

515. BARTHOLINA BURMANNIANA

Orchidaceae

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Summary. The history, taxonomy, distribution and cultivation requirements of the South African *Bartholina burmanniana* (L.) Ker-Gawl. (Orchidaceae) are discussed; a full botanical description and an illustration are provided.

The family *Orchidaceae* is handsomely represented in southern Africa and includes the horticulturally important genera *Ansellia* Lindl., *Disa* Bergius and *Eulophia* R.Br. ex Lindl. among the 53 genera and approximately 470 species, most of which are endemic to the region. The majority of orchids found here are terrestrial and either summer- or winter-deciduous, with comparatively few epiphytic species found in the wetter parts (Linder & Kurzweil, 1999). The greatest diversity of species is found in the Western Cape, the area that experiences a Mediterranean-type climate, where mild wet winters alternate with long, hot dry summers, flowering taking place mainly in spring and early summer. By far the largest group is *Disa*, with more than 130 species including *D. uniflora* Bergius, the RED DISA, a plant of truly classic beauty that has without doubt made the greatest contribution to horticulture of all the southern African orchids (Du Plessis & Duncan, 1989).

One of the most charming of all the orchid groups found here is the somewhat cryptic, dwarf genus *Bartholina*, a deciduous winter-growing, summer-dormant geophyte. It contains just two species, *B. burmanniana* (L.) Ker-Gawl. and *B. etheliae* Bolus, both of whose white and bluish-mauve, usually single flowers are dominated by their extraordinary large lips that are spurred at the base and deeply cut into many linear segments. *Bartholina* takes its name from Prof. Thomas Bartholin (1655–1738), a Danish anatomist and physiologist, while the specific epithet *burmanniana* commemorates the botanist-collector Johannes Burmann (1707–1779), Professor of Botany at Amsterdam University and friend of Linnaeus, who named the species *Orchis burmanniana* L., in 1763. Fifty years on, the same species was described under a different name, in the new genus *Bartholina*, by the English botanist Robert Brown, as *B. pectinata* (Thunb.) R. Br. in 1813, and finally in 1818 the plant

received its present-day name of *B. burmanniana* (L.) Ker-Gawl. The first living plants were seen in flower in the United Kingdom in 1787, having been introduced to the Royal Botanic Gardens, Kew, from the collections of Francis Masson, the Scottish gardener and plant-hunter sent out from Kew to the Cape of Good Hope (Saltmarsh, 2003). *Bartholina etheliae* is a relatively recent discovery and was collected for the first time by Ethel Bolus, daughter of Harry Bolus, the eminent Cape orchidologist, who described it in 1884. Harry Bolus made a special study of South African orchids and is well remembered for his *The Orchids of the Cape Peninsula*, first published in 1888.

The *Bartholina* species are easily distinguished from one another by the lip segments that are acuminate and deflexed in *B. burmanniana*, but have clavate tips and are upturned in *B. etheliae*, and by the sepals that are pubescent in *B. burmanniana* and glabrous in *B. etheliae*. The genus shares an identical flower structure and several vegetative features with *Holothrix*, another dwarf geophytic orchid group, indicating a close relationship to this genus (Linder & Kurzweil, 1999). Generic separation of *Bartholina* may not be justified, as the genus may be a specialized group within *Holothrix* (Kurzweil & Weber, 1991). The widely spreading lip of *B. burmanniana* has earned it the most appropriate common name of SPIDER ORCHID. Its very narrow segments fancifully resemble a spider's legs, while the petals and pubescent sepals do quite well for the spider's body.

Bartholina burmanniana occurs in a variety of habitats and is most frequently seen in heavy clay soil in clearings or among bushes on stony hill slopes and flats in 'renosterveld', an Afrikaans term literally meaning 'rhinoceros vegetation', used to describe the vegetation type dominated by the greenish-grey leafed shrub *Dicrothamnus rhinocerotis* associated with fertile, clay-based soils. *B. burmanniana* also occurs on nutrient poor, acid sandstone soils on mountain tops and slopes in 'fynbos', another Afrikaans term literally meaning 'fine bush', used to describe the unique Cape heathland vegetation type dominated by fine-leaved shrubs such as *Erica* and *Agathosma*.

Like many other deciduous, geophytic orchids from the Western Cape, the genus *Bartholina* is strongly stimulated to profuse flowering after summer bush fires that clear away thick vegetation. Though not dependent on fire for flowering to occur, it is, like many other orchids in the region, sometimes seen flowering *en masse* following a fire. The clearing effect of fires provides better opportunities for attracting its



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specialist pollinators (Pauw & Johnson, 1999), although as far as I am aware, the particular pollinators for *Bartholina* are as yet undocumented.

Bartholina burmanniana has a fairly wide distribution, occurring from Clanwilliam in the Olifants River Valley in an arc to Grahamstown in the southern part of the Eastern Cape, and still grows on top of Table Mountain above Cape Town. It occurs from just above sea-level up to 1200 m, flowering taking place from late August to mid-October, with a peak flowering period in September. Plants usually occur singly but are also found in small groups, and rarely in large colonies; they are sometimes seen growing in association with other orchid species including the similarly-leaved dwarf geophyte *Holothrix villosa* Lindl., and the much larger *Satyrium bicornis* (L.) Thunb. The distribution of the two species overlaps in the Western and southern Cape, and although *B. etheliae* is generally less frequent, it has a wider distribution stretching from southern Namibia to the central parts of the Eastern Cape. It occurs on sandy slopes and flats in fynbos, often under bushes, from near sea level to 1800 m, and flowers later in the season, from October to December. Its similar prostrate, orbicular leaf has usually withered by the time flowering commences with the onset of summer.

The specimens illustrated here by Elbe Joubert were painted in September 2003 from plants collected in October 2000 by Mrs Inemarie Marais, in the Ceres district of the southwestern Cape and form part of the living geophytic orchid collection in the Kirstenbosch bulb nursery; (voucher specimen: *Marais s.n.*, in Compton Herbarium, Kirstenbosch).

CULTIVATION. South African deciduous terrestrial orchids such as *Bartholina* and certain members of the genus *Disa* (formerly placed in the genus *Herschelianthe* Rausch.), have long been regarded as highly fastidious subjects that can be grown quite easily for the first year following translocation from the wild, but inevitably succumb shortly thereafter. Maintaining these plants successfully under cultivation over an extended period depends on several factors. Firstly, their most important and distinctive physiological characteristic is their association with mycorrhizal fungi, with which the plant, and probably also the fungus, derive nutritional benefit by the exchange of nutrients. Secondly, deciduous terrestrials such as *Bartholina* that have annually replaced, single root-stem tuberoids as their rootstocks, must re-establish the mycorrhizae anew every growing

season when new roots are formed, which provides at least a partial explanation for their more difficult cultivation compared to evergreen terrestrials (Du Plessis & Duncan, 1989). Successful cultivation of these orchids in the widest sense includes the ability to propagate them, in particular to propagate sexually. Vegetative propagation, whether by simple separation of rootstocks or by complicated *in vitro* techniques such as meristem culture, is of great economic importance, but as far as species conservation is concerned, it has limited value.

Truly successful cultivation of a species can only be claimed if one can raise mature, flower-producing plants from seed. Growing these species from seed requires knowledge of the mycorrhizal associations which these orchids form, generally beyond the means of the amateur enthusiast and dependent on laboratory research at the institutional level (Du Plessis & Duncan, 1989). Promising results have however been obtained using the symbiotic method of germination of South African deciduous terrestrial orchid seed, including *Bartholina burmanniana* (Clements, 1982). By this method, the orchid seed is germinated in the presence of an appropriate mycorrhizal fungus, in a medium from which the fungus can draw nutrients that are transformed and passed on to the orchid. The first step in the symbiotic method is to isolate the mycorrhizal fungus from roots of the orchid and store it in a culture medium. The orchid seeds are then sown on a suitable medium which is inoculated with the appropriate fungus. Once the young seedlings have grown to a suitable size, they are lifted together with their mycorrhizal fungi, and potted-up in a soil-based medium.

In order to cultivate *Bartholina burmanniana* and other deciduous terrestrials successfully from wild-collected plants, it is important to grow them in the soil in which they grow naturally, or at least to incorporate some soil from the habitat in the growing medium (Du Plessis & Duncan, 1989; Vogelpoel, 1994). This has produced excellent results in the Kirstenbosch bulb nursery, where the specimens illustrated here have been successfully maintained for five years. This species does not appear to reproduce vegetatively, but at Kirstenbosch seedlings have appeared spontaneously near the mother plants, the seed no doubt having been present in the soil from the habitat when they were collected. Similarly, a collection of *Disa spathulata* (formerly *Herschelianthe spathulata*) has been maintained at Kirstenbosch for 19 years, and been successfully vegetatively propagated.

In addition to the use of soil from the habitat, some coarse river sand is added to the growing medium, and the plants of *B. burmanniana* at Kirstenbosch are grown most successfully in a shallow terracotta container placed in bright light under cover, and are heavily watered roughly once every fortnight in autumn and winter, until the foliage begins to wither in late spring; they are kept absolutely dry for the duration of the summer rest period. The flowers of *B. burmanniana* are exceptionally long-lasting, remaining attractive for about six weeks, all the more reason to strive towards making this choice plant freely available as a specialist container subject.

Bartholina burmanniana (L.) Ker-Gawl. in J. Sci. Roy. Inst. London 4: 204, t. 6, fig. 2 (1818); Bolus, Icones Orchidearum Austro-africanorum: t. 14 (1913); Bolus, The Orchids of the Cape Peninsula: t. 8 (1918); Rice & Compton, Wild Flowers of the Cape of Good Hope: t. 164 (1951); Schelpe, An introduction to the South African Orchids: pl. 27 (1966); Mason & Du Plessis, Western Cape Sandveld Flowers: 96–97 t. 37 (1972); Stewart & Hennessy, Orchids of Africa: 56–57, t.5 (1981); Stewart *et al.*, Wild Orchids of Southern Africa: 66 (1982); Linder & Kurzweil, Orchids of Southern Africa: 95–96 (1999). **Type:** South Africa, Western Cape, *Oldenland s.n.* in Herb. Burman (holotype G).
Orchis burmanniana L. in Plantae rariorae africanae 6: 108 (1763).
Arethusa ciliaris L. f. in Supplementum plantarum: 405 (1781), nom. illeg.
Orchis pectinata Thunb. in Prodrromus plantarum capensium 4 (1794), nom. illeg.
Bartholina pectinata (Thunb.) R.Br. in Aiton's Hortus Kewensis (2nd ed.) 5: 194 (1813).
Bartholina lindleyana Rchb. f. in Otia Bot. Hamburg 2: 119 (1881).

DESCRIPTION. *Deciduous, winter-growing dwarf geophyte* 50–220 mm high. *Root-stock* a single small soft, pale brown, ovoid-oblong root-stem tuberoid, annually replaced, 9–12 × 5–8 mm. *Leaf* solitary, dark olive green, smooth, broadly cordate or orbicular, prostrate, lobes overlapping, firmly clasping base of scape, margins ciliate, 12–40 × 8–40 mm. *Scape* slender, erect to suberect, 35–160 mm high, maroonish-brown for entire length, or maroonish-brown in lower half shading to green above, densely covered with white patent hairs 1–3 mm long, desiccating in summer but remaining attached to tuberoid until following growing season; pedicel curved forwards, 10–15 mm long. *Inflorescence* almost always single-flowered, rarely two, bracts spatheous and clasping, oblong-lanceolate, green, subacute and pubescent, erect or slightly recurved, 9–12 mm long. *Flowers* large, faintly scented; sepals lanceolate and green, free, erect to suberect, subequal, pubescent only on margins and lower surface, 6–15 × 3–5 mm; petals narrowly lanceolate, white with bluish-mauve median stripe, erect or slightly recurved, 9–17 × 2–3 mm; lip broadly spreading, deeply cut into 3–5 lobes with 16–25 linear segments 22–32 × 0.5–2 mm, segments deflexed and acuminate, white with a bluish-mauve

median stripe; spur extending backwards, narrowly conical, subacute, 8–13 mm long. *Column* clavate, short, anthers immediately in front of petals, erect; pollinia solitary in each anther lobe, granular and oblong, on a long stalk; stigma minute. *Ovary* oblong and curved, pubescent, 10–15 mm long. *Capsule* oblong, 15–20 × 4–5 mm.

DISTRIBUTION. South Africa: From Clanwilliam in the Olifants River Valley to Grahamstown in the Eastern Cape.

HABITAT. Growing as isolated individuals, in small groups or rarely in colonies amongst bushes and in clearings on stony clay hillsides and flats, or on sandstone mountain tops and slopes, flowering profusely after summer bush fires.

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