



Short communication

Frankenia fruticosa (Frankeniaceae), a new dwarf shrub from the Knersvlakte, Western Cape

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ABSTRACT

Frankenia fruticosa J.C.Manning & Helme is a new species endemic to the Knersvlakte near Lutzville in Western Cape, South Africa. It is unique among the southern African species in its gnarled, woody habit, the plants forming compact dwarf shrubs up to 35 cm high, with small, sausage-shaped leaves, 1.5–2.5 mm long. The calyx is densely puberulous and the narrow petals, ± 8 mm long, have the blade scarcely wider than the claws, with the apex of the ligule merging into the blade, and the ovary has six ovules, a pair near the base of each of three parietal placentas. We provide an updated key to the southern African species of *Frankenia*.

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1. Introduction

Frankeniaceae are a family of 70–80 species of mainly halophytic herbs and shrubs of saline and calcareous substrates in Mediterranean-type regions around the world but best represented in Australia, where ± 40 species occur (Barnsley, 1982; Kubitzki, 2002; Heywood et al., 2007). The family is sister to Tamaricaceae, with which it shares numerous morphological and physiological characters, but the leaves in Frankeniaceae are alternate rather than opposite–decussate as in Tamaricaceae (Kubitzki, 2002; Gaskin et al., 2004). Frankeniaceae show a pronounced salt and gypsum tolerance, with sunken salt glands on the often ericoid leaves, and are bound to saline, gypseous or calcareous substrates, thus often coastal. They favour semi-arid to arid conditions, typically with pronounced winter rainfall. Although up to four genera have been recognised in the past, recent phylogenetic analysis favours the recognition of just the single genus *Frankenia* L. (Cuénoud et al., 2002; Olson et al., 2003).

Three species are currently recorded in southern Africa (Obermeyer, 1976). Two of them, *Frankenia repens* (Berg.) Fourc. and *F. pomonensis* Pohnert, are woody perennials or shrublets endemic to the region, and

the third, *F. pulverulenta* L., is an annual or perennial, almost cosmopolitan synanthropic herb. Here we describe a third southern African endemic species from the Knersvlakte in southern Namaqualand. The new species, *F. fruticosa*, is a gnarled, densely leafy dwarf shrub (from which we derive the specific epithet) with a thick, woody base and small, sausage-shaped leaves up to 2.5 mm long, whitish flowers with narrow petals, and six ovules per ovary.

2. Materials and methods

Collections at BOL, NBG, PRE and SAM, the main herbaria with good representation of collections of Cape species, were consulted.

3. Taxonomy

3.1. Key to species of *Frankenia* in southern Africa

- 1a. Gnarled dwarf shrublet; leaves 1.5–2.5 mm long, densely scabridulous above; calyx ribs densely puberulous; petal blade scarcely wider than claw; ovules six, basal–parietal... *F. fruticosa*
- 1b. Prostrate or sprawling herbs or softly woody shrublets; leaves 3–7 mm long, glabrous above; calyx ribs glabrous or sparsely pubescent; petal blade wider than claw; ovules numerous, 20–45, parietal:

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2a. Prostrate annual or rarely perennial herb; leaves petiolate with petiole ± 1 mm long, blade ovate to lanceolate; flowers scattered and solitary in forks of branches; petals ± 5 mm long... *F. pulverulenta*

2b. Prostrate or sprawling perennials or shrublets; leaves subsessile, allantoid (sausage-shaped); flowers in terminal dichasia; petals 9–11 mm long:

3a. Prostrate perennial with short, erect branches; calyx ribs coarsely pubescent; stamens as long as petals; South Africa: Northern, Western and Eastern Cape... *F. repens*

3b. Sprawling shrublet; calyx glabrous; stamens shorter than petals: Namibia: Luderitz... *F. pomonensis*

3.2. New species

Frankenia fruticosa J.C.Manning & Helme, sp. nov.

Type: South Africa, Western Cape, Vanrhynsdorp (3118): 11 km NE of Lutzville, Moedverloren 208, 3 km NW of old marble mine, (–AD), 20 Nov. 2013, N.A. Helme 7796 (NBG, holo.; K, PRE, MO, iso.).

Rounded, multi-stemmed, densely leafy dwarf shrub to 350 mm high, with numerous short, upright branchlets from thick, gnarled or twisted, woody base up to 80 mm diam., ending in flowering dichasia, young branches reddish with dense white, curly pubescence, later glabrescent with grey bark; internodes as long as leaves, 1.5–3.0 mm long. *Leaves* opposite–decussate, ascending–incurved, subsessile, allantoid–eroid, 1.5–2.5 \times 0.5–1.0 mm, coarsely punctate, densely scabridulous, ventral surface with densely puberulent longitudinal groove, apex with a small warty apiculus, sheath a fringe of coarse hairs; bracts 2 or 4 in a verticel, similar to leaves; bracteoles 1.0–1.5 mm long, with broad, flattened petiole partially adnate to sheath. *Flowers* 1–few in dichasia congested at branch tips, bisexual, unscented. *Calyx* tubular, induplicate, 5-ribbed, 4–6 mm long, coarsely puberulous outside with white hairs on ribs and densely puberulous in grooves, glabrous inside. *Petals* 5, narrowly oblong, ± 8 mm long, white with pink claw, claw ± 4 mm long, ligulate, cohering laterally with margins tucked along ligule, ligule linear and longitudinally adnate to claw with truncate apex merging imperceptibly into blade, blade oblong, $\pm 4 \times 1$ mm, erose. *Stamens* 6, exerted up to 1 mm beyond mouth of calyx at anthesis, later torn loose at base by ripening fruit and then spreading and exerted ± 3 mm, filaments linear–oblanceolate, ± 7 mm long, slightly expanded and angled in lower half and cohering, filiform above, white flushed pink, anthers subglobose, bipartite, versatile, ± 1 mm long, wine-red, pollen yellow. *Ovary* ellipsoid, 5-angled or -ribbed by pressure from stamens and petals, ± 1.5 mm long, 6-ovulate with two ovules near base of each of three parietal placentas, funicles erect, shorter than ovules; style terete, up to 3 mm long at anthesis but later elongating to 5 mm, usually sharply kinked at base, 3-branched, branches ± 1 mm long, included at anthesis but later exerted 3–4 mm but never beyond stamens, pink to wine-red, stigmas clavate. *Immature capsule* ovoid, ± 2 mm long. *Immature seeds* ellipsoid–fusiform, angled by pressure, ± 1 mm long, smooth; developing rapidly even before flower has withered. Flowering time: November, possibly late October in dry years. **Figs. 1 & 2.**

3.2.1. Distribution and ecology

A local endemic of the Knersvlakte in southern Namaqualand, Western Cape, *Frankenia fruticosa* is known thus far only from Moedverloren 208 (Fig. 3), the original, anchor property in the Knersvlakte Biosphere Reserve, managed by CapeNature as a conservation area. The species is locally common on the upper parts of south facing, quartz covered slopes, a habitat that receives significant extra moisture in the form of fog condensation (N. Helme, pers. obs.). The species is absent from many seemingly suitable habitats, and co-occurs with *Mesembryanthemum digitatum* Aiton (= *Dactyloopsis digitata* (Aiton) N.E.Br.), *Sarcocornia xerophila* (Tölken) A.J. Scott, *Gazania othonnites* (Thunb.) Less., and the recently described

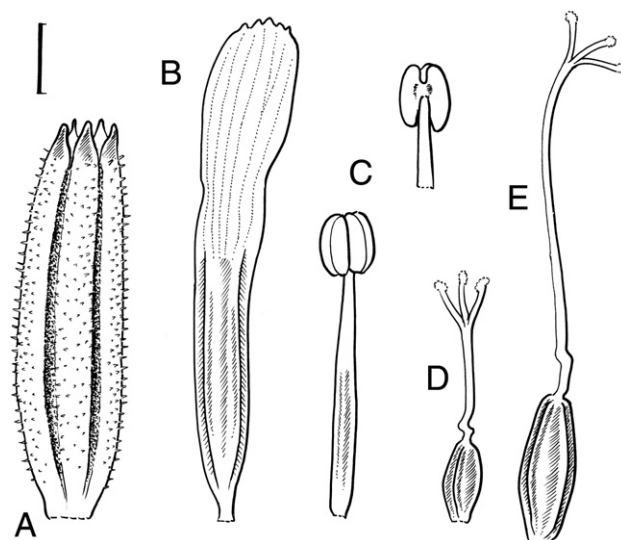


Fig. 1. *Frankenia fruticosa*, Helme 7796 (NBG). A, calyx; B, petal; C, stamen (adaxial view) and detached anther (abaxial view); D, ovary at anthesis (left) and after pollination (right). Scale: 1 mm. Artist: John Manning.

local endemics *Romulea quartzicola* J.C.Manning & Goldblatt and *Ficinia quartzicola* Muasya & Helme. The underlying soils are derived from heavily weathered shales, slightly saline, quick to erode, and rich in gypsum.

3.2.2. Conservation status

The total population is estimated to be 1 000–5 000 plants in a discontinuous but single population over a total area of about 100 ha, and there are no known threats to the population. We therefore suggest a conservation status of Least Threatened (IUCN, 2001).

3.2.3. Diagnosis

A very distinctive taxon, unique among the southern African species in its gnarled, woody habit, the plants forming compact dwarf shrubs up to 35 cm high, with numerous short, erect branches issuing from a thick, woody base. The small, sausage-shaped leaves, 1.5–2.5 mm long, are densely puberulous with short, white hairs, and narrowly grooved beneath. The flowers are distinctive in their densely puberulous calyx ribs and narrow petals, ± 8 mm long with the blade scarcely wider than the claws, the apex of the ligule merging into the blade. *Frankenia fruticosa* is unusual in the genus in the relatively few ovules per locule – just six ovules in three pairs, one pair near the base of each of three parietal placentas. Enlargement of the ovary that accompanies early and rapid ripening of the seeds causes the petals and stamens to tear free at the base and to be pushed up to protrude well beyond the mouth of the calyx tube, giving a false impression that the stamens and style are well exerted at anthesis.

Frankenia fruticosa cannot be confused with any of the southern African species, all of which are straggling or prostrate plants. The sausage-shaped leaves resemble those of the two endemic species, *F. pomonensis* from coastal southern Namibia, and *F. repens*, which is widespread in coastal areas throughout the Greater Cape Floristic Region, but both these species have significantly larger leaves, 3–7 mm long with the upper surface glabrous, larger flowers with obovate petals 9–11 mm long, a calyx that is either glabrous (*F. pomonensis*) or sparsely hispid (*F. repens*), and numerous ovules, ± 20 –40 per ovary (Obermeyer, 1976).

The relationships of this remarkable species remain to be established in view of its distinctive characters, notably the imperceptible grading of

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