Systematic Botany (2016), 41(4): pp. 944–949

DOI 10.1600/036364416X694044
Date of publication December 15, 2016

Drimia trichophylla (Hyacinthaceae, Urgineoideae), a New Species from the Eastern Cape Province, South Africa

Mario Martínez-Azorín,[1,3] Anthony P. Dold,[2] and Manuel B. Crespo[1]

[1]dCARN & CIBIO (Instituto Universitario de la Biodiversidad), Universidad de Alicante, P.O. Box 99, E-03080 Alicante, Spain.
[2]Selmar Schonland Herbarium, Department of Botany, Rhodes University, Grahamstown 6140 South Africa.
[3]Author for correspondence (mmartinez@ua.es)

Communicating Editor: Timothy M. Evans

Abstract—Within the framework of a taxonomic revision of *Drimia* sensu lato we here describe a new species from the Eastern Cape Province in South Africa. ***Drimia trichophylla*** sp. nov. is at first sight related to *D. vermiformis*, but it can be clearly differentiated by the flower and leaf morphology and distribution. A complete description is presented for this species, and data on morphology, ecology, and distribution are reported. Affinities and divergences with other close allies are also discussed.

Keywords—Asparagaceae, distribution, ecology, taxonomy.

Hyacinthaceae sensu APG II (2003) includes about 1,000 species of bulbous plants that are segregated in four monophyletic subfamilies (Oziroeoideae, Ornithogaloideae, Urgineoideae, and Hyacinthoideae). Alternatively, Hyacinthaceae is treated as subfamily Scilloideae of Asparagaceae, and the subfamilies above are respectively treated as tribes Oziroëeae, Ornithogaleae, Urgineeae, and Hyacintheae (e.g. APG III 2009; Chase et al. 2009; APG IV 2016). We favour the former treatment based on morphological grounds (cf. Crouch and Martínez-Azorín 2015).

Generic circumscriptions within Hyacinthaceae subfamily Urgineoideae have been especially controversial in recent decades. Further information on subfamily Urgineoideae can be found in Martínez-Azorín et al. (2013a, 2013b), Knirsch et al. (2015, 2016) and Crouch and Martínez-Azorín (2015). Due to the lack of a comprehensive study on generic circumscriptions in Urgineoideae, we provisionally follow the very broad concept of *Drimia* sensu Manning et al. (2004) as a contingency until a study on generic circumscriptions in this subfamily is published, which is the focus of our current research (Martínez-Azorín et al. in prep.).

During field work in South Africa towards a taxonomic revision of *Drimia* s. l., the study of plants related to *D. vermiformis* J. C. Manning & Goldblatt collected at Table Farm, a few kilometres north of Grahamstown in the Eastern Cape province of South Africa, revealed that they represent an undescribed species differing by distinct morphological features from all other species of the genus. This supports the description of a new species, namely *Drimia trichophylla*.

Materials and Methods

Herbarium specimens from the following herbaria were studied: ABH, BOL, GRA, GZU, J, K, NBG, NU, PCU, PRE, and WIND (acronyms according to Thiers 2016). We also studied wild and cultivated material of both *Drimia tricophylla* and *D. vermiformis* (from its type locality: SOUTH AFRICA. Western Cape. Picnic site by Clanwilliam Dam on N7, 01 Sep 2011, *Martínez-Azorín et al. 796* ABH!). Authorities of the cited taxa follow IPNI (2016). Localities are indicated as quarter degrees following Leistner and Morris (1976).

Results and Discussion

Drimia trichophylla Mart.-Azorín, A.P. Dold & M.B. Crespo, sp. nov.—TYPE: SOUTH AFRICA. Eastern Cape. Grahamstown (3326): Cradock Road, ca. 6 miles from BRU [Botanical Research Unit, currently Selmar Schonland Herbarium], Grahamstown, growing singly under *Pentzia incana* bushes, very rare and hard to spot, flowers dirty cream colour, stalks dark and wiry, leaves hairy, plants separated (110 or more metres apart) and not in clumps, 13 Nov 1979, *C. Vosa & E. Brink s.n.* (Holotype: GRA!).

Planta notabilis ad *Drimiam vermiformi* similis sed ea bene diversa folii parte hypogaea brevissima 3–5 mm longa, parte epigaea expansa ad terram appressa, 1.5–2 mm lata, anguste lanceolato-oblonga, parum applanata vel vix canaliculata, prope basin non contracta, utrinque pilosa (margine incluso), pilis albidis retrorsis ca. 1 mm longis laxe et regulariter obsita.

Herbaceous deciduous geophyte. Bulb hypogeal, solitary, ovoid to subglobose, 8–13 × 8–15 mm, extended into a short hypogeal neck 3–7 mm long, with pale brown membranous outer tunics and white fleshy tightly packed inner tunics. Roots fleshy, white, branched, 5–20 × 0.5–0.8 mm. Leaf solitary, withered or almost withered at flowering time, aerial portion 1.7–5.5 × 0.15–0.20 cm, not distinctly contracted at ground level but usually showing a purplish ring, narrowly lanceolate-oblong, flattened, sometimes somewhat canaliculated, dull dark green, leathery, spreading and appressed to the ground, straight, covered by scattered, retrorse, white hairs of ca. 1 mm long on both surfaces and margins, with a very short and white hypogeal leaf portion of 3–5 mm long. Inflorescence nodding in bud, raceme 2–5 mm long, subglobose, with 3–20 flowers; peduncle (4–) 6–10 cm long, erect or flexuose, glabrous; pedicels 5–9 mm long at anthesis, suberect to spreading; bracts ovate-lanceolate, ca. 2 mm long, clasping the pedicels, spurred, the lowermost with a spur of 1–2 mm long, membranous, white with a central darker band. Flowers stellate, opening in the afternoon and withering in the evening, only 1–3 flowers open at a time; tepals reddish, pale brown or rarely greenish, with a darker longitudinal central band, minutely glandulous at the apex, biseriate, outers overlapping inners at the base, fused for 1–1.5 mm to form a cup, free portions patent; outer tepals lanceolate, 4–4.2 × 1.1–1.3 mm, free segments canaliculate with margins strongly recurved at full anthesis; inner tepals ovate, 3.8–4 × 1.3–1.5 mm, free segments canaliculate with margins somewhat recurved at full anthesis. Stamens suberect, adnate to perigone for ca. 0.5 mm; filaments white, 1.8–2 × 0.5 mm, lanceolate, flattened,

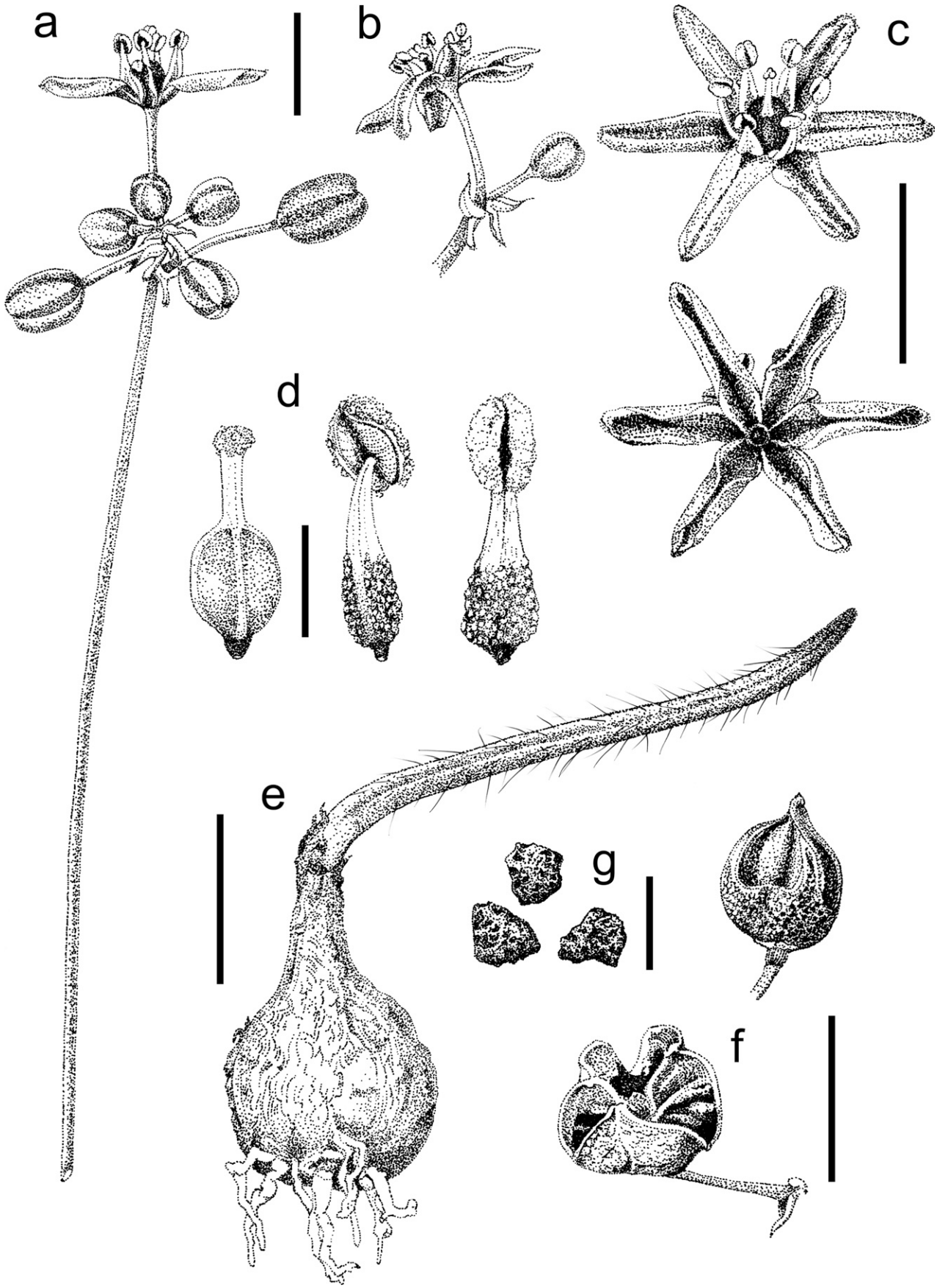

FIG. 1. *Drimia trichophylla* Mart.-Azorín, A. P. Dold & M. B. Crespo. a. Inflorescence. b. Flowers and spurred bracts. c. Flowers, frontal view (above) and dorsal view (below). d. Gynoecium and stamens. e. Bulb with leaf. f. Capsules, before dehiscence (above) and after dehiscence (below). g. Seeds. Scales: a, b, c, f = 5 mm; d = 1 mm; e = 1 cm; g = 2 mm.

Fig. 2. Comparison of leaves of two *Drimia* species: a–b. *Drimia trichophylla* Mart.-Azorín, A. P. Dold & M. B. Crespo in habitat at the type locality on 16 September 2009, corresponding to *Martínez-Azorín & Martínez-Soler MMA613* (ABH). c. Bulbs with leaves of *Drimia vermiformis* J. C. Manning & Goldblatt from the type locality. d. *Drimia vermiformis* J. C. Manning & Goldblatt in habitat at the type locality corresponding to *Martínez-Azorín et al. MMA796* (ABH).

distinctly papillate in lower half; anthers yellow, oblong, ca. 1 mm long, dehiscing by longitudinal slits, with yellow pollen. Ovary green, ellipsoid with truncate apex, 1–1.2 × 1 mm; style white, columnar, ca. 1.2 mm long, slightly trigonous in transverse section; stigma subcapitate, papillate. Capsule subglobose, 4–4.5 × 4.5–5 mm, dehiscing along the full length of valves, with a distinct apical cap formed by the withered perigone that abscises from the base. Seeds flattened, irregularly compressed, glossy black, 1.2–2 × 1–1.5 mm, black, with minutely rugulose testa. Figures 1–2.

Etymology—Named after the hairy leaf (trichos: hair; phyllum: leaf).

Biology—*Drimia trichophylla* flowers in October–November and fruits appear in December both in the wild and in cultivation in Grahamstown.

Habitat—At a broad scale the vegetation of the type locality of *Drimia trichophylla* is mapped as Albany Broken Veld (Nama-Karoo Biome) (Mucina and Rutherford 2006), which comprises an open short shrub land with *Aloe ferox* Mill. *Drimia trichophylla* is found on pebbly flats. The geological formation underlying Table Farm is Grahamstown Silcrete that comprises silcrete remnants overlaying kaolinised bedrock (Johnson and Le Roux 1994). The soil is consequently very shallow and nutrient poor.

The owner of Table Farm, Mr Robert White, has recorded a mean annual rainfall of 389 mm at his homestead, 1.6 km west of the type locality (Williamson and Dold 2004). Rainfall can be expected all year round in Grahamstown with approximately 82 days of rain a year, however, distinct bimodal peaks during March–April and November–December are evident (Kopke 1988).

In his description of *Ornithogalum unifolium* R. A. Dyer (currently *Trimelopter dyeri* (Poelln.) Mart.-Azorín, M. B. Crespo & Juan sensu Martínez-Azorín et al. 2011), Dyer (1930), from precisely the same locality as *D. trichophylla* on Table Farm, notes that the species is associated with many other miniature species, such as *Eriospermum dregei* Schönland, *Schizobasis* cf. *macowanii* Baker and *Bulbine mesembryanthemoides* Haw. (indeed referring to *Bulbine inamarxiae* G. Will. & A. P. Dold) (Williamson and Dold 2004). This observation is supported by more recent records at Table Farm including *Brachystelma luteum* Peckover (Peckover 1992), a dwarf variant of *Orthopterum waltoniae* L. Bolus (Hammer 2001), *Nicipe perdurans* (A. P. Dold & S. A. Hammer) Mart.-Azorín, M. B. Crespo & Juan (Dold and Hammer 2003) and *Nicipe britteniae* (F. M. Leight. ex Oberm.) Mart.-Azorín, M. B. Crespo & Juan (Dold 2003) from the same locality. In addition, the localised stem succulent *Ophionella arcuata* (N.E.Br.) Bruyns was collected growing with *Drimia trichophylla* at the type locality (A. P. Dold, pers. obs. 2015). Dold (2003) suggests that this concentration of endemic succulent species on Table Farm is found on the ecotone between Albany Broken Veld and Bhisho Thornveld and deserves further investigation.

Distribution—*Drimia trichophylla* is only known from a single locality in Table Farm, ca. 8 km north of

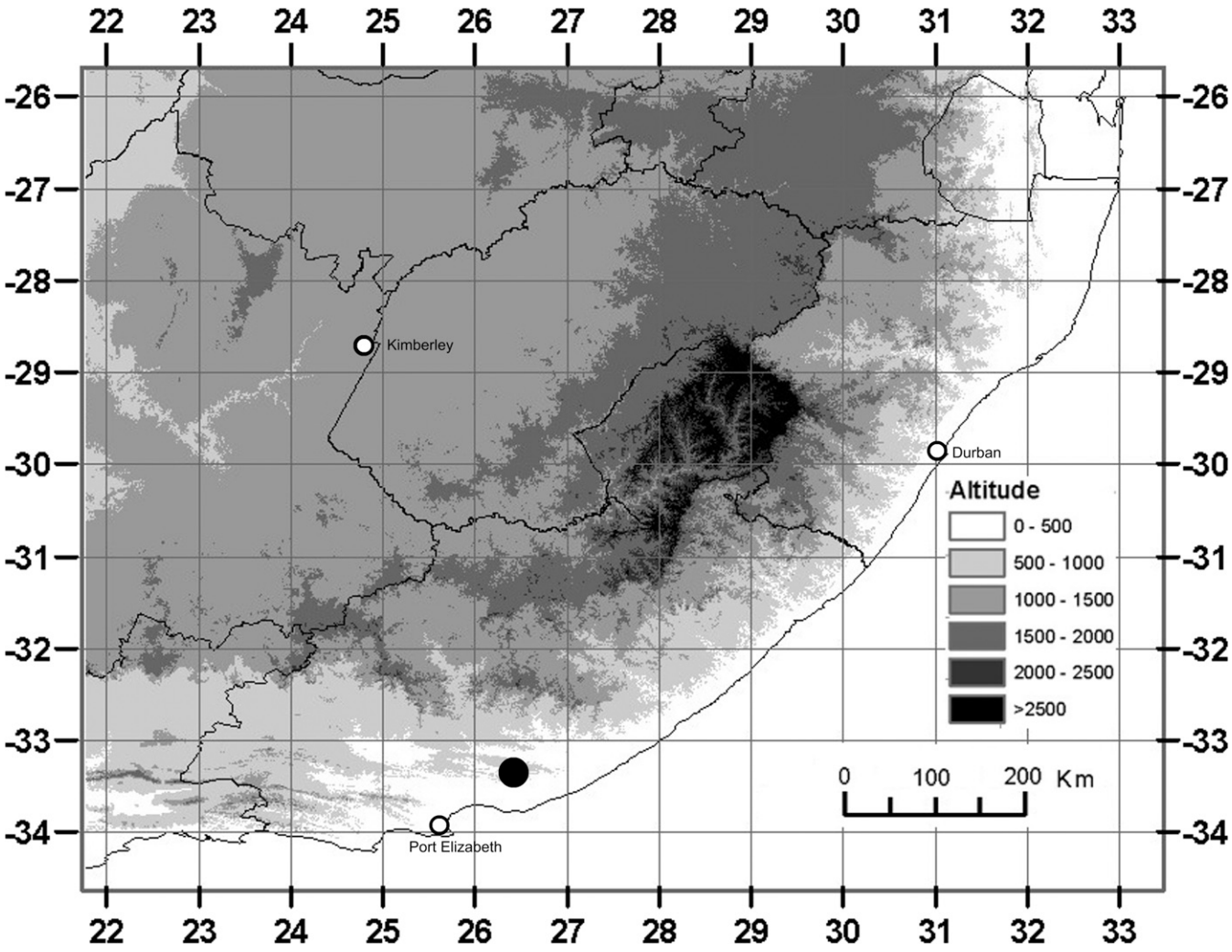

FIG. 3. Known distribution (black dot) of *Drimia trichophylla* Mart.-Azorín, A. P. Dold & M. B. Crespo in eastern South Africa.

Table 1. A comparison of the main morphological characters between *Drimia trichophylla* and its closest relative *D. vermiformis*. Data of *D. vermiformis* are based on own observations from wild material from the type locality corresponding to *Martínez-Azorín et al. MMA796* (ABH).

	D. trichophylla	*D. vermiformis*
Bulb size (mm)	8–13 × 8–15	15–22 × 10–23
Leaf shape	Narrowly lanceolate-oblong, not distinctly contracted at ground level	Narrowly lanceolate-oblong, subclavate and somewhat contracted at ground level
Leaf transverse section	Flattened, sometimes somewhat canaliculated	Subterete to ellipsoid
Leaf disposition	Appressed to the ground, straight	Suberect, arcuate
Aerial leaf portion length (mm)	17–55	50–70
Hypogeal leaf portion length (mm)	3–5	20–40
Leaf width (mm)	1.5–2	3–6
Leaf colour	Dull dark green in the aerial portion, with a purplish ring at ground level	Glossy dark green in the aerial portion, with a distinct purplish ring at ground level and white in the hypogeal portion
Leaf indumentum	Covered by scattered, retrorse, white hairs of ca. 1 mm long on both sides and margins	Glabrous
Distribution	Eastern Cape, near Grahamstown	Western Cape and Northern Cape (sensu Manning and Goldblatt 2007)

Grahamstown, in the Eastern Cape Province of South Africa (Fig. 3). Further research is needed to know the distribution range of this species.

History, Diagnostic Characters, and Relationships—*Drimia trichophylla* was apparently first collected by R. A. Dyer in November 1929 at the type locality. He identified this plant as "*Drimia* sp. nov." Fifty years later, C. Vosa and E. Brink recollected the plant and identified their collection as "*Urginea* sp. nov." However, this species was never formally described. Flower and inflorescence characters place *D. trichophylla* in a group of *Drimia* s. l. that share a distinct combination of characters, such as the usually nodding young inflorescences when in bud, the subglobose inflorescences, the reddish tepals (at least on the abaxial side), which are erect and connate at the base and show patent free portions, and the usually papillose basal portion of filaments. This group comprises species such as *Drimia acarophylla* E. Brink & A. P. Dold, *D. marginata* (Thunb.) Jessop, *D. vermiformis*, *D. pulchromarginata* J. C. Manning & Goldblatt, and other relatives (cf. Manning and Goldblatt 2007). However, none of the known species of this group shows the distinct indumentum of scattered and retrorse long hairs that is present in *D. trichophylla*. *Drimia vermiformis* shares with *D. trichophylla* the single, leathery, narrow leaf, but the former has larger bulbs, larger and glabrous leaves with a different disposition, and a different distribution range (Table 1) (cf. Manning and Goldblatt 2007). Furthermore, none of the taxa included in the taxonomic revisions presented in the last decades within subfamily Urgineoideae show the distinct characters present in *Drimia trichophylla* (cf. Nordenstam 1970, Jessop 1977, Müller-Doblies et al. 2001).

Additional Specimens Studied (paratypes)—SOUTH AFRICA. Eastern Cape. Grahamstown (3326): Cradock Road, 6–7 miles from Grahamstown – amongst *Pentizia globosa* in karroid veld, fl. brown with dark green stripe, no leaves when flowering; Nov 1929, *R. A. Dyer 2194* (GRA!); Eastern Cape. Grahamstown (3326): Table Hill farm, ca. 8 km north of Grahamstown on Cradock road (–AD), ca. 580 m elevation, ex. cult. in Grahamstown on 21 Oct 2011, *M. Martínez-Azorín & A. Martínez-Soler MMA613* (GRA!, ABH!).

Acknowledgments. This work was partly supported by Fundación Ramón Areces (Spain), H2020 Research and Innovation Staff Exchange Programme of the European Commission, project 645636: 'Insect-plant relationships: insights into biodiversity and new applications' (FlyHigh), University of Alicante (Spain), Rhodes University (Dept. of Botany) and the Selmar Schonland Herbarium (GRA) (Eastern Cape, South Africa). We thank the curators of the herbaria who provided access to specimens examined. The Department of Environment and Nature Conservation of Northern Cape Province and CapeNature of Western Cape Province provided permission to collect herbarium specimens (collecting permits numbers FLORA046/2010, FLORA047/2010, FLORA069/2011, FLORA070/2011, FLORA061/2/2015 FLORA062/2/2015, AAA008-00031-0028 and 0028-AAA008-00203 respectively). We also thank the Eastern Cape Department of Economic Development, Environmental Affairs & Tourism, Environmental Affairs Directorate, Cacadu Region for the collecting permit No. CRO 17/15CR. We are grateful to Susan Abraham for the artwork.

Literature Cited

APG, II. 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Botanical Journal of the Linnean Society* 141: 399–436.

APG, III. 2009. An update of the Angiosperm Phylogeny Group Classification for the orders and families of flowering plants: APG III. *Botanical Journal of the Linnean Society* 161: 105–121.

APG, IV. 2016. An update of the Angiosperm Phylogeny Group Classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society* 181: 1–20.

Chase, M. W., J. L. Reveal, and M. F. Fay. 2009. A subfamilial classification for the expanded asparagalean families, Amaryllidaceae, Asparagaceae and Xanthorrhoeaceae. *Botanical Journal of the Linnean Society* 161: 132–136.

Crouch, N. R. and M. Martínez-Azorín. 2015. *Drimia edwardsii* (Asparagaceae, Scilloideae), a new urgineoid species from the Mkhomazi River Valley of eastern South Africa. *Phytotaxa* 195: 135–144.

Dold, A. P. 2003. The rediscovery of *Ornithogalum britteniae* (Hyacinthaceae) and an amendment to the description. *South African Journal of Botany* 69: 505–513.

Dold, A. P. and S. H. Hammer. 2003. A new species of *Ornithogalum* from Eastern Cape, South Africa. *Bothalia* 33: 112–115.

Dyer, R. A. 1930. New species of *Ornithogalum* and *Albuca* from Albany Division. *Records of the Albany Museum* 4: 111–115.

Hammer, S. 2001. Rustles of spring. *Mesemb Study Group Bulletin* 16: 31–32.

IPNI. 2016. *The international plant names index*. http://www.ipni.org. Accessed May 2016.

Jessop, J. P. 1977. Studies in the bulbous Liliaceae in South Africa: 7. The taxonomy of *Drimia* and certain allied genera. *Journal of South African Botany* 43: 265–319.

Johnson, M. R. and F. G. Le Roux. 1994. The geology of the Grahamstown area; Explanation of sheet 3326, Scale 1:250 000. Council for Geosciences, Geological Survey of South Africa, pp 18–20.

Knirsch, W., M. Martínez-Azorín, M. Pfosser, and W. Westchnig. 2015. The reinstatement and rediagnosis of the Madagascan genus *Rhodocodon* (Asparagaceae, Scilloideae), with validation and remarks on H. Perrier's taxa. *Phytotaxa* 195: 101–134.

Knirsch, W., M. Martínez-Azorín, A. Brudermann, M. Pfosser, and W. Westchnig. 2016. *Rhodocodon jackyi* (Asparagaceae, Scilloideae), a new species from Madagascar related to *R. urgineoides*. *Phytotaxa* 253: 201–206.

Kopke, D. 1988. The Climate of the Eastern Cape. Pp. 44-52 in *Towards an Environmental Plan for the Eastern Cape*, eds. M. N. Bruton and F. W. Gess. Rhodes University, Grahamstown.

Leistner, O. A. and J. W. Morris. 1976. Southern African Place Names. Pp. 565 in *Annals of the Cape Provincial Museums* 12. Cape Provincial Museums, Grahamstown.

Manning, J. C. and P. Goldblatt. 2007. New species of *Drimia* (Hyacinthaceae Urgineoideae) allied to *Drimia marginata* from Western and Northern Cape, South Africa. *Bothalia* 37: 183–187.

Manning, J. C., P. Goldblatt, and M. F. Fay. 2004. A revised generic synopsis of Hyacinthaceae in Sub-Saharan Africa, based on molecular evidence, including new combinations and the new tribe Pseudoprospereae. *Edinburgh Journal of Botany* 60: 533–568.

Martínez-Azorín, M., M. B. Crespo, A. Juan, and M. F. Fay. 2011. Molecular phylogenetics of subfamily Ornithogaloideae (Hyacinthaceae) based on nuclear and plastid DNA regions, including a new taxonomic arrangement. *Annals of Botany (Oxford)* 107: 1–37.

Martínez-Azorín, M., M. B. Crespo, and A. P. Dold. 2013a. *Drimia cochlearis* (Hyacinthaceae), a new species from South Africa. *Systematic Botany* 38: 332–338.

Martínez-Azorín, M., M. B. Crespo, A. P. Dold, W. Westchnig, M. Pinter, M. Pfosser, and E. Van Jaarsveld. 2013b. *Sagittanthera* (Hyacinthaceae, Urgineoideae), a new buzz pollinated genus from the Eastern Cape Province of South Africa. *Phytotaxa* 98: 43–54.

Mucina, L. and M. C. Rutherford. 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute.

Müller-Doblies, U., J. Tang, and D. Müller-Doblies. 2001. A revision of the genus *Fusifilum* Raf. (1837) (Hyacinthaceae of Southern Africa). *Feddes Repertorium* 112: 473–497.

Nordenstam, B. 1970. Studies in South African Liliaceae. III. The genus *Rhadamanthus. Botaniska Notiser* 123: 155–182.

Peckover, R. 1992. A new species of *Brachystelma* from the Grahamstown area. *Aloe* 29: 66.

Thiers, B. 2016. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/. Accessed May 2016.

Williamson, G. and A. P. Dold. 2004. A new dwarf species of *Bulbine* Wolf (Asphodelaceae), *B. inamarxiae* G.Will. & A.P.Dold. *Aloe* 41: 28–31.