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

**INTRODUCTION**

The genus *Eulophia* R.Br. ex Lindl. (Orchidaceae, Cymbidieae) 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
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 (Segerbäck 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, Segerbäck (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 (MNHN 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 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 |
|--------------|-------------------|----------------|--------------------------|---------------------|-------------------------------------------|------------|
| *E. alta*    | rhizome           | broadly lanceolate | coetaneous               | heterogeneous       | saccate, subnull; pale green               | unicorn    |
| *E. angolensis* | rhizome         | linear-lanceolate to broadly lanceolate | coetaneous               | heterogeneous       | conical, up to 3 mm long; yellow, occasionally with a red spot | bicorn     |
| *E. barteri* | pseudobulb       | lanceolate      | coetaneous               | heterogeneous       | conical, acute, straight, 4–9 mm long; brownish | slightly bicorn |
| *E. bouliawongo* | rhizome       | broadly lanceolate | coetaneous               | heterogeneous       | conical, clearly gibbous on the ventral side, 10–14 mm long; pale rose | bicorn     |
| *E. brevipetala* | pseudobulb     | linear          | not coetaneous           | heterogeneous       | clavate, incurved, 3–4 mm long; purple-brownish | not seen    |
| *E. buettneri* | tuber            | lanceolate      | not coetaneous           | heterogeneous       | saccate; green                             | unicorn    |
| *E. caricifolia* | rhizome        | linear          | coetaneous               | heterogeneous       | conical, up to 7 mm long; pale rose        | bicorn     |
| *E. cristata* | tuber            | lanceolate      | not coetaneous           | homogeneous         | conical, 5–8 mm long, straitly oriented upwards; pale rose | unicorn    |
| *E. cucullata* | rhizome          | linear to lanceolate | coetaneous or not  | heterogeneous       | broadly saccate, 11–17 mm long; rose, yellowish towards the apex | unicorn    |
| *E. euglossa* | pseudobulb       | broadly lanceolate | coetaneous               | homogeneous         | clavate, up to 7 mm long, projected backwards; pale green | unicorn    |
| *E. flavipurpurea* | tuber          | broadly lanceolate | not coetaneous           | heterogeneous       | narrowly conical, 3–8 mm long; pale yellow, darker at the apex | unicorn    |
| *E. galeoloides* | rhizome         | absent          | homogeneous               |                     | conical, up to 5 mm long, usually curved upwards; pale yellow | unicorn    |
| *E. gracilis* | pseudobulb       | lanceolate      | coetaneous               | homogeneous         | clavate, 3–8 mm long; whitish, pale green at the apex | unicorn    |
| *E. guineensis* | tuber            | widely variable | coetaneous or not  | homogeneous         | filiform, 15–28 mm long, straight to curved upwards; green | obscuredly unicorn |
| *E. horsfallii* subsp. *horsfallii* | rhizome     | broadly lanceolate | coetaneous               | heterogeneous       | conical, 4–17 mm long, slightly curved upwards; rose | bicorn     |
| *E. horsfallii* subsp. *velayosiana* | rhizome     | broadly lanceolate | coetaneous               | heterogeneous       | conical, 10–15 mm long, slightly curved upwards; rose to purple | bicorn     |
| *E. juncifolia* | rhizome          | junciform       | coetaneous               | homogeneous         | conical, 3–7.5 mm long, slightly curved upwards; yellow | bicorn     |
| *E. latilabris* | rhizome          | lanceolate      | coetaneous               | heterogeneous       | conical, 5–11 mm long; rose                 | unicorn    |
| *E. leonensis* | pseudobulb       | elliptic to elliptic-lanceolate | not coetaneous           | heterogeneous       | cylindrical to subclavate, 4–6 mm; pale yellow tinged with green or mauve | not seen    |
| *E. orthoplectra* | tuber            | linear          | not coetaneous           | homogeneous         | conical, 13–16 mm long; purple to brown-purple | unicorn    |
| *E. parilamellata* | unknown        | unknown         | not coetaneous           | heterogeneous       | cylindrical, curved; colour not seen       | unicorn    |
| *E. penduliflora* | pseudobulb     | linear          | coetaneous               | homogeneous         | clavate, 5–6 mm long, slightly curved upwards; reddish | unicorn    |
| *E. pyrophila* | rhizome          | linear-lanceolate | not coetaneous           | heterogeneous       | conical, 1–2.5 mm long; yellowish           | unicorn    |
| *E. ramifera* | unknown          | linear          | not coetaneous           | homogeneous         | cylindrical, 1.9–3 mm; colour not seen      | not seen    |
| *E. stachyodes* | 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                  | Calli                     | Lip ornamentation | Papillae                                      |
|----------------|------------------------------|--------------------------|---------------------------|-------------------|-----------------------------------------------|
| *E. alta*      | 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 |
| *E. angolensis*| trilobed; yellow             | oblong, slightly curved downward at the apex; crenulate to undulate margin | absent             | 3, higher at the base, crenulate margin; yellow | absent |
| *E. barteri*   | trilobed; purple, whitish at the base | ovoblate-oblong, curved downward at the apex; undulate margin | 3 sircicular; colour not seen | 3, from the base of midlobe to 1/3 of the apex, crenulate margin; pale purple | absent |
| *E. bouliawongo*| trilobed; pale rose         | ovate-elliptical; slightly undulate margin | absent            | 3, from the base to 1/2 of the midlobe, crenulate margin; whitish | | along the midlobe; colour not seen |
| *E. brevipetala*| trilobed; whitish-pale rose | broadly elliptical-oblong; undulate margin | absent            | 5, from the base to the middle of midlobe; yellow | absent |
| *E. buettneri* | trilobed; rose, whitish to the base, sometimes with a purple spot | clawed at the base, bilobed at the apex; entire margin | absent            | absent | absent |
| *E. caricifolia*| trilobed; yellow to the base, with purple veins | elliptical; crenate margin | 2 semicircular; yellow | absent            | dense along midlobe; dark yellow |
| *E. cristata*  | trilobed; lateral lobes greenish purple, midlobe rose to dark purple | oblong-ovate; crenulate margin | 2 sircicular, thick; rose | absent            | absent |
| *E. cucullata* | 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 |
| *E. euglossa*  | 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 |
| *E. flavopurpurea*| trilobed; midlobe bent abruptly downwards; pale yellow | elliptical to obircular, strongly recurved downwards, emarginate apex; slightly undulate margin | absent            | 7–11, wart-like, unequal in length, the external occasionally bifurcate; pale rose | absent |
| *E. galeoloides* | trilobed; pale yellow | elliptical; slightly crenulate margin | absent            | 0–12–4, denticulated margin, from the base to the middle of lip; yellow | short, scattered through the lip; purple |
| *E. gracilis*  | 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 |
| *E. guineensis*| 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                                      | Calli                      | Lip ornamentation                                                                 | Papillae |
|------------------------|----------------------------|----------------------------------------------|----------------------------|-----------------------------------------------------------------------------------|----------|
| *E. horsfallii* subsp. *horsfallii* | 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   |
| *E. horsfallii* subsp. *velayosiana* | 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   |
| *E. juncifolia*        | trilobed; yellow            | ovate-elliptical; slightly undulate margin   | absent                      | 5, the two lateral shorter than central; yellow                                    | absent   |
| *E. latilabris*        | 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   |
| *E. leonensis*         | 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   |
| *E. orthoplectra*      | 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   |
| *E. parilamellata*     | 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   |
| *E. penduliflora*      | trilobed; usually yellow    | clawed at the base, broadly obovate at the emarginate apex; slightly undulate margin    | absent                      | 3, short in the base of midlobe; whitish                                            | 3–7 lines in the upper middle; yellow |
| *E. pyrophila*         | 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   |
| *E. ramifera*          | trilobed; colour not seen   | orbicular; slightly undulate margin           | absent                      | 5, crenulate, along the lip; colour not seen                                       | absent   |
| *E. stachyodes*        | 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. galeolooides*
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 reddish ......................................................... 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. *E. alta*
20'. Midlobe of lip broadly obovate, emarginate, not papillate .................. 9. *E. cucullata*
21. Lip obscurely trilobed, entire; spur not incurved. Rhizomatous plant ........ 17. *E. latilabris*
21'. Lip clearly trilobed, undulate; spur incurved. Tuberous plant ............... 24. *E. stachyodes*
22. Lip with 2 calli, densely papillate. Rhizomatous plant ....................... 7. *E. caricifolia*
22'. Lip with 3 calli and 3 ridges, not papillate. Pseudobulbous plant ........... 3. *E. barteri*
23. Lateral sepals erect. Flowers deep yellow .................................. 2. *E. angolensis*
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. *E. bouliawongo*
24'. Spur without a gibbosity; lip with 3–7 ridges along the midlobe ............ 15. *E. horsfallii*

**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 prominences 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. **E.** *E. cucullata*: unicorn. **F.** *E. guineensis*: obscurely unicorn. **G.** *E. horsfallii*: bicorn. A from *Scott-Elliot* 5116 (K00078652). 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 *Eimunjeze 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. brevipep-tala* 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), obliquely 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 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** – 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]); Delgema, Ahoa, 20 Aug. 1916, P.A. Talbot et al. 3804 (MA[747524, http://161.111.171.57/herbarioVvis/or/cat.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, 7º00′N, 11º10′E, 16 Jun. 1958, J.W.F. Chapman 7 (P[P00358950, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358950, web]); Mambila Plateau, 3.5 miles north of Gembi, 21 Jun. 1972, J.D. Chapman 2909 (WAG[WAG.1135577, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135577]; Old Oyo Forest Reserve, Ago–Ilorin, 8º55′N, 4º00′E, 20 Jul. 1971, C. Geering 3614 (WAG[WAG.1135579, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135579]); Ibuya, Upper Ogun Game Reserve, 8º24′N, 3º47′E, 27 Jul. 1971, C. Geering 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]); Orile Forest Reserve, Aligbeta to Awooki, 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[FHI006692, n.v.]).

**Cameroun** – 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–ajaia Camp on old German road, 26 Jun. 1951, E. Uijor s.n. (K[K000106918, http://specimens.kew.org/herbarium/K000106918], web); près Wandy (15 km ONO de Mokolo), 11 Sep. 1964, R. Letouzey 6287 (K, P[P00358992, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358992, web]); Katsina, Masha, 25 Jun. 1950, R.W.K. Keay 25898 (K); Mamu River, Awka District, Aug.–E.W. Jones s.n. (FHI[FHI006692, n.v.]).

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: Huila, 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.
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: river, *G. Mann* 1039 (lectotype: K, composed of 3 sheets [K000078544, http://specimens.kew.org/herbarium/K000078544, K000078545, http://specimens.kew.org/herbarium/K000078545, http://specimens.kew.org/herbarium/K000078546, designated here]).

*Eulophia oedeplectron* 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. Letouze 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 Niger, 2°27′11″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 Ndoga, 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 Déhâm, 28 Jun. 1918, *E. Annet* 1443 (P[P00358917, http://coldb.mnhn.
Gabor: 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]), 10 Jan. 1968, http://coldb.mnhn.fr/catalognumber/mnhn/p/p04026612, 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:** Rio Muni, Monte Bata toward Campos, around S. Joaquim de Ndyiacom, Monte Bata, 27 Feb. 1969, **WW. Sanford 6091 (K)**; Rio Muni, Bata to Rio Benito, 15 Feb. 1969, **WW. Sanford 5789 (K)**; Mibomán, à 22 km de Bata, 4 Jun. 1984, S. Castroviejo 9165 (MA[785029, http://161.111.171.57/herbarioV/visorVCat. image?img=MA-01-00785029]).

**Gabon:** Bouteia, 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[1135643, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135643, WAG.1135644, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135644]), 10 Jan. 1968, 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/05f2255-c38a-40c9-b657-4cc5ab2f2ebf2f/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. Guihe 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** Rehb.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 bouliavongo (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–Bouw, 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. (FHIF0021196–0, 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. (FHIF0016020–0, 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 Béтарé Oya, west of the Lom river, 21 Feb. 1961, F.J. Breteler 1085 [P(PO0358878 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358878, web, WAG[WAG.1133564, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1133564]); Béтарé Oya, 19 Feb. 1961, F.J. Breteler 1078 [WAG[WAG.1133647, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1133647]); piste Kon–confluent Noun–Mbim, 23 km NW Bafia, 23 Jan. 1981, B. Sabanté 582 [P(PO0358870, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358870, web), Nyamongo, 12 km NE Bafia, 28 Mar. 1963, J. & A. Raynal 10549 [P(PO0358871, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358871, web)]; Logone W., 22 Mar. 1933, H. Lhoste 181 [P(PO0358872, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358872, web)]; Makéné, à 13 km au N de Ndikiniméki et le confluent Noun–Nound, 17 Feb. 1972, R. Letouzey 11250 [P(PO0358873, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358873, web)]; au N de Tournaké, Deng Deng, 21 Feb. 1961, R. Letouzey 3507 [P(PO0358875, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358875, web)]; Gounte, Bertoua, 25 Jan. 1960, R. Letouzey 2778 [P(PO0358867, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358867, web)]; Gendimi, Mar. 1939, H. Jacques–Félix 3417 [P(PO0358877, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358877, web)]; Mount Cameroon, Bambuko Forest Reserve, 4º20’N, 9º10’E, 29 Jan. 1958, R.W.J. Keay 37460 (K, https://specimens.kew.org/herbarium/K00106921).

**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 riparian 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. Onohie s.n. (FHIF0035801–0, 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 Mouloudou, sur route de Yokoudouma, 4 Mar. 1971, R. Letouzey & J.F. Villiers 10497 [P(PO0358858, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00358858, web)]

**Equatorial Guinea:** Litoral, Etembe, 16 Jul. 1939 L. Del Val s.n. (MA785017, 785028, http://161.111.151.57/herbarioV/visorVCat.php?img=MA-01-00785017, 785028, http://161.111.151.57/herbarioV/visorVCat.php?img=MA-01-00785028); Bata–Bome, rio Boara, 1 Jun. 1991, M. Carvalho 4705 [MA597837, http://161.111.151.57/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 du Projet de Protection des Gorilles. 2º04’45”°S, 14º03’47″E, 27 Nov. 2001, G. Walters et al. 988 (K); Ogouéïndo, Lopê 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, 0º11’S, 9º20’E, 19 Oct. 1990, C.M. Wilks & J.J. Diamba 2330 [WAG[WAG.1135658, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135658]); route cap Estérias, 11 Sep. 1985, A.M. Louis 1803 [WAG[WAG.1135659, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135659]]; Nyanga, Moukalaba Doudou, national park south of Nyanga river, 3º00.87’S, 10º25.30’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]); Peninsule of Cap Estérias, 0º34’7’’N, 9º21’0.0’’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, 2º43’S, 10º12′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 / Ovingombo, 0º20’N, 9º21’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, 0º40’S, 8º50’E, 16 Sep. 1968, F.J. Breteler & R.A. van Raalte
Lisochilos 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.

**Priori 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, Abbeokuta road, 19 Feb. 1945, B.L. Burtt 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, Messemachers v/d Graaf Clayton s.n. (WAG[WAG.1135734, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135734, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135735]); W of Mubi, 10º15′N, 13º15′E, 5 May 1972, P. Wit et al. 1788 (WAG[WAG.1135732, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135732]); Yankari Game Reserve, 9º45′N, 10º30′E, 18 Apr. 1971, C. Geertling 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://coldb.mnhn.fr/catalognumber/mnhn/p/p00365843, web]); Ilorin–Jebba road, 2 Mar. 1990, R.D. Meikle 1235 (P[P00365844, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365844, web]); between Olokemeji and Iseyin, 7 Apr. 1958, D.J. Hambler 441 (P[P00365846, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365846, web]).

**Cameron**: 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. Tchinate 81 (P[P00365882, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365882, web]); near Obala, 35 km NNE Yaoundé, 8 Mar. 1969, W.W. Sanford 6126 (P[P00365883, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365883, web]); Guérina, 7 km NE Bafia, rive droite du Mbam, 28 Mar. 1963, J. & A. Raynal 10546 (P[P00365884, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365884, web]); Boye, about 50 km N of Garoua Bolai, 16 Apr. 1977, I. Nordal 964 (P[P00365885, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365885, web]); piste du Bouba au confluent Lorn / Bà, Betare Oya, 10 Mar. 1961, R. Letouzey 3631 (P[P00365886, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365886, web]); au NW de Kissi, Betare Oya, 28 Feb. 1961, R. Letouzey 3560 (P[P00365887, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365887, web]); Doumè, Apr. 1939, H. Jacques-Félix 3548 (P[P00365888, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365888, web]).
9. Eulophia cucullata (Afzel. ex Sw.) Steud. (Steudel 1840: 605) – Limodorum cucullatum Afzel. ex Sw. (Swartz 1805: 86).

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

**Lissochilus arenarius** Lindl. (Lindley 1862: 133) – *Eulophia arenaria* (Lindl.) Bolus (Bolus 1898: 185).

**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); Agui, near Ikorin, 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 May 1962, *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–Fulanli, 19 May 1921, *H.V. Lely* 199 (K); Zaria Province, Kam Gim, 9 May 1948, *R.W.J. Keay* & *W.E.S. Mutch* s.n. (K, P[00365707, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365707, web]); 10 miles before Abuja on road from Reika, 14 Jun. 1970, *W.W. Sanford* 6506a (L[00154977, https://datadiversitydata.nl/naturalis/specimen/L.1504977]); Beli, 7°50′N, 11°E, 8 May 1972, *P. Wit et al.* 1879 (WAG[WAG.1135807, https://datadiversitydata.nl/naturalis/specimen/WAG.1135807]); Maisamari village, 7°10′N, 11°05′E, 27 Apr. 1972, *J.D. Chapman* 2770 (WAG[WAG.1135803, https://datadiversitydata.nl/naturalis/specimen/WAG.1135803]); between Gwau and Abuja road junction, 12 Jun. 1958, *C.F. Onochie* s.n. (P[00365705, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365705, web]); Mambila Plateau, Dorofo, 25 Jun. 1958, *J.W.F. Chapman* 18 (P[00365766, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365766, web]); Birnin Gwari distr., Mando, 18 Jun. 1950, *R.W.J. Keay* s.n. (P[00365706, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365706, web]); 2 miles on Igan–Iwere road, 1 Aug. 1970, *V.E. Emunjese* & *J.K. Adebusuyi* s.n. (FHI[FH10063420-0, https://plants.jstor.org/stable/10.5555/al.ap.specimen.fhi0063420-0, web]).

**Cameron:** Yaunde-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 Roumsi, 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-Duftpjes* 2308 (P[00365760, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365760, web]).

**Gabon:** 74 km along the road from Sindara to Mouila, 1°30′S, 10°40′E, 26 Nov. 1984, *R. Letouzeay* 1962 (P[00365764, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365764, web]); près Nyandingi, à 30 km SW de Linte, 24 Apr. 1982, *B.A. Nkongeneck* 320 (P[00365763, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365763, web]); près du mont Meza, Nanga Eboko, 12 May 1959, *L. Jacquet-Félix* 3840 (P[00365765, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365765, web]); Ngoum, 36 km N de Yoko, axe Yoko-Tibati, 3 May 1979, *M. Biholong* 437 (P[00365767, http://coldb.mfn.fr/catalognumber/mnhn/p/p00365767, web]); Bambulwe 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]).

**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.
**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).

**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 Awba, 1948, R.W.J. Keay & J.P.M. Brenan s.n. (K).

**Cameroon**: 35 km au NNW de Sangmelima, 20 km NNW de Deho, 25 km à l'ouest de Bafou, près Loango, 23 Oct. 1969, L. Makany 959 (P[00365686, http://coldb.mnhn.fr/catalognumber/mnhn/p/00365686, web]); Poste du Diélé, 7 Dec. 1883, J. de Brazza s.n. (P[00365691, http://coldb.mnhn.fr/catalognumber/mnhn/p/00365691, web]); village Loundu, 23 Oct. 1883, J. de Brazza 198 (P[00365693, http://coldb.mnhn.fr/catalognumber/mnhn/p/00365693, web]); camp du Botidi à Deho, 18 Dec. 1928, J. de Zoetelé, 19 Nov. 1984, F.R. Thollon s.n. (P[00365680, http://coldb.mnhn.fr/catalognumber/mnhn/p/00365680, web]).

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

**Republic of the Congo**: Kouilou Region by Muvi, near Pounga, 12 Dec. 1900, J.F. & E.A.S. La Croix 1161 (K); Brazzaville, 9 Dec. 1957, H.C.D. de Wit s.n. (WAG[1135819, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135819, WAG.1135820, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135820]).
1. Eulophia flavopurpurea (Rehh.f.) Rolfe (Rolfe 1897: 65) – Cyrtopera flavopurpurea Rehh.f. (Reichenbach 1878: 68).

Type – Sudan: Nianniam, 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 1910: 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 savanna 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[00365575, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365575, web]); Benin, 3 miles N of Ugbohigan, 19 Apr. 1948, J. Dundas s.n. (FHI[FIH0021460-0, 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, web]); 9 miles N of Zungeru, 6 May 1948, R.W.J. Keay s.n. (K).

Cameroon: environs de Nkolsananga, 6 km NNE of Monatele, 11 Jan. 1983, B. Satabié 640 (P[00365585, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365585, web]); W of Nkambe, 6º37′N, 10º30′E, Apr. 1986, D.W. Thomas 6073 (P[00365584, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365584, web]); Elomzok, 39 km N Yaoundé, 27 Mar. 1963, J. & A. Raynal 10520 (P[00365586, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365586, web]); near Bonongo, 26 Jan. 1958, R.W.J. Keay s.n. (P[00365587, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365587, web]); Mbibol, 40 km W Ngaoundéré, 12 Jun. 1977, G. Fotius 2663 (P[002083016, http://coldb.mnhn.fr/catalognumber/mnhn/p/p002083016, web]); Ndop plain, below Ndop, 5º45′N, 10º15′E, 13 Apr. 1962, M.A. Brunt
363 (K[K000106928, http://specimens.kew.org/herbarium/K000106928]).

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

**Type** – Tanzania: Usambara, Mar., *E. Heinsen* 10 (holotype: B†); Tanzania, Lushoto District, Amani, *C. Braun* 670 (neotype: K[K000410402, http://specimens.kew.org/herbarium/K000410402, designated here]; isotype: 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 the specimen drawn.

**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 (*B. Braun* 670) as holotype, with an isotype deposited in K, which contains material collected in 1905 by Karl 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 *B. Braun* 670 (K000410402).

Summerhayes (1968) revised the sheet FH020925, 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. *Euphloia gracilis* Lindl. (Lindley 1823b: t. 742) – *Galeandra gracilis* (Lindl.) Lindl. (Lindley 1833: 187) – *Graphorkis gracilis* (Lindl.) Kunze (Kunze 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 (Río 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, 5º00′N, 8º30′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 Dajiye Forest Reserve, 20 Apr. 1947, *C.F. Onochie s.n.* (P[P00365485, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365485, web]); Enyinawo, lagoon opposite Epe, 19 Jan. 1956, *C.F. Onochie s.n.* (F[FIH0035262-1, https://plants.jstor.org/stable/10.5555/al.ap.specimen.fi0035262-1, web]); 16 miles W of Oyo, 10 FeV 1948, *R.W.J. Keay s.n.* (K); Imo State, Aju, 1976, *B. Segerbäck 1208* (K); Barga valley near Enugu, *s. col. s.n.* (K).

**Cameron** – Campo Ma’an area, Massif des Mamelles, path to Mamelles highlands, 2º63′11″N, 9º54′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 Bamba, 4º09′N, 9º41′E, 18 Feb. 1988, *P. Mambo et al. 825* (WAG[WAG.1135901, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135901]); *M. Elad 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, 2º52′N, 9º54′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 Badjoh, ca. 50 km SW of Eséka, Nyong river, near the bridge, 19 Dec. 1963, *W.J. de Wilde & B.E. de Wilde-Duyfjes 1574* (WAG[WAG.1135908, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135908, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135909, WAG.1135909], https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135909]); 36 km N of Kribi, on Lokoundje river bank, near bridge at Edéa, 3º11′N, 10º02′E, 27 Dec. 1969, *J.J. Bos 5974* (WAG[WAG.1135910, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135910]; près Ekite (3 km W Edéa), 22 Dec. 1973, *R. Letouzey 12498* (P[P00365541, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365541, web], Pout Kelle (20 km N Ejeka), Edéa, 9 Dec. 1973, *R. Letouzey 12310* (P[P00365434, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365434, web]); près Esseg, 12 km NNE of 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[P0036547, http://coldb.mnhn.fr/catalognumber/mnhn/p/p0036547, web]); confluent du Tia et de la Sanaga, Nangaeboko, 24 Feb. 1959, *R. Letouzey 1517* (P[P0036548, http://coldb.mnhn.fr/catalognumber/mnhn/p/p0036548, web]); Ebo National Park, 4º22′N, 10º25′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/visor-VCat.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 Estiers, 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 Estiers, 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 Estiers, 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, C.L.M. van Eijnatten et al. 108 (WAG[WAG.1135917, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1135917]); Moyen-Ogooué, 37 km W of Lopé, along road to Ndjolé, 0°35′4″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. Damien 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-Duyfjes 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]); enivrons de Libreville, 23 Nov. 1898, P. Klaine 1441 (P[P00365535, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365535, web]); cap Estiers (route Free), 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) – Graphorchis 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, E. Eimunjeze & 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, Falongo Crebo, 2 Jul. 1948, D.C. Omdudinhon 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 (F[FI][FH0060840-0, https://plants.jstor.org/stable/10.5555/al.ap.specimen.fh0060840-0, web]); Atuabo Forest Reserve, 28 Aug. 1981, P.E. Kwunwu 100 (F[FI][FH0095353-0, https://plants.jstor.org/stable/10.5555/al.ap.specimen.fh0095353-0, web]); Onitsha, Akpaka Forest Reserve, 15 Sep. 1953, C.F. Onoche 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]); Melén, about 3 km SW of Yaoundé, 25 Aug. 1964, W.J. de Wilde & B.E. de Wilde-Duvflies 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, Guradjie 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. Foiitus 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 subessile 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) Summerr. (Summerrhayes 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*

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**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 Gaamarra et al. (2019) – *Nigeria*: Maya-Ndaga, 3 Apr. 1970, J.B. Hall & J.K. Bowden s.n. (P00365311, web); Nsangbwang, 13 km S Ambam, 22 Feb. 1963, J. & A. Raynal 10042 (P00365357, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365357, web); route of Njombe, 1957, Rose S1 (P00365355, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365355, web); Poli, massif du Vokrè, versant N, vallée de Mangaté, 10 km S Poli, 18 Jan. 1965, J. & A. Raynal 13047 (P00365356, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365356, web); près de Schang, L. Hedin s.n. (P00365367, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365367, web); route of Njombe, 1957, Rose S1 (P00365355, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365355, web); Poli, massif du Vokrè, versant N, vallée de Mangaté, 10 km S Poli, 18 Jan. 1965, J. & A. Raynal 13047 (P00365356, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365356, web); Ekoundoum, 23 km SSW Ebolowa, 27 Feb. 1963, J. & A. Raynal 10042 (P00365357, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365357, web); Nsangbwang, 13 km S Ambam, 22 Feb. 1963, J. & A. Raynal 9989 (P00365358, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365358, web); Eyi-nantoum, 22 km SW Ambam, 19 Feb. 1963, J. & A. Raynal 9797 (P00365359, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365359, web); près Mararaba, Deng Deng, 22 Feb. 1961, R. Letouzey 3519 (P00365361, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365361, web); 6 km S of Kribi, Bwanbe, 2º53′N, 9º54′E, 26 Jun. 1969, J.J. Wieringa 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, 2º51′N, 10º00′E, Bidou II plantation in Kienke Reserve, 4 Jan. 1969, J.J. Bos 3556 (P00365371, http://coldb.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, 4º08′N, 9º05′E, Jan. 1984, D. Thomas 2946 (P00365352, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365352, web); region of Lolodor, Ngowayan, 14 Jun. 1918, E. Annet 274 (P00365372, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365372, web); about 6 km of Kribi, 2-4 km E of Gr. Batanga road, 2º53′N, 9º55′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://coldb.mnhn.fr/catalognumber/mnhn/p/p00365340, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365341, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365342, web]); Bélinga, mines de fer, 12 Jun. 1966, N. Hallé 3855 (P00365335, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365335, web); bord de route de Médoune à Akoga, 3 Sep. 1959, N. Hallé 899 (P00365340 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365340, P00365341 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365341, web); route de Méla au sud des Monts de Cristal, Aug. 1959, N. Hallé 877 (P00365342 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365342, web); Boutica, 12 Jul. 1902, G. Debeaux 378 (P00365343, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365343, web); Tchimbelé, 0º37′N, 10º24′E, 13 May 1990, J.J. Wieringa 5413 (P00365340 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365340, P00365341 http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365341, web); Eulophia horsfallii

**Republic of the Congo**: Ogooué, A. Leroy s.n. (P00365306, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365306, web); Bosse dell’Alima–Leketi, J. de Brazza s.n. (P00365310, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365310, web); Pays Bakongo, Mbangou à Gompa-ka, 4 Aug. 1912, A.J.B. Chevalier 27698 (P00365311, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365311, web); Brazzaville, Déc. 1903, A.J.B. Chevalier 11198 (P00365312, http://coldb.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, 3º21’37”N, 8º40’29”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 Nigeria (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, 8º55’N, 4º00’E, 20 Jul. 1971, *C. Geerling & P. Wit* (lectotype: BM[BM000529220, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365292, 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]); Eruwa station, 31 Jul. 1968, *B.O. Daramola* s.n. (FHI[FHI0061565-0, https://data.biodiversitydata.nl/naturalis/specimen/fhi0061565-0, web]).

**Cameroon** – Obala, à 45 km au NE bords de la Sanaga (confluent of the Assamba), près de la gare de Njoré, 4º20’N, 11º45’E, 21 May 1970, *C. Farron* 7319 (P[P00365300, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00365300, 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 latilabris* Rolfe (Rolfe 1897: 51).

**Type** – Sierra Leone: Bafodeya, Apr. 1892, *G.F. Scott Eliott* 5536 (lectotype: K[K000078468, http://specimens.kew.org/herbarium/K000078468, designated here; isolectotype: BM[BM000529220, https://data.nhm.ac.uk/dataset/collection-specimens/resource/05f22255-c38a-40c9-b657-4ccbb55ab2f2f/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* (Rechb.f.) Summerh. (Summerhayes 1939: 499) – *Lissochilus orthoplectrus* Rechb.f. (Reichenbach 1878: 63).

**Type** – Sudan: Niamniam, *G. Schweinfurthi* 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 10 in the area of study.

**Other collections examined** – Nigeria: Vom, *J. Dent Young* s.n. (K); Mambila Plateau, Nguroje, 7º00′N, 11º10′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 Koloise, 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, Feb. 28, 1961, F.J. Breteler s.n. (WAG [WAG.1136239, https://data.biodiversitydata.nl/naturalis/specific/WAG.1136239]); Amdo, lac Mbalan, 17 km E Ngoundéré, 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, Hoïéré 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 congensis* 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. Goetz* 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 labelum 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** (Rechb.f.) Summerh. (Summerhayes 1948: 132) – *Lissochilus pyrophilus* Rechb.f. (Reichenbach 1878: 65).

**Type** – Sudan: bei Kuraggera, im Lande der Mittu, *G. Schweinfurthi* 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 [K000078471, 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: Kakaye to Zonkwa, 6 Mar. 1958, G.V. Summerhayes 142 (K).

**Republic of the Congo**: forêt de Ngbé, 12 Aug. 1971, *L. Makany* 1889 ([P [P00538794, http://coldb.mnhn.fr/catalognumber/mnhn/p/p00538794, web]); Pays Bakongo, Mbangou 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* (Ren-dle) 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 Summerrh. (Summerhayes 1958: 80) – Eulophia elliotii Rolfe (Rolfe 1897: 54).

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 (Categorically 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 Rchb.f. (Reichenbach 1878: 66) – Graphorkis stachyodes (Rchb.f.) Kuntze (Kuntze 1891: 662).

Type – Sudan: nördl. von Mombuttu, im Lande der Niam-niam, 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 Fébé, 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, web], WAG[WAG.1136332, https://data.biodiversitydata.nl/naturalis/specimen/WAG.1136332]); Bamenda, Basenako, 6º19’N, 10º29’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, 0º51’N, 10º56’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, E. Warnecke 95 (syntypes: B†; BM[B000529442, https://data.nhm.ac.uk/dataset/collection-specimens/resource/05ff2255-c38a-40c9-b657-4cceb55ab2feb/record/4649236, web]; HBG[501714, 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 Schlr. (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 (Schlr.) Schlr.
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 mechwii** (Rchb.f.) T.Durand & Schinz (Durand & Schinz 1894: 23) = *Orthochilus mechwii* 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 warnekeana** 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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