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# A New Heterophyllous *Spermacoce* Species (Rubiaceae) from the Marungu Highlands, Democratic Republic of the Congo

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**ABSTRACT.** *Spermacoce heteromorpha* Dessein (Rubiaceae, Spermacoceae) is newly described and illustrated. It grows on the Marungu highlands of the Democratic Republic of the Congo (D.R. Congo) at altitudes of 1800 to 1900 m. The species resembles the Tanzanian *Spermacoce taylorii* Verdcourt, from which it mainly differs in having terminal inflorescences, only slightly exerted anthers, and densely pubescent stems. Moreover, *Spermacoce heteromorpha* features marked heterophylly, with long leaves at the plant's base and much shorter cauline leaves, a type of heterophylly rarely observed in *Spermacoce* or in the Rubiaceae as a whole. The finding of this species exemplifies the unique floristic richness of this underexplored part of D.R. Congo.

**Key words:** Democratic Republic of the Congo, heterophylly, Marungu highlands, Rubiaceae, *Spermacoce*.

*Spermacoce* L. is a pantropical genus of the family Rubiaceae comprising an estimated 275 species (Dessein et al., 2002; Harwood & Dessein, 2005). Tropical America, tropical Africa, and the northern part of Australia are the main centers of diversity. The genus is characterized by its herbaceous growth form, the fimbriate stipules connected to the petioles, the 4-merous flowers arranged in compact lateral and/or terminal inflorescences, the bilocular ovaries with a single ovule per locule, the often pluriaperturate pollen grains, and the dry dehiscent fruits. Many botanists know *Spermacoce* as a genus of annual weeds of ruderal places. Typical examples are *S. latifolia* Aublet and *S. verticillata* L., two species presumably native to America, but introduced in Africa, Asia, and Australia. Narrow endemics, however, are an element of the genus with a comparable level of importance. Our study of *Spermacoce* from the high plateaus of the Zambezian regional center of endemism, for example, revealed the existence of endemic or disjunct *Spermacoce* species on the Angolan, Zambian, and

Katangan high plateaus (Dessein et al., 2002, 2003). Within the Lisowski, Malaisse, and Symoens collection of POZG, which was recently put at our disposal, unicate *Spermacoce* specimens from the Marungu highlands (D.R. Congo) were found representing another narrow endemic as described below.

## HETEROPHYLLY

Heterophylly is not uncommon among woody Rubiaceae (Robbrecht, 1988), but is rarely observed among the herbaceous representatives of the family. Within *Spermacoce*, it has only been recorded for *S. hockii* (De Wildeman) Dessein, a perennial from D.R. Congo (Dessein et al., 2003). In this species, long linear leaves develop from the woody plant base, while the cauline leaves are broader and much shorter. During field work in Zambia, we observed that several biannual or short-lived perennial *Spermacoce* species develop rosettes of basal leaves. This feature was observed in the field for *S. dibrachiata* Oliver, *S. perennis* Verdcourt, and *S. phyteumoides* Verdcourt. Herbarium collections rarely show the basal leaves, as the basal part is seldom collected. In the three above-mentioned species, basal rosette leaves differ only slightly in size and shape from the cauline leaves. In *S. heteromorpha*, on the contrary, the basal leaves are markedly longer than the cauline ones. The type specimens of *S. taylorii* Verdcourt also have basal and cauline leaves, but the differences between the two leaf types are minor.

## THE MARUNGU HIGH PLATEAU

The Marungu high plateau is situated southwest of Lake Tanganyika in D.R. Congo. The name of the plateau is derived from the word "dilungu," which signifies "herbaceous plateau" (Verbeken, 1954). The name refers to a main feature of the environment, the absence of tree growth in the more elevated areas.

Very little detail is known, however, about the vegetation and environmental conditions of the region. Floristically, too, the area remains underexplored. Duvigneaud (1952) included the plateau in the "district des plateaux Katangais," which also comprised the Bianco, Kibara, and Kundelungu plateaus. Later, he placed the Marungu plateau in a district of its own because the vegetation shows several East African elements not found on the other Katangan plateaus (Duvigneaud, 1958). Most subsequent authors followed his opinion.

The Marungu region reaches altitudes up to 2460 m (mont Lusale) and is mainly covered by savannahs (Lisowski et al., 1971). The vegetation of the savannahs is composed of many species of Cyperaceae and Poaceae, along with geoxylic herbs. During the dry season, other plants, such as *Helichrysum* Miller species (Asteraceae), may develop (Duvigneaud, 1958; Lisowski et al., 1971). White (1976) pointed out that the main factor accounting for the absence of trees is the waterlogged soils of the plateaus, rather than the presence of sporadic frost periods or temporal burning. The Marungu plateau is isolated from the other highland areas and thus forms an island of very peculiar environmental and edaphic conditions. As a consequence, the Marungu plateau might house a large number of endemic taxa, as observed on the other Katangan plateaus (Lisowski et al., 1971; Malaisse et al., 1995; Geerinck et al., 1996; Dessein et al., 2003).

#### TAXONOMY

##### **Spermacoce heteromorpha** Dessein, sp. nov.

TYPE: D.R. Congo. Katanga: plateau des Marungu, Kibobwa, 15 Feb. 1970, *S. Lisowski, F. Malaisse & J.-J. Symoens 9696* (holotype, POZG; photos, BR, K, LV, MO, P). Figure 1.

Similis *Spermacocae taylorii* a qua inflorescentiis terminalibus et compactis, antheris vix exsertis et caulibus pubescentibus differt. Praeterea bene distincta habitu heterophyllo manifesto, cum foliis basalibus duplo longioribus quam illis caulinis.

Robust, erect herb with few stems from a woody perennial base with woody taproot; stems 45–55 cm tall, strictly erect, with short branches in the upper part bearing the inflorescences, densely covered with short, stiff, often ascending trichomes. Plants heterophyllous, with long leaves at the base and shorter cauline leaves. Leaves decussate, sessile, fused with the stipule base; blades of basal leaves narrowly elliptic to linear, (3–)11–22 × 0.7–2.2 cm; cauline leaves narrowly elliptic, (2–)5–10 × 0.8–1.7 cm, young leaves often densely covered with short stiff trichomes above and underneath, older leaves gla-

brescent; apex acute; base gradually narrowed; leaf margins somewhat thickened, beset with short stiff trichomes or scabrous; midvein somewhat prominent, densely pubescent toward the base underneath, sparsely pubescent above, with indistinct secondary and tertiary veins. Stipules fimbriate; stipule base 4–18 mm long, beset with short appressed trichomes, often with stalked colleters in between the fimbriae; fimbriae 3 to 6, up to 6(–12) mm long, ciliate. Flowers sessile in many-flowered capitula; inflorescences terminal, composed of several condensed flowering nodes each with a pair of subtending leaves, up to 3.5 cm wide in flowering stage; bracts stipuliform with numerous setae 3–6 mm long. Calyx tube ca. 0.5 mm high; lobes 2 or 3 (rarely no distinct lobes visible), narrowly triangular or leaf-like, often unequal, 2–8 mm long, beset with long hyaline trichomes, sometimes with numerous setae in between the lobes. Corolla blue; tube funnel-shaped, 6–8.5 mm long, glabrous or sparsely pubescent outside, with a trichome ring around or below its middle inside; lobes triangular, 4–6 mm long, 2–2.5 mm wide at the base, pubescent outside, glabrous inside; anthers narrowly elliptic in outline, 1.5–2 mm long, exserted; filaments 1–2 mm long. Pollen 14–17-zonocolporate, oblate to suboblate; equatorial diameter 67–83 μm; polar outline circular and somewhat lobed; ectocolpi relatively long; endoaperture a broad endocingulum; tectum perforate to microreticulate; microspines uniformly present; inner nexine surface granular with endocracks. Ovary ellipsoid to narrowly ellipsoid, 3–4.5 mm long, pubescent in the upper part; style 9–12 mm long, exserted; stigma shortly 2-lobed, ca. 1 mm wide; nectary disc bipartite. Capsule and mature seeds unknown; young seeds show the initiation of a basal elaiosome.

*Distribution, habitat, and phenology.* Endemic to the northern part of the Zambezi regional centre of endemism: only known from two collections from the Marungu high plateau (Katanga province, D.R. Congo) in grassland at 1800–1900 m elevation. Flowering specimens were collected in February.

*Affinities with other species.* *Spermacoce heteromorpha* is most similar to *S. taylorii*, a narrow endemic from the Songea district in Tanzania. The habit resemblance is especially striking: a woody base from which a few erect stems arise. Furthermore, *S. taylorii* shows a tendency toward the same type of heterophylly, much weaker, however, than in *S. heteromorpha*. Inflorescence and floral morphology clearly separate the two species. Whereas the flowers of *S. heteromorpha* are arranged in many-flowered terminal capitula, those of *S. taylorii* are in clusters at the

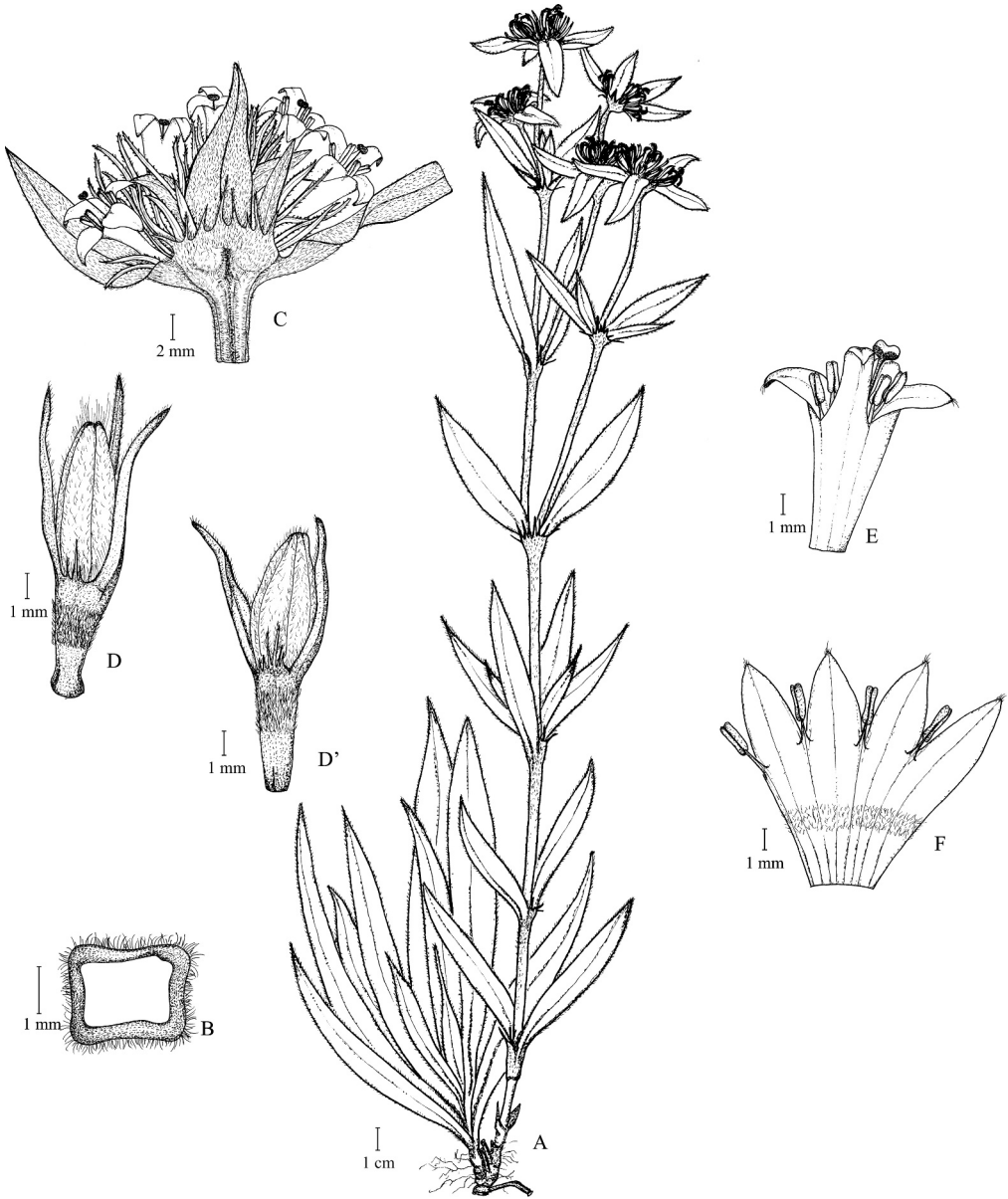


Figure 1. *Spermacoce heteromorpha* Dessein. —A. Habit. —B. Detail of stem. —C. Inflorescence. —D, D'. Flower buds showing variability of calyx. —E. Corolla, stamens, and style. —F. Open corolla showing stamens and a ring of trichomes. A. Lisowski, Malaisse & Symoens 9696 (POZG); B–F. Lisowski, Malaisse & Symoens 10061 (POZG).

nodes along the stem, from which the upper 4 or 5 run together to form a more congested cone-like inflorescence. The corolla tubes are similar, but the corolla lobes are, based on Verdcourt's (1976) measurements, much longer in *S. taylorii* (10–11 mm vs. 4–6 mm). The anthers of *S. heteromorpha* are only exerted for 1–2 mm, while those of *S. taylorii* are exerted for more than 5 mm. Further evidence for the separation of the two species is found

in the characteristics of the external indumentum: *Spermacoce taylorii* is almost entirely glabrous, whereas *S. heteromorpha* is densely covered with trichomes on almost all organs. *Spermacoce perennis*, collected from the northeastern part of Zambia, also has a similar habit. *Spermacoce perennis* lacks, however, some very characteristic features of *S. heteromorpha*: heterophylly is usually absent or, if present, the basal leaves are shorter than the cauline

ones; the inflorescences are both terminal and axillary; the cauline leaves are much narrower; and secondary nerves are invisible.

*Paratype.* D.R. CONGO. **Katanga:** plateau des Marungu, au pied du mont Kibobwa, au-dessus du village Kibobwa, steppe au bord d'une petite rivière, 29°42'E 7°31'S, 1900 m, 19 Feb. 1970, S. Lisowski, F. Malaisse & J.-J. Symoens 10061 (POZG; photos, BR, K, LV, P).

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