

# Notes on *Euphorbia mauritanica*, *E. gossypina* and some related species with an amplified description of *E. berotica*

L. C. LEACH\*

## ABSTRACT

Some aspects of the possible evolutionary development in the *Euphorbia mauritanica*—*lateriflora*—*gossypina* complex are discussed, and the seed morphology is considered probably to be of considerable significance in the taxonomy of the group. The relevance of the recently discovered relic population of *E. gossypina* is also considered, and a detailed description of this species, based on the Rhodesian material, is provided.

The identity of the little known *E. berotica* N.E. Br. from Angola is established and an amplified description drawn up. Attention is also given to the confusion concerning the type locality and distribution of *E. mauritanica* L. var. *lignosa* White, Dyer & Sloane.

These notes, although relating mainly to the problems of identification and classification of the complex containing *Euphorbia mauritanica* L., *E. lateriflora* Schum. & Thonn., *E. gossypina* Pax, etc., deal also with the possible evolution of the group. Presently included in Sect. *Tirucalli*, it seems to me that the complex may well represent part of a separate phylogenetic line. However, it is considered that clarification of the relationships and distribution of the genus as a whole is needed before such speculations should be accorded formal nomenclatural recognition in the infrageneric classification which, in the writer's opinion, already suffers from a number of doubtfully justifiable "sections".

The discovery, near Mangula in Rhodesia, of a colony of plants which clearly belongs to the complex, poses some interesting questions since no member of the group was previously known from the Flora Zambesiaca area nor, in fact, from any locality within a considerable distance from its boundaries.

It seems very probable that this disjunct, isolated population is indicative of a more "blanket" distribution of the complex in the past, and perhaps provides concrete evidence of the link between its southern, western and north-eastern relatives. Such a connection need not necessarily have existed during an arid period nor via an "arid corridor" (as is sometimes suggested in discussions of the similarities between the floras of the arid areas of south-western and north-eastern Africa), as the species concerned (*E. gossypina*) is not only tolerant of, but appears to thrive under "pluvial" conditions. In fact, it may well be that the Mangula population has been enabled to survive arid periods only because of the exceptionally high water availability obtaining in its particular habitat (Jacobsen, 1973). A specimen of this species, growing in rather heavy red soil and in shade in my garden near Salisbury, has received between 1 500 mm and 1 600 mm of rain this 1973-74 season (almost double the average for Mangula, and considerably above the maximum recorded for that area). This plant is thriving under these conditions whereas, during the semi-drought of the previous season, most specimens of the species then in cultivation were decidedly unhappy and some died.

When first investigating plants of this group occurring in southern Angola it seemed that they belonged in the affinity of *E. mauritanica*, and that they were possibly identical with var. *lignosa* White, Dyer & Sloane. However, although seemingly less likely from a geographical viewpoint, it is apparent

from the morphology of the seeds (Fig. 1), that the Angolan plants may be rather more closely related to the Rhodesian plants than to the southern *E. mauritanica* complex, and that related species of the north-eastern and south-western arid areas may well be vicariants which have arisen under the high rate of speciation which seems usually to be associated with desert conditions.

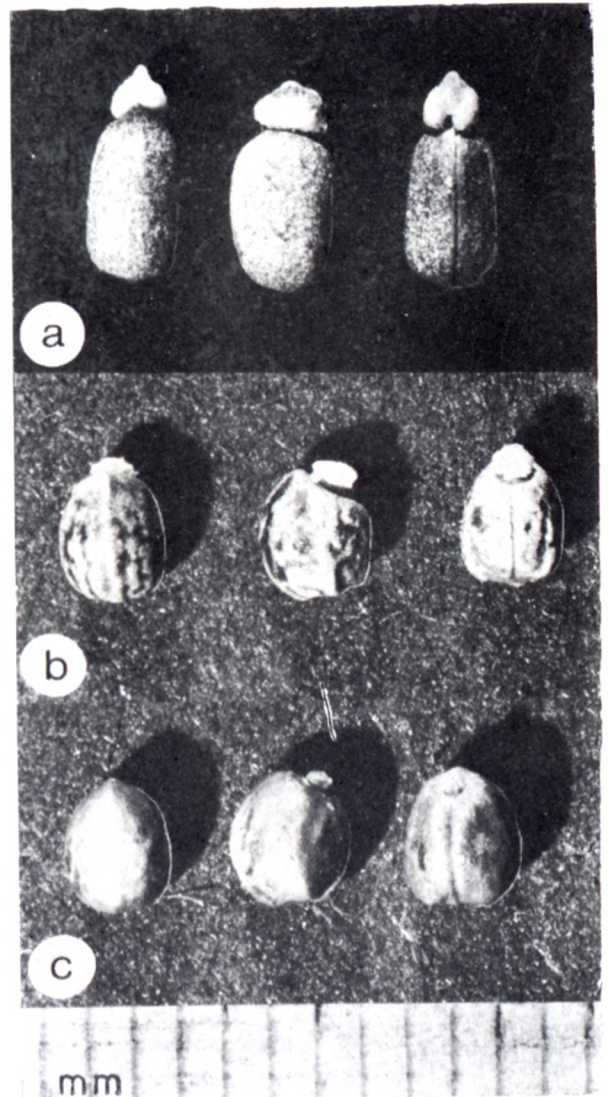


FIG. 1.—Comparison of seeds in *Euphorbia mauritanica*—*gossypina* Complex. a, *E. mauritanica* (Leach & Bayliss 15035, eastern Cape); b, *E. berotica* (Leach & Cannell 14026, southern Angola); c, *E. gossypina* (Leach et al. 14236, Mangula, Rhodesia). Photo: by courtesy of Ministry of Information, Rhodesia.

\*c/o National Herbarium, P.O. Box 8100, Causeway, Salisbury, Rhodesia.

The relic population of *E. gossypina* now surviving at Mangula would have been included in the closed forest area envisaged (Wild, 1968) under conditions of 150% of present day rainfall (conditions apparently eminently suitable for the species concerned) thus providing a direct connection with that area of west Africa where the closely related *E. lateriflora* is endemic today. Unfortunately I have not seen seeds of this latter species, but from the evidence offered by a plant in cultivation, as well as by flowering material in liquid, it seems probable that it is distinct from the previously mentioned taxa.

Also included in this grouping are *E. schimperi* Presl, *E. bottae* Boiss., *E. nubica* N.E. Br., *E. consobrina* N.E. Br., and *E. merkeri* N.E. Br.; other possible relationships, such as that with *E. cameronii* N.E. Br. require further investigation. Characteristic of these succulent and subsucculent glabrous shrubs are: slender, terete, exstipulate branches with, as far as is known, a thin, more or less odourless, apparently innocuous latex; alternate caducous leaves; a bracteate umbellate inflorescence, with cyathia with entire glands, emarginate or bidentate ciliate lobes and an exerted capsule bearing carunculate seeds.

Relevant herbarium material examined but not cited elsewhere in this paper includes, in addition to numerous examples of *E. mauritanica* complex from southern Africa: Arabia: *Schimper* 468 (K). Ethiopia (Eritrea): *Schweinfurth & Riva* 1083 (K). Sudan: *Schweinfurth* 207 (K); 265 (K). "Nubia" Th. *Bent* s.n. (K). Somalia: *Gillett* 4521 (K); *Peck* 321 (PRE). Ghana: *Chipp* 188 (K); *Newton* 1195 (SRGH). Nigeria: *Barter* 3309 (K); *Gunn* s.n. 31065 in PRE (PRE).

The taxonomy of the widely scattered populations involved appears to be as difficult to unravel as that of the closely related *E. mauritanica* Complex, and seems likely to remain a problem until adequate material becomes available. Although habit is generally distinctive, identification of the mostly incomplete herbarium material is usually difficult and sometimes well nigh impossible on any basis other than the locality of origin. However, from the comparisons now made, it seems that seed characters may be diagnostic at specific level and may consequently prove to be of considerable assistance in the classification of this taxonomically most difficult group.

*Euphorbia gossypina* Pax in Bot. Jahrb. 19: 119 (1895); N. E. Brown in Fl. Trop. Afr. 6, 1: 553 (1911); Brenan, Check-list Tang. Terr. 2: 211 (1949). Type: Tanzania, T1, Mwanza District, Kagehi, *Fischer* 514.

*E. implexa* Stapf in Kew Bull. 1908: 408 (1908). Type: Uganda, U4, Mengo District, Mawokota, *E. Brown* 414. *E. sp.*, W. B. G. Jacobsen in *Kirkia* 9, 1: 164, 193 (1973).

Plant a laticiferous, extipulate, unarmed, glabrous, succulent shrub, about 1 m high when self-supporting, but up to 2.5 m or more when semi-scandent on shrubs and trees, much branched from the base and above; branches at first erect, soon arching over if not supported (sometimes becoming pendent over cliffs) with flowering branchlets more or less erect; latex rather thin but copious, odourless and apparently innocuous. *Branches* terete, alternately or randomly produced, marked with alternate leaf-scars: succulent, becoming rather woody with age, green; main branches up to 2 cm diam. at the base, flowering branchlets usually  $\pm$  6 mm diam. tapering to  $\pm$  3–4 mm at the apex. *Leaves* alternate, caducous, sessile, often with an axillary bud, strongly deflexed, glabrous, green, fleshy, entire, usually concave above, obtusely convex or somewhat keeled beneath, linear-elliptic tapering into the base, or narrowly ovate to

ovate, acute, obtuse or truncate at the base, those towards the base of the branches distant, up to 6 cm long  $\times$  6.5 mm, becoming shorter and less distant above; those of the ultimate branchlets shorter and proportionally wider, becoming more so and more crowded towards the apex of the branchlets, then  $\pm$  8–10 mm long  $\times$  4.5 mm wide; *leaf scar* transverse, usually more or less straight (seldom lunate), slightly prominent, particularly on flowering branchlets, with a slight subtuberculate swelling just below, brownish, becoming corky and eventually blackish and conspicuous towards the base of the branchlets. *Inflorescence* a glabrous, terminal cymose-umbel, with a whorl of 4–7 (usually 5, up to 9 seen) spreading rays (peduncles) surrounding the initial cyathium, each subtended by a bract at its base and bearing a pair of bracts and a single bisexual cyathium at its apex. *Bracts* of the whorl glabrous, sessile, strongly deflexed, usually deciduous in fruit, ovate, acute or subapiculate, obtusely truncate at the base, up to 16 mm long and 8 mm wide, entire or occasionally with 1–3 relatively large, distant teeth, green, often somewhat yellowish towards the base and occasionally minutely red flecked. *Initial cyathium* male deciduous or sometimes bisexual, supported on a short, stout, prominently ribbed, pale green stipe; *involucre* yellowish, with 5–8 glands or occasionally eglandulose; *glands* rather variable as to shape and size, mostly more or less obovate, up to 4 mm long, 2.5–3 mm wide, entire or irregularly crenate or emarginate, spreading, only occasionally deflexed, often concave, yellow becoming deep orange; *lobes* 5–8, erect, obtuse, emarginate or bidentate, ciliate with long, slightly crisped, silky white hairs, otherwise glabrous, greenish yellow. *Rays* pale green, glabrous, variable in length (up to 25 mm), usually  $\pm$  2 mm diam.; *bracts* paired, usually deciduous in fruit, widely spreading, broadly elliptic or broadly ovate to very broadly ovate, up to 8 mm long and 7 mm wide (sometimes wider than long), acute or subapiculate, often shortly canaliculate at the apex, slightly keeled beneath, entire or occasionally sparingly toothed as those of the whorl; *cyathium* terminal, very shortly stipitate (perceptible only in fruit); *involucre* glabrous, pale green, cup-shaped,  $\pm$  4 mm deep,  $\pm$  6.5 mm diam. including the glands; *glands* 4, separate, spreading to deflexed, obovate or subcircular or occasionally transversely elliptic, 2–2.5 mm long, 2–3 mm wide, entire or occasionally crenulate or emarginate, usually convex from being recurved on the margins, pale green becoming dull yellow on the minutely and shallowly pitted upper surface; *lobes* 5, pale green erect, ovate or subquadrate, obtuse,  $\pm$  1.25 mm  $\times$  1.25 mm, irregularly denticulate, emarginate or bidentate, conspicuously ciliate with long, slightly crisped, silky, white hairs. *Male flowers*  $\pm$  35, arranged in 5 fascicles with numerous filamentose bracteoles, densely white hairy at the apex; *pedicel*  $\pm$  3 mm long; *filaments* pale green, 1–1.5 mm long; *anther cells* pale buff,  $\pm$  0.5 mm diam., pollen yellow. *Ovary* pale green, far exerted to one side (over the gap caused by the absence of the fifth gland) on a glabrous, pale green pedicel, slightly expanded at its apex into a rudimentary rim-like perianth. *Styles*  $\pm$  2.5 mm long, free almost to the base, spreading, bifid, with the lobes diverging recurved, slightly enlarged, obtuse and lightly rugulose at the apex. *Ovule* suspended under an entire, fleshy obturator. *Capsule* obtusely 3-lobed, 7–8 mm diam.,  $\pm$  5.5 mm high, eventually held erect on a pedicel 6–7.5 mm long, pale green, becoming pale brown shortly before dehiscence. *Seed* more or less ovoid, slightly obliquely truncate on the ventral side, more or less truncate at the base with a small gibbosity on each side of the

suture towards the ventral side, smooth, often very slightly pusticulate, brown, sometimes mottled with darker colour,  $\pm 3$  mm long  $\times$  2,5–2,75 mm, sometimes somewhat laterally compressed; with a very small, whitish caruncle. Figs. 2–6.

**KENYA.**—K4, Nairobi Distr., Mbagathi, *Gilbert Rogers* 232 (K); "Dugoretti" near Nairobi, *Tweedie* 1417 (K); "Karichwa Kubwa Stream", Nairobi, *A. G. McLoughlin* 984 (PRE); *ibid.* *Bally* "E12" (PRE). K6, "Narok Distr., Lemek Valley", *R. M. Hornby* 3088 (SRGH). K7, "Ribe to Galla Country", *T. Wakefield* (K); Teita Distr., Mwatate, *Bally* "E13" (PRE).

**TANZANIA.**—T3, Pare Distr., "Kihurio to Ndungu" "locally dominant both sides of the S. Pares, 1800ft–4000ft", *Greenway* 6476 (PRE); *ibid.*, *Leach & Brunton* 10210 (K; SRGH).

**RHODESIA.**—N, Lomagundi Distr., Mangula, Whindale Farm, alt.  $\pm$  1185 m, restricted to a small area of chert cliffs, fl. 18.ii.1968, *Jacobsen* 3372 (PRE; SRGH); *ibid.*, fl. 14.ii.1968, *Wild* 7686 (SRGH); *ibid.*, fl. 24.iii.1969, *Leach, Biegel & Pope* 14236 (BM; BR; K; LISC; SRGH).



FIG. 2.—*Euphorbia gossypina*, plant from near Mangula, Rhodesia, showing typically random branching (*Leach, Biegel & Pope* 14236).

The specimens from the Pare District are included here on the basis of the available material, although from this habitat some divergence would not be surprising.

The widely disjunct and apparently relic nature of the small, discrete population of this species at Mangula in Rhodesia, seems to indicate its isolation over a very long period. Combined with its restricted and specialized habitat this would lead one to expect that the plants would prove to be taxonomically distinct. However, a very close relationship with *E. gossypina* certainly exists and as no significant differences have been found between specimens from the Mangula population and those from various East African localities, there seems no doubt that they are conspecific which, in view of the apparent capacity



FIG. 3.—*Euphorbia gossypina*, normal inflorescence with male initial cyathium (*Leach, Biegel & Pope* 14236).



FIG. 4.—*Euphorbia gossypina*, typical fruiting cyme with deciduous initial cyathium (*Leach, Biegel & Pope* 14236).



FIG. 5.—*Euphorbia gossypina*, inflorescence with bisexual initial cyathium with eight glands (*Leach, Biegel & Pope* 14236).



FIG. 6.—*Euphorbia gossypina*, typically variable inflorescences (Leach, Biegel & Pope 14236).

for variation and speciation displayed by other portions of the complex, is somewhat surprising. There also seems little doubt (*ex descr.*) that N.E. Brown was correct when placing *E. implexa* in synonymy with Pax's species.

*Euphorbia berotica* N.E.Br. in Fl. Trop. Afr. 6, 1: 600 (1912). Type: Angola, Moçâmedes District, Welwitsch 633 (BM, holo.!; LISU!).

*E. tirucalli* sensu Hiern, Cat. Afr. Pl. Welw. 1, 4: 949 (1900), pro parte excl. Col. Carp. 916.

Shrub glabrous, yellowish green, spineless, much branched from the base, up to  $\pm 75$  cm high; root rhizomatose, thick, horizontal, often giving rise to adventitious plantlets at some little distance from the parent plant. Branches alternate or occasionally forked or subverticillate (possibly due to damage or die-back of the growing point), spreading-ascending or suberect, initially succulent, soon becoming woody, terete, slender (flowering branches tapering from 3,5–5 mm diam. to 1–2,5 mm at the apex). Leaves alternate, spreading to spreading-deflexed, sessile, fleshy, glabrous, concave above, convex beneath, very narrowly ovate or linear-ovate,  $\pm 1,5$  mm  $\times$  10 mm to 2,5–3 mm  $\times$  30 mm, quickly caducous; leaf-scar transverse,  $\pm$  straight, often slightly prominent but scarcely conspicuous. Inflorescence a cymose umbel (occasionally compound) with the initial cyathium male deciduous or sometimes bisexual, and 2–5 spreading rays (peduncles) developing from below the initial terminal cyathium, each with a bract at its base. Bracts unequal, varying in size and shape, 2–4,5 mm wide, 2,5–8,5 mm long (when more than 3 in the whorl often wider than long), sessile, subquadrate or very broadly ovate to narrowly ovate, acute or attenuate, often apiculate, eciliate, most dissimilar when 3 (cf. those of *E. monteiri* Hook.f.), usually deflexed, deciduous or subpersistent. Rays (peduncles) 4–10 mm long, 1,5–2 mm diam. (sometimes varying considerably in length in the same cyme), with a pair of bracts at their apex and bearing a shortly stipitate bisexual cyathium, occasionally with secondary pedunculate cyathia arising from the axils of the bracts. Bracts subpersistent (persistent at least to  $\pm$  mature fruiting stage), more regular in size and shape than those at the base of the cyme, subquadrate, subcircular or broadly ovate, apiculate, eciliate, often erose, widely spreading usually somewhat convex, 2–3 mm long, 3–4 mm wide. Cyathia shortly stipitate; stipe  $\pm 2$  mm long and thick, initially merging imperceptibly into the involucre but the junction eventually quite distinct: involucre glabrous, cup-shaped, 2,5–3 mm deep, 5,5–7 mm diam. including the glands; glands 3–5, mostly 4 (usually 5 in the initial, somewhat larger terminal cyathium, rarely 5 in secondary

cyathia, the 5th then relatively much reduced in size), widely spreading, separate, fleshy, minutely pitted on the concave upper surface, convex beneath, subcircular or transversely broadly elliptic,  $\pm 2$ –3 mm wide, 2 mm long, entire or slightly crenulate-crested on the outer margin, yellow; lobes 5, erect, bidentate, irregularly (sometimes obsolete) woolly ciliate: male flowers  $\pm 35$ , glabrous, with numerous, filamentose-laciniate, very variable woolly bracteoles; pedicels 2–2,5 mm long; filaments  $\pm 1,5$  mm long. Ovary glabrous, far exserted, curved to one side, on a 4–5 mm long pedicel with a rudimentary rim-like perianth; styles 2–2,5 mm long, free almost to the base or shortly connate, deeply bifid with the lobes widely diverging, recurved. Capsule obtusely 3-lobed or sometimes 2-lobed (rarely with 1 aborted), 5,5–6 mm diam., 4,5–5 mm high, eventually held erect on a pedicel  $\pm 7$  mm long. Seed more or less broadly ovoid, somewhat obliquely truncate at the apex, subtruncate at the base, lightly obtusely rugulose or somewhat pustulate, brownish cream or brown to almost black; with an almost sessile, somewhat laterally compressed, creamy yellow, subtranslucent caruncle. Figs. 6–9.

ANGOLA.—Moçâmedes Distr., "Suffrutex 2-pedalis, radice crassa . . . tota stirps . . . flavescenti-viridi-glaucis. Hab. in rupes arenoso-rubris . . . anti Boca do Rio Bero." st. July 1859 Welwitsch 633 (BM; LISU); yellow-green subsucculent shrub  $\pm 0,75$  m high, in association with *Cissus* sp., in sand on rocky slope  $\pm 37$  km from Moçâmedes on Vila Arriaga road, cult. Nelspruit, fl. & fr. Dec.–Jan. 1968–69, Leach & Cannell 14026 (BM; K; LISC; LUAI; M; MO; PRE; SRGH); subsucculent shrubs scattered on stony bare hills, in association with *Euphorbia virosa*,  $\pm 24$  km from Moçâmedes on road to Lucira, st. 11.ix.1967, Leach & Cannell 14033 (BOL; BR; COI; G; LISU; LUA; WIND); shrubby plants with thick horizontal root, st. 26.x.1970, Leach & Cannell 14659 (BM; K; LISC; M; MO; PRE; SRGH); shrubs scattered on sandy flats  $\pm 19$  km S of Curoca drift on Espinheira road, cult. Salisbury, fl. 6.viii.1971, Leach & Cannell 14679 (SRGH); scattered shrubs in close association with *Euphorbia congestiflora* in scattered "mopane" association on sandy flate  $\pm 25$  km S of Curoca drift, st. 29.x.1970, Leach & Cannell 14681 (BM; LISC), idem cult. Salisbury, fl. 6. viii.1971 (SRGH). Huila Distr., "entre Pocolo e Quihita, subarbusto de 1–1,7 m, formando colonias entre pedras", fl. 29.viii.1963, G. Barbosa & P. Gouveia 10720 (LUAI).

SOUTH WEST AFRICA.—1713 (Swartbooisdrif): sandy flats,  $\pm 17$  km E of Ombepera (—AC), shrubs  $\pm 0,6$  m high, fr. 12.iv.1957, De Winter & Leistner 5513 (WIND).

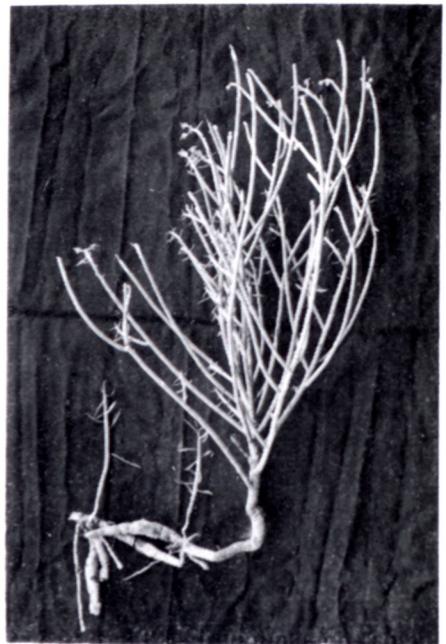


FIG. 7.—*Euphorbia berotica*, plant with thick rhizomatous roots bearing adventitious shoots (Leach & Cannell 14659).



FIG. 8.— *Euphorbia berotica*, plant growing in association with *E. virosa* near Moçâmedes (Leach & Cannell 14033).



FIG. 9.— *Euphorbia berotica* a, plant flowering and b, fruiting in cultivation at Nelspruit (Leach & Cannell 14026).

The heading "Imperfectly known species" under which N. E. Brown described this species seems to be particularly appropriate. The type specimen in the herbarium of the British Museum (BM) (the only specimen seen by N. E. Brown), comprises a single sterile twig, and it is obvious that the original description was, to a very large extent, compiled from the information given in Welwitsch's field notes; without these it is doubtful if the specimen could have been identified, even as to the family. There is another specimen from the same gathering in the herbarium of Lisbon University (LISU), which is similarly unidentifiable.

The species does not appear to have been again collected until 1967, when plants conforming exactly with Welwitsch's "aff. *E. rhipsaloidei* . . . radice crassa horizontali . . . flavescenti-viridi" (this is a peculiar hue characteristic of plants of the *E. mauritanica* group, one of the common names for which is "the yellow milk-bush"), were collected some 37 km from Moçâmedes towards Vila Arriaga (Leach & Cannell 14026). To the best of my knowledge there is no other species in southern Angola to which Welwitsch's description could be applied. As plants were not in flower at the time, a few plantlets were collected and placed in cultivation in the author's garden at Nelspruit in the eastern Transvaal, where both flowers and fruits were produced during the summer of 1968-69, so enabling adequate herbarium material to be prepared and the amplified description to be drawn up.

*E. berotica* appears to be most closely related to *E. mauritanica*, but differs in being a smaller shrub with more slender branches which soon become quite woody, while its thick rhizomatose horizontal root, which is not known to occur in *E. mauritanica*, often gives rise to plantlets at some little distance from the parent plant and is to some extent reminiscent of the habit of the related but quite different *E. stolonifera* Marl. The leaves of *E. berotica* are longer and proportionally narrower than those found in *E. mauritanica*, and its ciliate, more nearly persistent bracts, particularly those supporting the lateral cyathia, contrast quite sharply with those of its relative which are ciliate, concave and very quickly caducous. The 3-4, widely separate and concave, glands of the lateral cyathia (normally 5 in *E. mauritanica*) are also distinctive; however, it is possibly in the smaller capsule and quite different seeds that the most significant difference is to be seen.

It is interesting to note that in the narrow leaves, more nearly persistent bracts and four glands there appears to be a connection with the recently discovered and strangely disjunct Rhodesia population of the related *E. gossypina* Pax, a description of which is given on p. 506. Although in habit apparently more closely related to *E. mauritanica*, it is noteworthy that the seeds of *E. berotica* and *E. gossypina* are more similar to each other than to those of *E. mauritanica*. However, although obviously falling into the same group, in stature, habit and slender branches, as well

as in some details of the inflorescence, the Angolan species is altogether different from the Rhodesian.

Although *E. berotica* has a limited if somewhat scattered distribution, it seems probable that its coastal and inland populations should be recognized as taxonomically distinct. However, it is considered that no formal decision should be reached on this until an adequate quantity of material allows the extent of variability to be more reliably assessed.

At present the apparently significant differences between the coastal and inland populations include the more erect, rather taller but less freely rebranched habit of the latter as well as their less yellowish colour; while in the few flowering specimens seen, their leaves and bracts are considerably longer and proportionally narrower than those found in plants from the coastal area. It also seems noteworthy that the liquid used for preserving specimens remains clear when material from inland populations is preserved, but becomes blackish when used for similar specimens from near Moçâmedes.

Any discussion of this species would be incomplete without reference to *E. mauritanica* var. *lignosa* White, Dyer & Sloane to which, in slender lignescent branches, it superficially appears to be very closely related. However, this variety of *E. mauritanica* appears to differ from var. *namaquensis* N.E. Br. only in the extent, or perhaps the earlier development, of its woodiness and, on the evidence of the herbarium material examined, is represented by a number of geographically widely scattered individuals.

The southern Namib distribution, recorded by its authors for var. *lignosa*, appears to refer to that of the quite different *E. chersina* N.E. Br. of which one of the syntypes is *Marloth 4638*; since var. *lignosa* is also based on a specimen labelled *Marloth 4638* it seems that there has been some confusion of specimens or labels.

During a recent visit to Luderitz Bay, made to establish, if possible, the identity of this variety, no plants of *E. mauritanica* could be found, nor are there any herbarium records of var. *lignosa* from the coastal areas of the southern Namib where it is reputed to be "the most frequent shrub". On the other hand, *E. chersina* is extremely common around Luderitz Bay and there are numerous records of its occurrence southward to as far as the Richtersveld to the south of the Orange River. It seems certain, therefore, that the material of var. *lignosa* labelled *Marloth 4638* is from some locality other than Luderitz Bay and that the collector's notes attached thereto refer, in fact, to *E. chersina*.

Incidentally, the fact that var. *lignosa* does not occur in the southern Namib clears up the apparently rather anomalous situation in which var. *foetens* (Dinter) White, Dyer & Sloane, by far the most succulent variety of *E. mauritanica*, appeared to share a large part of its distribution with the least succulent (var. *lignosa*).

#### ACKNOWLEDGEMENTS

The author wishes to thank the following:

The Directors of the herbaria of: the British Museum, London (BM); the Royal Botanic Gardens, Kew (K); the Centro de Botânica da Junta de Investigações do Ultramar, Lisbon (LISC); the Universidade de Lisboa, Lisbon (LISU); the Instituto de Investigação Científica, Sá da Bandeira (LUAI); the Botanical Research Institute, Pretoria (PRE), and the State Herbarium, Windhoek (WIND), for the loan of much valuable material.

Mr J. Lavranos of Johannesburg and Mr L. E. Newton of Kumasi for live plants of the *E. mauritanica-gossypina-schimperii* Complex, and flowering material of *E. lateriflora* preserved in fluid.

Dr E. J. Mendes, Centro de Botânica, Lisbon, for much information concerning Angolan localities and other related matters.

The South African Council for Scientific and Industrial Research for generous financial support in respect of the 1967 Angolan expedition.

Dr W. T. Stearn for his most helpful discussions concerning nomenclatural problems.

Dr B. de Winter, Director, Botanical Research Institute, Pretoria, for the facilities of the herbarium and library, Dr L. E. Codd, formerly Director of that Institute and Mr R. B. Drummond of the National Herbarium, Salisbury, (SRGH), for many valued discussions.

#### REFERENCES

- BROWN, N. E., 1911–1912. *Euphorbia*. In W. T. Thiselton-Dyer, *Flora of Tropical Africa* 6, 1. London: Reeve & Co.
- DE WINTER, B., 1971. Floristic relationships between the northern and southern arid areas in Africa. *Mitt. Bot. Staatssamml. München* 10: 424–437.
- JACOBSEN, W. B. G., 1973. A check list and discussion of the flora of a portion of Lomagundi District, Rhodesia. *Kirkia* 9, 1: 139–207.
- MEYER, P. G., 1967. *Euphorbiaceae*. In H. Merxmüller, *Prodromus einer Flora von Südwestafrika* 67.
- WHITE, A., DYER, R. A. & SLOANE, B. L., 1941. *The succulent Euphorbieae*. California: Abbey Garden Press.
- WILD, H., 1968. Phytogeography in south central Africa. *Kirkia* 6, 2: 197–222.