

New species of *Sparaxis* and *Ixia* (Iridaceae: Ixioideae) from Western Cape, South Africa, and taxonomic notes on *Ixia* and *Gladiolus*

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ABSTRACT

Sparaxis auriculata is a new species of this western Cape and western Karoo genus. It resembles *S. villosa* (Burm.f.) Goldblatt in its flowers but is probably allied to *S. galeata* (Jacq.) Ker Gawl. *Sparaxis metelerkampiae*, currently a subspecies of *S. variegata* Sweet is raised to species rank. We propose changes to the infrageneric classification of the southern African winter rainfall genus *Ixia*, and describe a new species, *I. aurea*. It is related to *I. odorata* Ker Gawl. but differs in the larger deep yellow or orange flowers which are unscented. In *Gladiolus*, we propose the new name, *G. saxatilis*, for the Mpumalanga endemic, originally described as *G. lithicola* Goldblatt & J.C. Manning, a homonym for an Ethiopian species.

1. *Sparaxis auriculata* Goldblatt & J.C. Manning, sp. nov.

Plantae 150–400 mm altae, cormo conico 12–14 mm diam., tunicis fibrosis, foliis 5–8 anguste lanceolatis acutis 10–15 mm latis, caule plerumque 1- vel 2-ramoso, spica subsecunda 5–7-flora, bracteis scariosis 15–20 mm longis, floribus zygomorphis bilabiatis luteis violaceis notatis, tubo oblique-infundibuliforme ± 24 mm longo, tepalis inaequalibus, tepalo dorsale $\pm 25 \times 18$ –20 mm, inferioribus auriculatis, filamentis ± 18 mm exsertis, antheris 7–8 mm longis.

TYPE.—Western Cape, Farm Koorlandshoek (Collinshoek), slopes of the Gifberg, Aug. 1998, Goldblatt & Manning 10966 (NBG, holo.; K, MO, PRE, S, iso.).

Plants 150–400 mm high. *Corm* globose-conical, 12–14 mm diam., tunics of medium-textured fibres mostly oriented vertically. *Leaves* 5–8, mainly basal, uppermost inserted in middle of stem, sheathing lower part of stem, reaching to between middle of stem and base of spike, narrowly lanceolate, acute, mostly 10–15 mm wide, with a moderately prominent submarginal vein making margin appear somewhat thickened, sheathing parts of leaves speckled with purple (sometimes fading when dry). *Stem* usually with one or two branches; branches produced in axil of cauline leaf, usually inclined and slightly flexed above leaves. *Spike* mostly 5–7-flowered, weakly flexuose, more or less secund; bracts pale below with whitish veins, becoming streaked with light brown above, 15–20 mm long, lightly lacerate and with prominent central cusp, inner slightly shorter and with 2 apical cusps. *Flowers* zygomorphic, bilabiate, predominantly cream-coloured, dorsal tepal pale mauve, lower tepals deep yellow fading to cream-coloured at apices, abaxial half of throat obscurely lined with dull grey-purple, unscented; perianth tube obliquely funnel-shaped, upper part curving outwards, ± 18 mm long, lower tepals united for a further 6–7 mm, basal cylindrical portion nar-

row and filled by style, without nectar; tepals unequal, dorsal largest, broadly ovate, erect, $\pm 25 \times 18$ –20 mm, upper laterals oblong-ovate, $\pm 20 \times 10$ –12 mm, spreading in upper half, lower three abruptly deflexed above and pinched together at bases, directed downward, $\pm 18 \times 8$ mm, strongly channelled, lower laterals with prominent auriculate basal lobes. *Filaments* unilateral and arcuate, whitish, ± 18 mm long; anthers cream-coloured, 7–8 mm long, exserted completely; pollen cream-coloured. *Ovary* 3.5 mm long, oblong-trigonous; style arching over stamens, white, ± 4 mm long, dividing just below apex of anthers, branches filiform, diverging and recurved in upper half, slightly wider toward apex. *Capsules* and *seeds* unknown. *Chromosome number* unknown. *Flowering time*: August. Figure 1.

Distribution and habitat: the species is so far known only from the lower slopes of the Gifberg Mountains in the northernmost part of the Western Cape (Figure 2). Plants were found to be very local but fairly common among rocks and in cleared places on bush-covered, sandstone slopes.

Apparently first recorded in 1979 by I.S. Walters on the Farm Vleikraal (or Veekraal) on the slopes of the Gifberg east of Klawer, *Sparaxis auriculata* was initially associated with the superficially similar *S. villosa* (Burm.f.) Goldblatt, then classified in the genus *Synnotia* Sweet. A second gathering was made in 1997 on Gifberg Pass east of Vleikraal and we re-collected the species there on the middle slopes of the Pass on the Farm Koorlandshoek in early August, 1998. Examination of living plants, in particular the underground organs, confirmed our expectation that the two prior collections represented an undescribed species. *S. auriculata* can be distinguished mainly on vegetative features. The corms are narrowly conical and have tunics of medium-textured fibres, whereas the leaves have the sheaths liberally spotted with dark purple, blades with acute apices and, especially unusual for *Sparaxis*, a prominent submarginal vein that makes the margins appear thickened.

Narrow, conical corms with soft corm tunics are characteristic of only two species of *Sparaxis*, *S. galeata* (Jacq.) Ker Gawl. and *S. roxburghii* (Baker) Goldblatt,

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FIGURE 1.—*Sparaxis auriculata*. A, corm and leaves; B, flowering spike; C, D, flower: C, front view; D, side view. Scale bar: A–D, 12 mm. Artist: John Manning.

both northwestern Cape species (Lewis 1956; Goldblatt 1992). The underground part of the stem is enclosed by a thick neck of fine fibres and leaves with speckled sheaths, but both species differ in floral details from *S. auriculata*. *Sparaxis galeata* has short-tubed, extremely sweetly fragrant flowers with the dorsal tepal reflexed, the leaves are prostrate, oblong and obtuse, and the species favours dry, stony, clay flats. The rare *S. roxburghii* has long-tubed flowers (the tube 20–25 mm long), otherwise resembling those of *S. galeata*, and is known from a single population in the mid Olifants River valley on stony slopes. Neither species has the submarginal vein of *S. auriculata*.

The flowers of *Sparaxis auriculata* are much like those of the common southwestern Cape *S. villosa* in general

appearance, but they are substantially larger in all respects. In *S. auriculata* the dorsal tepal is $\pm 25 \times 18$ –20 mm and the anthers are 7–8 mm long, compared with 14 – 19×10 –12 mm for the dorsal tepal and 3–4 mm for the anthers in *S. villosa*. Furthermore, the style in the latter species divides near the anther bases, the style branches are ± 3 mm long, rarely reaching beyond the middle of the anthers, and the lower tepals are inclined slightly below the horizontal and without auriculate basal lobes. In *S. auriculata* the style branches are ± 4.5 mm long and exceed the anther apices, and the lower tepals are directed downwards and are prominently lobed near the base. The corms and leaves of the two species differ substantially and in *S. villosa* the corms are globose with coarse, netted fibres, the vertical elements of which are thickened and claw-like below, while the leaves lack the unusual spotting so marked in *S. auriculata*.

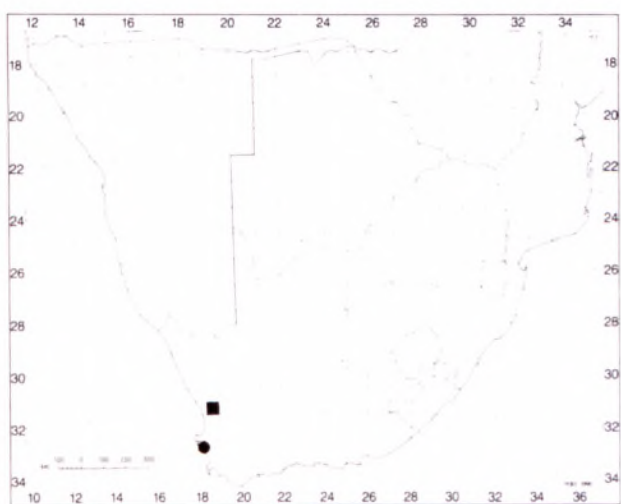


FIGURE 2.—Distribution of *Sparaxis auriculata*, ■, and *Ixia aurea*, ●, in Western Cape.

Specimens examined

WESTERN CAPE.—3118 (Vanhynsdorp): Farm Vleikraal east of Klawer, on east-facing lower slopes of the Gifberg, (–DC), Aug. 1979, Walters 15 (NBG); Gifberg Pass, (–DD), 25 Aug. 1997, Van Rooyen, Steyn & De Villiers 587 (NBG, PRU).

2. *Sparaxis metelerkampiae* (L.Bolus) Goldblatt & J.C.Manning, stat. nov.

Synnotia metelerkampiae L.Bolus, in Annals of the Bolus Herbarium 3: 77 (1923). *Synnotia variegata* Sweet var. *metelerkampiae* (L.Bolus) G.J.Lewis: 148 (1956). *Sparaxis variegata* (Sweet) Goldblatt subsp. *metelerkampiae* (L.Bolus) Goldblatt: 158 (1992). Type: Western Cape, Clanwilliam Div., near Eendekuil, *F. Metelerkamp* BOL16039 (BOL, holo.).

Goldblatt (1992) recognised two subspecies of *Sparaxis variegata* with subsp. *metelerkampiae* (L.Bolus) Goldblatt being distinguished from the typical subspecies by its smaller, longer-tubed flowers which are largely purple (including the anthers), a style which usually divides below the middle of the anthers, and short style branches only 2–4 mm long. The two were maintained as subspecies because of the presence of some apparently intermediate populations.

Field observations show that populations of *Sparaxis variegata* and *S. metelerkampiae* consistently differ and do not intergrade. This is particularly significant as their geographic ranges overlap. Apparent intermediates in herbaria may either be depauperate individuals or unusual forms of either taxon. The morphological differences between the two reflect differences in their pollination biology. *S. metelerkampiae* is pollinated by the long-proboscid flies *Prosoeca peringueyi* and *P. sp.* (Diptera: Nemestrinidae) (Manning & Goldblatt 1996), whereas *S. variegata* is pollinated by the large anthophorine bee, *Anthophora diversipes* (Hymenoptera: Apidae) (unpublished observations). These differences in morphology and reproductive biology suggest that it is more appropriate to recognise *S. metelerkampiae* as a species.

The two species can be distinguished as follows. *Sparaxis variegata* has flowers with a perianth tube 37–44 mm long with the lower part 25–32 mm long and the dorsal tepal 25–30 mm long. The style divides at or near the anther apices, the style branches are 4–5 mm long and the

cream-coloured anthers are 6–7 mm long. The perianth is usually predominantly yellow with the dorsal tepal and the tips of the others coloured violet whereas the lower part of the throat is streaked with dark violet lines. In *S. metelerkampiae* the perianth tube is 45–50 mm long with the lower part 35–40 mm long and the dorsal tepal is 14–18 mm long. The style usually divides below the middle of the anthers, the style branches are 2–4 mm long and the purple anthers are 2–4 mm long. The perianth is uniformly purple in colour except for the lower tepals which are marked with narrow white longitudinal streaks. Greenhouse-grown plants of *S. metelerkampiae* are self-compatible and autogamous, whereas *S. variegata* is self-incompatible (Goldblatt 1992).

Specimens examined

NORTHERN CAPE.—3119 (Calvinia): Nieuwoudtville-Oorlogskloof, (–AC), Leipoldt 872 (BOL, K).

WESTERN CAPE.—3118 (Vanhynsdorp): Zyferfontein, NE of Rietvlei, (–DC), Oliver 3812 (K). 3218 (Clanwilliam): Graafwater, (–BA), Compton 220 (NBG); between Clanwilliam and Graafwater, (–BA, –BB), Van Breda 1267 (PRE, Z); near Paleisheuwel, (–BC), Levyns 10154 (BOL); Farm Klein Remhoogte, west of Algeria, stony bank in sand, (–BD), Snijman 887 (MO, NBG); 10 km S of Clanwilliam, Lewis 4284 (K, PRE, SAM); Hex River Farm N of Citrusdal, sandstone slopes, Goldblatt 6148 (MO); Grey's Pass, (–DB), Barker 1476 (NBG), Salter 2733 (K). 3219 (Wuppertal): top of Pakhuis Pass, recently burned slopes in sandy soil, (–AA), Goldblatt 6404 (MO); Pakhuis Pass, Salter 3641 (BOL, K), Leipoldt BOL21277, Gillett 4062 (BOL, PRE), Esterhuysen 8032 (PRE); foot of Pakhuis Pass, Goldblatt 5657A (MO); Algeria campsite, 700 m, (–AC), Bos 503 (PRE); Kriedouw Krantz Pass, Cederberg, Gillett 4114 (MO); slopes of Middelberg, Elandskloof, (–CA), Hafström & Acocks 331 (PRE); Elandskloof, Leighton 1341 (NBG); slopes behind warm baths, Stephens 7086 (BOL, K).

3. *Ixia aurea* J.C.Manning & Goldblatt, sp. nov.

Plantae 200–400 mm altae, cormo globoso 10–16 mm diam., tunicis fibrosis reticulatis, foliis 5 vel 6 lanceolatis (8–)10–16 mm latis supra leviter contortis, caule eramoso, spica leviter flexuosa 6–20-flora, bracteis scariosis 8–9 mm longis, floribus hypocateriformibus luteis, tubo anguste infundibuliforme 8–11 mm longo, tepalis subaequalibus ellipticis patentibus 16–23 × 7–9 mm, filamentis decurrentibus 5–6 mm exsertis, antheris 6–7 mm longis.

TYPE.—Western Cape, Darling District, Farm Wolfontein, rocky slope among granite boulders, 22 Sept. 1998, Goldblatt & Manning 11029 (NBG, holo.; K, MO, PRE, S, WAG, iso.).

Plants 200–400 mm high. Corms globose, ± 10 mm diam., tunics of fairly fine reticulate fibres, often with few small cormlets at base. Cataphylls membranous, upper one reaching shortly above ground level. Leaves 5 or 6, all basal, narrowly lanceolate, (8–)10–16 mm wide, usually reaching to about middle of stem, uppermost leaf usually entirely sheathing, margins and midribs not thickened, lightly twisted in upper half. Stem erect, unbranched, ± 0.8 mm diam. below base of spike. Spike crowded, secund and spirally twisted, (6–)12–20-flowered; bracts scarious, translucent, outer ± 7 mm long, with prominent dark central vein, obscurely three-dentate, central tooth cusp-like and much exceeding lateral teeth, inner bract about as long as outer,

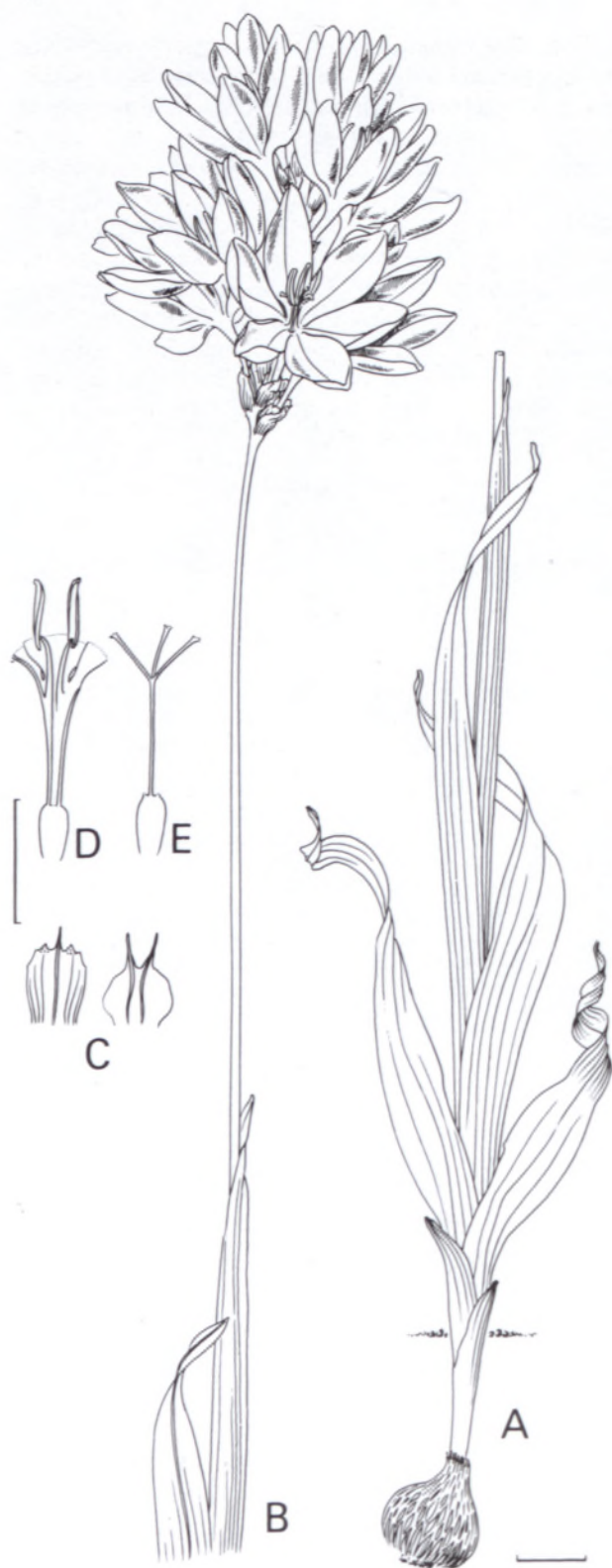


FIGURE 3.—*Ixia aurea*. A, corm and leaves; B, flowering spike; C, floral bracts; D, androecium; E, gynoecium. Scale bars: A–E, 10 mm. Artist: John Manning.

two-keeled, each keel with a prominent dark vein, bicuspidate. Flowers hypocrateriform, actinomorphic, uniformly deep yellow or orange, unscented; perianth tube straight and narrowly funnel-shaped, 8–11 mm long, filiform in lower half to two-thirds, widening gradually above, basal part tightly enveloping style, containing nectar in upper third; tepals obovate-elliptic, subequal, spreading, margins slightly upcurved, $16\text{--}23 \times 7\text{--}9$ mm. Filaments inserted ± 1 mm below apex of tube, decurrent for ± 1 mm, 5–6 mm long,

straight, weakly diverging; anthers 5–6 mm long (before anthesis), diverging, yellow; pollen yellow. Ovary ovoid, ± 3 mm long; style straight and erect, dividing opposite lower third of anthers, branches arching outward, 4.5–7.0 mm long, reaching to shortly above base of the anthers. Capsules barrel-shaped-trigonous, retuse, showing outline of seeds, $\pm 7 \times 5$ mm. Seeds subglobose, reddish brown, ± 1.2 mm long, testa sculpturing scalariform. Flowering time: September, occasionally into early October. Figure 3.

Distribution and habitat: *Ixia aurea* is known only from the granitic slopes above the Darling-Yzerfontein road (Figure 2) and is conspicuous when in flower, the brilliant yellow-orange spikes making a bright splash of colour among the late spring flora.

Despite occurring alongside the road in such a well-visited region as Darling, the species has rarely been collected. Plants from the type locality were originally mistakenly identified as a form of *I. dubia* Vent. of section *Ixia* by Goldblatt *et al.* (1998) because of the general resemblance to that species, despite the lack of a dark central mark to the flowers. More critical examination shows that *I. aurea* does not belong in section *Ixia* as currently circumscribed, for it has flowers with a narrowly funnel-shaped tube, tightly enclosing the style in the cylindrical lower half but flaring above and containing nectar in the upper third. In addition the filaments diverge from the base and do not occlude the mouth of the tube. In section *Ixia*, to which *I. dubia* belongs, the perianth tube is filiform-cylindrical almost to the apex, closely envelops the style and does not contain more than minute traces of nectar. The filaments are also coherent or connate from the base and thus close off the mouth of the tube. We suspect that records of this species were never made because even from a short distance the plants may be confused with two other common species from the Darling area, *I. maculata* L. and *I. dubia*. Apart from the floral differences, *I. aurea* may be distinguished from *I. dubia* by the leaves which lack thickened margins and midrib and are lightly coiled in the upper half. The blades of *I. dubia* and its allies have thickened margins and midribs and are plane. We suspect that the relationships of *I. aurea* lie with the two other yellow-flowered, narrow-tubed species, *I. tenuifolia* Vent. (= *I. framesii* L.Bolus) and *I. odorata* Ker Gawl. Of these, *I. odorata* may be its closest ally, based on general appearance, the broad, twisted leaf blades, and the many-flowered spikes. The flowers of *I. odorata* are in general smaller than those of *I. aurea*, with tepals up to 15 mm long, are white to lemon-yellow with a darker tube and never deep golden yellow to orange and are always sweetly scented of magnolia. The flowers are visited by a variety of bees for nectar and pollen.

The flowers of *I. aurea* are pollinated by a range of insects, including the hopline beetles *Heterochelus arthriticus*, *Lepithrix ornatella* and *Pachycnema crassipes* (Coleoptera: Scarabidae) and the horsefly *Mesomyia edentula* (Diptera: Tabanidae). The beetles use the flowers as sites for assembly and mating while the flies are attracted to the flowers as a source of nectar. Both the beetle species and the horsefly become covered in pollen after visiting several flowers. *Ixia aurea* thus joins the long list of species of this genus, mostly in section *Ixia*,

which are pollinated in part at least by hopliine beetles (Goldblatt *et al.* 1998).

INFRAGENERIC CLASSIFICATION OF *IXIA*

The following currently accepted infrageneric classification of *Ixia*, was proposed by Lewis (1962):

Subgenus *Ixia*

Section *Ixia*

Section *Morphixia* (Ker Gawl.) Pax

Section *Hyalis* (Salisb. ex Baker) Diels

Subgenus *Dichone* (Salisb. ex Baker) G.J.Lewis.

Subgenus *Dichone* and section *Ixia* (subgenus *Ixia*) share the synapomorphy of a filiform perianth tube which tightly clasps the style for its entire length. The tube also contains little or no nectar and the filaments are contiguous or connate from the base, effectively closing the mouth of the tube. We assume that this character arose once, for there seems no evidence to the contrary. Observations on the pollination biology of the genus are also consistent with this assumption and suggest that the species with filiform tubes have adopted derived pollination strategies which offer pollinator rewards other than nectar. The two taxa have flowers which are modified in different ways for different pollination strategies. In *Dichone* the flowers are uniformly pink and the anthers are short, somewhat inflated and dehisce tardily or only from the base by short slits. The flowers are buzz-pollinated by anthophorine bees (Apidae: Anthophorinae) which vibrate the flowers to extract the pollen (unpublished observations). In contrast, flowers of section *Ixia* are variously coloured, often with dark centres, and the anthers are large and longitudinally dehiscent. These flowers are adapted for pollination by hopliine beetles (Scarabidae) or by bees foraging for pollen. In the remaining sections *Hyalis* (Salisb. ex Baker) Diels and *Morphixia* (Ker Gawl.) Pax, the flowers have hollow perianth tubes which normally contain significant quantities of nectar; they are largely pollinated by nectar-foraging insects, particularly bees and long-tongued flies. Because of the shared synapomorphy we believe that *Dichone*, with section rank, and section *Ixia* should together constitute the subgenus *Ixia*. This decision is reinforced by the close resemblance between *I. micrandra* (subgenus *Dichone*) and *I. flexuosa* (section *Ixia*). Sections *Hyalis* and *Morphixia* are placed in a second subgenus for which we propose the name subgenus *Morphixia*.

We, therefore, put forward the following infrageneric classification for *Ixia*:

Subgenus ***Ixia***. Type: *Ixia polystachya* L.

Section ***Ixia***

Section ***Dichone*** (Salisb. ex Baker) Goldblatt & J.C.Manning, comb. et stat. nov.

Tritonia subgenus *Dichone* Salisb. ex Baker, Handbook of the Iridaceae: 190 (1892). *Ixia* subgenus *Dichone* (Salisb. ex Baker) G.J.Lewis: 159 (1962). Type: *I. erubescens* Goldblatt (= *I. crispa* L.f.).

Subgenus ***Morphixia*** (Ker Gawl.) Goldblatt & J.C.Manning, comb. et stat. nov.

Morphixia Ker Gawl., Iridearum genera: 105 (1827). *Ixia* section *Morphixia* (Ker Gawl.) Pax: 154 (1888). G.J.Lewis: 66 (1962). Type: *I. latifolia* D.Delaroche.

Ixia subgenus *Hyalis* Salisb. ex Baker: 161 (1892) (? in part?). *Ixia* section *Hyalis* (Salisb. ex Baker) Diels: 486 (1930). Type: *I. paniculata* D.Delaroche.

NOMENCLATORIAL NOTE IN *GLADIOLUS*

The name *G. lithicola*, used for a local endemic restricted to the Mpumalanga escarpment, South Africa, described by Goldblatt & Manning (1998) is a homonym for another species from Ethiopia (Goldblatt 1996). We propose the new name, *G. saxatilis* for the Mpumalanga plant. The epithet alludes to the mostly lithophytic habit of the species.

Gladiolus saxatilis Goldblatt & J.C.Manning, nom. nov., pro *G. lithicola* Goldblatt & J.C.Manning, *Gladiolus* in southern Africa 82 (1998), hom. illeg. non *G. lithicola* Goldblatt, *Gladiolus* in tropical Africa 284 (1996).

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