Five species recently described in the genus Geschollia Speta (Hyacinthaceae: Urgineoideae) are transferred to Drimia Jacq. ex Willd. as D. brachyandra (Mart.-Azorín et al.) J.C.Manning & Goldblatt, D. globuligera (Mart.-Azorín et al.) J.C.Manning & Goldblatt, D. longipedicellata (Mart.-Azorín et al.) J.C.Manning & Goldblatt and D. prolífera (Mart.-Azorín et al.) J.C.Manning & Goldblatt, with the new name D. zebrinella J.C.Manning & Goldblatt provided for G. zebrina Mart.-Azorín et al. since that epithet is pre-occupied in Drimia. Austronea pater­soniae Schönl. ex Mart.-Azorín et al. is treated as a synonym of D. chalumnensis A.P.Dold & E.Brink. The two names Urginea amboensis Baker and Albuca reflexa K.Krause & Dinter are formally placed in synonymy under Drimia zambesiaca (Baker) J.C.Manning & Goldblatt to accord with the current taxonomy. The recently described monotypic genus Triandra Mart.-Azorín et al. is also included in Drimia and the necessary transfer of T. pellabergensis Mart.-Azorín et al. to Drimia is effected, along with the second known locality for the species, representing a significant range extension. A total of 80 species of Drimia are now recognised in southern Africa. Updated identification keys to the species in sections Capitatae, Ledeboouriopsis, Macrocentrae, Physodia and Thuranthos are provided.

The most recent taxonomic review of the species of Drimia Jacq. ex Willd. in southern African recognised 70 species distributed among 19 sections (Manning & Goldblatt 2018). This work serves a valuable role in summarising the taxonomic knowledge in the genus to that date but is, as the authors themselves make clear, far from complete. At the time that the review by Manning & Goldblatt (2018) appeared, several species were still incompletely known, and others were anticipated to exist. Several of these additional species have since been described or treated in the segregate genera Austronea Mart.-Azorín et al. (Martínez-Azorín et al. 2018a, 2019a), Iosanthus Mart.-Azorín et al. (Martínez-Azorín et al. 2019b), Vera-duthiea Speta (Martínez-Azorín et al. 2018b), Zing­gela N.R.Crouch et al. (Crouch et al. 2018), and more recently Geschollia (Martínez-Azorín et al. 2019c). A simplified phylogeny of Urgineoideae was presented in Martínez-Azorín et al. (2019b), but publication of the full analysis is still pending. Until then it is not feasible to meaningfully assess the available options for circumscribing genera in the subfamily. All of these genera were included in a broadly circumscribed Drimia by Manning & Goldblatt (2018) and Manning (2019), where a full discussion of the issues surrounding these two classifications is provided.

Since then, a further monotypic genus Triandra Mart.-Azorín et al. has been described for a nocturnal species from northern Namaqualand in Northern Cape that is unique in the family in lacking the outer staminal whorl (Martínez-Azorín et al. 2019d). A simplified phylogeny of Urgineoideae was presented in Martínez-Azorín et al. (2019b), but publication of the full analysis is still pending. Until then it is not feasible to meaningfully assess the available options for circumscribing genera in the subfamily. All of these genera were included in a broadly circumscribed Drimia by Manning & Goldblatt (2018) and Manning (2019), where a full discussion of the issues surrounding these two classifications is provided.
et al. 2021). Aside from the striking loss of the outer stamens, *Triandra pellabergensis* Mart.-Azorín et al. is morphologically similar to *Drimia hesperantha* J.C. Manning & Goldblatt (= *U. revoluta* A.V. Duthie) (sect. *Thuranthos*) from the southwestern winter-rainfall region of Western Cape, although unpublished molecular analyses suggest that the two species may not be immediately related (Martínez-Azorín et al. 2021). Available molecular data (Buerki et al. 2012; Ali et al. 2013) certainly indicate that sect. *Thuranthos* was not monophyletic as circumscribed by Manning and Goldblatt (2018), confirming the suspicions of the authors themselves, who clearly recognised that it reflected a pollination syndrome, defined by a lax raceme of nodding flowers with nocturnal anthesis and narrow, reflexed tepals, filaments that are much longer than the anthers, and a ± clavate style. As suggested by them, larger species with caducous bracts and thickened fruiting pedicels such as *D. macrantha* (Baker) Baker, *D. pauciflora* Baker (= *D. basutica* (E.P. Phillips) J.C. Manning & Goldblatt) and *D. zambesiaca* Baker (as *D. indica* (Roxb.) Jessop), likely comprise a clade not immediately related to other species that were included in sect. *Thuranthos*. The southeast Asian species that were included in sect. *Thuranthos* have since been segregated as sect. *Indurgia* (Speta) J.C. Manning & Lekhak (Yadav et al. 2019). More fully sampled and resolved phylogenies will guide the further fragmentation of sect. *Thuranthos*, but until then it serves a purpose in providing a morphological framework for taxonomic study in the group.

Most of the relevant species described by Martínez-Azorín and co-workers since the review of the genus by Manning and Goldblatt (2018) were subsequently transferred to *Drimia* by Manning (2019) (who also synonymised a few), but one additional species of *Austronea* and five species recently described in *Geschollia* have still to be dealt with, as has *Triandra pellabergensis*. In addition, the two names *Urghina amboensis* Baker and *Albuca reflexa* K. Krause & Dinter, formerly treated as synonyms of *Drimia indica* (Roxb.) Jessop, need to be placed in synonymy under *Drimia zambesiaca* (Baker) J.C. Manning & Goldblatt, which is the earliest available name for this sub-Saharan taxon as circumscribed by Manning and Goldblatt (2018). These nomenclatural changes are necessary to integrate the newly described taxa into the classification of *Drimia* that was proposed by Manning and Goldblatt (2018) and which has been adopted by various institutes and checklists. A total of 80 species of *Drimia* are now recognised from southern Africa.

Finally, a few nomenclatural changes were also made by Martínez-Azorín et al. (2019d) and Manning (2019) to the taxa that were recognised by Manning and Goldblatt (2018). In view of both the increase in the number of species and the changes to the nomenclature of others, it seems useful to provide updated sectional keys to the species that have been affected, to facilitate both their identification and the correlation of the taxa with those enumerated by Manning and Goldblatt (2018). Updated keys to the southern African species of sects. *Capitatae*, *Ledebouriopsis*, *Macrocentrae*, *Physodia* and *Thuranthos* are accordingly provided. The system of numbering of species used in Manning and Goldblatt (2018) is retained, with new species inserted into that system with decimal points.

### Drimia Jacq. ex Willd., Species Plantarum 2: 165 (1799).

Type species: *Drimia elata* Jacq. ex Willd.


*Note:* *Drimia chalumnensis* is an Eastern Cape endemic described from two populations near Chalumna east of Grahamstown and diagnosed in sect. *Capitatae* by the loose bulb scales and several suberete or linear-channeled leaves with papillate margins. Two additional populations, from Alice-dale west of Grahamstown and from Port Elizabeth respectively, were provisionally included in *D. chalumnensis* by Manning and Goldblatt (2018) on the basis that they differed from that taxon essentially only in their taller inflorescences (60–110 mm vs 15–50 mm) and slightly longer pedicels (4–6 mm vs 2–6 mm). Plants matching these populations have now been recorded from further locations along the Eastern Cape coast between Jeffrey’s Bay and Alice-dale, and have been segregated from *D. chalumnensis* under the name *Austronea patersoniae* (Martínez-Azorín et al. 2019c). The cited differences between the two taxa remain essentially the mostly slightly longer, erect foliage (exposed portion 30–45 vs 15–30 mm long) and the longer peduncle (80–150 vs 10–20 mm), all of which are consistent
with a more mesic habitat. Purported minor differences in the length of the lower bract spur and tepals are not consistent. In addition, Martínez-Azorín et al. (2019c) record a second locality for smaller plants consistent with D. chalumnensis from Aberdeen far to the northwest of the original material. As there do not appear to be any additional substantive differences between the Jeffrey’s Bay–Alicedale plants and those from Aberdeen and Peddie it seems reasonable to regard them as representing a single species as suggested by Manning and Goldblatt (2018). Following this interpretation, Drimia chalumnensis is now known to occur more widely along the Eastern Cape coast from Jeffery’s Bay to Peddie and inland near Aberdeen.


Note: This species is distinguished from D. calcarata (Baker) Stedje by the more heavily barred cataphylls and the slightly smaller, reddish flowers. These differences are very slight and its status may need to be revised.


Note: This extraordinary species was known only from the type locality Pella se BERGE in Bushmanland in Northern Cape. A collection of an unidentified Drimia that was collected in leaf on the Koe-doebense near Touwsrivier in Western Cape has subsequently flowered in cultivation at Kirstenbosch National Botanical Gardens and clearly represents the same species, viz. 2 or 3 filiform leaves that are dry at flowering; diminutive inflorescence 30–90 mm tall with obscurely flecked, minutely striate-puberulous scape; nodding pedicels 4–6 mm long at flowering (the dimensions of 12–15 mm long at anthesis given in the protologue are clearly a mistake and refer to the elongated fruiting pedicels as is evident from Fig. 2 in the protologue); pendulous buff-coloured flowers with nocturnal anthesis and
linear, revolute tepals $\pm$ 5 mm long, connoate at the base; only the three inner stamens developed, with filiform filaments $\pm$ 4 mm long closely appressed to the ovary and style, and minute yellow anthers; narrowly subclavate style $\pm$ 2 mm long and as long as the ovary; small subglobose capsules $\pm$ 4 mm long; and elliptic, peripherally winged seeds $\pm$ 2.0–2.5 $\times$ 1 mm. This collection represents a range extension of some 200 km south of the type locality.

Additional specimen seen

South Africa, Western Cape, Sutherland (3220): Pienaarsfontein-se-Berge, Koedoesberge, (–CD), 17 Feb 2022 [fl. in cult], Harrower 6188 (NBG).

Drimia zambesiaca (Baker) J.C.Maning & Goldblatt in Manning et al. in Edinburgh Journal of Botany 60: 557 (2004); Manning in Bothalia 49: 4 (2019) [superf. comb. nov.]. Type: Mozambique, Expedition Island, without date, Kirk s.n. (K, holo.).


Note: These three names were treated as synonyms of Drimia indica (Roxb.) Jessop by Manning and Goldblatt (2018) following conventional usage but since the realisation that D. indica is restricted to the Indian subcontinent (Martínez-Azorín et al. 2018b; Yadav et al., 2019), the earliest available name for the African taxon as currently circumscribed is Drimia zambesiaca and the other two names are accordingly placed in synonymy.

7IGX Capitatae

1. Leaf margins thickened and cartilaginous, either papillate/colliculate or scabridulous:

2a. Bulb scales loose; leaves plane-channelled, 2.0–2.5 mm wide; pedicels 2–6 mm long; plants from Eastern Cape ................................................................. 37. D. chalumensis

2b. Bulb scales closely packed; leaves plane, 4–25 mm wide; pedicels 5–10 mm long; plants from Western and Northern Cape:

3a. Leaf blades obtuse; margins colliculate; plants from Western Cape Fold Mtns .......................... 31. D. ecklonii

3b. Leaf blades acute-apiculate; margins partly or entirely scabridulous on upper surface; plants not from Western Cape Fold Mtns:

4a. Leaf margins simple, densely retrorsely scabridulous along upper surface ................... 32. D. marginata

4b. Leaf margins duplex, narrowly colliculate along edge with submarginal band of erect or retrorse trichomes along upper surface ............................................. 33. D. pulchromarginata

1b. Leaf margins not thickened and cartilaginous, sometimes pubescent or scabridulous:

5a. Leaves usually 2 or more, plane or channelled above, with narrow hyaline margins:

6a. Leaves glabrous but minutely scabridulous along margins, at least distally .................. 28. D. virens

6b. Leaves pubescent or scabridulous on one or both surfaces:

7a. Leaves in a rosette, (15–)20–30 (–70) $\times$ (3–) 5–7(–9) mm, margins with long cilia and softly pubescent on one or both surfaces; tepals not fringed .................. 29. D. barkerae

7b. Leaves in a loose tuft, 12–26 $\times$ 1.0–1.5 mm, margins glabrous, upper surface recurved-scabridulous; inner tepals fringe ........................................... 30. D. limbrimarginata

5b. Leaf solitary (rarely two), without a distinct hyaline margin:

8a. Leaf glabrous, fleshy and semiterete to terete or clavate:

9a. Dwarf plants, inflorescence 15–30 mm long .................................................. 38. D. acarophylla

9b. Taller plants, inflorescence 40–100 mm long:

10a. Aerial portion of leaf 35–70 $\times$ 2–6 mm ........................................ 34. D. vermiciformis

10b. Aerial portion of leaf 15–25(–40) $\times$ 5–9 mm .................................... 34.1. D. pinguis

8b. Leaf plane, ciliolate or pubescent:

11a. Leaf retrorsely ciliolate along margins only with hairs $\pm$ 0.5 mm long ..................... 35. D. ciliolata

11b. Leaf softly retrorsely pubescent on one or both surfaces and along margins with hairs $\pm$ 1.0–2.5 mm long:

12a. Leaf plicately grooved adaxially, with soft spreading trichomes 2.5 mm long on upper surface only ............................................. 35.1. D. hispidoplicata

12b. Leaf not grooved, with scattered retrorsely trichomes $\pm$ 1 mm long on both surfaces. 36. D. trichophylla
71GX **Ledebouriopsis**

1a. Floral bracts 1.5–7.0 mm long:

2a. Plants evergreen with leaves synanthous; leaf blades concave above, the margins narrowly hyaline and smooth; bulb scales never fibrous, dark red below ground ........................................ 9. *D. delagoensis*

2b. Plants deciduous with leaves hysteranthous or emergent at flowering; leaf blades canalicate, the margins slightly thickened and papillate; bulb scales ± fibrous, white to pink:

3a. Bulbs with a conspicuous collar of stiff, apical fibres ........................................ 7. *D. multisetosa*

3b. Bulbs with at most a weak collar of fine, pale fibres ........................................ 6. *D. echinostachya*

1b. Floral bracts mostly up to 1 mm long:

4a. Raceme 1- to 3-flowered; plants from southern Namibia. ........................................ 13. *D. occultans*

4b. Raceme > 3-flowered; plants from South Africa:

5a. Raceme congested, ellipsoid to subglobose with flowers mostly 0.5–2.0 mm apart:

6a. Scape longitudinally colliculate-scabridulous basally; perianth cup puberulous within; plants from Richtersveld ........................................ 16. *D. barbata*

6b. Scape glabrous; perianth cup glabrous within; plants from extreme southwestern Western Cape:

7a. Leaf terete or clavate, 1–2 mm diam. ........................................ 15. *D. salteri*

7b. Leaf lorate-oblong, 10–16 mm wide ........................................ 15.1. *D. densiflora*

5b. Raceme elongate, lity cylindrical with flowers mostly more than 3 mm apart, rarely 1-flowered:

8a. Leaf solitary and stiffly erect, (2–)3–5 mm diam., sheathing base with wide, chestnut brown, papery margins; bulb often with a thick papery collar ........................................ 8. *D. anomala*

8b. Leaves 1 to 5, either solitary and erect but then less than 2 mm diam., or flexuous to drooping, sheathing basins with pale-papery margins, not forming a thick papery collar:

9a. Capsules ellipsoid to fusiform (rarely ovoid), usually more than twice as long as wide, 2–3 mm diam.; plants from southwestern South Africa. ........................................ 14. *D. dregeii*

9b. Capsules ovoid, up to twice as long as wide, 3–4 mm diam.; plants from southern and eastern South Africa:

10a. Filaments retrorsely scabrid-papillate:

11a. Bulb scales loose, subglobose; cataphylls not barred ........................................ 11.1. *D. globuligera*

11b. Bulb scales cohering, flattened; cataphyll transversely barred with thickened ribs 11.2. *D. zebrinella*

10b. Filaments smooth:

12a. Bulb scales loose and stalked; scape puberulous basally ........................................ 10. *D. edwardsii*

12b. Bulb scales usually tightly packed, rarely loose and subglobose but not stalked; scape glabrous throughout or minutely puberulous basally:

13a. Bulbs elongated and proliferous, forming clumps; leaves 2 or 3 per bulb ........................................ 11.3. *D. proliferia*

13b. Bulbs subglobose, not proliferating; leaf mostly solitary:

14a. Racemes 40- to 90-flowered; pedicels 17–25 mm long:

15a. Bulbs epigeal, keeled; leaves up to 500 mm long ........................................ 12. *D. flagellaris*

15b. Bulbs hypogeal, smoothy rounded; leaves up to 200 mm long 11.4. *D. longipedicellata*

14b. Racemes 3- to 30(40)-flowered; pedicels 2–10 mm long:

16a. Flowers white, tepals 4–6 mm long; filaments 2–4 mm long ........................................ 11. *D. calcara*

16b. Flowers buff to brown, tepals 3.3–4.2 mm long; filaments 1.4–1.9 mm long ........................................ 11.5. *D. brachyandra*

71GX **Macrocentrae**

1a. Dwarf plants to 30 mm tall; leaves linear, 1.0–1.5 mm wide; pedicels 1.5–2.0 mm long ........................................ 5.1. *D. toxicaria*

1b. Larger plants more than 60 mm tall; leaves linear to lanceolate or cylindrical and 3–14 mm wide; pedicels 2–14 mm long:

2a. Bulbs dark red; inflorescence (60–)200–450(–600) mm tall, scape mostly shorter than rachis, often less than half as long; bracts 1–3 mm long, spur of lower bracts up to 1 mm long; leaves 3 to 8, linear to narrowly lanceolate, channelled; plants from western and northern interior South Africa ........................................ 4. *D. sanguinea*

2b. Bulbs white to greenish; inflorescence 300–800(–900) mm tall, scape longer than inflorescence racis; bracts 4–6 mm long, spur of lower bracts 20–35 mm long, forming a skirt below raceme in bud; leaf solitary, cylindrical, resembling scape; plants from eastern Drakensberg ........................................ 5. *D. macrocentra*

71GX **Physodia**

1a. Inflorescence globose-capitate, all pedicels ± 0.5 mm apart and rachis not elongating in fruit; scape glabrous; lower bracts 1.5–4.0 mm long with a spur 1–6 mm long; plants from mesic grasslands along eastern Escarpment. ........................................ 39. *D. depressa*
1b. Inflorescence subcapitate-racemose or congested-racemose, lower pedicels often distant and rachis 
  somewhat elongating in fruit; scape usually longitudinally puberulous; lower bracts 0.5–2.0 mm long 
  with reduced spur up to 1.5 mm long; plants from drier habitats along western and southern coast and 
  interior:
2a. Leaves subterete-filiform, 0.5–1.0 mm wide; pedicels arcuate-suberect in fruit .................. 42. D. minor
2b. Leaves linear to lanceolate, 1–25 mm wide; pedicels spreading-reflexed with tips abruptly erect in fruit:
  3a. Pedicels (3.0–)5.0–6.5 mm long; ovary white with yellow shoulders edged with purple speckles; base 
  of bulb and roots bulbiliferous.......................................................... 40. D. montana
  3b. Pedicels (8–)15–20(–30) mm long; ovary uniformly white; plants not bulbiliferous ......... 41. D. physodes

7IGX Thuranthos
1a. Stamens 3 (inner whorl only), filaments ± 4 mm long; tepals 4.5–5.5 mm long .......... 21. D. pellabergensis
1b. Stamens 6, filaments >5 mm long; tepals >6 mm long:
  2a. Inflorescence to 400 mm long; pedicels 8–12 mm long, abscising ± midway if not pollinated; tepals 
     7–8 mm long; filaments 6–8 mm long; capsules 5–7 mm long; plants from southwestern Western 
     Cape ............................................. 21. D. hesperantha
  2b. Inflorescence 150–1 300 mm long; pedicels 15–80 mm long, abscising at base if not pollinated; tepals 
     8–33 mm long; filaments 7–20 mm long; capsules 7–40 mm long; plants from Eastern Cape northwards:
     3a. Filaments fusiform, constricted basally, ± 7 mm long; anthers subglobose-sagittate, ± 1 mm long at an-
         thesis; capsules on slender, horizontally spreading pedicels, subglobose-ovoid, ± 7 mm long; leaves 
         terete-canaliculate, 0.5–1.0 mm diam. ............................................. 22. D. vespertina
     3b. Filaments filiform or lanceolate, sometimes abruptly narrowed midway but never constricted basally, 
         5–20 mm long; anthers oblong, 1.5–7.0 mm long; capsules on thickened, suberect pedicels, subglo-
        bose to ellipsoid, 3-lobed, 8–40 mm long; leaves linear-canaliculate, 4–18 mm wide:
        4a. Leaf sheaths unmarked; tepals 22–33 mm long; filaments 15–20 mm long, basal 6–12 mm flattened 
           and incurved around ovary forming a cage-like structure, sharply constricted and terete-fusiform 
           above; style several times longer than ovary; stigma large and capitate .............. 25. D. macrantha
        4b. Leaf sheaths barred or blotched with purple towards base; tepals 9–20 mm long; filaments 5–11 mm 
           long, simple and lanceolate or fusiform; style as long as or slightly longer than ovary; stigma 3-angled: 
           5a. Inflorescence more than 500 mm tall; pedicels 35–80 mm long; tepals 14–20 mm long; filaments 
              7–11 mm long .................................................. 24. D. pauciflora
           5b. Inflorescence mostly up to 500 mm tall; pedicels 10–30 mm long; tepals 6–12 mm long; filaments 
              5–6 mm long:
              6a. Bulb scales loose and spathulate; leaves keeled beneath; pedicels 10–12 mm long at anthesis; 
                  filaments ± 6 mm long ............................................. 23. D. zambesiaca
              6b. Bulb scales cohering; leaves rounded beneath; pedicels 20–30 mm long at anthesis; filaments ± 
                  10 mm long .................................................. 23.1. D. zebrina

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  dispersal, vicariance, and extinction within Hyacinthaceae’, Journal of Integrative Plant Biology 
Baker, J.C., 1873, ‘Revision of the genera and species of Scil-
  leae and Chlorogaleae’, Journal of the Linnean Society, Bot-
Baker, J.C., 1903, Liliaceae, In H. Schinz, Kenntnis der Afri-
  kanischen Flora XV, Bulletin de l’Herbier Boissier, sér. 2, 3: 
  663–665.
Buerki, S., Jose, S., Yadav, S.R., Goldblatt, P., Manning, J.C. & 
  org/10.1371/journal.pone.0039377.