

# Two new subspecies of *Dietes* (Iridaceae: Iridoideae), *Dietes iridioides* subsp. *angolensis* from Angola and *Dietes bicolor* subsp. *armeniaca* from eastern South Africa, with notes and range extensions for *Dietes butcheriana* and *Dietes iridioides*

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**Dates:**

Received: 15 Oct. 2014

Accepted: 30 Mar. 2015

Published: 29 May 2015

**How to cite this article:**

Goldblatt, P. & Manning, J.C., 2015, 'Two new subspecies of *Dietes* (Iridaceae: Iridoideae), *Dietes iridioides* subsp. *angolensis* from Angola and *Dietes bicolor* subsp. *armeniaca* from eastern South Africa, with notes and range extensions for *Dietes butcheriana* and *Dietes iridioides*', *Bothalia* 45(1), Art. #883, 6 pages. <http://dx.doi.org/10.4102/abc.v45i1.883>

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**Background:** Recent collections of *Dietes* have extended the known geographical range and morphological variation in several species.

**Objectives:** To describe additional taxa in *Dietes* to reflect the morphological and geographical variation in the species more accurately and to record significant range extensions.

**Method:** Recent collections were compared with existing herbarium material and published literature.

**Results:** Two new subspecies in *Dietes* are described, viz. *Dietes iridioides* subsp. *angolensis* from Angola, constituting the first record of the species from that country, and *Dietes bicolor* subsp. *armeniaca* from eastern South Africa, which represents a range extension into southern KwaZulu-Natal. We also document a range extension for the local endemic *Dietes butcheriana* from KwaZulu-Natal into the Eastern Cape and discuss an anomalous population of *D. iridioides*, with long-lived flowers, from near Hankey in the Eastern Cape.

**Conclusions:** The range extensions and new infraspecific taxa increase our understanding of the diversity of *Dietes* in southern and south tropical Africa.

## Introduction

With five species in sub-Saharan Africa and one on Lord Howe Island (Australasia), *Dietes* Salisb. ex Klatt has one of the more remarkable distributions for Iridaceae, in which large disjunctions at generic rank are rare. Of the African species, four are relatively narrow endemics restricted to southern Africa. The fifth, *Dietes iridioides* (L.) Sweet ex Klatt, however, is widely distributed through eastern southern Africa, from the Riviersonderend Mountains in the Western Cape to Kenya and Uganda (Goldblatt 1981). Here we report substantial range extensions for *Dietes butcheriana* Gerstner, previously endemic to KwaZulu-Natal but now recorded from Pondoland in the Eastern Cape, *Dietes bicolor* (Steud.) Sweet ex Klatt, previously known from East London to Grahamstown but now recorded as far north as southern KwaZulu-Natal, and an important new country record for *D. iridioides* in Angola. Lastly, we discuss a novel variant from near Hankey in the Eastern Cape, South Africa, which we provisionally refer to *D. iridioides*. Three species of the genus, *D. bicolor*, *Dietes grandiflora* N.E.Br. and *D. iridioides*, are widely cultivated in parts of the world where the climate is suitable, both in gardens and in street and park plantings. They are valued for their drought resistance, tolerance of a range of growing conditions and, with the exception of *D. iridioides*, their attractive flowers produced over an unusually long time.

## Research method and design

We examined all relevant herbarium collections at the primary southern African herbaria, namely the Bolus Herbarium, University of Cape Town (BOL), the Compton Herbarium, South African National Biodiversity Institute, Cape Town (NBG), the National Herbarium, South African National Biodiversity Institute, Pretoria (PRE) and the South African Museum Herbarium, South African National Biodiversity Institute, Cape Town (SAM) (acronyms after Holmgren, Holmgren & Barnett 1990). Plants were also examined alive, either in cultivation at the Kirstenbosch National Botanical Garden or in the field wherever possible.

## Results

1. *Dietes bicolor* (Steud.) Sweet ex Klatt: Records of the species available to Goldblatt (1981) were from a limited area of the Eastern Cape, extending eastwards from near Grahamstown to the mouth of the Kei River in southern Transkei. New collections since then from eastern Transkei in the Mkhambathi Nature Reserve, along the Nyameni River, and from Umtamvuna in southern KwaZulu-Natal just across the Eastern Cape border, extend the known range of this species some 200 km to the north-east. The three northern stations are from a stretch of coast, some 60 km in extent, along the Msikaba, Nyameni [MnYameni] and Umtamvuna rivers. The species should thus also be looked for along the Mtentu River, which lies between the Msikaba and Nyameni. The habitat of *D. bicolor* is unusual for *Dietes*. Plants always grow close to water and all three new records are from populations growing along or in the riverbed in situations that are seasonally inundated.

The northern populations appear typical for the species except for details of the flowers. In typical *D. bicolor* the flowers are a pale lemon-yellow, with small or large dark brown, semicircular blotches at the base of the limb of the outer tepals, the claws of which are minutely dotted with brown (Figure 1a). In the eastern populations, flowers are paler in colour, white to creamy white with orange markings, with diffuse edges at the base of the outer tepal limbs, the claws spotted with orange (Figure 1b). Although the outer tepal claws were described as unmarked by Duncan (2008), his photographs indicate spotting, as in the collections that we examined. This colour variant, collected along the Mzamba River in Pondoland, was accorded cultivar status as 'Mzamba River' by Duncan (2008), but has not been documented in herbaria. Recent new collections extend the known range of this variant, which we recognise as a distinct subspecies.

### *Dietes bicolor* subsp. *armeniaca* Goldblatt & J.C.Manning, subsp. nov.

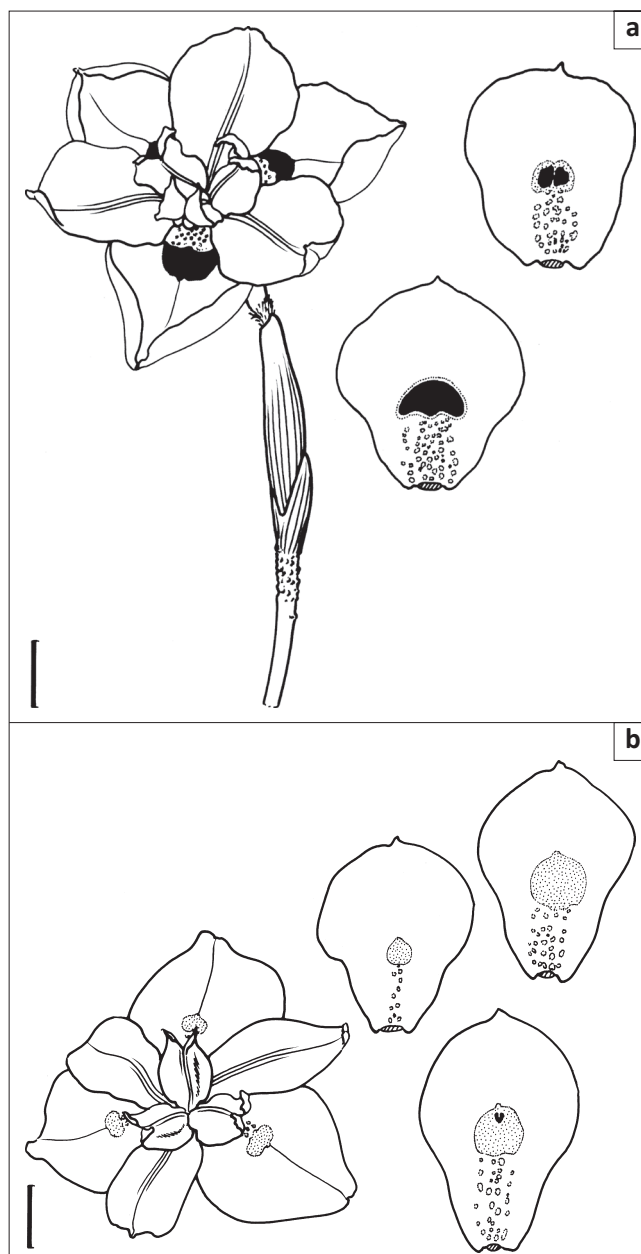
Type: SOUTH AFRICA. **KwaZulu-Natal**: 3130 (Port Edward): Leopard Beach, river bed, (–AA), Nov. 2011 [without day], Abbott 9381 (NBG, holo.; MO, iso.).

### Description

Inner rhipidial spathe 35 mm – 40 mm long. *Flowers*: white to creamy white, with orange nectar guides at bases of outer tepals, sometimes with minute pale or dark spot in centre of guides; outer tepals 23 mm – 33 mm × 21 mm – 29 mm, claws 9 mm – 10 mm long; inner tepals 23 mm – 33 mm × 17 mm – 22 mm. *Filaments*: 5 mm – 6 mm long; anthers 4.5 mm – 6.0 mm long. *Ovary*: 9 mm – 10 mm long; style branches 8 mm – 15 mm × 9 mm – 12 mm, crests 5 mm – 9 mm long. *Capsules*: 18 mm – 20 mm long (Figure 1b).

### Distribution

Extending from southern KwaZulu-Natal to the Mkhambathi Gorge in the northern coastal part of the Eastern Cape



Source: Artist – John Manning

**FIGURE 1:** Diagrammatic representation of *Dietes bicolor* flowers and detached outer tepals showing variation in shape, size and markings (a) for subsp. *bicolor*, from a garden plant, and (b) subsp. *armeniaca*, based on the Abbott 9381 specimen.

(Figure 2). A record from Town Bush Valley, Pietermaritzburg, probably does not represent a native population. Subsp. *bicolor* occurs well to the south and has been recorded from near the mouth of the Kei River southward to Grahamstown (Figure 2), thus some 150 km distant from the nearest recorded station for subsp. *armeniaca*. Further collecting may narrow that distance.

### Diagnosis

Recognised immediately by the white to palest yellow flowers with orange nectar guides and orange-spotted outer tepal claws, but also by the somewhat smaller (33 mm – 40 mm long) rhipidial spathes (34 mm – 45 mm long in subsp. *bicolor*) and generally slightly smaller outer tepals (23 mm – 33 mm ×

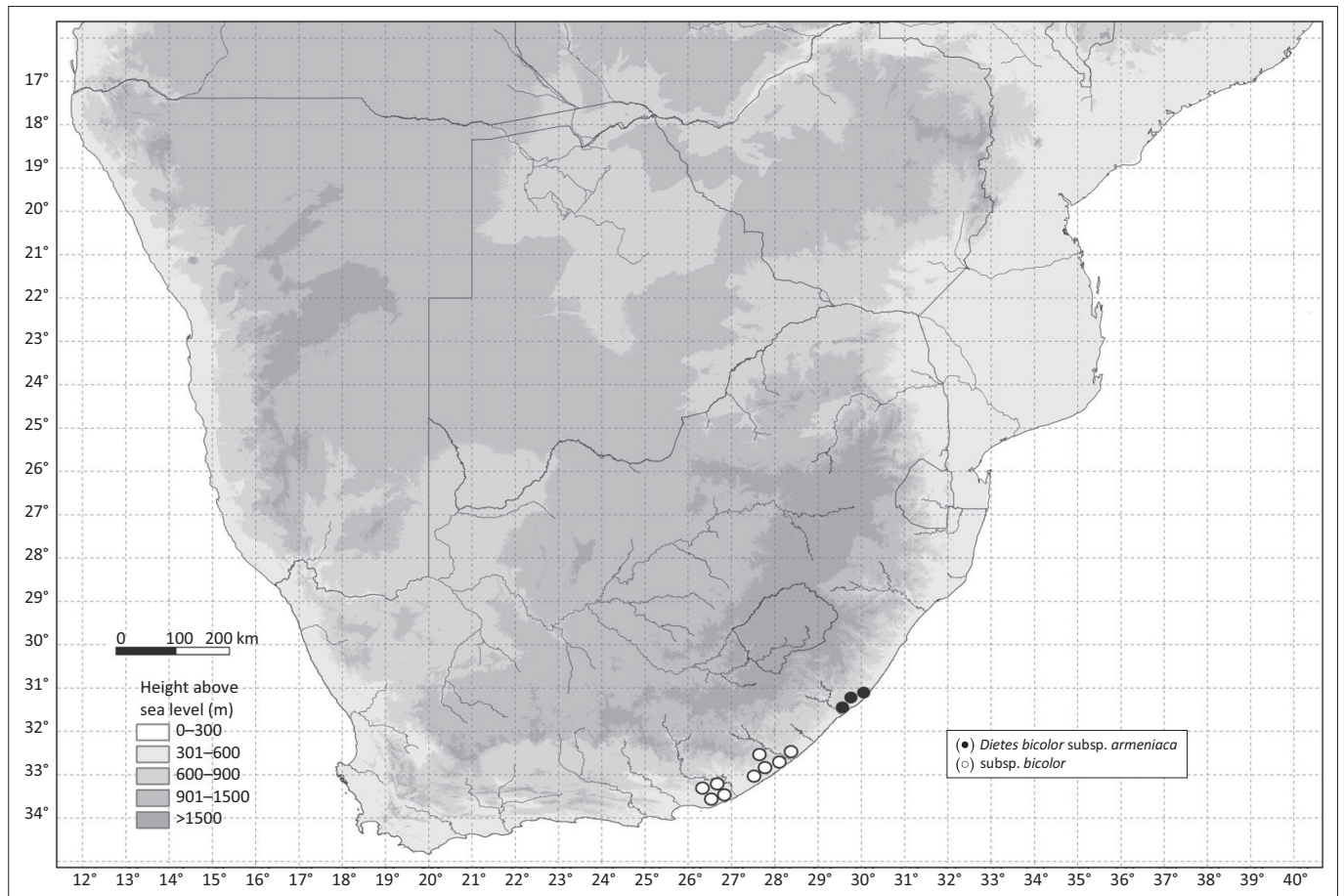


FIGURE 2: Map showing the geographic distribution of *Dietes bicolor* subsp. *armeniaca* and subsp. *bicolor*.

TABLE 1: Comparison of important taxonomic characters of the subspecies of *Dietes bicolor*.

Subspecies	Outer tepal: Claw length (mm)	Inner tepal (mm)	Anther length (mm)	Flower colour
<i>bicolor</i>	30–35 × 20–31: 9–12	26–33 × 17–27	6–9	Yellow with brown nectar guides
<i>armeniaca</i>	23–33 × 21–29: 9–10	23–33 × 17–29	4.5–6	White to pale yellow with orange nectar guides

21 mm – 29 mm vs 30 mm – 35 mm × 20 mm – 31 mm) and anthers (4.5 mm – 6 mm long vs 6 mm – 9 mm long in subsp. *bicolor*) (Figure 1b, Table 1). The ovary and capsules in subsp. *armeniaca* are also slightly shorter than in subsp. *bicolor*. Flowers of subsp. *bicolor* are pale yellow and the outer tepal limbs show solid, dark brown nectar guides (rarely brown-speckled) and brown-spotted claws (Figure 1a).

#### Additional specimens seen

KWAZULU-NATAL.—2930 (Pietermaritzburg): Pietermaritzburg, Town Bush Valley, (–CB), 25 Oct. 1939, *Fairall 143* (NBG) [? native]. 3130 (Port Edward): Leopard Beach, river bed, (–AA), 06 Oct. 1984, *Abbott 2184* (PRU).

EASTERN CAPE.—3129 (Port St. Johns): Mkhambathi Gorge, flood plain in rocky ground, (–BD), 26 Jan. 1986, *Goldblatt 7611* (MO). 3130 (Port Edward): Nyameni River [Mnyameni], (–AA), Nov. 2010 [without day], *Burring s.n.* (NBG, photographs only).

2. *Dietes butcheriana* Gerstner: The eastern southern African *D. butcheriana* is recognised by its very broad, sword-shaped

leaves, seldom less than 25 mm and up to 50 mm wide in healthy, mature plants, and by the large, broadly ovoid-oblong capsules of 25 mm – 35 mm × approximately 20 mm, which are nodding or pendent at maturity. The capsules do not dehisce, except near the apex, and remain attached to the flowering stems for months after ripening so that plants are seldom without capsules in some stage of development. Seeds are shed after gradual disintegration of the capsule walls (Goldblatt 1981). The relatively small flowers are white, with yellow and orange markings at the base of the limb and along the claw of the outer tepals. The outer tepals are up to 30 mm long and 13 mm at the widest, and the inner tepals are somewhat shorter. The style branches are also white, not pale to deep violet as in the related *D. grandiflora* and also often in *D. iridioides*, and are relatively short (approximately 7 mm long), with crests of approximately 5 mm long. The flowers are not often seen, because they open late in the afternoon and fade early in the evening, but the plants are readily identified by their wide leaves and large capsules.

First recorded in Zululand (Gerstner 1943), *D. butcheriana* was understood by Goldblatt (1981) to be restricted to



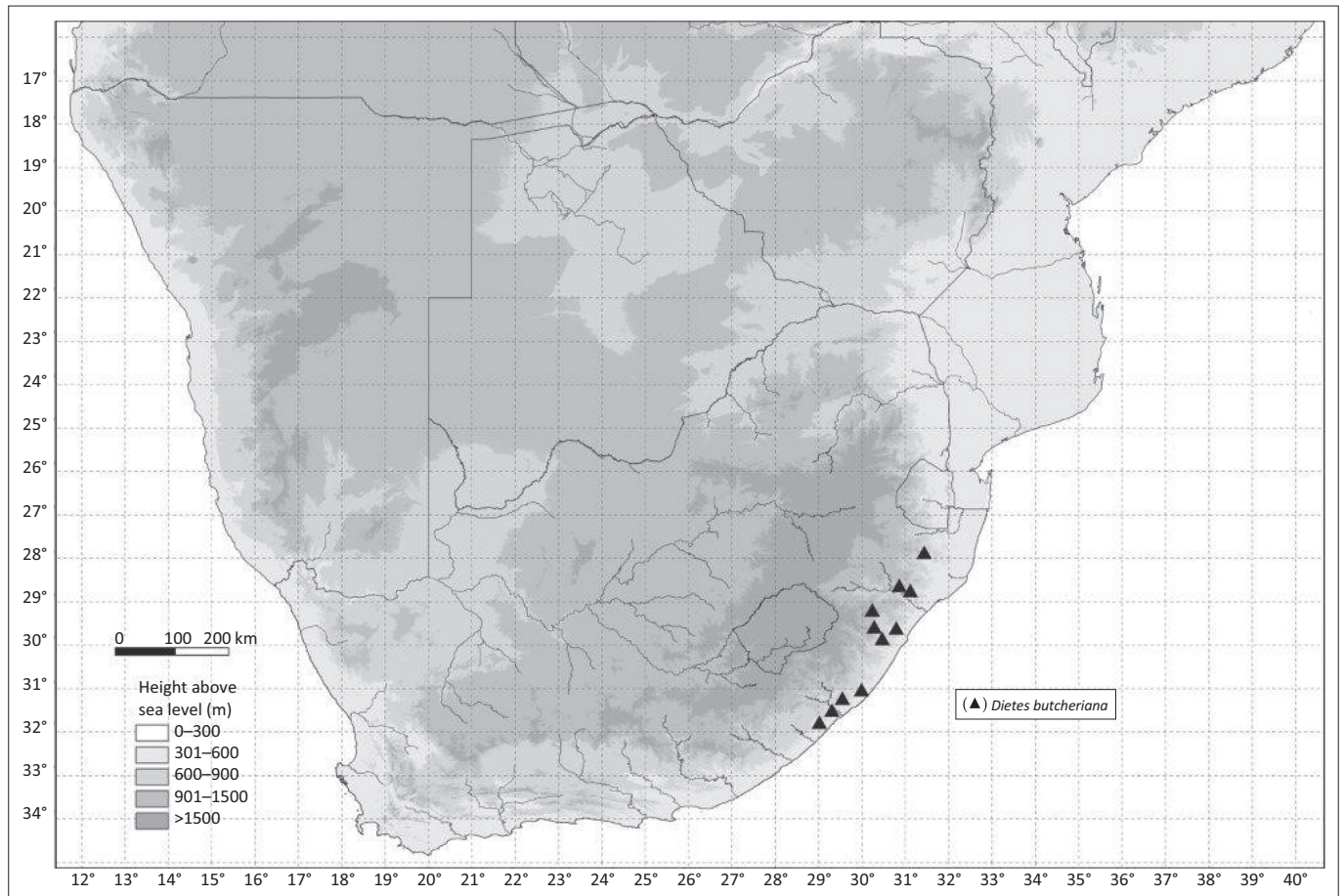


FIGURE 3: Map showing the geographic distribution of *Dietes butcheriana*.

the forests of Zululand and the central KwaZulu-Natal mist belt. A report that leaves of *D. butcheriana* are used locally in the Transkei of the Eastern Cape, South Africa (Hutchings 1996), indicated that the range is wider than until then reported. New records from the forests of the Umtamvuna Gorge on the KwaZulu-Natal/Eastern Cape border and from the Lusikisiki-Port St. Johns area of the central Transkei have considerably extended the known range of the species (Figure 3). The expanded knowledge of *D. butcheriana* is the result of the active collecting of Anne Hutchings and Tony Abbott. Hutchings also recorded *D. iridioides* growing in association with *D. butcheriana* in the Qokama Forest near Port St. Johns (Hutchings 2263, MO). The additional records are listed below. Hutchings described several uses for the species: fibres are used as string, plants may be burnt to purify a kraal, and the leaves are sometimes boiled and used as a douche for female ailments. *D. butcheriana* is known as *isiyunga* and *iconya* in Xhosa.

#### Additional specimens seen

**KWAZULU-NATAL.—3130** (Port Edward): Umtamvuna Nature Reserve, Valley of the Giants, forest floor, (–AA), Abbott 3316B (MO).

**EASTERN CAPE.—3129** (Port St. Johns): Mbotyi, coastal forest, (–BC), Hutchings 778 (KEI); Qokama Forest, frequent

on steep, shady slopes in forest, (–CC/CD), Hutchings 2287 (MO), 2264 (MO), 2265 (MO); along road 24 km from Hluleka Nature Reserve, forest margin on steep slope, (–CD), Hutchings 2268 (KEI, MO); north side of the Umzimvubu River above the bridge, (–DA), Hutchings & Johnson 2254 (KEI, MO), Hutchings 2271 (MO).

**3. *Dietes iridioides* (L.) Sweet ex Klatt:** This is the most widespread species of the genus, extending from forested valleys of the Riviersonderend Mountains in the Western Cape, South Africa, northward through wooded habitats in eastern southern Africa, Mozambique and Zimbabwe into Tanzania, Kenya and Uganda. The species occurs in shady habitats under bush or in evergreen forest. Leaves are typically linear to narrowly sword shaped, 6 mm – 15 mm wide and almost as long as the stems, which reach 20 cm – 60 cm in height. Flowers are predominantly white, apart from the style branches, which are usually pale violet (rarely white). The outer tepals have yellow markings at the limb bases and rows of brown spots along the claws. The inner tepals are unmarked. The flowers last about eight hours, opening in the late morning and fading and collapsing in the late afternoon. This is similar to other species of *Dietes*, in which flowers also last just one day, except for *D. grandiflora*, in which blooms last three days.

A population of plants from tropical thicket near Hankey in the Eastern Cape presents an unusual combination of

**TABLE 2:** Comparison of important taxonomic features in *Dietes grandiflora* and *Dietes iridioides*.

Taxon	Leaf width (mm)	Outer tepals (mm)	Inner tepal length (mm)	Filament length (mm)	Anther length (mm)	Style branch length (mm)	Style crest length (mm)
<i>Dietes grandiflora</i>	10–15	40–60 × 25–35	36–45	10–13	7–10	12–20	12–15
<i>Dietes iridioides</i> subsp. <i>iridioides</i>	5–15(–23)	24–35 × 12–16	24–30	5–9	3–6	7–9	5 (approx.)
Hankey population	5–6	30 × 14–20 (approx.)	25–30	9 (approx.)	5–6	10–11	4–6
<i>Dietes iridioides</i> subsp. <i>angolensis</i>	25–30	22–27 × 13	23–28	4	4	6 (approx.)	4–5

characteristics. Vegetatively the plants resemble *D. iridioides* in height and leaf width, and also in the production of small fans of leaves at the tips of old flowering stalks, capable of rooting when reaching the ground as a means of vegetative reproduction. This feature is common in *D. iridioides* but less so in the related and taller *D. grandiflora*. The Hankey plants also resemble *D. iridioides* in their smaller flowers and in the rostrate capsules, but differ from that species in the long-lived flowers, which open at about midday to early afternoon (12:00–13:00) and last through the night and into the following day, with the tepals collapsing only from mid morning to early afternoon. The style branches are consistently violet and the inner tepals, which remain suberect, either are uniformly white or have lines of dark brown dots in the lower half. The outer tepals also have unusually wide claws (10 mm wide), narrowing abruptly only at the base, much as in *D. grandiflora*. Outer tepals of other collections of *D. iridioides* have the claws tapering almost uniformly from the apex to the narrow base. Thus, floral longevity, tepal markings and the shape (but not the size) of the outer tepal claw are closer to the larger-flowered *D. grandiflora* than to *D. iridioides* (Table 2).

The conjunction of vegetative characteristics of *D. iridioides* with some floral characteristics of *D. grandiflora* makes us question the status of the Hankey population. Does it merit recognition as an infraspecific taxon and if so, of *D. iridioides* or *D. grandiflora*? Or might it be a separate species? We may, presumably, rule out the possibility of it being a hybrid, as the nearest known station for *D. grandiflora* is near Grahamstown, which is some 180 km east of Hankey. Provisionally, we conclude that it is best to include the Hankey population in *D. iridioides*. We also note that the habitat (shade under relatively dense thicket) differs from that for typical *D. iridioides*, which, according to our experience and herbarium records, is found in evergreen forest or woodland under relatively mesic conditions and often along streams. The occurrence of typical *D. iridioides*, with flowers that last only one day, in the nearby Baviaanskloof and in the Gamtoos River lowlands, makes the Hankey population appear all the more intriguing.

**EASTERN CAPE.—3324** (Steytlerville): Road from Hankey to Loerie, evergreen thicket, 915 ft [280 masl], (–DD), 24 Sept. 2003, *Goldblatt & Porter 12355* (MO, NBG); Hankey to Loerie via Kleinfontein, well-drained slopes in shade, 862 ft [260 masl], (–DD), 01 Oct. 2014, *Goldblatt & Porter 14051* (MO, NBG, PRE).

Even more notable than the Hankey population is the discovery of a population of *Dietes* in central Angola, also evidently referable to *D. iridioides*. Plants discovered on Mt. Mocu by Adam Harrower, horticulturist at the Kirstenbosch

National Botanical Garden, and later cultivated there, are unusual in both vegetative and floral morphology. The glossy, dark green leaves are consistently broader (generally 25 mm – 30 mm wide) than any recorded in other populations of the species and up to 45 cm long, slightly overtopping the flowering stems. The flowers are smaller than usual for *D. iridioides* (Table 2) and are almost uniformly white, with faint, dull yellow bilobed arcs at the bases of the outer tepal limbs and light, yellow-brown submarginal lines along the claw margins. The channelled outer tepal claws are minutely papillate (smooth to the naked eye), unlike those in typical *D. iridioides*, which have a broad, densely velvety, hairy, raised ridge along the midline. The style branches and crests (approximately 6 mm and 4 mm – 5 mm long, respectively) of the Angolan plants are only faintly suffused with violet and are smaller than encountered elsewhere in the species. The Angolan plants are clearly closely allied to eastern and southern African *D. iridioides*, but they seem sufficiently different to us to merit taxonomic recognition at the level of subspecies. Until now, no species of *Dietes* has been recorded in Angola and the genus is listed neither by *Figueiredo and Smith (2008)* nor in the online checklist ‘Flora of Angola Online’ (<http://flan.sanbi.org>, version as of September 2011).

### ***Dietes iridioides* subsp. *angolensis* Goldblatt & J.C.Manning, subsp. nov.**

Type: ANGOLA. **Huambo**: Mt. Mocu, evergreen forest floor, cultivated and flowered in Hort. Kirstenbosch, *Harrower s.n.* (NBG, holo.; MO, iso.).

Plants 0.45 m high. *Leaves*: glossy, dark green, generally 25mm–30mm wide, approximately as long as stems. *Rhipidia*: generally with 2–3 flowers; inner spathes approximately 50 mm long, outer spathes approximately two-thirds as long. *Flowers*: predominantly white; outer tepals with faint, dull yellow bilobed arches at limb bases; claws with yellow-brown longitudinal lines adjacent to margins; style branches faintly suffused with violet; outer tepals 22 mm – 27 mm × approximately 13 mm, claw approximately 11 mm long, channelled, minutely papillate but smooth along edges; inner tepals 23 mm – 28 mm long, limb approximately 15 mm × 9 mm. *Stamens*: free, white; filaments 4 mm – 5 mm long, broadened in lower half and contiguous at bases, filiform above; anthers approximately 4 mm long. *Ovary*: approximately 8 mm long; style branches approximately 6 mm long, crests 4 mm – 5 mm long. *Capsules*: ovoid oblong, approximately 25 mm long, often shortly rostrate, surface rough, not fissured. *Flowering time*: erratically, almost throughout the year in cultivation, not known in the wild.

### Distribution

Known only from the forest floor on the flanks of Mt. Mocu, the highest peak in Angola. The population may have been more extensive, but logging and forest clearing have destroyed suitable habitat at lower elevations.

### Diagnosis

We refer the Angolan population to *D. iridioides* but note several significant differences, which provide the basis for recognition at subspecies rank. The leaves, generally 25 mm – 30 mm wide, are significantly wider than in subsp. *iridioides*, in which leaves are usually 6 mm – 15 mm wide, rarely wider in some populations from the KwaZulu-Natal Drakensberg. Notably, our sampling of collections of *D. iridioides* from Zambia and Congo, the locations nearest to the Angolan station, have leaves quite typical of the species (10 mm – 18 mm wide). Flowers of the Angolan plants are predominantly white with faint markings on the outer tepals, which are 22 mm – 27 mm long, and have minutely papillate claws. In typical *D. iridioides*, the outer tepals are 25 mm – 35 mm long, the claws are densely hairy and the style branches are usually pale violet but sometimes white.

### Acknowledgements

We are grateful to Jan Burring of Durban, who discovered the Mzamba population of *D. bicolor* in 2004, for bringing

the Nyameni plants to our attention, Adam Harrower for specimens and notes regarding *D. iridioides* in Angola, and Anne Hutchings for bringing new records of *D. butcheriana* to our attention. Anthony Magee and Michelle Smith prepared the digital figures.

### 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

P.G. (University of KwaZulu-Natal) and J.C.M. (University of KwaZulu-Natal) contributed equally to this article.

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