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SHORT COMMUNICATION

Rhipidoglossum montealenense (Orchidaceae), a new species from Equatorial Guinea and Cameroon

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Background and aims – While conducting a taxonomic revision of the genera *Diaphananthe* and *Rhipidoglossum* (Orchidaceae), a new taxon from Equatorial Guinea and Cameroon was discovered, and is formally described here.
Methods – A comparison of about 800 specimens with the nomenclatural types and the specimens housed at BR, BRLU, K, P, WAG and YA herbaria was undertaken in order to confirm the taxonomical status of the new taxon. Its conservation status was assessed using the IUCN Red List Categories and Criteria.
Key results – *Rhipidoglossum montealenense* Descourvières, Stévart & P.J.Cribb sp. nov., here described and illustrated, is endemic to Río Muni (Equatorial Guinea) and southern Cameroon. The species is found in the mountainous area situated along the transition from the coastal and to the continental regions of Atlantic Central Africa. It is close to *R. melianthum* but differs by its decurrent petals, a small ovary and a comparatively short spur. The species also differs from *R. paucifolium* by its elliptical lip lacking a callus and by rounded to subacute sepals and petals, and from *R. rutilum* by its short leaf internodes. The species is considered as Endangered according to IUCN Categories and Criteria. Its survival *in situ* will likely depend on the maintenance of the subpopulation in the Monte Alén National Park.

Key words – Angraecoids, Atlantic Central Africa, Cameroon, conservation, Equatorial Guinea, *Rhipidoglossum*, IUCN Categories and Criteria, Orchidaceae, taxonomy.

INTRODUCTION

Schlechter (1918) established the genus *Rhipidoglossum.* According to him, *Rhipidoglossum* includes species with two pollinia attached by a short stalk to their own viscidium, whereas in *Diaphananthe* the two stipes share a single viscidium. Later, *Rhipidoglossum* was included in *Diaphananthe* Schltr. as a section by Summerhayes (1960), but Garay (1972) re-established it at generic rank. This statement was thereafter confirmed by Carlsward et al. (2006) based on phylogenetic analyses. *Rhipidoglossum* is an orchid genus of tropical Africa which according to Govaerts et al. (2012) includes 35 species, mostly epiphytic and with a spur connected to the lip as in other angraecoid orchids.

Since 1997, a survey of Atlantic Central African orchids has been conducted (Stévart 2003, Droissart 2009) and more than 14,000 living orchid specimens collected in the wild are being grown in shade-houses situated in São Tomé, Gabon, Equatorial Guinea (Río Muni) and Cameroon. This method provided numerous fertile specimens, including new species, some of them still to be described.

During an expedition to Río Muni in 1999, four different specimens of a supposedly new species were collected in the

Monte Alén National Park by the last author and preserved at the herbarium of BRLU (acronyms according to Thiers 2012). After careful examination of these specimens, and a comparison with the collections at K, it was clear that they represented a new species. It was illustrated but remained undescribed because a taxonomic revision was needed for the whole genus. Ten years later, while revising *Rhipidoglossum*, and after a comparison with material preserved at BM, BR, BRLU, K, P, WAG and YA, we filed one additional specimen at the YA herbarium, which we collected in southern Cameroon, in an area near the Campo Ma'an National Park. We then decided to describe the new species resulting in the present paper.

MATERIAL AND METHODS

This study is based on a detailed examination of about 800 specimens of *Rhipidoglossum* and *Diaphananthe* from tropical Africa. These specimens include dried and alcohol-preserved material deposited in the main herbaria with holdings from the region, viz. BM, BR, BRLU, K, P, WAG and YA. Specimens of the new species from Río Muni were observed in 2001 by P.J. Cribb who made a first drawing of it. This drawing is now conserved in the Kew Orchid Herbarium. For comparison, we also used illustrations accompanying the description of *Diaphananthe meliantha* P.J.Cribb (Cribb 1979), now considered as a synonym of *Rhipidoglossum melianthum* (P.J.Cribb) Senghas (Senghas 1986), and that of *Rhipidoglossum paucifolium* D.Johanss. (Johansson 1974). Measurements, colours and other details given in the description are based on living material, alcohol-preserved and herbarium specimens, and data derived from field notes.

The conservation status of the species was assessed by applying the IUCN Red List Categories and Criteria (IUCN 2001). Geo-referenced specimen data were imported into ArcView 3.3 to calculate the area of occupancy (AOO) and extent of occurrence (EOO) using Cats 1.2 (Moat 2007). The cell area was set such that the maximum AOO of a species known only from a single subpopulation does not exceed 10 km², the upper limit for Critically Endangered status (cell size = 3.16 × 3.16 km). Each subpopulation represents a different collecting locality. The number of locations is assessed with regard to distinct kinds of threats, which may involve merging adjacent subpopulations showing the same threat to a single location.

RESULTS

The detailed observation shows that the new species (fig. 1) is morphologically similar to *R. melianthum*, and to a lesser extent to *R. paucifolium* and *R. rutilum* (Rchb.f.) Schltr. (Reichenbach 1885, Schlechter 1918) (table 1). The new species, *R. montealenense*, is distinguishable from *R. melianthum* by its decurrent petals along the foot of the column, by much shorter ovary and spur, and also by the shape of the median lobe of the rostellum. It differs from *R. paucifolium*, by its petals being decurrent along the foot of the column, its much shorter ovary and spur, and the shape of the median lobe of the rostellum. It differs from *R. paucifolium* by its elliptic (not broadly triangular) lip, the lack of a callus on the lip and the petals and sepals being subacute or apiculate or obtuse, but never acute. The differences between *R. montealenense* and *R. rutilum* are more obvious and relate to the shorter leaf internode (2.5–4 mm) while it is longer (5–18 mm) in the other species, the peduncle carrying much flowers in *R. rutilum*, the color of the flowers, the form of various floral parts, and the rostellum structure (table 1).

TAXONOMIC TREATMENT

Rhipidoglossum montealenense Descourvières, Stévart & P.J.Cribb, **sp. nov.**

Rhipidoglossum montealenense Descourvières, Stévart & P.J.Cribb a *R. meliantha* (P.J.Cribb) Senghas petalis decurrentibus, calcari magnitudine distincte minore, ovario minore, a *R. paucifolio* D.Johanss. sepalis petalisque rotundatis vel subacutis sed nullo modo totibus distincte acutis, labello elliptico ecalloso et *R. rutilo* (Rchb.f.) Schltr. internodis foliosis brevibus differt. – Type: Equatorial Guinea (Río Muni), Monte Alén National Park, between Engong and Lago, 1°34'N 10°17'E, 1 Aug. 1999, *Ndong Bokung & Stévart* 23 (holo-: BRLU).

Epiphytic herb. Roots numerous and long, distributed at the base of the plant, unbranched, greyish, 2–3 mm in diameter. Stem semi pendulous, unbranched or exceptionally branched at its base up to 50 mm long, 2–3 mm in diameter; internodes about 2.5–4 mm. Leaves less than 10, not stalked, slightly conduplicate, slightly coriaceous, elliptic oblong to almost linear, sometimes slightly falcate, 48–152 mm long, 8–18 mm broad; margins entire; apex unequally bilobed, difference between the two lobes generally 2–8 mm; with or without a short notch. Inflorescences usually 1 or 2, hanging, emerging at the base of the stem, 3 to 15 flowered, 30–80 mm long; floral internode about 2–4.5 mm; rachis terete, single-flowered; bracts tubular, 1 mm long. Flowers green or greenish-yellow, 5–7 mm diameter; dorsal sepal elliptical, slightly concave, 1- or 3-nerved, 2.2–3 × 1.5–2 mm, with entire margins, with apex obtuse or sometimes subapiculate; lateral sepals obliquely elliptic, slightly keeled dorsally, 1 or 3-nerved, 3.1–4.3 × 1.1–1.2 mm, with entire margins, with apex subacute; petals slightly asymmetrical, decurrent along the very short columnal foot and along both sides of the mouth of the spur, ovate to suborbicular, 1.8–3 × 2–2.5 mm, attenuate to subacute at the apex; spur hanging, cylindrical, slightly flattened laterally, 4–9 mm long, 0.8–1 mm in diameter, somewhat curved forward, with apex rounded; lip elliptic and slightly trilobed or transversely elliptic, 3–4 × 2–3.5 mm, with 3 or 5 nerves, without callus, with margins entire to slightly eroded or irregular, with apex slightly emarginate and often a very short tongue recurved; ovary and pedicel not twisted, 2.5–4 × 0.6–1 mm. Column terete and often slightly club-shaped, always with a short basal foot, short, 1–1.4 × 0.8–1 mm; rostellum with a long median lobe, trumpet-shaped and slightly recurved, 0.6–1 mm long, with margins slightly membranous and apex lenticellate; pollinia 2, spherical; viscidia 2, disc-shaped; stipites 2, independent of each other, flattened, narrowly club-shaped, 0.7–0.8 mm long, with smooth margins. Fig. 1.

Table 1 – Diagnostic features of *Rhipidoglossum montealenense* sp. nov. compared with the three morphologically closest taxa.
Bold features used to differentiate the new species from the other three.

	R. monte-alenense	*R. melianthum*	*R. paucifolium*	*R. rutilum*
Geographical distribution	Rio Muni, Cameroon	Tanzania	Liberia, Cameroon	widespread in tropical Africa
Stem length	short (2–5 cm)	short (3–5 cm)	very short (0.5–1 cm)	short to long (3–40 cm)
Leaf internode	short (2.5–4 mm)	short (2–3 mm)	shorter than 2 mm	long (5–18 mm)
Leaf shape	elliptic-oblong to almost linear, sometimes slightly falcate or oblanceolate	falcate, linear	elliptic oblong to narrowly oblong	linear to oblanceolate, sometimes slightly falcate
Number of flowers per inflorescence	3–15	5–7	7–8	10–40 and more
Inflorescence	hanging, 30–80 mm long	spreading or pendent, 100 mm long	hanging, up to 80 mm long	hanging, 50–200 mm long
Flower color	pale green to greenish yellow	yellow with black hairs on the pedicel and ovary	pale green	olive-green tinged with purple to purple, rarely cream, pinkish or purplish
Dorsal sepal	**elliptic**; 2.2–3 × 1.5–2 mm; obtuse or apiculate	oblong-ovate; 4.5–3 mm; obtuse	broadly oblong; 3.5–4 × 2.5–3 mm; acute	broadly ovate to suborbicular; 3.0–5 × 1.5–3.5 mm; obtuse
Lateral sepal	**obliquely elliptic**; 3.1–4.3 × 1.1–1.2 mm; subacute	narrowly ovate, oblique; 5.5–2.5 mm; obtuse	ovate-lanceolate; 4.5–5 × 2 mm; acute	falcate linear; 2–4.3 × 1–2.1 mm; obtuse
Petal	**ovate to suborbicular**; **decurrent**; 1.8–3 × 2–2.5 mm; subacute	orbicular; not decurrent; 3 × 3 mm; obtuse	triangular; decurrent; 3–3.5 × 2.5 mm; acute	orbicular or broadly ovate; not decurrent; 1.5–2.8 × 1.1–3.5 mm; obtuse
Lip	**elliptic and slightly trilobed or transversely elliptic**; 3–4 × 2–3.5 mm; apex slightly emarginate	elliptic oblong; 2.5 × 3 mm; apex emarginate	broadly triangular; trilobed; 4–5 × 6.5–7 mm; median lobe of the apex triangular	flabellate or transversely elliptic; 2–3.5 × 2.5–4.5 mm; apex truncate, emarginate or apiculate
Lip margins	entire to slightly eroded or irregular	entire to subentire	irregular	subentire
Callus on the lip	absent	absent	crescent-shaped callus on the upper surface at the mouth of the spur	absent
Ovary length (mm)	2.5–4	8–10	about 4	about 2
Spur shape	cylindrical, slightly flattened and incurved, apex rounded	cylindrical, incurved, apex rounded	cylindrical, sligntly incurved, apex slightly enlarged	cylindrical, incurved, apex rounded to subacute
Length and average width (mm) of spur	4–9 × 0.8–1	15 × 1.1	9–10 × 1.2	4–8 × 0.7–1
Colum length (mm)	1–1.4	About 1	2–2.5	0.9–1.2
Rostellum shape and size (mm)	slightly trilobed; 0.6–1	slightly trilobed; 0.7–0.8	slightly trilobed; 1–1.2	clearly trilobed; 0.3–0.6
Shape of the median lobe of the rostellum	**trumpet-shaped with globular apex laterally flattened, proximal margins slightly membranous**	trumpet-shaped with globular apex not laterally flattened and without membranous margins	not seen	trumpet-shaped, globular apex not flattened and without membranous margins

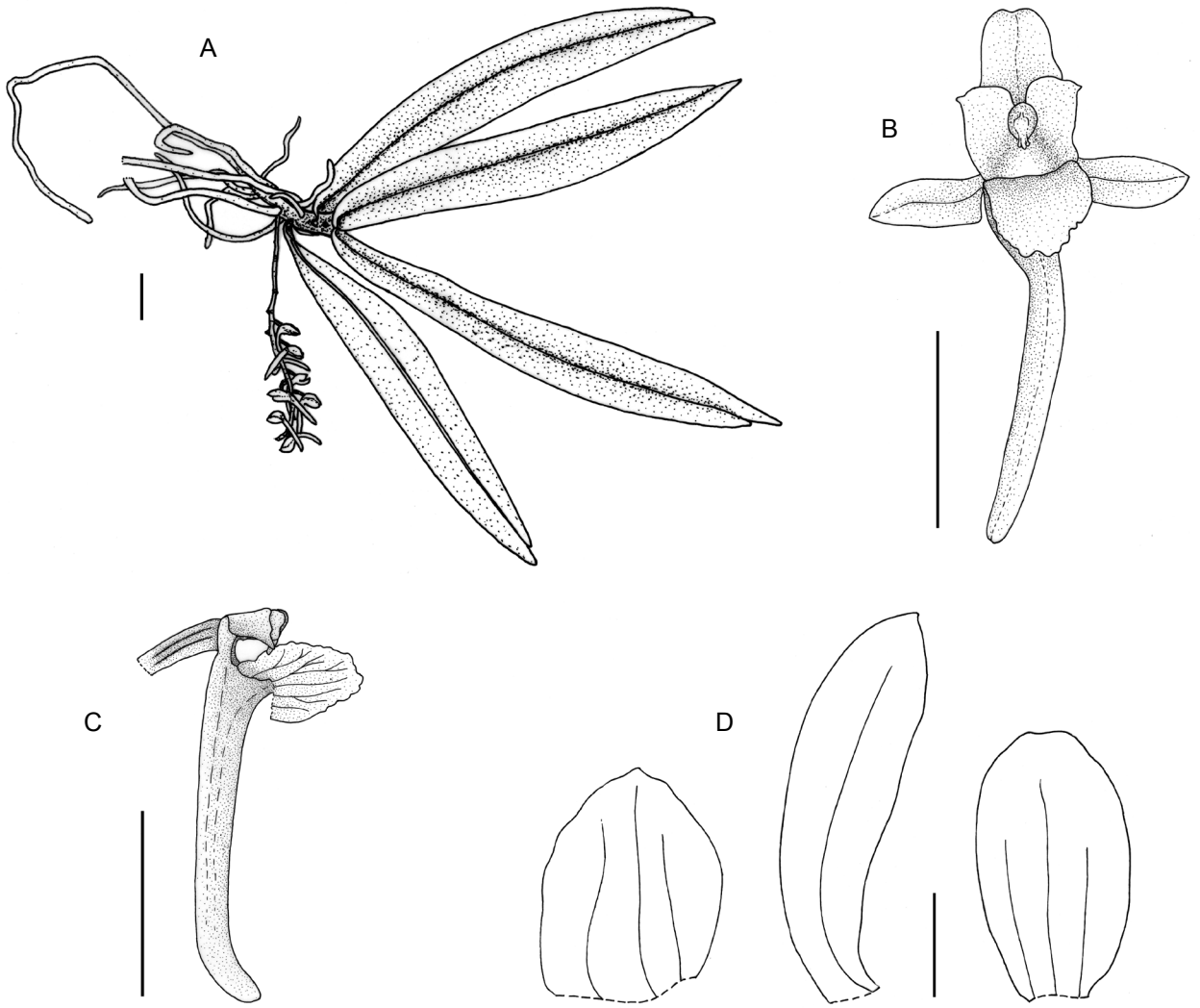

Figure 1 – *Rhipidoglossum montealenense*: A, habitus; B, flower; C, side view of spur, ovary, column and lip; D, from left to right, petal, lateral sepal and dorsal sepal. Scale bars: A & D, 1 mm; B & C, 5 mm.

Distribution – *Rhipidoglossum montealenense* is endemic to the coastal part of the Lower Guinea Domain (White 1979) of the Guineo-Congolian Region. It has been collected from Río Muni (Equatorial Guinea) and southern Cameroon (fig. 2).

Ecology – Lowland and submontane forest. Epiphyte in the canopy of the high primary rainforest, but also in the forest fringe of inselbergs. In the Monte Alén National Park, it was collected in forest with *Dacryodes* spp. (Burseraceae), is locally very common and apparently linked with mature forest.

Conservation – IUCN Red List Category: Endangered, [EN B1ab(i,ii,iii,iv,v) + B2ab(i,ii,iii,iv,v)]. The EOO of *Rhipidoglossum montealenense* is estimated as 220.9 km² and its AOO is about 36 km² (both of which fall within the limits for Endangered status). The species is known from four subpopulations; one subpopulation in Cameroon and the three others in Río Muni (Equatorial Guinea). In Equatorial Guinea, the species has been collected inside the effectively protected part of the Monte Alén National Park, represent-

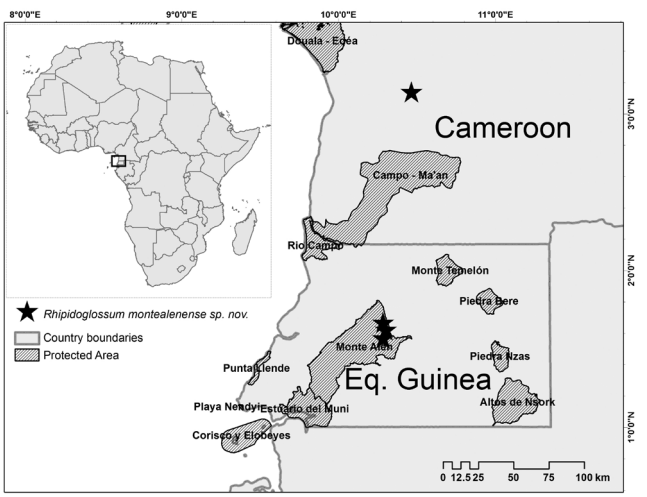

Figure 2 – Distribution of *Rhipidoglossum montealenense* sp. nov. in Atlantic Central Africa.

ing one location. The four subpopulations thus represent two locations, and this qualifies *Rhipidoglossum montealenense* for EN (greater than one location, the value for a Critically Endangered status under criterion B1a, but falls within the limits of an Endangered status under both criteria B1a and B2a). The main known threats to the species in the southern Cameroon are deforestation for timber, resulting from a strong international demand. The ongoing loss of its habitat leads us to predict a continuous decline of the number of subpopulations and mature individuals, and therefore of the extent of occurrence and area of occupancy. In particular, the Cameroonian subpopulation is accessible to local residents and through their practices of shifting agriculture and small-scale timber exploitation, they are gradually transforming this area into secondary forest (meeting each of the five subcriteria for B1b and B2b respectively under Endangered status). Nevertheless, considering its distribution and habitat, *R. montealenense* is also likely to occur in the Campo Ma'an National Park in Cameroon (fig. 2). It is to be hoped that more specimens and additional sites for *R. montealenense* will be found, and that the species does not prove to be so rare and endangered as it presently seems to be.

Etymology – The species epithet '*montealenense*' refers to the principal population being observed for now at the Monte Alén National Park.

The following key is provided to facilitate distinguishing the new species described here from the three most similar species of *Rhipidoglossum*.

Key to the *Rhipidoglossum* species morphologically close to *R. montealenense*

1. Leaf internodes longer than 5 mm.....*R. rutilum*
1'. Leaf internodes clearly shorter than 5 mm.....2
2. Lip broadly triangular, clearly trilobed, with a callus.....*R. paucifolium*
2'. Lip elliptical, not or only slightly trilobed, without a callus.....3
3. Petal decurrent along the foot of the column, ovary length shorter than 5 mm, spur length shorter than 10 mm.....*R. montealenense*
3'. Petal not decurrent, ovary length clearly longer than 5 mm, spur length clearly longer than 10 mm..... .....*R. melianthum*

Additional specimens examined – **Cameroon**: Bidjouka, Ngovayan mountain, 3°08'22"N 10°27'52"E, 13 Jul. 2006, *Ombrière de Yaoundé (Droissart V., Stévart T. & Simo M.)* 388 (YA).
Equatorial Guinea (Río Muni): Monte Alén National Park, between Engong and Lago, 1°34'N 10°17'E, 28 Aug. 1999, *Ndong Bokung & Stévart* 35 (BRLU); ibid., Mirador, rocky slab, 3 km West of the station Ecofac, 1°40'N 10°17'E, alt. 1,200 m, 20 Sep. 1999, *Ndong Bokung & Stévart* 77 (BRLU, K); ibid., Engong, way to the inselberg, 11 Sep. 2001, *Ndong Bokung & Stévart* 414 (BRLU).

Note – The specimen from Cameroon differs from the four specimens collected in Río Muni by the larger size of its leaves and flowers, but mostly by its transversely elliptic lip. Further samples will be necessary to clarify this morphological variation. The specimen from Cameroon might represent a subspecies of the species here described.

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