

IRIDACEAE

TAXONOMIC NOTES ON *BABIANA* AND *FERRARIA* IN ARID WESTERN SOUTHERN AFRICA

In preparation for an account of the Iridaceae for Namaqualand and the winter rainfall Karoo, we have found that several nomenclatural and taxonomic adjustments are necessary. These concern the genera *Babiana* Ker Gawl. and *Ferraria* Burm. ex Mill. Both genera are currently being actively studied but our conclusions will not be published in the immediate future.

Taxonomic notes on *Babiana*

***Babiana spiralis* Baker**, Handbook of the Irideae: 111 (1892). Type: South Africa, Northern Cape, Namaqualand, without precise locality or date, collector uncertain, possibly *J. Niven s.n.* in Herb. Forsyth (K, syn.!: 2 sheets).

Babiana fimbriata was first collected by J.F. Drège in 1830 in Namaqualand between the Swartdoorn and Groen Rivers, between Bitterfontein and present day Garies. It was assigned to the genus *Antholyza* by F.W. Klatt in 1867, 1868 and was transferred to *Babiana* by J.G. Baker in 1877. Then, in her monograph of *Babiana*, G.J. Lewis (1959) included as a synonym of *B. fimbriata*, a second species, *B. spiralis*, which had been described by Baker in 1892. In *Flora capensis*, Baker (1896) recognized both *B. fimbriata* and *B. spiralis*. Our field work in Namaqualand

over the past 10 years shows that Baker was correct in recognizing both species. They are readily distinguished from each other by vegetative and floral features. Normally a fairly tall plant, standing 250–550 mm high, *B. spiralis* has a velvety hairy stem and smooth cataphylls and leaf sheaths. The leaf blades are 1.5–2.5 mm wide and loosely twisted above with a distinct pseudopetiole up to 40 mm long. The flowers are coloured bright pink or pale blue with pale yellow nectar guides on the lower tepals, which have auriculate lobes at the base of the limbs. The upper lateral tepals curve outward shortly above the base and are thereafter subpatent.

In contrast, *Babiana fimbriata* is 100–200 mm tall, with a hairless or nearly hairless stem and cobwebby to woolly cataphylls and leaf sheaths. The leaf blades are 3–4 mm wide. The flowers are dull purple and cream-coloured and the lower lateral tepals also have prominent auriculate lobes at the base of the limbs. The upper lateral tepals are directed forward or slightly curved inward in the proximal half, giving the flower a distinctly closed appearance in comparison with that of *B. spiralis*.

Favouring deep sandy soils, *Babiana spiralis* is the more widespread of the two species, extending from Garies to Klawer in the south and along the coast

between Groen River mouth and Kotzesrus in the west. *B. fimbriata*, in contrast, is a fairly narrow endemic of central Namaqualand, with a range limited to the area between Garies and Nuwerus, and seems to prefer stony ground rather than deep sands.

The only collection of *Babiana fimbriata* correctly assigned to the species by Lewis (1959) is the type gathering. Other specimens that she cited are *B. spiralis*. Since the publication of her monograph, a handful of additional collections have been made of plants corresponding to the original Drège collection and they show beyond question that *B. fimbriata* is distinct from *B. spiralis*. The origin of the type collection of *Babiana spiralis* has long been puzzling. The name Forsyth on the type sheets at the Kew Herbarium is now thought to refer to William Forsyth, whose herbarium collection was bought in 1835 after his death by George Bentham of Kew Gardens (C.E. Nelson pers. comm. 2003). We suspect that the specimens were actually collected by James Niven, who botanized in Namaqualand in 1799 and possibly later, gathering seeds and perhaps bulbs, for patrons in Great Britain and France (Gunn & Codd 1981).

Material examined

Babiana fimbriata

NORTHERN CAPE.—3017 (Hondeklipbaai): 550 m ESE of Waterklop from Grootbrakfontein, near Garies, (–DB), August 1979, *Van Berkel* 129 (NBG).

WESTERN CAPE.—3018 (Kamiesberg): between Bitterfontein and Garies at Swartdoring River, (–CC), 2 September 2000, *Goldblatt & Nänni* 11452 (MO, NBG, PRE); 9 km N of Bitterfontein, (–CC), 20 August 2001, *Goldblatt & Porter* 11711 (MO, NBG). 3118 (Vanrhynsdorp): Meerhofkasteel Farm, 15 km W of Nuwerus, (–AA), 28 August 1986, *Hilton-Taylor* 1203 (NBG); 3 miles NW of Nuwerus, (–AB), 11 September 1971, *Hall* 4141 (NBG); between Nuwerus and Lutzville, (–AB), 17 July 1964, *Lewis s.n.* (NBG); rocky bank between Bitterfontein and Nuwerus, (–AB), 13 August 1997, *Goldblatt & Manning* 10666 (MO); Knersvlakte at Grootgraafwater turnoff, stony east-facing slope, (–BC), 20 August 2001 (fr.), *Goldblatt & Manning* 11710 (MO).

Babiana spiralis

NORTHERN CAPE.—3017 (Hondeklipbaai): lat. 30° 32' 67", long. 17° 56' 80", (–DB), 26 April 1981, *Van Berkel* 378 (NBG); hills above Garies, 4 August 1980, *Greig & De Villiers* 2 (PRE); 18 km from the junction of the Garies–Groenrivier road toward Nuwefontein, (–DC), 3 September 1976, *Boucher* 3159 (K, NBG, PRE); Farm Waterval west of Kotzesrus, (–DC), 28 August 2001, *Goldblatt & Porter* 11773 (MO, NBG); sandy flats 1.8 km east of Kotzesrus, (–DC), *Goldblatt & Porter* 12080 (MO, NBG); top of Garies hill, ± 0.5 km along road to Hondeklipbaai, (–DB), 2 September 2000, *Goldblatt & Nänni* 11453 (K, MO, NBG, PRE); 18 km towards Nuwefontein from junction with Garies–Groenrivier road, (–DC), 3 September 1976, *Boucher* 3159 (K, NBG, PRE); Farm Waterval, 14 km W of Kotzesrus, (–DC), 28 August 2001 (fr.), *Goldblatt & Porter* 11772 (MO, NBG).

WESTERN CAPE.—3118 (Vanrhynsdorp): hills at Bitterfontein, (–AA), 2 September 1897, *Schlechter* 11041 (K, MO, S); SW of Bitterfontein, (–AB), 5 September 1955, *Hall* 1003 (NBG); Klawer, (–DC), July 1848, *Stokoe s.n.* (SAM59866).

Locality uncertain: 1 km SW of Biesiesfontein, September 1974, *Nordenstam & Lundgren* 1770 (MO, S).

***Babiana planifolia* (G.J.Lewis) Goldblatt & J.C.Manning, comb. et stat. nov.**

Babiana striata var. *planifolia* G.J.Lewis in Journal of South African Botany, Suppl. 3: 130 (1959). Type: South Africa, Northern

Cape, 9 miles (14.4 km) west of Steinkopf, 30 June 1935, *T.M. Salter* 5554 (BOL, holo.).

Although only two collections were known to Lewis (1959) when she described *Babiana striata* var. *planifolia*, several additional gatherings are now available and make it clear that this taxon is best treated as a separate species. Typical *B. striata* has a strongly inclined stem and nearly horizontal spike, conspicuously undulate and crisped leaves, and corm tunics of coarse fibres. What we now recognize as *B. planifolia* has an erect stem and only slightly inclined spike, almost plane leaves that are only occasionally weakly undulate toward the base and loosely twisted distally, and corm tunics of relatively fine fibres. Plants of both taxa have cobwebby to woolly cataphylls and lower leaf sheaths, and the stem and bracts are usually hairless. The lower lateral tepals of *B. planifolia* also appear to lack the exaggerated auricular lobes at the base of the limbs typical of most other species of section *Exohebeoides*, including typical *B. striata*.

Plants from the Eksteenfontein area of the southern Richtersveld associated with *Babiana planifolia* (as *B. striata* var. *planifolia*) by Lewis have short, broad, weakly undulate leaves 35–50 × 15–20 mm, twisted in the upper half. These plants seem to differ consistently in their short stature and additionally have long, soft, almost silky hairs on the leaf margins and upper sheaths, especially conspicuous in *Goldblatt & Manning* 9898 (MO, NBG). Although corms, cataphylls, and the lower leaf sheaths of the Richtersveld plants are not known, we provisionally include this form in *B. planifolia*. Additional material may show that it is a separate taxon.

Both *Babiana striata* and *B. planifolia* flower in May and June, occasionally in July, and remain poorly represented in herbaria, although neither is rare in the wild. *Babiana planifolia* grows on rocky slopes, mainly on fine-grained soils, extending from the southern Richtersveld to Garies and Soebatsfontein and locally in the Knersvlakte.

Other material examined

NORTHERN CAPE.—2817 (Vioolsdrif): 3 km N of Eksteenfontein, (–CD), 3 August 1994, *Goldblatt & Manning* 9898 (MO, NBG); near Eksteenfontein, (–CD), 27 March 1979, *Van Berkel* 100 (NBG). 2917 (Springbok): 23 miles W of Steinkopf, (–AB), June 1929, *Marloth* 13254 (PRE); 26 km west of Springbok, Spektakel Pass, in granitic ground, (–DA), 22 July 1976, *Goldblatt* 3658 (MO); Ezelfontein, 14 miles west of Springbok, (–DA), 20 June 1965, *Hall* 3057 (NBG); near Paddagat, 22 miles NW of Springbok, (–DB), 28 May 1961, *Leistner* 2552 (NBG, PRE); 14 km S of Springbok, (–DD), 7 August 2000 (fr.), *Goldblatt & Manning* 11327 (MO, NBG). 3017 (Hondeklipbaai): 10 km N of Soebatsfontein, (–BA), 21 May 1986, *Duncan* 114 (NBG); 14 miles NW of Kamieskroon, (–BB), 19 July 1957, *Acocks* 19323 (PRE); road to Hondeklipbaai near turnoff N of Garies, (–DB), May–June, *Loubser* 2160 (NBG); 19 km S of Kotzesrus on road to Landplaas, (–DD), 16 September 2001 (fr.), *Goldblatt & Porter* 11898 (MO, NBG).

WESTERN CAPE.—3118 (Vanrhynsdorp): Knersvlakte at Grootgraafwater turnoff, stony east-facing slope, (–BC), 20 August 2001 (fr.), *Goldblatt & Manning* 11710A (MO).

Taxonomy of the *Ferraria divaricata* complex

When M.P. de Vos revised the southern African genus *Ferraria* in 1979, she treated *F. divaricata* as a single

widespread species with four subspecies. The entire range of the species extended from southwestern Namibia to the southern Cape, and locally eastward into the Karoo. Two subspecies, subsp. *arenosa* and subsp. *aurea* were distinguished by a well-developed aerial stem, usually extensively branched in the upper half and flowers lasting a single day, whereas subsp. *divaricata* and subsp. *variabilis* have short stems, branching to some extent, but usually close to ground level and the flowers last two, exceptionally three days. De Vos (1979) also noted differences in the seeds between the two pairs of subspecies, subsp. *arenosa* and subsp. *aurea* having globose, matte brown seeds with reticulate sculpturing and foveate epidermal cells, whereas subsp. *divaricata* and subsp. *variabilis* have seeds typical of the rest of the genus, being irregularly angled by pressure and pale straw-brown in colour with a coat that is slightly wrinkled to ruminate.

Uniting the four subspecies is a similarity in floral morphology, viz. the tepals have broad claws that together form a wide floral cup, while the fringed tepal limbs extend horizontally. The floral cup, 12–15 mm deep and 13–15 mm wide at the rim, holds a pool of nectar secreted from small nectaries a short distance above the tepal bases. *Ferraria divaricata* belongs in section *Macroscyphae* of the genus, defined by a beaked ovary and capsule and anthers with divaricate lobes. Other species of the section, including the Namaqualand *F. macrochlamys* (Baker) Goldblatt & J.C.Manning (Goldblatt & Manning 2004) and *F. kamiesbergensis* M.P.de Vos, and the Western Cape *F. uncinata* Sweet, have relatively narrow tepal claws that form a narrow cup and smaller flowers.

After collecting plants of all four subspecies in the field, we have become dissatisfied with this taxonomy. The tall-stemmed subsp. *arenosa* and subsp. *aurea*, which together have a distribution along the Cape west coast from Hondeklipbaai in the north to the Cape Flats in the south, have seeds unique in *Ferraria*, as well as a tall, branched habit, and flowers lasting a single day and differing in coloration from those of subsp. *divaricata* and subsp. *australis*, which last two or three days. A taxonomy that better reflects the biological situation is to treat subsp. *arenosa* and subsp. *aurea* as one species, and subsp. *australis* and subsp. *divaricata* as another.

A second consideration relating to *Ferraria divaricata* is the typification of the species. The type is an illustration in *The British flower garden* (Sweet 1827), which depicts a branch of a plant described as being 18 inches (0.45 m) high, with chocolate-brown flowers with a pale, darkly streaked floral cup. This matches exactly, populations of the plant currently called *F. divaricata* subsp. *arenosa* from the Western Cape coast near Leipoldville and Sandberg (see Manning *et al.* 2002: 158, as *F. foliosa*). It follows that subsp. *arenosa* and subsp. *aurea*, when raised to species rank, must be called *F. divaricata*. This means that subsp. *australis* and subsp. *divaricata* need a new name. There are no legitimate synonyms available at species rank. The only synonym, *F. antherosa* Ker Gawl., is a superfluous name for *F. viridiflora* Andr. which is itself a synonym of *F. ferrariola* (Jacq.) Willd. We chose the name *F. variabilis* for the species in view of the variable perianth coloration. This

ranges from red-brown tepal limbs with dull purple at the base and pale claws (subsp. *divaricata*) to variously greenish, dull yellow, or light brown with speckled markings on the limb bases (subsp. *australis*). Basic chromosome number is $x = 10$ in *F. divaricata* and *F. variabilis*. All counts are diploid, $2n = 20$, except in populations referred by De Vos (1979) to *F. divaricata* subsp. *australis*, which are tetraploid, $2n = 40$. We see no need to distinguish subspecies within *F. divaricata* and *F. variabilis*, based largely on tepal colour and patterning (and chromosome number in the case of subsp. *australis*), and thus recognize just two species in place of *F. divaricata* and De Vos's four subspecies.

***Ferraria divaricata* Sweet**, *The British flower garden* 1: t. 192 (1827); M.P.de Vos : 354 (1979). Type: illustration in Sweet, *The British flower garden* 1: t. 192 (1827), from South Africa, without precise locality, collected by W. Synnot.

F. divaricata subsp. *arenosa* M.P.de Vos 45: 358 (1979). Type: South Africa, [Western Cape], Clanwilliam, Nardouw Pass, Farm de Lille, October 1973, *Van Breda sub De Vos* 2295 (STE, holo.!).

F. divaricata subsp. *aurea* M.P.de Vos 45: 359 (1979). Type: South Africa, [Western Cape], 15 miles east of Lambert's Bay, Langdam, 28 September 1973, *De Vos* 2297 (STE, holo.!).

***Ferraria variabilis* Goldblatt & J.C.Manning**, sp. nov.

F. antherosa Ker Gawl. : t. 751 (1804), nom. illeg. superfl. pro *F. viridiflora* [as *F. viridis*] Andrews. Type: South Africa, without precise locality or collector, illustration in Curtis's Botanical Magazine 20: t. 751 (1804).

F. divaricata subsp. *australis* M.P.de Vos 45: 359 (1979). Type: South Africa, [Western Cape], Clanwilliam, Langdam, 17 September 1945, *R.H. Compton* 17412 (NBG, holo.!).

Plantae 60–200 mm altae saepe caespitosae, prope basem ramosae, foliis ensiformibus ad linearibus, rhipidiis 2-florum spatha interiore 40–80 mm longo exteriore usitate pauca brevior, floribus usitate limbis pallide flavis ad brunneis vel griseoceruleis marginibus coloribus pallidior vel atrobrunneis unguibus pallidis vel atrostriatis cupulatis, tepalis exterioribus 27–40(–50) × 10–15 mm, interioribus 25–40(–45) × 8–10 mm, unguibus 10–15 mm longis, filamentis connatis in columnam 8–13 mm longis liberibus divergentibusque 3–4 mm, antheris 3.5–5.0 mm longis lobis late divergentibus, ovario rostrato, capsulis ellipsoideis 30–50 mm longis.

TYPE.—Northern Cape, 3119 (Calvinia): Nieuwoudtville, Klipkoppies, lower slopes in sand, (–AC), 15 September 1961, *W.F. Barker* 9537 (NBG, holo.!, MO, iso.!).

Plants 60–200 mm tall, often branched just above base, branches crowded and subequal in length, often forming small tufts. *Leaves* sword-shaped to linear, usually about as long as stem, sometimes up to twice as long, (2–)4–10 mm wide, crowded basally, usually without visible midrib, often slightly striate, margins often weakly thickened, rarely obscurely crisped, sheaths usually overlapping and concealing stem. *Rhipidia* 2-flowered; inner spathes 40–80 mm long, outer slightly shorter to about as

long, often arching outward in upper half. *Flowers* lasting two or sometimes three days, predominantly pale to dull yellowish to pale to middle brown, or dull grey-blue, limbs solid dark brown to blackish purple at base, or with scattered dark spots, margins darker or paler in colour, claws uniformly pale or with dark longitudinal streaks or with broad darker median streak, forming floral cup 12–15 mm deep, 13–15 mm wide at rim, usually slightly putrid smelling, nectaries basal, pale or dark-coloured; outer tepals 27–40(–50) × 10–15 mm, claws 10–15 mm long, inner tepals 25–40(–45) × 8–10 mm. *Filaments* united in column 8–13 mm long, free and arching outward in upper 2–4 mm; anthers 3.5–5.0 mm long before anthesis, shorter after dehiscence, lobes widely diverging. *Ovary* with sterile beak; stigmas comprising small lobes below tips of style arms, arching over anthers. *Capsule* ellipsoid, 35–50 mm long, including beak; seeds rounded, usually angled by pressure, coat dull and slightly wrinkled. *Flowering time*: August to November.

Distribution and ecology: sandy and shale flats and granite outcrops, extending from southern Namibia to Oudtshoorn and into the Upper Karoo as far east as Upington and Britstown, but absent from the western coastal forelands of Western Cape.

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REFERENCES

- BAKER, J.G. 1877. *Systema Iridacearum*. *Journal of the Linnean Society of London, Botany* 16: 61–180.
 BAKER, J.G. 1892. *Handbook of the Iridaceae*. Bell, London.
 BAKER, J.G. 1896. Iridaceae. In W.T. Thiselton-Dyer, *Flora capensis* 6: 7–171. Reeve, London.
 DE VOS, M.P. 1979. The African genus *Ferraria*. *Journal of South African Botany* 45: 295–375.
 GOLDBLATT, P. & MANNING, J.C. 2004. New species of *Ixia* (Crocoidae) and *Moraea* (Iridoideae), and taxonomic notes on some other African Iridaceae. *Novon* 14: 288–298.
 GUNN, M. & CODD, L.E. 1981. *Botanical exploration of southern Africa*. Balkema, Cape Town.
 KER GAWLER, J. 1804. *Ferraria antherosa*. *Curtis's Botanical Magazine* 20: t. 751.
 KLATT, F.W. 1867–1868. Diagnoses Iridacearum novarum. *Linnaea* 35: 380.
 LEWIS, G.J. 1959. The genus *Babiana*. *Journal of South African Botany*, Suppl. 3.
 SWEET, R. 1827. *Ferraria divaricata*. *The British flower garden* 1: t. 192.
 MANNING, J.C., GOLDBLATT, P. & SNIJMAN, D. 2002. *The color encyclopedia of Cape bulbs*. Timber Press, Portland, Oregon.

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