A new species of *Brachystelma* (Asclepiadaceae) from the Waterberg, Limpopo Province, *Brachystelma waterbergensis* Peckover sp. nov.

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Figure 1. Type plant of *B. waterbergensis* in typical grassland habitat.

Abstract

A new species, *Brachystelma waterbergensis* is described from the Waterberg. This is a rare species known only from the farm Klein Elandsfontein in southwestern Limpopo, South Africa. Its nearest relative is probably *B. longifolium* from which it is easily distinguished by its funnel-shaped, transversely lined flowers. *B. waterbergensis* belongs to a group of three closely related species, for which a comparative table is provided.

Introduction

Brachystelma is a genus of about 158 currently recognized species (The Plant List, 2016). The group is confined mostly to Southern Africa with around two thirds of species with the rest into Africa but also to India and a single species in Australia. All the species have a swollen underground caudex or fusiform roots. The stems are deciduous and die back to the swollen underground caudex or fusiform roots at the end of the growing season.

Members of *Brachystelma* are characterized by leaves that are opposite, linear to elongated, with wavy, sinuate to entire straight margins. These are bright green to greyish and glabrous to very hairy.

The flowers are borne in the axils of the leaves or terminal in panicles. Each flower has five corolla lobes which can be united at their tips or free. The corona contains the pollinia as well in the gynostegium.

The paired follicles develop after fertilization and may be upright, decumbent thin or very fat. When mature these fruits split longitudinally to release the tufted seed which are dispersed by the wind. There may be from a few seed to many in each follicle.

The corms of some species of *Brachystelma* have, according to the literature been used as a food plant and especially the Bushmen community utilize these as a food source (Dyer, 1983).

In the present contribution one new species of *Brachystelma* is described from South Africa, namely *B. waterbergensis*. This species is compared to the three most closely related species namely *B. longifolium*, *B. thunbergii* and *B. pygmaeum* which have a similar upright growth form, grow in similar habitats and also have flowers two to each leaf node. Illustrations as well as a comparative table to distinguish the four species for the South African region are provided. Of the three similar species, *B. longifolium* was deemed to be the most closely related to *B. waterbergensis* based on the characters in the comparative study, i.e. flowers, leaves and plant form.

Taxonomic treatment

Brachystelma waterbergensis Peckover sp. nov.

Brachystelma waterbergensis resembles *B. longifolium* in having a similar underground caudex, but is easily distinguished from that species by the flowers being of a different form, funnel shaped with transverse reddish rings on the inside (vs. a uniform flattish yellow corolla bulb), corona yellowish green and without hairs (vs. yellow/ green with inward facing hairs), corolla lobes triangular 1.5 mm reddish with or without hairs (vs. long thin 7mm reflexed yellow to reddish 7mm lobes without hairs), and several other floral features (Table 1).

TYPE: South Africa, Limpopo, 2428 Modimolle, Klein Elandsfontein 2428(CC), 23 December 2014, *Peckover* 229 (PRU, holo!).

Description

Perennial herb up to 100mm high: single-stemmed, unless damaged early in growth, the basal organ a below ground caudex, 30mm diameter and 12mm thick, with numerous fusiform roots from the bottom surface. Leaves up to 50 mm long, 3 mm wide, linear, entire and sparingly hairy or glabrous on upper surface and hairy underneath. Flowers 7 mm diameter flesh coloured on outside and on inside, fine reddish rings on a yellowish green background; corolla lobes triangular 1.5 mm reddish with or without hairs; corolla bulb funnel shaped 4×5 mm; corona 3 mm diameter yellowish green with yellow pollinia. Fruit cylindrical, 70×4 mm, greenish upright. Seeds up to 10 per fruit.

Diagnosis

Brachystelma waterbergensis appears to be most closely related to *B. longifolium* (Schltr.) N.E.Br.

Both species have a swollen below ground caudex and fusiform roots. However, the two species differ in several floral and plant features (Figure 3 & 4; Table 1). The flowers of B. waterbergensis are on first observation a reddish colour (Fig1 & 2) whilst those of *B. longifolium* are predominantly yellowish with some plants in populations having reddish corolla lobes. In *B. waterbergensis* the corolla tube is funnel shaped as against a flat one for *B. longifolium*. The corolla lobes in *B. waterbergensis* are reduced to small triangular lobes whilst in *B. longifolium* these are long, linear and reflexed along their longitudinal axis. Diagnostic features to distinguish among *B. waterbergensis* and other Southern Africa related members of the genus are provided in Table 1.

Locality

Brachystelma waterbergensis is known only from the type locality in the Waterberg, Klein Elandsfontein, Limpopo province, South Africa. The Waterberg is a unique area with plants adapted to the poor sandy leached soils which are derived from the Waterberg conglomerate and very poor in plant nutrients. On my nature farm at the highest point on 23

Figure 2. Follicles of *B. waterbergensis*, around 80 mm long.

Figure 3. *B.waterbergensis* stem with bud and flower from a leaf axil.

Figure 4. Tip of another *B.waterbergensis* plant with more distinct corolla markings used to pollinate the type plants flowers.

Table 1	*B. waterbergensis*	*B. longifolium*	*B. thunbergii*	*B. pygmaeum*
Distribution	South Africa – Limpopo	South Africa – Mpumalanga	South Africa – KwaZulu-Natal, Lesotho	South Africa – Limpopo, Mpumalanga, KwaZulu-Natal, Zimbabwe
Plant Form	Disc shaped caudex 20–30 mm × 12 mm, fusiform roots below	Disc shaped caudex 30-50 mm × 20 mm, fusiform roots below	Disc shaped caudex 30–50 mm × 20 mm, fusiform roots below	Disc shaped caudex 50-70 mm × 25 mm, fusiform roots below
Stem	Mostly single, upright	Five to fifteen, upright to decumbent	Up to twenty five, upright to decumbent	Up to fifteen, upright
Leaves	Petiole 3 mm Blade up to 35–50 mm × 3–4 mm Linear , entire, sparingly hairy or glabrous on upper surface and hairy underneath	Petiole sessile Blade up to 40 mm × 1 mm Linear , entire, hairy on the upper and lower surfaces	Petiole sessile Blade up to 15 mm × 3 mm Linear, ovate or elliptical ,hairy on both surfaces	Petiole 1–3 mm Blade up to 10–15 mm × 2–5 mm Elliptical, ovate or linear ,glabrous on upper surface or both surfaces hairy
Pedicel	Two from one leaf axil, axillary to stem. Upright or slightly nodding, 3–10 mm finely pubescent	Two from one leaf axil, axillary to stem. Upright and then nodding, up to 20 mm finely pubescent	Two from one leaf axil, axillary to stem. Upright and then nodding, up to 20 mm finely pubescent	Two from one leaf axil, axillary to stem. Upright, up to 15 mm finely pubescent
Corolla bulb	4–5 mm ,funnel shaped On inside, yellowish green with fine to marked red transverse lines. Outside yellowish red	Up to 5 mm, flat on inside cream to yellowish	4 mm, bowl-shaped ,hairs or absent on inside, white to yellowish	Up to 4 mm, flattish, yellow, green or purple with laterally appressed trichomes attached at their centre to the bulb surface
Corona	Yellowish green without hairs	Yellowish to greenish, with inward facing hairs on outer corona lobes	Yellow with inward facing hairs on the outer corona lobes	Yellow, green or purple, raised above the corolla bulb, with or without peripheral hairs on outer corona lobes
Corolla lobes	Triangular, 1.5 mm, free, reddish on inside with or without hairs	Long, thin, 7 mm, free, yellow or reddish reflexed along the longitudinal axis	Long, thin up to 5 mm, free, yellow, green or reddish brown reflexed along their longitudinal axis	Long, thin, up to 10 mm connected at tips to form a cage or free, yellowish to green, reflexed or not along their longitudinal axis
Seed follicles	Upright, light green at maturity, 80 x 3 mm. Seed dark brown with a lighter margin, 10–14 seeds per follicle	Upright, greyish 40–50 mm × 2–3 mm. Seed greyish brown with brown mottles on lighter background, 10–15 seeds per follicle	Upright greyish green, 60–80 mm × 3 mm. Seed dark brown to black all over, 12–14 seeds per follicle	Upright, yellow green turning to reddish yellow, 70 × 3 mm. Seed dark brown with a lighter margin, 10–12 seeds per follicle

Figure 5. *B. thunbergii* flower.

Figure 6. *B. longifolium* flower.

Figure 7. *B. pygmaeum* with cage-like flowers from near Ermelo.

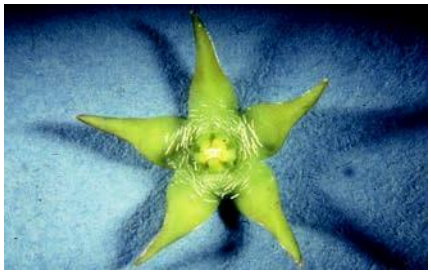

Figure 8. *B. pygmaeum* open flower form.

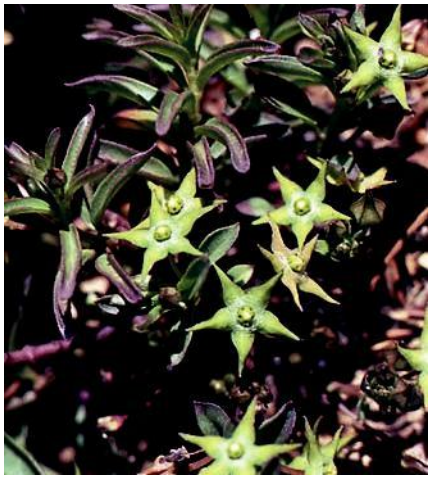

Figure 9. *B. pygmaeum* from Oribi Gorge.

Figure 10. *B. thunbergii* plant with nodding flowers from the Drakensberg.

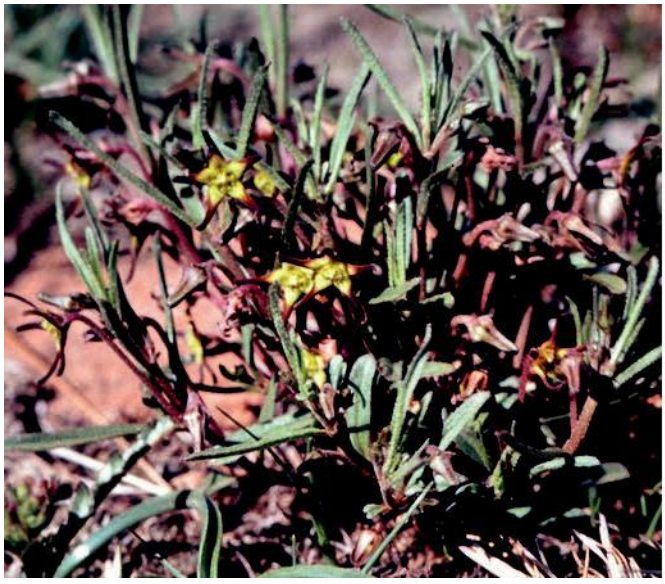

Figure 11. *B. longifolium*, a multi-stemmed plant from Morgenzon.

Figure 12. *B. longifolium* stems, leaves and flowers.

December 2014 I was looking for the elusive Waterberg Copper butterfly (*Erikssonia edgei*) whose larvae feed on the *Gnidia kraussiana* plants (Fig. 13). This butterfly had only recently been found on the adjacent farm and nowhere else, in a similar high-altitude grassland. The typical opposite small leaves of what looked like an interesting Asclepiad (Fig. 1) was observed in this area between grass whilst looking for this elusive butterfly. As the broken off leaf produced a clear sap and not a white one, its base was exposed to reveal a typical *Brachystelma* caudex. A search of the area revealed another four plants and this one was removed to study this plant further when it flowered. These plants appeared from their growth habit to be part of a group of brachystelmas which includes *B. longifolium* Schltr.

B. thunbergii N.E.Br. and *B. pygmaeum* (Schltr.) N.E.Br. These species also grow in rocky soils often in exposed, high elevation sites in grassland.

This past season, from August 2015, the plant grew out from the dormant corm and started producing double sets of flower buds from each node. This is also typical of the other related species mentioned. As the buds developed, they were almost top shaped and unlike the other species. The small flowers on opening were very distinct in that the inside of the corolla bulb had red transverse rings against a yellowish background and short triangular corolla lobes. The corolla bulb was also funnel shaped unlike any of the other species.

At the end of November 2015, the high point on the farm was revisited to obtain other plants in flower. The reasoning was to obtain pollen to be able to pollinate the type plant flowers under a stereo microscope. A flowering plant was observed next to the path in full flower after a short search. It was single stemmed, around 75 mm tall and the flowers had darker and more pronounced transverse lines on the inside of the corolla bulb. The important corona characteristics were however identical. Pollinia were used to pollinate 6 open flowers on the type plant and after three weeks, four paired seed follicles developed from these. A few weeks later another set of seed follicles developed from the fifth dormant fruit body. These upright seed follicles were light green and remained as such till maturity (Fig. 2).

References

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Figure 13. *Gnidia kraussiana*, the food plant for the larvae of the Waterberg Copper butterfly larvae.