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Abstract

Angola is a tropical country with many biogeographical units and, therefore, has a high floristic diversity. Although an increasing number of floristic studies has been carried out in Angola in recent years, the country is still considered to be underinvestigated as many species being collected were previously unknown there. Several scientific groups working in different parts of Angola contributed to this paper their data from biodiversity assessments. With this we can add 67 species newly recorded for Angola, including two new generic records and five alien species, to the almost 7,300 vascular plant taxa known so far for Angola. Most of the new records for Angola are also present in different neighbouring countries, but they are little known, and their IUCN threat status has not been assessed yet. However, ongoing fieldwork and exploration are needed to complete the floristic knowledge of the understudied country.

Keywords

Tropical Africa; plant diversity; disjunct populations; alien species

Academic editor: Robert Philipp Wagensommer | Received 29 June 2022 | Accepted 23 September 2022 | Published 2 November 2022

Citation: Lautenschläger T, Göhre A, Ditsch B, Baumgärtel C, Monizi M, Mandombe JL, Lehnert M, Jongkind CCH, Persoon HJGM, Cheek M, Monro A, Goyder D, Darbyshire I, Paton A, Lages F, Wells T, Jürgens N, Finckh M, Meller P (2022) Sixty-seven species newly recorded for the flora of Angola: recent findings from vegetation surveys and herbarium collections. *Check List* 18 (6): 1203–1230. <https://doi.org/10.15560/18.6.1203>

Introduction

Angola is a tropical country encompassing 15 terrestrial ecoregions that range from coastal deserts, through miombo woodland–grassland mosaics to dense Congolian rainforests (Burgess et al. 2004). Figueiredo et al. (2009) presented 6,735 indigenous plant species for Angola, with a rate of endemism of 14.8%. An extensive review of floristic research in Angola since the 17th century was given by Goyder and Gonçalves (2019) and Figueiredo and Smith (2021), building on earlier summaries by Mendonça (1962) and Figueiredo and Smith (2008).

Although recent collections and descriptions of new species are adding more and more information (e.g. Hind and Goyder 2014; Darbyshire and Goyder 2019), knowledge on floristic diversity in Angola is still far from complete. The “Angolan Protected Area Expansion Strategy – APAES” (Huntley 2010) highlighted 11 areas of particular biological significance. According to Goyder and Gonçalves (2019), much recent botanical study has focused on these areas.

The floristic findings presented here were contributed by several scientific groups working in different parts of Angola (Fig. 1). The northern provinces are characterized by elements of both the Guineo-Congolian and the Zambezi Regions and form a Regional Transition Zone of high complexity (White 1983). Recent botanical studies in this region have focused on new records or species of vascular plants (Cheek et al. 2015; Abrahamczyk et al. 2016; Lautenschläger et al. 2020b, Smith and Lautenschläger 2021), ferns and lycophytes (Mezonda et al. 2020), and mosses (Müller 2015; Müller et al. 2018, 2019), or on the documentation of traditional knowledge regarding plant uses (Göhre et al. 2016; Lautenschläger et al. 2018, 2020a). Darbyshire et al. (2014) updated the checklist of the flowering plants, gymnosperms, and pteridophytes of Lunda-Norte Province provided by Cavaco in 1959.

The Bié Plateau in Central Angola is characterized by an undulating, small-scale mosaic of wetlands, grasslands, and miombo woodlands. The upper catchment areas of some of the largest rivers in Angola are located there (Huntley 2019). This plateau is a diversity hotspot for geoxyles (Zigelski et al. 2019), and the heterogeneous landscape is rich in woody species in general (Monteiro 1970; Revermann et al. 2017a). East of the Bié Plateau lies the upper Zambezi basin, in which wide plains covered by savannahs and swamp forests get inundated annually (Huntley 2019). The seasonal inundations lead us to expect highly adapted plant species, but except for a general overview of the Cameia region of eastern Moxico Province (Zigelski et al. 2018), no comprehensive floristic work has been published so far.

The middle and lower Cubango (Okavango) river traverses the south-eastern corner of Angola and is fringed by open woodland and gallery forests. Some recent botanical work in this sparsely populated area has been

done with regard to the impact of land use patterns (Wallenfang et al. 2015; Revermann et al. 2017b), while the botanical diversity of the Cuito headwaters was reviewed by Goyder et al. (2018). Further expeditions have taken place in the very arid south-western corner of Angola, where the northern part of the Namib Desert and Kaokoveld Center of Endemism is located. Several species, and even a genus new to science were described from this area recently (e.g. Van Jaarsveld and Van Wyk 2005; Swanepoel 2019; Tripp and Darbyshire 2020; Swanepoel et al. 2021). Even in well-studied, easily accessible areas like the escarpment viewpoint Tundavala near Lubango, botanical discoveries are ongoing (Hind and Goyder 2014), which stresses the need for further floristic assessments.

Study Area

Angola is a tropical country in southern central Africa with a size of 1.25 million km². Due to its location between the Congolian rainforests to the north, the miombo woodland region to the east, the Namib and Kalahari (semi-) deserts to the south, and the Atlantic Ocean to the west, Angola takes part in numerous African ecoregions. Collections from some of those ecoregions are presented in this article. Our collections from northern Angola have been made in rainforest fragments, wet savannahs, and limestone formations. In eastern Angola, collections stem from flooded savannahs and miombo woodlands, which are part of the Cameia National Park. In southern Angola, collections have been made in Baikiaea-Burkea woodlands (partly within the Bicular National Park), in Afromontane grasslands, and in the coastal Namib desert (partly within Iona National Park). Lastly, collections in central Angola come from miombo woodland–grassland mosaics, and integrated wetlands. National parks are legally protected, but often only poorly so. Outside of national parks is mostly community land, which is not protected.

Methods

Unless otherwise stated, the new records are based on herbarium specimens that have been collected during scientific expeditions since 2000. Floristic research in Uíge Province has been conducted since 2012 in cooperation between the Universidade Kimpa Vita and the Technische Universität Dresden. The specimens are stored at the Herbarium Dresdense (DR). Duplicates will be transferred to Uíge as soon as suitable conditions including a herbarium are established. The biodiversity assessments in central, southern, and eastern Angola (Bié, Cuando-Cubango, Huíla, and Moxico Provinces) were conducted under the framework of The Future Okavango (TFO) (2011–2016) and South African Science Service Centre for Climate Change and Adapted Land Management (SASSCAL) (2011–2020), while assessments in

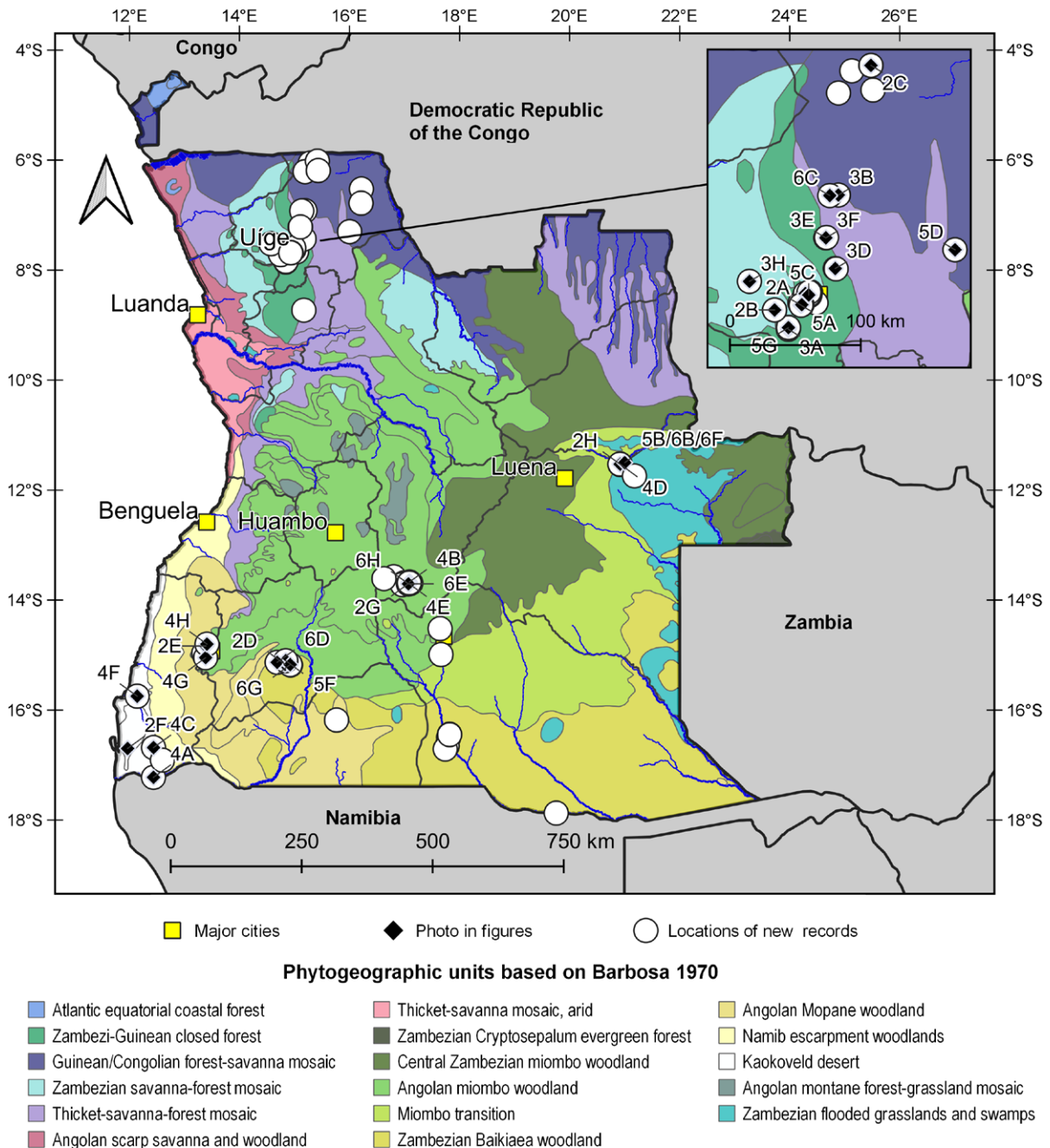


Figure 1. Collection sites in Angola of the new records. Colours indicate phytogeographical units based on the map of Barbosa (1970). The numbers 2–6 combined with the letters A–H mark the locations of important habitats that are shown in Figure 2, and of the species depicted in Figures 3–6, respectively. Map made with QGIS v. 3.10.14.

south-western Angola (Namibe Province) are linked to BIOTA Southern Africa (2000–2009).

All Angolan specimens collected in the context of BIOTA, TFO, and SASSCAL are deposited at the Herbarium Hamburgense (HBG) in Hamburg. If sufficient material was available, a duplicate was made, which is stored at the herbarium LUBA in Lubango, Angola.

Additionally, herbarium specimens from LUBA were studied for new records: findings from the Namibe province in south-western Angola mostly trace back to work in the context of Skeleton Coast–Iona Transfrontier Conservation Area (SCIONA 2018), and to specimens deposited in the herbarium LUBA collected in 2009 by Ernst van

Jaarsveld. Further collections stored at LUBA from David Goyder, Nigel Barker, Ralph Clark, and Nicola Bergh on the escarpment near Humpata, close to Lubango, Huila province, also contributed two new records. We also studied six new records from the Hess collection, collected in 1951–1952 and being stored at the United Herbaria (Z+ZT) of the University of Zurich and ETH Zurich.

We used the Plants of the World Online database PoWO (2021) as source for accepted species names, taxon authorities, plant family affiliation and distributions, except for Pteridophyta where Hassler (2021) was used. The distribution of taxa presented in this study is characterized by four categories: localized – a taxon is

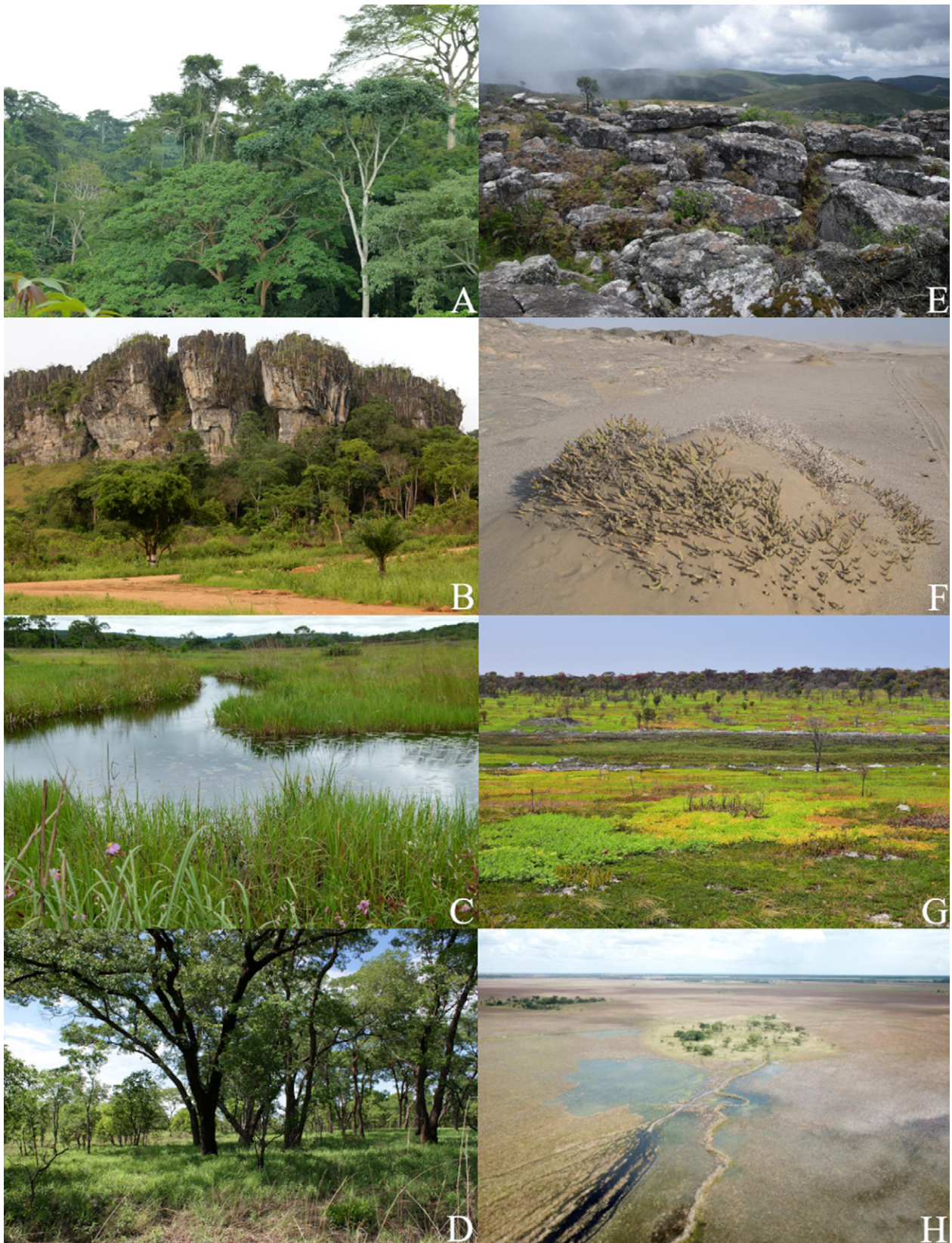


Figure 2. Typical habitats from where plant species were documented. Locations of these sites are marked in Figure 1. **A.** Serra Pingano mountain range, Uíge province. **B.** Limestone rocks near Ambuila, Uíge province. **C.** Swampy meadow, Uíge province. **D.** Open *Baikiaea* – *Burkea* woodlands in Bicuar NP, Huíla province. **E.** Escarpment with Afromontane forest-grassland mosaics near Tundavala, Lubango, Huíla province. **F.** Saline sand fields in the Iona desert, Namibe province. **G.** Small-scale mosaic of miombo woodlands, geoxyle grasslands and wetlands on the Bié Plateau, Bié province. **H.** Seasonally flooded savannah and emerging woodland patches in the Cameia NP, Moxico province. Photos: A–C by T. Lautenschläger; D–E and H by P. Meller; F by N. Jürgens; G by M. Finckh.

endemic to one contingent ecoregion or country, e.g. a Katanga (D.R. Congo) endemic; regional – a taxon occurs within one contingent biome, e.g. in miombo woodlands; widely – a taxon occurs widely within Africa, distribution can be patchy, e.g. when occurring in disturbed places; beyond Africa – a taxon occurs also beyond Africa. The conservation status of each taxon was retrieved from the IUCN Red List database (2022). The indicated habitats are the habitats in Angola where the given samples were found.

For identification, relevant floristic works used are listed in the species records below. The checklist of Figueiredo and Smith (2008) was used as the baseline for assessing Angolan species records. Species missing there but subsequently reported in later publications (Swanepoel 2009; Bergh and Nordenstam 2010; De Sousa et al. 2010; Catarino et al. 2013; Abreu et al. 2014; Hind and Goyder 2014; Paton 2014; Cheek et al. 2015; Darbyshire 2015; Abrahamczyk et al. 2016; Gonçalves and Goyder 2016; Gonçalves et al. 2016; Darbyshire et al. 2018; Harris and Wortley 2018a, 2018b, 2018c; Darbyshire and Goyder 2019; Darbyshire et al. 2019; Swanepoel 2019; Tripp and Darbyshire 2020; Lautenschläger et al. 2020b; Darbyshire et al. 2021; Smith and Lautenschläger 2021; Swanepoel et al. 2021, Figueiredo and Smith 2022) were excluded.

All records were also cross-checked against the evidence in GBIF (2022, last cross-check in June 2022). Some species would be new records for Angola, as they are not listed in the checklist (Figueiredo and Smith 2008). They were not included in this study; however, if they are already documented in GBIF for Angola, or in publications newer than the checklist (e.g., *Pavetta gardeniifolia* Hochst. ex A.Rich var. *gardeniifolia*, *Sherbournia hapalophylla* subsp. *wernhamiana* (N.Hallé) Sonké & L.Pauwels).

Results

The present study documents records for 67 species newly reported for the flora of Angola, including two new generic records (*Remusatia* Schott and *Cyclocarpa* Afzel. ex Urb.). Of these, 62 are native species (1 Pteridophyta, 23 monocotyledons, and 38 dicotyledons) and five are neophytes (5 dicotyledons).

The records belong to 32 plant families, with mostly single to few records per family except for some larger families such as Commelinaceae, Cyperaceae, and Lamiaceae. 92.5% of the recorded species also occur in neighbouring countries. Five species show disjunct distribution patterns. Sixteen species have narrow and localized distributions (sub-ecoregion), and 25 have more regional patterns (supra-ecoregion). The remaining species show either wide often patchy intra-African distributions (18), or wide distributions also beyond Africa (8). An overview of the 67 species with information about their distribution patterns and IUCN conservation status is presented in Table 1. In the following text, the species are sorted by groups and families and alphabetically within the families.

NATIVE SPECIES

Division Pteridophyta
Family Aspleniaceae

Asplenium megalura Hieron.

Examined material. ANGOLA – Uíge Province • Município de Quitexe, Serra Pingano; 07°40'17"S, 014°55'20"E; 836 m; 19.XI.2019; T. Lautenschläger leg. TL2019-123; forest; DR[DR065492].

Identification. A medium-sized to large species of *Asplenium* with fronds to ca. 50 cm long, with the genus-specific linear sori following the straight flabellate veins on the underside of the pinnae. This species is recognized by the dark brown petiole and rhachis and the particular shape of the pinnae, which are fan-shaped to rhomboid with a long-excurrent tip and serrate margins. The blade is not tapering at the tip but ends in an apical segment similar to the lateral pinnae. A regular epiphyte but also often found growing on rocks in full sun. Being a widespread species in Africa, its presence in Angola is not surprising.

Distribution and habitat. Burundi, D.R. Congo, Kenya, Malawi, Mozambique, Rwanda, São Tomé and Príncipe, Sierra Leone, Sudan (MacLeay 1953), Tanzania, Uganda, Zambia (Hassler 2021). Rainforest.

References. Schelpe (1977); Roux (2009).

Division Spermatophyta
Clade Angiospermae monocotyledons

Table 1. Overview of the 67 newly recorded species for the flora of Angola. Sorted by family, with information on distribution patterns and IUCN conservation status.

Family	Taxon	Present in neighbouring countries	Disjunct distribution	Neophyte	Distribution range	IUCN status
Acanthaceae	<i>Dicliptera carvalhoi</i> Lindau	x			Regionally	Not assessed
Acanthaceae	<i>Hypoestes potamophila</i> Heine		x		Localized	VU
Alismataceae	<i>Burnatia enneandra</i> Micheli	x			Widely	LC
Amaranthaceae	<i>Amaranthus tortuosus</i> Hornem.	x		x	Beyond Africa	Not assessed
Amaranthaceae	<i>Calicorema capitata</i> (Moq.) Hook.f.				Localized	Not assessed
Amaryllidaceae	<i>Crinum binghamii</i> Nordal & Kwembeya	x			Localized	Not assessed
Anacardiaceae	<i>Lannea schweinfurthii</i> var. <i>stuhlmannii</i> (Engl.) Kokwaro	x			Widely	Not assessed

Family	Taxon	Present in neighbouring countries	Disjunct distribution	Neophyte	Distribution range	IUCN status
Anacardiaceae	<i>Ozoroa paniculosa</i> (Sond.) R.Fern. & A.Fern.	x			Regionally	LC
Apocynaceae	<i>Landolphia villosa</i> J.G.M.Pers.	x			Regionally	Not assessed
Apocynaceae	<i>Tabernaemontana brachyantha</i> Stapf	x			Regionally	Not assessed
Araceae	<i>Remusatia vivipara</i> (Roxb.) Schott	x			Beyond Africa	Not assessed
Asparagaceae	<i>Chlorophytum sparsiflorum</i> Baker	x			Widely	Not assessed
Aspleniaceae	<i>Asplenium megalura</i> Hieron.	x			Widely	Not assessed
Asteraceae	<i>Inula robynii</i> De Wild.	x			Regionally	Not assessed
Asteraceae	<i>Senecio venosus</i> Harv.		x		Regionally	Not assessed
Asteraceae	<i>Vernonia lualabaensis</i> De Wild.	x			Localized	Not assessed
Burseraceae	<i>Commiphora giessii</i> J.J.A.van der Walt	x			Localized	Not assessed
Capparaceae	<i>Boscia integrifolia</i> J.St.-Hil.	x			Beyond Africa	Not assessed
Combretaceae	<i>Combretum elaeagnoides</i> Klotzsch	x			Regionally	LC
Commelinaceae	<i>Commelina pycnospata</i> Brenan	x			Regionally	Not assessed
Commelinaceae	<i>Commelina robynii</i> De Wild.	x			Localized	Not assessed
Commelinaceae	<i>Cyanotis foecunda</i> DC. ex Hassk.	x			Widely	Not assessed
Commelinaceae	<i>Floscopa leiothyrsa</i> Brenan	x			Widely	Not assessed
Commelinaceae	<i>Stanfieldiella oligantha</i> (Mildbr.) Brenan	x			Regionally	Not assessed
Connaraceae	<i>Agelaea paradoxa</i> var. <i>microcarpa</i> Jongkind	x			Regionally	Not assessed
Convolvulaceae	<i>Ipomoea hackeliana</i> (Schinz) Hallier f.	x			Widely	Not assessed
Convolvulaceae	<i>Ipomoea magnusiana</i> Schinz	x			Regionally	Not assessed
Cyperaceae	<i>Bulbostylis cardiocarpoides</i> Cherm.	x			Regionally	Not assessed
Cyperaceae	<i>Cyperus chersinus</i> (N.E.Br.) Kük.	x			Regionally	Not assessed
Cyperaceae	<i>Cyperus longispicula</i> Muasya & D.A.Simpson		x		Localized	DD
Cyperaceae	<i>Cyperus majestuosus</i> (P.A.Duvign. & G.Léonard) Bauters	x			Localized	Not assessed
Cyperaceae	<i>Cyperus tanzaniae</i> (Lye) Lye	x			Regionally	LC
Cyperaceae	<i>Cyperus testui</i> (Cherm.) Reynders	x			Widely	Not assessed
Cyperaceae	<i>Fimbristylis bivalvis</i> (Lam.) Lye	x			Widely	Not assessed
Cyperaceae	<i>Scleria iostephana</i> Nelmes	x			Widely	LC
Eriocaulaceae	<i>Eriocaulon glandulosum</i> Kimp.	x			Regionally	Not assessed
Eriocaulaceae	<i>Eriocaulon sinealeum</i> Kimp.	x			Localized	Not assessed
Euphorbiaceae	<i>Euphorbia erythrocephala</i> P.R.O.Bally & Milne-Redh.	x			Localized	Not assessed
Euphorbiaceae	<i>Euphorbia phylloclada</i> Boiss.	x			Localized	Not assessed
Euphorbiaceae	<i>Euphorbia thymifolia</i> L.	x		x	Beyond Africa	Not assessed
Fabaceae	<i>Crotalaria miranda</i> Milne-Redh.	x			Regionally	Not assessed
Fabaceae	<i>Cyclocarpa stellaris</i> Afzel. ex Urb.	x			Beyond Africa	Not assessed
Fabaceae	<i>Dolichos subcapitatus</i> var. <i>angustifolius</i> Mackinder	x			Localized	Not assessed
Fabaceae	<i>Humularia pseudoeschynomene</i> Verdc.	x			Localized	Not assessed
Lamiaceae	<i>Acrotome tenuis</i> G.Taylor	x			Localized	Not assessed
Lamiaceae	<i>Clerodendrum globuliflorum</i> B.Thomas	x			Regionally	Not assessed
Lamiaceae	<i>Coleus melleri</i> (Baker) A.J.Paton & Phillipson	x			Widely	Not assessed
Lamiaceae	<i>Rotheca wildii</i> (Moldenke) R.Fern.	x	x		Widely	Not assessed
Lamiaceae	<i>Tetradenia kaokoensis</i> van Jaarsv. & A.E.van Wyk	x			Localized	Not assessed
Malvaceae	<i>Pterygota bequaertii</i> De Wild.	x			Regionally	VU
Meliaceae	<i>Carapa macrantha</i> Harms	x			Regionally	Not assessed
Orchidaceae	<i>Habenaria humilior</i> Rchb.f.	x			Widely	Not assessed
Passifloraceae	<i>Barteria solida</i> Breteler	x			Regionally	Not assessed
Poaceae	<i>Entolasia olivacea</i> Stapf	x	x		Widely	Not assessed
Poaceae	<i>Eragrostis fimbriolata</i> Cope	x			Localized	Not assessed
Poaceae	<i>Panicum comorense</i> Mez	x			Widely	LC
Portulacaceae	<i>Portulaca grandiflora</i> Hook.			x	Beyond Africa	Not assessed
Rhamnaceae	<i>Helinus mystacinus</i> (Aiton) E.Mey. ex Steud.	x			Widely	Not assessed
Rubiaceae	<i>Bertiera loraria</i> N.Hallé	x			Regionally	Not assessed
Rubiaceae	<i>Leptactina laurentiana</i> Dewèvre var. <i>laurentiana</i>	x			Regionally	Not assessed
Rubiaceae	<i>Pavetta membranifolia</i> K.Krause	x			Regionally	Not assessed
Rubiaceae	<i>Vangueria pygmaea</i> Schltr.	x			Widely	Not assessed
Simaroubaceae	<i>Brucea javanica</i> (L.) Merr.	x		x	Beyond Africa	LC
Urticaceae	<i>Elatostema paivaeanum</i> Wedd.	x			Widely	Not assessed
Urticaceae	<i>Scopocarpus flamignianus</i> (Lambinon) T.Wells & A.K.Monro	x			Regionally	Not assessed
Urticaceae	<i>Scopocarpus repens</i> (Wedd.) T.Wells & A.K.Monro	x			Regionally	Not assessed
Verbenaceae	<i>Lantana horrida</i> subsp. <i>tiliifolia</i> (Cham.) R.W.Sanders	x		x	Beyond Africa	Not assessed

Family Alismataceae

***Burnatia enneandra* Micheli**

Examined material. ANGOLA – **Moxico Province**

• Cameia National Park, Biodiversity Observatory; 11°31'53"S, 020°54'51"E; 1125 m; V.2015; M. Finckh and P. Zigelski leg. 143347; damp and seasonally flooded grassland; HBG[HBG526987]; **Cunene Province** • Umgebung der Mission Cattolica Mupa (Municipal. Cu-anhama), 228 km südlich Vila da Ponte (Prov. Cubango), im Rio Cuvelai; ca. 16°10'47"S, 015°45'45"E; 1250 m; 9.I.1952; H.E. Hess and E. Hess-Wyss leg. 52/42; Buschwald, Sandboden, Grundwasser des Rio Cuvelai in ca. 2 m Tiefe. Flache Mulde, feucht, kein Wasser mehr an der Oberfläche; ZT[ZT00079834].

Identification. A perennial aquatic, monoecious herb, the only accepted species in the genus *Burnatia*. The tuberous rhizome bears several linear-lanceolate leaves with a petiole up to 50 cm long, and a peduncle of up to 90 cm long with 1–3 lax inflorescences. Male inflorescences are up to 40 cm long, and female inflorescences are up to 15 cm long. A second specimen in the Hess collection was originally identified by Walo Koch, ETH Zurich and now confirmed by us.

Distribution and habitat. Tropical and southern Africa. Swamps, shallow lakes, and edges of slow-flowing rivers and streams.

Reference. Martins and Catarino (2009).

Family Amaryllidaceae

***Crinum binghamii* Nordal & Kwembeya**

Figure 4D

Examined material. ANGOLA – **Moxico Province**

• Cameia National Park, Biodiversity Observatory; 11°31'53"S, 020°54'51"E; 1125 m; III.2022; M. Finckh s.n. leg.; damp and seasonally flooded grassland; HBG [HBG527149].

Identification. Unlike the superficially similar Zambesian *C. buphanoides* Welw. ex Baker, this Zambesian species occurs only in swampy or seasonally waterlogged areas. In comparison to *C. buphanoides*, *C. binghamii* also has longer peduncles (up to 75 cm) and smaller, but aggregated, whitish bulbs (not a single large, brownish bulb). Furthermore, molecular data places *C. binghamii* nearer to the Guineo-Congolian *C. natans* Baker and *C. purpurascens* Herb.

Distribution and habitat. West Zambia. Swampy areas on black clay soil.

Reference. Nordal et al (2004).

Family Araceae

***Remusatia vivipara* (Roxb.) Schott**

Figure 3G

Examined material. ANGOLA – **Uíge Province** • Município de Ambuila; 07°43'08"S, 014°44'45"E; 600 m;

15.XI.2019; T. Lautenschläger 2019_11_90 leg.; in moist rock fissure on inselberg; DR[DR062803].

Identification. Nonflowering specimens of this species are easily distinguished from other African Araceae by coppery modified peduncles bearing burr-like bulbils covered with hooked prickles. They may be little more than 30 cm long and arise from the tuber after dormancy simultaneously with the young leaves.

Distribution and habitat. Tropical and subtropical Old World. Rock fissures on limestone.

Reference. Hepper (1968b).

Family Asparagaceae

***Chlorophytum sparsiflorum* Baker**

Figure 6A

Examined material. ANGOLA – **Uíge Province** •

Serra Pingano, forest near waterfall in Serra do Pingano; 07°40'56"S, 014°56'05"E; 687 m; 16.II.2015; B. Ditsch BD 739 leg.; DR[DR067227].

Identification. *Chlorophytum sparsiflorum* is a variable species with mostly unbranched inflorescences longer than the leaves, that carry about 2–5 flowers per node, with the pedicels jointed at or below the middle. Our specimen has about 5.0–6.5 cm broad leaves arranged in a rosette. It differs from similar species such as *C. lancifolium* Welw. ex Baker and *C. brachystachyum* Baker, for example, in having a distinct petiole shorter than the leaf blade, a minutely scabrid inflorescence axis, and lax racemes.

Distribution and habitat. Tropical Africa. Rainforest.

References. Hepper (1968a); Meerts (2015).

Family Commelinaceae

***Commelina pycnospatha* Brenan**

Figure 4B

Examined material. ANGOLA – **Bié Province** • Chitembo municipality, Cusseque TFO core site; 13°40'09"S, 017°05'15"E; 1531 m; I.2018; P. Meller s.n. leg.; HBG [HBG527147].

Identification. Verified by Robert Faden. This species is similar to *C. africana* L., in that it has a decumbent habit and yellow flowers. However, the inflorescences consist of densely clustered spathes (not solitary as in *C. africana*), much smaller and rather orange-yellow flowers (not lemon-yellow) and wine-red shoots (not green).

Distribution and habitat. Tropical Central and eastern miombo region. (Damp) grasslands on sandy soils.

References. Faden (2012a); Faden pers. comm.

***Commelina robynsii* De Wild.**

Examined material. ANGOLA – **Bié Province** • Chitembo municipality; 13°43'03"S, 016°57'30"E; 1542 m; IV.2012; R. Revermann 134303 leg.; psammoferralithic geoxyle grassland; HBG[HBG526997] • Chitembo municipality, Cusseque TFO core site; 13°42'15"S,



Figure 3. Selected plant species from the Northern Uíge province. **A.** *Agelaea paradoxa*. **B.** *Barteria solida*. **C.** *Clerodendrum globuliflorum*. **D.** *Carapa macrantha*. **E.** *Coleus melleri*. **F.** *Habenaria humilior*. **G.** *Remusatia vivipara*. **H.** *Rothea wildii*. Photos: A, B, D, G, H by T. Lautenschläger; C, F by B. Ditsch; E by A. Göhre.

017°03'23"E; 1541 m; III.2019; P. Zigelski 145342A leg.; miombo woodland–geoxyle grassland ecotone; HBG [HBG526996].

Identification. Verified by Robert Faden. In the Flora of Tropical East Africa, this taxon is included in *C. aspera* G. Don ex Benth., which is known to occur in Angola. *Commelina aspera* encompasses a species complex with wide morphological variation throughout its range, and the status of *C. robynsii* is not finally determined yet, as it is a poorly studied taxon known only from the original description and type material.

Distribution and habitat. D.R. Congo. Ferrallithic geoxyle grassland, ecotone to miombo woodland.

References. De Wildeman (1930); Faden pers. comm.

Cyanotis foecunda DC. ex Hassk.

Examined material. ANGOLA – **Cuando Cubango Province** • Caiundo, TFO core site, 16°26'17"S, 017°49'00"E; 1155 m; II.2013; R. Revermann 136201 leg.; open *Baikiaea* woodland; HBG[HBG526998], LUBA [LUBA035530-0] • Comuna de Savate, 16°38'60"S, 017°46'12"E; 1185 m; II.2013; J. Wallenfang and R. Revermann 136378 leg.; open *Baikiaea* woodland; HBG [HBG526999], LUBA [LUBA035917-0] • Comuna de Savate; 16°39'07"S, 017°46'13"E; 1186 m; III.2013; J. Wallenfang and R. Revermann 136393 leg.; HBG[HBG527000], LUBA [LUBA035916-0].

Identification. Distinguished from similar *C. longifolia* Benth. by strongly decumbent and zigzagging habit, with much shorter and broader leaves.

Distribution and habitat. Eastern Central and Southern Africa. *Baikiaea* woodland.

Reference. Faden (2012b).

Floscopa leiothyrsa Brenan

Figure 6F

Examined material. ANGOLA – **Moxico Province** • Cameia National Park, Biodiversity Observatory; 11°31'44"S, 020°55'05"E; 1125 m; V.2016; M. Finckh and P. Zigelski 143294 leg.; damp, seasonally inundated grassland; HBG[HBG527001], LUBA [LUBA036296-0] • Cameia National Park, Biodiversity Observatory; 11°31'37"S, 020°54'48"E; 1126 m; V.2016; M. Finckh and P. Zigelski 143264 leg.; damp grassland; HBG[HBG527002], LUBA [LUBA036290-0].

Identification. Distinguished from other *Floscopa* species in the area by inflorescence being a lax fascicle of helicoidally aggregated flowers, both axillary and terminally. Overall with straggling habit.

Distribution and habitat. Patchily throughout Africa. Seasonally flooded grassland.

Reference. Faden (2012c).

Stanfieldiella oligantha (Mildbr.) Brenan

Figure 6C

Examined material. ANGOLA – **Uíge Province** • Município de Damba, near village Katembo; 07°55'22"S, 015°

07'46"E; 1061 m; 26.II.2015; B. Ditsch 856 leg.; forest; DR[DR066917].

Identification. It differs from *Stanfieldiella imperforata* (C.B. Clarke) Brenan in having a smaller and more compact inflorescence about 3 cm long and wide and larger leaves and capsules.

Distribution and habitat. West to West-Central Tropical Africa. Rainforest.

Reference. Brenan (1968).

Family Cyperaceae

Bulbostylis cardiocarpoides Cherm.

Examined material. ANGOLA – **Uíge Province** • Município de Uíge, near Cunga Quiximba; 07°37'03"S, 014°59'27"E; 799 m; 12.IV.2014; A. Göhre 112 leg.; DR [DR066702] • Município de Uíge, in future Botanic Garden Universidade Kimpa Vita; 07°35'32"S, 014°59'42"E; 815 m; 17.III.2013; B. Ditsch BD 311 leg.; savannah; DR [DR067352].

Identification. It is characterised by having smooth culms without hairs, carrying about 3 or more sessile spikelets with acute broadly boat-shaped glumes about 2 mm long with the midrib of the glume reaching the apex. The similar *Bulbostylis filamentosa* (Vahl) C.B. Clarke, which is documented for Angola, has larger glumes and an inflorescence composed of 12–20 closely packed spikes.

Distribution and habitat. Burundi, Gabon, Uganda, Zambia, D.R. Congo. Disturbed dry sandy ground.

References. Goetghebeur and Coudijzer (1985); Gordon-Gray and Browning (2020).

Cyperus chersinus (N.E.Br.) Kük.

Examined material. ANGOLA – **Cuando Cubango Province** • Comuna de Savate; 16°42'25"S, 017°44'18"E; 1182 m; III.2013; J. Wallenfang and R. Revermann 136440 leg.; dense woodland; HBG[HBG527006], LUBA [LUBA035544-0].

Identification. This species is annual or a weak perennial growing on more clayey soils in the Okavango region. It has been collected in Masari (Namibia) before, close to the Angolan border, and we provide here the first definitive collection in Angola. The wet-looking, tubular spikelets are distinctive.

Distribution and habitat. Southern Africa. Woodland.

Reference. Heath et al. (2009).

Cyperus longispicula Muasya & D.A. Simpson

Figure 6D

Examined material. ANGOLA – **Huíla Province** • Bicular National Park; 15°07'51"S, 014°41'01"E; 1265 m; XI.2016; M. Finckh and P. Zigelski 143716 leg.; woodland–wetland ecotone; HBG[HBG527007].

Identification. This species has a very delicate appearance, with slender culms and filiform leaves and bracts. The capitate inflorescence comprises numerous

conspicuously long (up to 25 mm by 2.4 mm), reddish-brown spikelets radiating to all directions. This differentiates it from the related *C. kirkii* C.B. Clarke, which has much shorter and stouter spikelets.

Distribution and habitat. Zimbabwe and Mozambique. Peaty soil in rocky outcrops and vleis grasslands.

Reference. Simpson and Muasya (2004).

Cyperus majestuosus (P.A. Duvign. & G. Léonard)

Bauters

Figure 6B

Examined material. ANGOLA – Moxico Province • Cameia National Park; 11°31'41"S, 020°54'58"E; 1132 m; III.2022; M. Finckh and P. Meller 145228 leg.; flooded savannah; HBG[HBG527152].

Identification. This species has a very conspicuous appearance, as thin, white, up to 2 cm long extensions of the glumes radiate all around the terminal inflorescence. As the inflorescence is glomerate, consisting of up to 9 contracted spikes, the thin frays are not arranged uniformly, but in bundles. These very long, bundled, white frays set *C. majestuosus* apart from other Cyperaceae with whitish elongated glumes like *Cyperus lipocomosus* Goetgh., *Cyperus ascopinguis* Goetgh., or *Cyperus proteus* (Welw.) Bauters.

Distribution and habitat. Zambia and D.R. Congo. Open woodlands and occasionally waterlogged grasslands.

References. Bauters (2020, under synonym *Ascolepis majestuosa* P.A. Duvign. and G. Léonard); P. Goetgebeur pers. comm.

Cyperus tanzaniae (Lye) Lye

Examined material. ANGOLA – Uíge Province • Município de Maquela do Zombo; 06°01'05"S, 015°24'56"E; 806 m; 26.IX.2018; T. Lautenschläger 2018_10_49 leg.; wetland meadow; DR[DR066193].

Identification. *Cyperus tanzaniae* bears cream to white coloured spikes on 20–40 cm long solitary culms. It differs from the similar *Cyperus albiceps* Ridl. (listed as *Kyllinga albiceps* (Ridl.) Rendle by Muasya and Simpson (2008)) in having smaller involucre bracts up to 4 cm long and 1–2-flowered spikelets arranged in a single ovoid to globose spike.

Distribution and habitat. From Tanzania to Zimbabwe. Well-drained grassland in miombo zone.

Reference. Lock (2020).

Cyperus testui (Cherm.) Reynders

Examined material. ANGOLA – Uíge Province • Município de Maquela do Zombo; 06°01'05"S, 015°24'56"E; 806 m; 26.IX.2018; T. Lautenschläger 2018_10_52 leg.; wetland meadow; DR[DR066195].

Identification. *Cyperus testui* is an erect sedge with inflorescences consisting of several unequally rayed spikes. The spikelets bear up to 20 dark red-brown acute glumes.

Distribution and habitat. West Tropical Africa to

Congo Republic. Wet grassland.

References. Hooper (1972a); Vollesen (2020).

Fimbristylis bivalvis (Lam.) Lye

Examined material. ANGOLA – Cuando Cubango Province • Caiundo, TFO Core site, rio Dindi about 2 km upstream of confluence with rio Cubango; 16°26'43"S, 017°49'02"E; 1131 m; VI.2012; R. Revermann 135019 leg.; HBG[HBG527008].

Identification. In neighbouring countries this species is known under the synonym *Fimbristylis longiculmis* Steud. This is a strikingly large *Fimbristylis* species whose flattened culms can attain more than 1 m in height. This feature, together with much reduced and inconspicuous leaves sheathing the swollen base, and the long spikelets (7–20 mm), are diagnostic.

Distribution and habitat. Southeast to Eastern Africa, Madagascar. Waterlogged, peaty areas, and swamps.

Reference. Hoenselaar et al. (2010).

Scleria iostephana Nelmes

Examined material. ANGOLA – Uíge Province • 06°46'55"S, 016°12'31"E; 1056 m; 22.VII.2015; T. Lautenschläger 2015-147 leg.; forest; DR[DR066156] • 06°11'20"S, 015°25'47"E; 892 m; 26.II.2017; T. Lautenschläger 2017-02-160 leg.; forest patch; DR[DR057606] • Provincia de Luanda [correct name at that time: district of Congo, today: province of Uíge]; Congo, Umgebung der Mission Sanza Pombo; 9.IV.1952; H.E. Hess and E. Hess-Wyss 52/1229 leg.; Galeriewald; ZT[ZT00090304].

Identification. *Scleria iostephana* differs from *S. naumanniana* Boeckeler in having slightly larger, purple achenes, and the straight tip of the fertile glume exceeding the achene. The specimen in the Hess collection was originally identified in 1984 by Alain Mincier, Ghent University and now confirmed by us.

Distribution and habitat. Tropical Africa. Gallery forest.

Reference. Hooper (1972b).

Family Eriocaulaceae

Eriocaulon glandulosum Kimp.

Examined material. ANGOLA – Moxico Province • Cameia National Park, Biodiversity Observatory; 11°31'40"S, 020°55'05"E; 1126 m; V.2016; M. Finckh and P. Zigeliski 143298 leg.; damp grassland after receding inundation; HBG[HBG527010].

Identification. A small annual species usually below 10 cm height. The scapes are conspicuously 3-ribbed and papillous. This is diagnostic together with a capitula diameter of 1–2 mm, featuring rounded, involucre bracts that are markedly paler (straw-coloured) than the floral bracts (greyish/blackish).

Distribution and habitat. D.R. Congo, Tanzania. Drying margins of temporary pools.

Reference. Phillips (1997).

***Eriocaulon sinealaeum* Kimp.**

Examined material. ANGOLA – **Moxico Province** • Cameia National Park, Biodiversity Observatory; 11° 31'60"S, 020°54'55"E, 1124 m; VI.2017; M. Finckh and P. Zigelski 143769 leg.; damp grassland after receding inundation; HBG[HBG527011].

Identification. This annual species is the only *Eriocaulon* species in the Flora zambesiaca area with only 3 stamens. The leaf rosettes are often submerged.

Distribution and habitat. D.R. Congo. Damp and flooded grasslands.

Reference. Kimpouni (1994).

Family Orchidaceae

***Habenaria humilior* Rchb.f.**

Figure 3F

Examined material. ANGOLA – **Uíge Province** • Município de Mucaba; 07°13'01"S, 015°06'08"E; 1181 m; 23.II.2017; C. Neinhuis PV1 leg.; moorland; DR [DR062749] photo.

Identification. The species much resembles *Habenaria huillensis* Rchb.f., which was recorded from southern Angola before. At times, it was regarded as conspecific with the latter (see e.g. Flore d'Afrique centrale). Both orchids show lateral petals that are two-lobed almost to the base. In *H. huillensis*, the lower petal lobes are about twice as long as the upper lobes, narrowly lanceolate, acute and spreading forwards and upwards. Instead, the spreading lower petal lobes of *H. humilior* are broader and shorter oblong-lanceolate, less than twice as long as the upper lobes and usually obtuse. Moreover, the bracts of the lower flowers reach the perianth in *H. huillensis*, while they are shorter in *H. humilior*. Kränzlin (1891) separates the two species based on the relative length of the median labellum lobe (33% longer than the lateral lobes in *H. huillensis*, hardly any longer than the lateral lobes in *H. humilior*). Modern floras no longer use this as a diagnostic character.

Distribution and habitat. From Sudan to Mozambique and Congo Republic to D.R. Congo. Swamps.

References. Kränzlin (1891); Geerinck (1984); La Croix and Cribb (1995).

Family Poaceae

***Entolasia olivacea* Stapf**

Examined material. ANGOLA – **Uíge Province** • Provincia de Luanda [correct name at that time: district of Congo, today: province of Uíge]: Congo, 5 km von Posto Macocola in Richtung Quitembe, 06°57'26"S, 016°19'12"E; ca. 900 m ü.M.; 12.IV.1952; H.E. Hess and E. Hess-Wyss 52/1284 leg.; lockerer Savannenwald, feucht, Boden sandig, Bachufer; ZT[ZT00098534], ZT[ZT00098535].

Identification. The pedicels of *E. olivacea* are terete and not strongly flattened as in *E. imbricata*. Furthermore, the spikelets are shorter (2–2.5 mm) than in *E. imbricata*

(4.5–6.5 mm). The specimens of the Hess collection were originally identified in 1984 by Philip De Pauw and Dominique Vande Plassche, Ghent University and now confirmed by us.

Distribution and habitat. Tropical and Southern Africa. Stream banks with swampy sandy soils.

References. Hepper (1972); Clayton (1989).

***Eragrostis fimbriata* Cope**

Examined material. ANGOLA – **Bié Province** • Chitembo municipality, Cusseque Biodiversity Observatory; 13°42'02"S, 017°04'47"E; 1528 m; X.2012; M. Finckh 135538 leg.; peaty hanging moor on grassland slope; HBG[HBG527018], LUBA[LUBA036355-0].

Identification. The ciliate frill at the apex of the lemma and palea are diagnostic and eponymous for this species.

Distribution and habitat. Zambia. Grassland, peaty margin of river.

Reference. Cope (1998).

***Panicum comorense* Mez**

Examined material. ANGOLA – **Uíge Province** • Provincia de Luanda [correct name at that time: district of Congo, today: province of Uíge]: Congo, nördlich des Postens Sanza Pombo (Concelho Sanza Pombo); 06°56'09"S, 016°21'49"E; 10.IV.1952; H.E. Hess and E. Hess-Wyss 52/1270 leg.; Wälder mit viel wildem Kaffee; ZT[ZT00098523].

Identification. With a length of about 2 mm, the spikelets of *P. comorense* are smaller compared than those of *P. madipirense*. The leaf lamina is narrowed at the base. The specimen of the Hess collection were originally identified by Philip De Pauw and Dominique Vande Plassche, Ghent University and now confirmed by us.

Distribution and habitat. Tropical Africa. Rainforest.

Reference. Clayton (1989).

Clade Angiospermae dicotyledons

Family Acanthaceae

***Dicliptera carvalhoi* Lindau**

Examined material. ANGOLA – **Huíla Province** • 6 km NNW of Humpata, towards Estação Zoótecnica; 14°58'07"S, 013°21'00"E; 2093 m; X.2013; D. Goyder, N. Barker and V.R. Clark 7422 leg.; on rocky soil disturbed by cultivation; LUBA[LUBA35422-0], K[K000508845].

Identification. *Dicliptera carvalhoi* Lindau encompasses 4 subspecies. This specimen is allied to subsp. *laxiflora* but differs in habit and may be a distinct taxon/subspecies. The subspecies *laxiflora* shows at least some pedunculated umbels, with the primary peduncle up to 9(–16) mm long and not compounded into a verticillate synflorescence. Furthermore, the capsules are 5.5–6.5 mm long with seeds smooth or tuberculate (then the tubercles less dense and shorter than in subsp. *erinacea*). The cymule bracts are 6.5–10.0 mm long. Hitherto, *D.*



Figure 4. Selected plant species from the central and southern provinces of Bié, Huila and Namibe. **A.** *Calicorema capitata*. **B.** *Commelina pycnospatha*. **C.** *Commiphora giessii*. **D.** *Crinum binghamii*. **E.** *Dolichos subcapitatus* var. *angustifolius*. **F.** *Euphorbia phylloclada*. **G.** *Senecio venosus*. **H.** *Vangueria pygmaea*. Photos: A, G by F. Lages; B, D, F, H by P. Meller; C, E by N. Jürgens.

carvalhoi was only listed for Angola as doubtful (Darbyshire et al. 2015).

Distribution and habitat. Eastern miombo region. Montane grasslands and shrublands.

References. Darbyshire (2008); Darbyshire et al. (2015).

Hypoestes potamophila Heine

Examined material. ANGOLA – Uíge Province • Município de Uíge, near village Pambu; 07°25'59"S, 015°10'23"E; 1244 m; 18.VII.2015; T. Lautenschläger 2015_7_37a leg.; understory of rainforest; DR [DR048228]; Município de Uíge, near village Pambu; 07°25'59"S, 015°10'23"E; 1244 m; 18.VII.2015; T. Lautenschläger 2015_7_37b leg.; understory of rainforest; DR [DR048227].

Identification. This species was previously considered to be endemic to Gabon where it grows as a rheophyte (Heine 1966; Sosef et al. 2006). The Angolan specimen is a good match for the type material, for example in the narrow lanceolate leaves and lax, long-pedunculate inflorescences. However, this species is closely allied to *H. triflora* (Forssk.) Roem. and Schult., which is one of the four species of *Hypoestes* previously recorded in Angola (Darbyshire 2015), and it may ultimately prove to be an extreme variant of that widespread species.

Distribution and habitat. Gabon. Amongst rocks along streams and rivers.

References. Heine (1966); Sosef et al. (2006); Darbyshire (2015).

Family Amaranthaceae

Calicorema capitata (Moq.) Hook.f.

Figure 4A

Examined material. ANGOLA – Namibe Province • Cunene river bank near Otchinungua; 17°13'15"S, 012°26'11"E; 256 m; IX.2018; F. Lages 364 leg.; river bank; LUBA[LUBA037451-0].

Identification. Stems are greenish grey and intertwined, with few linear, succulent leaves. The single flowers are conspicuous, the outside of the sepals is covered in long silky hairs, while the inside and the stamens and pistil are bright pink.

Distribution and habitat. Western Namibia, South Africa: Northern Cape. Stony or gravelly areas along dry riverbeds.

Reference. Cooke and Wright (1915).

Family Anacardiaceae

Lannea schweinfurthii var. *stuhlmannii* (Engl.)

Kokwaro

Examined material. ANGOLA – Bié Province • Chitembo municipality, near Jamba; 13°36'31"S, 016°37'28"E; 1627 m; V.2012; R. Revermann 134696 leg.; miombo woodland; HBG[HBG526988], LUBA[LUBA035239-0].

Identification. This variety differs from the others in

having more or less glabrous leaflets. Unlike other *Lannea* species, the inflorescences appear simultaneously with the leaves (not before) and are borne solitary in the leaf axils (not terminally aggregated on short branches).

Distribution and habitat. Kenya to southern Africa. Miombo woodland.

References. Exell and Mendonça (1954a); Kokwaro and Gillett (1980).

Ozoroa paniculosa (Sond.) R.Fern. & A.Fern.

Figure 6G

Examined material. ANGOLA – Huíla Province • Bicular National Park, Biodiversity Observatory; 15°10'19"S, 014°55'13"E; 1197 m; V.2016; M. Finckh 143452 leg.; woodland–grassland ecotone towards a shallow river valley; HBG[HBG526989], LUBA[LUBA036258-0].

Identification. It has been collected near Ruacana (Namibia) before, close to the Angolan border, and we provide here the first definitive collection in Angola. Distinguished from other *Ozoroa* species by oblong leaves with clearly raised lateral nerves below and an undulate margin.

Distribution and habitat. Southern Africa. Grassland–woodland ecotone.

References. Exell and Mendonça (1954b); Fernandes and Fernandes (1966).

Family Apocynaceae

Landolphia villosa J.G.M.Pers.

Examined material. ANGOLA – Uíge Province • Município de Milunga; 06°46'58"S, 016°12'38"E; 1062 m; 14.II.2019; C. Heinze CH 2019_35 leg.; forest; DR [DR056598].

Identification. *Landolphia villosa* and *L. jumellei* (Pierre ex Jum.) Pichon are distinguishable from other species of *Landolphia* in Central Africa (including Angola) by their more or less dense rusty hirsute indumentum, in combination with a densely hairy ovary and an axillary inflorescence. The indumentum is denser on younger branches. *L. villosa* differs from *L. jumellei* in the shape of the calyx lobes. *L. jumellei* has recurved (at the apex) calyx lobes at least 1.9 times as long as wide, while *L. villosa* has straight calyx lobes up until 1.1 times as long as wide. Furthermore, *L. jumellei* has a thicker flower bud, well distinguishable in the field.

Distribution and habitat. Central Africa excluding Gabon. Primary, secondary, and gallery forests. Elevation 0–700 m.

Reference. Persoon et al. (1992).

Tabernaemontana brachyantha Stapf

Examined material. ANGOLA – Uíge Province • Município de Uíge; in Serra do Pingano; 07°41'07"S, 014°55'46"E; 930 m; 31.X.2013; B. Ditsch BD558 leg.; rainforest near waterfall; DR [DR067786].

Identification. This species has not until now been re-

corded from Angola, but collections do exist from ca. 200 km to the north in Bas Congo, across the border in D.R. Congo. Photos of the flower show no twisting of the corolla tube, which helps to distinguish this species from the otherwise similar *T. pachysiphon* Stapf.

Distribution and habitat. South-east Nigeria, Cameroon, Gabon, Equatorial Guinea, D.R. Congo (Bas Congo). Rainforest.

Reference. Leeuwenberg (1991).

Family Asteraceae

***Inula robynsii* De Wild.**

Examined material. ANGOLA – Uíge Province • Near Mucaba swamp; 07°12'52"S, 015°06'23"E, 1160 m; II.2018; T. Lautenschläger 2018-02-78 leg.; sandy savannah; DR[DR068232].

Identification. *Inula robynsii* differs from other *Inula* species by its cauline leaves that are cuneate and not caudate or auriculate. Furthermore, the up to 2 cm wide capitula are clustered in terminal corymbose cymes. The involucre bracts are herbaceous above. All florets are tubular and hermaphrodite.

Distribution and habitat. D.R. Congo, Zambia, Cameroon. Sandy area at 1200 m height.

Reference. Wild (1980).

***Senecio venosus* Harv.**

Figure 4G

Examined material. ANGOLA – Huíla Province • Few km S of Humpata; 15°02'44.87"S, 013°22'59.88"E, 1846 m; I.2009; N.G. Bergh 1859 leg.; on clayey soils in shaded places; LUBA[LUBA34185-0].

Identification. This species can be distinguished from the very similar *S. latifolius* DC., *S. retrorsus* DC., and *S. pergamentaceus* Baker by the clearly translucent veins that become apparent when holding a leaf against the light. Also, unlike *S. latifolius*, it is not known to be poisonous to livestock.

Distribution and habitat. Southern Africa. Woodland and grassland.

Reference. Kirby (2013).

***Vernonia lualabaensis* De Wild.**

Figure 6H

Examined material. ANGOLA – Bié Province • Chitembo municipality; 13°42'14"S, 017°04'09"E; 1522 m; V.2011; R. Revermann 132477 leg.; psammoferralithic geoxyle grassland; HBG[HBG526990] • Cusseque, Biodiversity Observatory; 13°41'09"S, 017°05'02"E; 1544 m; XII.2014; M. Finckh 135898 leg.; psammoferralithic woodland–grassland ecotone; HBG[HBG526991].

Identification. This is a poorly known taxon of which only the original description and type material are available. The diagnostic leaves are markedly discoloured, with a pale golden-brown underside that is densely tomentose, whereas the upper side is dark brown-green and glabrous.

Distribution and habitat. D.R. Congo. Ferralithic geoxyle grassland, ecotone to miombo woodland.

Reference. De Wildeman (1915: 93).

Family Burseraceae

***Commiphora giessii* J.J.A.van der Walt**

Figure 4C

Examined material. ANGOLA – Namibe Province • Iona National Park; 16°40'50"S, 012°26'13"E; 482 m; VII.2007; N. Juergens 30593 leg.; gravel plain; HBG[HBG527148].

Identification. *Commiphora giessii* is a dioecious shrub with numerous straight slender woody stems with a reddish-brown bark and trifoliate leaves. It differs from *C. virgata* Engl. by the lack of the thickened basal stem and the bark is not or only slightly peeling.

Distribution and habitat. Namibia. Mostly found in rocky slopes and plains with shallow gravel above rock.

References. Exell and Mendonça (1951a); van der Walt (1973).

Family Capparaeae

***Boscia integrifolia* J.St.-Hil.**

Examined material. ANGOLA – Cuando Cubango Province • Comuna de Caiundo; 14°59'22"S, 017°39'44"E; 1415 m; III.2013; R. Revermann 136374A leg.; dense *Baikiaea* woodland; HBG[HBG526992].

Identification. *Boscia integrifolia* is closely related to *B. cauliflora* Wild, but with much denser leaf reticulation and corymbose terminal inflorescences. The synonym *B. angustifolia* A.Rich. is often in use.

Distribution and habitat. Tropical, southern and eastern Africa, Arabian Peninsula. *Baikiaea* woodland.

References. Exell and Mendonça (1937); Dale and Greenway (1961).

Family Combretaceae

***Combretum elaeagnoides* Klotzsch**

Examined material. ANGOLA – Bié Province • Chitembo municipality; 13°41'23"S, 016°58'53"E; 1606 m; V.2011; M. Finckh 132538 leg.; Miombo–*Cryptosepalum* forest; HBG[HBG526993], LUBA[LUBA035149-0]. – Cuando Cubango Province • Candelela, Biodiversity Observatory; 16°29'37"S, 017°48'01"E; 1141 m; III.2013; R. Revermann 136327 leg.; open *Baikiaea* woodland; HBG[HBG526994], LUBA[LUBA035909-0] • Menongue municipality; 14°31'06"S, 017°38'40"E; 1494 m; IV.2013; R. Revermann 136462 leg.; degraded miombo woodland; HBG[HBG526995], LUBA[LUBA035913-0].

Identification. This species is a small deciduous tree up to 6.5 m, with narrowly elliptic leaves, and 4-merous, subcircular to elliptic fruits <3.5 cm. Most organs are conspicuously lepidote, i.e. densely covered by silvery

scales of 120–175 µm diameter. The occurrences in Angola demonstrates that this species is not restricted to the course of the Zambezi River.

Distribution and habitat. Southern East Africa. Various types of open woodland.

Reference. Exell (1978).

Family Connaraceae

***Agelaea paradoxa* var. *microcarpa* Jongkind**

Figure 3A

Examined material. ANGOLA – Uíge Province • Município de Quitexe; 07°50'28"S, 014°50'32"E; 738 m; 13.XI.2019; T. Lautenschläger 2019_11_53 leg.; recently cut primary forest in Serra Vamba; DR[DR060228] • Município de Quitexe; 07°51'11"S, 014°50'28"E; 815 m; 13.XI.2019; T. Lautenschläger 2019_11_73 leg.; recently cut primary forest in Serra Vamba; DR[DR060225].

Identification. *Agelaea paradoxa* Gilg differs from other *Agelaea* species by the shorter sepals (up to 2 mm long) without small but conspicuous multicellular hairs on the edge. It also lacks the fascicled hairs present in all other African *Agelaea* species. (hairs that look like 2-armed or star shaped hairs, but are 2–4 separate hairs touching at base).

Distribution and habitat. Senegal to eastern D.R. Congo. Rainforest.

References. Exell and Mendonça (1954c); Jongkind and Lemmens (1989); Breteler et al. (1992).

Family Convolvulaceae

***Ipomoea hackeliana* (Schinz) Hallier f.**

Examined material. ANGOLA – Cuando Cubango Province • Calai municipality; 17°52'20"S, 019°45'21"E; 1083 m; IV.2013; R. Revermann 136512 leg.; degraded *Baikiaea* woodland; HBG[HBG527003].

Identification. It has been collected near Oshikango (Namibia) before, close to the Angolan border, and we provide here the first definitive collection in Angola. Diagnostic features are its annual habit, cordate-ovate leaves, and rather small whitish flowers. Often at disturbed sites.

Distribution and habitat. Southern Africa. Open woodland.

Reference. Gonçalves (1987a).

***Ipomoea magnusiana* Schinz**

Examined material. ANGOLA – Huíla Province • Bicular National Park, Biodiversity Observatory; 15°10'42"S, 014°55'37"E; 1231 m; XII.2015; M. Finckh 141681 leg.; *Baikiaea* woodland; HBG[HBG527004].

Identification. It has been collected near Ruacana (Namibia) before, close to the Angolan border, and we provide here the first definitive collection in Angola. Diagnostic features are its palmate (3–5), long pedicelled leaves and solitary pinkish flowers on peduncles up to 10 cm long.

Distribution and habitat. Southern Africa. *Baikiaea* woodland.

Reference. Gonçalves (1987b).

Family Euphorbiaceae

***Euphorbia erythrocephala* P.R.O.Bally & Milne-Redh.**
Figure 5B

Examined material. ANGOLA – Moxico Province • Cameia National Park; 11°31'41"S, 020°54'58"E; 1132 m; III.2022; M.Finckh and P.Meller 145543 leg.; ecotone between flooded savannah and miombo woodland; HBG[HBG527151].

Identification. *Euphorbia erythrocephala* has a broom-like appearance, with small, inconspicuous leaves along several straight, unbranched, dull green shoots. As a characteristic feature, each shoot bears a terminal inflorescence of crimson color, consisting of 1–4 cyathia. The shoots are annual and emerge from a perennial, thick woody rootstock; all of which contain white latex.

Distribution and habitat. West Zambia. Dambo grassland and open miombo woodland.

Reference. Carter and Leach (2001a).

***Euphorbia phylloclada* Boiss.**

Figure 4F

Examined material. ANGOLA – Namibe Province • Tombwa municipality; 15°44'45"S, 012°08'24"E; 97 m; VII.2007; N. Juergens 30627 leg.; sandy river canyon; HBG[HBG527145].

Identification. *Euphorbia phylloclada* is a spreading to prostrate annual to perennial herb. Very attractive series of opposite green-white colored bracts at apical branches are characteristic. *Euphorbia phylloclada* is sister to the annual *E. glanduligera* Pax.

Distribution and habitat. Namibia, South Africa. Dry riverbeds, sand and gravel plains, and on rocky slopes.

Reference. Bruyns et al. (2006).

Family Fabaceae

***Crotalaria miranda* Milne-Redh.**

Examined material. ANGOLA – Bié Province • Chitembo municipality, Cusseque, TFO core site; 13°41'24"S, 017°06'45"E; 1561 m; XI.2011; R. Revermann 132931 leg.; open miombo (*Julbernardia*) woodland; HBG[HBG527012] • Chitembo municipality, Cusseque, TFO core site; 13°41'13"S, 017°04'55"E; 1558 m; XI.2011; R. Revermann 133144A leg.; woodland–grassland ecotone; HBG[HBG527013] • Chitembo municipality, Cusseque, TFO core site; 13°41'08"S, 017°05'08"E; 1540 m; XI.2011; R. Revermann 133178 leg.; wooded grassland; HBG[HBG527014].

Identification. Diagnostic features are unifoliate leaves, small stipules, yellow wing petals, and a shorter calyx than the similar *C. juncea* L. (5–7 mm vs. 16–20 mm).

Distribution and habitat. Tanzania, Zambia. Miombo woodland.

References. Torre (1962); Polhill (2003).



Figure 5. Selected plant species. **A.** *Elatostema paivaeatum*. **B.** *Euphorbia erythrocephala*. **C.** *Euphorbia thymifolia*. **D.** *Helinus mystacinus*. **E.** *Leptactina laurentiana* var. *laurentiana*. **F.** *Portulaca grandiflora*. **G.** *Pterygota bequaertii*. **H.** *Scepcarpus repens*. Photos: A by B. Ditsch; B, F by P. Meller; C by Anne Göhre; D, E, G, H by T. Lautenschläger.

***Cyclocarpa stellaris* Afzel. ex Urb.**

Examined material. ANGOLA – Uíge Province • Provincia de Luanda [correct name at that time: district of Congo, today: province of Uíge]: Congo 1 km nördlich der Mission Sanza Pombo; Blüten gelb; 07°21'12"S, 016°17'04"E; 15.IV.1952, H.E. Hess and E. Hess-Wyss 52/1335 leg.; Savanne; ZT[ZT00077785].

Identification. The slender shrub is characterized by its coiled fruits with 9 or 10 segments and paripinnate sessile leaves. Stipels are ovate to acuminate and have a long lanceolate basal appendage. The 3–4 pairs of leaflets do not exhibit stipels. The specimen of the Hess collection were originally identified in 1990 by F. Smagghe, Ghent University and now confirmed by us.

Distribution and habitat. Tropical Africa, South-east Asia, and Australia. Savannah.

Reference. Hepper (1958).

***Dolichos subcapitatus* var. *angustifolius* Mackinder**
Figures 4E, 6E

Examined material. ANGOLA – Bié Province • Chitembo municipality; 13°42'12"S, 017°05'06"E; 1513 m; I.2020; M. Finckh and P. Ziegelski 145340B leg.; sandy geoxyle grassland; HBG[HBG527015].

Identification. The big triangular stipules are very conspicuous. The nominate form has broader leaflets and is known from the floristically eccentric Katanga region in D.R. Congo, whereas var. *angustifolius* has been known to occur further south in Zambia. Our Angolan specimen show even narrower leaflets.

Distribution and habitat. Zambia. Deep sand geoxyle grassland.

References. Torre (1966); Mackinder (1999).

***Humularia pseudaeschnomene* Verdc.**

Examined material. ANGOLA – Moxico Province • Cameia National Park; 11°44'28"S, 021°10'40"E; 1114 m; XI.2016; M. Finckh and P. Ziegelski 143566 leg.; on elevated (not inundated) termitarium within a seasonally flooded plain; HBG[HBG527016], LUBA[LUBA036188-0].

Identification. Distinguished from other *Humularia* species in the area in that bracts are all completely divided to the base.

Distribution and habitat. Zambia. Lowly elevated islets in seasonally flooded grassland.

References. Torre (1966); Verdcourt (1972).

Family Lamiaceae

***Acrotome tenuis* G.Taylor**

Examined material. ANGOLA – Bié Province • Chitembo municipality; 13°34'23"S, 016°48'03"E; 1646 m; V.2012; R. Revermann 134517 leg.; degraded miombo woodland; HBG[HBG527017].

Identification. Unlike other *Acrotome* species, flowers of *A. tenuis* are aggregated in solitary terminal capitulae

and the general habit is slender and unbranched.

Distribution and habitat. Zambia. Miombo woodland.

Reference. Taylor (1932).

***Clerodendrum globuliflorum* B.Thomas**

Figure 3C

Examined material. ANGOLA – Uíge Province • Município de Uíge, Kunga Quiximba; 07°36'17"S, 014°57'34"E; 880 m; 9.III.2013; B. Ditsch BD175 leg.; nahe Bachlauf; DR[DR067349].

Identification. The sessile inflorescences of this species are lateral on leafless hollow branches.

Distribution and habitat. Nigeria to Congo Republic. Rainforest.

Reference. Hubner et al. (1963).

***Coleus melleri* (Baker) A.J.Paton & Phillipson**

Figure 3E

Examined material. ANGOLA – Uíge Province • Município de Mucaba; 07°13'01"S, 015°06'08"E; 1181 m; 17.XI.2015; T. Lautenschläger 2019_s.n. leg.; swampy forest patch; DR[DR065503].

Identification. The species is characterized by more or less fusiform densely brown-villose bulbils in leaf axils of branches and inflorescences.

Distribution and habitat. Liberia, Gabon, Uganda to southern tropical Africa, Madagascar. Swampy forest patches.

References. Morton (1963); Paton et al. (2019).

***Rothea wildii* (Moldenke) R.Fern.**

Figure 3H

Examined material. ANGOLA – Uíge Province • Município de Ambuila, near village Bombo; 07°31'11"S, 014°34'16"E; 446 m; 14.X.2016; A. Kempe 2016_55 leg.; on rocks; DR[DR050183].

Identification. Very few described species of *Rothea* flower without leaves. *Rothea wildii* is easily distinguished from other species by the bark being purplish-grey when young, becoming pale to dark greyish-brown and corky and longitudinally wrinkled when dry, with whitish prominent lenticels and concave cordate-elliptic to semicircular leaf scars surrounded by raised corky margins. *Rothea wildii* is widespread, but this occurrence in Angola is disjunct being over 1500 km from the nearest other collections which are in Mazabuka and Chiweuwe Districts of in southern and central Zambia respectively and Nunga river area in north-western Botswana. Elsewhere, it is found on sandy soils around granite outcrops and on dry rocky hillsides in dry wooded grassland at 150–1500 m. Although the distribution is wide, the habitat is naturally fragmented and long-distance dispersal is the most likely cause of the disjunct pattern.

Distribution and habitat. Botswana, Malawi, Mozambique, South Africa (Limpopo), Zambia, Zimbabwe. On limestone rock, 800 m.

References. Fernandes (2005a); Manyama and Kamundi (2006).

***Tetradenia kaokoensis* van Jaarsv. & A.E.van Wyk**

Examined material. ANGOLA – Namibe Province • Iona Police station, Iona peaks; 16°54'33"S, 012°35'58"E; 474 m, I.2009; E. van Jaarsveld 22650 leg.; on cliff near peak; LUBA[LUBA34554-0].

Identification. This species resembles the widely spread *T. riparia* (Hochst.) Codd., but can be distinguished by its succulent roots, dense white-cobwebby indumentum, orange sessile gland dots, and characteristic thick young branches with crowded leaves on pointy, woody phyllodia with heart-shaped leaf scars.

Distribution and habitat. North-west Namibia. Rock cracks in precipices of dolomite cliffs.

Reference. Van Jaarsveld and Van Wyk (2003).

Family Malvaceae

***Pterygota bequaertii* De Wild.**

Figure 5G

Examined material. ANGOLA – Uíge Province • Município de Quitexe, Serra Vamba; 07°50'28"S, 014°50'32"E; 738 m; 14.XI.2019; T. Lautenschläger 2019_11_102 leg.; forest edge; DR[DR067708].

Identification. The form and dimension of the fruit clearly differentiate it from other species like *P. macrocarpa* K.Schum. or *P. mildbraedii* Engl.

Distribution and habitat. West and Central-West Tropical Africa. Rainforest.

Reference. Hutchinson and Dalziel (1958a).

Family Meliaceae

***Carapa macrantha* Harms**

Figure 3D

Examined material. ANGOLA – Uíge Province • Municipality of Bungo, Serra Mucaba; 07°25'49"S, 015°10'03"E; 1198 m; 1.X.2018; T. Lautenschläger 2018_10_119 leg.; secondary forest near stone quarry; DR[DR066681].

Identification. This usually monocaulous tree has leaves longer than 60 cm with truncate leaflets lacking any indumentum. The 5-merous flowers are composed of a dark purple calyx and dark purple petals, as well as an up to 4.5 mm long, 10-lobed staminal tube.

Distribution and habitat. From South Nigeria to D.R. Congo. Rainforest.

References. Exell and Mendonça (1951b); Kenfack (2011).

Family Passifloraceae

***Barteria solida* Breteler**

Figure 3B

Examined material. ANGOLA – Uíge Province • Mu-

nicipality of Damba; near street between Mucaba and Damba; 06°55'09"S, 015°11'21"E; 1094 m; 20.XI.2014; M. Futuro s.n. leg.; forest remnant; DR[DR042749].

Identification. In contrast to *Barteria nigritana* Hook.f., *B. dewevrei* De Wild. and T.Durand, and *B. fistulosa* Mast., the branches of *B. solida* are solid without housing ants. The species has 1 or 2 flowers per axillary inflorescence and flowers on the upper side of the branches.

Distribution and habitat. Eastern Nigeria, Cameroon, Gabon, Congo Republic, western D.R. Congo; 500–1600 m. Rainforest.

References. Breteler (1999); Fernandes and Fernandes (1970).

Family Rhamnaceae

***Helinus mystacinus* (Aiton) E.Mey. ex Steud.**

Figure 5D

Examined material. ANGOLA – Uíge Province • Provincia de Luanda [correct name at that time: district of Congo, today: province of Uíge]: Congo, nördlich des Postens Sanza Pombo (Concelho Sanza Pombo); Blüten Weiss; 06°58'36"S, 016°22'47"E; 10.IV.1952; H.E. Hess and E. Hess-Wyss 52/1261 leg.; Wälder mit viel wildem Kaffee; ZT[ZT00082847].

Identification. The species is clearly distinguishable from *Helinus integrifolius* (Lam.) Kuntze by the well-developed indumentum: hairs cover the sepals, the inflorescences, the tendrils, and even the capsules.

Distribution and habitat. From Eritrea in the north to Mozambique in the south and the D.R. Congo in the west. Forest margins.

References. Exell and Mendonça (1954d); Drummond (1966).

Family Rubiaceae

***Bertiera loraria* N.Hallé**

Examined material. ANGOLA – Uíge Province • Municipality Uíge; near village Bemvindo; 07°40'22"S, 014°56'17"E; 615 m; 30.X.2013; B. Ditsch BD551 leg.; secondary forest DR[DR067783].

Identification. *Bertiera loraria* is characterised by contracted terminal inflorescences, linear calyx lobes about 4–9 mm long, and tubular stipules. It differs from the similar *B. letouzey* N.Hallé in having glabrous to only slightly puberulous leaf blades with cuneate base. More hairs are present on the leaf veins, with domatia in the nervature axils.

Distribution and habitat. Central African Republic, Cameroon, Gabon, Congo Republic, D.R. Congo. Rainforest.

References. Hallé (1963); Nguembou et al. (2003).

Leptactina laurentiana* Dewèvre var. *laurentiana

Figure 5E

Examined material. ANGOLA – Uíge Province • near

waterfall in Serra do Pingano; 07°40'56"S, 014°56'05"E; 687 m; 16.II.2015; B. Ditsch BD740 leg.; forest; DR[DR067226].

Identification. *L. laurentiana* is a lianescent shrub with small erect stipules up to 1 cm long and terminal inflorescences. The variety *laurentiana* is distinguished from var. *seretii* (De Wild.) Neuba by the fruits less than 1 cm long.

Distribution and habitat. From Cameroon to D.R. Congo. Rainforest.

Reference. Neuba et al. (2014).

***Pavetta membranifolia* K.Krause**

Examined material. ANGOLA – Uíge Province • 07°43'08"S, 014°44'45"E; 600 m; 21.II.2017; T. Lautenschläger 2017-2-98 leg.; forest; DR[DR052015].

Identification. *P. membranifolia* belongs to the subgenus *Pavetta*, characterised by a long corolla tube exceeding the lobes in length with the throat of the corolla not bearded. The species can be recognised by its lax inflorescences and linear to triangular calyx lobes about 4–7 mm long. The leaves are obovate-oblong, up to 18 × 9 cm large, with a petiole of 2–3 cm. The corolla tube is about 2 cm long, the style about 7 cm.

Distribution and habitat. Cameroon, Gabon, D.R. Congo. Rainforest near limestone.

Reference. Engler (1916).

***Vangueria pygmaea* Schltr.**

Figure 4H

Examined material. ANGOLA – Huíla Province • Tundavala SASSCAL Observatory; 14°47'58"S, 013°24'29"E; 2226 m; I.2022; P. Meller s.n. leg.; Afromontane grassland; HBG[HBG527150].

Identification. Generally known under the synonym *Pachystigma pygmaeum* (Schltr.) Robyns. Diagnostic features separating it from other *Vangueria* and *Pachystigma* species is the suffrutescent habit with an extended underground woody rhizome, and few inflorescences borne near the ground.

Distribution and habitat. Southern to eastern Africa. Geoxyle grassland.

Reference. Bridson (1998).

Family Urticaceae

***Elatostema paivaeum* Wedd.**

Figure 5A

Examined material. ANGOLA – Uíge Province • Municipality of Quitexe, Serra do Pingano; 07°41'07"S, 014°55'46"E; 930 m; 31.X.2013; B. Ditsch BD547b leg.; border of a creek in the forest; DR[DR050185].

Identification. This species differs from *E. welwitschii* in having a smaller number of teeth on each side of the long-acuminate leaf lamina (16–22).

Distribution and habitat. From west tropical Africa to

Malawi and Tanzania. Rainforest.

References. Hutchinson et al. (1958b); Friis (1991).

***Scepcarpus flamignianus* (Lambinon) T.Wells & A.K.Monro**

Examined material. ANGOLA – Uíge Province • Serra Pingano; 07°40'56"S, 014°56'05"E; 687 m; 12.II.2017; T. Lautenschläger 2014_s.n. leg.; in forest; DR[DR060189] • Serra Pingano; 07°40'56"S, 014°56'05"E; 687 m; 12.II.2017; T. Lautenschläger 2014_s.n. leg.; in forest; DR[DR060198].

Identification. Also known as *Urera flaminigiana* Lambinon, but this genus was recently revised by one of the co-authors (see Wells et al. 2021) and is yet not changed in PoWO. With a distinctively dense covering of hairs on leaves, which are often tinted silver or reddish-golden. Inflorescences are compact corymbs, generally with a pronounced initial fork in the peduncle. Female flowers are subtended by a dense ring of stinging hairs, and the perianth is almost entirely fused, covering the entire ovary.

Distribution and habitat. West tropical Africa, from eastern Nigeria to D.R. Congo. Rainforest.

References. Sosef et al. (2018); Wells et al. (2021).

***Scepcarpus repens* (Wedd.) T.Wells & A.K.Monro**
Figure 5H

Examined material. ANGOLA – Uíge Province • Municipality of Uíge; Serra Pingano; 07°40'56"S, 014°56'05"E; 687 m; 12.II.2017; T. Lautenschläger 2017_16a leg.; near waterfall; DR[DR050898].

Identification. Also known as *Urera repens* Wedd., but this genus was recently revised by one of the co-authors (see Wells et al. 2021) and is yet not changed in PoWO. The slender stems and trailing habit distinguish this species from the majority of *Scepcarpus* species, which are generally shrubby lianas growing to many metres in height. Also distinctive are the suborbicular to broadly cordate leaves and the compact corymbs.

Distribution and habitat. West tropical Africa, from eastern Nigeria to D.R. Congo. Rainforest floor near small creeks.

References. Sosef et al. (2018); Wells et al. (2021).

NEOPHYTES

Clade Angiospermae dicotyledons

Family Amaranthaceae

***Amaranthus tortuosus* Hornem.**

Examined material. ANGOLA – Uíge Province • Municipality Maquela do Zombo, Nzadi Quiowa; 06°03'21"S, 015°16'58"E; 16.II.2018; G. Jendras L9 leg.; DR[DR051616].

Identification. The circumscissile capsules of the terminal or axillary inflorescences are shorter than the subequal bracteoles and the 5 perianth segments. The leaves



Figure 6. Selected plant species. **A.** *Chlorophytum sparsiflorum*. **B.** *Cyperus majestuosus*. **C.** *Stanfieldiella oligantha*. **D.** *Cyperus longispicula*. **E.** *Doilichos subcapitatus* var. *angustifolius*. **F.** *Floscopa leiothyrsa*. **G.** *Ozoroa paniculosa*. **H.** *Vernonia luabulensis*. Photos: A by B. Ditsch; B by M. Finckh; C by T. Lautenschläger; D-H Herbarium Hamburgense HBG.

are broadly triangular at the base.

Distribution and habitat. Tropical America. Often cultivated and escaped.

Reference. Hutchinson and Dalziel (1954).

Family Euphorbiaceae

***Euphorbia thymifolia* L.**

Figure 5C

Examined material. ANGOLA – Uíge Province • Kungu Quiximba; 07°36'51"S, 014°58'59"E; 810 m; 29.IV.2014; A. Göhre 373 leg.; edge of village; DR[DR042692] • Município de Maquela do Zombo; 06°03'58"S, 015°06'33"E; 890 m; 18.II.2018; G. Jendras L18 leg.; DR[DR051624] • Banga; 08°43'41"S, 015°10'06"E; 846 m; 17.XI.2016; C. Heinze 129 leg.; DR[DR067257].

Identification. *Euphorbia thymifolia* differs from other prostrate species of *Euphorbia* by having sessile pilose capsules included within the involucre.

Distribution and habitat. A pantropical weed from tropical America, widely introduced in tropical Africa, including in the adjacent D.R. Congo. Disturbed grounds at the village edge.

Reference. Carter and Leach (2001b).

Family Portulacaceae

***Portulaca grandiflora* Hook.**

Figure 5F

Examined material. ANGOLA – Huíla Province • Bicular National Park; near the headquarters; 15°06'02"S, 014°50'22"E; 1245 m; III.2022; M. Finckh s.n. leg.; HBG[HBG527146].

Identification. A plant that is cultivated for ornamental uses because of its large, brightly colourful flowers. In warmer region, these cultivated plants can escape easily. It is an annual or short-lived perennial, and grows prostrate on the ground, forming an attractive cushion full of flowers.

Distribution and habitat. Native to southern South America but introduced to North America and parts of Europe, Africa, and Asia. Ruderal plant.

Reference. Coelho et al (2010).

Family Simaroubaceae

***Brucea javanica* (L.) Merr.**

Examined material. ANGOLA – Uíge Province • Municipality Ambuila, estaleiro Kisanga; 07°40'09"S, 015°02'00"E; 756 m; 15.XI.2019; M. Monizi 2018 s.n. leg.; savannah; DR[DR056586].

Identification. In contrast to the other species, the leaves of *B. javanica* are serrate. The species was found in the neighbouring D.R. Congo.

Distribution and habitat. Tropical and subtropical Asia, northern Australia, D.R. Congo. Disturbed areas.

Reference. Peng and Wayt (2008).

Family Verbenaceae

***Lantana horrida* subsp. *tiliifolia* (Cham.)**

R.W.Sanders

Examined material. ANGOLA – Uíge Province • municipality Uíge, campus of UniKiVi; 07°35'42"S, 014°59'09"E; 798 m; 31.I.2014; T. Lautenschläger s.n. leg.; savannah; DR[DR050177].

Identification. The lowermost bracts are linear-lanceolate and only up to 2 mm wide. The plant is covered with gland-tipped and bristle-like hairs. The fruiting spikes do not elongate when fruiting.

Distribution and habitat. Tropical South America, Zambia. Degraded savannah.

Reference. Fernandes (2005b).

Discussion

This study provides records of 67 plant species that were not previously known from Angola. This is a remarkable number, which highlights the need for further surveys of old collections stored in herbaria, and for new plant collections from more remote areas.

In comparison, recent studies reporting new records in tropical regions list fewer species, e.g. 11 new records in Singapore (Lim et al. 2018), 23 from Shan state in Myanmar (Kang et al. 2018), or 55 from Santa Catarina, Brazil (Funez et al. 2017). Those studies focus on a single region, whereas our study combines the work of several groups working in Angola, thus providing more new floristic knowledge at once. This work adds to recent reports of new records (Lautenschläger et al. 2020b) and species (e.g. Swanepoel et al. 2021) in Angola, and we expect more to come if survey efforts will be increased, and/or more alien species are introduced (Rejmánek et al. 2017).

With their occurrence now confirmed in Angola, five species show a disjunct distribution pattern, with several hundreds to thousands of kilometres to the nearest known population, e.g. *Senecio venosus* and *Cyperus longispicula*. Several explanations are possible for such patterns, e.g. populations in between exist but have not been found yet; populations in between existed under past climatic conditions but are now extinct (Ehrich et al. 2007; Kuhn et al. 2016); long distance dispersal of seeds (Popp et al. 2011; Villaverde et al. 2015) or human transport and introduction (Hulme 2009).

For instance, *Senecio venosus* is found in humid Afrotropical regions in western Angola, and far away South Africa/Eswatini. But from there, it ranges throughout the wetter eastern part of Southern Africa as far as southern Zambia, making the distance superable. The remaining gap might be conquerable via aerial seed dispersal, of which particularly Asteraceae species are capable of, because of their pappi (Muñoz et al. 2004).

Similarly, *Rothea wildii* is known from elevated rocky sites in southern East Africa, and the population

nearest to the Angolan one is in Zambia, 1500 km away. Since *Rothea* does not have wind dispersed seeds, this distribution pattern is more likely caused by animal dispersal (Popp et al. 2011), or by a broader corridor of Afromontane habitats in this area during the Pleistocene (Allen et al. 2021).

Several findings from eastern Angola (Moxíco) represent logical range extension from similar and contingent habitats in western Zambia and southern D.R. Congo, being part of the Flora zambesiaca area. *Eriocaulon glandulosum* for instance was originally collected in wetlands directly at the Angola/D.R. Congo boarder, but on the Congolian side; we collected it approximately 180 km away from this place in similar habitats on the Angolan side. Such patterns are not surprising as Angola, and particularly Eastern Angola, are floristically still little explored (Goyder and Gonçalves 2019).

Within our study, we identified two species hitherto thought to be endemic to D.R. Congo as new records for Angola (*Commelina robynsii* and *Vernonia lualabaensis*), thereby expanding their geographic range. Both are poorly sampled and little-known species. Therefore, we provide additional information about their habitat and distribution. *Commelina robynsii*, *Vernonia lualabaensis*, and *Dolichos subcapitatus* var. *angustifolius* are known from the Upper Katanga (copperbelt) area, where metal-rich soils promote a unique flora (Malaisse et al. 2016). In Angola, they occur in comparable woodland–grassland mosaics on shallow bedrock (Bié Plateau), where the soils have a lower metal content and are rather dominated by iron/aluminium than by copper/cobalt (Gröngröft 2013). More than 900 km including the Zambezi graben separate these populations, but this Katanga–Bié distribution pattern has been reported before, for example for the Asteraceae *Schistostephium crataegifolium* (DC.) Fenzl ex Harv. (Gonçalves et al. 2016).

Many of the new records from Uíge presented here have a Guineo-Congolian background. This is because the mountain ranges in Uíge are covered by evergreen tropical forest and represent an exclave of the Guineo-Congolian Floristic Region (Lautenschläger et al. 2020b). Probably, the exclave is a remnant of a broader expanse of montane habitats in the Pleistocene, when a corridor of evergreen tropical forests likely spanned from Cameroon over Angola to East Africa (Allen et al. 2021). The finding of a high number of new records in Uíge province in the recent past reflects increasing research effort, but also improved accessibility into the steep mountain ranges by logging companies (Lautenschläger pers. obs.). However, increasing uncontrolled deforestation, agroforestry and bushmeat hunting (Teutloff et al. 2021) follows this improved access.

Four of the five newly documented alien species originate from the Neotropics. The only neophytic species of Asian and northern Australian origin, *Brucea javanica*, was already documented for the provinces of Kinshasa and Équateur in the adjacent D.R. Congo (GBIF 2022).

It was found in savannah at the edge of a village and may well have been introduced to Angola from the D.R. Congo recently by local people because of its medicinal properties (Chen et al. 2013).

All of the five alien species new to Angola are already known from tropical Africa. *Lantana horrida* subsp. *tiliifolia* was up to now only found in Zambia and Burundi. *Amaranthus tortuosus* was already found in West Africa (Benin, Cote d'Ivoire, Senegal, and Burkina Faso) as well as in East Africa (Tanzania and Rwanda). It may have escaped from cultivation as a green vegetable for human nutrition or as a medicinal herb (CABI 2021). According to the CABI website, several African countries list *A. tortuosus* as invasive. Still, neither this species nor the remaining ones are listed as invasive by the IUCN Global Invasive Species Database (ISSG 2015).

Unless Angola's number of naturalised aliens compared to Zimbabwe and South Africa is still rather modest (Rejmánek et al. 2016; Spear et al. 2013; Smith and Figueiredo 2017; Figueiredo and Smith 2022), constant monitoring in the future is needed as higher rates are to be expected due to decreasing isolation of the country.

Only 10 of the 67 listed taxa are assessed for the IUCN Red List (2022) (Table 2). Two of these are categorized as Vulnerable with unknown population status (*Hypoestes potamophila* and *Pterygota bequaertii*). The finding of additional populations and areas of occurrence in Angola will therefore improve their conservation status. This kind of information is urgently needed for reliable updated assessments. Seven taxa are listed as least concern, the remaining 58 taxa are stable, or their population trend is unknown. Thus, the conservation status of 85% of the species presented here is not assessed yet, which sadly is representative of many other tropical regions globally, where status of plant species is Data Deficient (Brummitt et al. 2008). For instance, 15 of the taxa presented here that were not assessed for the IUCN Red List show localized distributions (Table 1). This could be threatening for the taxa when their area of occurrence is experiencing habitat loss and/or climate change (Brooks et al. 2002).

Angola is undergoing rapid land use change and intensification since the end of the civil war, often in an uncontrolled way resulting in habitat degradation and loss. It has one of the highest rates of tree cover loss in Africa due to poorly controlled and increasing extraction of natural resources (Hansen et al. 2013; Catarino et al. 2020). Chiteculo et al. (2018) states that clearance for timber and charcoal production heavily affects the

Table 2. IUCN conservation status categories for the 67 newly recorded species.

Category	Count out of 67	Percent %
Not assessed	57	85.1
Data Deficient	1	1.5
Least Concern	7	10.4
Vulnerable	2	3.0

miombo region. In the northern area of the country, agricultural activities and sand mining are additional threats. The seasonally flooded savannahs in the Moxico province have been targeted for large-scale rice plantations, even within the Cameia National Park (Chiambo et al. 2019; Finckh and Meller pers. obs.). On top of that, southern Angola is expected to get warmer and drier in the near future due to climate change (Barros et al. 2014). With most of the Angolan flora not assessed by the IUCN Red List, it is difficult to predict which effect this habitat loss will have on single species (Brooks et al. 2002). However, established and highly specialized species seldom benefit from habitat loss, and it is much more likely that generalist or invasive species will be at an advantage (Marvier et al. 2004). With ongoing fieldwork and exploration in Angola additional new records are very likely to be documented. However, time is of the essence as several habitats are at high risk of irreversible change, degradation or destruction from different human activities and climate change.

Acknowledgements

We thank Alessia Guggisberg for providing selected samples from the United Herbaria Z+ZT of the University of Zurich and the ETH Zurich that were collected by the married couple Hess who travelled through Angola in 1951–1952. Thanks are given to Robert Faden, Paul Goetgebheur, David Kenfack, Isabel Larridon, Daniel Layton, Geoffrey Levin, Elmar Robbrecht, and Jan Wieringa for their help with species identification, and thanks to Nigel Barker, Nicola G. Bergh, Stoffel Bester, Ralph Clark, Kyle Dexter, Francisco Maiato Gonçalves, Brian J. Huntley, Matt Janks, Rasmus Revermann, Erin Tripp, Ernst van Jaarsveld, and Johannes Wallenfang as collectors.

The University Kimpa Vita was an essential base for our fieldwork in northern Angola and provided logistical support. We are also grateful to the Botanical Garden of the TU Dresden for cultivating plants until essential characters for identification had developed. The fieldwork in Angola was supported by the program “Strategic Partnerships” of the TU Dresden. The published results were obtained in collaboration with the Instituto Nacional de Biodiversidade e Conservação (INBC) of the Ministério da Cultura, Turismo e Ambiente da República de Angola. Fieldwork of N. Jürgens, M. Finckh, and P. Meller (= P. Ziegelski) in the central and southern parts of the country was funded by the German Ministry of Education and Research in the context of The Future Okavango (TFO) (grant number 01LL0912A) and SASSCAL (grant number 01LG1201A, M, N) projects.

Authors' Contributions

Conceptualization: TL. Investigation: MC, DG, ID, ML, TL, TW, AG, BD, CCJ, NJ, PM, CB, HP, AP, MF, FL, AM. Resources: JLM, MM. Visualization: CB, PM.

Writing – original draft: PM, TL. Writing – review and editing: TL, PM.

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