, uniformly brown (Figures 2e–g and Figure 8). Flowering time: Oct to Mar (Apr).

Distribution and ecology
A South African endemic, with populations found in the Free State, Gauteng, KwaZulu-Natal, Mpumalanga and North-West provinces (Figure 9). It grows in grassland areas on black turf or loamy soil on dolomite or quartzite.

Diagnostic characters and relationships
*Rhynchosia pedunculata* is closely related to *R. totta*, but differs in the prostrate habit (never twining), upright leaves, long peduncles that extend beyond the leaves, and wing petals approximately equal in length to the keel. *Rhynchosia totta* is a trailing, climbing and twining species with leaves not distinctly erect and the peduncles not distinctly longer than the leaves (peduncles might be longer when multi-flowered), and wing petals slightly shorter and narrower than the keel. The specific epithet was chosen to honour the strikingly long peduncles by which it is differentiated from *R. totta*.

Additional specimens seen

SOUTH AFRICA. NORTH-WEST.—2527 (Rustenburg): Rustenburg Nature Reserve, (–CA), 5000 ft, 5 Nov 1970, N.H.G. Jacobsen 1121 (PRE). 2627 (Potchefstroom): Carletonville, A. Bailey Nature Reserve, (–AD), Apr 1983, S. van Wyk 326 (PRE); Klipdrift, Potchefstroom, (–CB), 7 Jan 1935, J.J. Theron 1164 (PRE).

GAUTENG.—2528 (Pretoria): Brummeria Botanical Gardens (Pretoria Botanical Gardens), (–CA), 4 Jan 1967, J.A. Marsh 150 (PRE); Onderstepoort, (–CA), 17 Oct 1912, A.C. Thetler 9304 (PRE); Pretoria, Erasmusdrift, (–CA), 7 Nov 1915, A.O.D. Mogg 11677 (PRE); Willow Glen, (–CA), 11 Nov 1961, R.G. Strey 3932 (K, PRE); near 1.9 milestone along road from Tygerpoort to Rayton, (–CD), 30 Jan 1971, B. Clarke 134 (PRE). 2628 (Johannesburg): N of Rosebank near Johannesburg, (–AA), 23 Feb 1927, R.G.N. Young s.n. (PRE); Suikerbosrand Natuureervaat, Valsfontein 311, (–AC), 20 Feb 1974, S. Wolff 7 (PRE).

MPUMALANGA.—2629 (Bethal): Ermelo, (–DB), 10 Feb 1910, R. Lenderitz s.n. (TRV 7811) (PRE); Amersfoort area, Uitspanning, Rolfontein Farm, (–DD), 1640 m, 13 Mar 1986, B.J. Turner 978 (PRE).

FREE STATE.—2627 (Potchefstroom): Uitkomst Farm 413, as crow flies, 5–6 km WNW of Sasolburg, (–DC), 1430 m, 18 Dec 1996, N.V. Kroon 14058 (PRE); Uitkomst Farm 413, 5–6 km WNW of Sasolburg, (–DC), 24 Oct 1996, N.V. Kroon 12060 (PRE); Wonderwater Section 1B, adjacent to Section 1, (–DD), 1430 m, 14 Apr 1997, N.V. Kroon 15223A (PRE).

KWAZULU-NATAL.—2729 (Volksrust): Ingogo, Newcastle, Rotsvas, (–DD), 16 Dec 2002, S.J. Siebert & F. Siebert 2051 (PRE).

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors’ contributions

A.N.M. and M.M.L.R. contributed equally to this article in conceptualisation and execution of the study. A.N.M. compiled the initial manuscript, while M.M.L.R. contributed the specimens examined sections and figures. Both authors were equally involved in the editing process.

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