



# Notes on *Justicia* sect. *Monechma* (Acanthaceae) in Angola, including two new species

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## Key words

Cuando Cubango  
Huila  
justicioid  
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**Abstract** Two new species of *Justicia* sect. *Monechma*, *Justicia cubangensis* and *J. erinia*, are described from Angola. Their affinities are reviewed, together with a discussion on the correct generic name to apply to these species. A conspectus of *Justicia* sect. *Monechma* 'Group I' in Angola is presented, including a key to the species and notes on habitat and distribution for each taxon. Two new combinations and one new name are provided for species for which there was no previous name available in *Justicia*, and lectotypes are proposed for four names. Twelve species are recognised in this group in total, eight of which are currently believed to be endemic to Angola. *Justicia subsessilis* is recorded in Angola for the first time, and *J. laeta* is placed in sect. *Monechma*, having previously been tentatively referred to sect. *Tyloglossa*. *Monechma carrissoi* is considered to be conspecific with *J. virgultorum* and so is synonymised here. In addition, the botanical importance of the type locality of *J. cubangensis*, the Cuchi River gorge of the Cubango drainage, is highlighted and two further new provincial records for Cuando Cubango are noted from this site: *Eriocaulon angustibracteum* (Eriocaulaceae) and *Crepidiorhpalon schweinfurthii* (Linderniaceae).

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## INTRODUCTION

Angola remains very unevenly explored botanically despite its rich and diverse flora (Romeiras et al. 2014, Goyder & Gonçalves 2019). Following the end of the prolonged civil war (1975–2002) and the subsequent gradual increase in accessibility of most of the country to scientific study, there has been a renewed interest in the botany of Angola. This was fuelled by the publication of the checklist of vascular plants of Angola (Figueiredo & Smith 2008), and has continued through a series of biodiversity surveys in under-explored parts of the countries (e.g., see Darbyshire et al. 2014, Gonçalves & Goyder 2016, Goyder & Gonçalves 2019) which have consistently resulted in the discovery of a significant number of new plant species to science and/or new plant records for Angola. In this paper, we report on the discovery of two new species of *Justicia* L. sect. *Monechma* (Hochst.) T. Anderson, found during two such recent expeditions, and we provide a synoptic review of this group in Angola.

The first of the new species of *Justicia* was discovered in May 2015 as part of a major biodiversity assessment of the upper catchment of the Okavango system in Angola – the Okavango Wilderness Project – during which the second author had the opportunity to visit the Cuchi River gorge. The 17 specimens collected at this site included a perennial species of *Justicia* sect. *Monechma*, a single plant of which was found growing amongst grass in open miombo woodland close to the gorge. On studying the specimen at Kew herbarium (K) and comparing it to type material available on JSTOR Global Plant (<https://plants.jstor.org/>), the species was found to be most similar to *Justicia lolioides* S.Moore (1880: 310) (= *Monechma lolioides* (S.Moore) C.B.Clarke) from the Pungo Andongo region of northern Angola, but differing in a number of key characters

(see Table 1). A subsequent review of specimens in the BM, K and LISC herbaria, which together house the largest historical collections of Angolan plants, revealed three earlier collections of the same species from the Menongue and Kuvango areas (Gossweiler 2701, 3100, Santos & Barroso 2674). The Gossweiler specimens at BM had been misnamed as *M. lolioides* by Moore (1930) and continued to be filed under that name to this day, while the Santos & Barroso specimen was only named to genus. These four collections together form the basis for the new species, *Justicia cubangensis* I.Darbysh. & Goyder, described below.

The second newly described species was discovered in April 2017 during *Acanthaceae*-focussed field research in Namibe Province of Southwest Angola by Erin Tripp of the University of Colorado (COLO herbarium) and Kyle Dexter of the University of Edinburgh. This fieldwork was carried out primarily to study the genus *Petalidium* Nees in Angola, where species are concentrated in the Kaokoveld Centre of floristic endemism which extends from northwest Namibia into the arid southwestern portion of Angola (Van Wyk & Smith 2001, Tripp et al. 2017). The opportunity was also taken to collect specimens of other *Acanthaceae* species as they were encountered. These collections have revealed several new or interesting species, including *Barleria deserticola* I.Darbysh. & E.Tripp, currently under description (Darbyshire et al. 2019), and a species in the tribe *Ruellieae* which is unmatched and yet to be placed to genus (E.A. Tripp, unpubl. data). A duplicate of the specimen of a perennial species of *Justicia* sect. *Monechma*, collected between Bibala and Assunção (Tripp & Dexter 6917), was sent to the first author at K. The specimen was received just as a key to the Angolan species of *Justicia* sect. *Monechma* was in preparation for the current work, and it was immediately recognised as a new species for Angola. On checking the accounts of the genus for southern Africa and Namibia (Meyer 1968, Baden et al. 1995) and the 'Flora of Tropical East Africa' and 'Flora Zambesiaca' regions (Vollesen 2010, 2015), it was clear that this is a new species to science, apparently restricted

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**Table 1** Morphological characters separating *Justicia cubangensis* from *J. loliooides*.

Character	<i>Justicia cubangensis</i>	<i>Justicia loliooides</i>
Indumentum of inflorescence rachis, bracts, bracteoles and calyces	Puberulous with mixed eglandular and capitate-glandular hairs	Glabrous except for short ascending eglandular hairs along margins of bracts, bracteoles and calyx lobes; calyces can have sessile glands
Bract, bracteole and calyx colouration	Apices dark green or purplish, margins with a narrow pale portion	Apices darker only along midrib, margins with a broad pale portion
Bract length: mid-portion of spike	1.8–4.8 mm, markedly shorter than calyces	6–7.5 mm, equal to or only slightly shorter than calyces
Bracteole length	2.5–5.5 mm, markedly shorter than calyces	7–8.5 mm, ± equal in length to calyces
Corolla indumentum: lower lip	Finely eglandular-puberulous	Mixed eglandular-puberulous and numerous coarser conspicuous bristly eglandular hairs
Anther appendage	Apex tapering to a single point, not bifid	Apex bifid
Capsule indumentum	Eglandular-puberulous	Glabrous except occasionally one or two hairs on short beak
Capsule length	± 11 mm (immature)	8–9 mm

to the northern Namib Desert of Angola and unmatched in the herbarium collections studied. It is described below as *Justicia erinia* I.Darbysh.

This work forms a part of wider studies on the *Acanthaceae* of Angola, focussing on the diverse genera *Barleria* L. (Darbyshire et al. 2019), *Justicia* and *Petalidium* (see Tripp et al. 2017), but with the eventual aim of documenting all the genera of *Acanthaceae* there. Recent studies on other genera of *Acanthaceae*, including *Blepharis* Juss. (Vollesen 2000), *Justicia* sect. *Harnieria* Benth. (Hedrén 1989), *Phaulopsis* Willd. (Manktelow 1996), *Hypoestes* R.Br. (Darbyshire 2015) and *Rhinacanthus* Nees (Darbyshire et al. 2018), have all resulted in the description of new, endemic species in Angola.

#### WHAT IS THE CORRECT GENERIC NAME TO APPLY TO THE NEW SPECIES – MONECHMA OR JUSTICIA?

*Monechma* Hochst. has traditionally been separated from *Justicia* based on the presence of 2-seeded capsules with compressed seeds with a smooth testa, vs usually 4-seeded capsules with seeds variously sculptured or if smooth then not so compressed (Hedrén 1990, Baden et al. 1995). However, Hedrén (1990) found that his new species *Justicia tetrasperma* Hedrén has a combination of characters intermediate between *Justicia* and *Monechma*, namely that it has a 4-seeded capsule with compressed smooth seeds. This, together with his observation that it can be difficult to separate members of the two genera in the absence of mature fruits, led Hedrén to suggest that *Monechma* is better treated as a section of *Justicia* as per Anderson (1863). This decision has been followed by several subsequent authors (e.g., Darbyshire et al. 2010, 2015b, Manning & Goldblatt 2014), although others have chosen to maintain *Monechma* as a distinct genus (e.g., Baden et al. 1995, Ensermu 2006, Makholela 2008). However, recent molecular phylogenetic studies on the 'justicioid' lineage (Kiel et al. 2017) indicate that *Justicia* sect. *Monechma* is not monophyletic, with two distinct and widely separated lineages discernible based on limited sampling (six species of sect. *Monechma* sampled). *Monechma* Group I of Kiel et al. (2017), is believed to comprise predominantly tropical African species including the type species of the genus, *M. bracteatum* Hochst. (= *Justicia bracteata* (Hochst.) Zarb), and falls within their 'Core Harnieria' clade together with members of *Justicia* sect. *Harnieria*. *Monechma* Group II of Kiel et al. (2017), is believed to comprise predominantly southern African species and falls within the *Diclipterinae* lineage, sister to the genus *Rhinacanthus* Nees.

Although these two groups of *Monechma* are morphologically similar, particularly in flower and fruit morphology, there is some morphological evidence to support their separation. In particular, there are notable differences in inflorescence form. In Group I

the flowers are usually arranged in 1–few-flowered cymes aggregated into axillary and/or terminal spikes or fascicles with the bracts markedly differentiated from the leaves. These plants are annual or perennial herbs or suffrutices often growing in fire-prone wooded grasslands, although annual species such as *J. bracteata* can be weeds of disturbed areas. In Group II, the species have single- or rarely 2-flowered (sub)sessile axillary inflorescences which can together sometimes form weakly defined terminal spikes but with the bracts largely undifferentiated from the leaves. Species of Group II are mainly found in arid environments and often have either highly reduced and/or densely glandular-hairy leaves, while most are small shrublets (Kiel et al. 2017). Based on these diagnostic morphological characters, the two new species described here are hypothesised to belong within *Monechma* Group I.

Kiel et al. (2017) reviewed the potential taxonomic implications of their findings of the complex relationships between and within genera in the 'justicioid' lineage. They noted that in order to maintain a broadly circumscribed *Justicia*, including morphologically similar taxa such as *Monechma* s.lat., the entire 'justicioid' lineage would potentially have to be treated as a single genus. This is undesirable as it would mean subsuming several large genera that are easily separated morphologically, such as *Dicliptera* Juss. and *Hypoestes* R.Br. If accepting a paraphyletic *Justicia* is not an option, the most credible alternative appears to be to divide *Justicia* s.lat. into a number of segregate genera. Under this scenario, the 'Core Harnieria' clade could be considered a separate genus, with *Monechma* the earliest available name. The genus *Monechma* could therefore be resurrected, albeit with a revised circumscription, and the new species described here would be renamed in *Monechma*. However, Kiel et al. (2017) note that only 12–15 % of all justicioids have been sampled so far and a number of sampling deficiencies need to be addressed before fully informed taxonomic decisions can be made. This is certainly true of both groups of *Monechma* where only a small number of species were sampled, and an incomplete range of the morphological variation within *Monechma* s.lat. was represented. In view of this uncertainty, we consider it best to maintain *Justicia* sect. *Monechma* at the present time, and the new species are described in *Justicia*.

#### MATERIALS AND METHODS

This study is based upon the investigation of herbarium specimens held at BM, COLO, K, LISC and LUBA herbaria, supported where available by photographs of the species in the field. Abbreviations for herbaria follow the standard form listed on Index Herbariorum (Thiers, continuously updated). The fledgling herbarium of the Angolan Ministry of the Environment's Instituto Nacional da Biodiversidade e Áreas de Conservação,

which is not yet listed on Index Herbarium, is abbreviated to 'INBAC'. All duplicates of specimens listed have been seen except where noted as '[not seen]'. Those for which only online images have been seen are marked with an asterisk (\*); these were accessed via JSTOR Global Plants (<https://plants.jstor.org/>). All measurements were made on dried material except for those of the flowers, which were soaked in Aerosol OT 5 % solution prior to dissection and measurement.

Spelling of Angolan provinces and major towns or cities follows usage in Figueiredo & Smith (2008) except for the municipality of Cubango which is now generally referred to as Kuvango, and the province Cuando Cubango where the hyphen is omitted. Historic place names or other spelling variants are placed within square brackets after the standardised name.

The assessment of the conservation status of the new species follows the categories and criteria of the IUCN Red List of Threatened Species (IUCN 2012).



**Fig. 1** *Justicia cubangensis* I.Darbysh. & Goyder. a. Habit, basal and distal portions of stems; b. mature leaf, abaxial surface; c. inflorescence; d. dissected calyx, external surface, with detail of indumentum; e. dissected corolla with androecium; f. anther; g. pistil; h. immature capsule (Goyder 8068, CAS, K, LUBA). — Scale bars: a = 3 cm; b–c = 1 cm; d–e, g–h = 5 mm; f = 2 mm. — Drawn by Juliet Williamson.



## TAXONOMIC ACCOUNT: NEW SPECIES DESCRIPTIONS

*Justicia cubangensis* I.Darbysh. & Goyder, *sp. nov.* — Fig. 1, 2a–c; Map 1

Most similar to *Justicia lolioides* S.Moore but differs in the inflorescence having a puberulous indumentum of mixed eglandular and capitate-glandular hairs throughout (vs in *J. lolioides* inflorescences largely glabrous except for short ascending eglandular hairs along the margins of the bracts, bracteoles and calyx lobes); the calyx lobes being markedly longer than the subtending bracts and bracteoles (vs calyx  $\pm$  equal in length to the bracts and particularly to the bracteoles); the corolla being finely eglandular-puberulous externally (vs corolla having numerous coarse bristly hairs on the lower lip externally in addition to being eglandular-puberulous); the anther appendage tapering to a single point at the apex (vs anther appendage bifid at the apex); and the capsule being eglandular-puberulous and  $\pm$  11 mm long (vs capsule essentially glabrous and 8–9 mm long). See Table 1. — Type: *Goyder 8068* (holo K; iso CAS, INBAC, LUBA), Angola, Cuando Cubango Province, Cuchi River gorge (Cubango drainage), c. 7 km N of Cuchi, S14.58972 E16.90722, 1350 m, fl. & imm. fr., 28 May 2015.

*Monechma lolioides* sensu Moore (1930) 138, non (S.Moore) C.B.Clarke (1900) 218.

*Etymology.* The epithet '*cubangensis*' denotes the Cubango River drainage in which this species is found.

Erect or decumbent perennial herb, several annual, many-branched stems 15–65 cm tall from a woody base and rootstock, burnt

stem bases from previous years' growth sometimes persisting; stems quadrangular, two opposite sides with a central furrow, other two opposite sides either flat or with two shallow furrows, minutely retrorse-puberulous, hairs often more numerous on the two centrally furrowed sides, most conspicuous on lowermost internodes; nodal line with longer hairs. *Leaves* sessile, linear-lanceolate, longest blades 29–46 by 2.3–3.2 mm (length : width ratio 10–16 : 1); base cuneate, margin entire, apex acute, surfaces with sparse and inconspicuous minute antrorse hairs mainly along margin; venation of 5 parallel veins,  $\pm$  prominent particularly on adaxial surface. *Inflorescences* terminal and in upper axils, secund spikes 25–70 mm long; rachis (at least distally), bracts, bracteoles and calyces puberulous with mixed patent eglandular and capitate-glandular hairs; peduncle 3.5–12 mm long; each node of inflorescence single-flowered; bracts paired, minute, lanceolate or triangular, 1.8–4.8 by 0.7–1.5 mm in central portion of spike, dark green or purplish with paler base, midrib prominent; flowers sessile along rachis or lowermost flowers on a secondary peduncle to 5 mm long; calyx immediately subtended by erect paired bracteoles, lanceolate, 2.5–5.5 by 0.7–1.8 mm, pale yellowish cream distally, green towards apex, with pale hyaline margin. *Calyx* divided almost to base into five subequal linear-lanceolate lobes 6–7.5 by 0.7–1 mm in flower, extending somewhat in fruit when up to 9.5 by 1.6 mm, pale yellowish cream proximally and along



**Fig. 2** Species of *Justicia* sect. *Monechma* from Angola. a–c. *Justicia cubangensis* I.Darbysh. & Goyder; d–e. *Justicia moorei* I.Darbysh. & Goyder; f. *Justicia virgultorum* (S.Moore) I.Darbysh. & Goyder (a–c. *Goyder 8068*; d–e. *Goyder 8210*; f. *Goyder 8471*). — Photos by D. Goyder.

margin, dark green to pinkish brown towards apex and along three parallel veins. *Corolla* 12–13 mm long, cream-white, palate of lower lip pink with white veins in raised 'herring-bone' pattern, eglandular-puberulous externally mainly on lips; tube  $\pm$  7.5 mm long, cylindrical with ventricose floor  $\pm$  2 mm from base, pubescent internally at base of pouch and at base of rugula (stylar furrow); upper lip hooded, 5.5–6 mm long, apex shallowly bilobed; lower lip 5.2–6.2 mm long, reflexed distally at anthesis, apex 3-lobed, lateral lobes 1.2–1.5 by 1–1.1 mm, median lobe broader, 1.7–1.8 mm wide. *Stamens* inserted  $\pm$  5.5 mm from base of corolla tube; filaments white, 5.5–5.7 mm long; anthers at first green, turning dark brown, with thecae overlapping for  $\pm$  half their length, oblique, upper theca 1–1.2 mm long, lower theca 1.2–1.4 mm long, with basal white subulate appendage 1–1.3 mm long, both thecae with few irregular rounded protrusions (?glands) on inner surface. *Ovary* oblong-ovoid, 1.4–1.7 mm long, sparsely puberulous towards apex; style 9–10 mm long, pubescent in proximal half; stigma shortly bifid. *Capsule* only seen in immature state, 2-seeded,  $\pm$  11 mm long, shortly stipitate, eglandular-puberulous externally; immature seeds somewhat compressed, with smooth surface, glabrous.

**Distribution & Ecology** — *Justicia cubangensis* is found in Cuando Cubango and Huíla provinces of South-central Angola. It grows in open, sunny areas amongst grassland in open miombo woodland and open thicket on sandy soils, at  $\pm$  1350–1400 m elevation.

**Conservation** — This species is currently known only from three localities: the Cuchi River gorge, the vicinity of the municipality of Menongue and between Kuvango and Chipindo. Only a single plant was observed at Cuchi River gorge and Gossweiler recorded it as rare at Menongue, while Santos & Barroso recorded it as occurring in scattered tufts near Kuvango. This region of Angola has not been thoroughly botanized, and furthermore, many Angolan *Acanthaceae* collections were lost – presumed destroyed – during the civil war (see Darbyshire et al. 2019). It may therefore prove to be more widespread and/or locally common than current evidence suggests. The sites around Menongue are likely to have been impacted by the continued development of this town and the related expansion of agriculture in the surrounding area. The species may be tolerant to some degree of disturbance, however, as the Cuchi

River gorge site was open and was possibly cleared from the surrounding miombo. In light of the incomplete evidence to date, *Justicia cubangensis* is provisionally assessed as Data Deficient (DD).

**Additional specimens seen.** ANGOLA, Gossweiler 2701 (BM [BM001135166], ?K - see note), Menongue [Munongue], fl. & imm fr., 20 April 1906; Gossweiler 3100 (BM [BM001135165], K), Ganguellas [Gunguellas], at Menongue [Munongue], fl. & imm fr., April 1906; Santos & Barroso 2674 (LISC\*), Kuvango [Artur de Paiva], na estrada para Chipindo, fl., 10 May 1969.

**Notes** — As noted in the Introduction, this species has previously been confused with *Justicia loliooides* with which it shares narrow foliage and very slender, secund inflorescence spikes. However, it is easily separated by the characters listed in the diagnosis and in Table 1.

In addition to a duplicate of Gossweiler 3100 (incorrectly labeled as 30100), there is a second, unnumbered Gossweiler collection of this species at K with no locality data or date; it may be a duplicate of Gossweiler 2701.

The Cuchi River gorge, the type locality for this species, is a site of considerable botanical importance. It is one of the few places in the region where rock emerges from the overlying sand and is the *locus classicus* of succulents such as *Aloe metallica* Engl. & Gilg and *Euphorbia faucicola* L.C.Leach. In addition to the new species of *Justicia*, the 17 collections made at Cuchi River gorge in May 2015 included two new botanical records for Cuando Cubango Province, recorded below. A subsequent visit to the site in November 2016 revealed a species of *Crotalaria* L. that is also probably new to science.

*Eriocaulon angustibracteum* Kimp. (1994) 329 (*Eriocaulaceae*)

Goyder 8071 (INBAC, K, LUBA, PRE), Angola, Cuando Cubango Province, Cuchi River gorge c. 7 km N of Cuchi, 28 May 2015.

This is only the third record of this species from Angola. It was not recorded by Figueiredo & Smith (2008) in their checklist of Angolan plants, but a collection at K from Huambo province, near Ukuma [Cuma], made in 1959 (*Damann in Herb. Hess 59/228*) was redetermined as this species by Sylvia Phillips in 2016. It was also collected near Capaia, Lunda Norte, in 2013 (Goyder et al. 7163). The species is quite widely distributed and has been recorded from southern Tanzania, Zambia, the Katinga region of D.R. Congo, and Cameroon (Phillips 2010: 65).

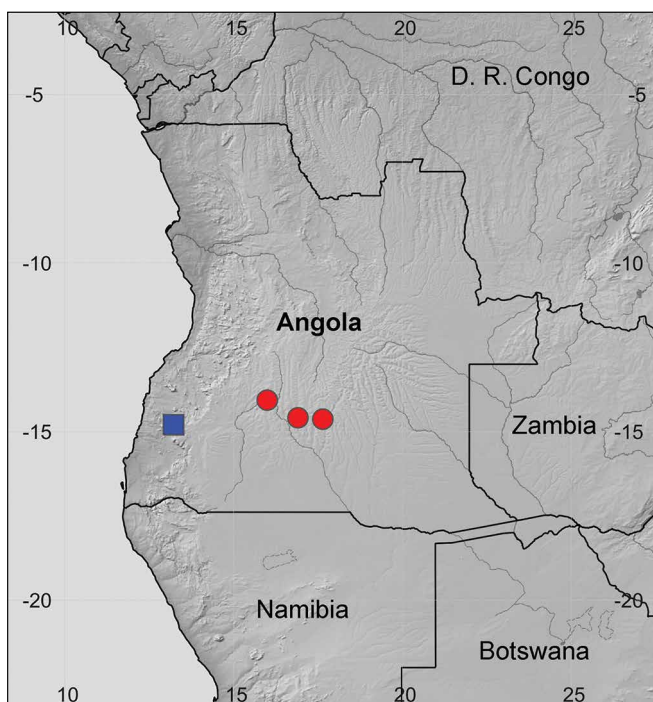
*Crepidorrhopalon schweinfurthii* (Oliv.) Eb.Fisch. (1989) 443; (1992) 130 (*Linderniaceae*)

Goyder 8060 (INBAC, K, LUBA, PRE), Angola, Cuando Cubango Province, Cuchi River gorge c. 7 km N of Cuchi, 28 May 2015.

This species was listed by Ghazanfar (2008) under the name *Torenia schweinfurthii* Oliv. (*Scrophulariaceae*), and within Angola it has been recorded from Benguela, Huíla, Malange and Moxico provinces. It has a wide but scattered distribution from Mali to South Sudan, and south to Mozambique and Angola (Darbyshire et al. 2015a: 329).

*Justicia erinia* I.Darbysh., sp. nov. — Fig. 3; Map 1

Similar to *Justicia tricostata* Vollesen but differs in the capsule being puberulous and having black seeds (vs capsule glabrous, seeds mottled grey and black in *J. tricostata*); the bracts and bracteoles being shorter, the latter being 4.5–6 mm long, typically  $\pm$  half the length of the calyx (vs 6.5–12.5 mm long and only slightly shorter than or subequal to the calyces); the inflorescence being lax throughout (vs typically dense throughout or at least distally); and the stem and inflorescence indumentum being  $\pm$  patent (vs indumentum antrorse). In Angola, it is most likely to be confused with *Justicia glaucifolia* (S.Moore) I.Darbysh. & Goyder (see below) which shares the lax secund inflorescences with an eglandular indumentum, but *J. erinia* differs in the leaves being lanceolate with a markedly acute apex and a length : width ratio 4.5–6.7 : 1 (vs leaves obovate with a rounded or obtuse apex, length : width



Map 1 Distribution map of *Justicia cubangensis* (●) and *J. erinia* (■).



ratio 2.5–2.6 : 1 in *J. glaucifolia*); the stem, inflorescence rachis and calyces etc. having a spreading / patent indumentum (vs indumentum antrorse); and in having larger flowers, the calyx lobes 8–9 mm long, the corolla 18–18.5 mm long (vs calyx lobes  $\pm$  6 mm long, corolla  $\pm$  14 mm long). See Table 2. — Type: *Tripp & Dexter 6917* (holo K; iso COLO [not seen], LUBA [not seen]), Angola, Namibe Prov., between Bibala and Assunção, S14.79891 E13.22217, 189 m, fl. & fr., 10 Apr. 2017.

*Etymology.* The epithet '*eriniae*' honours Dr. Erin Tripp of the Museum of Natural History (COLO Herbarium) at the University of Colorado, a leading

authority on *Acanthaceae*, great all-round naturalist and collector of the type specimen of this species. Dr. Tripp also kindly provided extra floral measurements from the COLO isotype.

Brittle-stemmed herb, with many-branched stems to 50–75 cm tall; stems quadrangular or somewhat 6-angular, pale-pubescent throughout, hairs patent or those immediately above the nodes somewhat deflexed. Leaves with a short, ill-defined petiole to 4.5 mm long, blade lanceolate to narrowly so, longest



**Fig. 3** *Justicia eriniae* I.Darbysh. a. Habit, distal portion of stem; b. mature leaf, abaxial surface; c. inflorescence; d. bracts, bracteoles and base of calyx; e. dissected calyx, external surface with detail of indumentum; f. flower, lateral view; g. anther; h. capsule with persistent calyx and bracteoles; i. seed (*Tripp & Dexter 6917*, K). — Scale bars: a–b = 3 cm; c–f, h = 1 cm; g, i = 3 mm. — Drawn by Juliet Williamson.

**Table 2** Morphological characters separating *Justicia erinia* from *J. glaucifolia* and *J. tricolorata*.

Character	<i>Justicia erinia</i>	<i>Justicia glaucifolia</i>	<i>Justicia tricolorata</i>
Stem indumentum orientation	Patent	Antrorse	Antrorse
Leaf shape	Lanceolate	Obovate	Lanceolate, narrowly ovate or narrowly (oblong-)elliptic, lower leaves can be somewhat obovate or oblanceolate
Leaf length : width ratio	4.5–6.7 : 1	2.5–2.6 : 1	3.2–6(–8) : 1
Leaf apex	Acute	Rounded or obtuse	Acute, lower leaves sometimes obtuse or rarely rounded
Inflorescence characteristics	Laxly spiciform	Laxly spiciform	Densely spiciform throughout or at least distally
Bracteole length	4.5–6 mm long, $\pm$ half as long as calyx	1.8–2.3 mm, $\pm$ one third the length of the calyx	6.5–12.5 mm long, slightly shorter than or subequal in length to calyx
Calyx lobe length	8–9 mm	$\pm$ 6 mm	7.3–11 mm
Corolla length	18–18.5 mm	$\pm$ 14 mm	17–20 mm
Capsule indumentum	Puberulous	Unknown	Glabrous
Seed characteristics	Black	Unknown	Mottled grey and black

blades 57–65 by 8.5–13 mm (length : width ratio 4.5–6.7 : 1); base cuneate, margin entire, apex acute, surfaces sericeous-puberulous when young, more sparse at maturity when hairs most numerous along veins beneath, midrib above and margin; lateral veins 2 or 3 per side, markedly ascending, with scalariform tertiary venation between midrib and lateral veins. *Inflorescences* terminal and sometimes also in upper axils, secund spikes 5.5–8 cm long, each node of inflorescence single-flowered, lax, up to 9 nodes along spike; peduncle 10–19 mm long, rachis eglandular-puberulous; bracts paired, lanceolate, 3.5–5.5 by 1.5 mm in central portion of spike (those at lowermost fertile node can be longer and more linear), at first pale yellowish with 3 prominent (brown-)green veins, becoming brown with age; flowers sessile, calyx immediately subtended by erect paired bracteoles, resembling bracts but 4.5–6 by 1–2 mm, apex  $\pm$  attenuate, 3-veined but midvein apparently composed of two partially fused parallel veins. *Calyx* divided almost to base into five subequal linear-lanceolate lobes 8–9 by 1.3–2 mm in flower, extending somewhat in fruit when up to 10.5 mm long, pale yellowish cream with three markedly raised parallel green veins, apices green, external surface eglandular-puberulous, hairs along the margins longer and somewhat crisped. *Corolla* 18–18.5 mm long, white, eglandular-pubescent externally; tube  $\pm$  10.5 mm long including unexpanded basal portion 2.5–3.5 mm long, floor of expanded throat markedly ventricose, 6.5 mm deep centrally (when flattened), 3 mm deep at mouth; upper lip hooded,  $\pm$  8 mm long, apex shallowly bilobed; lower lip  $\pm$  8.5 mm long, apex 3-lobed, lobes rounded, 2.5 mm long, median lobe broader, palate of lower lip with weakly raised 'herring-bone' pattern. *Stamens* inserted  $\pm$  7–8 mm from base of corolla tube; filaments 6–7.5 mm long; anthers with thecae overlapping for  $\pm$  1/3 their length, somewhat oblique, upper theca 1.2 mm long, lower theca 1.45–1.5 mm long, with basal pale yellowish appendage 1.7–1.9 mm long, apex unevenly and inconspicuously forked, anther connective pilose at apex. *Ovary* oblong-ovoid,  $\pm$  3 mm long, sparsely puberulous towards apex; style  $\pm$  16 mm long, sparsely puberulous, hairs becoming denser in proximal portion; stigma minutely bifid, one lobe much reduced. *Capsule* 2-seeded, 10.5–11 mm long, shortly stipitate, eglandular-puberulous externally; seeds lenticular, compressed, black, 3.5–4 mm diam, with smooth surface.

**Distribution & Ecology** — *Justicia erinia* is recorded from Namibe Province of Southwest Angola where it is known only from the type specimen. It was recorded from roadside thorny scrub in lowland *Colophospermum mopane* woodland at 189 m elevation.

**Conservation** — Only a small population of fewer than 10 plants was recorded at the single locality known for this species, but the surrounding areas were not extensively searched

by the collectors, and potentially suitable habitat is widespread in the region. Although it was collected from a roadside site, it was in a largely undisturbed area with very little traffic. Mining of marble occurs in the vicinity of the type locality but does not appear to impact this species (E.A. Tripp, pers. comm.). With more information needed on its full range and abundance, *J. erinia* is currently considered to be Data Deficient (DD) but it may prove to be of Least Concern as threats appear to be minimal.

**Taxonomic notes** — *Justicia erinia* is most likely to be confused with *J. tricolorata*, a recently described species from rock outcrops and stony soils in miombo woodland in Zambia and Tanzania (Vollesen 2010, 2015) which does not extend to Angola. They share the combination of lanceolate leaves, eglandular inflorescence indumentum and prominently 3-veined calyx lobes, bracts and bracteoles. This latter character is widespread in the perennial species of *Justicia* sect. *Monechma* Group I sensu Kiel et al. (2017; see Discussion below) but is particularly marked in these two species. However, *J. erinia* clearly differs in the characters listed in the diagnosis, and also occurs in much drier habitat.

## DISCUSSION: A CONSPECTUS OF JUSTICIA SECT. MONECHMA 'GROUP I' IN ANGOLA

Makholela (2008) recorded 10 species of *Monechma* in Angola. Of these, *M. cleomoides* (S.Moore) C.B. Clarke, *M. divaricatum* (Nees) C.B. Clarke and *M. salsola* (S.Moore) C.B. Clarke are considered to belong to *Monechma* Group II sensu Kiel et al. (2017), based on the sessile axillary cymes with the bracts largely undifferentiated from the leaves. *Monechma divaricatum* was one of the two species sampled within this clade in the phylogeny of Kiel et al. (2017). The extant material of *M. spissum* C.B. Clarke is depauperate and requires further investigation; it may be a small form of one of the other recognised species. The remaining six species recorded by Makholela (2008) are here considered to belong to *Monechma* Group I sensu Kiel et al. (2017). However, several changes and additions to Makholela's list are required. First, we follow Vollesen (2010, 2015) in recognising several species within the '*Monechma debile* (Forssk.) Nees' complex, of which two are recorded from Angola: *Justicia bracteata* and *J. monechmoides* S.Moore. Second, Makholela (2008) recorded *M. depauperatum* (T.Anderson) C.B. Clarke (= *J. depauperata* T.Anderson) as occurring in Angola but we recognise *J. scabrida* S.Moore as distinct from that species and only the latter occurs in Angola (Vollesen 2015). Third, *J. subsessilis* Oliv. has recently been recorded for the first time in Angola – see below. Finally, *J. laeta* S.Moore, also endemic to Angola, is here included in this lineage for the first time, and

a second species allied to *J. laeta* is also recognised here, based on *Nolde 229* from Malange province.

Therefore, with the addition of the new species *J. cubangensis* and *J. eriniaie*, twelve species of *Justicia* sect. *Monechma* Group I are currently known from Angola and a provisional key to these species is provided here to aid their identification. A summary of our current knowledge of each of these species in Angola is also provided below, including citation of all specimens seen. No existing combinations in *Justicia* are available for three Angolan endemic species: *M. glaucifolium* S.Moore, *M. rigidum* S.Moore and *M. virgultorum* S.Moore; the new combinations (or, in the case of *M. rigidum*, a new name) are therefore formalised here. This may be a temporary solution in view of the uncertainty over the future generic delimitation in the ‘justicioid’ lineage, but as we currently accept *Justicia* sect. *Monechma* (see Introduction), it is sensible to make the required combinations in *Justicia* for all the Angolan species.

### KEY TO JUSTICIA SECT. MONECHMA GROUP I IN ANGOLA

1. Annual herbs, inflorescence spikes axillary, sometimes also terminal but those at lower nodes often longest; bracts elliptic or ovate to broadly so . . . . . 2
1. Perennial herbs, inflorescence spikes or panicles primarily terminal, sometimes also in the upper leaf axils; bracts linear, lanceolate or elliptic . . . . . 3
2. Bract apex subacute to truncate, markedly recurved, with distinct ‘shoulders’; margin with conspicuous pale long eglandular hairs contrasting with short indumentum of external surface . . . . . 1. *J. bracteata*
2. Bract apex acute and straight or acuminate and slightly recurved, usually without ‘shoulders’, margins usually without markedly longer hairs or if these present then not so conspicuous and also present on external surface . . . . . 8. *J. monechmoides*
3. Bracts and bracteoles longer than calyces which are largely hidden; inflorescence spikes not (or not clearly) secund . 4
3. Bracts and bracteoles shorter than or bracteoles subequal in length to calyces which are clearly visible; inflorescence spikes often markedly secund . . . . . 5
4. Bracts, bracteoles and calyces with a broad and conspicuous pale hyaline margin, this often drying yellowish; leaves narrowly elliptic to lanceolate, 7–14.5 cm long, apex markedly acute; calyx lobes 6–7(–9) mm long . . . . . 10. *J. scabrida*
4. Bracts, bracteoles and calyces lacking or with only a very narrow hyaline margin; leaves ovate or elliptic, 3–7 cm long, apex obtuse or more rarely acute; calyx lobes 11–19(–21) mm long . . . . . 11. *J. subsessilis*
5. Indumentum of bracts, bracteoles and calyces eglandular only or largely glabrous, glandular hairs absent . . . . . 6
5. Indumentum of bracts, bracteoles and calyces with mixed glandular and eglandular hairs . . . . . 9
6. Leaves large, 95–115 by 38–46 mm, elliptic or oblong-elliptic, apex acuminate . . . . . 5. *J. laeta*
6. Leaves smaller, 33–68 by 2–14 mm, linear, lanceolate or obovate, apex acute, obtuse or rounded . . . . . 7
7. Bracts, bracteoles and calyx lobes glabrous except for inconspicuous ascending hairs along margins; leaves linear to narrowly oblong, up to 8 mm wide, length : width ratio of longest leaves 3–16 : 1; capsule essentially glabrous . . . . . 7. *J. lolioides*
7. Bracts, bracteoles and calyx lobes pubescent or puberulous; leaves obovate or if lanceolate and length : width ratio over 3 : 1 then capsule puberulous . . . . . 8
8. Leaves obovate with apex rounded or obtuse; length : width ratio 2.5–2.6 : 1; indumentum of stems, inflorescence rachis and calyces antrorse; calyx lobes ± 6 mm long, corolla ± 14 mm long . . . . . 4. *J. glaucifolia*
8. Leaves lanceolate with apex acute, length : width ratio 4.5–6.7 : 1; indumentum of stems, inflorescence rachis and calyces spreading/patent; calyx lobes ± 8 mm long; corolla ± 18.5 mm long . . . . . 3. *J. eriniaie*
9. Leaves linear-lanceolate, 2.3–3.2 mm wide, length : width ratio 10–16 : 1, primary venation of 5 closely parallel veins . . . . . 2. *J. cubangensis*
9. Leaves ovate, elliptic or narrowly oblong-elliptic, ≥ 15 mm wide, length : width ratio < 5 : 1, primary venation either pinnate or campylodromous, the latter with strongly ascending and converging secondary veins and with prominent scalariform tertiary veins . . . . . 10
10. Leaves narrowly oblong-elliptic, up to 13 by 4.2 cm with base long cuneate-attenuate, primary venation pinnate; corolla 18–20 mm long . . . . . 6. *J. sp. aff. laeta*
10. Leaves ovate, elliptic, or elliptic-lanceolate, up to 5 by 2.3 cm with base cuneate to rounded, primary venation campylodromous; corolla 11–13 mm long . . . . . 11
11. Leaves elliptic or elliptic-lanceolate; calyces clearly longer than bracteoles, lobes oblong-spathulate, markedly 3-veined, the veins prominent and purple in fresh material; inflorescence spikes at first crowded but proximal flowers becoming more widely spaced . . . . . 9. *J. moorei*
11. Leaves ovate; calyces only slightly longer than bracteoles, lobes linear-lanceolate, only inconspicuously 3-veined, only the lobe apices coloured purple; inflorescences spikes crowded throughout . . . . . 12. *J. virgultorum*

#### 1. *Justicia bracteata* (Hochst.) Zarb

*Justicia bracteata* (Hochst.) Zarb (1879) 32. — *Monechma bracteatum* Hochst. (1841) 375. — Type: *Kotschy 261* (holo TUB [not seen]; iso GOET\* [GOET005559], GZU [not seen], HBG\* [HBG502284, HBG502285], K [K000378692], LD\* [LD1226235], M\* [M0109807], MPU [not seen], S\* [S09-6163], STU\* [STU000468], US\* [US01049972]), Sudan, Kordofan, Tejera, 19 Nov. 1839.

*Monechma debile* sensu auct., non (Forssk.) Nees: Meyer (1968) 45 p.p.; Makholela (2008) 23 p.p.; Munday (1995) 59 p.p.

**Distribution & Ecology** — This is a widespread and common species, recorded throughout eastern and southern Africa (Angola, Botswana, D.R. Congo, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Somalia, South Africa, Sudan, Tanzania, Uganda, Zambia, Zimbabwe), southern Arabia (Oman, Yemen) and India. In Angola, it is restricted to the south, having been recorded in Cuando Cubango and Huíla provinces. It is an annual herb, found in a variety of open to lightly shaded habitats including woodland, bushland and grassland, often in disturbed areas where it can be a weed.

*Angolan specimens seen.* *Baum 775* (BM, K), Cuando Cubango, zw. Kutue und Sobi am Cuito [Kuito], fl. & fr., 10 Mar. 1900; *Barbosa & Gouveia 10692* p.p. (BM), Huíla, Gambos, Chimbolelo, fl. & fr., 24 Aug. 1963; *Harris & Murray-Hudson 860* (K), Cuando Cubango, Cuito R., between Rito and Nankova, fl. & fr., 19 Apr. 2013.

**Notes** — This species has commonly been named *Monechma debile* in the past. However, *M. debile* s.str. (= *Justicia debilis* (Forssk.) Vahl) is a perennial (rarely annual) herb of Northeast Africa and Arabia (Vollesen 2010).

For a full synonymy and bibliography for this species, see Vollesen (2010, 2015).

#### 2. *Justicia cubangensis* I.Darbysh. & Goyder

See New Species accounts above.



**3. *Justicia erinia*** I.Darbysh.

See New Species accounts above.

**4. *Justicia glaucifolia*** (S.Moore) I.Darbysh. & Goyder, *comb. nov.*

*Monechma glaucifolium* S.Moore in J. Bot. 49 (1911) 310; S.Moore (1930) 138. — Type: Gossweiler s.n. (holo BM [BM000923665]), Angola, without precise locality or date.

Distribution & Ecology — *Justicia glaucifolia* is known only from the type specimen, for which the collection data were lost. The exact distribution and the ecology of this species are therefore unknown, but it is currently considered to be endemic to Angola.

**5. *Justicia laeta*** S.Moore

*Justicia laeta* S.Moore (1880) 311; Hiern (1900) 820. — Type: *Welwitsch 5108* (lecto BM\* [BM000839214], chosen here; isolecto K [K000419259]), Angola, Pungo Andongo, inter Condo et Quisonde, fl., Mar. 1857.

Distribution & Ecology — *Justicia laeta* is known only from the two syntype gatherings from Malange province, collected from bushy hillslopes and amongst rocks (Hiern 1900).

*Additional Angolan specimen seen.* *Welwitsch 5081* (BM), Pungo Andongo, Fonte de Casamba, fl. & imm. fr., May 1857.

Note — Moore (1880) suggested that his *J. laeta* is allied to *J. petiolaris* (E.Mey. ex Nees) T.Anderson, but did not elaborate on this affinity. *Justicia petiolaris* belongs within sect. *Tyloglossa* (Hochst.) Lindau (Vollesen 2015, Kiel et al. 2017) and is morphologically very different to *J. laeta*. The BM syntype *Welwitsch 5081* includes an immature capsule with poorly developed seeds that appear to be smooth as in sect. *Monechma*. This, together with the prominently 3-veined calyx lobes, bracts and bracteoles, and the fact that some of the spikes of the inflorescence are secund, indicates that this species belongs in sect. *Monechma* Group I. See also note to species 6 below.

**6. *Justicia* sp. aff. *laeta*** S.Moore

Distribution & Ecology — This taxon is known only from a single collection from Malange province, where it was recorded from rainforest.

*Angolan specimen seen.* *Nolde 229* (BM 2 sheets), hochland von Quela, fl. & fr., without date.

Notes — The specimen cited has previously been named *J. laeta* and is certainly closely allied to that species, sharing large leaves with prominent pinnate veins beneath, compound paniculate inflorescences and similarly sized corollas. However, *Nolde 229* differs in having narrower, linear-lanceolate bracts, bracteoles and calyx lobes, the latter c. 1.2–1.5 mm wide, and in the inflorescence having a mixed glandular and eglandular indumentum, the glandular hairs being longer and conspicuous, while in *J. laeta* s.str. the bracts and bracteoles are lanceolate-acuminate, the calyx lobes are 1.8–2.5 mm wide and the inflorescence has an eglandular indumentum only. The specimen was collected c. 100–170 km to the ENE of the known localities for *J. laeta* and apparently in a wetter, forest habitat. More material is desirable from this region of Angola to determine whether there are two species or one variable species involved.

One sheet of *Nolde 229* includes a mature fruit which appears to be four-seeded but with two seeds aborting early; the mature seeds are unfortunately missing from this specimen but the immature seeds are smooth as in *J. laeta* and other members of *Justicia* sect. *Monechma*. This capsule type is similar to that

of *J. tetrasperma*, the species that Hedrén (1990) considered to be intermediate between *Justicia* and *Monechma* (see Introduction).

**7. *Justicia loliooides*** S.Moore

*Justicia loliooides* S.Moore (1880) 310. — *Monechma loliooides* (S.Moore) C.B.Clarke (1900) 218; Hiern (1900) 822. — Type: *Welwitsch 5178* (lecto BM [BM000923676], chosen here; isolecto C\* [C10000041], K [K000378722], LD\* [LD1569502], LISU\* [LISU223483]), Angola, Malange, Dist. Pungo Andongo, de Mata de Mutollo, fl. & fr., Jan. 1857.

1. Leaves linear, length : width ratio 18–24 : 1 . . . . .  
 . . . . . a. var. *loliooides*  
 1. Leaves oblong, length : width ratio 3–6.5 : 1 . . . . .  
 . . . . . b. var. *latifolia*

**a. var. *loliooides***

Distribution & Ecology — *Justicia loliooides* var. *loliooides* is endemic to Angola where it is recorded from Malange province. It is only known from the two original syntypes; *Welwitsch* recorded it from ‘moist, hot wooded parts of Mata de Mutollo’ (Hiern 1900: 822).

*Additional Angolan specimen seen.* *Welwitsch 5090* (original syntypes BM, K, LISU\*), Pungo Andongo, fr., without date.

**b. var. *latifolia*** S.Moore

*Justicia loliooides* var. *latifolia* S.Moore (1880) 310. — Type: *Welwitsch 5099* (lecto BM [BM000923675] chosen here; isolecto C\* [C10000039], K [K000378723], LD\* [LD1575500]), Angola, Malange, Dist. Pungo Andongo, inter Quisonde et Condo, fl. & fr., Mar. 1857.

Distribution & Ecology — *Justicia loliooides* var. *latifolia* is endemic to Angola and is known only from the type specimen from Malange province, where it was recorded as growing in dense masses in somewhat dry wooded pastures with sparse herbage (Hiern 1900).

Notes — Clarke (1900: 218) recorded this species as occurring in ‘Pungo Andongo and Huila’ but this is in error as the syntypes of var. *loliooides* (*Welwitsch 5090*, *Welwitsch 5178*) and the type of var. *latifolia* (*Welwitsch 5099*) are all from the Pungo Andongo region, and there are no further collections known. The foliage is rather variable in *J. loliooides*. The leaves of var. *loliooides* are linear as in *J. cubangensis*, but those of var. *latifolia* are oblong, up to 8 mm wide with a length : width ratio of  $\pm 3.5$ –6 : 1 and with pinnate venation.

**8. *Justicia monechmoides*** S.Moore

*Justicia monechmoides* S.Moore (1880) 311. — *Monechma monechmoides* (S.Moore) Hutch. (1946) 524. — Type: *Welwitsch 5140* (lecto BM, chosen by Vollesen 2015: 214; isolecto K, LISU\* [LISU223491, LISU223493], P\* [P00434925]), Angola, Luanda, Imbondeiro dos Lobos, fl. & fr., Mar. 1858 [date fide Hiern 1900].

*Monechma welwitschii* C.B.Clarke (1900) 216, nom. illegit; Hiern (1900) 822; Moore (1930) 137; Benoist (1950) 29. — Syntypes: *Welwitsch 5065* (BM, K), *Welwitsch 5123* (BM), *Welwitsch 5140* (BM, K, LISU\*), *Welwitsch 5184* (K), Angola, Loanda, fl. & fr., Mar. 1858 [date fide Hiern 1900] – see note. *Monechma tettense* C.B.Clarke (1900) 216. — Type: *Kirk s.n.* (lecto K [K000378730], chosen by Vollesen 2015: 214), Lower Zambesi, opposite Tete, Kaimba Is., 1860.

*Monechma debile* sensu auct., non (Forssk.) Nees: Meyer (1968) 45 p.p.; Munday (1995) 59 p.p.; Makholela (2008) 23 p.p.

Distribution & Ecology — *Justicia monechmoides* is widespread in southern Africa, occurring in Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. In Angola, it is recorded from Cuando Cubango, Cunene, Huila, Luanda and Namibe provinces. It is an annual

herb of a variety of woodland, bushland and grassland habitats, often favouring disturbed areas where it can be a weed.

*Additional Angolan specimens seen.* *Welwitsch* 5065 (BM, K), 5123 (BM), 5184 (K), Luanda [Loanda], Imbondeiro dos Lobos, fl. & fr., Mar. 1858 [precise locality and date fide Hiern 1900]; *Gossweiler* 306 (BM, K), 306B (BM), 307 (BM, K), Luanda [Loanda], fl. & fr., 1903; *Pearson* 2684 (K), Huíla, between Chibia and Quihila, fl. & fr., 13 May 1909; *Pearson* 2221 (K), between Quihila - Jambos, 3–18 miles, fl. & fr., 14 May 1909; *Exell & Mendonça* 2403 (BM), 2413 (BM), Namibe, Moçâmedes, Tampa, fl. & fr., 1 June 1937; *Exell & Mendonça* 2958 (BM), Huíla, near Leba, fl. & fr., 20 June 1937; *Gossweiler* 14268 (BM), Luanda, Catete, fr., July 1949; *Pritchard* 357 (BM), Huíla, Tchivinguiro, fl. & fr., 3 Aug. 1954; *Barbosa & Gouveia* 10692 p.p. (BM), Huíla, Gambos, Chimbolelo, fl. & fr., 24 Aug. 1963; *Borges* 227 (LISC\*), Huíla, Lubango, aos 600 m da picada para a missão do Munhino, fl. & fr., 11 May 1971; *Santos* 2910 (LISC\*), Cunene, Cuvelai, fl. & fr., 21 July 1971; *Harris & Murray-Hudson* 828 (K), Cuando Cubango, Rápidos M'Pupo, Cuito R., between Dingo and Lumeta, fl. & fr., 17 Apr. 2013; *Harris & Murray-Hudson* 1028 (K), Cuando Cubango, 20 km SE of Sianga on SW edge of R. Cuando floodplain near Benorio, fl. & fr., 28 Apr. 2013.

**Notes** — This species is sometimes treated as conspecific with *J. bracteata* (under the name *Monechma debile* – see note under *J. bracteata* above) and the two are certainly close but are usually readily separated by the characters listed in the key. The five Welwitsch syntypes listed for Clarke's (1900) *Monechma welwitschii* are the same as those of Moore's (1880) *Justicia monechmoides*; Vollesen (2015) selected *Welwitsch* 5140 as the lectotype of *J. monechmoides* and noted under *M. welwitschii* (p. 214): “type: as for *Justicia monechmoides*”, but he did not formally lectotypify this name.

### 9. *Justicia moorei* I.Darbysh. & Goyder, *nom. nov.* — Fig. 2d–e

*Monechma rigidum* S.Moore in J. Bot. 49 (1911) 310; S.Moore (1930) 138. — Type: *Gossweiler* 3355 (lecto BM [BM00092362], chosen here; isolecto K [K001009703]), Angola, Menongue [Munongue], fl., Apr. 1906.

**Etymology.** The epithet *rigida* is already occupied in *Justicia* (*J. rigida* Balf.f.) and so a new name is required for this Angolan species. The epithet ‘*moorei*’, honours Spencer le Marchant Moore (1850–1931) who worked extensively on the *Acanthaceae* of Africa amongst many other plant groups, and who originally described this species as *Monechma rigidum*.

**Distribution & Ecology** – *Justicia moorei* is endemic to Angola where it is recorded from Bié and Cuando Cubango provinces. It occurs in dry sunny sites on gravel-clay soils, on short grassy slopes and on raised ground above marshes; *Goyder* 8210 was collected from 1648 m elevation.

*Additional Angolan specimens seen.* *Gossweiler* 2535 (BM [BM000923663], K [K000378713], original syntypes), Cuando Cubango, Forte Princesa Amelia, Cubango, fl., 27 Jan. 1907; *Mendes* 2425 (LUBA\*), Cuando Cubango, Menongue [Vila Serpa Pinto], fl., 9 Feb. 1960; *Goyder* 8210 (INBAC, K, LUBA, PRE), Bié, Rio Cutato 52 km W of Kuito, Cubango drainage, fl., 11 Feb. 2016.

**Note** — There is also an unnumbered *Gossweiler* specimen at K which appears to be a further duplicate of *Gossweiler* 3355.

### 10. *Justicia scabrada* S.Moore

*Justicia scabrada* S.Moore (1880) 310. — *Monechma scabridum* (S.Moore) C.B.Clarke (1900) 217; Hiern (1900) 822; S.Moore (1930) 137; Benoist (1950) 29. — Type: *Welwitsch* 5092 (lecto BM [BM000923677], chosen by Vollesen 2015: 222; isolecto K [K000378724], LISU\* [LISU223487]), Angola, Pungo Andongo, fl., 11 Mar. 1857.

*Justicia marginata* Lindau (1894) 73. — Type: *Buchner* 33 (holo B†; iso K [K000378726, K000378727]), Angola, Malange [Malansche], fl. & fr., Mar. 1879.

*Monechma depauperatum* sensu Makholela (2008) 23, non (T.Anderson) C.B.Clarke.

**Distribution & Ecology** — *Justicia scabrada* is recorded from D.R. Congo, Zambia and Angola; in Angola it is found in Lunda Sul and Malange provinces. It is found in fire-prone woodland

and bushland including miombo woodland and in open, tall grassland as well as in fallow fields.

*Additional Angolan specimens seen.* *Welwitsch* 5085 (BM, K, LISU\*, original syntype), Dist. Pungo Andongo, prope Condo, Nbille et Bumba, fl., Mar. 1857; *Gossweiler* 1084 (BM, K), Loanda, Gamanhiango near Malange, fl. & fr., 5 June 1903; *Exell & Mendonça* 430 (BM), Lunda Sul, Xa-Sengue, fl., 8 Apr. 1937; *Rocha* 123 (LUBA\*), Malange, Cambo, Sunginge, fl., 28 Mar. 1953.

**Note** — Vernacular name and local uses: Moka (Chiokwe), rubbed on throat (*Exell & Mendonça* 430).

### 11. *Justicia subsessilis* Oliv.

*Justicia subsessilis* Oliv. (in Grant et al. 1875) 129, t. 129b. — *Monechma subsessile* (Oliv.) C.B.Clarke (1900) 216. — Type: *Speke & Grant* 213 (holo K [K000378735]), Tanzania, Bukoba Prov., Karagwe, fl., 2 Dec. 1861. *Justicia simplicispica* C.B.Clarke (1900) 188. — Type: *Scott Elliot s.n.* (holo K [K000378734]), East Africa, without locality or date.

*Monechma nemoralis* S.Moore (1909) 296. — Type: *Kässner* 3010 (holo BM [BM000923664]; iso K [K000379152]), D.R. Congo, Niembe R., 27 May 1908.

**Distribution & Ecology** — *Justicia subsessilis* is widespread across central and southern tropical Africa, largely associated with the Zambesian regional centre of endemism. It is recorded in Burundi, D.R. Congo, Kenya, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe. In Angola, it is known from Cuando Cubango Province. It occurs in fire-prone woodland, bushland and short grassland; the single Angolan record was from 1234 m elevation.

*Angolan specimen seen.* *Barker, Bester & Janks* 89 (INBAC, K, LUBA, PRE), Cuando Cubango, Longa River, 55 km SW of Cuito Cuanavale [Cuito drainage], fr., 7 June 2015.

**Note** — This species was collected for the first time in Angola in 2015 during a survey of the more southerly catchment of the Cubango and Cuito rivers in Angola by a team from Grahamstown and Pretoria in South Africa, again as part of the Okavango Wilderness Project.

### 12. *Justicia virgultorum* (S.Moore) I.Darbysh. & Goyder, *comb. nov.* — Fig. 2f

*Monechma virgultorum* S.Moore in J. Bot. 49 (1911) 311; S.Moore (1930) 138. — Type: *Gossweiler* 3679 (holo BM [BM000923667]), Angola, Cuando Cubango, Cassuango, Cuiriri, fl., 26 March 1906.

*Monechma carissoi* Benoist (1950) 30, syn. nov. — Type: *Carriso & Sousa* 113 (holo COI [not seen], ?†; iso BM [BM001252126]), Angola, Benguela, Huambo [Nova Lisboa], fl., 18 May 1937.

**Distribution & Ecology** — *Justicia virgultorum* is endemic to Angola, where it is recorded from Bié, Huambo, Huíla and probably (fide *Barbosa & Correia* 9051) Benguela provinces. It is recorded from dry short grassland and shrubland (‘anharas’) and from open miombo woodland of *Julbernardia* and *Brachystegia*.

*Additional Angolan specimens seen.* Angola, *Hundt* 907 (BM, 2 sheets), Benguela, zwischen Ganda und Caconda, Fazenda Xangorolo, fl., Apr. 1934; *Barbosa & Correia* 9051 (BM, K), Huíla, Capelongo [Vila Artur de Paiva], a 26 km desta, em direcção ao Dongo, fl., 10 Apr. 1960; *Bamps, Raimundo & Matos* 4007 (LISC\*), Huambo [Nova Lisboa] - Caála, fl., 6 Mar. 1973; *Maiato FM* 897 (139013) (K, LUBA), Bié, Cusseque study area, Chitembo, fl., 19 Mar. 2013; *Goyder* 8471 (INBAC, K, LUBA, PRE), Bié, near Linhunga R., Cubango drainage, fl., 14 Mar. 2016; *Frisby & Maiato* 4151 (K, LUBA, PRE), Huambo, Cubango R. rapids 75 km ESE of Huambo on Catchiungo – Kuvango (Capelongo) road, in bud, 9 May 2017; *Frisby & Maiato* 4183 (K, LUBA, PRE), Huambo, near Cubango River rapids 75 km ESE of Huambo on Catchiungo – Kuvango (Capelongo) road, fr., 10 May 2017.

**Notes** — This species is allied to *J. moorei* (see above) from Angola, and P.G. Meyer noted on the BM sheets that they are scarcely distinct. However, the current study finds that they

clearly differ in the characters listed in the key; see also Fig. 2d–f for comparison of these species. The type of *Monechma carrissoi* is clearly a specimen of *J. virgultorum* but it has shorter calyx lobes (7 mm long) and bracts (c. 6 mm) than typical; this is most probably an immature or depauperate specimen.

The K sheet of *Barbosa & Correia 9051* is numbered '9051a' but the collecting details are the same as on the BM sheet.

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