



## A new species of *Kosteletzkya* (Hibisceae, Malvoideae, Malvaceae) and notes on a second species, both from eastern Democratic Republic of the Congo

ORLAND J. BLANCHARD, JR.

University of Florida Herbarium, Florida Museum of Natural History, 379 Dickinson Hall, P. O. Box 110575, Gainesville, FL 32611-0575, USA, e-mail: [oblancha@liu.edu](mailto:oblancha@liu.edu)

### Abstract

A new species, *Kosteletzkya rotundalata*, is described from northeastern Democratic Republic of the Congo. A second species, *K. borkouana*, originally characterized as endemic to northern Chad, is here documented from several localities in the Albertine Rift of eastern Democratic Republic of the Congo.

### Introduction

*Kosteletzkya* Presl (1835: 130; Hibisceae, Malvoideae, Malvaceae) is a genus of 17 species that are distributed mainly in Africa and the northern Neotropics, with outliers in the southeastern United States and the Philippines. The plants are mostly herbaceous perennials or subshrubs with small *Hibiscus*-like flowers and a tendency toward locally moist habitats. *Kosteletzkya* falls within the complexly paraphyletic *Hibiscus* Linnaeus (1753: 693; Pfeil & Crisp 2005), but it has depressed, pentagonal capsules that disintegrate at maturity and contain one seed per locule. These characters combine to uniquely distinguish the genus within the tribe Hibisceae. Chromosome numbers, all of which are based on  $x = 19$ , support the morphological circumscription of the genus. Recent counts have identified a polyploid series in Africa that suggests that the genus originated there (Blanchard 2012). Several other taxa described under *Kosteletzkya*, and especially those unique to Madagascar, have their true affinities elsewhere (Blanchard unpublished data; Koopman & Baum 2008).

Recent studies of *Kosteletzkya* (see Blanchard 2008, 2009, 2012) have revealed specimens of an undescribed species from northeastern Democratic Republic of the Congo (DRC). Since this species is included in ongoing studies of the cytogenetics and molecular phylogeny of the genus, it is provided here with a formal name.

### Taxonomic treatment

*Kosteletzkya rotundalata* O. J. Blanch., *sp. nov.* (Figs. 1, 2A)

*A K. begoniifolia pedicellis brevioribus, foliis latioribus, fructibus parvioribus, petalis angustioribus et praesertim marginibus valvarum capsularum aspectu laterale rotundatis vice angulosis differt.*

**Type:**—DEMOCRATIC REPUBLIC OF THE CONGO. Prov. Orientale: Saga-Saga (grotte), rég. Mt. Hoyo, elev. 1200 m, 22 July 1955, *van Schuytbroeck* in *de Witte 12579* (holotype, BR!).



FIGURE 1. Herbarium specimen (a paratype) of a cultivated plant of *Kosteletzkya rotundalata* O. J. Blanch., *sp. nov.* Blanchard 3203 (FLAS). Photographed by Kent Perkins.

Erect, ascending or scrambling perennial herbs or subshrubs to 2.5 m. *Roots* fibrous-thickened. *Stems* +/- retrorsely hispid with yellowish, simple or few-armed stellate hairs mostly 1–2 mm long, underlain by minute multi-armed stellate hairs, and also with a line of short curved hairs extending from node to node, this sometimes obscured. *Leaves* alternate, petiolate; stipules linear-subulate, 5–6 mm long, setose; petioles 3–8 cm, reduced above, pubescence as in the stems but minute stellate hairs mostly lacking; blades simple, transversely ovate, 6.5–8.5 × 7.5–9.5 cm, base truncate to broadly cordate, margin coarsely and irregularly serrate, apex short-acuminate, the whole shallowly 3-lobed, the lobes arising in the distal 1/3–1/4 of blade, the distal blades smaller, broadly ovate and unlobed, pubescence adaxially of simple or few-armed stellate hairs less dense than on stems, abaxially as in stems but less dense except on nerves. *Flowers* single in axils of upper leaves, often together with a branch that itself bears flowers in axils of reduced leaves; pedicels 3–8 mm, to 12(–18) mm in fruit, articulated below epicalyx, becoming deflexed distally in fruit, pubescence as in the stems; epicalyx rotate or the segments slightly reflexed, 8–9, linear-filiform, 5–7 mm long, setose, setae ca. 1 mm, simple; calyx broadly campanulate, 9–11 mm long, abaxially with simple or few-armed stellate hairs and minute multi-armed stellate hairs, adaxially sparingly stellate- and glandular-pubescent, less so basally, lobed for about 3/4 its length, lobes triangular, slightly narrowed at base, acute, ciliate; corolla pale pink with a dark red center radiating outward in lines, the petals asymmetrically obovate, 22–30 × 14–20 mm, +/- rounded apically, adaxially glabrous, abaxially stellate- and glandular-pubescent where exposed in bud; staminal column dark red, 15–18 mm, minutely papillose especially toward base, anthers ca. 18–30, confined to the distal 1/2–3/4 of the column, filaments 1.0–1.4 mm; carpels 5, style-branches deep pink, exerted ca. 3–4 mm, sparingly glandular-pubescent, stigmas capitate, pink. *Fruits* capsular, depressed-pentagonal, pale brown, 4.0–5.5 × 5–6 mm, capsule-valves ultimately separating from the floral axis and from one another, dorsally transversely rugose, stellate- and glandular-pubescent, marginally ciliate with simple hairs ca. 1 mm long, valve margins in lateral aspect rounded in outline; seeds one per locule, dark brown with fine, pale concentric lines, reniform-obovate, 3.4–3.6 mm long. Chromosome number  $n = 38$ .

**Paratypes:**—DEMOCRATIC REPUBLIC OF THE CONGO. Prov. Orientale: Nizi, 1500 m, 2 February 1953, *Liben 444* (BR!); cultivated as 81-81, seed source: DEMOCRATIC REPUBLIC OF THE CONGO. Nizi, 1500 m, 2 February 1953, *Liben 444*, specimen harvested 27 December 1981, *Blanchard 3203* (FLAS!); cultivated as 10-53, seed source: *ibid.*, specimen harvested 19 January 2011, *Blanchard 3398* (FLAS!).

**Distribution and habitat:**—*Kosteletzkya rotundalata* is restricted in its range to northeastern DRC, Province Orientale, Ituri District, where it occurs at elevations from 1200 to 1500 m in rainforest habitats. The two known collection localities are separated by about 70 km (Fig. 3). Both of these records are over half a century old, so it is difficult to know what may be the current status of the species in the wild. The type locality is within the Mt. Hoyo Natural Reserve, an area noted for its numerous caves, of which the "Saga-Saga" of the label data is one. However, in the recent past protection of the reserve from poaching and deforestation is said to have been hindered due to sporadic actions by armed rebels in the area (Shamavu *et al.* 2010).

**Etymology:**—The species epithet refers to the rounded "wings" of the fruit.

**Discussion:**—*Kosteletzkya rotundalata* is closely similar and apparently related to the more widely distributed *K. begoniifolia* (Ulbrich 1917: 182) Ulbrich (1924: 684) with which it was confused in the herbarium and by Hauman in his treatment of the Malvaceae in *Flore du Congo, du Rwanda et du Burundi* (1963). It differs from the latter in having smaller capsules that have rounded (Fig. 2A) rather than acutely angulate (Fig. 2B–F) capsule-valve margins, narrower petals, shorter pedicels and broader leaves.

A recently published chromosome count of  $n = 38$  for this species (as *sp. nov.* O. J. Blanch. *ined.*) identifies it as one of the four known tetraploids in the genus (Blanchard 2012).

### *Kosteletzkya borkouana* Quézel

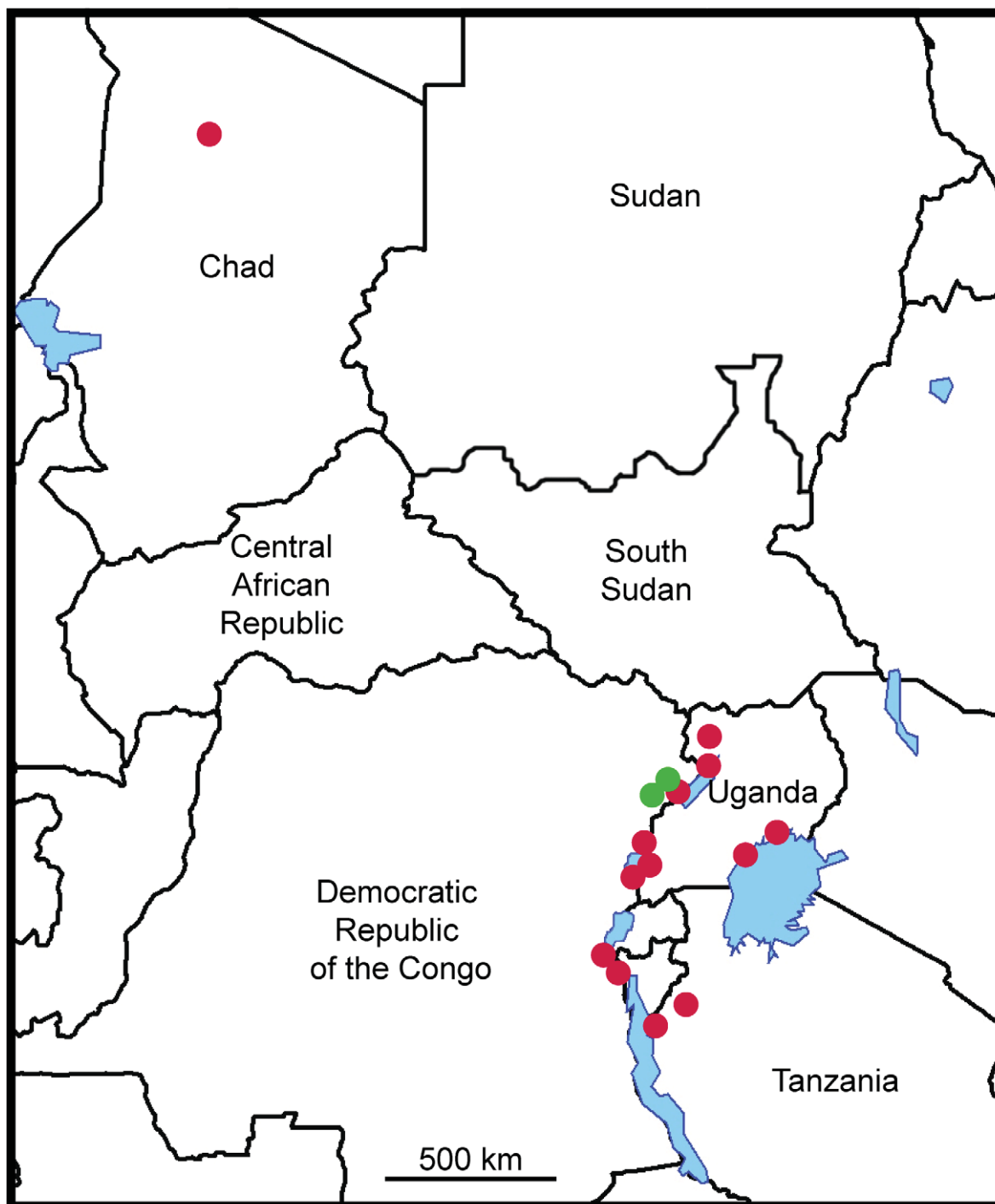
A second species of *Kosteletzkya* from the DRC is also of note. Six years prior to the treatment of the Malvaceae in the *Flore du Congo, du Rwanda et du Burundi* (Hauman 1963), a new species, *Kosteletzkya*

*borkouana* Quézel (1957: 87), was described from two specimens collected on different dates from the same locality in Tigui in the Borkou region of northern Chad, where it was said to be a rare endemic (Quézel 1957, 1958). Unexpectedly—as this locality is some 2300 km distant in the Sahara—*K. borkouana* has been recognized recently as also occurring rather widely in easternmost DRC (cited as "Congo-Kinshasa") and in western Uganda and Tanzania (Blanchard 2009). Several collections from East Africa were cited in this latter work, but precise occurrences in the DRC were not specified. Here I note the following eight Congolese collections of *K. borkouana*, which range through the Albertine Rift from the northern end of Lake Albert to the northern end of Lake Tanganyika:

DEMOCRATIC REPUBLIC OF THE CONGO. Mahagi Port, Lac Albert, September 1934, *Brédo 1686* (BR); Kasenyi, November 1935, *Brédo 1880* (BR); Parc National Albert, Kyavinonge (Lac Edouard), ±925 m, 20 May 1954, *de Witte 10242* (BR); Lac Edouard, Baie de Vitshumbi, 2 January 1953, *Van der Ben 4* (BR); Lac Edouard, circuit de la Rwindi, extrémité d'un bras de la baie de Vitshumbi, 19 December 1953, *Van der Ben 953* (BR); Kabare, bords du lac, 28 August 1914, *Bequaert 5478* (BR, US); plaine de la Ruzizi, 15 May 1950, *Germain 6999* (BR); plaine de la Ruzizi, Lac Tsimuka, 20 January 1950, *Germain 5682* (BR).



**FIGURE 2.** Capsule valves from *Kosteletzkya rotundalata* (A) and from five different collections of *K. begoniifolia* (B–F). A. *Kosteletzkya rotundalata*, DEMOCRATIC REPUBLIC OF THE CONGO. Nizi, *Liben 444*. B. *K. begoniifolia*, ETHIOPIA. Sirré, S. Bale, *Mooney 8408*. C. KENYA. Shores of Lake Naivasha, *Blanchard & Blanchard 1352*. D. ETHIOPIA. 40 km W of Ambo, *de Wilde & de Wilde-Duyffes 10421*. E. TANZANIA. Ngorongoro Crater, *Bonnefille & Riollet 73/26*. F. KENYA. Seboti, S.E. Elgon, *Tweedie 3242*. All specimens at FLAS. Scale bar = 5 mm. Photographed by Jane Blanchard.



**FIGURE 3.** Map of a part of eastern and northern Africa showing the known distributions of *Kosteletzkya rotundalata* (green dots, light gray in print version) and *K. borkouana* (red dots, dark gray in print version). Prepared by Kurt Neubig.

Specimens of what is now called *Kosteletzkya borkouana* had actually been collected for the first time over a century ago in Uganda ("Rhino Camp," Bahr el Jebel, Lado Enclave, 10 January–2 February 1910, *Mearns 2803* [US]), but the distinctness of the species had remained unrecognized for nearly half a century until it was described in 1957 from collections made the previous year in Chad. Indeed all of the Congolese specimens cited here also pre-date the Chadian collections on which *K. borkouana* is based. In herbaria and in publications, these earlier Congolese collections were generally identified as *K. grantii* (Masters 1868: 203)

Garcke (1880: 53) or *K. adoensis* (Hochst. ex Richard (1847: 54) Masters (1868: 194). For example the collection *Brédo 1880* cited above was listed under *K. grantii* in *Flore du Congo, du Rwanda et du Burundi* (Hauman 1963); a study of the plant associations of the plain of the Ruzizi River identified plants of *K. borkouana* (see Germain 5682 and 6999 above) as *K. adoensis* (Germain 1952); and a treatment of the flora of the Albert National Park identified the specimen *Bequaert 5478*, cited here, as *K. adoensis* (Robyns 1948).

Figure 3 shows the currently known distribution of *K. borkouana*, including the records from East Africa and Chad.

*Kosteletzkya borkouana* is distinguishable from *K. adoensis* by its erect habit, smaller flowers that are often sessile or subsessile in pairs or fascicles of three on naked peduncles, the absence of a dark spot at the petal bases, and larger fruits and seeds. From *K. grantii* it can be separated by its much smaller flowers, broader, more depressed, bristly capsules, and pubescent seeds. *K. borkouana* is found in and on the edges of marshes, often those dominated by graminoids (Eggeling 1934, Germain 1952, Quézel 1958; Eggeling 221 [K], Lye 6989 [EA]), whereas the other two species occur in more upland habitats. Unlike either of its congeners, which are diploids, *K. borkouana* is a tetraploid ( $n = 38$ ; Blanchard 2009, 2012).

The identification key to *Kosteletzkya* in the treatment of the Malvaceae in *Flora of tropical East Africa* (Blanchard 2009) covers the five species that also occur in northeastern DRC (except for the new *K. rotundalata*), and the use of that key will suffice to separate *K. borkouana* from the other species that occur there. A line-drawing illustration of a flowering specimen of *K. borkouana* can be found in Quézel (1958: pl. 8, fig. A).

It is now evident that the northern Chad population originated by dispersal from the Albertine Rift area or the environs, rather than the reverse. *K. borkouana* is an allotetraploid, and evidence from chromosome pairing in experimental hybrids indicates that the two diploid species whose genomes contributed to the inception of *K. borkouana* are *K. adoensis* and *K. buettneri* Gürke (1890: 92; Blanchard, in prep.). Both of these species occur widely in eastern DRC and western Uganda and Tanzania but they are found nowhere near northern Chad. An estimated 2.1 billion birds migrate annually between Africa and Europe (Hahn *et al.* 2009), so it is not difficult to imagine an event in which a fruit or seed of *K. borkouana* was actively or passively picked up in the rift lakes region and deposited in Chad's Tigui marshes during a migratory stopover. In support of this idea is the observation that the *Fuirena umbellata*-*Epilobium mirei* plant association at Tigui of which *K. borkouana* is a characteristic element is composed in large part of other tropical African freshwater-marsh species (Quézel 1958: 208, 210).

## Acknowledgments

I thank two anonymous reviewers, whose careful reading has improved this manuscript. Thanks are extended to curators at BR, EA, FLAS, K and US for the loans of the specimens cited herein. Kent Perkins prepared the photograph for Fig. 1, Jane Blanchard and Kurt Neubig provided technical assistance with the imaging of Fig. 2, and Kurt Neubig prepared the map image for Fig. 3.

## References

- Blanchard, O.J., Jr. (2008) Innovations in *Hibiscus* and *Kosteletzkya* (Malvaceae, Hibisceae). *Novon* 18: 4–8.  
<http://dx.doi.org/10.3417/2006125>
- Blanchard, O.J., Jr. (2009) *Kosteletzkya*. In: Verdcourt, B. & Mwachala, G. M. Malvaceae. In: Ghazanfar, S. A. & Beentje, H. J. (eds.) *Flora of tropical East Africa*. Royal Botanic Gardens, Kew, pp. 81–88.
- Blanchard, O.J., Jr. (2012) Chromosome numbers, phytogeography and evolution in *Kosteletzkya* (Malvaceae). *Rhodora* 114: 37–49.  
<http://dx.doi.org/10.3119/0035-4902-114.957.37>
- Eggeling, W.J. (1934) Notes on the flora and fauna of a Uganda swamp. *Uganda Journal* 1: 51–60.

- Garcke, A. (1880) Aufzählung der abyssinischen Malvaceen aus der letzten im Jahre 1869 eingesandten Schimper'schen Sammlung. *Linnaea* 43: 49–58.
- Germain, R. (1952) Les associations végétales de la plaine de la Ruzizi (Congo Belge) en relation avec le milieu. *Publications de l'Institut National pour l'Étude Agronomique du Congo Belge, Série Scientifique* 52: 1–307.
- Gürke, M. (1890) Malvaceae. In: Büttner, R. Neue Arten von Guinea, dem Kongo und dem Quango I. *Verhandlungen des Botanischen Vereins der Provinz Brandenburg* 31: 92–93.
- Hahn, S., Bauer, S. & Leicht, F. (2009) The natural link between Europe and Africa—2.1 billion birds on migration. *Oikos* 118: 624–626.  
<http://dx.doi.org/10.1111/j.1600-0706.2008.17309.x>
- Hauman, L. (1963) Fam. 86. Malvaceae. In: Robyns, W. et al. (eds.) *Flore du Congo, du Rwanda et du Burundi. Spermatophytes* 10. Institut National pour l'Étude Agronomique du Congo, Bruxelles, pp. 92–190.
- Koopman, M. M. & Baum, D. A. (2008) Phylogeny and biogeography of tribe Hibisceae (Malvaceae) on Madagascar. *Systematic Botany* 33: 364–374.  
<http://dx.doi.org/10.1600/036364408784571653>
- Linnaeus, C. (1753) *Species plantarum*. Salvius, Stockholm, 1200 pp.
- Masters, M.T. (1868) Malvaceae. In: Oliver, D. *Flora of tropical Africa* 1. Reeve & Co., London, pp. 175–214.
- Pfeil, B.E. & Crisp, M.D. (2005) What to do with *Hibiscus*? A proposed nomenclatural resolution for a large and well known genus of Malvaceae and comments on paraphyly. *Australian Systematic Botany* 18: 49–60.  
<http://dx.doi.org/10.1071/SB04024>
- Presl, K.B. (1835) *Reliquiae Haenkeanae* 2. Calve, Prague, 152 pp.
- Quézel, P. (1957) Plantes nouvelles du Tibesti. *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord* 48: 82–104.
- Quézel, P. (1958) Mission Botanique au Tibesti. Contribution à l'étude de la flore et de la végétation du Borkou et du Tibesti. *Mémoires, Institut de Recherches Sahariennes* 4: 99–357.
- Richard, A. (1847-1851 [1847]) *Voyage en Abyssinie. Troisième partie. Histoire Naturelle—Botanique* 4. Arthus Bertrand, Paris, 472 pp.
- Robyns, W. (1948) *Flore des spermatophytes du Parc National Albert. 1. Gymnospermes et Choripétales*. Institut des Parcs Nationaux du Congo Belge, Bruxelles, 745 pp.
- Shamavu, P., Kujirakwinja, D. & Plumptre, A. (2010) *Establishing a conservation presence in the Mt. Hoyo Reserve and development of a strategy for the conservation of a corridor*. Final Report for USFW Project 96200-9-G096. Available from: <http://www.albertinerift.org/AboutUs/SearchResults.aspx?Search=Mt.%20Hoyo> (accessed 10 September 2012)
- Ulbrich, E. (1917) Einige neue *Hibiscus*-Arten aus dem tropischen Afrika. *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 7: 179–183.  
<http://dx.doi.org/10.2307/3994358>
- Ulbrich, E. (1924) Malvaceae. In: Fries, R. E. & Fries, T. C. E. Beiträge zur Kenntnis der Flora des Kenia, Mt. Aberdare und Mt. Elgon, 4. *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 8: 674–686.