

A new *Uvaria* L. species (Annonaceae) from northern Mozambique

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ABSTRACT

A new species *Uvaria rovumae* Deroin & Lötter, sp. nov. is described, illustrated and mapped from Cabo Delgado Province in northern Mozambique. Its morphology, as well as systematic affinities, habitat and conservation status are briefly discussed. Very similar to *U. tanzaniae* Verdc. by its habit, it differs mainly by its free sepals, inner petals slightly unguiculate and a high carpel number (>35). *Uvaria rovumae* Deroin & Lötter, sp. nov. is known only from a handful of individual plants in one location near Nangade, making it “Critically Endangered” (CR) following IUCN Red List categories and criteria.

KEY WORDS

Cabo Delgado,
new species,
systematics,
Rovuma River,
Critically Endangered.

RÉSUMÉ

Une nouvelle espèce d'Uvaria L. (Annonaceae) du nord du Mozambique.

Uvaria rovumae Deroin & Lötter, sp. nov. est décrite comme nouvelle espèce de la province de Cabo Delgado (Nord du Mozambique), illustrée et cartographiée. Sa morphologie, ainsi que ses affinités systématiques, son habitat et son statut de conservation sont brièvement discutés. Proche, par son port, de *Uvaria tanzaniae* Verdc., *U. rovumae* Deroin & Lötter, sp. nov. en diffère principalement par ses sépales libres, ses pétales internes un peu onguiculés et ses carpelles plus nombreux (>35). Ce taxon n'est représenté que par un petit nombre d'individus sur une seule dition près de Nangade, et peut être considéré « en danger critique d'extinction » (CR) selon les catégories et critères de la Liste rouge de l'UICN.

MOTS CLÉS

Cabo Delgado,
espèce nouvelle,
systématique,
rivière Rovuma,
danger critique
d'extinction.

INTRODUCTION

With *c.* sixteen recognized species, *Uvaria* L. is the largest genus in the family for the tropical East African flora, but its taxonomy remains imperfectly known (Robson 1960; Verdcourt 1971; Johnson *et al.* 1999). Taxonomic difficulties in the group may, at least in part, be due to a complex biogeographical history during the Oligocene or Early Miocene, involving both Africa and Madagascar, changes in sea currents and fruit dispersal by primates, as recently demonstrated by Zhou *et al.* (2012).

Uvaria rovumae Deroin & Lötter, sp. nov., was first collected by one of us (Mervyn Lötter) in March 2009 during a plant survey in Cabo Delgado province (northern Mozambique). A collection of a fruiting specimen was made, which ML provisionally referred to as *Uvaria tanzaniae* Verdc., but suspected to be a new species. ML returned to the site again in January 2012 and collected flowering material, which was sent to the senior author who confirmed that it was indeed an undescribed species.

MATERIAL AND METHODS

Two collections – one flowering, the other fruiting – were made from the same locality, two years apart. As usual for the family, flowers were rather sparse on the twigs, and thus a single flower – a little time before the anthesis (Fig. 1E) – was available on the isotype deposited at P. This was then rehydrated and restored in NH₄OH 10%aq. at 60°C, fixed in FAA and dissected in the usual preservative (Alcohol-Water-Glycerol, at equal volumes). Each stage of the dissection was drawn, and all floral members were mounted on slides and filed with the isotype sheet kept at P herbarium. Examination of a dried mature fruit was found to be enough for the description.

Several photographs taken on the field were available, allowing a correct interpretation of floral and fruit morphology.

SYSTEMATICS

Uvaria rovumae Deroin & Lötter, sp. nov.
(Figs 1; 3; 5)

Species habitu cum Uvaria tanzaniae Verdc. valde congruens, sed foliis non hirsutis subtus, pedicellis non obsoletis, calyce non cupuliformi sesquialtiori cum sepalis omnino liberis, petalis ellipticis vs. ovatis, neque tomentosus, plusminusus sesquilongioribus, intimis leviter unguiculatis, carpellis numerosissimis cum ovulis *c.* 10 vs 20 biserialibus, mericarpis nullo modo fusiformibus 2 vs. 10-seminatis praecipue differt.

TYPUS. — **Mozambique.** Cabo Delgado, Nangade, tall closed woodland, 11°12'05"S, 39°38'48"E, 332 m, 6.I.2012, fl., Lötter 2142 (holo-, BNRH; iso-, K, P[P00700917]).

PARATYPUS. — **Mozambique.** Cabo Delgado, 16 km south of Nangade, tall mixed closed woodland forest, 11°12.081' S, 39°38.796' E, 332 m, sandy soil, 23.III.2009, fl., Lötter & Turpin 1763 (K, LMA, P[P00700918]).

ETYMOLOGY. — The specific epithet refers to the nearby Rovuma River.

DESCRIPTION

Scrambling liana *c.* 3–4 m tall, young branchlets rusty stellate-pubescent, later glabrous, pale brown, sparsely lenticellate. Leaves held in one plane; leaf-blades elliptic or obovate, 55–126 × 27–61 mm, obtuse acuminate or emarginate at the apex, rounded or somewhat cordate at the base, papery, densely pubescent when young, then glabrous above and beneath except for a few stellate hairs on the midrib and secondary veins (8–11 pairs), all veins slightly printed above, prominent beneath; petiole 3–6 mm long, stellate-pubescent.

Inflorescence leaf-opposed, peduncle *c.* 7 mm long, flowers 1(–2); bracteoles 2, *c.* 10 × 6.5 mm, pubescent outside, lower bracteole rounded slightly unguiculate, upper one elliptic. Torus as a depressed cylinder *c.* 14 mm in diameter, flat convex above. Perianth members basically with 5 primary nerves and a dense brochidodromous venation. Sepals broadly ovate, *c.* 11 × 15 mm, obtuse, free, pubescent outside, pale green. Petals subequal, gold yellow with a greenish tinge, apex obtuse or rounded, spreading, reflexed at the end of anthesis, the outer elliptic *c.* 18 × 11.5 mm, sparsely pubescent outside, the inner narrowly elliptic with

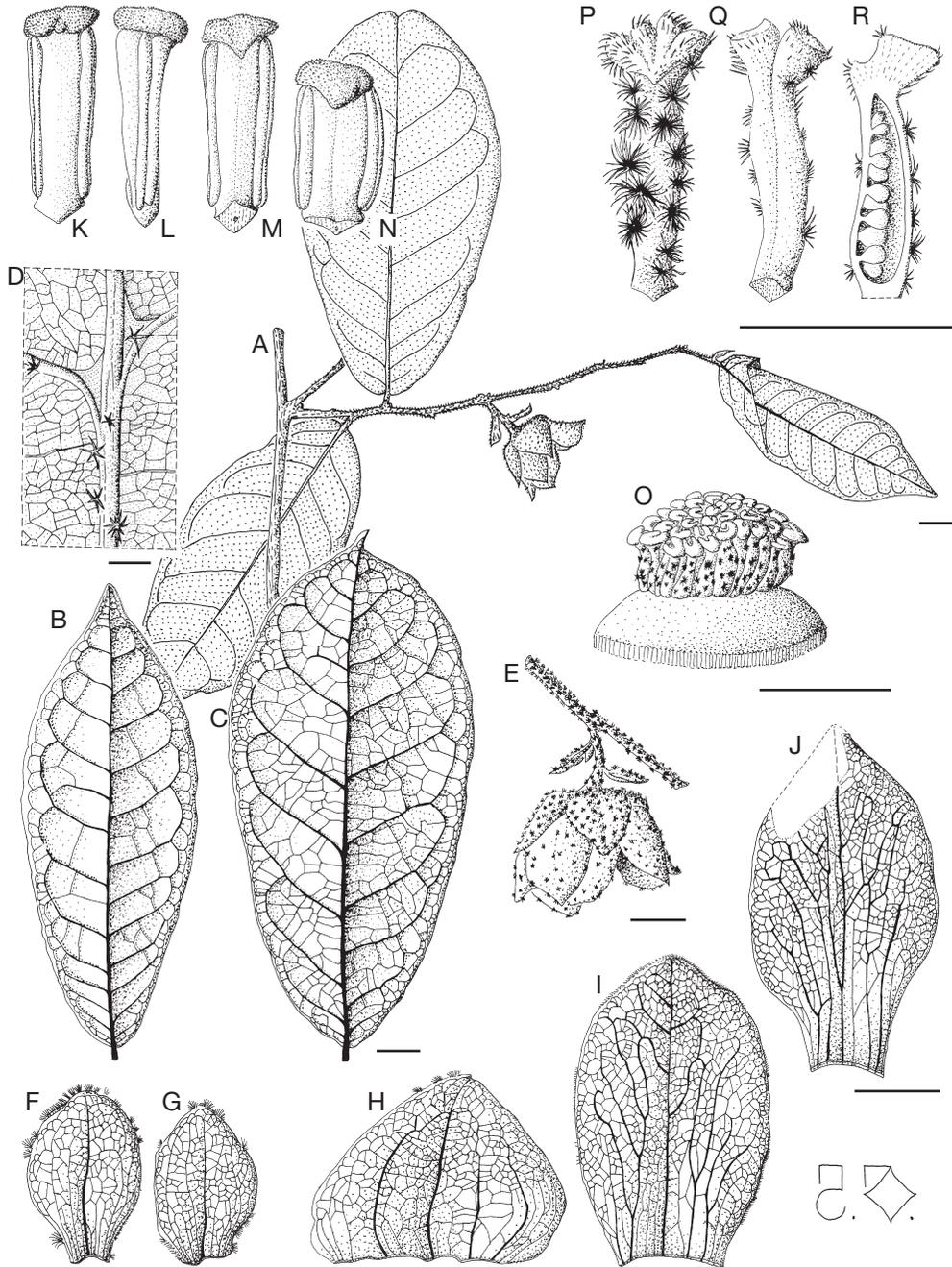


FIG. 1. — *Uvaria rovumae* Deroin & Lötter, sp. nov.: **A**, flowering twig; **B, C**, leaves (abaxial side); **D**, detail of the middle of leaf-blade, with domatia; **E**, flower just before the anthesis; **F, G**, lower and upper bracteoles; **H**, sepal; **I, J**, outer and inner petal; **K-M**, stamen, in abaxial, side and adaxial views; **N**, outer stamen, adaxial view; **O**, receptacle and gynoecium; **P, Q**, carpel in abaxial and adaxial views; **R**, carpel in longitudinal section. *Lötter 2142* (iso-, P). Drawing Thierry Deroin. Scale bar: A-C, E, 1 cm; D, 1 mm; F-J, O, 5 mm; K-N, P-R, 2 mm.

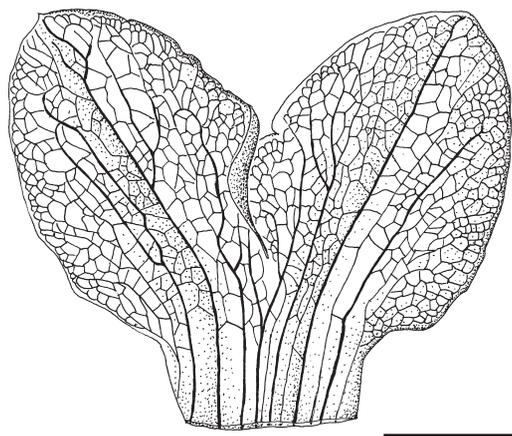


FIG. 2. — *Uvaria rovumae* Deroin & Lötter, sp. nov.: two inner petals congenitally fused. Lötter 2142 (iso-, P). Drawing Thierry Deroin. Scale bar: 5 mm.

a broad claw *c.* 20 × 11 mm, glabrous outside. Stamens numerous (*c.* 300, arranged in 6-7 whorls), linear *c.* 2 × 0.6 mm, latrorse, connective head truncate and minutely papillose, enlarged above narrow pollen sacs. The outermost stamens more rounded, *c.* 1.5 mm long. Carpels slender, *c.* 50, ovary *c.* 2 mm long, with scattered stellate hairs on the abaxial side, ovules *c.* 10, biseriate; stigmas horseshoe convoluted *c.* 0.5 mm thick, covered with simple hairs.

Fruit pseudosyncarp ellipsoid in outline, *c.* 45 mm in diameter and 30 mm tall, pale yellow, borne on a peduncle *c.* 12 mm long and 3 mm thick, sepals persistent reflexed but not accrescent, mericarps *c.* 50 obovoid and apically rostrate, covered by sparse stellate hairs, 13-18 mm long, crowded on a globular receptacle by very short stipes (2 mm or less). Seeds 2 per mericarp, ellipsoid-irregular *c.* 6-8 × 4 × 4 mm, with a glossy reddish brown testa showing a weak pattern of endosperm rumination.

DISTRIBUTION, ECOLOGY AND PHENOLOGY

Uvaria rovumae Deroin & Lötter, sp. nov., appears to be a range-restricted species, hitherto only recorded from the dense understory of a single large *Newtonia paucijuga* (Harms) Brenan tree, about 25 km south of the Rovuma River

near Nangade, 63 km north of Mueda (Fig. 4). The surrounding vegetation was once probably tall semi-deciduous closed woodland or dry deciduous forest, but this has now largely been transformed to a mosaic of open to closed semi-deciduous woodland with isolated small patches of semi-deciduous forest. Forty-five years ago, Wild & Barbosa (1967) classified the vegetation in this area as Dry deciduous Lowland Forest. Our new species now only occurs in one of the very small remnant forest/thicket patches. Some of the associated woody species occurring with *Uvaria rovumae* Deroin & Lötter, sp. nov., include: *Newtonia paucijuga*, *Bombax rhodognaphalon* K.Schum. ex Engl., *Millettia stuhlmannii* Taub., *Strychnos myrtooides* Gilg & Busse, *Vismianthus punctatus* Mildbr., *Whitfieldia orientalis* Vollesen, *Rinorea welwitschii* (Oliv.) Kuntze subsp. *tanzanica* Grey-Wilson, and *Streblus usambarensis* (Engl.) C.C.Berg.

Floral biology (Fig. 3B-D) conforms to the pattern typical of *Uvaria*: no pollination chamber (Saunders 2009: 578) and strict protogyny, with at first a receptive stigmatic plate covered by a mucilaginous cap (Fig. 3B) then a release of pollen grains (Fig. 3D).

CONSERVATION STATUS

After several botanical surveys in the region, this new species appears to be restricted to only one very small patch of forest undergrowth in an area to the north Nangade and just south of Mecabua village. This same locality harbours several other species of considerable biogeographic interest, such as two new records for Mozambique; *Whitfieldia orientalis* (Lötter & Turpin 1764); and *Rinorea welwitschii* subsp. *tanzanica* (Violaceae) (Burrows & Burrows 11314). It is also the second only locality of *Streblus usambarensis* (Moraceae) (Burrows & Burrows 11313) for Mozambique. An undescribed species of *Lagynias* E.Mey. (Rubiaceae) (Burrows & Burrows 11316) was also found in the same forest patch. The habitat of the first record of the *Streblus usambarensis* for Mozambique is classified by Wild & Barbosa (1967) as Dry Deciduous Lowland Forest, supporting our opinion that this area was once much more heavily forested.



FIG. 3. — *Uvaria rovumae* Deroin & Lötter, sp. nov., flower morphology: **A**, floral bud, note the leaf-opposed position; **B**, **C**, flower at the ♀ stage, by side and above, petals are spread out; **D**, flower at the ♂ stage, petals are strongly reflexed, pollen (white) is released by browning dislocating stamens (field photographs Mervyn Lötter).

The current site is dependent on the shade from a single large *Newtonia paucijuga* tree. The logging of this tree would allow light and fire to penetrate this biogeographically important forest patch. A large road running southwards from Nangade to Mueda cuts through part of this once larger forest patch. We suspect that more plants of *Uvaria rovumae* Deroin & Lötter, sp. nov., may eventually be found in the Rovuma River valley, or even in southern Tanzania. However it is currently only known from less than 5 individuals

in an area no more than 30 × 30 m. Based on the IUCN Red List categories and criteria version 3.1 (IUCN 2001), a provisional conservation status of Critically Endangered CR B1ab(iii); C1; D1 is thus proposed.

MORPHOLOGICAL REMARKS

The dissected flower of *Uvaria rovumae* Deroin & Lötter, sp. nov., showed two puzzling features:

1) Two of the three inner petals were accidentally connate, as demonstrated by the merging of the



Fig. 4. — Map showing the known distribution of *Uvaria rovumae* Deroin & Lötter, sp. nov.

most lateral veins (Fig. 2). A basal fusion of petals was previously reported in some species of the genus (van Heusden 1992: 150), but did not involve the primary vasculature.

2) Some of the most outer stamens are shorter and rounded (Fig. 1N), rather reminiscent of staminodes, frequent in Annonaceae (Saunders 2009: 584) and usually present in several – especially Asiatic – *Uvaria* species (van Heusden 1992: 150), although they are here fertile.

Uvaria rovumae Deroin & Lötter, sp. nov. resembles members of the *Uvaria angolensis* group, as expanded by Johnson *et al.* (1999), in that its petals become strongly revolute during anthesis, but differs markedly by its free sepals and more numerous carpels (>35).

If the cupuliform calyx is not considered, *U. rovumae* appears intermediate between the two subgroups (*U. tanzaniae* Verdc. + *U. angolensis* Oliver) and (*U. lucida* Bentham + *U. puguensis* D.M. Johnson), being similar to the first in habit and petal size, much more to the second by the scattered pubescence of flowers. The similarity is striking with *U. puguensis*, especially in the torus morphology (Johnson *et al.* 1999; Fig. 2E) and petal colour (“yellow-green to pale orange-yellow”), as well as trichome, but the flower is much smaller (torus c. 5 vs 14 mm diam.), exhibiting a low stamen number (30–40 vs 300) with stretched quadrate vs truncate head connectives.

In their phylogenetic reconstruction of *Uvaria*, Zhou *et al.* (2012: 325) show that all African and Malagasy species are in a same clade II, splitting off during the Miocene, at c. 17.0 Ma. It is noteworthy that sepals are usually free or slightly connate at the base in Malagasy species (Cavaco & Keraudren 1958: 7; Deroin & Gautier 2006), as in *U. rovumae*. A cupuliform calyx is a good character in an identification key, but cannot be used for outlining natural units. Perhaps it is possible to explain the free sepals of *U. rovumae* by a shift in the gene expression during floral morphogenesis (Saunders 2009: 586). The synsepaly character, expected in this species-group, tends to be then expressed more inside in the perianth, while outer stamens are coming close to staminodes. It is possible that the increase of stamen and carpel numbers is correlated.

The pseudosyncarpic fruit (Fig. 5) is similar to that of *Uvaria scabrida* Oliv., a West African species (Le Thomas 1969: 77). It is noticeable that in both species almost no carpel abortion occurs during fruit set. However in *U. scabrida* the floral receptacle is already globular, while in *U. rovumae* Deroin & Lötter, sp. nov. it appears flattened. On the other hand, if compared with the related *U. tanzaniae* Verdc., only 20% of the ovules evolve in mature seeds and so the mericarps are not fusiform and even very slightly lomentaceous (Verdcourt 1986: 287). These structural differences entail likely divergences in dispersal biology between these close species.



FIG. 5. – *Uvaria rovumae* Deroin & Lötter, sp. nov.: details of fruit. **A**, fruiting twig; **B**, cross section of the pseudosyncarp, Lötter & Turpin 1763 (field photographs Mervyn Lötter).

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