

# Revision of *Eulophia* (Orchidaceae) in Nigeria, Cameroon, Equatorial Guinea, Gabon, and the Republic of the Congo

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**Background and aims** – The genus *Eulophia* (Orchidaceae) is revised for Nigeria, Cameroon, Equatorial Guinea, Gabon, and the Republic of the Congo. The aims are: to present a morphological characterization of the main vegetative and reproductive features of *Eulophia* to clarify the delimitation of the taxa within the genus in the studied countries; to provide an updated identification key and an updated checklist of the genus with nomenclatural data, distribution maps, ecological information, and preliminary conservation status. This revision may serve as a basis for future studies of the genus in other regions of Africa.

**Material and methods** – Relevant material kept in BM, BR, FHI, HBG, K, MA, P, and WAG was examined, using standard practices of herbarium taxonomy. Vegetative and reproductive structures were analysed. MapMaker was used to produce the distribution maps.

**Key results** – A total of 24 species are recognised in the study area. The variability of perennating organs, leaves, sepals and petals, lip (including ornamentation), spur, and anther cap are described and depicted, and were found to be informative for species recognition. A taxonomic treatment is given with an identification key, synonymy, distribution maps, preliminary conservation status, and specimen citations. *Eulophia galeoloides* is neotypified, *E. brevipetala*, *E. leonensis*, *E. penduliflora*, and *Lissochilus elatus* are lectotypified. According to our study, we consider *E. parvula* a synonym of *E. pyrophila*. *E. sordida* is considered as a doubtful species in the study area.

**Keywords** – Cymbidiaceae; ecology; Eulophiinae; identification key; taxonomy; typification; West Tropical Africa.

## INTRODUCTION

The genus *Eulophia* R.Br. ex Lindl. (Orchidaceae, Cymbidiaceae) is the most diverse in the subtribe Eulophiinae (Chase et al. 2015), including about 164 terrestrial species (Martos et al. 2014; Bone et al. 2015). The genus shows a pantropical distribution, mainly in Africa (Central and Southern), Madagascar, and Asia, with seven species in Australasia and five in America (Pridgeon et al. 2009; Bone et al. 2015; Govaerts et al. 2019).

No complete taxonomic revision has ever been attempted for *Eulophia*. Thomas (1998) provided a preliminary checklist of the genus. Due to its wide distribution, the high degree of morphological interspecific variation in the vegetative and reproductive characters, and the lack of complete preserved material of many taxa in herbaria, misidentifications occurred, and an infrageneric classification is not firmly settled at present (Cieslicka 2006; Pridgeon et al. 2009; Bone et al. 2015). Based on a molecular phylogenetic analysis of the genus, focused principally on South African taxa (Martos et

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al. 2014), some species have been transferred to the genus *Orthochilus* Hochst. ex A.Rich. This approach was also supported by Bone et al. (2015).

The African species of *Eulophia* have not been comprehensively revised, although a revision was done for the South African taxa (Hall 1965). Floristic treatments for the Orchidaceae have been published for West Tropical Africa (Summerhayes 1968), East Tropical Africa (Cribb 1989), Central Africa (Geerinck 1992), and South-East Tropical Africa (La Croix & Cribb 1998). Local orchid floras are available for Nigeria (Segebräck 1983), Cameroon (Szlachetko & Olszewski 2001), Gabon (Szlachetko et al. 2004), and Equatorial Guinea (Galán et al. 2018). In these floristic treatments, identification keys show the high morphological variability of vegetative and reproductive features in *Eulophia*, and the diversity of terms used to describe some characters, notably for the lip ornamentation (calli, ridges, crests, keels, lamellae, and papillae). Furthermore, the number of species and its taxonomy differ among the treatments. Summerhayes (1968) recognised 32 species for West Tropical Africa, Segebräck (1983) estimated about 40 species for Nigeria only, and in Cameroon (Szlachetko & Olszewski 2001), Gabon (Szlachetko et al. 2004), and Equatorial Guinea (Galán et al. 2018), 24, 13, and six species are recognized, respectively. These floristic treatments have highlighted the taxonomic complexity of the genus and the necessity of a revision in the studied area.

The aims of our study were: to present a morphological characterisation of the main vegetative and reproductive features to clarify the delimitation of taxa within *Eulophia* in Nigeria, Cameroon, Equatorial Guinea, Gabon, and the Republic of the Congo; to provide an updated identification key; to provide an updated checklist with nomenclatural data, distribution maps, and ecological information. We hope that our study will provide a baseline for ongoing studies of the genus in other regions of Africa.

## MATERIAL AND METHODS

The study area comprises Nigeria, Cameroon, Equatorial Guinea (Bioko and Rio Muni), Gabon, and Republic of the Congo. More than 500 specimens deposited at the herbaria K, MA and WAG were revised. Additional specimens were analysed from the digital collections of the herbaria BM (Natural History Museum 2018), BR (BR Herbarium 2018), HBG (Herbarium Hamburgense 2018), P (MNH 2018), and the JSTOR Global Plants facility (JSTOR 2018) for type materials and specimens from FHI. All specimens cited have been examined unless indicated by “n.v.” after the herbarium acronym. Specimens seen only as digital images are indicated by “web”. All herbarium acronyms follow Thiers (2019).

Accepted species appear in alphabetical order, and only synonyms with type specimens recorded in countries of the study area are included. We provide type details for each name, and lectotypes or neotypes were designated when necessary.

Vegetative and reproductive characters were analysed for each species (table 1). Flowers of dried specimens were rehydrated in boiling water prior to study. Floral characters were measured with the help of digital calipers (Digimatic

**Table 1 – List of structures and selected characters analysed in *Eulophia*.**

Structure	Character
Perennating organ	type
Leaves	shape
Inflorescence	coetaneous
	shape
Sepals and petals	size
	colour
Lip	shape
	colour
Midlobe	shape
	apex
	margin
Lip ornamentation	type
	shape
	number of calli/ridges
	position
Spur	colour
	position
	shape
	length
Anther cap	apex

Caliper Mitutoyo). Unless otherwise stated, the dimensions mentioned for vegetative structures refer to dry material or relevant literature, and the colours to digital images of live specimens and relevant literature. Some characteristics were captured from labels, especially those which are lost in the process of drying and pressing. Terminology was generally adopted from Dressler (1993), Pridgeon et al. (2009), and Beentje (2016), although a detailed description of the main features of the species studied has been provided.

Distribution and ecology were obtained from labels of herbarium specimen and bibliographic resources. Distribution maps were produced using the software Map Maker Pro v.3.5 (Map Maker Limited 2019) from georeferenced specimens. For each species, global distribution is provided followed by the country repartition in the study area.

The conservation assessments followed the criteria and categories of the IUCN Red List (IUCN 2001, 2019), based on the regional distribution of each taxon.

## RESULTS

After a detailed examination of specimens, the study of vegetative and reproductive characters reveals the occurrence of a set of diagnostic features (tables 2, 3), described below and mainly used for the elaboration of the dichotomous key.

**Table 2 – Main diagnostic features in the genus *Eulophia*, including vegetative (perennating organs and leaves) and floral (sepals, petals, spur? and anther cap) characters.**

Taxon	Perennating organ	Leaves	Leaves and inflorescence	Sepals and petals	Spur	Anther cap
<i>E. alta</i>	rhizome	broadly lanceolate	coetaneous	heterogeneous	saccate, subnull; pale green	unicorn
<i>E. angolensis</i>	rhizome	linear-lanceolate to broadly lanceolate	coetaneous	heterogeneous	conical, up to 3 mm long; yellow, occasionally with a red spot	bicorn
<i>E. barteri</i>	pseudobulb	lanceolate	coetaneous	heterogeneous	conical, acute, straight, 4–9 mm long; brownish	slightly bicorn
<i>E. bouliawongo</i>	rhizome	broadly lanceolate	coetaneous	heterogeneous	conical, clearly gibbous on the ventral side, 10–14 mm long; pale rose	bicorn
<i>E. brevipetala</i>	pseudobulb	linear	not coetaneous	heterogeneous	clavate, incurved, 3–4 mm long; purple-brownish	not seen
<i>E. buettneri</i>	tuber	lanceolate	not coetaneous	heterogeneous	saccate; green	unicorn
<i>E. caricifolia</i>	rhizome	linear	coetaneous	heterogeneous	conical, up to 7 mm long; pale rose	bicorn
<i>E. cristata</i>	tuber	lanceolate	not coetaneous	homogeneous	conical, 5–8 mm long, straight to slightly oriented upwards; pale rose	unicorn
<i>E. cucullata</i>	rhizome	linear to lanceolate	coetaneous or not	heterogeneous	broadly saccate, 11–17 mm long; rose, yellowish towards the apex	unicorn
<i>E. euglossa</i>	pseudobulb	broadly lanceolate	coetaneous	homogeneous	clavate, up to 7 mm long, projected backwards; pale green	unicorn
<i>E. flavopurpurea</i>	tuber	broadly lanceolate	not coetaneous	heterogeneous	narrowly conical, 3–8 mm long; pale yellow, darker at the apex	unicorn
<i>E. galeoloides</i>	rhizome	absent		homogeneous	conical, up to 5 mm long, usually curved upwards; pale yellow	unicorn
<i>E. gracilis</i>	pseudobulb	lanceolate	coetaneous	homogeneous	clavate, 3–8 mm long; whitish, pale green at the apex	unicorn
<i>E. guineensis</i>	tuber	widely variable	coetaneous or not	homogeneous	filiform, 15–28 mm long, straight to curved upwards; green	obscurely unicorn
<i>E. horsfallii</i> subsp. <i>horsfallii</i>	rhizome	broadly lanceolate	coetaneous	heterogeneous	conical, 4–17 mm long, slightly curved upwards; rose	bicorn
<i>E. horsfallii</i> subsp. <i>velayosiana</i>	rhizome	broadly lanceolate	coetaneous	heterogeneous	conical, 10–15 mm long, slightly curved upwards; rose to purple	bicorn
<i>E. juncifolia</i>	rhizome	junciform	coetaneous	heterogeneous	conical, 3–7.5 mm long, slightly curved upwards; yellow	bicorn
<i>E. latilabris</i>	rhizome	lanceolate	coetaneous	heterogeneous	conical, 5–11 mm long; rose	unicorn
<i>E. leonensis</i>	pseudobulb	elliptic to elliptic-lanceolate	not coetaneous	heterogeneous	cylindrical to subclavate, 4–6 mm; pale yellow tinged with green or mauve	not seen
<i>E. orthoplectra</i>	tuber	linear	not coetaneous	heterogeneous	conical, 13–16 mm long; purple to brown-purple	unicorn
<i>E. parilamellata</i>	unknown	unknown	not coetaneous	heterogeneous	cylindrical, curved; colour not seen	unicorn
<i>E. penduliflora</i>	pseudobulb	linear	coetaneous	heterogeneous	clavate, 5–6 mm long, slightly curved upwards; reddish	unicorn
<i>E. pyrophila</i>	rhizome	linear-lanceolate	not coetaneous	heterogeneous	conical, 1–2.5 mm long; yellowish	unicorn
<i>E. ramifera</i>	unknown	linear	not coetaneous	homogeneous	cylindrical, 1.9–3 mm; colour not seen	not seen
<i>E. stachyodes</i>	tuber	lanceolate to oblanceolate	coetaneous	heterogeneous	conical, up to 4 mm long, incurved; green, tinged with purple to the apex	unicorn

**Table 3 – Main diagnostic features in the genus *Eulophia* related to the lip (shape, colour? and ornamentation).**

Taxon	Lip	Midlobe	Lip ornamentation		
			Calli	Ridges	Papillae
<i>E. alta</i>	trilobed; white-rose to pale purple	semicircular; undulate margin	2 quadrangular; white-rose to pale rose	absent	from the middle of the lip to near the apex; white-rose to pale rose
<i>E. angolensis</i>	trilobed; yellow	oblong, slightly curved downward at the apex; crenulate to undulate margin	absent	3, higher at the base, crenulate margin; yellow	absent
<i>E. barteri</i>	trilobed; purple, whitish at the base	obovate-oblong, curved downward at the apex; undulate margin	3 semicircular; colour not seen	3, from the base of midlobe to 1/3 of the apex, crenulate margin; pale purple	absent
<i>E. bouliawongo</i>	trilobed; pale rose	ovate-elliptical; slightly undulate margin	absent	3, from the base to 1/2 of the midlobe, crenulate margin; whitish	absent
<i>E. brevipetala</i>	trilobed; whitish-pale rose	broadly elliptical-oblong; undulate margin	absent	5, from the base to the middle of midlobe; yellow	along the midlobe; colour not seen
<i>E. buettneri</i>	trilobed; rose, whitish to the base, sometimes with a purple spot	clawed at the base, bilobed at the apex; entire margin	absent	absent	absent
<i>E. caricifolia</i>	trilobed; rose, yellowish to the base, with purple veins	elliptical; crenate margin	2 semicircular; yellow	absent	dense along midlobe; dark yellow
<i>E. cristata</i>	trilobed; lateral lobes greenish purple, midlobe rose to dark purple	oblong-ovate; crenulate margin	2 semicircular, thick; rose	5–7, wart-like, from the base to 1/3 of apex, more or less discontinuous; dull purple	absent
<i>E. cucullata</i>	trilobed; from pale to dark rose, tinged with purple toward the base of the lip	broadly obovate, emarginate apex; entire to slightly undulate margin	2 quadrangular; dull purple	occasionally 1(–3) small, hardly visible	absent
<i>E. euglossa</i>	trilobed, pale yellow at the base, white and purple at the upper middle	ovate-elliptical, acute; undulate to entire margin	absent	2–4 small and short, from the base to the insertion of the lateral lobes; pale yellow	absent
<i>E. flavopurpurea</i>	trilobed; midlobe bent abruptly downwards; pale yellow	elliptical to orbicular, strongly recurved downwards, emarginate apex; slightly undulate margin	absent	7–11, wart-like, unequal in length, the external occasionally bifurcate; pale rose	absent
<i>E. galeoloides</i>	trilobed; pale yellow	elliptical; slightly crenulate margin	absent	(0–)2–4, denticulated margin, from the base to the middle of lip; yellow	short, scattered through the lip; purple
<i>E. gracilis</i>	obscurely trilobed; white to whitish green	truncate, shorter than lateral lobes; with long and fleshy papillae in the margin	absent	0–2 (if two, thickened, in the apex; if one, along the lip)	sometimes scattered and thin, through the lip; colour not seen
<i>E. guineensis</i>	obscurely trilobed; rose to whitish, tinged with purple veins at the base	orbicular, apiculate; usually undulate margin	absent	absent	absent

Table 3 (continued) – Main diagnostic features in the genus *Eulophia* related to the lip (shape, colour, and ornamentation).

Taxon	Lip	Midlobe	Lip ornamentation		
			Calli	Ridges	Papillae
<i>E. horsfallii</i> subsp. <i>horsfallii</i>	trilobed; variable, greenish to purple	elliptical-oblong, acute to apiculate; undulate margin	absent	3 in the midlobe, crenate margin; occasionally the external bifurcate at the apex; whitish to pale cream	absent
<i>E. horsfallii</i> subsp. <i>velayosiana</i>	trilobed; lateral lobes purple-greenish with dull purple nerves, midlobe rose to purple	elliptical-oblong, acute to apiculate; undulate margin	absent	5(–7) crenate margin; the three central from the base of the lip, the two external shorter, in the midlobe, occasionally the outer bifurcated; yellow	absent
<i>E. juncifolia</i>	trilobed; yellow	ovate-elliptical; slightly undulate margin	absent	5, the two lateral shorter than central; yellow	absent
<i>E. latilabris</i>	obscurely trilobed; pale rose to whitish	orbicular-oblong; entire margin	2 semicircular; dull purple	5, the lateral shorter, the central taller towards the apex, crenulate margin; whitish with pale brown to the top	absent
<i>E. leonensis</i>	trilobed; greenish yellow to brownish	oblong-elliptical; slightly undulate margin	absent	2–5, wart-like, from the base to near the apex; colour not seen	absent
<i>E. orthoplectra</i>	trilobed; yellow tinged with purple	obovate-elliptical; crenulate margin	absent	5, thickened, more or less fleshy, the two lateral shorter than central; colour not seen	absent
<i>E. parilamellata</i>	trilobed; colour not seen	clawed at the base, broadly obovate at the emarginate apex; entire to slightly undulate margin	2 semicircular, colour not seen	5, wart-like, on the middle of the midlobe; colour not seen	absent
<i>E. penduliflora</i>	trilobed; usually yellow	orbicular, obtuse to emarginate apex; slightly undulate margin	absent	3, short in the base of midlobe; whitish	5–7 lines in the upper middle; yellow
<i>E. pyrophila</i>	trilobed; from greenish yellow to cream, tinged with reddish or brown	elliptical, curved downward at the apex; undulate margin	absent	3–9, fleshy, wrinkled, from the base of the lip to the middle of the midlobe, with transversal grooves along each ridge; dark yellow	absent
<i>E. ramifera</i>	trilobed; colour not seen	orbicular; slightly undulate margin	absent	5, crenulate, along the lip; colour not seen	absent
<i>E. stachyodes</i>	trilobed; pale green to whitish	oblong; undulate margin	2 semicircular, white	3–7, wart-like, along the midlobe; purple	absent

————— Key to the species of *Eulophia* in Nigeria, Cameroon, Equatorial Guinea, Gabon, and Republic of the Congo —————

1. Sepals and petals similar in shape, size, and colour..... 2
- 1'. Sepals and petals dissimilar in shape, size, or colour ..... 7
2. Spur filiform, up to 28 mm long ..... 14. *E. guineensis*
- 2'. Spur conical, cylindrical or clavate, less than 10 mm long..... 3
3. Spur conical or cylindrical ..... 4
- 3'. Spur clavate..... 6
4. Inflorescence paniculate..... 23. *E. ramifera*
- 4'. Inflorescence unbranched..... 5
5. Photosynthetic species, tuberous. Lip with 2 semicircular calli and 5–7 wart-like ridges, without papillae..... 8. *E. cristata*
- 5'. Mycoheterotrophic species, rhizomatous. Lip without calli, (0–)2–4 denticulate ridges and scattered purple papillae..... 12. *E. galeoloides*
6. Lip with long and fleshy papillae on the margin; midlobe shorter than lateral lobes ..... 13. *E. gracilis*
- 6'. Lip without papillae on the margin; midlobe longer than lateral lobes ..... 10. *E. euglossa*
7. Leaves and inflorescence not coetaneous..... 8
- 7'. Leaves and inflorescence coetaneous..... 15
8. Midlobe of lip bilobed or with an emarginate apex ..... 9
- 8'. Midlobe of lip not bilobed or without an emarginate apex..... 12
9. Base of the lip without calli ..... 10
- 9'. Base of the lip with 2 calli ..... 11
10. Midlobe of lip bilobed at apex, clawed at base; spur saccate ..... 6. *E. buettneri*
- 10'. Midlobe of lip with an emarginate apex, recurved; spur narrowly conical ..... 11. *E. flavopurpurea*
11. Lip with (0–)1(–3) small ridges, hardly visible; spur broadly saccate..... 9. *E. cucullata*
- 11'. Lip with 5 wart-like ridges; spur cylindrical..... 20. *E. parilamellata*
12. Spur clavate, incurved; lip papillate along the midlobe; petals rose to whitish..... 5. *E. brevipetala*
- 12'. Spur conical or cylindrical to subclavate, not incurved; lip without papillae; petals yellowish to red-brownish..... 13
13. Spur 13–16 mm long..... 19. *E. orthoplectra*
- 13'. Spur < 7 mm long ..... 14
14. Spur cylindrical to subclavate, 4–6 mm long. Leaves elliptic to elliptic-lanceolate. Pseudobulbous plant..... 18. *E. leonensis*
- 14'. Spur conical, 1–3 mm long. Leaves linear-lanceolate. Rhizomatous plant ..... 22. *E. pyrophila*
15. Leaves junciform, more or less circular in cross-section..... 16. *E. juncifolia*
- 15'. Leaves linear to broadly lanceolate, flat in cross-section..... 16
16. Spur cylindrical, slightly broadening towards the apex..... 21. *E. penduliflora*
- 16'. Spur conical to saccate..... 17
17. Lip with 2(–3) calli near the base..... 18
- 17'. Lip without calli near the base ..... 23

18. Anther cap unicorn.....	19
18'. Anther cap bicorn.....	22
19. Spur saccate.....	20
19'. Spur conical .....	21
20. Midlobe of lip semicircular, not emarginate, papillate .....	1. <i>E. alta</i>
20'. Midlobe of lip broadly obovate, emarginate, not papillate .....	9. <i>E. cucullata</i>
21. Lip obscurely trilobed, entire; spur not incurved. Rhizomatous plant.....	17. <i>E. latilabris</i>
21'. Lip clearly trilobed, undulate; spur incurved. Tuberous plant.....	24. <i>E. stachyodes</i>
22. Lip with 2 calli, densely papillate. Rhizomatous plant.....	7. <i>E. caricifolia</i>
22'. Lip with 3 calli and 3 ridges, not papillate. Pseudobulbous plant .....	3. <i>E. barteri</i>
23. Lateral sepals erect. Flowers deep yellow .....	2. <i>E. angolensis</i>
23'. Lateral sepals patent. Flowers rose to purple.....	24
24. Spur with a gibbosity on the ventral side; lip with 3 ridges from the base to 1/2 of the midlobe .....	4. <i>E. bouliawongo</i>
24'. Spur without a gibbosity; lip with 3–7 ridges along the midlobe.....	15. <i>E. horsfallii</i>

**Morphological characters**

**Perennating organs** – Three types of perennating organs are recognised: rhizome, tuber, and pseudobulb.

Rhizomes are horizontal subterranean, usually cylindrical, organs with whitish roots (fig. 1A), showing variation in diameter and length. In some species (*E. cucullata*, *E. pyrophila*), the rhizome shows major discontinuous ovoid to conical thickenings (fig. 1B).

Tubers are thickened ovoid to conical subterranean organs, which are covered by the bases of the leaves (fig. 1C).

Pseudobulbs are aboveground organs (fig. 1D), occasionally with the base underground, with whitish roots. From the pseudobulbs arise the normal leaves on the top and the lateral inflorescence with scale-leaves.

**Leaves** – Among the species studied, leaf shape usually varies from linear to lanceolate. The leaves of *E. guineensis* are highly variable, from oblong, non-petiolate to elliptic, long-petiolate. The only mycoheterotrophic species is *E. galeoloides*, which lacks functional leaves.

One of the diagnostic features is the presence of mature leaves at anthesis, distinguishing between coetaneous and non-coetaneous species. Only *E. cucullata* and *E. guineensis* have both forms.

**Sepals and petals** – Based on the morphology, size and colour of sepals and petals, two patterns are recognized: homogeneous when both floral parts are similar or only show slight differences (fig. 2A); heterogeneous when, at least, sepals and petals differ clearly in one of the characteristics mentioned above (fig. 2B–D).

**Lip** – Most of them are trilobed, although sometimes obscurely trilobed as in *E. gracilis*, *E. guineensis* and *E. latilabris* (fig. 3A). The midlobe is usually longer than the lateral lobes, except in *E. gracilis* where it is abruptly truncate,

with long and fleshy papillae on the margin (fig. 2A). The midlobe shows great variability in shape and margin, varying from entire to undulate, crenate or crenulate, sometimes emarginate (fig. 2B) or apiculate as in *E. guineensis*. Only *E. buettneri* has a bilobed apex.

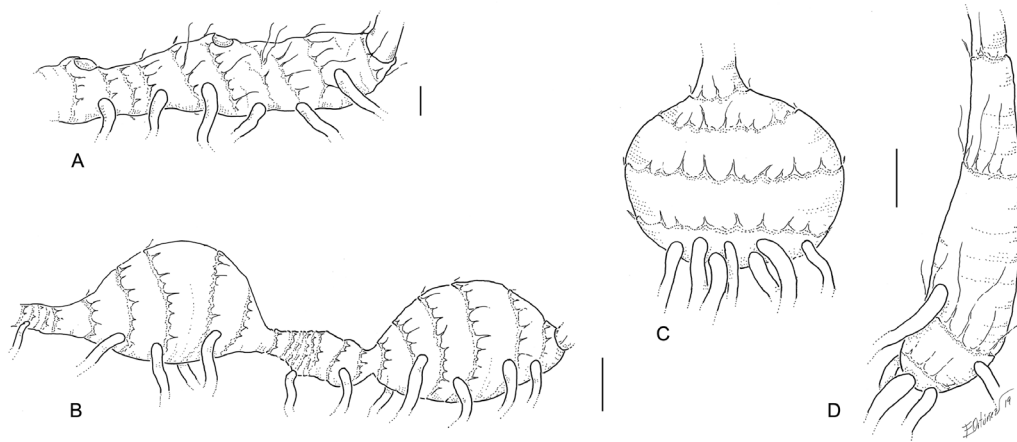
The lip shows variability in colour and usually varies between lateral lobes and midlobe.

**Lip ornamentation** – The lip is usually ornamentated, except in *E. guineensis* and *E. buettneri*. Three types of ornamentation (fig. 3) are recognized: calli, ridges, and papillae.

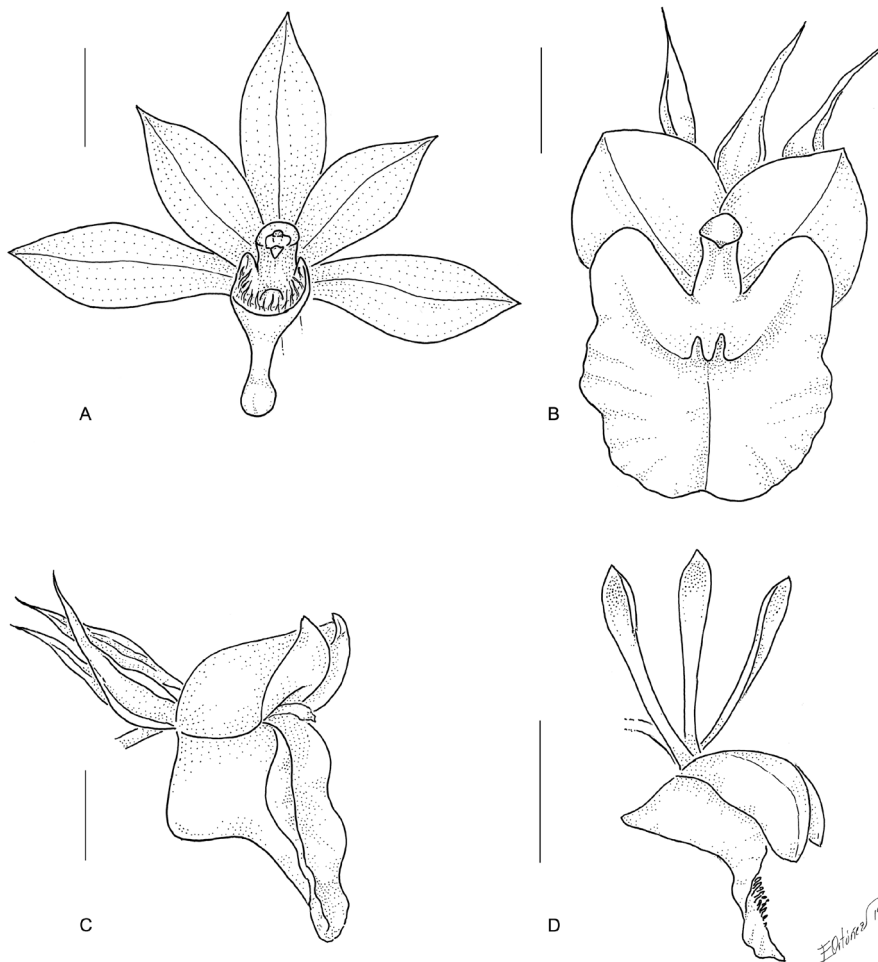
Calli are protrusions at the base of the lip, near the entrance of the spur (fig. 3A), more or less thickened. Two erect calli are the most common, except in *E. barteri*, which shows three. Shape varies from semicircular (fig. 3B, C) to quadrangular (figs 2B, 3D, E). Thick and low semicircular calli are only observed in *E. cristata* (fig. 3F, G). The colour is highly variable, for example, whitish in *E. stachyodes* and dull purple in *E. cucullata*.

Ridges are the most common ornamentation on the lip (fig. 3A), sometimes as a prolongation of the calli along the main veins. They usually arise from the base of lip to different lengths along the midlobe and rarely extend to the apex. They usually resemble more or less continuous gills, usually with crenulate to undulate margins (fig. 3H, I). Sometimes they are wart-like (fig. 3J). In *E. pyrophila*, the ridges are fleshy and wrinkled (fig. 3K, L). The number of ridges varies from 1 to 11, the external being occasionally bifurcate (fig. 3M). Variability in colour was observed (whitish, yellow, rose to purple), and generally different to the lip.

Papillae are finger-like, cylindrical projections, distributed along the lip, usually dense such as in *E. caricifolia* (fig. 3N, O). Papillae vary in abundance and colour among the taxa studied.

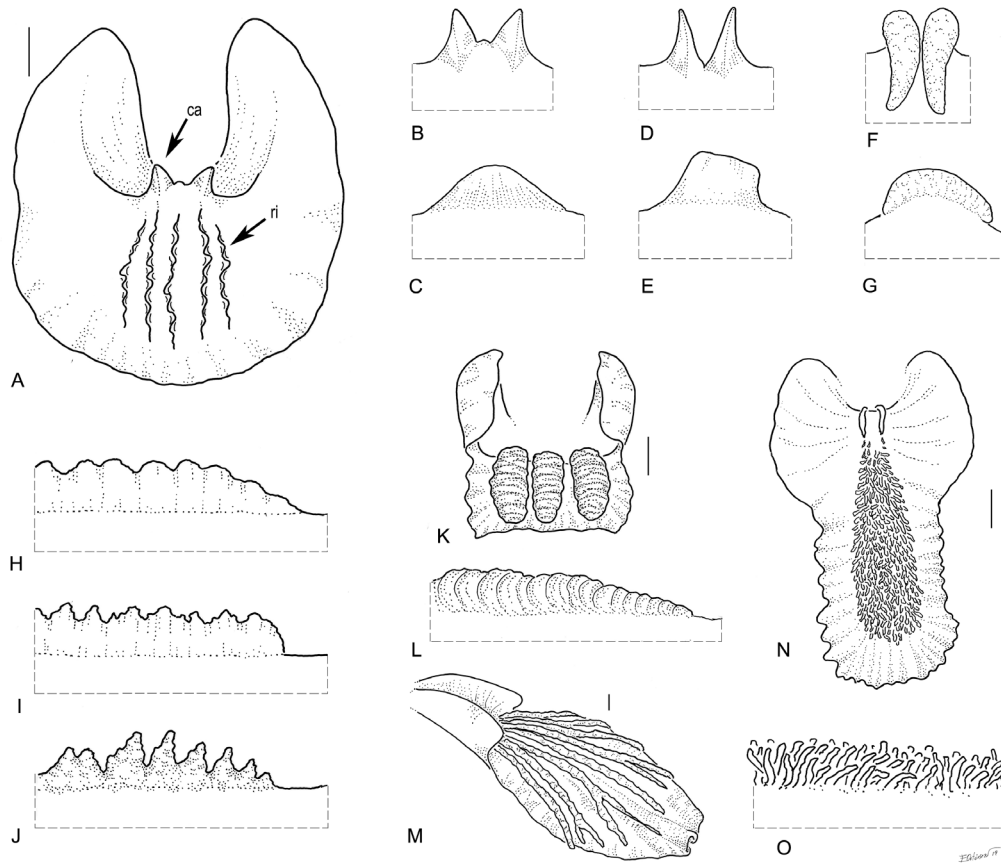


**Figure 1** – Perennating organs. **A.** *Eulophia bouliawongo*: rhizome. **B.** *E. cucullata*: rhizome. **C.** *E. guineensis*: tuber. **D.** *E. gracilis*: pseudobulb. A from *Letouzey 14938* (K). B from *Chapman 2770* (WAG1135803). C from *van Eijnatten 1077* (WAG1135997). D from *Wieringa et al. 3252* (WAG1135916). Scale bars: A–D = 1 cm. Drawn by E. Ortúñez.



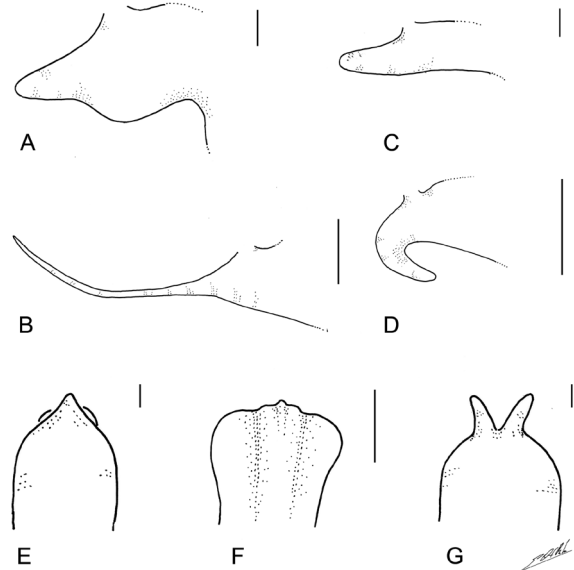
**Figure 2** – Sepals and petals. **A.** *Eulophia gracilis*: front view. **B–C.** *E. cucullata*: front and lateral view. **D.** *E. caricifolia*: lateral view. A from *Wieringa et al. 3252* (WAG1135916). B–C from *Louis 1976* (WAG1135767). D from *Carvalho 4705* (MA597837). Scale bars: A = 0.5 cm; B–D = 1 cm. Drawn by E. Ortúñez.





**Figure 3** – Lip ornamentation. **A.** *Eulophia latilabris*: location of calli (ca) and ridges (ri). **B–C.** Semicircular calli. **D–E.** Quadrangular calli. **F–G.** Thick and low semicircular calli. **H.** Ridge with undulate margin. **I.** Ridge with crenulate margin. **J.** Wart-like ridge. **K–L.** *E. pyrophila*: front view and scheme of fleshy and wrinkled ridges. **M.** *E. flavopurpurea*: bifurcated ridges. **N–O.** *E. caricifolia*: front view and scheme of papillae. A from Wieringa et al. 3687 (WAG1136115). K from Schaijes 2043 (K). M from Troupin 2298 (WAG1135892). N from Wilks & Dibata 2330 (WAG1135658). Scale bars: A = 5 mm; K–M = 1 mm; N = 2 mm. Drawn by E. Ortúñez.

► **Figure 4** – Spur. **A.** *Eulophia ramifera*: cylindrical. **B.** *E. guineensis*: filiform. **C.** *E. bouliawongo*: conical with gibbous. **D.** *E. stachyodes*: incurved. Anther cap. **E.** *E. cucullata*: unicorn. **F.** *E. guineensis*: obscurely unicorn. **G.** *E. horsfallii*: bicorn. A from Scott-Elliot 5116 (K000078652). B from van Eijnatten 1077 (WAG.1135997). C from Wieringa 1245 (WAG.1135644). D from Letouzey 4729 (WAG.1136332). E from Wilde et al. 2308 (WAG.1135751). F from Eimunjese et al. s.n. (WAG1135991). G from Elad et al. 1458 (WAG.1136016). Scale bars: A = 1 mm; B–D = 0.5 mm; E, G = 2 mm; F = 5 mm. Drawn by E. Ortúñez.



**Spur** – The spur shows great variability in shape, being widely to narrowly conical (fig. 2D), saccate (fig. 2C), cylindrical (fig. 4A), or clavate (fig. 2A); filiform in *E. guineensis* (fig. 4B). In *E. bouliawongo*, a typical gibbosity is observed at the base (fig. 4C). The spur is usually parallel to the lip lamina or is slightly curved upwards, except in *E. brevipedata* and *E. stachyodes* where it is incurved (fig. 4D). It varies in length, from 1 mm in *E. pyrophila* up to 28 mm in *E. guineensis*, which has the longest spur in the genus. The colour is similar to the lip such as in *E. bouliawongo*, or dissimilar such as in *E. euglossa* and *E. guineensis*.

**Anther cap** – Two main types of anther caps can be observed. Unicorn caps with a clear pointed end (fig. 4E), obscurely in *E. guineensis* (fig. 4F), and bicorn caps with two clear pointed ends, more or less divergent (fig. 4G).

**1. *Eulophia alta*** (L.) Fawc. & Rendle (Fawcett & Rendle 1910: 112) – *Limodorum altum* L. (Linnaeus 1767: 594).

**Type** – Jamaica: s. col. s.n. (lectotype: LINN[1058.2, <http://linnean-online.org/11247>, web], designated by Fawcett & Rendle 1910: 113).

**Distribution** – Tropical and subtropical America and Africa. Nigeria, Cameroon and Gabon (fig. 5A).

**Habitat and ecology** – Swampy areas, secondary herbaceous vegetation, and rocky banks with shrubs and small trees. Elevation 0–300 m.

**Preliminary IUCN conservation status** – VU (Vulnerable). Although this taxon is widely distributed in America and Africa, the number of locations is less than 10 in the area of study.

**Other collections examined** – Nigeria: Lagos, *H. Millen s.n.* (K); Oban Forest Reserve west, 26 Jan. 1976, *J.O. Ariwado s.n.* (FHI[FHI0092606-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0092606-0>, web]).

**Cameroon**: Edea–Yaoundé, ca. 10 miles out of Edea, 11 Oct. 1968, *W.W. Sanford 5177* (K); Buea–Douala, Mana River, 4°58'N, 8°51'E, 20 Jul. 1983, *D. Thomas 2316* (P[P00359024, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00359024>, web]); NW Muetan Aku, 9 km SW Bangem, Mamfé, 2 Jun. 1982, *J.F. Villiers 1380* (P[P00376355, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00376355>, web]).

**Gabon**: Upper Ogoué River, Lastoursville, 4 Jan. 1929, *G. Le Testu 7834* (K).

**2. *Eulophia angolensis*** (Rchb.f.) Summerh. (Summerhayes 1958: 76) – *Cymbidium angolense* Rchb.f. (Reichenbach 1865: 188) – *Lissochilus angolensis* (Rchb.f.) Rchb.f. (Reichenbach 1878: 64).

**Type** – Angola: Huilla, Nov. 1859, *F. Welwitsch 734* (holotype: W, n.v.; isotypes: BM[BM000525488, <https://data.nhm.ac.uk/object/3e41aa45-d5a1-454b-928e-7e1ce2e5f2ee/1591056000000>, web]; COI, n.v.; G, n.v.; K[K000058013, <http://specimens.kew.org/herbarium/K000058013>, web]; LISU, n.v.; P[P00538767, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00538767>, web]).

*Lissochilus lindleyanus* Rchb.f. (Reichenbach 1878: 65) – *Eulophia lindleyana* (Rchb.f.) Schltr. (Schlechter 1900: 279). **Type** – Nigeria: Nupe, *C. Barter 1486* (holotype: K[K000078518, <http://specimens.kew.org/herbarium/K000078518>, web]).

**Distribution** – Tropical and subtropical Africa. Nigeria, Cameroon, Gabon and Republic of the Congo (fig. 5B).

**Habitat and ecology** – Open and wet grassland, swampy areas, riparian vegetation, and grassy woodland. Elevation 600–1000 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – Nigeria: Lagos, Ogoya village, Kuramo Waters, 25 Feb. 1955, *P.W. Richards 5087* (K); Igbosere, Kuramo, 10 Jul. 1952, *H.J. Savory s.n.* (K); Aviele, between Uromi et Auchi, 9 Jul. 1969, *J. Lowe 1770* (K, WAG[WAG.1135584, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135584>]); Degema, Ahoada, 20 Aug. 1916, *P.A. Talbot et al. 3804* (MA[747524, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00747524>]); Ilorin road, 3 Jul. 1965, *W.W. Sanford 1038/65* (L[L.1520024, <https://data.biodiversitydata.nl/naturalis/specimen/L.1520024>], L[L.1520025, <https://data.biodiversitydata.nl/naturalis/specimen/L.1520025>]); Mambila Plateau, 7°00'N, 11°10'E, 16 Jun. 1958, *J.W.F. Chapman 7* (P[P00358950, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358950>, web]); Mambilla Plateau, 3.5 miles north of Gembu, 21 Jun. 1972, *J.D. Chapman 2909* (WAG[WAG.1135577, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135577>]); Old Oyo Forest Reserve, Ago–Ilorin, 8°55'N, 4°00'E, 20 Jul. 1971, *C. Geerling 3614* (WAG[WAG.1135579, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135579>]); Ibuya, Upper Ogun Game Reserve, 8°24'N, 3°47'E, 27 Jul. 1971, *C. Geerling 3797* (WAG[WAG.1135580, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135580>]); Ilorin, turning 3 km S of Oyo, 22 Jul. 1962, *J.B. Gillett 15192* (P[P00358949, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358949>, web]); Igala, Ibaji Ojobo Forest Reserve, 27 Jun. 1963, *W.J. Howard s.n.* (P[P00358948, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358948>, web]); Orle Forest Reserve, Aligbeta to Awoiki, 22 Aug. 1953, *C.F. Onochie s.n.* (FHI[FHI0033293-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0033293-0>, web]); Katsina, Masha, 25 Jun. 1950, *R.W.K. Keay 25898* (K); Mamu River, Awka District, Aug., *E.W. Jones s.n.* (FHI[006692, n.v.]).

**Cameroon**: Mbéré à Meiganga, prairie humide, Jun. 1939, *H. Jacques-Félix 4157* (K, P[P00358998, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358998>, web]); Bamenda, district Wum, Aba–ajia Camp on old German road, 26 Jun. 1951, *E. Ujor s.n.* (K[K000106918, <http://specimens.kew.org/herbarium/K000106918>]); près Wanday (15 km ONO de Mokolo), 11 Sep. 1964, *R. Letouzey 6827* (K, P[P00358992, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358992>, web], WAG[WAG.1135546, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135546>]); Buea, 6°00'N, 15°35'E, May 1914, *J. Mildbraed 9497* (K); Mbaw plain, 2 miles N of Sabongari, 6°15'N, 11°00'E, 10 May 1962, *W. Brunt 419* (K[K000106919, K000106920]); km 8 Mbakaou – Tibati road, 6°22'N, 12°46'E, 30 Jun. 1972, *A.J.M. Leeuwenberg 10057* (WAG[WAG.1135544, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135544>, WAG.1135545, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135545>]); 12 km Tignère vers Kontcha, 19 Jun. 1977, *G. Fotius 2695* (P[P02083024, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p02083024>, web]); près Wum, Nkambe, 18 Jul. 1975, *R. Letouzey 14045* (P[P00358989, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358989>, web]); près confluent Mayo Tankouli Mayo–Banyo, 20 km N Banyo, 5 Jun. 1967, *R. Letouzey 8504* (P[P00358991, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358991>, web]); Membe et Guervoum, Nanga Eboko, 24 May 1959, *R. Letouzey 2084*

(P[P00358996, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358996>, web]); Obala, 45 km NE des bords de la Sanaga, confluent de l'Assamba, près de la gare de Njoré, 4°20'N, 11°45'E, 21 May 1970, *C. Farron 7316* (P[P00358999, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358999>, web]); 15 km W Meting, piste Matsari–Linte, Yoko, 14 May 1979, *M. Biholong 528* (P[P00359001, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00359001>, web]).

**Gabon:** Nyanga, Gamba, 37.5 km from Gamba airport, road to Mayonamie on the Nyanga river, 2°58'S, 10°18'E, 3 Dec. 1994, *J.J. de Wilde & R.W. de Wilde-Bakhuizen 11292* (WAG[WAG.1135562, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135562>]); Lopé reserve, 6°00'S, 11°40'E, 27 Jul. 1986, *J.M. Reitsma & B. Reitsma 2447* (WAG[WAG.1135563, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135563>]); NW de Nangha, entre Mouila et Ndendé, 2°11'21"S, 11°12'7"E, 3 Dec. 2016, *O. Lachenaud et al. 2384* (P[P01193309, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p01193309>, web]); entre Mouila et Ndendé, au N de Ferra, 2°17'52"S, 11°17'47"E, 9 Dec. 2016, *E. Bidault et al. 2960* (P[P01193238, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p01193238>, web]); N'Dendé, mare de Ferra, route de Mouila, 26 Nov. 1960, *B. Descoings 6292* (P[P00358979, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358979>, web]); Payilou [=Pahilou], 12 Dec. 1907, *G. Le Testu 1262* (K, P[P00358976, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358976>, web]).

**Republic of the Congo:** between Impe and the main road, Lefini Reserve, 2°50'S, 15°20'E, 18 Oct. 1991, *D.J. Harris et al. 3052* (K); Plateau Batéké, km 45, mare Ngatsou, 19 Dec. 1964, *P. Sita 1096* (P[P00358818, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358818>, web]); Guadaloupi, S de Loango, Oct. 1893, *H. Lecomte s.n.* (P[P00358941, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358941>, web]); Poste dell'Alima–Leketi, Dec. 1883, *J. de Brazza s.n.* (P[P00358943, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358943>, web]); région Pointe Indienne–Loango (Pointe-Noire), 3 Feb. 1966, *C. Farron 4946* (P[P00358944, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358944>, web]).

**3. *Eulophia barteri*** Summerh. (Summerhayes 1936a: 224).

**Type** – Nigeria: Nupe, *C. Barter 1481* (holotype: K[K000078540, <http://specimens.kew.org/herbarium/K000078540>, web]).

**Distribution** – Tropical Africa, from Guinea to Central African Republic. Nigeria (fig. 5A).

**Habitat and ecology** – Swampy areas. Elevation 400–500 m.

**Preliminary IUCN conservation status** – EN (Endangered). The number of locations is less than 5 in the area of study. Besides, a considerable period of time has elapsed since 1860 when Charles Barter collected the only two specimens from Nigeria, so we consider that data on abundance and current distribution in Nigeria are lacking, and future prospectations will be appropriate.

**Other collection examined** – Nigeria: Sare, *C. Barter 3429* (K).

**4. *Eulophia bouliawongo*** (Rchb.f.) J.Raynal (Raynal 1966: 47) – *Galeandra bouliawongo* Rchb.f. (Reichenbach 1852: 935) – *Lissochilus bouliawongo* (Rchb.f.) Rchb.f. (Reichenbach 1865: 188).

**Type** – Gabon: 1847, *E. Jardin 150* (holotype: P[P00358904, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358904>, web]; isotype: P[P00358903, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358903>, web]).

*Lissochilus elatus* Rolfe (Rolfe 1897: 87). **Type** – Gabon: Gabon river, *G. Mann 1039* (lectotype: K, composed of 3 sheets [K000078544, <http://specimens.kew.org/herbarium/K000078544>, K000078545, <http://specimens.kew.org/herbarium/K000078545>, K000078546, <http://specimens.kew.org/herbarium/K000078546>], designated here).

*Eulophia oedoplectron* Summerh. (Summerhayes 1936b: 442) – *Lissochilus macranthus* Lindl. (Lindley 1833: 191). **Type** – Nigeria: Boney [Bonny], *H. Shepherd 6* (holotype: K[K000078548, <http://specimens.kew.org/herbarium/K000078548>, web]).

**Distribution** – Atlantic Central Tropical Africa. Nigeria, Cameroon, Equatorial Guinea (Rio Muni), and Gabon (fig. 5C).

**Habitat and ecology** – Coastal forests including mangroves, swampy areas, savannah, riparian forests, disturbed forests, open vegetation, on sandy soils and gravel. Elevation 0–300 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – Cameroon: au Nord de Bangue, 5 km NE Douala, 12 May 1976, *R. Letouzey 14938* (K); Batanga, near Lobe village, 11 Mar. 1895, *G.L. Bates 61* (K); 3 km E of Eséka, 14 Mar. 1965, *A.J.M. Leeuwenberg 5168* (WAG[WAG.1135613, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135613>, WAG.1135614, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135614>, WAG.1135615, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135615>]); Campo Ma'an area, Itonde Nigerian, 2°27'17"N, 9°49'54"E, 17 Apr. 2002, *M. Elad et al. 1507* (WAG[WAG.1135616, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135616>, WAG.1135617, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135617>, WAG.1135618, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135618>]); 20 km SE of Douala, 2 km NW Dibamba river to Ndonga, 20 Aug. 1965, *A.J.M. Leeuwenberg 6473* (WAG[WAG.1135619, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135619>, WAG.1135620, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135620>, WAG.1135621, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135621>, WAG.1135622, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135622>]); South Province, 1999, *G. Shu Neba & D. Ndoum X4948* (WAG[WAG.1135623, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135623>]); km 14 Douala–Loum road, 1 km E of Boadibo, 4°05'N, 9°36'E, 27 Oct. 1972, *A.J.M. Leeuwenberg 10574* (WAG[WAG.1135626, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135626>, WAG.1135627, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135627>]); route de Bipindi à Deham, 28 Jun. 1918, *E. Annet 1443* (P[P00358917, <http://coldb.mnhn>]).

fr/catalognumber/mnhn/p/p00358917, web]); road Douala–Tiko, 4°06'N, 9°36'E, 24 Aug. 1983, *D. Thomas 2488* (P[P00358912, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358912>, web]).

**Equatorial Guinea:** Río Muni, Monte Bata toward Campos, around S. Joaquim de Ndyiacom, Monte Bata, 27 Feb. 1969, *W.W. Sanford 6091* (K); Río Muni, Bata to Río Benito, 15 Feb. 1969, *W.W. Sanford 5789* (K); Miboman, à 22 km de Bata, 4 Jun. 1984, *S. Castroviejo 9165* (MA[785029, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00785029>]).

**Gabon:** Boutica, 12 Jul. 1902, *O. Debeaux 378* (K); Gamba, near Shell terminal, 2°47'S, 10°02'E, 9 Jul. 1992, *J.J. Wieringa 1245* (WAG[WAG.1135643, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135643>, WAG.1135644, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135644>]); Lopé Reserve, near the Lopé Railway station, 0°06.03'S, 11°36.01'E, 20 Dec. 1996, *J.J. de Wilde & R.W. de Wilde-Bakhuizen 11782* (WAG[WAG.1135631, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135631>]); Mayumba, 22 Oct. 1986, *A.M. Louis 2209* (WAG[WAG.1135632, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135632>, WAG.1135633, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135633>]); Ngounié, ca. 20 km NE of Coucal/Yeno, Ofoubou area, 1°39.09'S, 10°04.00'E, 5 Mar. 1994, *J.J. Wieringa & R.M. Haegens 2406* (WAG[WAG.1135634, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135634>, WAG.1135635, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135635>]); Okala, Libreville, 0°29'N, 9°25'E, 9 Jun. 1987, *Dibata 173* (WAG[WAG.1135636, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135636>]); Moka creek, E of Mondah river, 0°39'N, 9°28'E, 24 Jul. 1985, *J.J. Bos et al. 10811* (WAG[WAG.1135637, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135637>, WAG.1135638, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135638>, WAG.1135639, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135639>]); Rabi, 100 m S of Shell platform number 9, 1°55'S, 9°52'E, 1 Nov. 1993, *R.M. Haegens 9* (WAG[WAG.1135640, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135640>]); Rabi - Kounga, 1°56'S, 9°53'E, 9 Nov. 1991, *J. Schoenmaker 123* (WAG[WAG.1135641, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135641>, WAG.1135642, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135642>]); Haute-Ngounyé, Ndandé (Echiras), Dec. 1924, *G. Le Testu 5133* (K); lac de Fernan Vaz, 14 Sep. 1912, *F. Fleury s.n.* (P[P00358909, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358909>, web]); cap Esterias, 21 Jun. 1959, *N. Hallé 608* (P[P00358901, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358901>, web]); route d'Owendo à Libreville, 29 Jan. 1961, *N. Hallé 955* (P[P00358900, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358900>, web]); Lébamba, bords de la rivière Loetsi, 13 May 1963, *N. Hallé & G. Cours 5862* (P[P00358899, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358899>, web]); Owendo, 27 Feb. 1968, *N. Hallé & J.F. Villiers 5619* (P[P00358897, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358897>, web]); Mbel, sur le Komo, 10 Jan. 1968, *N. Hallé & J.F. Villiers 4278* (P[P04026612,

<http://coldb.mnhn.fr/catalognumber/mnhn/p/p04026612>, web]).

**Republic of the Congo:** Mayumbe, 8 Jan. 1977, *I. Bitsindou s.n.* (P[P00358885, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358885>, web]).

**Notes** – The lectotype specimen of *Lissochilus elatus* Rolfe, consists of three herbarium sheets, one with the inflorescence (K000078544), one with foliar stem and part of the scape with the bracts (K000078545), and the last one with the basal part of the scape (K000078546).

### 5. *Eulophia brevipetala* Rolfe (Rolfe 1897: 53).

**Type** – Sierra Leone: above Falaba, 15 Mar. 1892, *G.F. Scott Elliot 5224* (lectotype: K[K000410367, <http://specimens.kew.org/herbarium/K000410367>], designated here; isolecotype: BM[BM000525522, <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/4647736>, web]).

**Distribution** – West Tropical Africa, from Guinea to Nigeria. Nigeria (fig. 5B).

**Habitat and ecology** – Rain forest and open savannah woodland. Elevation 100–300 m.

**Preliminary IUCN conservation status** – EN (Endangered). The number of locations is less than 5 in the area of study.

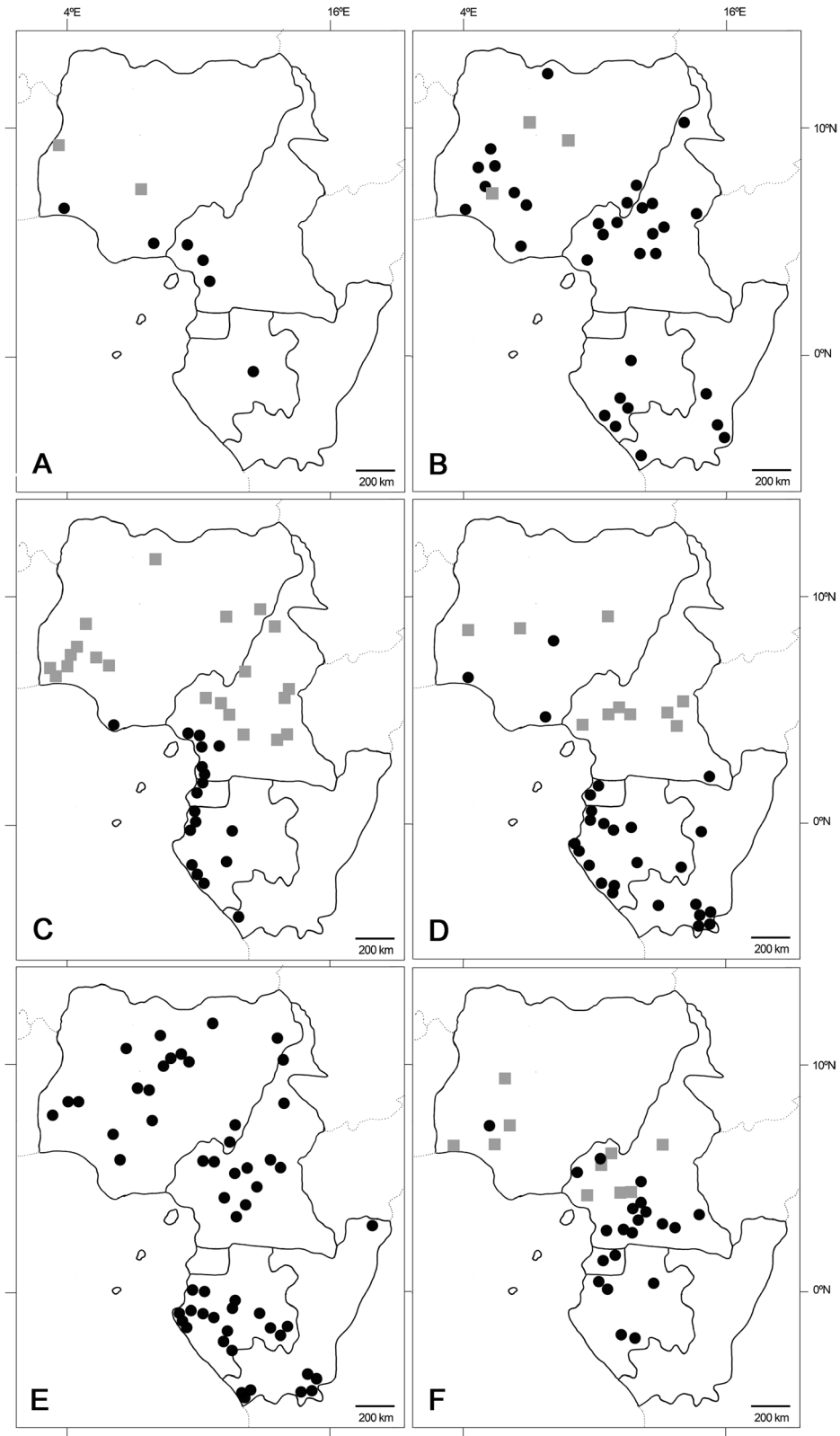
**Other collections examined** – **Nigeria:** Akure Forest Reserve, Apr. 1967, *D.P.M. Guile 2686* (L[L1504961, <https://data.biodiversitydata.nl/naturalis/specimen/L.1504961>]); Mando Forest Reserve, between Gidan Sabo and Karu, 6 Jun. 1950, *R.W.J. Keay s.n.* (FHI[FHI0025851-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0025851-0>, web]); Jemaa Distr., Apr. 1958, *D.E.S. King 139* (K).

**Notes** – Cribb (1989) and Lebrun & Stork (2015) considered *E. brevipetala* as conspecific with *E. monile* Rchb.f., whereas Pérez Vera (2003) considered it a variety of *E. monile*. However, both taxa differ in several characters, such as the colour of the petals and lip (rose to whitish in *E. brevipetala*, yellow-green with purple margin in *E. monile*), shape and length of the petals (oblong-ovate and 4.4–5 mm long in *E. brevipetala*, linear and 7–11 mm long in *E. monile*) and the number of ridges (5 in *E. brevipetala*, 3 in *E. monile*).

Two sheets with material collected by *G.F. Scott Elliot 5224* from Sierra Leone, were deposited in the herbaria K and BM. Since R.A. Rolfe did not designate the holotype, both sheets can be regarded as syntypes and we can choose a lectotype. The designated lectotype (K000410367) consists of a complete specimen, with a detached flower, measurements of floral structures and drawings from microscopic preparations made by V.S. Summerhayes. The specimen from herbarium BM is incomplete, only contains the scape and three flowers.

**6. *Eulophia buettneri*** (Kraenzl.) Summerh. (Summerhayes 1936b: 446) – *Lissochilus buettneri* Kraenzl. (Kraenzlin 1893: 53).

**Type** – Togo: *R. Buettner 415* (holotype: B†).



**Figure 5** – Distribution maps. **A.** *Eulophia alta* (circles) and *E. barteri* (squares). **B.** *Eulophia angolensis* (circles) and *E. brevipetala* (squares). **C.** *Eulophia bouliawongo* (circles) and *E. cristata* (squares). **D.** *Eulophia buettneri* (squares) and *E. caricifolia* (circles). **E.** *Eulophia cucullata*. **F.** *Eulophia euglossa* (circles) and *E. flavopurpurea* (squares). Maps created with Map Maker Pro version 3.5 (Map Maker Limited 2019).

*Lissochilus ledermannii* Kraenzl. (Kraenzlin 1912: 396) – *Eulophia ecarinata* Butzin (Butzin 1975: 588). **Type** – Cameroon: Bave–Bowu, *C.L. Ledermann 1467* (holotype: B†).

**Distribution** – West Tropical Africa from Guinea to Cameroon. Nigeria and Cameroon (fig. 5D).

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread in the area of study.

**Habitat and ecology** – Open savannah and swamp grassland. Elevation 800–900 m.

**Other collections examined** – **Nigeria**: S of Ijalye Forest Reserve, near Batake, 8 Mar. 1947, *R.W.J. Keay s.n.* (FHI[FHI0021196-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0021196-0>, web]); Budu Ekun, 4 miles S of Opa Hill in the Old Oyo Forestry Reserve, 24 Feb. 1946, *R.W.J. Keay s.n.* (FHI[FHI0016020-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0016020-0>, web]); Plateau province, *D.E.S. King s.n.* (K).

**Cameroon**: 13 km NW of Bétaré Oya, west of the Lom river, 21 Feb. 1961, *F.J. Breteler 1085* (P[P00358878, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358878>, web], WAG[WAG.1135646, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135646>]); Bétaré Oya, 19 Feb. 1961, *F.J. Breteler 1078* (WAG[WAG.1135647, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135647>]); piste Kon–confluent Noun–Mbam, 23 km NW Bafia, 23 Jan. 1981, *B. Satabié 582* (P[P00358870, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358870>, web]); Nyamongo, 12 km NE Bafia, 28 Mar. 1963, *J. & A. Raynal 10549* (P[P00358871, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358871>, web]); Logone W., 22 Mar. 1933, *H. Lhote 181* (P[P00358872, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358872>, web]); Makenène, à 13 km au N de Ndikinimeki et le confluent Ndé–Noun, 17 Feb. 1972, *R. Letouzey 11250* (P[P00358873, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358873>, web]); au N de Touraké, Deng Deng, 21 Feb. 1961, *R. Letouzey 3507* (P[P00358875, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358875>, web]); Gounte, Bertoua, 25 Jan. 1960, *R. Letouzey 2778* (P[P00358876, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358876>, web]); Gendimi, Mar. 1939, *H. Jacques-Félix 3417* (P[P00358877, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358877>, web]); Mount Cameroon, Bambuko Forest Reserve, 4°20'N, 9°10'E, 29 Jan. 1958, *R.W.J. Keay 37460* (K, <http://specimens.kew.org/herbarium/K000106921>).

**Note** – We refrain from designating a neotype because we have not seen material from Togo, a country outside the area covered by our revision.

**7. *Eulophia caricifolia*** (Rchb.f.) Summerh. (Summerhayes 1936b: 442) – *Lissochilus caricifolius* Rchb.f. (Reichenbach 1877: 74).

**Type** – Gabon: *M.-T. Griffon de Bellay s.n.* (holotype: W, n.v.)

**Distribution** – Widely distributed in tropical Africa. Nigeria, Cameroon, Equatorial Guinea (Rio Muni), Gabon and Republic of the Congo (fig. 5D).

**Habitat and ecology** – In swampy places, temporarily inundated savannah, open places, grassland, forest edge and ri-

parian forests, on sandy and siliceous soils. Elevation 0–800 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – **Nigeria**: Lagos, Ikoyi Plains, 18 May 1914, *J.M. Dalziel 964* (K); Eket District, 1912–13, *P.A. Talbot et al. 3160* (K); between Uke and Nobi, valley of the Idemili stream, 15 May 1956, *C.F. Onochie s.n.* (FHI[FHI0035801-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0035801-0>, web]).

**Cameroon**: 10 km à l'E de Kinsasa, à 65 km au NNE de Moloundou, sur route de Yokadouma, 4 Mar. 1971, *R. Letouzey & J.F. Villiers 10497* (P[P00358858, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358858>, web]).

**Equatorial Guinea**: Litoral, Etembue, 16 Jul. 1939 *L. Del Val s.n.* (MA[785017, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00785017,785028>, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00785028>]); Bata–Bome, río Boara, 1 Jun. 1991, *M. Carvalho 4705* (MA[597837, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00597837>], WAG[WAG.1135653, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135653>]); Baga, 19 Jun. 1999, *Eneme 352* (WAG[WAG.1135652, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135652>]).

**Gabon**: Batéké Plateau, Mpassa River watershed, 4.2 km N of Station of the Projet de Protection des Gorilles. 2°04'45"S, 14°03'47"E, 27 Nov. 2001, *G. Walters et al. 988* (K); Ogooué-Ivindo, Lopé Reserve, 26 Dec. 1996, *J.J. de Wilde & R.W. de Wilde-Bakhuizen 11821* (WAG[WAG.1135669, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135669>]); Oyan, 0°11'S, 9°20'E, 19 Oct. 1990, *C.M. Wilks & J.J. Dibata 2330* (WAG[WAG.1135658, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135658>]); route cap Esté-rias, 11 Sep. 1985, *A.M. Louis 1803* (WAG[WAG.1135659, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135659>, WAG.1135660, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135660>]); Pointe Denis, 0°20'N 9°21'E, 13 Nov. 1988, *L.J.G. van der Maesen et al. 5462* (WAG[WAG.1135661, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135661>]); Nyanga, Moukalaba Doudou, national park south of Nyanga river, 3°00.87'S, 10°25.30'E, 21 Feb. 2004, *J.L. van Valkenburg et al. 2933* (WAG[WAG.1135662, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135662>]); Nyanga, Mayumba, 22 Oct. 1986, *A.M. Louis 2226* (WAG[WAG.1135663, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135663>]); Peninsula of Cap Esterias, 0°34.7'N, 9°21.0'E, 10 Dec. 2003, *C.C.H. Jongkind 5929* (WAG[WAG.1135664, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135664>]); Gamba, around 5 km from station des pompiers at S side of Gamba lagoon, 2°43'S, 10°12'E, 17 Dec. 1995, *M.A. van Bergen & M.H. van der Houten 178* (WAG[WAG.1135665, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135665>]); Pointe Denis / Pongara / Ovingombé, 0°20'N, 9°21'E, 20 Dec. 1999, *E.L. Simons & R. Westerduijn 484* (WAG[WAG.1135666, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135666>]); SE of Port Gentil, 0°40'S, 8°50'E, 16 Sep. 1968, *F.J. Breteler & R.A. van Raalte*

5574 (WAG[WAG.1135667, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135667>]); 20 km N of Libreville, 0°35'N, 9°22'E, 29 Jan. 1987, *J.M. Reitsma & B. Reitsma 2859* (WAG[WAG.1135668, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135668>]); cap Lopez, Nov. 1894, *F.-R. Thollon s.n.* (P[P00358846, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358846>, web]); près d'Imeno, Haute-Ngounyé, 2 Jan. 1925, *G. Le Testu 5166* (P[P00358849, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358849>, web]); CEFA Ayem, 10 km SW Ndjolé, km 9 du chantier, 30 Apr. 1963, *N. Hallé 1936* (P[P00358850, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358850>, web]); Ogooué, Fernan Vaz, *A. Leroy s.n.* (P[P00358826, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358826>, web]); Franceville, route N de Mounana–Ogooué, 27 Dec. 1961, *P. Sita 488* (P[P00358975, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358975>, web]).

**Republic of the Congo:** Brazzaville, 9 Dec. 1957, *H.C.D. de Wit 6004* (WAG[WAG.1135651, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135651>]); bord du Congo au confluent du Djoué, 4°20'S, 15°15'E, 22 Feb. 1965, *C. Farron 4741* (P[P00538796, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00538796>, web]); Moyen Congo, près Mayama, Sep. 1949, *J. Trochain 7993* (P[P00358808, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358808>, web]); Brazzaville, plaine de Mpila, IX-1887, *F.-R. Thollon 883* (P[P00358809, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358809>, web]); environs de Brazzaville, route de Kinkala, village de Gangalingolo, à 18 km sur la route Brazzaville–Kinkala, 5 Dec. 1962, *de Néré 16* (P[P00358820, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358820>, web]); Ngakouba, Plateaux Batékés, 20 Apr. 1970, *L. Makany 1563* (P[P00358821, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358821>, web]); Mare de Ngamakala, à 37 km au N de Brazzaville, 23 Oct. 1969, *L. Makany 1248* (P[P00358822, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358822>, web]); près Brazzaville, 16 Jan. 1959, *J. Koechlin 5713* (P[P00358827, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358827>, web]); Marais de la Djili, près de Brazzaville sur la route de M'bé, Oct. 1958, *J. Koechlin 5304* (P[P00358828, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358828>, web]); mare de Gamakala, 4°05'S, 15°25'E, 14 May 1965, *C. Farron 4138* (P[P00358829, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358829>, web]); Plateau Bateké, route des falaises de Douvres, mare de Gamakala, 26 Feb. 1962, *B. Descoings 9821* (P[P00358830, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358830>, web]); environs d'Etoumbi, à 36 km sur la route d'Ewo, 2 Aug. 1961, *B. Descoings 8732* (P[P00358833, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358833>, web]); Pays Bakongo, Mbamou à Gompaka, 4 Aug. 1912, *A. Chevalier 27687* (P[P00358835, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358835>, web]); vallée du Niaú près Malolo, ancienne route de Gabon, 1 Feb. 1976, *P. Cabaliou 145* (P[P00358839, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00358839>, web]).

**8. *Eulophia cristata*** (Afzel. ex Sw.) Steud. (Steudel 1840: 605) – *Limodorum cristatum* Afzel ex Sw. (Swartz 1805: 86). **Type** – Sierra Leone: *A. Afzelius s.n.* (lectotype: S, n.v., designated by Szlachetko 2008: 230).

*Lissochilus purpuratus* Lindl. (Lindley 1862: 133). **Type** – Nigeria: Abbeokuta, *C. Barter 3331* (holotype: K[K000078575, <http://specimens.kew.org/herbarium/K000078575>, web]).

**Distribution** – West, Central, and East Tropical Africa. Nigeria and Cameroon (fig. 5C).

**Habitat and ecology** – In open savannah woodland and temporarily inundated, herbaceous savannah on lateritic soils. Elevation 700–1000 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – **Nigeria:** Ilaro, 70 km NW of Lagos, 7 Apr. 1950, *L. Bels 65* (U[U.1466620, <https://data.biodiversitydata.nl/naturalis/specimen/U.1466620>]); Lagos, Abeokuta road, 19 Feb. 1945, *B.L. Burt 33* (K); W of Ife campus, 14 Mar. 1968, *W.W. Sanford s.n.* (L[L.1504972, <https://data.biodiversitydata.nl/naturalis/specimen/L.1504972>]); near Zaria, Sep. 1957, *Messemaeckers v/d Graaf Clayton s.n.* (WAG[WAG.1135734, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135734>, WAG.1135735, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135735>]); W of Mubi, 10°15'N, 13°15'E, 5 May 1972, *P. Wit et al. 1788* (WAG[WAG.1135732, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135732>]); Yankari Game Reserve, 9°45'N, 10°30'E, 18 Apr. 1971, *C. Geerling 3542* (WAG[WAG.1135733, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135733>]); near the Ogun river bridge on the Oyo–Iseyin road, 23 Mar. 1958, *C.F. Onochie s.n.* (WAG[WAG.1135728, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135728>]); near Akure, 5 Mar. 1955, *P.W. Richards 5123* (P[P00365843, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365843>, web]); Ilorin–Jebba road, 2 Mar. 1950, *R.D. Meikle 1235* (P[P00365844, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365844>, web]); Olokejé, 21 Mar. 1947, *Jonathan s.n.* (P[P00365845, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365845>, web]); between Olokemeji and Iseyin, 7 Apr. 1958, *D.J. Hambler 441* (P[P00365846, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365846>, web]).

**Cameroon:** near Monay, 20 km north of Betare Oya, 20 Feb. 1961, *F.J. Breteler 1154* (WAG[WAG.1135730, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135730>]); Bertoua–Batouri, 1962, *V. Tchinye 81* (P[P00365882, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365882>, web]); near Obala, 35 km NNE Yaoundé, 8 Mar. 1969, *W.W. Sanford 6126* (P[P00365883, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365883>, web]); Guérima, 7 km NE Bafia, rive droite du Mbam, 28 Mar. 1963, *J. & A. Raynal 10546* (P[P00365884, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365884>, web]); Boye, about 50 km N of Garoua Bolai, 16 Apr. 1977, *I. Nordal 964* (P[P00365885, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365885>, web]); piste de Bouba au confluent Lom / Bâ, Betare Oya, 10 Mar. 1961, *R. Letouzey 3631* (P[P00365886, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365886>, web]); au NW de Kissi, Betare Oya, 28 Feb. 1961, *R. Letouzey 3560* (P[P00365887, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365887>, web]); Doumé, Apr. 1939, *H. Jacques-Félix 3548* (P[P00365888, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365888>, web]).

web]); Guenderou, Mar. 1939, *H. Jacques-Félix* 3372 (P[P00365889, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365889>, web]); Fouban à Banyo, Feb. 1939, *H. Jacques-Félix* 3233 (P[P00365890, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365890>, web]); Mango vers Hoseré Vokré, 10 km S Poli, 13 Apr. 1977, *G. Fotius* 2619 (P[P00365891, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365891>, web]); Madele–Bamenda road, 19 Feb. 1948, *H. Gregory* 251 (K).

**9. *Eulophia cucullata*** (Afzel. ex Sw.) Steud. (Steudel 1840: 605) – *Limodorum cucullatum* Afzel. ex Sw. (Swartz 1805: 86).

**Type** – Sierra Leone: *A. Afzelius* s.n. (lectotype: S, n.v., designated by Szlachetko 2008: 232).

*Lissochilus arenarius* Lindl. (Lindley 1862: 133) – *Eulophia arenaria* (Lindl.) Bolus (Bolus 1898: 185). **Type** – Nigeria: Nupe, *C. Barter* 1488 (holotype: K[K000078553, <http://specimens.kew.org/herbarium/K000078553>, web]).

**Distribution** – Widely distributed in tropical and subtropical Africa. Nigeria, Cameroon, Gabon, and Republic of the Congo (fig. 5E).

**Habitat and ecology** – In woodland and herbaceous savannah, occasionally in humid areas, on sandy and lateritic soils and on rocky hills (inselberg). Elevation 0–1900 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – **Nigeria:** Kabba, May 1962, *D. Westwood* s.n. (K); within 50 miles of Maiduguri, Borna, 6 Jul. 1907, *A.C. Parsons* s.n. (K); Aguji, near Ilorin, 26 Aug. 1913, *J. Thornton* s.n. (K); Kaccacere, Zangon Ketaf District, 14 Jun. 1957, *G.V. Summerhayes* 105 (K); Vom, Bauchi Plateau, 1922, *J. Dent Young* 235 (K); 17 miles S. of Igbeti, 9 May 1970, *J.K. Bowden* 146 (K); Amban, 1 May 1972, *D.E.S. King* s.n. (K); Zenabi–L. Kano, 7 Jun. 1968, *D.E.S. King* s.n. (K); near Ukpelu Naboua, Orle River Forest Reserve, 26 Jun. 1952, *O.A. Umana* s.n. (K); Vom Catering Rest House, 9°40'N, 8°50'E, 19 Apr. 1972, *P. Wit* 1309 (K, WAG[WAG.1135804, <https://bioportal.naturalis.nl/specimen/WAG.1135804>]); Zaranda–Fulani, 19 May 1921, *H.V. Lely* 199 (K); Zaria Province, Kam Gimi, 9 May 1948, *R.W.J. Keay & W.E.S. Mutch* s.n. (K, P[P00365707, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365707>, web]); 10 miles before Abuja on road from Reika, 14 Jun. 1970, *W.W. Sanford* 6506a (L[L.1504977, <https://data.biodiversitydata.nl/naturalis/specimen/L.1504977>]); Beli, 7°50'N, 11°E, 8 May 1972, *P. Wit et al.* 1879 (WAG[WAG.1135807, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135807>]); Maisamari village, 7°10'N, 11°05'E, 27 Apr. 1972, *J.D. Chapman* 2770 (WAG[WAG.1135803, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135803>]); between Gawu and Abuja road junction, 12 Jun. 1958, *C.F. Onochie* s.n. (P[P00365705, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365705>, web]); Mambila Plateau, Dorofi, 25 Jun. 1958, *J.W.F. Chapman* 18 (P[P00365766, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365766>, web]); Birnin Gwari distr., Mando, 18 Jun. 1950, *R.W.J. Keay* s.n. (P[P00365706, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365706>, web]); 2 miles on Igana–Iwere road, 1 Aug. 1970, *V.E. Ei-*

*munjeze & J.K. Adebusuyi* s.n. (FHI[FHI0063420-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0063420-0>, web]).

**Cameroon:** Yaúnde-Station, 1890-94, *G. Zenker & A. Staudt* 256 (K); Ndop Plain, near Bamessi, 6°00'N, 10°30'E, 30 Mar. 1962, *M. Brunt* 271 (K[K000106924, <http://specimens.kew.org/herbarium/K000106924>]); Ndop Plain, Bamali to Bambalang, 5°45'N, 10°15'E, 12 Apr. 1962, *M.A. Brunt* 354 (K[K000106923, <http://specimens.kew.org/herbarium/K000106923>]); 6 km W of Bali, 5°53'N, 10°0'E, 26 Mar. 1978, *J. Lowe* 3646 (K[K000106922, <http://specimens.kew.org/herbarium/K000106922>, web]); Haman, am Lom-Fluss, 13°35'E, 19 Apr. 1914, *J. Mildbraed* 8910 (K); Parc National de la Bénoué, 8°7'30"N, 13°47'00"E, 16 Jul. 1975, *P. Wit* 3147 (WAG[WAG.1135754, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135754>]); Mogode a Roumsiki, 10°35'N, 13°35'E, 11 Jun. 1974, *C. Geerling & J. Néné* 5016 (WAG[WAG.1135753, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135753>]); between Bafia and N'Dikiniméki, 20 km W of Bafia, 28 Apr. 1964, *W.J. de Wilde & B.E. de Wilde-Duyffes* 2308 (P[P00365760, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365760>, web, WAG[WAG.1135751, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135751>, WAG.1135752, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135752>]); colline de Mbolhové, environs 10 km E d'Awaé, N du village de Uchgambo, 10 Apr. 1974, *J.F. Villiers* 920 (P[P00365761, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365761>, web]); Yoko, ancien tracé de la route de Bafia (vallée du Djim), 21 Apr. 1963, *J. & A. Raynal* 10935 (P[P00365762, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365762>, web]); près Nyandingi, à 30 km SW de Linte, 24 Apr. 1982, *B.A. Nkongmeneck* 320 (P[P00365763, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365763>, web]); près du mont Meza, Nanga Eboko, 12 May 1959, *R. Letouzey* 1962 (P[P00365764, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365764>, web]); Guidoler, May 1939, *H. Jacques-Félix* 3804 (P[P00365765, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365765>, web]); Ngoum, 36 km N de Yoko, axe Yoko-Tibati, 3 May 1979, *M. Biholong* 437 (P[P00365767, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365767>, web]); Bambuluwe lake, Bafut Ngemba reserve, 28 May 1959, *B.O. Daramola* s.n. (WAG[WAG.1135805, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135805>, WAG.1135806, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135806>]).

**Gabon:** 74 km along the road from Sindara to Mouila, 1°30'S, 10°40'E, 26 Nov. 1984, *J.C. Arends et al.* 456 (K, WAG[WAG.1135775, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135775>, WAG.1135776, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135776>]); Ngouné, along road Yombi to Mandji, 5 km past Bembodí, 1°30'12"S, 10°30'48"E, 28 Oct. 1994, *J.J. Wieringa et al.* 2950 (MA[843750, <http://161.111.171.57/herbarioV/visorV-Cat.php?img=MA-01-00843750>], WAG[WAG.1135771, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135771>]); between Mouila and Moabi, 2°10'S, 11°40'E, 24 Oct. 1985, *J.M. Reitsma & B. Reitsma* 1759 (MA[456410, <http://161.111.171.57/herbarioV/visorV-Cat.php?img=MA-01-00456410>], WAG[WAG.1135774,



<https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135774>); about 22 km in Northern direction from Doussala, 2°12'S, 10°36'E, 4 Dec. 1986, *J.J. de Wilde et al.* 9157 (P[P00365754 web, WAG[WAG.1135773, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135773>]); Plateau Batéké, 7 km S of Léconi, opposite the cirque of Léconi, 1°39'S, 14°17'E, 8 Dec. 1989, *J.J. de Wilde et al.* 10016 (WAG[WAG.1135772, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135772>]); km 3 Moanda–Franceville, 1°31'S, 13°14'E, 7 Oct. 1970, *F.J. Breteler* 6811 (WAG[WAG.1135770, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135770>]); Lopé reserve, near Airstrip Lopé hotel, 0°06'21"S, 11°36'06"E, 22 Dec. 1996, *J.J. de Wilde & R.W. de Wilde-Bakhuizen* 11797 (WAG[WAG.1135769, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135769>]); SSE of Moanda, near Mandjaye, 1°41'S, 13°18'E, 8 Dec. 1992, *J. Dibata* 1108 (WAG[WAG.1135768, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135768>]); Mouila, lac bleu, bord de l'eau, 21 Nov. 1985, *A.M. Louis* 1976 (WAG[WAG.1135767, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135767>]); Oyan, 0°11'S, 9°20'E, 18 Oct. 1990, *C.M. Wilks & J.J. Dibata* 2320 (WAG[WAG.1135766, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135766>]); Loango National Park, 1°55'28"S, 9°19'55"E, 28 Sep. 2004, *J.-C. Mouandza Mbembo & B. Koumba* 298 (WAG[WAG.1135765, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135765>]); Pongara, 0°19'42"N, 9°21'E, 17 Dec. 012, *T.H.J. Damen et al.* 542 (WAG[WAG.1924526, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1924526>]); Lopé Reserve, alongside the Lopé river, 6°00'S, 11°40'E, 27 Jul. 1986, *J.M. Reitsma & B. Reitsma* 2448 (WAG[WAG.1135777, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135777>]); Iguéla, Sep. 1894, *A. Leroy s.n.* (P[P00365678, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365678>, web]); Préfecture de M'paga, à environ 7 km au N du lac Alombié, au S de la réserve de Wonga Wongué, 0°51'05"S, 9°27'38"E, 18 Oct. 2014, *E. Bidault et al.* 1768 (BR[BR0000024391931, <https://www.botanicalcollections.be/specimen/BR0000024391931>], P[P00854768, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00854768>, web]); 50 km S de Lambaréné, 15 km SE lac Ezanga, 1°06'07"S, 10°15'38"E, 21 Nov. 2013, *E. Bidault et al.* 1377 (BR[BR0000020751678, <https://www.botanicalcollections.be/specimen/BR0000020751678>, web]); Ogooue-Lolo, Ivindo area, SE of Lastoursville, 0°55'54"N, 13°17'40"E, 21 Nov. 2015, *N. Texier & E. Akouangou* 235 (P[P01192873, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p01192873>, web]); lagune de Fernan Vaz, Toungounamba, 1°34'31"N, 9°22'18"E, 17 Nov. 2016, *E. Bidault et al.* 2651 (P[P01193325, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p01193325>, web]); région du Lac Alombié, 4 km au N de M'paga, 0°52'11"S 9°27'26"E, 18 Oct. 2014, *O. Lachenaud et al.* 2003 (P[P01069561, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p01069561>, web]).

**Republic of the Congo:** Kouilou Region by Mvuti, near Pounga, 12 Dec. 1990, *I.F. & E.A.S. La Croix* 1161 (K); Brazzaville, 9 Dec. 1957, *H.C.D. de Wit s.n.* (WAG[WAG.1135819, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135819>, WAG.1135820, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135820>]);

Brazzaville, Nov. 1884, *F.R. Thollon s.n.* (P[P00365680, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365680>, web]); Bafou, près Loango, *C.J. Spire s.n.* (P[P00365683, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365683>, web]); Plateau Batéké, route de Maloukou, entre Mandielé et la mare Ngatsou, 1965, *P. Sita* 1173 (P[P00365684, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365684>, web]); environs de Brazzaville, route de Kinkala, village de Gangalingolo, à 18 km sur la route Brazzaville–Kinkala, 5 Dec. 1962, *de Néré* 18 (P[P00365685, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365685>, web]); Mare de Ngokouba, à 47 km au N de Brazzaville, 23 Oct. 1969, *L. Makany* 959 (P[P00365686, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365686>, web]); rivière Tschissafou, près Loango, 3 Nov. 1893, *H. Lecomte s.n.* (P[P00365687, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365687>, web]); près de Guadaloupi, au S de Loango, 1 Oct. 1893, *H. Lecomte s.n.* (P[P00365689, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365689>, web]); Poste du Diélé, 7 Dec. 1883, *J. de Brazza s.n.* (P[P00365691, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365691>, web]); village Lindui, 23 Oct. 1883, *J. de Brazza* 198 (P[P00365693, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365693>, web]); depuis Chysville, sur le plateau Botidi en Botoki, 18 Dec. 1928, *M. Estève* 12b (P[P00365694, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365694>, web]).

**Notes** – Flower size shows a wide variability among specimens studied, throughout its distribution range.

**10. *Eulophia euglossa*** (Rchb.f.) Rchb.f. ex Bateman (Bateman 1866: t. 5561) – *Galeandra euglossa* Rchb.f. (Reichenbach 1852: 935).

**Type** – Sierra Leone: *van Hees* 1288 (holotype: W, n.v.).

*Eulophia dusenii* Kraenzl. (Kraenzlin 1894: 254). **Type** – Cameroon: *P. Dusén* 264 (holotype: B†).

**Distribution** – Widely distributed in tropical and subtropical Africa. Nigeria, Cameroon, Equatorial Guinea (Rio Muni) and Gabon (fig. 5F).

**Habitat and ecology** – Secondary forests and plantations, riparian forests, shrubby low montane forests, also in rocky areas. Elevation 500–1100 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – **Nigeria:** Idanre Hills, near Aweba, 1948, *R.W.J. Keay & J.P.M. Brenan s.n.* (K).

**Cameroon:** 35 km au NNW de Sangmelima, 20 km NNW de Zoetélé, Mokomessi, 7 Jul. 1972, *R. Letouzey* 11453 (P[P00365606, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365606>, web, WAG[WAG.1135847, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135847>, WAG.1135848, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135848>]); Yokadouma, near catholic mission, 3°31'N, 15°02'E, 6 Jun. 1979, *F.M. van der Laan* 24 (WAG[WAG.1135834, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135834>, WAG.1135835, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135835>]); Nkolbisson, on top of Mt. Akouandoué, 3°51'N, 11°28'E, 23 May 1970, *J.J. Bos* 6874 (P[P00365611 [415](http://coldb.</a></p>
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mnhn.fr/catalognumber/mnhn/p/p00365611, web, WAG[WAG.1135836, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135836>, WAG.1135837, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135837>, WAG.1135838, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135838>]; 16 km on the road from Ebolowa to Minkok, 2°58'N, 11°17'E, 15 May 1975, *J.J. de Wilde 8231a* (WAG[WAG.1135839, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135839>]); Yaoundé, 1962, *de Wilde s.n.* (WAG[WAG.1135840, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135840>]); N'Koemvone, 14 km on the road from Ebolowa to Ambam, 2°49'N, 11°8'E, 7 Apr. 1975, *J.J. de Wilde 8149a* (WAG[WAG.1135843, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135843>, WAG.1135844, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135844>]); colline de Nkoltsia, 23 km NW Bipindi, 3°10'30"N, 10°16'30"E, 27 Apr. 1974, *J.F. Villiers 887* (P[P00365598, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365598>, web]); Bamenda, by river Metschem, 2 Aug. 1951, *E. Ujor s.n.* (K[K000106934], P[P00365603, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365603>, web]); Bez. Ebolowa, 2 Jun. 1911, *J. Mildbraed 5518* (P[P00365605, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365605>, web]); Yaoundé, Nkolbisson (Akokdoué), 23 May 1970, *C. Farron 73* (P[P00365609, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365609>, web]); Ngoekele (Yaoundé), 22 Jul. 1960, *E. Endengle 153* (P[P00365610, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365610>, web]); entre Ndonga et Essandja, 60 km NE Ntui, Bafia, 17 May 1979, *M. Biholong 553* (P[P00365612, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365612>, web]); Makak, 72 km SE Akonolinga, 11 Jun. 1981, *J.N. Asonangani 243* (P[P00365613, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365613>, web]); inselberg de Akomssili, zone de Bouamir, à 6 km au SO du grand rocher de Bouamir, Réserve du Dja, 3°10'16"N, 12°45'36"E, 21 Jul. 2002, *T. Stévant & D. Pial 502* (K, P[P00376356 <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00376356>, web]); sommet du Mbam Minkom (20–25 km NW de Yaoundé), 29 May 2009, *O. Lachenaud & H. Taedoung 923* (BR[BR6202001858008, <https://www.botanicalcollections.be/specimen/BR6202001858008>, web]); Korup National Park, 4°59'N, 8°51'E, Mar. 1979, *D.W. Thomas 1037* (K[K000106933, <http://specimens.kew.org/herbarium/K000106933>]).

**Equatorial Guinea:** Alum, entre Mikomeseng y Nkue, 1°39'N, 11°4'E, 13 Jun. 2000, *R. Pérez Viso 3050* (MA [784974, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00784974>]); Parque Nacional de Monte Alén, Bong, senda que va hacia el lago Atok, 1°39'18"N, 10°16'41"E, 28 Jun. 1999, *R. Pérez Viso 1304* (MA[703172, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00703172>]).

**Gabon:** track from Doussala to Bongo, 1°23'S, 10°12'E, 2 Dec. 1986, *J.J. de Wilde et al. 9105* (WAG[WAG.1135851, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135851>, WAG.1135852, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135852>, WAG.1135853, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135853>, WAG.1135854, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135854>]); rocher de

Abanga, 0°50'N, 10°55'E, 31 Oct. 1985, *F.M. van der Laan 944* (WAG[WAG.1135850, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135850>]); 2 km on road from Lébamba to Mbigou, along the Biroundou river, 2°13'S, 11°29'E, 8 Feb. 1991, *J.J. de Wilde & M. Sosef 10417* (WAG[WAG.1135845, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135845>, WAG.1135846, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135846>]); Efout, 11 km E Medouneu, rocher Fané, 4 Feb. 1968, *N. Hallé & J.F. Villiers 4921* (P[P00365592, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365592>, web]); Makoukou, *N. Hallé 4245* (P[P00365593, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365593>, web]); Makoukou, 22 Jan. 1979, *J. Florence 1575* (P[P00365595, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365595>, web]).

**11. *Eulophia flavopurpurea*** (Rchb.f.) Rolfe (Rolfe 1897: 65) – *Cyrtopera flavopurpurea* Rchb.f. (Reichenbach 1878: 68).

**Type** – Sudan: Niamniam, *G. Schweinfurth 3546* (lectotype: W, n.v., designated by Szlachetko 2008: 235).

*Lissochilus millsonii* Rolfe (Rolfe 1897: 79) – *Eulophia millsonii* (Rolfe) Summerh. (Summerhayes 1936b: 446). **Type** – Nigeria: Yoruba, *A. Millson 86* (holotype: K[K000078565, <http://specimens.kew.org/herbarium/K000078565>, web]).

*Eulophia tuberifera* Kraenzl. (Kraenzlin 1900: 169). **Type** – Cameroon: *P. Dusén 258* (holotype: B†).

**Distribution** – Widely distributed in tropical and subtropical Africa. Nigeria and Cameroon (fig. 5F).

**Habitat and ecology** – In grassland, marshy savannah, and savannah woodland, on lateritic soils. Elevation 300–1500 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread in the area of study.

**Other collections examined** – **Nigeria:** Kabba, School of Agriculture, Apr. 1962, *D. Westwood 259* (P[P00365575, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365575>, web]); Benin, 3 miles N of Ugbohigan, 19 Apr. 1948, *J. Dundas s.n.* (FHI[FHI0021460-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0021460-0>, web]); Interior, western Lagos, 1893, *Rowland 86* (K[K000078568, <http://specimens.kew.org/herbarium/K000078568>]); 9 miles N of Zungeru, 6 May 1948, *R.W.J. Keay s.n.* (K).

**Cameroon:** environs de Nkolosananga, 6 km NNE Monatele, Bafia, 11 Jan. 1983, *B. Satabié 640* (P[P00365585, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365585>, web]); W of Nkambe, 6°37'N, 10°30'E, Apr. 1986, *D.W. Thomas 6073* (P[P00365584, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365584>, web]); Elomzok, 39 km N Yaoundé, 27 Mar. 1963, *J. & A. Raynal 10520* (P[P00365586, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365586>, web]); near Bonongo, 26 Jan. 1958, *R.W.J. Keay s.n.* (P[P00365587, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365587>, web]); Mbibol, 40 km W Ngaoundéré, 12 Jun. 1977, *G. Fotius 2663* (P[P02083016, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p02083016>, web]); Ndop plain, below Ndop, 5°45'N, 10°15'E, 13 Apr. 1962, *M.A. Brunt*

363 (K[K000106928, <http://specimens.kew.org/herbarium/K000106928>]).

**12. *Eulophia galeoloides*** Kraenzl. (Kraenzlin 1898: 508).

**Type** – Tanzania: Usambara, Mar., *E. Heinsen* 10 (holotype: B<sup>+</sup>); Tanzania, Lushoto District, Amani, *C. Braun* 670 (neotype: K[K000410402, <http://specimens.kew.org/herbarium/K000410402>, designated here; isoneotype: EA n.v.).

**Distribution**: Mainly distributed in East Tropical Africa, extending from Ghana to the west. Nigeria (fig. 6A), Cameroon (?).

**Habitat and ecology** – Shady forests. Elevation 0–100 m.

**Preliminary IUCN conservation status** – CR (Critically Endangered). Although this taxon is widely distributed in Africa, it is only known from one location in the area of study.

**Notes** – Kraenzlin (1898: 508) described this species from material collected by E. Heinsen in Usambara, Tanzania. In the herbaria B, BM, BR, and K where Heinsen's collections could be deposited, no material assigned to *E. galeoloides* could be traced. Cribb (1989) and Geerinck (1992) mentioned a destroyed sheet from B (*Braun* 670) as holotype, with an isotype deposited in K, which contains material collected in 1905 by Carl Braun from the seedbeds in Amani (in the East Usambara Mountains, Tanzania). The holotype would have been assigned to a specimen collected by E. Heinsen, but this material was destroyed. So, it is necessary to designate a neotype and we have chosen the specimen from the same region, collected by *Braun* 670 (K000410402).

Summerhayes (1968) revised the sheet FHI20295, with specimens collected by S. Tamajong in Etemi, Ijebu Ode (Nigeria), which is represented in the distribution map.

There is a distribution record for Cameroon in Govaerts et al. (2019), but we have not seen specimens or bibliographic references, which could confirm its presence in this country.

**13. *Eulophia gracilis*** Lindl. (Lindley 1823b: t. 742) – *Galeandra gracilis* (Lindl.) Lindl. (Lindley 1833: 187) – *Graphorkis gracilis* (Lindl.) Kuntze (Kuntze 1891: 662).

**Type** – Sierra Leone: coll. *G. Don* s.n. cult. *Horticultural Soc. Chiswick* (holotype: t. 742 in Lindley 1823b).

**Distribution** – West and Central Tropical Africa, extending to the south to Angola. Nigeria, Cameroon, Equatorial Guinea (Rio Muni), and Gabon (fig. 6B).

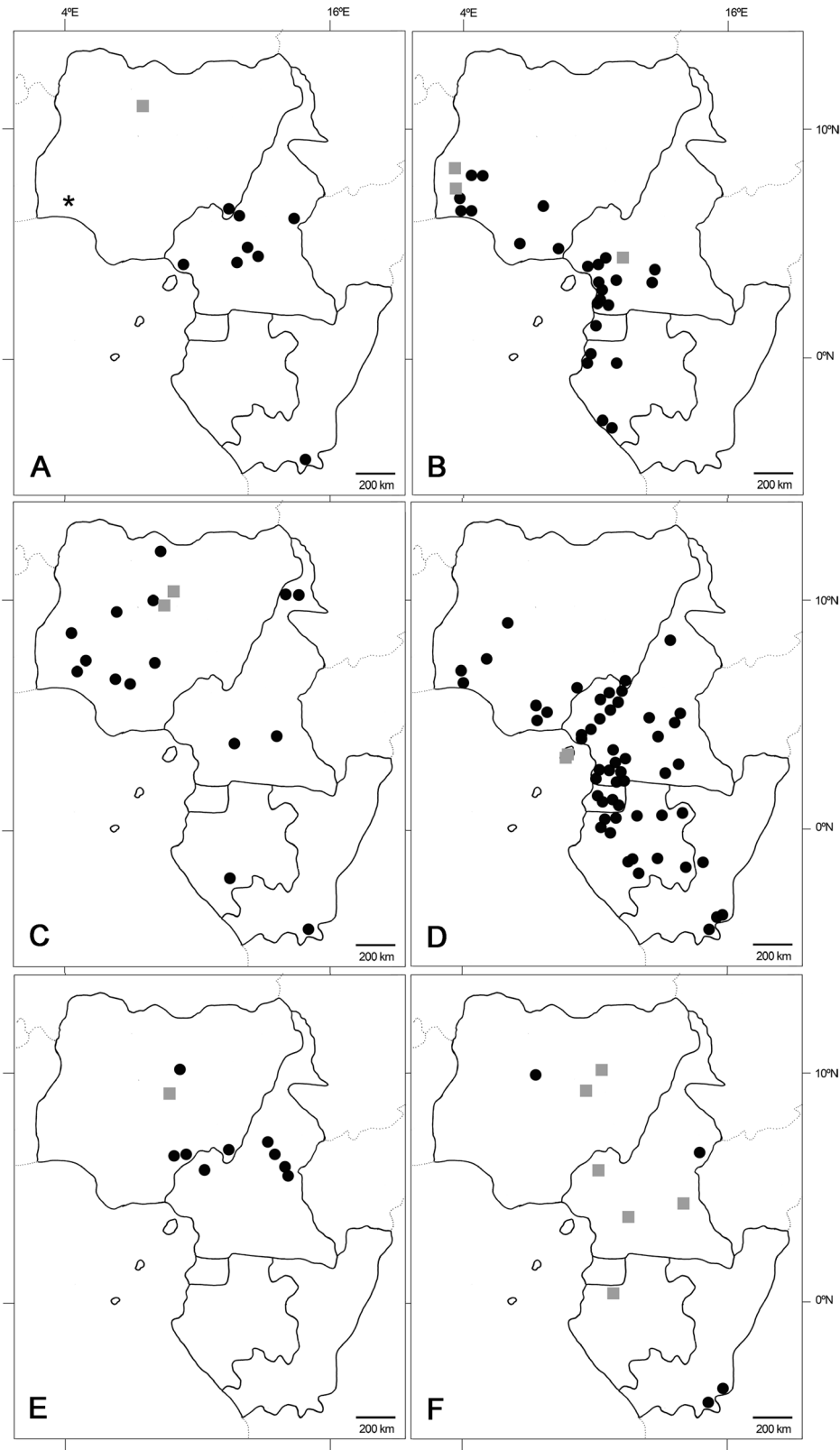
**Habitat and ecology** – Open woodland, secondary forests and plantations, coastal shrub and forests, grassland, occasionally in riparian forests and ruderal vegetation, on sandy soils and rocky places. Elevation 0–100 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined** – **Nigeria**: Lagos (Ikoyi), 13 Jan. 1950, *L. Bels* 5 (U[U.1466621, <https://data.biodiversitydata.nl/naturalis/specimen/U.1466621>]); Ekinta River Forest Reserve, about 20 km ENE of Calabar, 5°00'N, 8°30'E, 2 Apr. 1971, *P.P. van Meer* 1146 (WAG[WAG.1135955, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135955>]); Oba Hills Forest Reserve, 30 Jan. 1966, *W.W. Sanford* 469/66

(L[L.1520451, <https://data.biodiversitydata.nl/naturalis/specimen/L.1520451>]); river Ogun opposite Djaiye Forest Reserve, 20 Apr. 1947, *C.F. Onochie* s.n. (P[P00365485, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365485>, web]); Enyinawsa, lagoon opposite Epe, 19 Jan. 1956, *C.F. Onochie* s.n. (FHI[FHI0035262-1, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0035262-1>, web]); 16 miles W of Oyo, 10 Feb. 1948, *R.W.J. Keay* s.n. (K); Imo State, Avu, 1976, *B. Segerbäck* 1208 (K); Barga valley near Enugu, s. col. s.n. (K).

**Cameroon**: Campo Ma'an area, Massif des Mamelles, path to Mamelles highlands, 2°26'31"N, 9°54'51"E, 23 Apr. 2001, *T. Peguy* et al. 3224 (WAG[WAG.1136028, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136028>]); 5 km south of Dibombari, near Bonambwass, 4°09'N, 9°41'E, 18 Feb. 1988, *P. Mambo* et al. 825 (WAG[WAG.1135901, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135901>]); Mpolongwe, 8 km N of Kribi, 3°02'N, 9°58'E, 1 Mar. 1997, *M. Elad* 591 (WAG[WAG.1135902, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135902>]); 15 km from Kribi, Edea road, Mpolongwe river, 3°00'N, 9°58'E, 7 Jan. 1969, *J.J. Bos* 3576 (P[P00365551, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365551>, web], WAG[WAG.1135904, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135904>, WAG.1135905, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135905>]); about 9 km S of Kribi, S bank of Lobe river, 2°52'N, 9°54'E, 21 Jan. 1969, *J.J. Bos* 3708 (WAG[WAG.1135906, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135906>, WAG.1135907, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135907>]); ca. 40 km S of Badjob, ca. 50 km SW of Eséka, Nyong river, near the bridge, 19 Dec. 1963, *W.J. de Wilde & B.E. de Wilde-Duyffes* 1574 (WAG[WAG.1135908, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135908>, WAG.1135909, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135909>]); 36 km N of Kribi, on Lokoundje river bank, near bridge at Edéa, 3°11'N, 10°02'E, 27 Dec. 1969, *J.J. Bos* 5974 (WAG[WAG.1135910, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135910>]); près Ekite (3 km W Edea), 22 Dec. 1973, *R. Letouzey* 12498 (P[P00365541, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365541>, web]); Pout Kelle (20 km N Ejeka), Edea, 9 Dec. 1973, *R. Letouzey* 12310 (P[P00365543, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365543>, web]); près Es-seng, 12 km NNE de Ngam, Ndikinimeki, 23 Jan. 1972, *R. Letouzey* 11066 (P[P00365544, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365544>, web]); près Ndoknabao, à 30 km au SW de Ndikinimeki, 16 Dec. 1971, *R. Letouzey* 10834 (P[P00365545, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365545>, web]); près Akom, 35 km S Bengbis, Akonolinga, 16 Mar. 1962, *R. Letouzey* 4539 (P[P00365547, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365547>, web]); confluent du Tia et de la Sanaga, Nangaeboko, 24 Feb. 1959, *R. Letouzey* 1517 (P[P00365548, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365548>, web]); Ebo National Park, 4°22'N, 10°25'E, 15 Feb. 2006, *B. Tchiengue* s.n. (K[K000580997, <http://specimens.kew.org/herbarium/K000580997>]).



**Figure 6** – Distribution maps. **A.** *Eulophia galeoloides* (asterisk), *E. latilabris* (circles), and *E. penduliflora* (square). **B.** *Eulophia gracilis* (circles) and *E. juncifolia* (squares). **C.** *Eulophia guineensis* (circles) and *E. leonensis* (squares). **D.** *Eulophia horsfallii* subsp. *horsfallii* (circles) and *E. horsfallii* subsp. *velayosiana* (squares). **E.** *Eulophia orthoplectra* (circles) and *E. ramifera* (square). **F.** *Eulophia pyrophila* (circles) and *E. stachyodes* (squares). Maps created with Map Maker Pro version 3.5 (Map Maker Limited 2019).

**Equatorial Guinea:** Bata–Bome, 6 Dec. 1993, *M. Carvalho 5430* (MA[598441, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00598441>], WAG[WAG.1135911, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135911>], WAG.1135912, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135912>)).

**Gabon:** near Libreville, along road to Cap Esterias, Forêt de la Mondah, 0°29'N, 9°30'E, 30 Oct. 1983, *A.M. Louis et al. 192* (WAG[WAG.1135918, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135918>], WAG.1135919, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135919>); near Libreville, along road to Cap Esterias, Forêt de la Mondah, 0°29'N, 9°30'E, 8 Aug. 1984, *F.M. van der Laan 814* (WAG[WAG.1135915, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135915>]); 1 km sur la piste à droite, 2 km avant le Cap Esterias, 12 Nov. 1982, *A.M. Louis 93* (WAG[WAG.1135913, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135913>], WAG.1135914, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135914>); about 8 km N of Mayumba, 3°21'S, 10°40'E, 6 Dec. 1986, *J.J. de Wilde et al. 9190* (WAG[WAG.1135917, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135917>]); Moyen-Ogooué, 37 km W of Lopé, along road to Ndjolé, 0°3'54"S, 11°16'48"E, 20 Nov. 1994, *J.J. Wieringa et al. 3252* (WAG[WAG.1135916, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135916>]); between Pongara and Point Denis, 0°19.5'N, 9°19.1'E, 19 Dec. 2012, *T.H. Damen et al. 564* (WAG[WAG.1924527, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1924527>]); Gamba, 4 km along the track Setté Cama to Gamba, 2°33'S, 9°47'E, 11 Dec. 1994, *J.J. de Wilde & R.W. de Wilde-Bakhuizen 11374* (WAG[WAG.1135920, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135920>]); Mayumba, 23 Jan. 1907, *G. Le Testu 968* (P[P00365489, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365489>, web]); environs de Libreville, 23 Nov. 1898, *P. Klaine 1441* (P[P00365535, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365535>, web]); cap Esterias (route Freel), 23 Sep. 1967, *J.F. Villiers 318* (P[P00365540, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365540>, web]); Libreville, *F.-R. Thollon 49* (P[P00365482, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365482>, P00365483, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365483>, P00365484, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365484>, web]).

**14. *Eulophia guineensis*** Lindl. (Lindley 1823a: t. 686) – *Graphorkis guineensis* (Lindl.) Kuntze (Kuntze 1891: 662).

**Type** – Sierra Leone: coll. *G. Don s.n. cult. Horticultural Soc.* (holotype: t. 686 in Lindley 1823a).

**Distribution** – Widely distributed in tropical and subtropical Africa, also in Republic of Cape Verde and the Arabian Peninsula, Nigeria, Cameroon, Gabon, and Republic of the Congo (fig. 6C).

**Habitat and ecology** – In open and secondary forest, grassy and shrubby savannah. Elevation 500–1100 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread in the area of study.

**Other collections examined** – **Nigeria:** Moor plantation, Ibadan, Jan. 1966, *C.L.M. van Eijnatten 1077*

(WAG[WAG.1135996, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135996>, WAG.1135997, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135997>]); Gambari, 20 miles NE of Ibadan, 25 Aug. 1966, *C.L.M. van Eijnatten 1905a* (WAG[WAG.1135990, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135990>]); Gurara Falls, bank of Gurara river, 17 May 1973, *V.E. Eimunjeye et al. s.n.* (WAG[WAG.1135991, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135991>]); Ancho, IV-1936, *D. Hepburn 129* (P[P00365438, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365438>, web]); Kano province, Falingo Crebo, 2 Jul. 1948, *D.C. Onwudinjoh s.n.* (P[P00365439, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365439>, web]); Igbeti, near Forestry Rest House, 29 May 1966, *D.P. Stanfield & W. Sanford 807/66* (FHI[FHI0060840-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0060840-0>, web]); Atuagbo Forest Reserve, 28 Aug. 1981, *P.O. Ek-wuno 100* (FHI[FHI0095353-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0095353-0>, web]); Onitsha, Akpaba Forest Reserve, 15 Sep. 1953, *C.F. Onochie s.n.* (K); Boju Plateau State, 7 Sep. 1975, *B. Segerbäck 1161* (K).

**Cameroon:** Mogode à Roumsiki, 10°35'N, 13°35'E, 11 Jun. 1974, *C. Geerling & J. Néné 5014* (WAG[WAG.1135988, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135988>]); Melèn, about 3 km SW of Yaoundé, 25 Aug. 1964, *W.J. de Wilde & B.E. de Wilde-Duyffes 2930* (WAG[WAG.1135993, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135993>]); Doumé, around catholic mission, 11 Sep. 1960, *F.J. Breteler 223* (WAG[WAG.1135994, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135994>]); Maroua, Guradje gordje, Jun. 1945, *A. Vaillant 304* (P[P00365474, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365474>, web]); Magoumaz (10 km NNW Mokolo), ravine sur le flanc W de l'Hossiné, 19 May 1974, *G. Fotius 999* (P[P00365475, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365475>, web]).

**Gabon:** Ngounié, Bongolo vers Lébamba, 2 Apr. 1986, *A.M. Louis 2064* (WAG[WAG.1135995, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135995>]).

**Republic of the Congo:** Brazzaville, 2007, *R.J.H. Becker 429* (WAG[WAG.1135986, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135986>]); *ibid.*, 2007, *R.J.H. Becker 491* (WAG[WAG.1135985, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135985>]).

**Note** – Throughout the study area, this species shows a high variation in morphology and length of the leaves. Some specimens have leaves up to 45 cm long with a petiole up to 11 cm long; other have subsessile leaves, with the longest leaves up to 12 cm long. It is necessary to extend the study of this species throughout its distribution range, with the aim to know all its variability and evaluate the recognition of infraspecific levels.

**15. *Eulophia horsfallii*** (Bateman) Summerh. (Summerhayes 1936b: 444) – *Lissochilus horsfallii* Bateman (Bateman 1865: t. 5486).

**Type** – Nigeria: Old Calabar: coll. *S. Cheetham, cult. J.B. Horsfall* (holotype: t. 5486 in Bateman 1865).

Key to the subspecies of *Eulophia horsfallii*

1. Lip with 3 ridges, whitish ..... 15a. *E. horsfallii* subsp. *horsfallii*  
 1'. Lip with 5(–7) ridges, deep yellow ..... 15b. *E. horsfallii* subsp. *velayosiana*

**15a. *Eulophia horsfallii* subsp. *horsfallii***

**Distribution** – Widely distributed in tropical and subtropical Africa. Nigeria, Cameroon, Equatorial Guinea (Rio Muni), Gabon, and Republic of the Congo (fig. 6D).

**Habitat and ecology** – Riparian vegetation, marshy areas with dense vegetation, open and swampy places, ancient plantations, montane forests and meadows, on schists. Elevation 400–2000 m.

**Preliminary IUCN conservation status** – LC (Least Concern). Widespread and abundant in the area of study.

**Other collections examined – Additional material to Gammarra et al. (2019)** – **Nigeria:** Maya-Ndaga, 3 Apr. 1970, *J.B. Hall & J.K. Bowden 1713* (K); between Bida and Zungaru, 15 Jan. 1950, *R.D. Meikle 1023* (K); Abak, Ikot Nkeri, 23 Aug. 1948, *H.D. Maggs 148* (K); Port Harcourt, 1950, *H. Gregory 13* (K); Nekede, Imo State, 20 Aug. 1975, *B. Segerbäck 1162* (K); Ikwette, 28 Dec. 1948, *H.J. Savory & R.W.J. Keay s.n.* (K).

**Cameroon:** Yamba, Nanga Eboko, 25 May 1959, *R. Letouzey 2148* (P[P00365362, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365362>, web]); Bertoua, 1 Mar. 1927, *L. Hedin 220* (P[P00365365, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365365>, web]); Nguem, route de Bertoua, 24 Feb. 1927, *L. Hedin 134* (P[P00365366, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365366>, web]); près de Schang, *L. Hedin s.n.* (P[P00365367, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365367>, web]); route de Njombé, 1957, *Rose 51* (P[P00365355, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365355>, web]); Poli, massif du Vokré, versant N, vallée de Mangaté, 10 km S Poli, 18 Jan. 1965, *J. & A. Raynal 13047* (P[P00365356, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365356>, web]); Ekoumdoum, 23 km SSW Ebolowa, 27 Feb. 1963, *J. & A. Raynal 10042* (P[P00365357, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365357>, web]); Nsangbwang, 13 km S Ambam, 22 Feb. 1963, *J. & A. Raynal 9989* (P[P00365358, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365358>, web]); Eyinantoum, 22 km SW Ambam, 19 Feb. 1963, *J. & A. Raynal 9797* (P[P00365359, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365359>, web]); près Mararaba, Deng Deng, 22 Feb. 1961, *R. Letouzey 3519* (P[P00365361, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365361>, web]); 6 km S of Kribi, Bwanbe, 2°53'N, 9°54'E, 26 Jun. 1969, *J.J. Bos 4932* (WAG[WAG.1136022, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136022>, WAG.1136023, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136023>, WAG.1136024, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136024>]); about 16 km from Kribi, N of Ebolowa road, 2°51'N, 10°00'E, Bidou II plantation in Kienke Reserve, 4 Jan. 1969, *J.J. Bos 3556* (P[P00365371, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365371>,

web, WAG[WAG.1136025, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136025>, WAG.1136026, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136026>, WAG.1136027, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136027>]); southern slope of Mount Cameroon, above Batoke, 4°08'N, 9°05'E, Jan. 1984, *D. Thomas 2946* (P[P00365352, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365352>, web]); region de Lolodorf, Ngowayang, 14 Jun. 1918, *E. Annet 274* (P[P00365372, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365372>, web]); about 6 km of Kribi, 2–4 km E of Gr. Batanga road, 2°53'N, 9°55'E, 26 Sep. 1969, *J.J. Bos 5418* (WAG[WAG.1136037, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136037>, WAG.1136038, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136038>)).

**Equatorial Guinea:** Bata–Seney, estrada kms. 21–22, proximo a Ncoekie, 28 Oct. 1991, *M. Carvalho 4911* (MA[597884, <http://161.111.171.57/herbarioV/visorVCat.php?img=MA-01-00597884>)).

**Gabon:** Mbigou, 30 Apr. 1925, *G. Le Testu 5413* (P[P00365332, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365332>, web]); Ovale, 16 May 1963, *N. Hallé & G. Cours 5928* (P[P00365333, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365333>, web]); 10 km SW Ndjolé, 11 Apr. 1963, *N. Hallé 1618* (P[P00365339, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365339>, web]); Bélinga, mines de fer, 12 Jun. 1966, *N. Hallé 3855* (P[P00365335, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365335>, web]); bord de route de Médoune à Akoga, 3 Sep. 1959, *N. Hallé 899* (P[P00365340, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365340>, P00365341 <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365341>, web]); route de Méla au sud des Monts de Cristal, Aug. 1959, *N. Hallé 877* (P[P00365342, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365342>, web]); Boutica, 12 Jul. 1902, *G. Debeaux 378* (P[P00365343, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365343>, web]); Tchimbélé, 0°37'N, 10°24'E, 13 May 1990, *J.J. Wieringa 928* (WAG[WAG.1136177, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136177>)).

**Republic of the Congo:** Ogoué, *A. Leroy s.n.* (P[P00365306, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365306>, web]); Bosse dell'Alima–Leketi, *J. de Brazza s.n.* (P[P00365310, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365310>, web]); Pays Bakongo, Mbamou à Gompaka, 4 Aug. 1912, *A.J.B. Chevalier 27698* (P[P00365311, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365311>, web]); Brazzaville, Dec. 1903, *A.J.B. Chevalier 11198* (P[P00365312, <http://colddb.mnhn.fr/catalognumber/mnhn/p/p00365312>, web]).

**15b. *Eulophia horsfallii* subsp. *velayosiana*** Ortúñez, Galán Cela & Gamarra (Gamarra et al. 2019: 4).

**Type** – Equatorial Guinea: Bioko, road from Malabo–Bioko to Moka–Luba, 3°21'37"N, 8°40'29"E, 18 Nov. 2012, *P. Barberá et al.* 368 (holotype: MA[866365]).

**Distribution** – Endemic of Equatorial Guinea (Bioko) (fig. 6D).

**Habitat and ecology** – Grassland, ancient plantations, and edges of dense forests. Elevation 1000–1700 m.

**Preliminary IUCN conservation status** – EN (Endangered) (Gamarra et al. 2019).

**Other collections examined** – **Equatorial Guinea** (material studied in Gamarra et al. 2019).

**16. *Eulophia juncifolia*** Summerh. (Summerhayes 1958: 78).

**Type** – Ghana: Anam Plains, 25 Aug. 1905, *W.H. Johnson s.n.* (holotype: K[K000078392, <http://specimens.kew.org/herbarium/K000078392>, web]).

**Distribution** – West Tropical Africa, from Guinea-Bissau to Cameroon and Chad. Nigeria and Cameroon (fig. 6B).

**Habitat and ecology** – Moist grassland and savannah woodland. Elevation 200–700 m.

**Preliminary IUCN conservation status** – VU (Vulnerable). The number of locations is less than 10 in the area of study.

**Other collections examined** – **Nigeria**: Old Oyo Forest Reserve, Ago-Ilorin, 8°55'N, 4°00'E, 20 Jul. 1971, *C. Geerling* 3611 (WAG[WAG.1136134, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136134>]); Old Oyo Forest Reserve, Ago-Ilorin, 8°50'N, 3°50'E, 29 Jul. 1971, *C. Geerling & P. Wit* 3866 (WAG[WAG.1136132, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136132>, WAG1136133, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136133>]); Eruwa station, 31 Jul. 1968, *B.O. Daramola s.n.* (FHI[FHI0061565-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0061565-0>, web]).

**Cameroon**: Obala, à 45 km au NE bords de la Sanaga (confluent de l'Assamba), près de la gare de Njoré, 4°20'N, 11°45'E, 21 May 1970, *C. Farron* 7319 (P[P00365300, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365300>, web]).

**17. *Eulophia latilabris*** Summerh. (Summerhayes 1936b: 444) – *Lissochilus schweinfurthii* Rchb.f. (Reichenbach 1878: 60).

**Type** – Sudan: bei Tuhamis Seriba, im Lande der Niamniam, 25 May 1870, *G. Schweinfurth* 3776 (holotype: W, n.v.; isotypes: BM[BM000529212, <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/4649023>, web, K[K000078517, <http://specimens.kew.org/herbarium/K000078517>]).

**Distribution** – Tropical and subtropical Africa. Nigeria, Cameroon and Republic of the Congo (fig. 6A).

**Habitat and ecology** – Moist grass savannah. Elevation 1000–1900 m.

**Preliminary IUCN conservation status** – VU (Vulnerable). The number of locations is less than 10 in the area of study.

**Other collections examined** – **Nigeria**: Mambila Plateau, Gembu, 7°00'N, 11°10'E, 5 Jul. 1958, *J.W.F. Chapman* 5 (K, P[P00365278, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365278>, web]); 3.5 miles N of Gembu, Mambilla plateau, 6°42'N, 11°16'E, 21 Jun. 1972, *J.D. Chapman* 2910 (WAG[WAG.1136115, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136115>]).

**Cameroon**: Buea, 6°00'N, 15°35'E, May 1914, *J. Mildbraed* 9480 (K); ±5 km N of Obala, 11 Jun. 1964, *W.J. de Wilde et al.* 2650 (K, P[P00365288, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365288>, web, WAG[WAG.1136137, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136137>, WAG.1136138, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136138>]); Mbéré à Meiganga, Jun. 1939, *H. Jacques-Félix* 4002 (K, P[P00365293, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365293>, web]); Mankim, 70 km SSW Yoko, 23 Apr. 1963, *J. & A. Raynal* 10995 (P[P00365289, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365289>, web]); près Gamti, 25 km NNO Banyo, 14 Jun. 1967, *R. Letouzey* 8639 (P[P00365290, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365290>, web]); Yamba, Nanga Eboko, 25 May 1959, *R. Letouzey* 2149 (P[P00365292, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365292>, web]); Mango, 7 km S Poli, 24 Jul. 1974, *G. Fotius* 2154 (P[P00365296, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365296>, web]).

**Republic of the Congo**: Brazzaville, vallée du Congo, 9 Dec. 1957, *H.C.D. de Wit s.n.* (WAG[WAG.1136139, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136139>]).

**18. *Eulophia leonensis*** Rolfe (Rolfe 1897: 51).

**Type** – Sierra Leone: Bafodeya, Apr. 1892, *G.F. Scott Elliot* 5536 (lectotype: K[K000078468, <http://specimens.kew.org/herbarium/K000078468>, designated here; isolectotype: BM[BM000529220, <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/4649031>, web]).

**Distribution** – West and Central Tropical Africa, extending to the east of Uganda. Nigeria (fig. 6C).

**Habitat and ecology** – Open woodland. Elevation 1100–1400 m.

**Preliminary IUCN conservation status** – EN (Endangered). Although this taxon is widely distributed in Africa, it is only known from less than 5 locations in the area of study.

**Other collections examined** – **Nigeria**: Plateau Prov., Rukuba, *D.E.S. King* 73 (K); Zaria Prov., Forest Reserve, Mando, *J.A. Cole s.n.* (K); Gimi River Forest Reserve, Jos–Jemaa road, 12 Apr. 1958, *R.W.J. Keay & E.W. Jones s.n.* (FHI[FHI0037619-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0037619-0>, web]).

**Note** – The specimen deposited at K consists of a scape with 20 flowers, a group of detached flowers, and measurements and drawings made by V.S. Summerhayes of floral structures, which unequivocally belong to this species. We choose this specimen as lectotype.

**19. *Eulophia orthoplectra*** (Rchb.f.) Summerh. (Summerhayes 1939: 499) – *Lissochilus orthoplectrus* Rchb.f. (Reichenbach 1878: 63).

**Type** – Sudan: Niamniam, *G. Schweinfurth 3270* (holotype: W, n.v.)

**Distribution** – Widely distributed in tropical and subtropical Africa. Nigeria and Cameroon (fig. 6E).

**Habitat and ecology** – Moist grassland and savannah. Elevation 1500–1800 m.

**Preliminary IUCN conservation status** – VU (Vulnerable). The number of locations is less than 10 in the area of study.

**Other collections examined** – **Nigeria:** Vom, *J. Dent Young s.n.* (K); Mambila Plateau, Nguroje, 7°00'N, 11°10'E, 23 Jan. 1958, *F.N. Hepper & J. Chapman 1755* (K, P[P00365126, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365126>, web]); Ogoja Prov., NE of Koloishe, 22 Dec. 1948, *R.W.J. Keay & H. Savory s.n.* (FHI[FHI0025120-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0025120-0>, web]).

**Cameroon:** Bamenda, Jua, Apr. 1931, *T.D. Maitland 1778* (K[K000106951, <http://specimens.kew.org/herbarium/K000106951>]); road from Bétaré Oya, 20 km to the North, beyond the Lom river and N. of Monay, 28 Feb. 1961, *F.J. Breteler s.n.* (WAG[WAG.1136239, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136239>]); Amdo, lac Mbalan, 17 km E Ngaoundéré, 30 Jan. 1965, *J. & A. Raynal 13321* (P[P00365137, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365137>, web]); au SW de Dang Haoussa (Deng Ndeng), 18 Feb. 1961, *R. Letouzey 3496* (P[P00365139, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365139>, web]); Poli, massif du Vokré, Hoséré Kogo, 13 km S Poli, 18 Jan. 1965, *J. & A. Raynal 13093* (P[P00365138, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365138>, web]).

**20. *Eulophia parilamellata*** Butzin (Butzin 1975: 589) – *Lissochilus congoensis* Rolfe (Rolfe 1897: 88).

**Type** – Congo: long way in the interior, *J. Dybowski s.n.* (holotype: K[K000410347, <http://specimens.kew.org/herbarium/K000410347>]).

**Distribution** – Endemic of Republic of the Congo. Known from the type collection only.

**Habitat and ecology** – Ecology unknown.

**IUCN conservation status** – DD (Data deficient). Population trend, habitat, and ecology unknown (Contu 2013). The only location is unclear; there are no recent collections, so it is uncertain if the species is still extant (IUCN 2019). Future research is necessary to establish a high threat category.

**Notes** – The type material was supposedly collected in the Republic of the Congo by Jean Dybowski, who was sent to “French Congo” in 1891. No date or ecology are mentioned on the label. Only known from the type material which includes original drawings and measurements by P. Cribb.

**21. *Eulophia penduliflora*** Kraenzl. (Kraenzlin in Engler 1901: 288).

**Type** – Tanzania: Unyika, Mbozi-Hügel, 28 Oct. 1899, *W. Goetze 1383* (holotype: B†; lectotype: K[K000410381,

<http://specimens.kew.org/herbarium/K000410381>, web, designated here).

**Distribution** – Widespread in tropical Africa. Nigeria (fig. 6A), Cameroon (?).

**Habitat and ecology** – Open woodland. Elevation 400–600 m.

**Preliminary IUCN conservation status** – EN (Endangered). Although this taxon is widely distributed in Africa, it is only known from 2 locations in the area of study.

**Other collections examined** – **Nigeria:** Kan Gimi, 11 May 1948, *R.W.J. Keay s.n.* (FHI[FHI0022950-0, <https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0022950-0>, web]); Anara Forest Reserve, Kaduna State, 1966, *s. col. s.n.* (FHI[FHI0112086, n.v.]).

**Notes** – There is a distribution record for Cameroon in Govaerts et al. (2019), but we have neither seen a specimen nor a bibliographic reference that confirms its presence in this country.

During World War II the holotype material deposited at the herbarium B was destroyed. A photograph and drawings of the labellum and petal of this specimen from B are on the sheet K000410381, with remains of three flowers, measurements and drawings made by V.S. Summerhayes, which unequivocally belong to this species. We therefore choose the specimen deposited at K as lectotype.

**22. *Eulophia pyrophila*** (Rchb.f.) Summerh. (Summerhayes 1948: 132) – *Lissochilus pyrophilus* Rchb.f. (Reichenbach 1878: 65).

**Type** – Sudan: bei Kuraggera, im Lande der Mittu, *G. Schweinfurth 2795* (holotype: W, n.v.; isotypes: B†, K[K000078479, <http://specimens.kew.org/herbarium/K000078479>, K000078480, <http://specimens.kew.org/herbarium/K000078480>, web], P[P00365061, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365061>, web]).

*Eulophia ledermannii* Kraenzl. (Kraenzlin 1912: 394). **Type** – Cameroon: Bakari, *C. Ledermann 2511* (holotype: B†; lectotype: K[000078471, <http://specimens.kew.org/herbarium/K000078471>, web]).

**Distribution** – Tropical and subtropical Africa. Nigeria, Cameroon, and Republic of the Congo (fig. 6F).

**Habitat and ecology** – Riparian vegetation. Elevation 300–600 m.

**Preliminary IUCN conservation status** – EN (Endangered). Although this taxon is widely distributed in Africa, it is only known from less than 5 locations in the area of study.

**Other collections examined** – **Nigeria:** Kaciya to Zonkwa, 6 Mar. 1958, *G.V. Summerhayes 142* (K).

**Republic of the Congo:** forêt de Ngabé, 12 Aug. 1971, *L. Makany 1889* (P[P00538794, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00538794>, web]); Pays Bakongo, Mbamou à Gompaka, Aug. 1912, *A.J.B. Chevalier 27699* (P[P00538793, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00538793>, web]).

**Notes** – Within the study area, the specimen collected by G.V. Summerhayes in Nigeria was cited as *E. parvula* (Rendle) Summerh. (Summerhayes 1968). Szlachetko & Olszew-



ski (2001) did not find this taxon in Cameroon. However, Govaerts et al. (2019) recorded it in Nigeria, Cameroon and Republic of the Congo. After analysis of the specimens, original descriptions and different diagnoses (Summerhayes 1968; Cribb 1989; Geerinck 1992; Szlachetko 2008), we consider *E. parvula* as a synonym of *E. pyrophila*. Based on the length of the spur (1 mm in *E. parvula* vs. 1.5–2.5 mm in *E. pyrophila*) and the petals (5–5.5 mm in *E. parvula* vs. 5.8–8 mm in *E. pyrophila*), both species were recognised as distinct by Cribb (1989). However, an examination of specimens showed that the length of the spur and petals overlaps: spur 1–2 mm in *E. parvula* vs. 1.5–3 mm in *E. pyrophila*; petals 3.5–6.5 mm in *E. parvula* vs. 4.5–8 mm in *E. pyrophila*. In the original material of *Lissochilus pyrophilus*, the length of the spur is 1 mm, which falls within the variability of *E. parvula*.

**23. *Eulophia ramifera*** Summerh. (Summerhayes 1958: 80) – *Eulophia elliotii* Rolfe (Rolfe 1897: 54), nom. illeg.

**Type** – Sierra Leone: above Falaba, 15 Mar. 1890, *G.E. Scott-Elliot 5116* (holotype: K[K000078652, <http://specimens.kew.org/herbarium/K000078652>, web]).

**Distribution** – Only known from Senegal, Sierra Leone, and Nigeria. Nigeria (fig. 6E).

**Habitat and ecology** – Ecology unknown. Elevation 1100–1300 m.

**Preliminary IUCN conservation status** – CR (Critically Endangered). It is only known from one location in the area of study. Future searches for this species are required throughout its distribution range.

**Other collections examined** – Nigeria: Plateau Prov., Jos, *D.E.S. King 108* (K).

**24. *Eulophia stachyodes*** Rehb.f. (Reichenbach 1878: 66) – *Graphorkis stachyodes* (Rehb.f.) Kuntze (Kuntze 1891: 662).

**Type** – Sudan: nördl. von Mombuttu, im Lande der Niamniam, 20 Apr. 1870, *G. Schweinfurth 3554* (holotype: W, n.v.; isotype: K[K000078594, <http://specimens.kew.org/herbarium/K000078594>, web]).

*Eulophia lambii* Rolfe (Rolfe 1914: 212). **Type** – Nigeria: Bauchi Plateau, Jun. 1913, *P.H. Lamb s.n.* (holotype: K[K000078593, <http://specimens.kew.org/herbarium/K000078593>, web]).

**Distribution** – Tropical and subtropical Africa. Nigeria, Cameroon, and Gabon (fig. 6F).

**Habitat and ecology** – Grassy savannah and rocky places in open woodland. Elevation 400–1000 m.

**Preliminary IUCN conservation status** – VU (Vulnerable). The number of locations is less than 10 in the area of study.

**Other collections examined** – Nigeria: Kassa, Jun. 1958, *D.E.S. King 119* (K).

**Cameroon:** Yaoundé, 3 km NW Mont Fèbé, 11 May 1961, *F.J. Breteler 1335* (WAG[WAG.1136328, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136328>]); près Boden (40 km NNW de Batouri), 12 Apr. 1962, *R. Letouzey 4729* (P[P00365018, <http://coldb.mnhn.fr/catalog>

[number/mnhn/p/p00365018](http://number/mnhn/p/p00365018), web], WAG[WAG.1136332, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136332>]); Bamenda, Basenako, 6°19'N, 10°29'E, Jun. 1931, *T.D. Maitland 1507* (K[K000106930, <http://specimens.kew.org/herbarium/K000106930>]); Bamenda, Bum-Nchan area, 1931, *T.D. Maitland 1753* (P[P00365630, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365630>, web]).

**Gabon:** ca. 24 km SE of Medouneu, 0°51'N, 10°56'E, 5 Feb. 1986, *J.M. Reitsma et al. 1881* (WAG[WAG.1136329, <https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136329>, web]).

**Notes** – Szlachetko & Olszewski (2001: 650) recorded *E. elegans* Schltr. in Cameroon, based on the sheet P00365660, collected by *T.D. Maitland 1753*. After studying this specimen, we consider it belongs to *E. stachyodes*, so without further evidence, we consider *E. elegans* to be restricted to Tanzania and Malawi.

#### DOUBTFUL SPECIES

*Eulophia sordida* Kraenzl. (Kraenzlin 1902: 67).

**Type** – Togo: Lome Gebiet, *O. Warnecke 95* (syntypes: B†; BM[BM000529442, <https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4ccb55ab2feb/record/4649236>, web]; HBG[501714, [http://www.herbariumhamburgense.de/herbarsheets/disk\\_batch01/medium/HBG-501714.jpg](http://www.herbariumhamburgense.de/herbarsheets/disk_batch01/medium/HBG-501714.jpg), web]; P[P00365056, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365056>, web]).

**Notes** – Summerhayes (1953) recognised this taxon as distinct to *E. pyrophila* and only known from Ghana and Togo. Later, Summerhayes (1968) extended its distribution to Nigeria. Cribb (1989) considered *E. sordida* as synonym of *E. pyrophila*. Govaerts et al. (2019) recognize the species, indicating the distribution for Nigeria, Cameroon, and Republic of the Congo. According to the original description (Kraenzlin 1902) and the drawings depicted by Szlachetko & Olszewski (2001), the ornamentation of the lip consists of three decreasing ridges, which acquire a more papillose appearance (pearl-like) on the midlobe. We have not observed any specimens with the characteristics mentioned above for *E. sordida* in the study area.

#### EXCLUDED SPECIES

*Eulophia calantha* Schltr. (Schlechter 1903: 215).

**Notes** – This taxon was cited for Gabon in Szlachetko et al. (2004), who mentioned two sheets: *F.J. Breteler & J.J. de Wilde 603* and *F.J. Breteler et al. 9451*, deposited in WAG. However, this record is erroneous as these specimens were identified as *Aerangis calantha* (Schltr.) Schltr.

The following taxa occur in the study area, but have been transferred to the genus *Orthochilus* by Martos et al. (2014).

*Eulophia adenoglossa* (Lindl.) Rchb.f. (Reichenbach 1878: 66) = *Orthochilus adenoglossus* (Lindl.) Bytebier (Martos et al. 2014: 18).

*Eulophia mechowii* (Rchb.f.) T.Durand & Schinz (Durand & Schinz 1894: 23) = *Orthochilus mechowii* Rchb.f. (Reichenbach 1882: 532).

*Eulophia zeyheri* Hook.f. (Hooker 1893: t. 7330).

*Eulophia milnei* Rchb.f. (Reichenbach 1881: 116) = *Orthochilus milnei* (Rchb.f.) Bytebier (Martos et al. 2014: 19)

*Eulophia warneckeana* Kraenzl. (Kraenzlin 1902: 67).

*Eulophia poiformis* Szlach. (Szlachetko 1993: 463).

*Eulophia thollonii* Szlach. & Olszewski (Szlachetko & Olszewski 2001: 652).

*Eulophia odontoglossa* Rchb.f. (Reichenbach 1846: 373) = *Orthochilus odontoglossus* (Rchb.f.) Bytebier (Martos et al. 2014: 19).

*Eulophia shupangae* (Rchb.f.) Kraenzl. (Kraenzlin 1895: 157).

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