

STUDIES ON THE GENUS *BIDENS* L. (COMPOSITAE) FROM THE EASTERN HEMISPHERE. 7. A REAPPRAISAL OF *BIDENS DIVERSA* SHERFF

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ABSTRACT

The southern African species *Bidens diversa* Sherff is re-examined. It is shown to consist of two allopatric, morphologically distinct forms occurring in Angola, and Mozambique, Tanzania and Zambia respectively. They are distinguished primarily by characters of the ray and disc florets. These differences are afforded subspecific status requiring the new combination *Bidens diversa* ssp. *filiformis* (Sherff) T.G.J. Rayner (= *Bidens filiformis* Sherff). A detailed taxonomic appraisal and full synonymy and descriptions are provided for both taxa.

KEY WORDS: *Bidens*, Compositae, taxonomy, Africa

Bidens diversa Sherff is a most beautiful slender annual species possessing deeply divided leaves with narrow lobes, small but showy radiate capitula with yellow rays and apically usually orange, red or purple paleae which provide a stark contrast to the dark brown or black cypselas. It occurs in a narrow band across southern Africa, extending from Angola in the west, through Zambia to Mozambique and Tanzania in the east. Within the range of its distribution two distinct morphological forms may be recognized. These are treated here as representing subspecies. The western form (ssp. *diversa*) is restricted to Angola. Plants from this area are primarily characterized by their obtriangular-obovate, truncate and usually tridentate ray florets. By contrast, in specimens of the eastern form (ssp. *filiformis*), from Mozambique, Tanzania and Zambia, these are narrowly elliptic to narrowly elliptic-obovate and rounded and 1-3-denticulate at the apex.

Bidens diversa was described by Sherff (1923) from two specimens of *J.M. Antunes 315* (at B) collected from Mounyino in Angola. Although both sheets of the original material are apparently destroyed, Sherff's brief but detailed

description and later published illustration (Sherff 1937) easily enable the application of this name to be ascertained. As a consequence, I had no qualms about selecting *Borges 167* as the neotype (Rayner 1992). A number of other specimens also closely match Sherff's protologue. This has enabled an emended description of this species to be provided.

Sherff (1931) later published a variety *megaglossa* Sherff which he (Sherff 1937) distinguished from var. *diversa* by its "Involucri bractee exteriores ciliatae, ligulis 7-13 mm. longis." This taxon was based on a specimen collected by F.X.O.A. Newton from Bibala in the Serra da Chela, about 20 miles to the northwest of the type locality of *Bidens diversa*. Although this specimen is also destroyed, the characters provided by Sherff, and considered by him to be diagnostic, form part of the normal variation of the species as circumscribed here. Similar considerations apply to *B. diversa* var. *quilembana* Sherff (1957), described from the single specimen of A.W. Exell & F.A. Mendonça 2524 at BM. Sherff considered that this variety differed from var. *diversa* by its "ligulis vix longioribus, bracteis exterioribus interdum etiam 3 mm. longis, aristas plerumque nudis rarius basim versus erecte 1-spinulatis." A comparison of this specimen and the duplicates at COI and LISJC with Sherff's original description of *B. diversa*, however, shows that the rays and the outer phyllaries are not or only slightly longer than those of the type of *B. diversa*, and that the implied absence of retrorse barbs on the aristas of Exell & Mendonça 2524 is in fact incorrect. On at least two of the cypselas these are clearly evident.

Bidens cochlearis Merxm. was described by Merxmüller (1954) from specimens of the collection H. Hess 52/1531 at M and ZT. This collection agrees with Sherff's description of *B. diversa* for most characters except that the rays are somewhat longer and tridentate at the apex, and the apices of the central paleae are mostly cochleariform. Collections of *B. diversa* exist, however, which possess both bidentate and tridentate rays of intermediate length, as well as capitula lacking cochleariform paleae. As a consequence *B. cochlearis* is not thought to represent a taxon distinct from *B. diversa*. In his protologue, Merxmüller compared *B. cochlearis* with *B. lineariloba* Oliv., stating that "Diese Art zeigt deutliche Verwandtschaft mit *B. lineariloba* Oliv., die im tropischen Ostafrika beheimatet ist und mit der sie im wesentlichen den Blattzuschnitt, die Köpfchen- und Hüllenform und die langen, schlanken Achänen, vor allem aber die stark verlängerten inneren Spreuschuppen gemeinsam hat." He considered *B. cochlearis* to be distinguishable from *B. lineariloba* in a number of ways, most dramatically by the scarlet cochleariform paleae. In fact *B. lineariloba* appears to lack any close relationship with *B. diversa*, resembling it only in habit and leaf morphology. These two taxa are readily distinguished by their cypselial aristas. In *B. diversa* these are erect or slightly divergent, slender and only up to about 2 mm long. By contrast, in *B. lineariloba* the aristas are thick, 3.4-6.2 mm long and orientated more or less perpendicularly to the axis of the cypselas.

Sherff's description of *Bidens filiformis* was based on the single specimen of *B.D. Burt* 6269 at F, collected from Lake Chila in northeastern Zambia. This and other specimens of this taxon from Zambia, as well as a number of collections from Mozambique and Tanzania, are characterized by their annual habit, deeply divided leaves with filiform or linear lobes, narrowly elliptic to narrowly elliptic-obovate ray florets and linear to narrowly elliptic-linear cypselas. In his protologue of *B. filiformis*, Sherff (1939) rightly compared this taxon with *B. diversa* var. *megaglossa*, considering that it differed by "its proportionately narrower, more elongate outer involucre bracts, these commonly eciliate and 4-5 mm. not ciliate and only 1-2 mm. long, [and] in having a purplish tinge near the tops of the inner involucre bracts and of the outer paleae". As mentioned above, *B. diversa* var. *megaglossa* is not considered worthy of formal recognition within *B. diversa*. Although the presence of purple apices on the inner phyllaries and outer paleae is found in many specimens of ssp. *diversa*, the differences in outer phyllaries noted by Sherff form part of the suit of characters considered here to distinguish *B. diversa* ssp. *filiformis* from *B. diversa* ssp. *diversa*. In most features, including habit, and stem, leaf and fruit morphology and indumentum, plants of the eastern form are identical with those of *B. diversa* from Angola. Indeed, non-flowering specimens and fruits can not be distinguished. A number of capitular organs, however, are strikingly dimorphic between the eastern and western forms. As noted above, plants from the two areas are primarily characterized by differences in ray floret shape. Other qualitative differences include the shape of the disc floret corollas. In ssp. *diversa* these are infundibular with usually more or less convex sides, whereas in ssp. *filiformis* the corollas are cylindrical and rounded at the base. Differences are also apparent in the indumentum. The paleae of ssp. *filiformis* often possess glandular hairs, whereas in ssp. *diversa* they are always glabrous. In addition, many of the differences between the two forms are the result of discrete quantitative variation. This is particularly apparent for the stamens which are larger in all their constituent parts in plants of ssp. *filiformis*. A similar variation in size is found for the styles and corolla lobes.

The decision to recognize the two forms as subspecies has been determined primarily by the heterofacial nature of *Bidens diversa* and follows the use of this category as proposed by Du Rietz (1930). The subspecies show a certain degree of morphological intergradation between themselves, especially in vegetative and fruit characters, and due to the large number of attributes in common clearly form a monophyletic group. At the same time they are distinguished by a number of morphological differences. The small number of qualitative differences precludes the possibility of maintaining the two forms as separate species. Nevertheless the dissimilarities are sufficient to enable the two forms to be effectively identified and their place of origin to be easily determined.

Bidens diversa is most closely allied to *B. acuticaulis* Sherff, a taxon with

which it shares a largely coincident distribution. The two species possess a number of features in common, including leaf morphology, phyllary and palea shape, and usually arista morphology and indumentum. They are distinguished primarily by characters of the ray florets and cypselas. In *B. acuticaulis* the former are mostly smaller and a decidedly paler yellow than in *B. diversa*. The fruit of *B. acuticaulis* are distinctly attenuate above and provided with a rostrum which may be up to about 25 cm long. By contrast, in *B. diversa* the attenuation is less abrupt, the beak absent and consequently the cypselas much shorter.

Bidens diversa Sherff, Bot. Gaz. 76:159. 1923; Sherff, Field Mus. Nat. Hist., Bot. Ser. 16:329, t. 75, f. a, b, d-i. 1937. TYPE: ANGOLA. Huilla, Lubango, Tundavala, at 12 km, source of the Inhames, 30 Apr. 1971, A. Borges 167 (NEOTYPE [selected by Rayner 1992]: LISC; Isonotypes; M,P,PRE,SRGH).

Annual herbs, to 15-75(-110) cm tall; stems solitary, arising from a short (to 0.7-2.8 cm long) taproot with scattered, branched, adventitious roots; stems erect, sometimes more or less prostrate or ascending at base, simple or branched chiefly above; stems and branches tetragonal or subtetragonal to more or less terete, 0.9-4.3 mm diam. near base, 0.6-1.5(-1.9) mm diam. beneath peduncles, sulcate or striate-sulcate chiefly above, often smooth below, pale to dark brown especially below, often pale yellow-brown to green-brown above, rarely slightly woody only near base, glabrous or rarely sparsely to somewhat densely pilose especially beneath nodes, with to 0.5-1.3 mm long, variously orientated, weak, uniseriate, unibasal hairs; branches suberect to somewhat divergent. Leaves decussate, sometimes the uppermost 1-2 alternate, sessile or petiolate; lamina tripartite or 1-2(-3)-pinnatisect, with 3-7(-9) segments, rarely undivided, papyraceous, pale to medium green, sparsely to somewhat densely pilose, with to 0.20-0.45 mm long hairs, margin and median nerves of both faces with minute (to 0.05-0.15 mm long), antrorse, more or less adpressed, rigid hairs; divided leaves narrowly to somewhat broadly trullate to broadly ovate or broadly ovate-obtrullate in outline, 0.7-10.4(-11.7) cm long \times 0.3-8.9 cm wide; divided segments narrowly to broadly ovate or variously and often irregularly trullate or obtrullate-ovate in outline, 0.6-5.8 cm long \times 0.4-4.0(-4.5) cm wide; undivided segments opposite or subopposite, rarely more or less alternate, antrorsely inserted at 25-80° to rachis, filiform or linear to narrowly obovate-linear or narrowly elliptic-linear, acute to obtuse and usually mucronate at the not or only slightly callose-indurated apex, entire and somewhat thickened at the often revolute margin, (0.15-)0.30-4.20 cm long \times 0.2-2.6 mm wide; rachis narrowly oblong to narrowly obtriangular-oblong, 0.2-1.5 mm wide, generally broadest beneath leaf segments; petioles

to 0.3-3.6 cm long \times 0.3-1.8(-4.2) mm wide, somewhat canaliculate above, narrowly to broadly winged, with wings often dilated toward middle and more or less sheathing the stem, generally more or less dilated and flattened toward the clasping and connate bases, glabrous or sparsely to densely pilose chiefly on margin and beneath, pale green. Capitula radiate, heterogamous, erect, 0.9-5.8 cm diam. \times 4.9-9.0 mm high at anthesis, to 1.8 cm high in fruit, solitary at the stem and branch apices or more usually 2-3(-5) in lax cymes; receptacles flat to slightly convex at anthesis, sometimes becoming strongly convex in fruit; peduncles to 2.6-18.4 cm long, very slender, 0.3-0.6(-0.7) mm diam. at anthesis, to 0.8 mm diam. in fruit, often somewhat dilated immediately beneath capitula, subtetragonal to angled terete, shallow to deeply striate-sulcate, glabrous or more rarely sparsely to somewhat densely pilose, with to 0.1-0.2(-0.5) mm long, weak, uniseriate, unibasal, flexuous hairs; ebracteate or with 1-3(-4), alternate, (0.5-)2.6-22.0(-34.0) mm long, undivided or more rarely tripartite or pinnatisect bracts resembling the leaf lobes and segments. Involucre depressed-hemispheric or broadly campanulate to cupuliform, glabrous or base sparsely pilose at anthesis, more or less glabrate in fruit, base often callose-indurated and becoming pale to dark beige in fruit; outer phyllaries uniseriate, often alternating with the inner, 5-10, linear or linear-triangular, often slightly dilated at base or in apical half, acute to obtuse and rarely somewhat sharply mucronulate at the callose-indurated apex, entire at margin, 0.9-7.6 mm long \times 0.15-0.70 mm wide at anthesis, unchanged in fruit, erect to somewhat spreading chiefly in fruit, papyraceous, pale to dark green, with 1-3, rarely paired, longitudinal, red-brown nerves with lateral nerves often only present in apical portion and central nerves usually only present in basal 1/2-4/5, glabrous or margin with isolated, to 0.05-0.40 mm long, few-cellular, uniseriate hairs; inner phyllaries uniseriate, fused at base and often for up to ca. 1/3 of length, 7-12, ovate or ovate-oblong to ovate-elliptic or more or less obovate-elliptic, often slightly contracted just beneath the acute to subobtuse apex, entire or irregularly and shallow few-denticulate-serrate at margin, 2.5-5.8 mm long \times 1.0-2.7 mm wide at anthesis, to 9.7 mm long in fruit, erect, membranous, pale stramineous, sometimes becoming purple toward apex, with a scarious, (0.20-)0.25-0.40 mm wide margin usually broadest at or above the middle, with 11-28, pale to dark red-brown nerves with at least the central paired and percurrent and the laterals often interrupted, glabrous or dorsal surface minutely hispid, apex puberulous. Ray florets 6-12, neuter; ovary narrowly oblong to oblong, 0.6-1.3 mm long \times 0.25-0.55 mm wide, glabrous or erect setose at apex, laterally biaristate or exaristate, style absent; aristae 0.20-0.35 mm long, usually glabrous; corolla tube 1.5-1.9 mm long, glabrous or sparsely pubescent, with ca. 0.1 mm long, few to many-cellular, uniseriate, mostly antrorse and adpressed, occasionally flexuous, weak hairs; ray yellow or basal 1/3 yellow-orange or orange, narrowly elliptic to narrowly elliptic-obovate and more or less cuneate at base or

obtriangular-obovate, 3.2-27.2 mm long \times 2.6-8.1 mm wide, with 6-12, darker, longitudinal, percurrent nerves, glabrous or most sparsely pubescent beneath; apex either rounded, subentire to 1-3-denticulate, with irregular, subacute to obtuse teeth with sinuses to 0.1-0.2(-0.3) mm long, or truncate, (2-)3-dentate, with teeth acute to obtuse at apex, outer teeth 1.0-2.6 mm long \times 0.9-3.3 mm wide, usually larger than the 0.6-1.7 mm long \times 0.6-1.8 mm wide central ones. Paleae often greatly overtopping disc florets and cypselas, linear or linear-triangular to most narrowly ovate-linear, at least the inner often dilated or spatulate to cochleariform and reflexed above, acute to obtuse or rounded at apex, entire or with 1-2(-3), to ca. 0.2 mm long, acute serrations at margin, 3.9-8.6 mm long \times 0.1-1.2 mm wide at anthesis, to 14.2 mm long in fruit, thin and membranous, glabrous or dorsal surface sparsely glandular-hairy, with few-cellular, short stalked, spherical headed, dark brown hairs, sometimes puberulous at apex, pale yellow or pale stramineous with the apical portion often purple, red or orange, with 2-10 longitudinal, pale to dark red-brown nerves, often darker above. Disc florets 6-33(-41); corolla yellow, glabrous or sparsely to subdensely pubescent, with to 0.2 mm long, unilinear, irregular hairs chiefly toward apex of tube; limb infundibular with usually more or less convex sides, or cylindric and rounded at base, 1.8-3.1 mm long \times 0.8-1.5 mm diam., not annularly thickened, apex 5-lobed; lobes erect or spreading, triangular, subacute at apex, 0.3-1.1 mm long \times 0.3-0.8 mm wide, papillate at apex of dorsal surface; limb gradually or abruptly attenuate below into a narrow, 0.7-1.3 mm long \times 0.3-0.4 mm diam., terete tube; anthers 1.1-2.9 mm long \times 0.4-0.7 mm diam., brown to dark brown, often somewhat exerted; endothelial tissue with polarized thickening; apical appendages ovate-triangular, acute to obtuse at apex, 0.15-0.35 mm long \times 0.1-0.3 mm wide, with a darker median nerve, margins recurved; basal appendages sagittate or rounded sagittate, not reaching or somewhat exceeding base of the filament collar; collar 0.20-0.35 mm long \times 0.10-0.15 mm wide; filament 0.4-2.2 mm long, flat or terete; style 2.2-6.4 mm long, not or slightly contracted immediately above base, with caudate, 0.5-1.2 mm long branches; stylopodium cupuliform or cylindric. Cypselas unwinged; body linear to narrowly elliptic-linear, gradually attenuate toward apex and base, 5.3-14.5 mm long \times 0.6-1.5 mm wide, dull or shiny, dark grey or black, strongly compressed; dorsal face slightly to often strongly convex, sometimes somewhat carinate; ventral face slightly concave to more or less flat, rarely slightly convex; both faces more or less faintly 6-8-striate-sulcate, glabrous or sparsely to most densely (especially in central 3/5-4/5) antrorsely setose, with setae to 0.1 mm long, pale stramineous to orange-brown and usually arising from swollen tubercles, sometimes only tubercles present; margin more or less densely antrorsely setose, with setae to 0.3 mm long and occasionally forked at base; apex densely erect setose, laterally biaristate; aristae erect to slightly divergent, rigid, trigonous, light to dark stramineous, to 0.5-2.1 mm long \times ca. 0.1 mm wide at base, nude or with 1-4(-6) retrorse barbs in apical 2/3

and sometimes with 1-3 antrorse barbs in basal 1/3, barbs to 0.1-0.3 mm long; base of cypsela with a short (0.05-0.20 mm long), slightly to markedly dorsally produced, cartilaginous rim-like carpodium.

Bidens diversa Sherff ssp. *diversa*

Bidens diversa Sherff var. *megaglossa* Sherff, Bot. Gaz. 92:202. 1931, *e descr.*; Sherff, Field Mus. Nat. Hist., Bot. Ser. 16:330, t. 75, f. c. 1937, *e descr. et fig.* TYPE: ANGOLA. Serra da Chela, Bibala, 3 Jun. 1883, F.X.O.A. Newton s.n. (HOLOTYPE: B[2 sheets]†).

Bidens cochlearis Merxm., Mitt. Bot. Staatssamml. München 2:33. 1954. TYPE: ANGOLA. Huilla Prov., 40 km SW of Quilengues, Mt. Eyvila, 4 May 1952, H. Hess 52/1531 (HOLOTYPE: ZT; Isotypes: M, ZT[2 sheets]).

Bidens diversa Sherff var. *quilembana* Sherff, Ann. Mag. Nat. Hist., ser. 12, 10:43. 1957. TYPE: ANGOLA. Quilemba, 4 Jun. 1937, A.W. Exell & F.A. Mendonça 2524 (HOLOTYPE: BM; Isotypes: COI, LISJC).

Bidens diversa Sherff var. *typica* Sherff, Amer. J. Bot. 34:156. 1947, *nom. invalid.*

Capitula 0.9-3.1 cm diam. × 4.9-9.0 mm high at anthesis, to 1.8 cm high in fruit; outer phyllaries 5-8, 0.9-4.8 mm long × 0.15-0.40 mm wide at anthesis, with marginal hairs (when present) to 0.2-0.4 mm long and usually inserted at ca. 90° to axis; inner phyllaries entire at margin, 3.4-5.8 mm long at anthesis, to 9.7 mm long in fruit, with 15-28 nerves, the laterals rarely interrupted. Ray florets with 9-12 nerves; ray obtriangular-obovate, 3.2-13.5 mm long × 2.6-8.1 mm wide; apex truncate, (2-)3-dentate, with teeth acute to obtuse at apex, outer teeth 1.0-2.6 mm long × 0.9-3.3 mm wide, usually larger than the 0.6-1.7 mm long × 0.6-1.8 mm wide central ones. Paleae entire or with 1-2(-3), to ca. 0.2 mm long, acute serrations at margin, 0.6-1.2 mm wide at anthesis, glabrous. Disc florets with anthers not or exerted to 0.5 mm at anthesis; corolla glabrous or sparsely to subdensely pubescent with unilinear, irregular, to 0.2 mm long hairs chiefly toward apex of tube; limb infundibular, with usually more or less convex sides, 1.8-2.6 mm long × 0.8-1.2 mm diam., gradually attenuate below; lobes erect or spreading, 0.3-0.4 mm long × 0.3-0.4 mm wide; anthers 1.1-1.7 mm long; apical appendages 0.15-0.20 mm long × 0.10-0.15 mm wide; basal appendages sagittate or rounded sagittate, not or just reaching base of the filament collar; filament 0.4-1.1 mm long, terete; style 2.2-4.4 mm long, with 0.5-0.6 mm long branches.

FLOWERING. Early April to early June.

HABITAT. Wooded savanna, in clearings, often on rocky slopes with poor soil; wet places. Alt. 1150-2250 m.

SPECIMENS EXAMINED: ANGOLA. Huilla Province - *s.a.*, *J.M. Antunes vel E. Dekindt 1005* (LISC); Lubango, Tundavala, at 12 km, source of the Inhames [ca. 14° 55' S 13° 31' E], 30 Apr. 1971, *A. Borges 167* (LISC,M,P,PRE,SRGH); Cola [ca. 14° 00' S 14° 30' E], 24 May 1954, *G. Boss s.n.* (M); 40 km SW of Quilengues, Mt. Eyvila [14° 19' S 13° 53' E], alt. 1150 m, 3 May 1952, *H. Hess 52/1531* (M,ZT[3 sheets]); 20 km SE of Lubango, on road to João de Almeida [ca. 15° 03' S 13° 38' E], 19 Apr. 1968, *L.E. Kers 3182* (S); Lubango, source of the waterfall of Tundavala [ca. 14° 56' S 13° 28' E], alt. 2250 m, 19 Apr. 1960, *E.J.S.M. Mendes 3750* (LISC); between Lubango and Caconda, near Cacula [ca. 14° 29' S 14° 10' E], alt. 1700 m, 2 Apr. 1970, *M. Silva 3037* (BR,K); Lubango, Serra da Senhora do Monte, alt. 1800 m, 5 Apr. 1960, *J.B. Teixeira & A.M. Andrade 4757* (LISC). Huilla/Namibe Provinces - 20 km from Lubango towards Bibala [14° 45' S 13° 29' E], alt. 1950-2000 m, 19 Apr. 1973, *P. Bamps, S. Martins & C. Matos 4582* (BR,LISC); Serra da Chela [15° 00' S 13° 20' E-16° 00' S 13° 40' E], alt. 1300 m, 17 May 1937, *J. Gossweiler 10776* (COI,K,LISJC,LISU,US). Namibe Province - Quilemba [14° 46' S 13° 28' E], alt. 1900-1950 m, 4 Jun. 1937, *A.W. Exell & F.A. Mendonça 2524* (BM,COI,LISJC).

***Bidens diversa* Sherff ssp. *filiformis* (Sherff) T.G.J. Rayner, *comb. et stat. nov.* BASIONYM: *Bidens filiformis* Sherff, Field Mus. Nat. Hist., Bot. Ser. 17:600. 1939; Wild, *Kirkia* 6:21. 1967; M.A.E. Richards & W.V. Morony, *Check List Fl. Mbala & Distr.*: 181. 1969. TYPE: ZAMBIA. Lake Chila, Apr. 1936, *B.D. Burt 6269* (HOLOTYPE: F; Isotypes: BM,BR,K[2 sheets]).**

Bidens steppia auct. non (Steetz) Sherff: M.A.E. Richards & W.V. Morony, *Check List Fl. Mbala & Distr.*: 182. 1969, *quoad* M.A.E. Richards 16260.

Capitula 2.3-5.8 cm diam. × 5.8-8.3 mm high at anthesis, to 1.6 cm high in fruit; outer phyllaries 7-10, 3.2-7.6 mm long × 0.2-0.7 mm wide at anthesis, with marginal hairs (when present) to ca. 0.05 mm long, antrorsely inserted at ca. 45° to axis; inner phyllaries entire or irregularly and shallow few-denticulate-serrate at margin, 2.5-4.4 mm long at anthesis, to 6.5 mm long in-fruit, with 11-15 nerves, the laterals often interrupted. Ray florets with 7-9 nerves; ray narrowly elliptic to narrowly elliptic-obovate, more or less cuneate at base, 13.0-27.2 mm long × 4.2-4.7 mm wide; apex rounded, subentire or 1-3-denticulate, with irregular, subacute to obtuse teeth with sinuses to 0.1-0.2(-0.3) mm long. Paleae entire at margin, 0.1-1.0 mm wide at anthesis, glabrous or dorsal surface sparsely glandular-hairy, with few-cellular, short stalked, spherical headed, dark brown hairs. Disc florets with anthers usually

strongly exerted to 1.8-2.8 mm at anthesis; corolla glabrous; limb cylindrical, rounded at base, 2.6-3.1 mm long \times 1.2-1.5 mm diam., abruptly attenuate below; lobes erect, 0.8-1.1 mm long \times 0.6-0.8 mm wide at base; anthers 2.1-2.9 mm long; apical appendages 0.25-0.35 mm long \times 0.2-0.3 mm wide; basal appendages sagittate, just reaching or somewhat exceeding base of the filament collar; filament 1.6-2.2 mm long, flat; style 5.0-6.4 mm long, with 0.9-1.2 mm long branches.

FLOWERING. Late March to late May.

HABITAT. In clearings or under trees in *Brachystegia* woodland, open bush among grass, on sandy or stony soil; frequently in wet places; occasionally as a weed of fields and fire-breaks. Alt. 820-1830 m.

SPECIMENS EXAMINED: MOZAMBIQUE. Nampula Province - Nampula [15° 09' S 39° 14' E], 15 Apr. 1937, *A.R. Torre 1375* (COI,LISC).

TANZANIA. *s. acc. loc., comm.* 1914, *E.H. Clark s.n.* (BM).

ZAMBIA. Luapula Province - Samfya, NW of the post-office [11° 21' S 29° 32' E], alt. 1150 m, 14 Apr. 1963, *J.-J. Symoens 10238* (BR,K). Northern Province - Kapata-Sondwa [08° 46' S 31° 10' E], alt. 1000 m, 18 Apr. 1950, *A.A. Bullock 2882* (BR,K); Lake Chila [08° 50' S 31° 23' E], alt. 1500-1670 m, Apr. 1936, *B.D. Burt 6269* (BM,BR,F,K[2 sheets]); Mbala district, alt. 1330 m, Apr. 1932, *A.H. Gamwell 107* (BM); Mpulungu [08° 50' S 31° 06' E], alt. 820 m, 10 Apr. 1961, *J.B. Phipps & L.D.E.F. Vesey-Fitzgerald 3015* (K,LISC,M); Chilongowelo, top escarpment [08° 53' S 31° 15' E], alt. 1520 m, 3 Apr. 1952, *M.A.E. Richards 1348* (K); Chilongowelo, above escarpment [08° 53' S 31° 15' E], alt. 1520 m, 19 Apr. 1952, *M.A.E. Richards 1492* (K); Kalambo Gorge, Saisi [ca. 09° 07' S 31° 29' E], alt. 1830 m, 24 Mar. 1955, *M.A.E. Richards 5128* (BR,K,UZL); top of escarpment above Mukoma, Inono Valley [ca. 08° 41' S 31° 18' E], alt. 1520 m, 13 Apr. 1955, *M.A.E. Richards 5419* (BR,K,UZL); Chilongowelo [08° 53' S 31° 15' E], alt. 1440 m, 9 May 1957, *M.A.E. Richards 9622* (K,UZL); Mbala, Simanwe Farm [08° 52' S 31° 20' E], alt. 1650 m, 24 Mar. 1959, *M.A.E. Richards 12265* (K); Chilongowelo Escarpment [08° 53' S 31° 15' E], alt. 1500 m, 6 Apr. 1962, *M.A.E. Richards 16260* (K,M,UZL); Kalambo Falls [08° 35' S 31° 13' E], alt. 1350 m, 16 Apr. 1966, *M.A.E. Richards 21433* (K); Chiyanga stream near Kalambo road [08° 45' S 31° 19' E], alt. 1520 m, 9 May 1966, *M.A.E. Richards 21471* (K,MO); path to Kalala village, 4 miles from Mbala [08° 47' S 31° 21' E], alt. 1500 m, 25 Apr. 1968, *M.A.E. Richards 23235* (K); Mbala, Uningi Pans [08° 57' S 31° 23' E], alt. 1500 m, 16 May 1968, *M.A.E. Richards 23267* (K); Zambia Government Ranch, Saisi Valley [ca. 09° 07' S 31° 29' E], alt. 1500 m, 20 May 1968, *M.A.E. Richards 23275A* (EA,K); near Kalambo Falls [08° 35' S 31° 20' E], alt. 1220 m, 23 May 1967, *S.A. Robertson 589* (EA,K); top of Kambole Escarpment [ca. 08° 46' S 30° 43' E], alt. 1520 m, 22 Apr. 1969, *M. Sanane 631* (K,UZL).

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