

# Nomenclatural adjustments in African plants 1

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**Background:** Ongoing systematic studies of the African flora necessitate periodic nomenclatural adjustments and corrections.

**Objectives:** To effect requisite nomenclatural changes.

**Method:** Relevant literature was surveyed and type material located and studied.

**Results:** Nomenclatural corrections were published in *Justicia* L. (Acanthaceae), *Babiana* Ker Gawl. and *Geissorhiza* Ker Gawl. (Iridaceae) and *Zaluzianskya* F.W.Schmidt (Scrophulariaceae).

**Conclusions:** Firstly, a complete enumeration of all southern African species of *Justicia* was provided within the infrageneric classification for the genus accepted by Graham (1988) and later modified and expanded by Ensermu (1990) and Hedrén (1990). In this circumscription, *Justicia* includes such well-established segregates in an African context as *Adhatoda* Miller, *Aulojusticia* Lindau, *Duvernoia* E.Mey. ex Nees, *Monechma* Hochst. and *Siphonoglossa* Oersted. Both southern African species of *Adhatoda* were transferred to *Justicia*, as well as all of the southern African species of *Monechma*, with eight new combinations or replacement names provided. All species were placed to section within *Justicia*. Secondly, the type of *Gladiolus nervosus* Lam. (1788) was considered to be conspecific with *Gladiolus strictus* Aiton (1789) and is therefore the earliest available name for the species currently known as *Babiana stricta* (Aiton) Ker Gawl. The new combination *Babiana nervosa* (Lam.) Goldblatt & J.C.Manning was provided. Thirdly, *Geissorhiza ornithogaloides* has been regarded as a new species described by F.W. Klatt (1866) but the name should be treated as the combination *G. ornithogaloides* (Lichst. ex Roem. & Schult.) Klatt, based on *Ixia ornithogaloides* Lichst. ex Roem. & Schult. (1817a). Examination of the type showed that it is conspecific with *Geissorhiza marlothii* R.C.Foster (1941) and it is therefore the valid name for the taxon treated as *G. ornithogaloides* subsp. *marlothii* (R.C.Foster) Goldblatt. An epitype for the taxon was designated and the new combination *G. ornithogaloides* subsp. *flava* (Klatt) Goldblatt & J.C.Manning was provided for the taxon currently treated as *G. ornithogaloides* subsp. *ornithogaloides*. Lastly, *Reyemia* Hilliard was reduced to a synonym of *Zaluzianskya* as sect. *Reyemia* (Hilliard) J.C.Manning & Goldblatt and the new combination *Zaluzianskya chasmanthiflora* (Hilliard) J.C.Manning & Goldblatt was provided. A neotype was selected for *Zaluzianskya nemesioides* Diels.

## 1. Synopsis of the genus *Justicia* L. (Acanthaceae) in southern Africa, with eight new combinations for species of *Adhatoda* Miller and *Monechma* Hochst.

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### Introduction

*Justicia* L. (Acanthaceae: Ruellieae: Justiciinae) (Scotland & Vollesen 2000) is the largest genus of Acanthaceae, containing at a conservative estimate some 600 spp. (Graham 1988). As noted by Graham (1988) in her landmark review of the delimitation of *Justicia*, the circumscription of the genus has historically followed one of two divergent trends – either the adoption of a broad view of the genus, or towards the recognition of greater or lesser numbers of small segregate genera. The worldwide distribution of *Justicia* and the high degree of morphological variation amongst the species has hampered the general acceptance of one or the other of these two options, with workers generally focused on regional floristic accounts and thus missing the taxonomic wood for the trees. The result has been a confusing situation, whereby some regional floras recognise one or more of the segregate genera whilst others do not. The need for a stable, or at least comprehensive,

classification of the genus stimulated Graham (1988) to undertake the first worldwide morphological survey of *Justicia* since Lindau's (1895) revision for *Die natürllichen Pflanzenfamilien*. The result of her extensive study of vegetative and floral morphology and pollen ultrastructure was the conviction that the genus is most appropriately and satisfactorily circumscribed in the broad sense favoured by Lindau (1895), thus including such well-established segregates in an African context as *Adhatoda* Miller, *Aulojusticia* Lindau, *Duvernoia* E.Mey. ex Nees and *Siphonoglossa* Oersted.

The resulting infrageneric classification for *Justicia* proposed by Graham (1988) recognised sixteen sections, seven of them in southern Africa, and enumerated 295 species, representing an estimated half of the species in the genus. Amongst the species not listed were several from southern Africa. Although clearly not complete, Graham's classification forms the basis for future taxonomic studies in the genus and a framework in which to incorporate additional species.

*Monechma* Hochst. was retained by Graham (1988) as distinct from *Justicia*. The genus is traditionally diagnosed by its two-seeded capsules containing smooth, compressed seeds; whereas, *Justicia* is characterised by having mainly four-seeded (rarely two-seeded) capsules containing at most weakly compressed, mostly rugose (rarely smooth) seeds. The validity of this distinction in the light of the occurrence of intermediate forms was questioned by Hedrén (1990), who concluded that the two taxa could not be upheld at generic level. Accordingly, he reduced *Monechma* to a section within *Justicia*, as had been done earlier by Lindau (1895), thus increasing the number of sections in southern Africa to eight. In the same year, *J.* subsect. *Ansellia* (C.B. Clarke) V.A.W. Graham was raised by Ensermu (1990) back to sectional level as sect. *Ansellia* C.B. Clarke.

Graham's (1988) classification of *Justicia* was not implemented for the floristic treatment of the tribe for southern Africa (Baden *et al.* 1995) but has been adopted in later regional treatments for sub-Saharan Africa (Scotland & Vollesen 2000). As a result, the generic circumscriptions currently accepted for the southern African subregion are now out of line with those for the *Flora of tropical East Africa* (Darbyshire, Vollesen & Kelbessa 2010) and the *Flora of Somalia* (Hedrén & Thulin 2006) to name just two, both of which adopt the broad circumscription of *Justicia* accepted by Graham (1988) and Hedrén (1990), as will the planned volume for the Flora Zambesiaca region.

A start at integrating the treatment of the southern African flora with recent accounts for the rest of the continent was made by the formal transfer to *Justicia* of the remaining species of *Aulojusticia* (= *Siphonoglossa* spp.) by Manning and Goldblatt (2012) and *Duvernoia* by Cubey (2006). What remains to be effected is the transfer to *Justicia* of the two southern African species of *Adhatoda* and all of the southern African species of *Monechma*, several of which require new combinations or replacement names, as well as the placement within the appropriate sections in Graham's (1988) classification of the southern African species that were left unplaced by her.

We do this here and provide a complete enumeration of the southern African species within the infrageneric classification developed by Graham (1988) and modified and expanded by Ensermu (1990) and Hedrén (1990). This will facilitate the uniform curation of the southern African material in a system compatible with that adopted elsewhere in sub-Saharan Africa.

## Results

The primary characters used by Graham (1988) to circumscribe her sections are the structure of the inflorescence and the pollen, notably the number of apertures and the condition of the margocolpi. Placing the currently unplaced species in an appropriate section in the system was mostly straightforward through direct association with allied species already in the system. Notable exceptions to this are the two southern African species of *Adhatoda*, *A. andromeda* (Lindau) C.B. Clarke and *A. densiflora* (Hochst.) J.C. Manning. Their association with the genus *Adhatoda* dates from the treatment of the family for *Flora capensis* by Clarke (1901), who included them in *Adhatoda* rather than in *Justicia* on account of their pollen having entire rather than areolate margocolpi, the latter then considered to be diagnostic for *Justicia*. Their placement in *Adhatoda* was later questioned by Manning and Getliffe-Norris (1995), who considered that they merited segregation from the tropical African and Indian members of the genus. These species, including the type of *Adhatoda*, were assigned by Graham (1988) to sect. *Vasica*, diagnosed by a shrubby habit and 2-aperturate pollen.

The South African *Adhatoda* species, both perennial herbs with 3-aperturate pollen, would certainly be misplaced in sect. *Vasica* and conform best to the small sect. *Rhaphidospora* (Nees) T. Anderson, based on the combination of their contracted, cymose inflorescences and 3-aperturate pollen with entire margocolpi. This pollen type is otherwise found only in sect. *Betonica* and in the New World sect. *Drejerella*, both of which have strictly simple, spike-like inflorescences. The pollen type in *Adhatoda andromeda* and *Adhatoda densiflora* is evidently ancestral in *Justicia* (Graham 1988) and thus not phylogenetically informative, whilst the highly condensed inflorescences are difficult to interpret. It is possible that the two species are better segregated in a separate section but a trend towards a similar contraction of the inflorescence is evident in *Justicia bolusii* C.B. Clarke, which seems correctly placed in this section, and we include them here pending evidence to the contrary.

We place *Justicia minima* A. Meeuse, unusual amongst African species in its 4-fid calyx, in sect. *Tyloglossa*, largely on its similarity in inflorescence and pollen morphology to *Justicia linearispica*, placed here by Graham (1988).

Our placement in sect. *Harniaria* of the species previously treated as the genus *Aulojusticia*, as recommended by Hedrén (1990), is entirely consistent with the derived, sessile inflorescences and 2-aperturate pollen with areolate margocolpi that define this section. Similarly, placement of

*Justicia cuneata* Vahl. in the same section accords with its sessile, 1-flowered axillary cymes and areolate margocolpi.

The southern African species of *Monechma* as treated by Immelman (1995) were placed *en bloc* in sect. *Monechma*, following Hedrén (1990). Inflorescence morphology in the section is very variable (Hedrén 1990), raising the possibility that the section is not monophyletic, although all species examined share derived 2-aperturate pollen with areolate margocolpi.

## Taxonomic treatment

*Justicia* L., Species plantarum: 15 (1753).

Type: *J. hyssopifolia* L., lecto., designated by Hitchcock & Green (1929), fide Graham (1988).

## Description

Herbaceous or shrubby perennials or annuals. *Leaves*: opposite, simple, entire. *Inflorescence*: a simple false-spike or compound with dichasial or spike-like subunits. *Flowers*: each subtended by a bract and two bracteoles (or bracts absent in simple dichasia), white, yellow, pink to purple or red. *Calyx*: mostly 5-partite to near base, rarely  $\pm$  halfway, segments equal or with 1 segment reduced or absent and then 4-partite. *Corolla*: funnel-shaped or trumpet-shaped, bilabiate, upper lip usually bifid (rarely entire), lower lip trilobed, throat usually pubescent within. *Stamens*: 2, ditheous [rarely monotheous fide Graham (1988) but not in the southern African taxa], thecae equal or unequal, usually superposed, often oblique, lower usually with sterile tail-like appendage. *Pollen*: 2 or 3(4) porate, subprolate to perprolate, surface finely reticulate, trema ornamented with 4 or more margocolpi, these either entire and band-like or discontinuous and forming areoli or peninsulae. *Ovary*: with 2 ovules per locule, pubescent or glabrous; style lying within channel (rugula) along upper lip; stigma minutely 2-lobed. *Capsules*:  $\pm$  clavate with sterile stipe, 4-seeded, or 2-seeded or 3-seeded by abortion, valves remaining entire during dehiscence or rarely septum and adjacent capsule walls rising (placenta elastic). *Seeds*: supported by retinacula, spheroidal to discoid, testa smooth or variously ornamented.  $\pm$  600 spp., worldwide in tropics and subtropics.

I. Sect. *Vasica* Lindau. Type: *J. adhatoda* L., lecto., designated by Graham: 584 (1988).

*Adhatoda* Miller. Type: *Adhatoda 'zeylesianum'* Miller = *J. adhatoda* L.

*Duvernoia* E.Mey. ex Nees. Type: *D. adhatodoides* E.Mey. ex Nees = *J. adhatodoides* (E.Mey. ex Nees) V.A.W.Graham.

Shrubby perennials. *Inflorescence*: a simple false-spike with 1 or 3 flowers per axil. *Calyx*: 5-partite with segments equal. *Corolla*: 12 mm – 38 mm long, white or cream. *Anther*: thecae equal or unequal, superposed and oblique, appendages mostly small. *Pollen*: 2-aperturate, margocolpi areolate or entire. *Ovary*: glabrous or pubescent. *Capsules*: sterile for 0.4–0.6 length. *Seeds*: scarcely or distinctly compressed, rugulose-tuberculate-alveolate.

*J. aconitiflora* (A.Meeuse) Cubey [*Duvernoia aconitiflora* A.Meeuse]

*J. adhatodoides* (E.Mey. ex Nees) V.A.W.Graham [*Duvernoia adhatodoides* E.Mey. ex Nees, *Adhatoda duvernoia* C.B.Clarke, nom illegit. superfl.]

II. Sect. *Betonica* (Nees) T.Anderson [*Adhatoda* sect. *Betonica* Nees]. Type: *J. betonica* L., lecto., designated by Graham: 586 (1988).

Herbaceous or shrubby perennials. *Inflorescence*: spiciform, 1-sided with one flower per node, bracts conspicuous and usually exceeding calyx, often  $\pm$  scarious. *Calyx*: 5-partite with segments equal or 4-partite plus one reduced segment. *Corolla*: 2.4 mm – 13.0 mm long, white, pale pink or blue. *Anther*: thecae equal or slightly unequal, superposed and oblique, appendages large or rarely lacking. *Pollen*: 3-aperturate, margocolpi entire. *Ovary*: glabrous or pubescent. *Capsules*: sterile for  $\pm$  0.4 length. *Seeds*: scarcely or distinctly compressed, rugulose-tuberculate or appressed-pubescent.

*J. betonica* L.

*J. betonicoides* Burkill & C.B.Clarke

*J. cheiranthifolia* Nees

*J. montis-salinarum* A.Meeuse

### BOX 1: Key to *Justicia* L. (Acanthaceae) sections in southern Africa.

- 1A. Inflorescences sessile or very shortly pedunculate (peduncle < 10 mm long), 1-flowered to 6-flowered:
- 2A. Mature capsules with one smooth, shiny seed per locule, always dehiscent; pollen 2-aperturate, margocolpi areolate ..... VII. sect. *Monechma*
- 2B. Mature capsules with two seeds per locule, rarely only one and then seeds either rough or capsules indehiscent; pollen various:
- 3A. Inflorescences sessile; pollen 2-aperturate, margocolpi areolate ..... VI. sect. *Harnieria*
- 3B. Inflorescences shortly pedunculate; pollen 2-aperturate, margocolpi entire ..... V. sect. *Justicia*
- 1B. Inflorescences distinctly pedunculate or more than 7-flowered:
- 4A. Inflorescence a simple false-spike (sometimes terminal and in adjacent axils giving a compound appearance); ovary pubescent; pollen margocolpi entire:
- 5A. Flowers two or more per node, the inflorescence thus cylindrical; bracts oblanceolate to elliptic, foliar; calyx lobes shorter than tube; pollen 2-aperturate, margocolpi entire ..... I. sect. *Vasica*
- 5B. Flowers mostly solitary at the nodes, the inflorescence thus one-sided; bracts ovate and  $\pm$  scarious with green veins; calyx lobes longer than tube; pollen 3-aperturate, margocolpi entire ..... II. sect. *Betonica*
- 4B. Inflorescence either compound and evidently cymose, or spike-like but then ovary glabrous; pollen margocolpi entire or areolate:
- 6A. Inflorescence evidently dichasial, the axis glandular; ovary mostly pubescent; pollen 3-aperturate, margocolpi entire or  $\pm$  areolate ..... III. sect. *Rhaphidospora*
- 6B. Inflorescence spike-like; ovary glabrous:
- 7A. False-spike with 1–3(–15) flowers per node; pollen 3-aperturate, margocolpi areolate ..... IV. sect. *Tyloglossa*
- 7B. False-spike with 1 flower per node; pollen 2-aperturate, margocolpi areolate ..... VIII. sect. *Ansellia*

III. Sect. *Rhaphidospora* (Nees) T.Anderson [*Rhaphidospora* Nees]. Type: *J. glabra* Koenig ex Roxb. = *J. scandens* Vahl

Shrubby or herbaceous perennials. *Inflorescence*: dichasial, axis glandular. *Calyx*: 5-partite with segments equal. *Corolla*: 9 mm – 27 mm long, white or cream to pale pink. *Anther*: thecae equal or slightly unequal, superposed and oblique, appendages large. *Pollen*: 3-aperturate, margocolpi entire or ± areolate. *Ovary*: mostly pubescent. *Capsules*: sterile for ± 0.5 length. *Seeds*: scarcely or distinctly compressed, rugulose-tuberculate or rarely echinate.

**Group A:** Shrubs; inflorescence a ± open or contracted cyme.

*J. bolusii* C.B.Clark

*J. campylostemon* (Nees) T.Anderson [*Leptostachya campylostemon* Nees]

*J. scandens* Vahl

*J. glabra* Koenig ex Roxb.

**Group B:** Herbaceous perennials; inflorescence a highly contracted, strobilate cyme. (Note: these two species are placed here based on the combination of their highly contracted dichasial inflorescences and 3-aperturate pollen with entire margocolpi. This pollen type is otherwise found only in sect. *Betonica* and in the New World sect. *Drejerella*, both of which have strictly simple, spike-like inflorescences.)

*J. andromeda* (Lindau) J.C.Manning & Goldblatt, *comb. nov.* *Duvernoia andromeda* Lindau in Engler & Prantl, Die natürlichen Pflanzenfamilien 4 (3B): 339 (1895). *Adhatoda andromeda* (Lindau) C.B.Clark: 76 (1901).

*J. densiflora* (Hochst) J.C.Manning & Goldblatt, *comb. nov.* *Gendarussa densiflora* Hochst. in Flora 28: 71 (1845). *Adhatoda densiflora* (Hochst.) J.C.Manning in Manning & Getliffe-Norris: 490 (1985).

IV. Sect. *Tyloglossa* (Hochst.) Lindau [*Tyloglossa* Hochst.]. Type: *J. palustris* (Hochst.) T.Anderson, lecto designated by Graham: 590 (1988).

Herbaceous perennials. *Inflorescence*: compound but spike-like with 1–3(–15) flower per node. *Calyx*: 5-partite with segments equal (rarely 4-partite). *Corolla*: 5 mm – 12 mm long, white, yellow or purple. *Anther*: thecae equal, superposed and parallel or oblique, appendages large. *Pollen*: 3-aperturate, margocolpi areolate. *Ovary*: glabrous. *Capsules* sterile for ± 0.35 length. *Seeds*: scarcely compressed, ammonite-like or rugose.

*J. flava* (Vahl) Vahl [*Dianthera flava* Vahl]

*J. fasciata* Nees

*J. kirkiiana* T.Anderson

*J. minima* A.Meeuse (Note: placed here on account of its spike-like inflorescence and 3-aperturate pollen with areolate margocolpi. Although the white flowers and 4-partite calyx are anomalous in the section, *L. linearispica* C.B.Clark from tropical Africa, placed here by Graham (1988) as a 'Peripheral species', has a very similar inflorescence and 4-partite calyx with the fifth segment reduced.)

*J. petiolaris* (Nees) T.Anderson

subsp. *petiolaris*

subsp. *bowiei* (C.B.Clark) Immelman [*J. bowiei* C.B.Clark]

subsp. *incerta* (C.B.Clark) Immelman [*J. incerta* C.B.Clark]

V. Sect. *Justicia*

Shrubs or perennials. *Inflorescence*: a simple dichasium, bracts absent. *Calyx*: 5-partite with segments equal. *Corolla*: 17 mm – 21 mm long, white or cream. *Anther*: thecae equal or slightly unequal, level or slightly superposed and oblique, appendages large. *Pollen*: 2-aperturate, margocolpi entire. *Ovary*: glabrous. *Capsules*: sterile for ± 0.5 length. *Seeds*: not compressed, verrucose.

*J. cordata* (Nees) T.Anderson [*Leptostachya cordata* Nees]

*J. guerkeana* Schinz

*J. orchioides* L.f.

subsp. *orchioides*

subsp. *glabrata* Immelman

*J. platysepala* (S.Moore) P.G.Mey. [*Monechma platysepala* S.Moore]

*J. thymifolia* (Nees) C.B.Clark [*Adhatoda thymifolia* Nees]

VI. Sect. *Harnieria* (Solms-Lauba.) Benth. [*Harnieria* Solms-Lauba.]. Type: *H. dimorphocarpa* Solms-Lauba = *J. heterocarpa* T.Anderson

*Aulojusticia* Lindau. Type: *A. linifolia* Lindau = *J. linifolia* (Lindau) V.A.W.Graham

[*Siphonoglossa* pp. excl. type.]

Shrubs, herbaceous perennials or annuals. *Inflorescence*: a sessile axillary cluster of ± sessile flowers, bracts usually absent. *Calyx*: 5-partite with segments equal. *Corolla*: funnel-shaped or trumpet-shaped with short or elongate tube, 5 mm – 58 mm long, white or yellow to lilac or purple. *Anther*: thecae equal, superposed and parallel or oblique, appendages large. *Pollen*: 2-aperturate, margocolpi areolate. *Ovary*: glabrous. *Capsules*: sterile for ± 0.3 length. *Seeds*: scarcely compressed, rugulose-tuberculate.

**Group A:** Corolla tube shorter than lips.

*J. capensis* Thunb.

*J. cuneata* Vahl (Note: placed here on account of its 1-flowered, sessile axillary cymes and 2-aperturate pollen with areolate margocolpi.)

subsp. *cuneata*

subsp. *hoerleiniana* (P.G.Mey.) Immelman [*J. hoerleiniana* P.G.Mey.]

subsp. *latifolia* (Nees) Immelman [*Gendarussa orchoides* subsp. *latifolia* Nees]

*J. heterocarpa* T.Anderson

subsp. *heterocarpa*

subsp. *dinteri* (S.Moore) Hedrén [*J. dinteri* S.Moore]

- J. odora* (Forssk.) Vahl [*Dianthera odora* Forssk.]  
*J. protracta* (Nees) T.Anderson [*Gendarussa protracta* Nees]  
*J. kraussii* C.B.Clarke  
 subsp. *protracta*  
 subsp. *rhodesiana* (S.Moore) Immelman [*J. rhodesiana* S.Moore]  
*J. puberula* Immelman

**Group B:** Corolla tube longer than lips.

- J. linifolia* (Lindau) V.A.W.Graham [*Aulojusticia linifolia* Lindau, *Siphonoglossa linifolia* (Lindau) C.B.Clarke]  
*J. nkandlaensis* (Immelman) J.C.Manning & Goldblatt [*Siphonoglossa nkandlaensis* Immelman]  
*J. tubulosa* (Nees) T.Anderson [*Adhatoda tubulosa* Nees]  
*Gendarussa leptantha* Nees, *Siphonoglossa leptantha* (Nees) Immelman  
 subsp. *tubulosa*  
 subsp. *late-ovata* (C.B.Clarke) J.C.Manning & Goldblatt [*J. pulegioides* var. *late-ovata* C.B.Clarke]

VII. Sect. *Monechma* (Hochst.) T.Anderson [*Monechma* Hochst.].  
 Type: *J. bracteata* (Hochst.) Zarb.

Shrubs or annual or perennial herbs. *Inflorescence*: a terminal spike, axillary clusters, or scattered. *Calyx*: 5-partite with segments equal. *Corolla*: 5 mm – 19 mm long, white, red or yellow. *Anther*: thecae equal or the lower slightly larger, superposed, appendages large. *Pollen*: 2-aperturate, margocolpi areolate. *Ovary*: glabrous or almost so. *Capsule*: sterile for 0.3–0.5 length. *Seeds*: compressed, smooth, sometimes fringed.

- J. callothamnum* (Munday) J.C.Manning & Goldblatt, *comb. nov.* *Monechma callothamnum* Munday in South African Journal of Botany 53: 140 (1987).  
*J. cleomoides* S.Moore [*Monechma cleomoides* (S.Moore) C.B.Clarke]  
*J. crassiuscula* (P.G.Mey.) J.C.Manning & Goldblatt, *comb. nov.* *Monechma crassiusculum* P.G.Mey. in Mitteilungen der Botanischen Staatssammlung München 3: 604 (1960).  
*J. debilis* (Forssk.) Vahl. [*Monechma debile* (Forssk.) Nees]  
*J. desertorum* Engl. [*Monechma desertorum* (Engl.) C.B.Clarke]  
*J. distichotrichum* Lindau [*Monechma distichotrichum* (Lindau) P.G.Mey.]  
*J. divaricata* Licht. ex Roem. & Schult. [*Monechma divaricatum* (Licht. ex Roem. & Schult.) C.B.Clarke [as '(Nees) C.B.Clarke'] [Note: the formal publication of Lichtenstein's manuscript name '*Justicia divaricata*' by Roemer and Schultes (1817a) has been overlooked until now, and the later *Adhatoda divaricata* Nees (1847) has been erroneously accepted as the basionym for the taxon.]  
*J. dregei* J.C.Manning & Goldblatt, *nom. nov.* pro *Monechma mollissimum* (Nees) P.G.Mey. in Mitteilungen der Botanischen Staatssammlung München 2: 304 (1957), non *Justicia mollissima* (Nees) Y.F.Deng & T.F.Daniel (2011). *Adhatoda mollissima* Nees: 391 (1847). (Note: the replacement epithet honours J.F. Drège who collected the type.)

*J. fleckii* J.C.Manning & Goldblatt, *nom. nov.* pro *Monechma grandiflorum* Schinz in Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich 61: 441 (1916), non *J. grandiflora* Dum. Cours. (1811). (Note: the replacement epithet honours E. Fleck who collected the type.)

- J. genistifolia* Engl. [*Monechma genistifolium* (Engl.) C.B.Clarke]  
 subsp. *genistifolia*  
 subsp. *australe* (P.G.Mey.) J.C.Manning & Goldblatt, *comb. nov.* *Monechma australe* P.G.Mey. in Mitteilungen der Botanischen Staatssammlung München 3: 602 (1960). [*Monechma genistifolium* subsp. *australe* (P.G.Mey.) Munday]

- J. incana* (Nees) T.Anderson [*Gendarussa incana* Nees]  
*J. karroica* J.C.Manning & Goldblatt, *nom. nov.* pro *Monechma robustum* Bond in Journal of South African Botany 6: 67 (1940), non *Justicia robusta* T.Anderson ex C.B.Clarke (1900).  
*J. leucoderme* Schinz [*Monechma leucoderme* (Schinz.) C.B.Clarke]  
*J. namibensis* J.C.Manning & Goldblatt, *nom. nov.* pro *Monechma calcaratum* Schinz in Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich 61: 441 (1916), non *J. calcarata* Wall. (1830), nec Hochst. (1843).  
*J. salsola* S.Moore [*Monechma salsola* (S.Moore) C.B.Clarke]  
*J. saxatilis* (Munday) J.C.Manning & Goldblatt, *comb. nov.* *Monechma saxatile* Munday in South African Journal of Botany 3: 363 (1984).  
*J. serotina* (P.G.Mey.) J.C.Manning & Goldblatt, *comb. nov.* *Monechma serotinum* P.G.Mey. in Mitteilungen der Botanischen Staatssammlung München 11: 112 (1973).  
*J. spartioides* T.Anderson [*Monechma spartioides* (T.Anderson) C.B.Clarke]  
*J. tonsum* (P.G.Mey.) J.C.Manning & Goldblatt, *comb. nov.* *Monechma tonsum* P.G.Mey. in Mitteilungen der Botanischen Staatssammlung München 2: 304 (1957).

VIII. Sect. *Anselliana* C.B.Clarke. [*Justicia* sect. *Rostellaria* subsect. *Anselliana* (C.B.Clarke) V.A.W.Graham]. Type: *J. anselliana* (Nees) T.Anderson, lecto., designated by Graham: 598 (1988).

Herbaceous perennials or rarely shrubs. *Inflorescence*: a simple false-spike with 1 flower per node. *Calyx*: 5-partite with segments equal. *Corolla*: 5 mm – 7 mm long, white or lilac. *Anther*: thecae equal, superposed and parallel or oblique, appendages large. *Pollen*: 2-aperturate, margocolpi areolate. *Ovary*: glabrous. *Capsule*: sterile for ± 0.3 length. *Seeds*: scarcely compressed, rugulose or reticulate-alveolate.

- J. anagalloides* (Nees) T.Anderson [*Adhatoda anagalloides* Nees]  
*J. anselliana* (Nees) T.Anderson [*Adhatoda anselliana* Nees]  
*J. exigua* S.Moore  
*J. matammensis* (Schweinf.) Oliv. [*Adhatoda matammensis* Schweinf.]

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### Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

Both authors collaborated on all aspects of the research.

## 2. Nomenclatural corrections in *Babiana* and *Geissorhiza* (Iridaceae: Crocoideae)

Authors: Peter Goldblatt and John C. Manning

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### Introduction

*Babiana* Ker Gawl. (93 spp.) (Goldblatt & Manning 2007, 2012) is relatively widespread in southern Africa and centred in the winter rainfall zone in the west of the subcontinent. One of the better known species in Western Cape Province, *Babiana stricta* (Aiton) Ker Gawl. (1803), is a combination based on *Gladiolus strictus* Aiton (1789). The location of a type, if it exists, is unknown and Goldblatt and Manning (2004) designated the illustration in *Curtis's Botanical Magazine* accompanying the combination as a neotype. Lewis (1959), in her monograph of *Babiana*, cited *Gladiolus nervosus* Lam. (1788) as a synonym of *B. stricta* and used the later epithet *stricta* for the species. Her apparently inexplicable action is perhaps due to the presence of the name *Babiana nervosa* Ker Gawl. in *Index Kewensis*, which we assume she would have seen. Checking the reference therein, we find neither *G. nervosus* nor *B. nervosa* mentioned. In our accounts of *Babiana* we overlooked Lewis's error and maintained *B. stricta*, although in somewhat revised circumscription (Goldblatt & Manning 2004, 2007). The type of *G. nervosus*, cultivated at the Jardin Botanique in Paris, was grown from material collected by Pierre Sonnerat at the Cape, which he visited briefly en route to and from Mauritius in 1773 and 1781 (Gunn & Codd 1981). The specimen is well preserved and is without doubt the species known as *B. stricta*, as evinced by the stiff, acute, upright leaves of that species, flowers with a narrow, straight perianth tube ± as long as the tepals, inner floral bracts divided to the base, a pubescent ovary and most significant, arrow-shaped anthers wider at the base.

We note that Lewis's circumscription of *B. stricta* included four varieties: of these var. *erectifolia* (G.J.Lewis) G.J.Lewis is included in *B. nervosa*, var. *grandiflora* G.J.Lewis is now *Babiana tubaeformis* Goldblatt & J.C.Manning, var. *regia* G.J.Lewis is *Babiana regia* (G.J.Lewis) Goldblatt & J.C.Manning and var. *sulphurea* (Jacq.) Baker has been excluded as the type cannot be associated with any known species (Goldblatt & Manning 2007; Goldblatt, Manning & Gereau 2008).

Lamarck's epithet *nervosus* is valid in *Gladiolus* and is available in *Babiana* [indexes of plant names show the name *B. nervosa* Ker Gawl. (1804) but it does not appear in the purported place of publication nor in Ker Gawler's earlier article dealing with *B. stricta*]. We provide the new combination here and reduce *B. stricta* to synonymy. For completeness we include the full synonymy of the species.

### Taxonomic treatment

*Babiana nervosa* (Lam.) Goldblatt & J.C.Manning, *comb. nov.*  
*Gladiolus nervosus* Lam., *Encyclopédie méthodique* 2: 724 (1788). Type: South Africa, without precise locality, ex hort. Paris, *Sonnerat s.n.* (P: Herb. Lamarck, holo.—digital image!).

*Gladiolus strictus* [Sol. in] Aiton: 63 (1789) *syn. nov.*

*Babiana stricta* (Aiton) Ker Gawl.: t. 621 (1803). Type: South Africa, without precise locality or collector, illustration in Ker Gawl.: t. 621 (1803) [neotype designated by Goldblatt & Manning: 94 (2004)].

*Babiana erectifolia* G.J.Lewis: 3 (1938). *Babiana stricta* var. *erectifolia* G.J.Lewis: 43 (1959). Type: South Africa, [Western Cape], Brand Vlei, near Worcester, Sept. 1932, *G.J. Lewis s.n.* as Nat. Bot. Gard 2686/32 (BOL, holo.!).

*Gladiolus ringens* Thunb.: 186 (1800), hom. illegit. non Andrews (1798). Type: South Africa, without precise locality, *Thunberg s.n.* (UPS: Herb. Thunberg, syn.).

?*Babiana caesia* Eckl.: 32 (1827). Type: South Africa, without precise locality, ?*Ecklon s.n.* (location unknown, not at S).

*Babiana flavocaesia* Eckl.: 32 (1827). Type: South Africa, vicinity of Stellenbosch, ?*Ecklon s.n.* (S, holo.!).

In *Geissorhiza* Ker Gawl. (100 spp.) (Goldblatt & Manning 2009, 2013), the nomenclature of *G. ornithogaloides* and its two subspecies need adjustment. The name *Geissorhiza ornithogaloides* is currently treated as a new species described by F.W. Klatt in 1866 (Goldblatt 1985). We note, however, that Klatt cited as a syntype, *Lichtenstein s.n.* from the 'Koue Bokkeveld'. This specimen is the type of *Ixia ornithogaloides* Lichst. ex Roem. & Schult. (1817a). Although Klatt did not cite a basionym for his species, it should be treated as a combination according to the *International Code of Botanical Nomenclature* Art. 41.4 (especially examples 7, 8 and 10) as it is based in part on the same type (Greuter *et al.* 2000).

The identity and type locality of the Lichtenstein collection matches what is currently *G. ornithogaloides* subsp. *marlothii*, based on *Geissorhiza marlothii* R.C.Foster (1941). As a result, the name subsp. *marlothii* must be replaced by subsp. *ornithogaloides* and this taxon, in turn, requires a new name in place of its current circumscription as subsp. *ornithogaloides*. We accordingly replace it with the name subsp. *flava* based on *Geissorhiza flava* Klatt (1882). The choice of *Ecklon & Zeyher Irid.* 225 (51.8) from Caledon as lectotype of *G. ornithogaloides* Klatt by Goldblatt (1985) falls away. We also cite an epitype for *G. ornithogaloides* because the type specimens lack corms, important in distinguishing the two subspecies. The revised nomenclature is as follows.

*Geissorhiza ornithogaloides* (Licht. ex Roem. & Schult.) Klatt in *Linnaea* 34: 656 (1866). *Ixia ornithogaloides* Licht. ex Roem. & Schult.: 376 (1817b). *Trichonema ornithogaloides* (Licht. ex Roem. & Schult.) A.Dietr.: 583 (1833). Type: South Africa, [Western Cape], Koue Bokkeveld [Cold Bokkeveld], possibly Nov. 1803, *Lichtenstein s.n.* (B, holo.).

subsp. *ornithogaloides*

*Geissorhiza marlothii* R.C.Foster: 66 (1941), *syn. nov.* *G. ornithogaloides* subsp. *marlothii* (R.C.Foster) Goldblatt: 325 (1985). Type: South Africa, [Western Cape], Cold Bokkeveld, Houdenbeck, 850 m, *Marloth 10612* (B, holo.!, NBG!, PRE!, iso.); [Western Cape], Schoongesig, Ceres, *Hanekom 1222* (NBG, epi., designated here).

subsp. *flava* (Klatt) Goldblatt & J.C.Manning, *comb. & stat. nov.* *Geissorhiza flava* Klatt: 392 (1882). *G. ornithogaloides* var. *flava* (Klatt) R.C.Foster: 68 (1941). Type: South Africa, [Western Cape], without precise locality, *Breutel s.n.* (B, holo.!).

[*Waitzia flava* Reichb. in Klatt: 392 (1882), cited in synonymy]

[*Geissorhiza romuleoides* Eckl: 27 (1827), nom. nud.]

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## Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

## Authors' contributions

Both authors collaborated on all aspects of the research.

## 3. *Reyemia* included in *Zaluzianskya* (Scrophulariaceae: Limoselleae) with the new combination *Zaluzianskya chasmanthiflora* (Hilliard) J.C.Manning & Goldblatt

Authors: John C. Manning and Peter Goldblatt

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## Introduction

The genus *Reyemia* Hilliard (1992) (Scrophulariaceae: Limoselleae) was established for two species of annual herbs from the Hantam and Roggeveld Plateau in Northern Cape Province, South Africa, neither of them well known. *Reyemia nemesioides* (Diels) Hilliard (previously *Zaluzianskya nemesioides* Diels) has been collected several times along the length of the Hantam-Roggeveld escarpment between

Calvinia and Sutherland, but *Reyemia chasmanthiflora* Hilliard is still known only from the type locality near Williston. The relationships of *Reyemia* were presumed by Hilliard (1994) to lie with *Zaluzianskya* F.W.Schmidt, with which it shares a derived, shortly toothed and plicate calyx and similar, centrally depressed, cushion-shaped seeds. It was distinguished from *Zaluzianskya* by what was described as a 'loosely paniculate' inflorescence, a resupinate corolla with a patch of clavate hairs inside the throat on the posticous side, and with two stamens and two staminodes. Examination of the specimens confirms that the inflorescence comprises essentially spicate units, sometimes with the lower flowers shortly pedicellate. Species of *Zaluzianskya* have simple or sparsely branched, spicate or racemose inflorescences, non-resupinate flowers, sometimes with a ring of clavate hairs in the mouth, and either four or two stamens, usually without staminodes (Hilliard 1992). The differences between the two genera are thus centred on the strongly branched inflorescence and more zygomorphic flowers in *Reyemia*.

An examination of phylogenetic relationships in Manuleae and Selagineae by Kornhall, Heidari and Bremer (2001), based on the plastid gene regions *ndhF* and *trnL*, confirmed the close relationship between *Reyemia* and *Zaluzianskya*. This analysis, although including just four species of *Zaluzianskya* plus *R. chasmanthiflora*, provided the first indication that the latter was, in fact, nested in *Zaluzianskya*. A subsequent, more intensively sampled study of relationships within *Zaluzianskya* by Archibald, Mort and Wolff (2005) used a combination of nuclear ITS and plastid *rps16* and *trnL-F* gene regions from a sampling of 23 species of *Zaluzianskya*, plus the second species of *Reyemia*, *R. nemesioides*, to produce the first broad phylogenetic analysis of the genus. This study confirmed that *Reyemia* is deeply nested within *Zaluzianskya*, as sister to the clade comprising those members of section *Holomeria* (Benth.) Hilliard & Burt with four fertile stamens. The placement is entirely consistent with the morphological similarities between the two genera noted by Hilliard (1994) and supplemented by additional states identified by Archibald *et al.* (2005), viz. filaments decurrent to the base of the corolla tube and a ligulate stigma.

These findings led Archibald *et al.* (2005) to conclude that the differences in floral morphology between the two genera are no greater than exists amongst other species of *Zaluzianskya* and that *Reyemia* should be merged with *Zaluzianskya*.

The entire corolla lobes in the former species of *Reyemia* and in members of *Zaluzianskya* sect. *Holomeria* supports the close relationship between the two groups suggested by the molecular analysis of Archibald *et al.* (2005). There are indications, however, that sect. *Holomeria* may not be monophyletic as currently defined because *Zaluzianskya benthamiana* was retrieved as a member of sect. *Zaluzianskya* subsect. *Zaluzianskya*. This species (plus *Zaluzianskya diandra* which was not included in the analysis) are unique in sect. *Holomeria* in having just two stamens, raising the possibility that the entire corolla lobes in *Z. benthamiana* and the other

members of sect. *Holomeria* are convergent. This possibility, combined with the distinctive inflorescence and flowers of the former members of *Reyemia*, favours the retention of the two species as the separate section *Reyemia* within *Zaluzianskya*.

We implement this finding here in preparation for the forthcoming regional flora of the Karoo region. We also select an appropriate neotype from the same locality to replace the holotype of *Zaluzianskya nemesioides* in the Berlin Herbarium which has been lost.

## Research method and design

We consulted the relevant literature and implemented the necessary nomenclatural conclusions. Type material is cited from the Berlin Herbarium (B) and Compton Herbarium, South African National Biodiversity Institute, Cape Town, South Africa (acronyms after Holmgren, Holmgren & Barnett 1990).

## Taxonomic treatment

*Zaluzianskya* F.W.Schmidt, Neue und Seltene Pflanzen: 11 (1793), nom. cons., non *Zaluzianskia* Necker (= *Marsilea* L.). Type species: *Zaluzianskya villosa* F.W.Schmidt.

Sect. *Reyemia* (Hilliard) J.C.Manning & Goldblatt, syn. et stat. nov. *Reyemia* Hilliard in Edinburgh Journal of Botany 49: 297 (1992). Type species: *Reyemia chasmanthiflora* Hilliard = *Zaluzianskya chasmanthiflora* (Hilliard) J.C.Manning & Goldblatt.

*Zaluzianskya chasmanthiflora* (Hilliard) J.C.Manning & Goldblatt, comb. nov. *Reyemia chasmanthiflora* Hilliard in Edinburgh Journal of Botany 49: 297 (1992). Type: South Africa, [Northern Cape, Williston], Farm Annexe Kransfontein 721, 02 Sept. 1986, Cloete & Haselau 172 (NBG [as STE], holo.).

*Zaluzianskya nemesioides* Diels in Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23: 482 (1896). *Reyemia nemesioides* (Diels) Hilliard: 297 (1992). Type: South Africa, [Northern Cape], Hantam Mountains, Meyer s.n. (B†, holo.). Neotype, selected here: South Africa, Northern Cape, Calvinia, gravel flats below Hantamsberg, 15 Sept. 1996, Goldblatt & Manning 10525 (NBG, neo.; MO, iso.).

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The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

Both authors collaborated on all aspects of the research.

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