

Notes on *Euphorbia* subgenus *Euphorbia* in Ethiopia.

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Resum

GILBERT, M. G. (1992). Notes sobre *Euphorbia* L. Subgènere *Euphorbia* a Etiòpia. Collect. Bot. (Barcelona) 21:67-77.

Es presenten unes notes preliminars per a la Flora d'Etiòpia sobre *Euphorbia* L. subgen. *Euphorbia*. Es donen les sinonímies revisades per a *E. abyssinica*, *E. ampliphylla* i *E. polyacantha*. Es descriuen sis espècies noves (*E. burgeri* M.G. Gilbert, *E. nigrispinoides* M.G. Gilbert, *E. sebsebei* M.G. Gilbert, *E. bitataënsis* M.G. Gilbert, *E. baleënsis* M.G. Gilbert i *E. awashensis* M.G. Gilbert) i una subespècie (*E. septentrionalis* subsp. *gamugofana* M.G. Gilbert).

Mots claus: Euphorbiaceae, *Euphorbia* subgènere *Euphorbia*, Taxonomía, Flora d'Etiòpia.

Abstract

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Precursory notes on *Euphorbia* subgen. *Euphorbia* for the Flora of Ethiopia are given. Revised synonymies are given for *E. abyssinica*, *E. ampliphylla* and *E. polyacantha*. Six species: *E. burgeri* M.G. Gilbert, *E. nigrispinoides* M.G. Gilbert, *E. sebsebei* M.G. Gilbert, *E. bitataënsis* M.G. Gilbert, *E. baleënsis* M.G. Gilbert and *E. awashensis* M.G. Gilbert, and one subspecies: *E. septentrionalis* subsp. *gamugofana* M.G. Gilbert, are described as new.

Keywords: Euphorbiaceae, *Euphorbia* subgenus *Euphorbia*, Taxonomy, Flora of Ethiopia

INTRODUCTION

The following notes are a precursor to an account of the genus *Euphorbia* for the Flora of Ethiopia. Subgenus *Euphorbia* is the largest group within the genus in Ethiopia with some 44 taxa currently recognised in the draft account. Several of these are still inadequately known but others are sufficiently well collected to be described as new. It is very likely that the final number of taxa will be significantly higher, especially once the south eastern parts of Ethiopia

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(most particularly the almost totally unexplored gypsum areas of southern Bale Region) become better known.

The material now available, coupled with fairly extensive field work suggests, quite strongly, that there are rather few distinct taxa of succulent euphorbias in northern Ethiopia and contiguous areas. Early botanists, notably Berger, Pax and, particularly, Brown made much too much of the variation shown by the few specimens then available to them. This variation is due more probably to differences in the age of the plant from which they were collected or, in several cases, due to the atypical growth of plants in European conditions, than to significant differences in genotypes. The author believes that there are three species of large tree euphorbias in the area: a wet montane forest species with \pm deciduous branches, predominantly 3-winged stems, very weak spination and prominent leaves on both adult and juvenile growth — *E. ampliphylla* Pax; a tree of dry montane evergreen woodlands and bushlands with a 6 or more angled trunk, very persistent branches, 4 or more angled stems, more robust spines, prominent leaves only on young seedlings and large, rather fleshy fruits — *E. abyssinica* and a tree of lowland deciduous woodlands and bushlands very similar to *E. abyssinica* but with a 4-5(-6)-angled trunk and smaller, more deeply lobed fruits — *E. candelabrum* Kotschy. Similarly, only one common shrubby species with paired spines can be discerned, *E. polyacantha*. New synonymies are given for these species along with notes on certain other species from central and southern Ethiopia and descriptions of new species.

It is interesting to note that the variation pattern is parallel within *E. abyssinica* and *E. polyacantha*, with robust many-angled plants in the north and 4-5-angled plants in the south. It may reflect an adaption syndrome to the drier north with a long dry season and just the one only relatively reliable period of rain in contrast to the rather higher but more variable bimodal rainfall of south. At the same time the difference in fruit size and form that seems to provide the most reliable difference between the higher altitude *E. abyssinica* and the lower altitude *E. candelabrum* is also paralleled in the East African taxa *E. magnicapsula* Carter and *E. bussei* Pax which have a similar altitudinal separation, suggesting that higher altitudes might favour larger fruits.

TAXONOMIC NOTES

Euphorbia abyssinica Gmel, Syst. Nat. ed. 13.2 (7): 759 (1791); Raeuschel, Nomencl. Bot. ed. 1797: 139 (1797); Boissier in DC, Prodr. 15.2: 84 (1862); N.E. Brown in Fl. Trop. Afr. 6.1: 588 (1912); Andrews, Flow. Pl. Angl. Egypt. Sudan 2: 66 (1952); Jacobsen, Handb. Sukk. Pfl. 1: 509 (1954) & Sukk. lex.: 180 (1970); Cufodontis in Bull. Jard. Bot. Brux. 28, Suppl.: 441 (1958). TYPE 'Kol-qual' Bruce, Travels to the source of the Nile 5: tab. ad p. 41-43 (1970).

E. officinarum L. β *kolquall* Willd. Sp. Pl. 2: 884 (1799). TYPE: as for *E. abyssinica*.

E. obovalifolia A. Rich., Tent. Fl. Abyss. 2: 239 (1851); Boissier, loc. cit.: (1862); Gilbert in Kew Bull. 45: 195-197 (1990). TYPE: Ethiopia, Shewa Region or Tigray Region, 'Prov. Choho & Chiré', *Quartin-Dillo* (holotype + isotypes P) (*non sensu auct. plur.!*)

E. grandis Lem., Ill. Hort. 4. Miscell.: 101, 107 (1857); N.E. Brown, loc. cit.: 590 (1912); Cufodontis, loc. cit.: 447 (1958). TYPE: cultivated in Paris from Ethiopian material collected by Quartin-Dillon & Petit (holotype P).

E. richardiana Baill. in Adansonia 1: 105 (1860). *nom. illegit.* TYPE: as for *E. grandis*.

E. abyssinica var. *tetragona* Schweinf. in Bull. Herb. Boiss. 7, Appendix: 319 (1899). TYPE: Ethiopia, Eritrea Region, high plateau of Haigett, *Schweinfurth* 1351 (holotype B†; isotype K).

E. hararensis Pax in Engl. Bot. Jahrb. 39: 632 (1907); N.E. Brown, loc. cit.: 602 (1912); Cufodontis, loc. cit.: 448 (1958). **synon. nov.** TYPE: Ethiopia, Harerge Region, Karssa, based on photo by F. Rosen.

- E. neutra* Berger, Sukkulente Euphorbien: 71 (1907); Jacobsen loc. cit.: 569 (1954) & loc. cit.: 197 (1970). TYPE: a cultivated plant, possibly from Ethiopia (probably based entirely on living material, no permanent specimen preserved).
- E. candelabrum* Kotschy var. *erythraeae* Berger, Sukkulente Euphorbien: 73 (1907); Jacobsen loc. cit.: 524 (1954) & loc. cit.: 183 (1970). TYPE: cultivated in Italy from material collected in Eritrea or Sudan by Schweinfurth & Penzig (probably based entirely on living material, no permanent specimen preserved).
- E. erythraeae* (Berger) N.E.Br., loc. cit.: 596 (1912) *nom. illegit.*, non *E. erythraea* Hemsley in J. Linn. Soc. Bot. 26: 414 (1891).
- E. acruensis* N. E. Br., loc. cit.: 595 (1912); Jacobsen loc. cit.: 509 (1954) & loc. cit.: 180 (1970); Cufodontis, loc. cit.: 442 (1958). **synon. nov.** TYPE: Ethiopia, Eritrea Region, near Acrur, Schweinfurth & Riva 1351 *pro parte* (holotype K; isotype P).
- E. controversa* N. E. Br., loc. cit.: 588 (1912); Cufodontis, loc. cit.: 444 (1958). **synon. nov.** TYPES: Ethiopia, Tigray Region, Mai Gouagoua, *Quartin-Dillon* (syntype P) & without locality (?near Adwa fidé Gay), *Schimper* II: 934 (syntype K; isosytype G, P).
- E. disclusa* N. E. Br., loc. cit.: 592 (1912); Jacobsen loc. cit.: 534 (1954) & loc. cit.: 187 (1970); Cufodontis, loc. cit.: 446 (1958). **synon. nov.** TYPE: cultivated, of unknown origin (holotype K).
- E. neglecta* N. E. Br. loc. cit.: 593 (1912); Jacobsen loc. cit.: 566-568 (1954) & loc. cit.: 197 (1970); Cufodontis, loc. cit.: 453 (1958). TYPE: cultivated, of unknown origin (holotype K).
- E. aethiopicum* Croizat in J. Jap. Bot. 17: 575 (1941). TYPE: as for *E. candelabrum* var. *erythraeae*.

There has been no review of the taxonomy of *E. abyssinica* since N. E. Brown's account for the Flora of Tropical Africa. It is now clear that this is a common and variable species which shows some clinal variation: most plants from northern Ethiopia, including the type, an illustration by the artist Belugani for James Bruce, are very robust with a trunk with 8 or more ribs and branches only slightly constricted into very short segments; plants from the southern end of the range — Shewa, northern Harerge and northern Somalia — have narrower 5-6-ribbed trunks and branches more deeply constricted into longer segments ('*E. hararensis*'). It is possible that the latter could have originated by introgression from *E. candelabrum* but the two forms overlap so much in distribution that it does not seem feasible to attempt any formal separation between them. Thus it seems safe to include quite a number of later taxa as synonyms even though rather too many of these are now only known from the original descriptions: either the types were lost during the destruction of much of the Berlin herbarium in 1943 or, in the case of the species described by Berger, the descriptions were based on plants in cultivation and no type material was preserved. If there was a complex of tree species in the parts of Ethiopia concerned such as occurs in East Africa it would be extremely difficult to place some of these names but in the much simpler situation described above it is thought possible to assign them to the known species with an acceptable level of confidence.

Euphorbia ampliphylla Pax in Ann. Bot. Roma 6: 186 (1897); Gilbert in Kew Bull. 45: 195-197 (1990). TYPE: Ethiopia, Sidamo Region, between Alghe (Aghere Mariam) & Oi, *Ruspoli* & *Riva* 1481 (B holotype destroyed; FT, Z isotypes) sheets seen also bear the numbers '1936' and '(1337)'.

E. abyssinica sensu Engler, Hochgebirgsfl. Trop. Afr.: 286 (1892)

E. winkleri Pax in Engl. Bot. Jahrb. 30: 342 (1901); N.E.Brown in Fl. Trop. Afr. 6.1.: 594 (1912); Brenan, Tangan. Terr. Check List: 214 (1949); Jacobsen, loc. cit.: 613 (1954). TYPE: Tanzania, Njombe Distr., Lipanga [Lipanye] Mts., *Goetze* 1000 (B, holotypet; K, fragment and drawing of holotype.)

E. menelikii Pax in Engl. Bot. Jahrb. 39: 632 (1907); N.E.Brown loc. cit.: 603 (1912); Cufodontis

- loc. cit.: 452 (1958). **synon. nov.** TYPE: Ethiopia, Shewa Region, 2400 m., Genet - photo. in Rosen, Eine deutsche Gesandtschaft in Abessinien: 292 (1907).
- E. sancta* Pax loc. cit.: 632 (1907); N.E.Brown loc. cit.: 603 (1912); Cufodontis loc. cit.: 457 (1958). **synon. nov.** TYPE: Ethiopia, Harerge Region, Chercher Mts., 2270 m., Deder ('Deru') - photo. in Rosen, Eine deutsche Gesandtschaft in Abessinien: 95 (1907).
- E. obovalifolia* sensu N.E.Br. in Fl. Trop. Afr. 6.1: 594 (1912); Cufodontis loc. cit.: 454 (1958); Dale & Greenway, Kenya Trees & Shrubs: 200 (1961); Jacobsen loc. cit. 198 (1970); S. Carter in Cact. Succ. J. Gt. Brit. 38: 66 (1976) & in Fl. Trop. E. Afr. Euphorbiaceae pt. 2: 483 (1988), *non* A. Rich. (1851).

The unfortunate need to change the name of this well known forest tree has been explained elsewhere (Gilbert, 1990). The species is very widely distributed in the moister afro-montane forests of Ethiopia where it is the only tree Euphorbia known to occur. The two species added to the synonymy are known only from photographs of entire trees which show no details of stem and flower form but are quite adequate, particularly when combined with the localities they were taken, to confirm that they represent *E. ampliphylla* which is known to be common both in the Chercher Mts. and in the forests west of Addis Abeba around Genet.

Euphorbia burgeri M. Gilbert, *spec. nov.*

A. E. cactus Boiss. habitu arborescentibus, ramis veteribus deciduis, pedunculis brevioribus, capsulo minoris, seminibus rugoso-pustulatis differt; a *E. polyacanthae* Boiss., *E. nigrispinae* N.E.Br. et *E. nigrispinoide* mihi ramulis robustioribus pro parte maxime trigonis, spinis longioribus, fructis maioribus exsertens et duos primis habitu arborescentibus differt.

TYPE: Ethiopia, Harerge Region, S of Midaga, c.70 km S of Harar, 28 Dec. 1962 (fruits), *Burger* 2481 (K, holotypus; ETH, isotypus).

Candelabriform shrub or small tree to 3 m high with distinct main stem and ascending branches, old branches deciduous leaving clear trunk; stems uniformly green, 3(-4)-sided, up to 3-4.5(?-7) cm wide, strongly constricted at intervals of up to 12 cm, segments widest near to base, occasionally uniformly slender, wider portions shallowly toothed; spineshields grey, contiguous along angles to form continuous horny margin c.1.5 mm wide, spine pairs 4-11 mm apart, up to 9-15 mm long but much reduced, sometimes almost obsolete, along narrow portions of stem, prickles almost obsolete. Cymes solitary, yellow, 1-forked, c.7 mm long overall; peduncle c.0.7 mm long, stout; basal bracts broadly ovate to triangular, soon lost, upper bracts oblong-ovate, 1.5 × 1.2 mm, scarious. Cyathia c. 2.5 × 3(+) mm; involucre 5-merous, funnel-shaped; lobes ± semicircular, c. 0.7 × 1 mm, margin irregularly dentate; glands transversely elliptical, contiguous, 0.5 × 1.6 mm, spreading when mature. Fully mature flowers not seen. Male flowers: bracteoles oblanceolate, c. 2 mm long, ± fimbriate near centre of cyathium, split into linear lobes towards outside; anther-cells reniform, c.0.6 mm long. Female flowers in lateral cyathia only, subsessile; styles c.1.1 mm long, joined at base for c.1/4-1/5 length, stigma very shortly bifid, almost capitate. Capsule just exserted from involucre, broadly ovoid, obtusely 3-lobed, c. 4 × 6 mm, grey with small white dots. Seeds (slightly shrivelled) subglobose with slight dorsal keel, over 2 mm long, grey with prominent whitish papillae.

HABITAT. Locally common, sometimes subdominant, on limestone slopes; 1200-1560 m.

ETHIOPIA: Harerge Region, between Galalca and Borale (9°00'N 42°33'E), 10 Nov. 1963 (flowers), *Burger* 3353 (K); 50 km along road Harar, 18 March 1962 (sterile), *Burger* 1567 (K); slopes W of Daletti, above Gobelli River (8°32'N 42°07'E), 28 Dec. 1963 (fruits), *Burger* 3403 (K).

These collections were previously named as *E. ?thi* Schweinf., a name also consistently, but incorrectly, used for collections of *E. cactus* Boiss. from inland Ethiopia. This species does seem most closely related to *E. cactus*, the Ethiopia forms of which also have uniformly 3-sided, irregularly-segmented, stems with similar spines. However *E. cactus* rarely, if ever, has a distinct main stem and has much larger (c. 4.6×8 mm) capsules, strongly exserted from the cyathia, and smooth seeds. *E. burgeri* could be regarded as a possible link between *E. cactus* and members of the *E. polycantha* complex as the shortly exserted, moderate sized capsules are nicely intermediate between those of the two groups.

Plants growing around Sof Omar (Balé Region, 6°55'N 40°48'E), e.g. Thulin et al. 3746, are closely related, possibly conspecific. Most are rather irregular shrubs to 2 m high growing under well-developed woodland with *Commiphora erythraea* and *Kirkia burgeri* as the most common trees but plants growing in more open situations, and cultivated seedlings, do develop a trunk. They differ from the Harerge material by the distinctly smaller segments, to 3 cm wide, 5 cm long, often less, with relatively more prominent spines. Young cyathia are bright yellow but the fruits are not known.

Euphorbia polycantha Boiss. Cent. Euph.: 25 (1860) & loc. cit.: 84 (1862); N.E. Brown loc. cit.: 578 (1912); Jacobsen, loc. cit.: 578 (1954) & loc. cit.: 180 (1970); Cufodontis loc. cit.: 455 (1958). TYPES: Ethiopia, Tigray Region, near Djeladgeranne, Schimper III. 1790 (isotype K!) & Schimper (1855) 1264 (syntype P!); Wegerat [Ouodjerate], Quartin-Dillon (syntype P!)

E. thi Schweinf. in Verhandl. Zool.-Bot. Gesellsch. Wien 18: 660 (1868); N.E. Brown loc. cit.: 581 (1912); Andrews, loc. cit.: 78 (1952); Jacobsen loc. cit.: 601 (1954) & loc. cit.: 204 (1970); Cufodontis, loc. cit.: 460 (1958). **synon. nov.** TYPE: Sudan, Wadi Haratreb, between Suakin and Berber, Schweinfurth 832 (isotype K!).

E. polycantha var. *subinarticulata* Schweinf. in Bull. Herb. Boiss. 7: Append. 2: 323 (1899). TYPE: Sudan, Wadi Haratreb, between Suakin and Berber, Schweinfurth 203, 204 & 339 (?syntypes B†) & Sinkat, Schweinfurth 210 (?syntype B†).

E. polycantha subsp. *rosenii* Pax in Bot. Jahrb. 39: 632 (1907); N.E. Brown loc. cit. 578 (1912); Cufodontis, loc. cit.: 455 (1958). TYPE: Ethiopia, Harerge Region, Alemaya ['Haramaja'], Rosen (holotype B†).

E. infausta N. E. Br. loc. cit.: 580 (1912); Andrews, loc. cit.: 78 (1952); **synon. nov.** TYPE: Ethiopia, Eritrea Region, Acrur, Schweinfurth & Riva 1008, 1694 (both syntype K!) & Gheleb, Schweinfurth 1233, 1248 (both syntype K!), 1094, 1438 (not seen).

E. thi var. *subinarticulata* (Schweinf.) N.E.Br. loc. cit.: 582 (1912); Andrews, loc. cit.: 78 (1952); Cufodontis, loc. cit.: 460 (1958).

E. tetragona sensu A. Rich., Tent. Fl. Aeth. 2: 238 (1851) non Haw. (1826).

This species was described from material from N Ethiopia but it is now taken to include material from the Red Sea Hills south to Balé Region in Ethiopia, most records coming from on or near the eastern escarpment of the Ethiopian highlands. The species is quite variable with a suggestion of clinal variation from north to south: northern plants show a tendency to be stouter and with more ribs, up to 7 ('*E. thi*'), in contrast to the south where most material is 4-5-ribbed ('subsp. *rosenii*'). As the floral characters used by Brown do not seem significant, probably more accidents of preservation than any real difference, and there are no discernible discontinuities in any other character, the author has no hesitation in sinking *E. thi*, *E. infausta* and the two infraspecific taxa.

The name *E. thi* has been applied frequently but incorrectly to a group of Ethiopia collections more correctly included with *E. cactus*.

Burger 3276 from near Alemaya College is in many respects intermediate between *E. polycantha* and the much larger tree species, *E. abyssinica*, and is almost certainly a hybrid between them. The two species are grown intermingled as hedge plants along roads in the area.

Euphorbia nigrispina N.E.Br. in Fl. Trop. Afr. 6.1: 574 (1912); Cufodontis, loc. cit.: 453 (1958); ?Jacobsen, loc. cit.: 197 (1970). TYPE: Ethiopia, Bale Region, Web Karanle, *Ruspoli & Riva* 929 (holotype B†; fragment & drawing of holotype K; isotype FT) (The isotype sheet in FT also bears the numbers '1030' and '(392)')

This species is here regarded as being limited within Ethiopia to the type collection plus a small number of collections made by Burger from Harerge Region. Carter (in prep.) also includes a range of Somali collections but with some reservations: first there must be some doubt as to the exact identity of this species until topotypic material can be obtained; second the variation within Somalia is so great that more than one taxon might be involved. Most Ethiopian collections hitherto so named have been included in *E. nigrispinoides* described below.

E. nigrispina is separated from other described species in the group by the slender, erect, distinctly jointed stems and the regularly varying spines, the longest of which are 13-15 mm, longer than in other members of this complex. It is a shrub branching primarily from ground level to produce a clump as in *E. polyacantha*.

Euphorbia nigrispinoides M.Gilbert sp. nov.

E. polyacanthae Boiss. et *E. nigrispinae* N.E.Br. *affinis sed habitu arboreis trunco manifeste, ramis non manifeste articulatis veteris deciduis differt.*

TYPUS: Ethiopia, Shewa Region: 46 km ENE of Nazareth on road to Awash Station, 1400 m, 25 Nov. 1972, *Jonquil Ash* 1800 (holotypus K).

Small tree with well-defined trunk, reaching c. 3 m high overall; crown rounded, relatively open, branches spreading ascending, eventually deciduous to leave clean bole. Stems (3-)4-5-angled, 12-17(-20) mm thick, usually only obscurely segmented, uniformly pale green, often slightly glaucous, angles straight or only slightly toothed. Leaves reduced to caducous scales. Spine-shields continuous along angles, blackish when young or wet, otherwise pale grey; flowering eyes 5-12 mm apart; prickles almost obsolete; spines paired, straight, up to 7-11(-13) mm long, varying only gradually in length along the stem. Cymes solitary, bright yellow throughout, apparently never producing more than 1 male cyathium and 2 bisexual cyathia; peduncles up to 1.5 mm long; bracts broadly ovate-deltoid, tip acute, margin entire, c. 1.1 mm long. Cyathia sessile; involucre funnel-shaped, c. 2 X 3 mm (2-2.5 X 4-4.8 mm in spirit) including glands; lobes flabellate, margin irregularly dentate, c. 0.9 mm long; glands 5(-6), transversely oblong-elliptic, entire, 0.8 X 2.8 mm (spirit). Male flowers: bracteoles oblong, tip shortly lacinate, often with linear lobes split from margin, hardly exserted from involucre; pedicel 3 mm long; filament c. 0.8 mm long; anthers broadly reniform, 0.6 mm long. Female flower pedicellate but with only the tip of the ovary exserted beyond involucre at anthesis; styles free, very shortly 2-lobed into subcapitate stigmas, 1.9 mm long. Capsule partly exserted from involucre but with base still concealed, 3-lobed, lobes rounded, smooth or obscurely articulated, brown, c. 3.2-3.5 mm long. Seeds subglobose, densely rugose, grey, c. 1.7 X 1.5 mm.

HABITAT. Nearly all records are from relatively recent flows of spongy basalt and volcanic ash with a sparse cover of deciduous woodland with *Pistacia falcata*, *Terminalia brownii*, *Steganotaenia araliaceae* etc. 1100-1430 m.

ETHIOPIA. Awash National Park, Kassin River, 1100 m, 4 Nov. 1967, *Bally* 13001 (ETH,K); 31 km ENE of Nazareth on road to Awash Station, 1425 m, 7 Jan. 1965, *Beals* 961 (ETH,K); Metahara, 1000 m, 26 Sept. 1976, *Boulos* 9468 (K); 5 km E of Welenchiti on Nazareth - Awash Station road, 1300 m, 16 Feb. 1965, *Burger* 3688 (ETH,K); Marribona, 1430 m, 22 Nov. 1959, *Mooney* 8251 (ETH,K); 35 km ENE of Nazareth on road to Awash Station, 1400 m, 13 Feb. 1965, *W. de Wilde* 10019 (K).

Most of the material of this locally rather common species had been named as *E. nigrispina* but it differs sharply from that species by the distinctly arborescent habit, plants having a main stem with lateral branches that eventually die and drop off to leave a well defined trunk. All habit notes to collections of *E. nigrispina* sens. str. describe it as a shrub with numerous erect stems from near ground level, as in *E. polyacantha*. There are possibly related plants with a similar habit in Somalia but most notes indicate plants nearer *E. nigrispina* but with more irregular branching and not forming proper trunks. *E. burgeri* has a very similar habit but that species has much more strongly articulated 3(-4)-angled branches.

Euphorbia makallensis Carter in Kew Bull. 36: 31-33 (1981). TYPE: Ethiopia, Tigray Region, Igre Hariba, 10 km E of Mekele, Wilson 696 (K, holotype!).

A very restricted and distinct endemic known only from an area of about 4 square kms. in Tigray Region. It is easily recognised by the habit – it forms low mounds, broader than high, of very densely crowded stems, and distinctive white spine shields with very short spines. Fruits were not known when the species was described and it was first suggested that it was related to the Arabian *E. fruticosa* Forssk. which has exserted ovaries. Since then the fruits have been seen: these are sessile which suggests rather a relationship to *E. polyacantha* and *E. nigrispina*.

***Euphorbia septentrionalis* subsp. *gamugofana* M. Gilbert subsp. nov.**

E. septentrionalis Bally & Carter in Kew Bull. 29(3): 514-516 (1974) quoad collectiones Corradiorum, non sens. str.

A typo podariis magis decurrentibus, spinis et cymis longioribus differt.

TYPUS: Ethiopia, Gamu Gofa Region, Corradi 5743 (FT, holotypus)

Succulent with dense tufts of short, and occasional longer sprawling, stems to 25 cm long, usually less. Stems 4-sided with rounded, \pm toothed, angles, c 10 mm thick, probably glaucous grey-green with irregular paler central stripe along sides. Spine-shields separate, linear, (3-)5-8 mm long overall, 1.5(-2) mm wide above spines, slender below; prickles up to 1 mm long, very slender, sometimes \pm obsolete; spines paired, up to 8-13 mm long, grey. Flowering eye just above spine-shield, solitary, cymes very slender, up to 7.5 mm long overall, peduncle 1-2(-5) mm long; involucre obconical, 2-2.5 X 1.5 mm, glands clearly separate, rounded, suberect. Capsule exserted from involucre. Seed (immature) ovoid, 2 X 1.2 mm, rugose.

HABITAT. "In open woodland near river" – nearly all related species grow on basement complex rock outcrops at moderately low altitudes.

ETHIOPIA. Sidamo Region: El Banno (Tertale), 2 May 1939, Corradi 5553 (FT); Gamu Gofa Region, along Caschei River, 4 July 1939, Corradi 5743 (holotype FT); on Atana – Murle road, 13 July 1939, Corradi 5762 (FT); Asile, 28 July 1939, Corradi 5811 & 5813 (FT); 28 km SE of Turmi on road to Konso (ca. 4°50'N 36°41'E), 5 October 1989, Gilbert & Phillips 9082 (ETH K UPS).

VERNACULAR NAMES: Lollol-(Caro area); D-la or Dalla (Atan-area).

These collections were cited as *E. septentrionalis* in the protologue of that species but Carter (1988: 519) later referred to them as close to but distinct from that species. Most of the Kenyan material does present a slightly distinct facies from the Ethiopian material but there does not seem to be any absolute discontinuity to separate all collections, at least so far as dried herbarium material is concerned. Experience has shown that the information loss on drying succulents such as these is very considerable and that it may well be possible to make

an absolute separation between Ethiopia and Kenyan material when living. However as such material is not available a compromise seems wise and thus the view of Carter that a distinct taxon is accepted but at a subspecific rather than specific rank. The East African plants can be most easily separated by the shorter spine shields which are decurrent for only 1.5-3(-4) mm below the spines, not 4-6 mm and usually by the shorter spines, 5-9 mm long. There is an important exception to the latter, the northernmost collection of *E. septentrionalis*, Carter & Stannard 268 has spines up to 17 mm long! Carter indicates that there is some evidence of regional variation within *E. septentrionalis* and it could be that Carter & Stannard 268 is a distinct element within this. *E. cuprispina* S. Carter is also closely related with similar spines but these can be readily distinguished by their coppery-red colour whilst the densely tufted erect stems are also distinctive.

***Euphorbia sebsebei* M. Gilbert sp. nov.**

Speceibus habitu similis pro parte maximis ramis gracilioribus glaucissimis manifeste distinguenda, a E. gemmeae Bally & S. Carter sed rhizomatis longioribus, aculeis longioribus, cyathio flavescentis differt; a E. taruensis Carter sed spinis longioribus differt.

TYPUS: Ethiopia. Sidamo Region, 43 km from Wachile on road to Moyale (4°11'N 39°05'E), 6 June 1988 (young flowers), M. Gilbert & Sebsebe D. 8740 (holotypus K; isotypi ETH, UPS).

Succulent, seedlings with well developed tuberous taproot but soon spreading extensively by slender white rhizomes and easily collected without evidence of any taproot. Stems solitary or in clumps, to 30 cm long, ca. 7 mm thick, sharply 4-sided with obscure tubercles, very glaucous with pale patterning. Leaves ovate, 0.7 X 0.7 mm, acuminate, soon falling. Spine shields separate, linear, up to 7-8 mm long, less than 1 mm wide; prickles 1-1.5(-2.5) mm long, very slender; spines paired, up to 12.5 mm long, slender, pale brown when young. Cymes solitary, with central male involucre and 2 lateral bisexual involucres, less than 3.5 mm long overall. Peduncle less than 1 mm long, thicker than long; bracts oblong-ovate, ca. 1 mm long, emarginate, irregularly denticulate. Involucre between obconical and bowl-shaped, 1.5 mm deep, ca. 3 mm wide overall; glands 5, transversely oblong; \pm contiguous, 1.8 X 0.6 mm, yellowish when young; involucre lobes suborbicular, margins lacerate. Male flowers: peduncle ca. 1.8 mm long; pedicel ca. 1.0 mm long; anther sacs ovoid, ca. 1.0 mm long. Female flower with only styles exerted beyond involucre lobes; styles ca. 1.5 mm long, free almost to base; stigmas capitate to very shortly bifid. Fruits and seeds not seen.

HABITAT. In crevices and grass tussocks on massive granitic inselbergs ('whale-backs') within areas of *Acacia-Commiphora* bushland; 1300-1450 m.

ETHIOPIA. Sidamo Region: 44 km from Wachile on road to Yavello, ca. 4°48'N 38°29'E, M. Gilbert s.n. — living plants collected May 1975, cultivated by A. Hart, S. Carter-Holmes and others.

The nearest relatives are probably *E. gemmea* and *E. taruensis* which are found in similar habitats within Kenya. *E. gemmea*, from just the other side of the Ethiopia-Kenyan boundary, is very easily separated by the short rhizomes, non-glaucous stems, much shorter prickles and the striking dark red inflorescences and fruits. *E. taruensis* is very similar in habit but can be immediately separated by the remarkably short spines, shorter than the prickles. Other species with a similar habit, all East African, have more robust stems with rounded, sometimes toothed, angles and blackish spines.

The author took photographs in February 1971 of a similar plant growing near where the track from Yabelo to Konso crosses the Sagan River which forms the boundary between Sidamo Region and Gamu Gofa region; living plants collected at the same time did not

survive in cultivation. The site was revisited in 1989 but proved to be very overgrown. The search was also curtailed by a local territorial dispute. This plant was even more slender, with reddish spines, and was stoloniferous rather than rhizomatous. This would appear to be yet another species.

I take great pleasure in naming this species after the co-collector, Dr. Sebsebe Demissew.

***Euphorbia bitataënsis* M. Gilbert sp. nov.**

A E. saxorum Bally & S Carter et E. gemmeae Bally & S. Carter sed duobus ramis robustioribus, dentibus plus prominentibus, cyathiis et glandulis cyathiorum sordido-luteis, primis habitu rhizomatoso, podariis non contiguis, secundis ramis effusis, aculeis longioribus differt.

TYPUS: Ethiopia, Sidamo Region: Bittata rocks, 20 km north of Negele on road to Kibre Menghist, 24 May 1983, *M.G. Gilbert, Ensermu K. & K. Vollesen 7759* (K, holotypus in spiritu conservatis)

Forming dense tufts of stems when growing in open situations but, more usually, with elongated fairly stout rhizomes and isolated little-branched stems growing in crevices among rocks. Stems sprawling, clearly 4-sided with fairly prominently toothed rounded angles, green with little or no patterning. Spine-shields 3-6 mm apart, linear-oblong, 5.5-12 X ca. 3 mm; prickles ca. 2 mm above spines, up to 8-10 mm long, blackish when young or wet. Cymes once forked, Cyathia subsessile, 2.6 mm high overall at first anthesis of male flowers; involucre very broadly obconical to shallowly bowl-shaped, 6.0 mm wide in spirit, glands 5, transversely oblong-elliptic, 1.2 X 3.0 mm, \pm contiguous, dirty yellow with pinkish margins. Fruits and seeds not seen.

HABITAT. Growing in crevices on a massive granitic outcrop with *Combretum-Terminalia-Lannea-Ozoroa* woodland; ca 1500-1600 m.

ETHIOPIA. Sidamo Region: Bittata rocks, 24 May 1982, *Friis et al. 3300* (ETH,K).

Most closely related to *E. saxorum* which grows on similar rock outcrops in central Kenya. That species has less robust stems with more closely spaced almost contiguous spine-shields and is stoloniferous rather than rhizomatous though this may depend to some extent on the circumstances in which the plants are growing. It also has very distinctive purplish-red inflorescences. *E. gemmea* is also rather similar but, apart from also having less robust stems and red inflorescences, has \pm erect stems and much shorter prickles, up to 0.5 mm long.

***Euphorbia baleënsis* M. Gilbert sp. nov.**

Euphorbia fissispina Bally & Carter in Kew Bull. **42(2)**: 375-376 (1987) pro parte quoad *Gilbert et al. 8001* et fig. 1 C 1, 2.

E. fissispina Bally & Carter affinis sed caulibus plus numerosis angustioribus effusis non scandentibus, spinis nigrescentibus plerumque haud stipitatis facile distinguenda.

TYPUS: Ethiopia Bale Region, 3 km N of Sof Omar on Weyb River long road to Ghinir (6°55'N 40°50'E), 1 June 1983 (sterile), *M. Gilbert, Ensermu K. K. Vollesen 8001* (holotypus K; isotypi C, ETH, UPS)

Succulent. Taproot thickened but not napiform, rhizomes absent; stems few to many from base soon bending over and eventually sprawling, up to 75 cm long, usually less. Stems

slightly bluish-green with obscure paler markings on sides, 4-sided, ca. 8 mm thick, angles slightly rounded with obscure teeth 15-20 mm apart. Spine shields separate, 11-13 mm long, blackish when young; prickles 2-3 m above spines, up to ca. 1 mm long; spines paired, 7-14 mm long overall sometimes including, on more vigorous growth, a short thick stipe up to 3 mm long. Leaves scale-like, ovate, ca. 0.5 mm long, soon lost. Mature cymes not seen, glands reddish-green. Fruits and seeds not known.

HABITAT. In fairly dense *Commiphora-Kirkia-Acacia* woodland on reddish soil overlying limestone, 1150-1400 m.

ETHIOPIA. Bale Region, 27 km from Delo Menna along road to Bidré and Negele (6°17'N 39°44'E), 1 June 1988 (young cymes), *Gilbert & Sebsebe* 8571.

This species was only known from a single collection at the time *E. fissispina* was described and that collection was included there, albeit with reservations. The discovery of a second population closely matching the first confirms that this is indeed yet another distinct species. It differs sharply in habit from *E. fissispina* which has rather few, more robust, ascending-scandent stems up to 1.5 m high and spine-shields that are contiguous along the angles of rapidly growing stems and reddish when young with prickles 3-5.5 mm long.

***Euphorbia awashensis* M. Gilbert sp. nov.**

Ab aliis species circulis Euphorbiae monacanthae Pax – E. schizacanthae Pax caulis primis subterraneis, caulibus lateralibus paucis erectis gracilis glaucis, aculeolis longis, spinis reflexis, cyathis citrinis differt.

TYPUS: Ethiopia, Shewa Region, Awash National Park, near Mt. Fantale, 13 Aug. 1909 (fruits), *Negri* 1318 (holotypus FT).

Main stem underground, with relatively few erect lateral stems to 30 cm high, ca 7 mm thick, almost terete, glaucous. Spine shield up to 7 mm long, usually much less; prickles up to 2 mm long; spines solitary, up to 12 mm long, distinctly reflexed. Cymes (dried) to ca 7 mm long, bright yellow, well-pressed involucre ca 3.5 mm wide. capsule not seen, columella not exerted, ca 3 mm long.

HABITAT. In *Chrysopogon* grassland on shallow volcanic soils, general area with open *Acacia* bushland or *Acacia – Balanites* woodland in areas of deeper soil; ca. 1000 m.

This species is a member of the very well defined complex of species allied to *E. triaculeata*, *E. monacantha* and *E. schizacantha*, characterised by the solitary main spine (apically branched in *E. schizacantha*) and the medusoid habit with a short thick central stem which produces much more slender, normally unbranched, lateral stems from every axil. It is unusual in that it is a grassland species, all the other members of the complex occur in bushland habitats with a much more open ground cover. It seems a reasonable conjecture that the underground main stem is an adaptation to the fires that occasionally sweep through grasslands. The erect lateral stems are also an obvious adaptation to growing up through often quite dense but low grass.

A living plant was collected by the author in 1969 in Awash National Park near Mt. Fantale, a dormant volcano last active ca 1840. This was grown in Addis Abeba for some years during which photographs were taken of the inflorescences and cuttings given to Frank Horwood who grew them successfully in England and later California. It is likely that such material is still in cultivation. Another collection was made at about the same time by Raymonde Bonnefille during a survey of an archaeological site in the Awash Valley down stream from the type locality. The current location of this material is not known.

Acknowledgements

This work was done whilst the author was employed at the Royal Botanic Gardens, Kew, by the Ethiopian Flora Project funded by SAREC. The Keeper of the Herbarium, Prof. G. Lucas, is thanked for all the help support received over those years. My thanks are also due to Susan Carter for much invaluable advice and comment and to Melanie Wilmott-Dear for checking the Latin descriptions.

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(Received 20 April 1992, accepted 30 April 1992)