

## The genus *Elephantorrhiza*

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### ABSTRACT

The genus *Elephantorrhiza* is reviewed. Nine species, including one new species, *E. praetermissa* J. H. Ross, from the eastern Transvaal, are recognized. A description of each species and a key to the identification of the nine species are provided. Lectotypes are selected for two species. The known distribution of each species is plotted and attention is drawn to the more serious deficiencies in our knowledge of some of the species. Concern is expressed over the present conservation status of several species.

### INTRODUCTION

*Elephantorrhiza*, a small genus of nine species restricted to Africa south of the equator, was founded by Benth. in Hook., J. Bot. 4: 344 (1841), on a specimen collected by Burchell (No. 2410) in the northern Cape Province. Burchell 2410 was also the specimen on which Burchell had earlier based his *Acacia elephantina* in his Trav. 2: 236 (1824), and on which De Candolle had based his *Acacia elephantorrhiza* in his Prodr. 2: 457 (1825). Although De Candolle placed this specimen in *Acacia*, he was not altogether satisfied with the decision and questioned whether it was not perhaps a species of *Prosopis*. Sprengel, in Sys. Cur. Post. 4: 165 (1827), transferred De Candolle's species to *Prosopis* and later E. Mey., Comm. 1: 165 (1836), transferred Burchell's *A. elephantina* to *Prosopis*.

In founding *Elephantorrhiza* as a new genus, Benth. (l.c.) wrote: "... not only do the more pedicellate flowers, habit and foliage, remove it in appearance from *Prosopis*, but the pod described above (by E. Mey., l.c.) does not at all agree with that of *Prosopis*, which is multilocular, indehiscent, and does not separate from the sutures. The *Elephantorrhiza* is nearer in character to *Adenanthera*, but the habit and the pod appear to me to be sufficient to warrant its being considered as a distinct genus. I have seen it only in flower".

The last fairly comprehensive account of the genus was by Phillips in Bothalia 1: 187 (1923). Much material and information have become available since then but, despite this, the present state of knowledge of this essentially southern African genus leaves much to be desired. One of the aims of this paper is to draw attention to the more serious gaps in our knowledge in the hope that collectors will make an effort to collect the additional material and make the field observations necessary to enable a more comprehensive account of each species to be compiled.

In keying out species of *Elephantorrhiza*, emphasis is usually laid on the habit of the plants, that is, whether the plants are suffrutices with unbranched aerial stems or whether they are shrubs or small trees with branched aerial stems. This is the character employed in the first dichotomy of the key and, as far as is known, it is a fairly reliable character. However, *E. elephantina*, which typically has unbranched aerial stems, may prove an exception when the growing apex has been damaged, because then the stems sometimes develop lateral branches.

Leaflet shape, size and, in particular, the position of the midrib in the leaflet, are of prime taxonomic significance in distinguishing the species. Number of pinnae pairs and, to a lesser extent, number of leaflet pairs are also useful characters. Pod size, especially

pod width, is of taxonomic significance, but in general the flowers in all species are fairly uniform. *E. rangei* is perhaps the exception in that it has larger flowers than the other species. The colour of the minute glands at the base of the pedicels is sometimes a useful character.

The underground root systems of each species need to be investigated as they may provide useful additional means of distinguishing some of the species. For example, there is a suggestion that *E. obliqua* and *E. elephantina* have different root systems, but field observations are necessary to substantiate this.

### ELEPHANTORRHIZA

*Elephantorrhiza* Benth. in Hook., J. Bot. 4: 344 (1841); Harv. in Fl. Cap. 2: 277 (1862); Benth. & Hook. f., Gen. Pl. 1: 590 (1865); Harv., Gen. Pl., ed. 2: 91 (1868); Benth. in Trans. Linn. Soc. Lond. 30: 365 (1875); Taub. in Pflanzenfam. 3, 3: 122 (1892); Sim, For. Fl. Cape Col. 209 (1907); Harms in Engl., Pflanzenw. Afr. 3, 1: 398 (1915); Phillips in Bothalia 1: 187 (1923); Bak. f., Leg. Trop. Afr. 3: 800 (1930); Burtt Davy, Fl. Transv. 2: 331 (1932); Phillips, Gen. ed. 2: 392 (1951); Torre in Consp. Fl. Angol. 2: 263 (1956); Brenan in Fl. Trop. E. Afr. Legum.—Mimos.: 19 (1959); Hutch., Gen. Flow. Pl. 1: 288 (1964); Schreiber in Prodr. Fl. S. W. Afr. 58: 16 (1967); Brenan & Brummitt in Fl. Zamb. 3, 1: 23 (1970). Type species: *E. elephantina* (Burch.) Skeels (*E. burchellii* Benth.).

*Prosopis* sensu E. Mey., Comm. 165 (1836); Eckl. & Zeyh., Enum.: 259 (1836), non *Prosopis* L., Mant. 1: 10 (1767).

Unarmed small trees, shrubs or suffrutices, often with a greatly enlarged underground root-stock or a number of root-stocks. Leaves bipinnate; petioles eglandular; pinnae 3-42 pairs; pinnae each with many pairs of leaflets. Inflorescences of spiciform racemes which are axillary, solitary or fascicled, often  $\pm$  aggregated. Flowers normally hermaphrodite, 5-merous, usually pale yellowish-white, on pedicels 1-2 mm long. Calyx gamosepalous, small, 1-2, 5 mm long, 5-toothed. Petals 5, free or shortly united basally. Stamens 10, fertile, free among themselves, slightly adnate to the corolla basally; filaments 4-7, 5 mm long; anthers with a usually rapidly deciduous apical gland. Ovary usually sessile, glabrous; style filiform; stigma terminal. Pods straight or somewhat curved, not spirally twisted, often large and up to 45 cm long, somewhat compressed, without transverse septa within; at maturity the valves separating from the persistent margins, but not splitting transversely into segments; the outer layer (exocarp) of the pod-wall often peeling off the inner layer (endocarp), the layers remaining intact or breaking up irregularly. Seeds often  $\pm$  compressed.

A genus of 9 species restricted to Africa south of the equator.

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## KEY TO SPECIES

- Suffrutex; annual aerial stems unbranched (unless damaged), up to 0,75 (1) m high:
- Pinnae (1) 2–6 pairs per leaf; leaflets 4–13 pairs per pinna, 2–6,5 mm wide, ovate to ovate-oblong, very oblique basally, midrib starting in the distal corner of the leaflet-base and gradually becoming  $\pm$  central in the leaflet, lateral nerves and veins usually prominent; confined to the Transvaal.....1. *E. obliqua*
- Pinnae (2) 7–17 pairs per leaf; leaflets (7) 12–45 (55) pairs per pinna, 0,5–2 (2,5) mm wide, linear to linear-oblong, rarely narrowly oblanceolate, base asymmetric; widespread....2. *E. elephantina*
- Shrub or small tree with woody, branched, aerial stems, up to 7 m high, very rarely a suffrutex with branched, procumbent stems:
- Leaflets with the midrib marginal throughout, in (17) 27–40 (50) pairs per pinna, 3–7,5  $\times$  0,5–1,2 mm.....9. *E. suffruticosa*
- Leaflets with the midrib central or nearly so, at least towards the apex:
- Suffrutex; branched aerial stems procumbent, longitudinally striate, glabrous to densely puberulous; leaves with (2) 5–10 pinnae pairs.....3. *E. woodii*
- Shrub or small tree; branched aerial stems erect, glabrous:
- Leaflets only slightly asymmetric basally, with the proximal side cuneate to slightly rounded, 1,5–3,5 (4,5) mm wide; leaves with (1) 4–8 (9) pairs of pinnae.....4. *E. burkei*
- Leaflets  $\pm$  strongly asymmetric basally, with the proximal side broadly rounded—truncate to almost auriculate and the distal side cuneate; leaves with 2–41 pairs of pinnae:
- Leaves with (3) 9–30 (41) pinnae pairs (if less than 10 pairs then leaflets usually 4 mm or more wide); leaflets 0,7–8 mm wide, usually on very short petiolules; pods 1,3–2,4 cm wide, very narrow in proportion to their length, when mature the position of the seeds usually marked by distinct raised bumps; flowers usually precocious (except in the Transvaal); widespread, but absent from South West Africa.....6. *E. goetzei*
- Leaves with 2–12 (14) pinnae pairs; leaflets 0,9–3,5 mm wide; pods 2–3,9 cm wide,  $\pm$  compressed, position of seeds not marked by distinct raised bumps; restricted to the eastern Transvaal and South West Africa:
- Leaflets 0,9–1,5 mm wide, sessile; racemes short, 4–5,5 cm long, usually aggregated on short lateral branchlets, less frequently solitary or fascicled; pods 12–18  $\times$  2–3,2 cm; restricted to the eastern Transvaal.....5. *E. praetermissa*
- Leaflets (1) 1,5–3,5 mm wide; racemes 5,5–9,5 cm long, axillary, solitary or paired; pods (15) 18,5–40,5  $\times$  2–3,9 cm; restricted to South West Africa:
- Pinnae in (2) 6–14 pairs per leaf; calyx up to 1,5 mm long; pods 3–3,9 cm wide.....8. *E. schinziana*
- Pinnae in 3–7 (9) pairs per leaf; calyx 2–2,25 mm long; pods 2–2,5 cm wide.....7. *E. rangei*

1. *Elephantorrhiza obliqua* Burt Davy in Kew Bull. 1921: 191 (1921); Phillips in Bothalia 1: 189 (1923); Burt Davy, Fl. Transv. 2: 332 (1932) pro parte excl. specim. Rogers 22011. Type: Transvaal, 2630 (Carolina), between Carolina and Oshoek, at an outspan  $\pm$  1,6 km from Robinson's, Burt Davy 2976 (BM, holo.!, FHO, ! K!).

Suffrutex producing at ground level annual herbaceous stems up to 30 cm high from a number of underground rhizomes; aerial stems usually unbranched (rarely branched after damage to the main apex), longitudinally striate, pubescent or glabrous. Leaves pubescent or glabrous: petiole 2–6 cm long; rhachis (0) 1,5–9 cm long; pinnae (1) 2–6 pairs; rhachillae 2–11 cm long; leaflets 4–13 pairs per pinna, 5,5–15  $\times$  2–6,5 mm, very oblique, ovate to ovate-oblong, broadly truncate basally, asymmetric and attached by one corner, midrib starting in the distal corner of the leaflet-base and gradually becoming almost central in the leaflet, usually with 2–3 other prominent veins arising from the leaflet-base, midrib and lateral nerves prominent above and below, acute or distinctly mucronate apically, glabrous or sparingly pubescent on the margins. Racemes axillary, often solitary, on the lower or the apical part of the stem, 3,5–6 cm long (including the peduncle), glabrous or very sparingly pubescent. Flowers yellowish-white, on pedicels up to 1,5 mm long, with minute reddish glands at the base of the pedicels. Calyx campanulate, up to 2 mm long, shortly 5-toothed, glabrous. Petals shortly united below, up to 4,5 mm long, 1 mm wide, linear-oblong, inflexed apically, glabrous. Stamens free among themselves, slightly adnate to the corolla basally; filaments up to 7,5 mm long; anthers

up to 0,8 mm long, with a deciduous apical gland. Ovary up to 2 mm long, glabrous, sessile. Pods unknown.

Apparently confined to the Transvaal. (see Fig. 1) Occurs in grassland.

*E. obliqua* is readily distinguished from all other species by its large ovate leaflets with prominent venation. *E. obliqua* appears to have a different underground root system to *E. elephantina* but field observations are required to substantiate this.

## KEY TO VARIETIES

- Stems pubescent; petioles, rhachides and rhachillae sparingly pubescent.....(a) var. *obliqua*
- Stems glabrous; petioles, rhachides and rhachillae glabrous.....(b) var. *glabra*

Unfortunately not enough material is available to evaluate the taxonomic significance of the degree of pubescence of the stems and leaves as a means of distinguishing varieties within this species.

(a) var. *obliqua*.

Phillips in Bothalia 1: 189 (1923); Burt Davy, Fl. Transv. 2: 332 (1932) pro parte excl. specim. Rogers 22011. Type as above

TRANSTVAAL.—2630 (Carolina): between Carolina and Oshoek, at an outspan  $\pm$  1,6 km from Robinson's farm, Burt Davy 2976 (BM, FHO, K).

Known only from the type collection. As var. *obliqua* has not been re-collected since January 1905, concern must be expressed about its current conservation status. A thorough search in the type locality is necessary to establish whether the plant still survives. More material of *E. obliqua*, particularly fruiting material, is required.

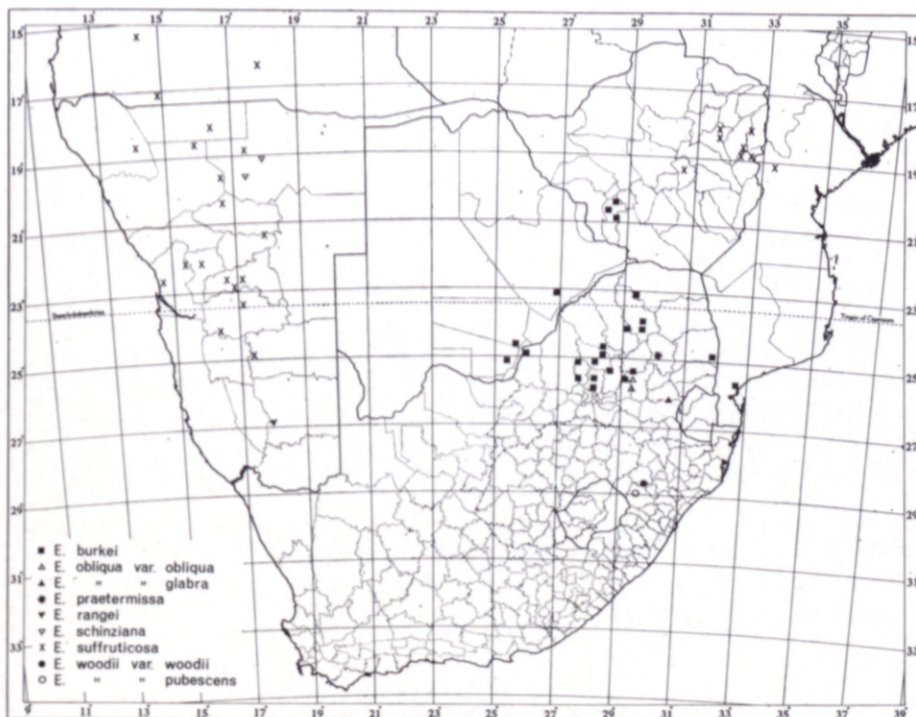


FIG. 1.—The known distributions of *Elephantorrhiza burkei*, *E. obliqua*, *E. praetermissa*, *E. rangei*, *E. schinziana*, *E. suffruticosa* and *E. woodii*.

*Rogers* 22011 from the Pietersburg District of the Transvaal, cited under *E. obliqua* var. *obliqua* by Burt Davy l.c. : 332 (1932), is in fact *Dichrostachys cinerea* (L.) Wight & Arn. subsp. *nyassana* (Taub.) Brenan.

(b) var. *glabra* Phillips in *Bothalia* 1: 189, t. 5 fig. 1 (1923); Burt Davy, *Fl. Transv.* 2: 332 (1932). Syntypes: Transvaal, 2529 (Witbank), Botsabelo (–CB), *Eiselen* sub PRE 1229 (GRA!; K!; PRE!); Middelburg (–CD), *Jenkins* sub TRV 9128 (PRE!).

*E. transvaalensis* Phillips ined.

Known only from the type collections. As typical var. *glabra* has not been re-collected for over fifty years, there is also concern about its current conservation status. A thorough search in the type localities is necessary to establish whether the plant still survives. More material is desired.

*Codd* 10119 from Bellevue farm near Twentyfour Rivers in the Waterberg District of the Transvaal resembles *E. obliqua*. The stem, petioles, rhachides and rhachillae are glabrous or almost so, and the leaves have up to 6 pinnae pairs and up to 19 pairs of leaflets per pinna. The leaflets are 9–18 × 3–4 mm, ± oblong, oblique basally with an excentric midrib and two other prominent veins arising from the leaflet-base, conspicuously venose and distinctly mucronate apically. Although leaflet shape differs somewhat from the leaflet shape of the syntypes, *Codd* 10119 is closer to *E. obliqua* than to any of the other species and, for the present, is referred to *E. obliqua* var. *glabra*. Unfortunately *Codd* 10119 is sterile. Further collections are required to indicate whether or not *Codd* 10119 falls within the range of variation of *E. obliqua*.

2. *Elephantorrhiza elephantina* (Burch.) Skeels in U. S. Dept. Agric. Bur. Pl. Ind. Bull. 176: 29 (1910); Bak. f., *Leg. Trop. Afr.* 3: 800 (1930); Burt Davy, *Fl. Transv.* 2: 332 (1932); O.B. Miller in *J.S. Afr. Bot.* 18:31 (1952); Leistner in *Mem. Bot. Surv. S. Afr.* 38: 123, t. 14 (1967); Schreiber in *Prodr. Fl. S. W. Afr.* 58: 16 (1967); Van der Schijff & Snyman in *J. Arn. Arb.* 51: 114 (1970); Brenan & Brummitt in *Fl. Zamb.* 3, 1: 27 (1970); Ross, *Fl. Natal*: 194 (1973).

Type: Cape Province, 2723 (Olifantshoek), between Matlowing [Mashowing] River and Kuru (–BB), *Burchell* 2410 (K, holo. ! ; P!).

*Acacia elephantina* Burch., *Trav.* 2: 236 (1824). Type as above. *A. elephantorrhiza* DC., *Prodr.* 2: 457 (1825), nom. illegit. Type as above.

*Prosopis elephantorrhiza* (DC.) Spreng., *Syst. Cur. Post.* IV: 165 (1827); Eckl. & Zeyh., *Enum.*: 259 (1836). Type as above. *P. elephantina* (Burch.) E. Mey., *Comm.* 165 (1836). Type as above.

*Elephantorrhiza burchellii* Benth. in Hook., *J. Bot.* 4: 344 (1841), nom. illegit.; Harv. in *Fl. Cap.* 2: 277 (1862); Benth. in *Trans. Linn. Soc. Lond.* 30: 365 (1875); MacOwan in *Agric. J. Cape G. H.* 10: 29 (1897); Schinz in *Mém. Herb. Boiss.* 1: 116 (1900); Sim, *For Fl. Cape Col.* 209, t. 16, VIII (1907); Dinter, *Deutsch-Südwest Afrika Fl. Forst und landwirtschaft. Frag.* 78 (1909); Harms in *Engl., Pflanzenw. Afr.* 3, 1: 400, t. 229 (1915); Dinter in *Feddes Repert.* 17: 190 (1921); Hofmeyer in *S. Afr. J. Nat. Hist.* 3: 215 (1921); Phillips in *Bothalia* 1: 189, t. 5 fig. 2 (1923); Marloth, *Fl. S. Afr.* 2: fig. 26 (1925). Type as above. *E. rangei* ("rangeri") sensu Phillips in *Bothalia* 1: 192, t. 5 fig. 5 (1923) pro parte quoad specim. *Dinter* 2264 et *Herb. Mus. Austro-Afr.* 4485 non Harms sensu stricto. *E. dinteri* Phillips ined.

Suffrutex producing at ground level annual stems 20–90 cm high from the woody end of a ± elongate rhizome, aerial stems usually unbranched except for inflorescences (rarely branched after damage to the main apex); young stems glabrous or rarely pubescent. *Leaves* glabrous or sparingly pubescent: petiole 1,3–3,6 (8) cm long; rhachis 3,5–13,5 (17,5) cm long; pinnae 2–4 pairs in lower leaves, increasing to 7–17 opposite or subopposite pairs in upper leaves; rhachillae 3–9 (10,5) cm long; leaflets (7) 12–45 (55) pairs per pinna, (4) 5–10 (15) × (0,3) 0,5–2 (2,5) mm, linear to linear-oblong, rarely narrowly oblanceolate, glabrous or almost so, base nearly always asymmetric, with the proximal side rounded to cuneate, apex symmetric to asymmetric, acute, usually mucronate or rarely obtuse, lateral nerves and veins prominent or not. *Racemes* usually confined to the lower part of the stem, axillary, solitary or clustered, (2) 3,5–8 (12) cm long (including the peduncle), glabrous or very rarely pubescent. *Flowers* yellowish-white, on pedicels up to 1,5 mm long, pedicels articulated near the middle, with minute reddish-brown glands at the base

of the pedicels. *Calyx* shortly campanulate, up to 1,75 mm long, 5-toothed, glabrous. *Petals* free or slightly connate basally, 2,75–3,75 mm long, up to 1 mm wide, linear-oblong, inflexed apically, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments up to 6,5 mm long; anthers up to 1 mm long, with a deciduous apical gland. *Ovary* up to 1,75 mm long, linear, shortly stipitate, glabrous. *Pods* dark brown or reddish-brown, (5) 9,5–15 (21) × 3–5,7 cm, straight or slightly curved, oblong, compressed, usually prominently transversely venose, often umbonate over the seeds, at maturity the valves separating from the persistent margins, the outer layer of the pod-wall peeling off the inner layer, the layers usually breaking up irregularly. *Seeds* 18–26 × 13–18 × 6–13 mm, ± ellipsoid.

Found in South West Africa, Botswana, Rhodesia, Mozambique, the Transvaal, Orange Free State, Swaziland, Natal, Lesotho and Cape Province. (see Fig. 2). Occurs in grassland and open scrub; often gregarious.

As a selection of specimens from Botswana, Rhodesia and Mozambique was cited by Brenan & Brummitt in Fl. Zamb. 3, 1: 27 (1970), no specimens from these territories are cited here.

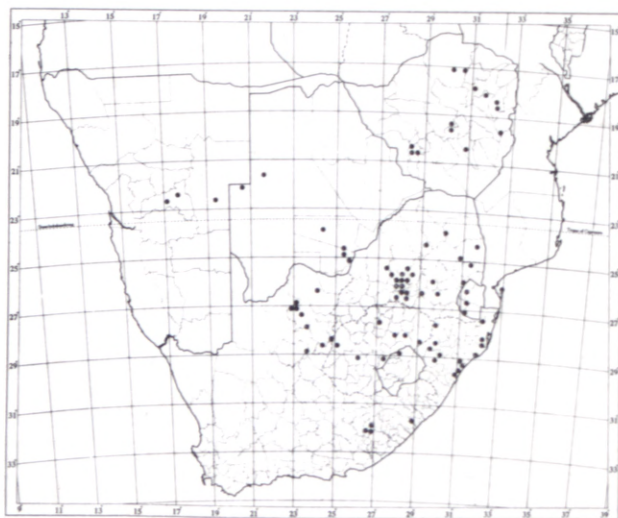


FIG. 2.—The known distribution of *Elephantorrhiza elephantina*

S.W.A.—2217 (Windhoek): Bodenhausen, Seydel 2388, 2219 (Sandfontein): Oas, Seydel 3761. Grid ref. unknown: Lichtenstein, Dinter s.n. (Z); Kalahari, Nosob, Fleck 399a (Z); Fleck 398a (Z).

TRANSVAAL.—2330 (Tzaneen): Houtbosch, Rehmann 6280(Z), 2429 (Zebediela): Percy Fyfe Nature Reserve, Huntley 1492, 2430 (Pilgrim's Rest): Pilgrim's Rest, Rogers 23066, 2431 (Acornhoek): Kruger National Park, 29 km from Satara on Rabelais road, Van der Schijff 3291, 2527 (Rustenburg): Rustenburg, Nation 225(K), 2528 (Pretoria): Groenkloof, Phillips 3051, 2529 (Witbank): ±11 km from Middelburg on road to Hendrina, Marsh 115, 2531 (Komatiport): Barberton, Galpin 562, 2627 (Potchefstroom): Vereeniging, Burtt Davy 15084, 2628 (Johannesburg): 12,8 km from Heidelberg on Brakpan road, Marsh 57, 2629 (Bethal): 11 km from Ermelo on road to Hendrina, Marsh 96.

O.F.S.—2627 (Potchefstroom): Sasolburg, Theron 569, 2727 (Kroonstad): near Kroonstad, Pont 454 (Z), 2825 (Boshof): 24 km from Kimberley along Boshof road, Badenhorst 86, 2827 (Senekal): Doornkop, Goosens 901, 2828 (Bethlehem): Bethlehem, Phillips 3186, 2829 (Harrismith), Sankey 35 (K), 2926 (Bloemfontein): P.O. De Burg, Bloemfontein, Cyrus sub PRE 8794, 2927 (Maseru): Ladybrand, Rogers sub TRV 5057. Grid ref. unknown: Olifantsfontein, Rehmann 3512 (K,Z).

SWAZILAND.—2631 (Mbabane): Black Mbuluzi Falls, Compton 28175; Evelyn Baring Bridge, Compton 29160.

NATAL.—2729 (Volksrust): Laingsnek, 18,4 km from New-castle, Marsh 65, 2732 (Ubombo): 4,8 km west of Jozini, Lebombo Mts., Edwards 2914, 2829 (Harrismith): Harts Hill, near Colenso, Strey 9942, 2831 (Nkandla): Mtunzini, Mogg 5803, 2832 (Mtubatuba): Hluhluwe Game Reserve, Ward 2704, 2930 (Pietermaritzburg): Inanda, Wood 634 (K,Z), 2931 (Stanger): Mount Moreland, Wood 2607 (NH).

LESOTHO.—2828 (Bethlehem): Leribe, Dieterlen 46 (P).

CAPE.—2623 (Morokweng): bank of Matlowing River, between Takoon [Takun] and Molito, Burchell 3210 (K), 2624 (Vryburg): farm Palmyra, 96 km north-west of Vryburg, Rodin 3532, 2722 (Olifantshoek): between Matlowing River and Kuru, Burchell 2410 (K,P), 2723 (Kuruman): between source of Kuruman River and Kosi Fontein, Burchell 2537(K), 2824 (Kimberley): Kimberley, Marloth 852 (GRA), 3126 (Queenstown): "Prospect", Queenstown, Galpin 1917 (GRA), 3226 (Fort Beaufort): Shiloh, Baur 379 (GRA,K); between Klip-laatrivier and Swart Kei, Drege (BM,K).

*E. elephantina*, commonly known as "Elands-boontjie", is the commonest and most widespread species. *E. elephantina* shows considerable variation in the number of pinnae pairs and in the number, size and shape of the leaflets. This variation appears to some extent to be geographical. There is a tendency for specimens from South West Africa, Botswana, the western portion of Rhodesia, the western Transvaal, Orange Free State and northern Cape to have leaves with fewer than 10 pinnae pairs, fewer than 26 leaflet pairs per pinna and leaflets more than 8 × 1 mm. The leaflets in these areas are frequently glaucous and the midrib is close to the distal margin basally but gradually becomes ± centric so that the leaflets are ± symmetric apically. In the eastern areas of Rhodesia, Mozambique, the eastern Transvaal, Swaziland and Natal there is a tendency for specimens to have leaves with more than 10 pinnae pairs, more than 26 leaflet pairs per pinna and leaflets less than 8 mm long and 1 mm wide. The midrib in these specimens is very close to the distal margin of the leaflets throughout their length as in *E. suffruticosa* and the leaflets are asymmetric apically. The Pretoria district of the Transvaal appears to be a critical area, for to the west the leaves tend to have fewer than 10 pinnae pairs and fewer pairs of large leaflets, while to the east the leaves tend to have more than 10 pinnae pairs and more numerous pairs of smaller leaflets. The extremes, for example Seydel 3761 from Oas in South West Africa and Wood 634 from Inanda in Natal, look very different but as there is ± continuous variation throughout and the individual characters often vary independently, no means has been found of delimiting the two groups satisfactorily.

The thick, red, underground root-stocks were at one time used for tanning and dyeing. Burtt Davy, Fl. Transv. 2: 332 (1932), reports having dug up a root-stock ± 8 metres long at Vereeniging.

Although the exocarp of the ripe pod is fairly hard, it readily absorbs water and soon starts to disintegrate. Seeds often germinate within the moist disintegrating pods on the surface of the soil. The interesting and unusual type of germination of the seeds of *E. elephantina* is discussed by Hofmeyer in S. Afr. J. Nat. Hist. 3: 215 (1921) and by Van der Schijff and Snyman in J. Arn. Arb. 51: 114 (1970).

3. *Elephantorrhiza woodii* Phillips in Bothalia 1: 193, t.5 fig. 6 (1923). Type: Natal, 2829 (Harrismith) Pieters, near Colenso (–DB), Wood 7958 (NH, holo.).

Suffrutex (but see below) producing at ground level annual, procumbent, branched stems up to 60 cm long, from an elongate rhizome; aerial stems longitudinally striate, glabrous to densely puberulous. *Leaves* glabrous to densely puberulous: petiole 0.8–1.6 cm long; rhachis (1)3.5–8.5(13) cm long, distinctly sulcate above, pinnae (2)5–10 opposite or subopposite pairs; rhachillae 1.8–6 cm long; leaflets 12–28 pairs per pinna, 2.5–6(9) × 1–1.8(2.25) mm, linear to linear-oblong, glabrous, asymmetric basally, midrib starting in the distal corner of the leaflet-base and gradually becoming almost central in the leaflet, proximal side of base rounded, apex symmetric or asymmetric, acute or obtuse, mucronate, midrib prominent or not, lateral veins indistinct. *Racemes* axillary, usually solitary, 4.5–9.5 cm long (including the peduncle), glabrous to densely puberulous. *Flowers* yellowish-white, on pedicels up to 1.25 mm long, pedicels articulated near the middle, with minute glands at the base of the pedicels. *Calyx* up to 1.5 mm long, shortly 5-toothed, glabrous. *Petals* free or slightly connate basally, up to 3.25 mm long, 1.25 mm wide, lanceolate, slightly inflexed apically, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments up to 6 mm long; anthers up to 1 mm long, with a deciduous apical gland. *Ovary* up to 2 mm long, linear, subsessile, glabrous. *Pod* (only one ever collected) dark reddish-brown, 9 × 3.2 cm, falcate, compressed, prominently transversely venose, umbonate over the seeds. *Seeds* immature.

Found in Natal and Lesotho (See Fig. 1). Occurs in grassland.

Phillips, in *Bothalia* 1: 189 (1923), keyed out *E. woodii* under the species which are "shrubs or small trees with a distinct aerial stem". As there is no information about the habit of the plants in Medley Wood's collector's book or on the herbarium sheets, it is thought that Phillips assumed *E. woodii* was a shrub or small tree because the aerial stems are branched. During recent years several attempts have been made to re-collect *E. woodii* in the type locality and eventually, in 1970, Mr R. G. Strey succeeded in finding a few plants. However, the plants were procumbent and not shrubby or arborescent as indicated by Phillips. The habit notes in the above description are based on the specimens collected by Mr Strey and subsequently cultivated at the Natal Herbarium, Durban. Each year the branched, procumbent, aerial stems die back and are replaced by a new set of stems the following season. The stems are relatively weak and show no signs of assuming an erect posture. More field observations are required to establish whether *E. woodii* ever does grow as an erect shrub. At the time of collecting the living plants, concern was expressed for the future of the species in the type locality, at least, because the plants survive only in the narrow strips of uncultivated land which may themselves be cultivated at any time.

*E. woodii* is closely related to *E. elephantina* but differs in having branched, procumbent, aerial stems and leaflets with a slightly different venation. It differs from all the other species with branched stems in that the stems are procumbent and longitudinally striate.

#### Key to Varieties

- Stems glabrous or almost so; petioles, rhachides and rhachillae glabrous or almost so; inflorescence axes ± glabrous.....(a) var. *woodii*  
 Stems pubescent; petioles, rhachides and rhachillae pubescent; inflorescence axes pubescent.....(b) var. *pubescens*

Unfortunately not enough material is available to evaluate the taxonomic significance of the degree of pubescence of the stems, leaves and inflorescence axes as a means of distinguishing varieties within this species.

#### (a) var. *woodii*.

Phillips in *Bothalia* 1: 193 (1923); Ross, *Fl. Natal*: 194 (1973). Type as above.

NATAL.—2829 (Harrismith): Pieters (–DB), *Strey* 9760; Harts Hill, near Colenso (–DB) *Strey* 10000; Ladysmith (–DB), *Geekie* 46 (NU).

More material of var. *woodii* is required.

The following note written by Phillips on *Wood* 7958 (NH) indicates that he had initially intended calling this specimen *E. wahlbergii* (Harv.) Phillips: "This is undoubtedly the plant described by Harvey as *Entada? wahlbergii* in *Fl. Cap.* 2: 277. I propose the new combination *Elephantorrhiza wahlbergii*, *Phill.* 8/6/19".

(b) var. *pubescens* Phillips in *Bothalia* 1: 193 (1923); Ross, *Fl. Natal* 194 (1973). Type: Natal, probably 2929 (Underberg), near Little Tugela, 1219 metres (–BA), *Wood* 2867 (NH, holo.!).

*E. pubescens* Phillips ined.

NATAL.—probably 2929 (Underberg): near Little Tugela, *Wood* 2867 (NH). Grid ref. unknown: between Pietermaritzburg and Newcastle, Nov. 1883, *Wilms* 1973 (BM).

LESOTHO?—no precise locality, *Cooper* 2279 (K).

*Wilms* 1973 (BM), collected between Pietermaritzburg and Newcastle in 1883, appears to be referable to *E. woodii* var. *pubescens*. However, the specimen has wider leaflets and a somewhat different facies to typical var. *pubescens*. More material is desirable but, as the specimen was not well localized, there seems little likelihood of further material being collected.

*Cooper* 2279, a flowering specimen with immature leaves, also appears to be referable to var. *pubescens*. Although recorded as being collected in "Basutoland," *Cooper* is not known to have been in present-day Lesotho.

*Mogg* sub PRE 9644, an immature and rather fragmentary specimen from Charlestown in northern Natal, is extremely difficult to place with certainty. The specimen in the Kew Herbarium consists of a single stem bearing axillary racemes and very young foliage, the details of which are scarcely discernible. The stem is 17.5 cm high, longitudinally striate and pubescent. The leaves have 2 pinnae pairs and up to 16 leaflets per pinna. The immature leaflets are up to 4.5 × 1.75 mm, the midrib is excentric basally and the leaflet-apex is distinctly mucronate. This specimen is hesitantly referred to *E. woodii* var. *pubescens*, but additional and better material from this area is required to establish the identity of the plants.

More material of var. *pubescens*, and from definite localities, is required. Pods would be of particular interest.

4. *Elephantorrhiza burkei* Benth. in Hook., *Lond. J. Bot.* 5: 81 (1846); Harv. in *Fl. Cap.* 2: 278 (1862); Benth. in *Trans. Linn. Soc. Lond.* 30: 365 (1875); Phillips in *Bothalia* 1: 192, t.5 fig. 4 (1923); Bak.f., *Leg. Trop. Afr.* 3: 801 (1930); Burt Davy, *Fl. Transv.* 2: 332 (1932); O. B. Miller in *J. S. Afr. Bot.* 18: 31 (1952); Wild, *Guide Fl. Vict. Falls* 149 (1953); Brenan & Brummitt in *Fl. Zamb.* 3, 1: 27 (1970). Type: Transvaal, Magaliesberg, *Burke & Zeyher* (K, holo.!, BM!, TCD!, Z!).

*E. elephantina* (Burch.) Skeels var. *burkei* (Benth.) Merr. in *Contr. Gray Herb.* 59: 18 (1919). Type as above.

A branched shrub or small tree 1–3(6) m high, occasionally as small as 0,3 m, but then the stems distinctly woody and branched and the inflorescences normally borne on lateral shoots of the current season's growth; bark dark grey to reddish; young branchlets glabrous. *Leaves* glabrous or almost so: petiole 2,6–6,5 cm long; rhachis 3,6–14,5 cm long; pinnae (1)4–8(9) pairs; rhachillae 3,5–12,5 cm long; leaflets (9)12–23(32) pairs per pinna, 7–17 × 1,5–3,5(5) mm, narrowly oblanceolate to very narrowly elliptic or linear-oblong, usually glaucous, glabrous, base slightly asymmetric (less so than in *E. elephantina*), with the proximal side rounded to cuneate, apex symmetric, obtuse to rounded, generally mucronate, lateral nerves and veins prominent or not. *Racemes* axillary, solitary or fascicled, often on lateral shoots, 5–10(12,5) cm long (including the peduncle), glabrous. *Flowers* yellowish-white, on pedicels up to 2 mm long, pedicels articulated near the middle, with minute reddish glands at the base of the pedicels. *Calyx* campanulate, up to 2,5 mm long, 5-toothed, the teeth up to 0,75 mm long, glabrous. *Petals* shortly united basally, up to 4,5 mm long, 1 mm wide, linear-oblong, inflexed apically, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments up to 5 mm long; anthers up to 0,75 mm long, with a deciduous apical gland. *Ovary* up to 2 mm long, glabrous. *Pods* dark brown to reddish-brown, 10–19(28) × 2,5–4 cm, straight or slightly curved, oblong, compressed, sometimes prominently transversely venose, at maturity the valves separating from the persistent margins, the outer layer of the pod-wall peeling off the inner layer, the layers remaining intact or breaking up irregularly. *Seeds* ± 9–13 × 8–12 mm.

Found in Botswana, Rhodesia, Mozambique and the Transvaal (See Fig. 1). Favours rocky situations, in woodland, grassland and scrub.

As specimens from Botswana, Rhodesia and Mozambique were cited by Brenan & Brummitt in Fl. Zamb. 3, 1: 27(1970), it is not considered necessary to cite specimens from these territories here.

TRANSVAAL.—2329 (Pietersburg): University College of the North, 28,8 km from Pietersburg on road to Tzaneen, *Van Vuuren* 1293. 2425 (Gaberones): Lekkerlach, *Louw* 597 (NH). 2428 (Nylstroom): 15,2 km north of Warmbaths, *Marais* 1236. 2429 (Zebediela): Chuniespoort, *Pole Evans* sub PRE 19452. 2431 (Acornhoek): Kruger National Park, 25,6 km north-east of Skukuza, *Codd* 5723. 2527 (Rustenburg): Wolhuterskop, *Schweickerdt* 1642. 2528 (Pretoria): end of Daspoort range about 9,6 km east of Pretoria, *Phillips* 3040. 2529 (Witbank): Loskop Dam Nature Reserve, *Mogg* 30603.

*E. burkei* differs from *E. elephantina* primarily in being a shrub or tree with branched, perennial, aerial stems and not a suffrutex with annual, unbranched, aerial stems (unless damaged). The leaflet-base in *E. burkei* is less asymmetric than in *E. elephantina*, and the midrib soon becomes ± centric. The leaflets of *E. burkei* are typically larger than those of *E. elephantina*. *E. burkei* appears to have smaller seeds than *E. elephantina*, but more fruiting material is required to confirm this.

5. *Elephantorrhiza praetermissa* J. H. Ross, sp. nov., *E. goetzei* (Harms) Harms typicae affinis, sed foliorum pinnis constanter paucioribus et leguminibus brevioribus et latioribus differt; *E. elephantinae* (Burch.) Skeels etiam affinis sed caulibus ramosis; ab utraque insuper foliolis differt.

Frutex 1–2 m altus; ramuli juveniles griseo-vel rubro-brunnei, glabri. *Folia* glabra: petiolus 2,2–4 cm longus; rhachis 4–9 cm longus; pinnae (3)5–10(12)-jugatae; rhachillae (2,8)3,5–6(7) cm longae; foliola 20–40-juga, 5–10 mm longa, 0,9–1,5 mm lata, lineari vel lineari-oblonga, sessilia, glabra, basi

asymmetrica, costa basi obliqua, apice ± centralis, latere proximo rotundata, apice rotundata vel acuta, fere symmetrica, nervis lateralibus subtus haud conspicuis vel obscuris. *Inflorescentia* racemosa, racemis solitariis, fasciculatis vel in ramulis lateralibus aphyllis abbreviatis aggregatae, 4–5,5 cm longis, glabris. *Flores* ochroleuci, pedicellati, pedicellis 1,5–2 mm longis, articulatis. *Calyx* 0,75–1,25 mm longus, quinquedenticulatus, glaber. *Petala* basi breviter connata, 2–3 mm longa, lineari-oblonga, glabra. *Stamina* 10; filamenta 4–5 mm longa; antherae apice glandula caduca coronatae. *Ovarium* ± 2 mm longum, lineare, glabrum. *Legumina* atrobrunnea vel rubro-brunnea, 12–18 cm longa, 2–3,2 cm lata, oblongo, recta plus minusve curvata, compressa, obscure vel prominenter nervosa. *Semina* ± 15 × 13 × 3,5 mm.

*Type*: Transvaal, 2430 (Pilgrim's Rest), Steelpoort valley, near Sarashof (–CC), *Codd* 9830 (PRE, holo.; BM, K, iso.).

Shrub 1–2 m high; young branchlets grey- or reddish-brown, glabrous. *Leaves* glabrous: petiole 2,2–4 cm long; rhachis 4–9 cm long, sulcate above, sometimes with minute, scattered, dark glands; pinnae (3) 5–10(12) opposite or subopposite pairs; rhachillae (2,8) 3,5–6(7) cm long; leaflets 20–40 pairs, 5–10 × 0,9–1,5 mm, linear or linear-oblong, sessile, glabrous, asymmetric basally, midrib starting in the distal corner of the leaflet-base and gradually becoming almost central in the leaflet, proximal side of base rounded, apex rounded or acute, nearly symmetric, lateral nerves not visible or inconspicuous beneath, sometimes with minute, dark purplish glands, at the base of the leaflets. *Inflorescences* racemose, racemes solitary, fascicled or aggregated on abbreviated lateral branchlets, 4–5,5 cm long (including the peduncle), glabrous. *Flowers* yellowish-white, pedicellate, pedicels 1,5–2 mm long, articulated near or below the middle, with minute, dark reddish glands at the base of the pedicels. *Calyx* 0,75–1,25 mm long, 5-toothed, glabrous. *Petals* shortly united basally, 2–3 mm long, linear-oblong, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments 4–5 mm long; anthers with a deciduous apical gland. *Ovary* ± 2 mm long, linear, glabrous. *Pods* dark brown or reddish-brown, 12–18 × 2–3,2 cm, oblong, straight or slightly curved, compressed, obscurely or prominently venose, at maturity the valves separating from the persistent margins. *Seeds* ± 15 × 13 × 3,5 mm.

*E. praetermissa* appears to have a rather restricted distribution in the eastern Transvaal (see Fig. 1). Occurs on dry wooded hillsides.

TRANSVAAL.—2429 (Zebediela): 25 km NNW of Schoonoord (–DB), *Acocks* 20969. 2430 (Pilgrim's Rest): 59 km from Lydenburg on road to Steelpoort via Tweefontein (–CC), *Vorster* 2129; 74 km from Lydenburg on road to Steelpoort via Tweefontein (–CC), *Vorster* 2128; near Sarashof (–CC), *Codd* 9830.

The first specimen of this plant was collected by Dr L. E. Codd in Sekukuniland in the eastern Transvaal some fifteen years ago, and the second by Mr J. P. H. Acocks two years later. In response to an appeal for fruiting material, Mr P. Vorster collected some excellent specimens earlier this year.

The specimens, which are fairly uniform vegetatively and appear to represent a distinct entity, cannot be accommodated satisfactorily within any of the existing species of *Elephantorrhiza*. There are a number of small differences which, collectively, distinguish the specimens from those of related species and appear to be of significance.

*E. praetermissa* is most closely related to *E. goetzei* and to *E. elephantina*. Both *E. goetzei* and *E. elephantina* occur in the eastern Transvaal but the specimens in question differ from the material of both of these species.

*E. praetermissa* differs from typical *E. goetzei* in having consistently fewer pinnae pairs. Although from 3–41 pinnae pairs are recorded in *E. goetzei*, specimens with fewer than 12 pinnae pairs usually have large leaflets which are  $\pm 4$ –8 mm wide, and these have been separated as *E. goetzei* subsp. *lata*. The fewer pinnae pairs distinguish *E. praetermissa* from typical *E. goetzei*, and the narrow leaflets distinguish *E. praetermissa* from *E. goetzei* subsp. *lata*. The leaflets of *E. praetermissa* differ from those of typical *E. goetzei* in having a somewhat thicker texture and in being  $\pm$  sessile; the leaflets of typical *E. goetzei* usually have distinct petiolules. In *E. goetzei* the pods are long and narrow in proportion to their length ( $15$ – $44 \times 1$ ,  $3$ – $2$ ,  $4$  cm) and, when mature, the position of the seeds is marked by distinct raised bumps. In *E. praetermissa* the pods are shorter and broader ( $12$ – $18 \times 2$ – $3$ ,  $2$  cm),  $\pm$  compressed, and lack distinct raised bumps over the seeds. The seeds of *E. praetermissa* are  $\pm$  compressed in contrast to the ellipsoid or lenticular seeds of *E. goetzei*, and they are smaller than those of the latter. Although the length of the racemes provides no discontinuity between the two species, the racemes of *E. praetermissa* are consistently short and are much shorter than is usual in *E. goetzei*.

*E. praetermissa* differs from *E. elephantina* in being a robust shrub 1–2 m high and in having branched aerial stems. The leaflets of *E. praetermissa* differ slightly in texture and lack the  $\pm$  conspicuous venation of typical *E. elephantina*, while the pods tend to be slightly narrower than is usual in *E. elephantina*.

Although *E. praetermissa* is described as locally common by collectors, very few specimens have been collected. More material is required.

6. **Elephantorrhiza goetzei** (Harms) Harms in Engl., Pflanzenw. Afr. 3, 1: 400 (1915); Bak. f., Leg. Trop. Afr. 3: 802 (1930); Brenan, Checklist Tang. Terr. 344 (1949); Wild, Guide Fl. Vict. Falls 149 (1953); Williamson, Useful Pl. Nyasal. 52 (1955); Brenan in Fl. Trop. E. Afr. Legum.—Mimos. 19, fig. 4 (1959); White, For. Fl. N. Rhod. 91 (1962); Brenan & Brummitt in Fl. Zamb. 3, 1: 24, t. 4 (1970). Type: Tanzania, Rufiji District, Goetze 82 (B, holo.†, BM, drawing!; K!).

*Piptadenia goetzei* Harms in Bot. Jahrb. 28: 397 (1900). Type as above.

Shrub or small tree 1–4 (7) m high; bark grey-brown to dark brown or reddish-brown to purplish, often becoming blackish; young branchlets glabrous. Leaves glabrous or nearly so: petiole 1–5 (7,5) cm long; rachis 6–20 (45,5) cm long, sulcate above; pinnae 3–30 (41) opposite or subopposite pairs; rachillae 1,8–9 (11) cm long; leaflets 9–40 (48) pairs,  $3,5$ – $9$  ( $22$ )  $\times$   $0,7$ – $8$  mm, linear-oblong to narrowly oblong, midrib starting in the distal corner of the leaflet-base, gradually becoming almost central in the leaflet, proximal side of the base rounded and almost auriculate, apex acute to rounded and mucronate, nearly symmetric, glabrous, lateral nerves and veins not or scarcely visible. Racemes solitary, fascicled or borne on short lateral shoots, (2) 5–20 (23) cm long (including the peduncle), glabrous. Flowers yellowish-white, sometimes tinged with pink or purple, on pedicels up to 1 mm long, pedicels articulated near the middle, with minute, pale yellowish-white glands at the base of the pedicels. Calyx 1,5–1,75 mm long,

with 5 acute teeth, glabrous. Petals shortly united below, becoming almost free in open flowers, 2,5–3 mm long, linear-oblong, inflexed apically, glabrous. Stamens free among themselves, slightly adnate to the corolla basally; filaments up to 4,5 mm long; anthers up to 1 mm long, with a deciduous apical gland. Ovary up to 2 mm long, linear, glabrous. Pods dark brown or reddish- or purplish-brown,  $15$ – $30$  ( $44$ )  $\times$   $1$ ,  $3$ – $2,4$  cm, linear, straight or curved, raised over the seeds, at maturity the valves separating from the persistent margins, the outer layer of the pod-wall peeling off the inner layer, the layers remaining intact or breaking up irregularly. Seeds  $11$ – $20 \times 9$ – $18 \times 7$ – $12$  mm, ellipsoid to lenticular.

#### Key to subspecies

Leaves with (3) 14–41 pairs of pinnae; rachillae 3,5–9,5 cm long; leaflets in (11) 20–48 pairs,  $3,5$ – $12 \times 0,7$ – $3$  mm. .... (a) subsp. *goetzei*

Leaves with 4–15 pairs of pinnae; rachillae 6,5–15 cm long; leaflets in 9–28 pairs, mostly  $12$ – $22 \times 4$ – $8$  mm ..... (b) subsp. *lata*

(a) subsp. *goetzei*.

Brenan & Brummitt in Bol. Soc. Brot., Sér. 2, 39: 189 (1965); Fl. Zamb. 3, 1: 24 (1970).

*E. rubescens* Gibbs in J. Linn. Soc. Bot. 37: 441 (1906). Eyles in Trans. Roy. Soc. S. Afr. 5: 364 (1916). Type: Rhodesia, Matopo Hills, Gibbs 184 (BM, holo.). *E. cf. petersiana* sensu Gomes e Sousa, Pl. Menyharr. 70 (1936). *E. cf. goetzei* (Harms) Harms, Torre in Cons. Fl. Angol. 2: 263 (1956). *E. sp. sensu* Torre l.c. 264 (1956).

*Acacia rehmanniana* sensu Exell in Bol. Soc. Brot. Sér. 2, 12: 16 (1937), non Schinz.

Found in Tanzania, Angola, Botswana, Zambia, Rhodesia, Malawi, Mozambique and the Transvaal (See Fig. 3). Occurs in woodland of various types and scrub; favours rocky places.

As a selection of specimens from Tanzania, Angola, Botswana, Zambia, Rhodesia, Malawi and Mozambique have been cited in recent regional floras, no further specimens from these territories are cited here.

TRANSVAAL.—2331 (Phalaborwa): Kruger National Park, Shingwedzi, in Lebombo Mts., Van der Schijff 3848. 2429 (Zebediela): Wolkberg, 14,4 km south of Boyne on road to Welcome Gold Mine, Codd 10393. 2430 (Pilgrim's Rest): 28 km south east of Gravelotte (–BB), Codd 9477; Abel Erasmus Pass, c. 3 km south of Strydom Tunnel (–BC), Vorster & Coetzer 2099. 2431 (Acornhoek): Kruger National Park,  $\pm 29$  km from Satara on Rabelais road (–BC), Van der Schijff 3290; Kruger National Park, 10,4 km from Nwanedzi [Ngwanetsi] on Satara road (–BC), Story 3967.

In the area delimited for Flora Zambesiaca *E. goetzei* frequently produces its flowers when the plant is leafless. In the Transvaal, however, *E. goetzei* usually produces flowers together with the leaves.

As leaves are required for establishing which subspecies specimens belong to, it is not possible to refer many of the leafless flowering specimens from the Flora Zambesiaca area to either subspecies with certainty. These leafless flowering specimens have been plotted under the category “subsp. uncertain” on the accompanying distribution map of *E. goetzei* (see Fig. 3).

It is possible that *E. petersiana* Bolle in Peters, Reise Mossamb. Bot. 1: 9 (1861) is an earlier name for *E. goetzei*. If this were ever confirmed, then *E. petersiana* would be the correct name for this species. The holotype of *E. petersiana*, now destroyed, was a flowering specimen (without leaves) collected by Peters at Sena in Mozambique. Unfortunately the type description is too imperfect to enable the species to be positively identified. Bak.f., Leg. Trop. Afr. 3: 802 (1930) shed no light on the identity of *E. petersiana*.

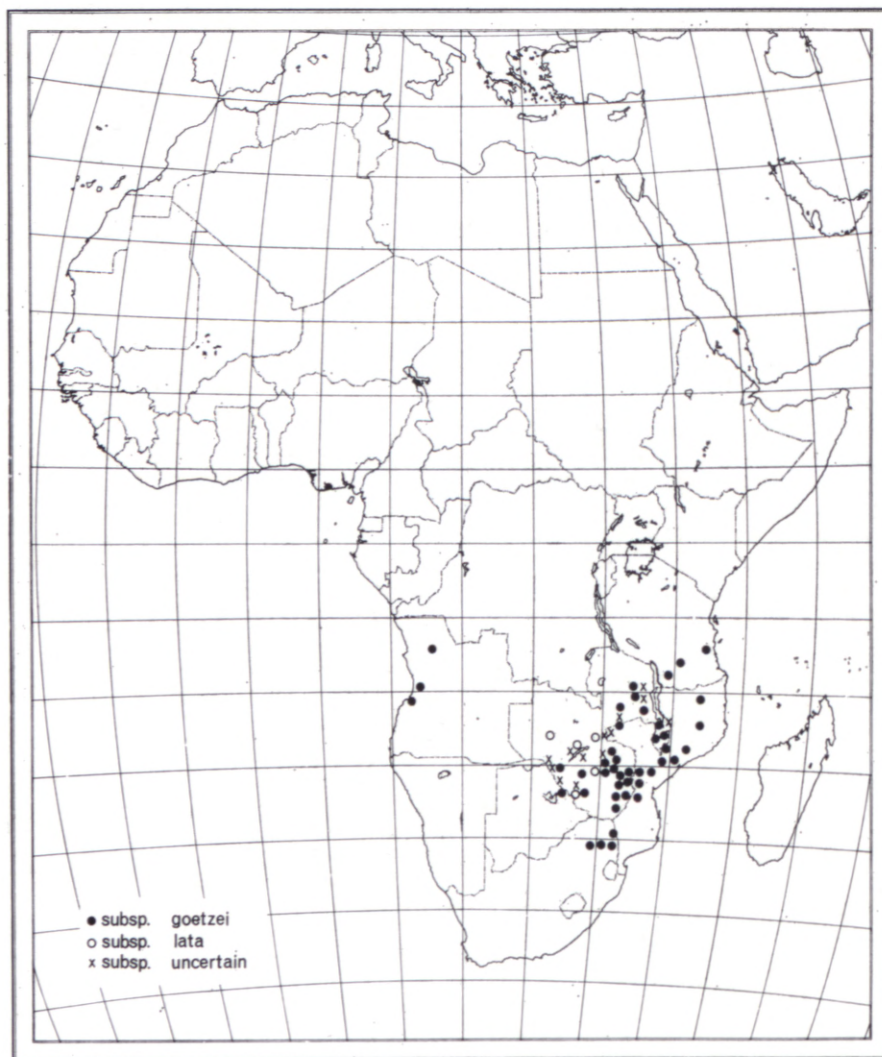


FIG. 3.—The known distribution of *Elephantorrhiza goetzei*.

Burt Davy, Fl. Transv. 2: 332 (1932) based his *E.* (?) sp. nov.? (= *E.* (?) *elongata* Burt Davy ined.) on *Burt Davy H 2304* collected at Potgietersrust in the Transvaal. This specimen, which is quite leafless, has  $\pm$  straight immature pods up to  $21 \times 1.7$  cm. The pods of *Burt Davy H 2304* resemble those of *E. goetzei* fairly closely and, although *E. goetzei* has not been recorded from Potgietersrust subsequently, it seems likely that Burt Davy's specimen is referable to *E. goetzei*. *E.* (?) sp. nov.? is therefore a probable synonym of *E. goetzei*.

(b) subsp. *lata* Brenan & Brummitt in Bol. Soc. Brot., Sér. 2, 39: 189 (1965); Fl. Zamb. 3, 1: 26 (1970). Type: Zambia, Katombora, Morze 55 (FHO, holo!, K fragm.!).

*E.* sp. 1—White, For. Fl. N. Rhod.: 91 (1962).

Known only from Zambia and Rhodesia (See Fig. 3). Occurs in woodland of various types.

An adequate selection of specimens has already been cited in Bol. Soc. Brot., Sér. 2, 39: 189 (1965) and in Fl. Zamb. 3, 1: 26 (1970).

7. *Elephantorrhiza rangei* Harms in Bot. Jahrb. 49: 420 (1913); Dinter in Feddes Repert. 17: 190 (1921); Bak. f., Leg. Trop. Afr. 3: 802 (1930); Range in Feddes Repert. 30: 148 (1932); Schreiber in Prodr. Fl. S. W. Afr. 58: 17 (1967) pro parte quoad specim. Range 455. Type: South West Africa, 2617 (Bethanie), Naute, near Keetmanshoop (—DD), Range 455 (B, holo., †, BM, drawing!; SAM, iso.)

A branched shrub (? or small tree) to 4 m high; young branchlets reddish-brown to purplish, glabrous. *Leaves* glabrous: petiole 2–4.5 cm long; rachis (1.5) 3–7.5 cm long [petiole and rachis together described as 2–15 cm long by Harms]; pinnae in 3–7 [9] opposite or subopposite pairs, sometimes in 1–3 pairs on immature leaves; rachillae 5–8, 5 [9] cm long; leaflets 24–36 pairs per pinna, 6–9 [12]  $\times$  1–2.75 [4] mm, linear-oblong to oblong, sometimes slightly falcate, midrib starting in the distal corner of the leaflet-base, gradually becoming almost central in the leaflet, proximal side of the base rounded to almost auriculate, apex rounded to acute, mucronate, almost symmetric, lateral nerves inconspicuous, glabrous. *Racemes* axillary, solitary or paired, 5–8 cm long (including the peduncle), glabrous. *Flowers* greenish-yellow, on pedicels 1–1.75 mm long, pedicels articulated just below the middle, with minute yellowish glands at the base of the pedicels. *Calyx* campanulate, 2–2.25 mm long, glabrous, 5-toothed. *Petals* shortly united basally, 3–4 mm long, 1 mm wide, oblong, inflexed apically, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments up to 5.5 mm long; anthers up to 0.9 mm long, with a deciduous apical gland. *Ovary* up to 4 mm long, shortly stipitate, linear, glabrous. *Pods* dark brown or reddish-brown, 18.5–20 [22]  $\times$  2–2.5 cm, straight or almost so, oblong, compressed, slightly umbonate over the seeds, transverse venation relatively inconspicuous, at maturity the valves separating from the persistent margins. Seeds unknown.

Known only from the type locality in South West Africa (See fig. 1). Ecology unknown.

S.W.A.—2617 (Bethanie): Naute, near Keetmanshoop (—DD), Range 455 (SAM).

The above description was drawn up from two isotypes in the SAM Herbarium. The extreme dimensions given in square brackets were recorded by Harms in his type description.

There is considerable variation in leaflet size even on a single branch; the upper leaves often have small leaflets and the lower leaves larger leaflets.

*E. rangei* bears a superficial resemblance to *E. suffruticosa* but differs in having larger and broader leaflets in which the midrib is  $\pm$  centric apically, slightly longer pedicels, and larger flowers.

The specimens cited by Phillips in Bothalia 1: 192 (1923) under *E. rangei* ("rangeri"), and on which t.5 fig. 5 was based, are in fact referable to *E. elephantina*.

*E. rangei* is known only from the type collection. It has never been re-collected since Jan. 1908 and the possibility exists that it is now extinct. A thorough search for this plant in the type locality is most desirable in an attempt to evaluate its present conservation status.

8. *Elephantorrhiza schinziana* Dinter in Feddes Repert. 17: 190 (1921); Bak. f., Leg. Trop. Afr. 3: 802 (1930); Schreiber in Prodr. Fl. S. W. Afr. 58: 17 (1967). Syntypes: South West Africa, 1917 (Tsumeb), farm Heidelberg near Tsumeb (—BB), *Dinter 1689* (SAM!); Otavi (—CB), *Dinter 745* (SAM!)

A branched shrub (? or small tree) up to 2,5 m high; bark grey- to dark or reddish-brown; young branchlets grey- or reddish- to purplish-brown, glabrous. Leaves glabrous: petiole 2,2–3,5 (5,2) cm long; rhachis (4,5) 7,5–14,5 (20,5) cm long; pinnae (2) 6–11 (14) opposite or subopposite pairs; rhachillae 5,5–10 (14) cm long; leaflets (14) 21–40 pairs per pinna, (5) 7–14  $\times$  1,5–3,5 mm, linear-oblong to oblong, midrib starting in the distal corner of the leaflet-base, gradually becoming almost central in the leaflet, proximal side of base rounded, apex rounded and sometimes distinctly mucronate, nearly symmetric, lateral nerves scarcely visible, glabrous, somewhat glaucous. Racemes axillary, solitary or paired, 7–9,5 cm long (including the peduncle), glabrous. Flowers yellowish-white, on pedicels up to 0,75 mm long, pedicels articulated towards the apex, with minute yellowish glands at the base of the pedicels. Calyx cupular, up to 1,5 mm long, glabrous, shortly 5-toothed. Petals shortly united basally, 3–3,75 mm long, 1 mm wide, linear-oblong, inflexed apically, glabrous. Stamens free among themselves, slightly adnate to the corolla basally; filaments up to 5 mm long; anthers up to 0,8 mm long, with a deciduous apical gland. Ovary up to 2,25 mm long, glabrous. Pods dark brown or reddish-brown, (15) 19–30 (40,5)  $\times$  3–3,9 cm, straight or slightly curved, oblong, compressed, umbonate over the seeds, prominently transversely venose, at maturity the valves separating from the persistent margins, the outer layer of the pod-wall peeling off the inner layer, the layers tending to break up irregularly. Seeds immature, mature seeds unknown.

Known only from the Grootfontein District in South West Africa (See Fig. 1) Ecology unknown.

S.W.A.—1917 (Tsumeb): farm Heidelberg near Tsumeb (—BB) *Dinter 1689* (SAM!); Otavi (—CB), *Dinter 745* (SAM), *Dinter 5300* (PRE, Z). Grid ref. unknown: Grootfontein District, farm Asis, Volk 767 (M).

The original specimens on which Dinter based his description are no longer available for study. Fortunately, however, both syntypes, namely *Dinter 745* and *1689*, are represented in the South African Museum collections. There is one sheet of *Dinter 745* and three sheets of *Dinter 1689*. One of the sheets of *Dinter 1689* is a mixed gathering consisting of a vegetative shoot of *E. suffruticosa* and a pod of *E. schinziana*, while the flowers in the capsule could belong to either species. On the second sheet of *Dinter 1689* there is a vegetative shoot of *E. schinziana* with a mature pod attached and, in addition, there is a flowering specimen which is leafless apart from an extremely young leaf or shoot on which no details are discernible. In view of the mixed gathering of *E. schinziana* and *E. suffruticosa* on the first sheet of *Dinter 1689*, the possibility exists that the flowering specimen on the second sheet belongs to *E. suffruticosa* and not to *E. schinziana*. It will be recalled that in South West Africa *E. suffruticosa* usually flowers when leafless. As none of the other specimens of *E. schinziana* examined were in flower, the details of the flowers in the above description were taken from this second specimen of *Dinter 1689*. It is possible therefore that the flowers described are those of *E. suffruticosa* and not of *E. schinziana*. The third sheet of *Dinter 1689* consists of a single leaf and two mature pods (the valves of one pod are mounted separately which gives the impression that there are three pods).

As the one sheet of *Dinter 1689* is a mixed gathering, and as there is a possibility that a second sheet is also a mixed gathering, it seems desirable to select a lectotype for *E. schinziana* from the third sheet of *Dinter 1689* or from *Dinter 745*. *Dinter 745* is the better specimen of the two and consequently I now select *Dinter 745* as the lectotype of *E. schinziana*.

There is a considerable variation in leaflet size on a single branch; some of the upper leaves often have distinctly smaller leaflets than the leaflets on the lower leaves.

*E. schinziana* has not been re-collected since Jan. 1939 and there is a possibility that it is now extinct. A thorough search for this plant in the type localities is most desirable in an attempt to evaluate its present conservation status. If *E. schinziana* is re-discovered, it is important that an effort be made to collect both flowering and fruiting material. Flowering material is essential to establish whether or not the flowers on which the above description was based are in fact those of *E. schinziana*.

9. *Elephantorrhiza suffruticosa* Schinz in Mém. Herb. Boiss. 1: 117 (1900); Dinter, Deutsch-Südwest-Afrika Fl. Forst und landwirtschaft. Frag. 78 (1909); Harms in Engl., Pflanzenw. Afr. 3, 1: 400 (1915); Dinter in Feddes Repert. 17: 190 (1921); Phillips in Bothalia 1: 193, t. 5 fig. 7 (1923); Bak. f., Leg. Trop. Afr. 3: 801 (1930); Schreiber in Prodr. Fl. S. W. Afr. 58: 17 (1967); Brenan & Brummitt in Fl. Zamb. 3, 1: 26 (1970). Syntypes: South West Africa, 1816 (Namutoni), Amutele (—AB), *Schinz 2070* (Z!); 2215 (Trekopje), Ebony Mine (—AB), *Schenck 457* (Z!); 2317 (Rehoboth), Rehoboth (—AC), *Fleck 497a* (Z!), *Fleck 499a* (Z); grid ref. unknown, "sandige stellen bei Ombalambunge", *Rautanen 242* (Z!); Angola, Huila district, "Kilevi am Kunene" (south of Humbe), *Schinz 2071* (Z!).

A branched shrub or small tree 1–5 m high; bark grey-brown to dark or reddish-brown; young branchlets glabrous, or sometimes puberulous to shortly pubescent. Leaves glabrous to puberulous or shortly pubescent: petiole (0,6) 1,5–3,5 cm long; rhachis (0,5) 10–17 (25,4) cm long; pinnae (2) 15–27

(42) opposite or subopposite pairs; rhachillae (1,4) 2–3,5 (6,8) cm long; leaflets (17) 27–40 (50) pairs per pinna, 3–7,5 × 0,5–1,2 mm, linear-oblong to linear, rarely almost falcate, midrib marginal throughout, proximal side rounded basally, apex asymmetric, obtuse to acute, often mucronate, lateral nerves and veins not or scarcely visible, glabrous or sometimes sparingly pubescent on the margins. *Racemes* axillary, solitary or 2–3 together, or borne on lateral shoots, (4) 6–14 (18) cm long (including the peduncle), pubescent or sometimes glabrous. *Flowers* yellowish-white, on pedicels up to 1 mm long, pedicels articulated near the middle, with minute reddish, reddish-brown or pale yellow glands at the base of the pedicels. *Calyx* cupular, up to 1 mm long, shortly 5-toothed, glabrous or sometimes very sparingly pubescent. *Petals* shortly united basally, 3–3,75 mm long, 1 mm wide, linear-oblong, inflexed apically, glabrous. *Stamens* free among themselves, slightly adnate to the corolla basally; filaments up to 5 mm long; anthers up to 0,8 mm long, with a deciduous apical gland. *Ovary* up to 2 mm long, linear, glabrous. *Pods* dark brown or reddish-brown, 8,5–30,5 × 1,8–2,25 cm, straight or slightly curved, linear-oblong to linear, compressed, usually prominently transversely venose, umbonate over the seeds, at maturity the valves separating from the persistent margins, the outer layer of the pod-wall peeling off the inner layer, the layers remaining intact or breaking up irregularly. *Seeds* 13–15 × 9–12 mm, roughly ellipsoid.

Found in Angola, South West Africa, Rhodesia and Mozambique (See Fig. 1). Occurs in woodland, grassland and in broken country; often among rocks. The ecological preferences of *E. suffruticosa* are not clear and more information is required.

As specimens from Rhodesia and Mozambique were cited by Brenan & Brummitt in Fl. Zamb. 3, 1: 26 (1970), it is not considered necessary to cite specimens from these territories here.

I have not seen the specimen from Huila, *Dekindt* 536 (LISC), hesitantly referred to *E. suffruticosa* by Torre in Consp. Fl. Angol. 2: 263 (1956). The following specimens from Angola have, however, been examined:

ANGOLA.—Huila District: 8 km para o Chitado, *Azancot de Menezes & Henriques* 38 (K); proximo do Chilau, *Azancot de Menezes* 919 (K); na picada Chimbole—Gambos, *Azancot de Menezes* 698 (K); 4 km de Cavalaua a Gambos, *Mendes* 1692 (BM).

S.W.A.—1814 (Otjitundua): Otusemba, *Story* 5920. 1815 (Okahakana): 84,4 km north of Okakeujo on road to Ondongwa, *De Winter* 3517. 1816 (Namutoni): Amutele, *Schinzi* 2070 (Z). 1817 (Tsintsabis): 48 km north of Tsumeb, *Rodin* 2605. 1916 (Gobaub): farm Zukov 337, *De Winter* 3019. 2016 (Otjiwarongo): Otjiwarongo, *Liebenberg* 4909. 2116 (Okahandja): Okahandja, *Dinter* 314 (BM, E, GRA, Z). 2117 (Otjosondou): Omupanda, *Wulffhorst s.n.* (Z). 2214 (Swakopmund): Swakopmund, *Seydel* 114 (Z). 2215 (Trekkopje): Ebony Mine, *Schenck* 457 (Z). 2216 (Otjimbingwe): Auas Mts., pass between Haris and Aub, *Pearson* 9658 (K). 2217 (Windhoek): Windhoek, *Rogers* 29755. 2317 (Rehoboth): Rehoboth, *Fleck* 499a (Z). 2416 (Maltahöhe): Bull's Mouth Pass, *Pearson* 8919; Bullsport, Naukluft Mts., *Hardy* 1982. 2417 (Mariental): Voigtsgrund, *Keet* 1662. Grid ref. unknown: "sandige stellen bei Ombalambunge", *Rautanen* 242 (Z).

The narrow leaflets of *E. suffruticosa*, with the midrib marginal throughout the length of the leaflet, are most diagnostic and enable this species to be readily distinguished from all of the other *Elephantorrhiza* species.

There appears to be a discontinuity in the distribution of *E. suffruticosa* between eastern and central Rhodesia and South West Africa and Angola (See Fig. 1). No significant morphological differences have so far been noted between specimens from these two

areas of distribution except for an inconsistent tendency for some leaflets to be more acute and mucronate in Rhodesia than in South West Africa and Angola. In addition, in specimens from Rhodesia there are usually  $\pm$  conspicuous reddish or orange glands at the base of the leaflets, while in Angola and South West Africa the glands are inconspicuous and pale yellow or even absent.

In the Flora Zambesiaca area *E. suffruticosa* usually produces flowers together with the leaves, while *E. goetzei* usually flowers when leafless. The leaves which accompany the flowers in *E. suffruticosa* enable specimens of these two species to be readily distinguished in the Flora Zambesiaca area. Otherwise it is sometimes difficult to differentiate these two species from flowers alone. The inflorescence axes in *E. suffruticosa* are often puberulous whereas in *E. goetzei* they are glabrous, and this character sometimes assists in the identification of specimens.

In South West Africa, however, *E. suffruticosa* frequently flowers when leafless, while in the Transvaal *E. goetzei* usually produces flowers together with the leaves. In the area delimited for the Flora of Southern Africa, therefore, the reverse situation tends to prevail; *E. suffruticosa* flowering when leafless and *E. goetzei* producing flowers together with the leaves. Although *E. goetzei* has been recorded from Angola, it has not been recorded from South West Africa.

Schinzi in Mém. Herb. Boiss. 1: 117 (1900) cited six specimens of *E. suffruticosa* and these specimens must all be regarded as syntypes. The syntypes are: *Fleck* 497a and 499a, *Schenck* 457, *Schinzi* 2070 and 2071, and *Rautanen* 242. An examination of all the material of *E. suffruticosa* in the University of Zurich Herbarium revealed that there are two sheets of *Fleck* 497a; one in flower and young pod collected in October 1891, and the other with mature pods and seeds plus the fragments of a leaf collected in January 1891.

Schinzi (l.c.) was uncertain whether all of the above specimens belonged to the same taxon, and was therefore in some doubt about including them all under his *E. suffruticosa*. In particular, he expressed doubt about the specimen of *Fleck* 497a, with the robust mature pods, stating that they bore a resemblance to the pods of *E. elephantina*. As none of the specimens was regarded as complete, Schinzi drew up his type description from all of the syntypes. In view of the doubt in Schinzi's mind whether all of the specimens belonged to the same taxon, it seems desirable to select a lectotype for *E. suffruticosa*.

Owing to the difficulty of establishing the identity of leafless flowering specimens with absolute certainty, *Schenck* 457 and the flowering specimen of *Fleck* 497a have been eliminated as potential lectotypes as neither has any leaflets. *Fleck* 499a and *Rautanen* 242 are sterile and are not considered suitable for choice as lectotype either. The two best specimens are undoubtedly the Schinzi specimens; one from "Kilevi am Kunene", just south of Humbe in Angola, and the other from Amutele in Amboland, South West Africa. However, neither of these specimens bears a collector's number. Both specimens were named *E. suffruticosa* by Schinzi and the localities of collection correspond with the localities cited for the specimens of *Schinzi* 2071 and 2070 respectively. There are no other *Elephantorrhiza* specimens in Schinzi's collection from these localities, so it is considered safe to assume that these two specimens are the specimens he had before him and cited as *Schinzi* 2071 and 2070.

Schinz drew attention to the specimen from Kilevi having immature pods and, as the pods on this specimen in question from Kilevi are immature, this supports the contention that this was the specimen Schinz was referring to.

The Schinz specimen from "Kilevi am Kunene" (number 2071), consisting of three leaves and two pods and having two inflorescences in the capsule mounted on the sheet, is the better of the two Schinz specimens of *E. suffruticosa*. Consequently, I now select Schinz 2071 from Kilevi am Kunene in Angola as the lectotype of *E. suffruticosa*.

Having arrived at this decision to regard Schinz 2071 as the lectotype of *E. suffruticosa*, I found it more than a little disconcerting to find that Schinz in Mém. Herb. Boiss. 1: 105 (1900) cited Schinz 2071 from Olukonda-Oshiheke, Amboland, South West Africa as one of the syntypes of *Acacia arenaria* Schinz. Fortunately I have examined this syntype of *Acacia arenaria* and can vouch for its identity. In any event, it seems unlikely that Schinz 2071 from Olukonda-Oshiheke in South West Africa, the syntype of *Acacia arenaria*, would ever be confused with Schinz 2071 from Kilevi am Kunene in Angola, the lectotype of *Elephantorrhiza suffruticosa*. It is as well, however, to draw attention to the existence of these two Schinz specimens, each numbered 2071.

The flowering specimen, Hornby 2448 (K) from Poole farm, Hartley Distr., Rhodesia, doubtfully referred to *E. suffruticosa* in Fl. Zamb. 3, 1: 26 (1970), is in fact *E. goetzei* subsp. *goetzei* (see the leaves in the envelope mounted on the sheet).

#### INSUFFICIENTLY KNOWN SPECIES

##### 10. *Elephantorrhiza* sp.

Suffrutex producing at ground level unbranched, longitudinally striate, glabrous, stems 60–80 cm high. Leaves glabrous or almost so: petiole 3–4.5 cm long; rhachis 7.5–18 cm long; pinnae 3–8 opposite or subopposite pairs; rhachillae 7.5–10 cm long; leaflets 13–22 pairs per pinna, 9–11 × 3–5 mm, very oblique, broadly truncate basally or sometimes slightly auricled on the proximal side, asymmetric and attached by one corner, the midrib starting in the distal corner of the leaflet-base and gradually becoming almost central in the leaflet, rounded to acute or distinctly mucronate apically, glabrous throughout or with few minute marginal cilia. Flowers and pods unknown.

Known from one gathering from the eastern Cape.

CAPE.—3128 (Umtata): Umtata aerodrome (–DA), Strey 11073

Strey 11073 does not appear to match material of any of the existing species. Like *E. elephantina* and *E. obliqua*, the specimen has unbranched aerial stems. Strey 11073 appears to differ from *E. elephantina* in having larger leaflets, and differs from *E. obliqua* in having larger leaves with more numerous pinnae and leaflet pairs, and leaflets without a conspicuous venation. More material, particularly fertile material, is required in order to make a positive identification.

#### EXCLUDED SPECIES

*Elephantorrhiza pubescens* Phillips, in Bothalia 1: 190, t.5 fig. 3 (1923), based on Rogers 8659 (PRE holo.!; K!; SRGH) from Zambia, is a synonym of *Entada abyssinica* Steud. ex A. Rich.

#### CONCLUSIONS

The present state of knowledge of several species of *Elephantorrhiza* in southern Africa leaves much to be desired. Only the four most widespread species, namely, *E. elephantina*, *E. burkei*, *E. goetzei* and *E. suffruticosa* are fairly well collected and documented. Flowering and fruiting material of *E. praetermissa* has been collected, but more material is desired. The four remaining species, however, are inadequately known and there is concern about the present conservation status of all of them.

A list of the most serious deficiencies in our knowledge has been drawn up in the hope that collectors will make an effort to collect the material and information required to enable a more comprehensive picture to be compiled.

1. Pods of *E. obliqua* have never been collected. Both var. *obliqua* and var. *glabra* are known only from the type collections and no authentic material of either has been collected for over fifty years. More material of *E. obliqua*, particularly fruiting material, and information on the current conservation status of the species are required.

2. More material of *E. woodii* var. *woodii*, particularly fruiting material, is required. The pods of *E. woodii* var. *pubescens* are unknown. There is a need for flowering and fruiting material of var. *pubescens* and it is essential that the precise localities of collection are recorded. Ecological notes and information on the current conservation status of both varieties of *E. woodii* are desirable.

3. The identity of the plants from northern Natal, which have hesitantly been referred to *E. woodii* var. *pubescens* needs elucidation. Additional and better material is required.

4. *E. schinziana* has not been re-collected since Jan. 1939. As it is not absolutely certain whether the flowers of *E. schinziana* have been collected, flowering material is most desirable. It would also be interesting to know whether or not *E. schinziana* flowers when leafless. More material, ecological notes and information on the current conservation status of this species are required.

5. *E. rangei* is known only from the type collection (Jan. 1908). More material, ecological notes and information on the current conservation status of the species are required.

6. More material of Strey 11073 from the Umtata aerodrome in the eastern Cape is required.

