

Hypoxis bampsiana subsp. *tomentosa*, a New African Taxon of Hypoxidaceae

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ABSTRACT. A description of *Hypoxis bampsiana* Wiland (Hypoxidaceae) is extended, and a new subspecies, *H. bampsiana* subsp. *tomentosa* Wiland, is described from the Dzalanyama Forest Reserve in Malawi (also distributed from the Democratic Republic of Congo and Tanzania). It differs from *H. bampsiana* subsp. *bampsiana* in the indumentum dispersed on the whole leaf blade and in the number of leaf veins. Ranges of both subspecies are almost allopatric except at the Kundelungu Plateau in the Democratic Republic of Congo where they co-occur.

Key words: Africa, Hypoxidaceae, *Hypoxis*, IUCN Red List.

Hypoxis bampsiana Wiland was described from the Democratic Republic of Congo and Zambia (Wiland, 1997). Its known distribution was limited to the Kundelungu Plateau in the Democratic Republic of Congo and Ndola in Zambia. In a treatment of *Hypoxis* L. for the areas of Flora Zambesiaca (Malawi, Mozambique, Zambia, Zimbabwe, and Botswana), based on the study of herbarium collections, Nordal and Zimudzi (2001) regarded two specimens from Malawi as belonging to *H. bampsiana*, because of the shape of their leaves and seed testa sculpture. However, these specimens differ from typical *H. bampsiana* by having an indumentum present on both sides of the leaf lamina. A plant similar to the specimens from Zambia was also collected in Tanzania (Bullock 2045, K), but no scientific name was attributed to it (Nordal et al., 1985). Moreover, several plants from the Democratic Republic of Congo show congruent morphological characters with the specimens mentioned above; however, they were not included in a treatment of the genus *Hypoxis* for the latter area because of their uncertain taxonomic position (Wiland-Szymańska, 2001). Further evaluation of the herbarium materials has led me to conclude that the description of *H. bampsiana* needs to be amplified. Moreover, the morphological variation among the collections and their pattern of distribution suggests the recognition of two distinct subspecies: a typical *H. bampsiana* subsp. *bampsiana*,

and the new *H. bampsiana* subsp. *tomentosa* Wiland.

Shape and size of leaves are characters often used for the identification of taxa within *Hypoxis*. Unfortunately, in many species of this genus the shape of the lamina, as well as its size, depends on the age of a plant. In such a case, further characters have to be used for determination of species. In *Hypoxis*, cataphylls—smaller outer leaves—often appear together with inflorescences. Therefore, only the inner, well-developed leaves should be taken into consideration, being much more variable in shape between species. Also, the number of veins varies between taxa of *Hypoxis* and is a useful taxonomic character.

The indumentum is one of the more important characters that distinguishes species of *Hypoxis*, and it is often used in keys (Nordal et al., 1985; Zimudzi, 1996; Wiland-Szymańska, 2001). Distribution of the leaf indumentum differs between the two subspecies described. In *H. bampsiana* subsp. *tomentosa*, the indumentum is dispersed on the whole leaf lamina, but it is absent on the ventral surface of leaves of subspecies *bampsiana*. Both taxa possess the same trichome type. It is noteworthy that in the herbarium the indumentum of *H. bampsiana* is always golden or reddish golden, whereas field notes on the herbarium sheets of subspecies *tomentosa* (Pawek 4142, K, MAL; Brummit et al. 16080, K, MAL) indicate the indumentum to be gray. Unfortunately, no description of the indumentum color of subspecies *bampsiana* was available for living plants; however, the possibility of a similar change in color during drying should be considered.

Field observations suggest that tuber color should be taken into consideration as a useful morphological character. The color of the tuber tissue of subspecies *tomentosa* has been described as white (Pawek 4142) and looks to be so on most of the other herbarium sheets. This is a character shared with *Hypoxis goetzei* Harms, but it needs further evaluation in the field. Therefore, all collectors are encouraged to collect specimens of Hypoxidaceae with tubers and to add a description of their flesh color (white, yellow, or

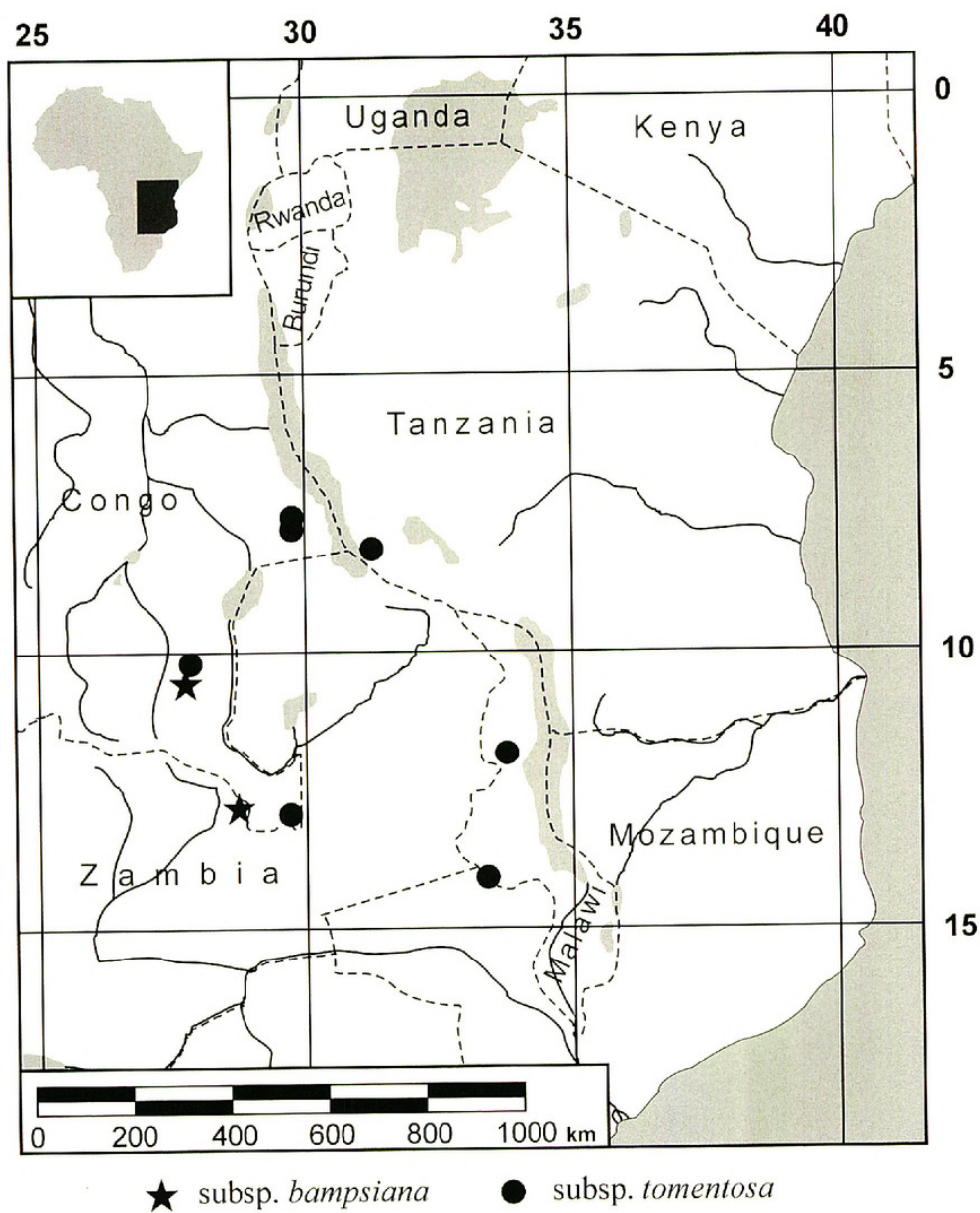


Figure 1. Distribution of *Hypoxis bampsiana*.

orange) seen just after cutting. When exposed to air, it always changes rapidly to brown, sometimes becoming bluish, and the color does not persist in the herbarium or pickled plant material.

The geographic ranges of both subspecies are almost allopatric (Fig. 1). Subspecies *bampsiana* occurs in the western part of a range of *Hypoxis bampsiana*, where it is endemic to the Upper Katanga and the Copperbelt Province in Zambia. Subspecies *tomentosa* is much more widespread, reaching as far east as Malawi and Tanzania. Both subspecies are present on the Kundelungu Plateau, but a lack of precise collection sites makes it impossible to determine whether they are sympatric or not.

A detailed description of both subspecies will hopefully help to avoid future incorrect determinations of *Hypoxis bampsiana* subsp. *tomentosa* as a

different species. So far, plant materials of this taxon have been determined in various herbaria as the Central and East African *H. goetzei* or the South African *H. multiceps* Buchinger, and finally as *H. bampsiana*. These three species indeed look similar to each other in the herbarium due to their large elliptical leaves that are abruptly acuminate and often hooked at the apex. They are covered with tufted trichomes. However, they do differ in several other characters (see Table 1).

Morphological and biometric studies were conducted on 19 specimens from the following herbaria: BR, K, POZG. Flowers from herbarium specimens were boiled in water or softened with Pohl's softening agent (Pohl, 1965) for morphological analysis under a dissecting microscope. Leaf veins were counted under a light microscope. Trichomes were taken from boiled

Table 1. Character differences between four closely related taxa of *Hypoxis* with elliptical leaves. (Data with * after Pooley, 1998 and Heideman, 1987.)

Character	<i>H. bampsiana</i> subsp. <i>bampsiana</i>	<i>H. bampsiana</i> subsp. <i>tomentosa</i>	<i>H. goetzei</i>	<i>H. multiceps</i>
Tuber flesh color	white	white	white	yellow
Location of indumentum on a leaf blade	abaxial	adaxial and abaxial	abaxial	adaxial and abaxial
Trichome color of living plants	?	gray	brownish	golden or grayish
Trichome color of dried plants	golden or reddish golden	golden or reddish golden	brownish	golden
Flowering	synanthous	synanthous	hysteranthous	hysteranthous*
Flowering sequence	acropetalous	acropetalous	basipetalous	acropetalous
No. of flowers	6 to 14	4 to 9	4 to 14	1 to 4*
Seed color	brown and dull	brown and dull	brown and dull	black and glossy

scapes and leaves, and a light microscope was used for their examination and drawing. Freeze-dried seeds were examined using scanning electron microscopy after coating with gold. Data on ecology and distribution were taken from the herbarium labels of specimens.

1. *Hypoxis bampsiana* Wiland, Bull. Jard. Bot. Natl. Belg. 66: 207. 1997. TYPE: Democratic Republic of Congo. Shaba [Katanga]: “Plateau des Kundelungu, au bord de la riviere Lofoi,” 1500 m, Oct. 1969, S. Lisowski, F. Malaisse & J. -J. Symoens 7653 (holotype, POZG). Figure 1.

Perennial herb, to 45 cm; tuber ovoid, 5.5–6 × 2.8–6 cm (when dry), white inside, bearing membranous and fibrous remains of old leaves, growing to 8.5 cm; roots thick. *Outer leaves* 3 to 7, sheathing at base, thick, ovate, cuspidate, keeled and reflexed, (1.3–)3.5–20 × (1–)2–5 cm, tomentose on both faces or only the abaxial, nervation parallel, composed of 18 to 105 veins of different size; *inner leaves* (3)5 to 7, thick, ovate or lanceolate, cuspidate, slightly keeled, erect or slightly reflexed, (12–)13.5–46(–56) cm × (8–)14–70(–76) mm, tomentose bifacially or only abaxially, basally glabrous; trichomes tufted, 9- to 13-branched, to 1.6 mm, golden or reddish golden after drying, rather gray in the field, trichomes longer on blade edges and midrib; older leaves less hairy; nervation parallel, composed of 17 to 191 veins of different size. *Scapes* 4 to 9, 11–30 cm × 2–4 mm, compressed, short winged and ciliate in the basal part, wider and tomentose in the apical part above 1/3–1/2 of their length with tufted trichomes to 3.5 mm. *Inflorescences* 4- to 14-flowered, racemose; bracts subulate, acute, keeled, 0.9–2.5 cm × 1.5–4 mm, at the lowest, oldest flowers veined with 3 or 5 veins, with lamina abaxially covered with tufted trichomes except edges or pubescent only on midrib and veins; pedicels 3–23 mm, tomentose. *Perigone* composed of 6 tepals, yellow; outer tepals oblong or ovate, acute,

slightly keeled, 13–15 × 5–6 mm, pubescent beneath, with a 1-mm-long clavate appendage under apex, nervation composed of 7 to 14 rather regular veins; inner tepals ovate, obtuse or cuspidate, 12–15 × 7–8 mm, veined with 5 to 11 irregular veins, pubescent along the midrib beneath to 1/3–1/2 of its length; *stamens* 6, biseriate, equal, 6–8 mm; filaments subulate, 2.5–5 mm; anthers linear, fused or ± emarginate at apex, prominently sagittate at base, 4.5–7 mm; *ovary* obconical, 4–10 × 3–5 mm, pubescent; style trigonous, 1–3 mm, stigma 2 mm, obtuse, solid or free-lobed. *Capsule* obconical or turbinate, circumscissile, 4–10 × 4–8 mm, surmounted by a persistent perigone, pubescent, with numerous seeds; *seeds* ovoidal or spherical, brown, dull, 1–1.5 mm, with a prominent nipple-shaped appendage at apex, covered with thick cuticle; testa bristly with pointed pyramidal projections, winged with cuticle.

1a. *Hypoxis bampsiana* Wiland subsp. ***bampsiana***. Figure 1.

Tuber ca. 5.5 × 4.5–6 cm. *Outer leaves* 4 to 7, (1.3–)5–18 × (1–)3–5 cm; lamina tomentose abaxially, glabrous adaxially, nervation of 65 to 105 veins; inner leaves 6 or 7, (12–)17–45(–56) × 30–70(–76) mm; lamina tomentose abaxially, glabrous adaxially, nervation of 95 to 191 veins. *Scapes* 6 to 9, 14.5–30 cm × (2–)3–4 mm. *Inflorescences* 6- to 14-flowered; bracts 1–2 cm × 1.5–4 mm, the lowest 5-veined; pedicels 4–23 mm; *outer tepals* oblong, 14–15 × 5.5–6 mm, 9- to 14-veined; *inner tepals* wide-ovate, obtuse, 13 mm, 11-veined; *stamens* 8 mm; filaments 5 mm; anthers 5–6 mm, emarginate at apex; *ovary* 6–10 × 3–5 mm; style 1–3 mm, stigma solid, triangular. *Capsule* turbinate, 4–10 × 4–8 mm.

Habitat. Mountain, shrub, or wooded grasslands, miombo forest, in sandy soils, at altitudes from 1250–1650 m.

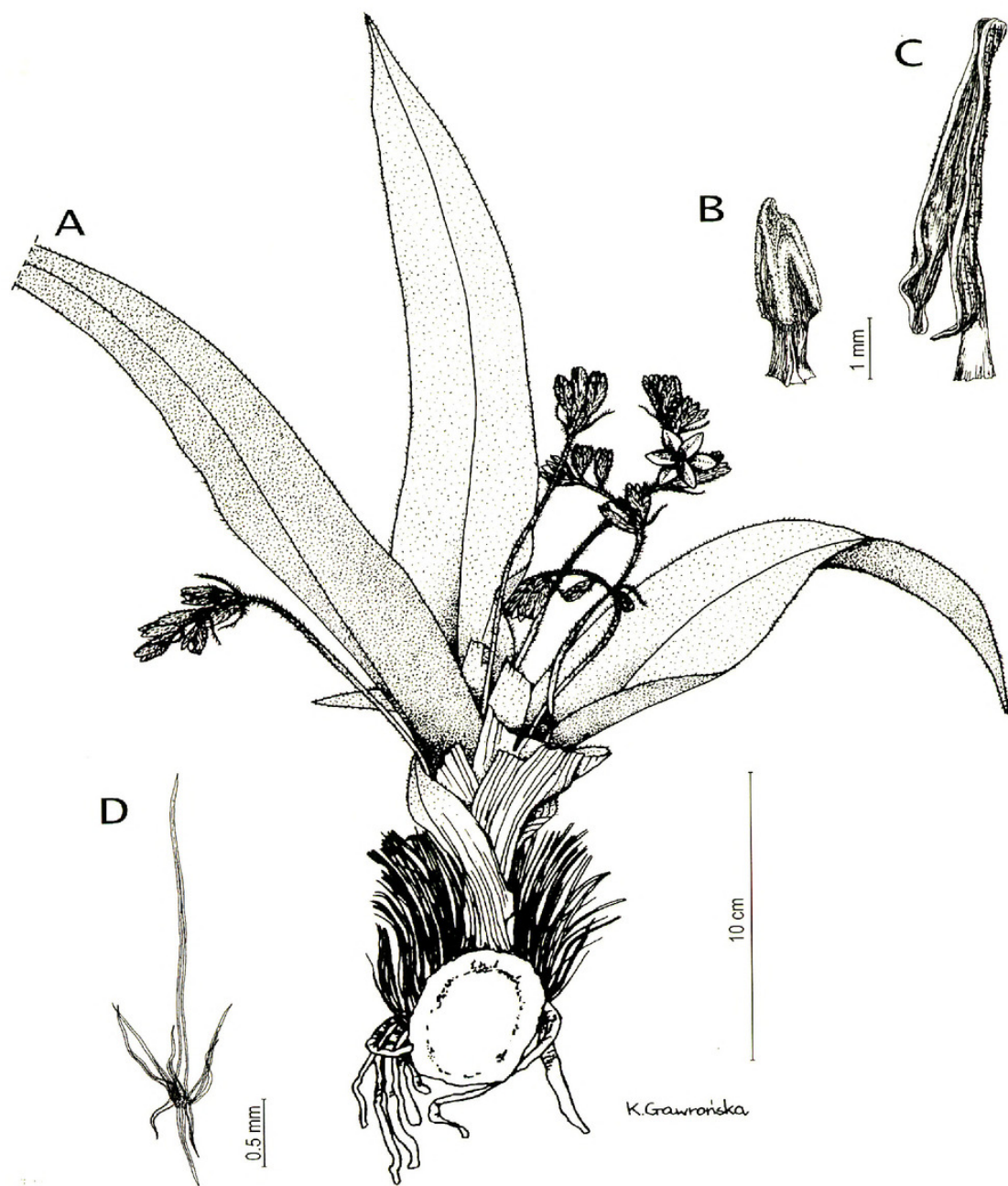


Figure 2. *Hypoxis bampsiana* subsp. *tomentosa* Wiland. —A. Habit. —B. Style with stigma. —C. Anther. —D. Trichome from the scape. A drawn from Brummitt, Polhill & Banda 16080 (K); B, C from Lisowski et al. 8574 (POZG); D from Lisowski et al. 8267 (POZG).

IUCN Red List category. *Hypoxis bampsiana* subsp. *bampsiana* should be considered Endangered (EN) according to IUCN Red List criteria (IUCN, 2001). There are only two known populations, not farther than 250 km apart. Although no information on medicinal uses was available, it is possible that it might be taken as a substitute for other more useful *Hypoxis* species. An overgrazing of the grassland ecosystem, tree cutting, soil erosion, and agriculture are threats for this taxon. The last collection available for this study was made in 1971.

Specimens examined. DEMOCRATIC REPUBLIC OF CONGO. **Haut-Katanga:** Kundelungu Plateau, Lisowski,

Malaisse & Symoens 737, 7615 (POZG), betw. rivers Petite Lofoi & Kalembe, Lisowski, Malaisse & Symoens 12947, B-7279 (POZG), riverside of Kalembe, Lisowski, Malaisse & Symoens 12830, 12853, 12859 (POZG), riverside of Lofoi, Lisowski, Malaisse & Symoens 7653 (POZG), near RACK camp, Lisowski, Malaisse & Symoens 1009 (POZG). ZAMBIA. **Ndola:** Kambowa (Kamboja), Fanshawe 519 (BR).

1b. *Hypoxis bampsiana* subsp. *tomentosa* Wiland, subsp. nov. TYPE: Malawi. Central Region, Lilongwe District: Dzalanyama Forest Reserve, valley NE of Kazuzu Hill, on flat rock & shallow gravel in *Brachystegia-Julbernardia* woodland, with *Xerophyta*, 1420 m, 24 Feb. 1982, R. K.

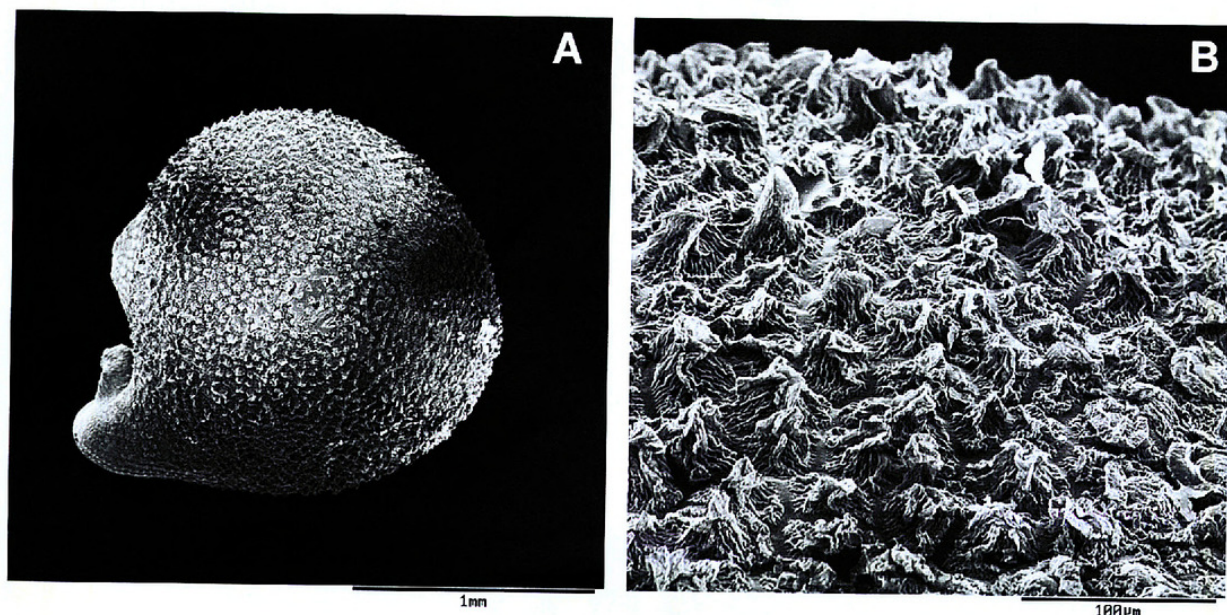


Figure 3. *Hypoxis bampsiana* subsp. *tomentosa* Wiland. —A. Seed. —B. Seed, testa covered with thick cuticle. From Lisowski et al. 8574 (POZG).

Brummitt, R. M. Polhill & E. A. Banda 16080 (holotype, K; isotype, MAL). Figures 1, 2, 3.

Folia utrinque tomentosa, externa nervis 18 ad 49, interna nervis 17 ad 67. *Inflorescentia* 4- ad 9-flora; scapi 3 ad 8, 11–25 cm longi; perigonii segmenta exteriora ovata, acuta; perigonii segmenta interiora ovata, cuspidata; stigma trilobata.

Tuber ca. 6×2.8 –5.5 cm. *Outer leaves* 3 to 4, 3.5 – $20 \times (1.2)$ –2–4 cm; lamina tomentose on both sides, nervation of 18 to 49 veins; inner leaves 3 to 5, 13.5 – $46 \times (8)$ –14–57 mm; lamina tomentose bifacially, nervation of 17 to 67 veins. *Scapes* 3 to 8, 11–25 cm \times 2–4 mm. *Inflorescences* 4- to 9-flowered; bracts 0.9–2.5 cm \times 2–4 mm, the lowest 3-veined; pedicels 3–18 mm; *outer tepals* ovate, acute, 13 – $15 \times$ ca. 5 mm, 7-veined; *inner tepals* ovate, cuspidate, 12 – $15 \times$ 7–8 mm, 5- or 6-veined; *stamens* 6 mm; filaments 2.5 mm; anthers fused or slightly emarginate at apex, 4.5–7 mm; *ovary* 4–6 \times 3–4 mm; style 2–3 mm, stigma free, with 3 unequal triangular lobes. *Capsule* obconical, 6–8 \times 4–5 mm.

Habitat. Grassland, miombo woodland, in sandy or rocky soil, at altitudes from 1250–2000 m.

IUCN Red List category. *Hypoxis bampsiana* subsp. *tomentosa* should be considered Near Threatened (NT) according to IUCN Red List criteria (IUCN, 2001). There are seven known populations distributed far apart. Although no information concerning this taxon's medicinal uses was available, it is possible that it might be taken as a substitute for other more useful *Hypoxis* species. An overgrazing of the grassland ecosystem, tree cutting, soil erosion, and

agriculture are threats for this taxon. The last collection available for this study was made in 1982.

Observations. One additional specimen from Nyika Plateau in Malawi (Pawek 480, MAL) seems to belong to this taxon; however, because only a photocopy of this specimen was available, it is not included with the paratypes.

Paratypes. DEMOCRATIC REPUBLIC OF CONGO. **Haut-Katanga:** S. Lisowski 8570 (POZG); Marungu Plateau, 2 km E from Luonde, S. Lisowski, F. Malaisse & J.-J. Symoens 8267 (POZG), Mont Kampilikwe, 3 km NNW from Kionta, S. Lisowski, F. Malaisse & J.-J. Symoens 8574 (POZG); Sakania Zone, SE from Namopala, S. Lisowski B-7278 (POZG); Kundelungu Plateau, 3 km W from Poste de Lualala, S. Lisowski 7558B (POZG). MALAWI. **Mzimba:** Chimpyai View, ca. 66 km SW of Mzuzu, J. Pawek 4142 (K, MAL). TANZANIA. **Ufipa:** Chapota, open country at top of scarp, A. A. Bullock 2045 (K); Sumbawanga, H. M. Richards 3444 p.p. (K).

Acknowledgments. I would like to address my thanks to the curators and workers of BR and K herbaria for their help and hospitality. I offer special thanks to Inger Nordal for her valuable help. I am very grateful to Victoria C. Hollowell, Dee Snijman, and the anonymous reviewer for their comments. The scientific work was financed from funds of the Polish Science Research Committee in 2003–2006 as a research project. Illustrations were drawn by Kinga Gawrońska and Marcin Matuszczak. A base for the distribution map was taken from "Distributiones Plantarum Africanum" published by the National Garden of Belgium and was redrawn by Maciej Szymański.

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