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The genus *Polystachya* in South Africa

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Abstract

Eleven species of *Polystachya* plus one natural hybrid have been confirmed to occur in South Africa; this is equivalent to 21% of all the epiphytic orchid species that have been recorded in the country. Another species, *P. zambesiaca*, is also probably present in the Limpopo Province of South Africa (Stewart *et al*., 1982), but this must still be confirmed because the evidence provided is insufficient. Most *Polystachya* species in South Africa occur in small pockets of suitable habitat that span a wide altitudinal range from the Western Cape eastwards along the coastal and mountainous areas, and then northwards to Limpopo Province. Five of the *Polystachya* species and the one natural hybrid are endemic to South Africa and Swaziland.

Introduction

The genus name *Polystachya* is derived from two Greek words '*poly*' (many) and '*stachys*' (ears of wheat) – probably alluding to the arrangement of the flowers on the spike (la Croix & la Croix, 1997). To date, over 200 *Polystachya* species have been described across the world. Over 160 species have been recorded from mainland Africa, while the remainder occur in Madagascar, South and Central America and Australasia. For convenience, and based on ecological similarities, Swaziland has been combined with South Africa in my analysis.

A total of eleven *Polystachya* species (five of them endemic) have been confirmed for South Africa and Swaziland, plus one naturally-occurring hybrid that is also endemic. It is possible that further searches in suitable habitats will reveal that at least one additional species, *Polystachya zambesiaca*, occurs in South Africa. A taxonomic evaluation of the different growth and colour forms of the *Polystachya ottoniana* complex might also result in the separation of this group into one or more species or sub-species.

Polystachya species occur in the higher rainfall areas of South Africa, mostly in the summer rainfall areas. Most species are epiphytic on trees and shrubs, though a few species also grow on rocks in humid coastal areas (Harrison, 1981). All *Polystachya* species grow in positions that have high humidity, receive adequate sunlight, and good air movement. Cool, forested areas close to waterfalls and streams seem to be preferred by most *Polystachya* species, but some species are also found in the warmer coastal forests of the Western Cape, Eastern Cape and KwaZulu-Natal (Harrison, 1981; Johnson *et al*., 2015).

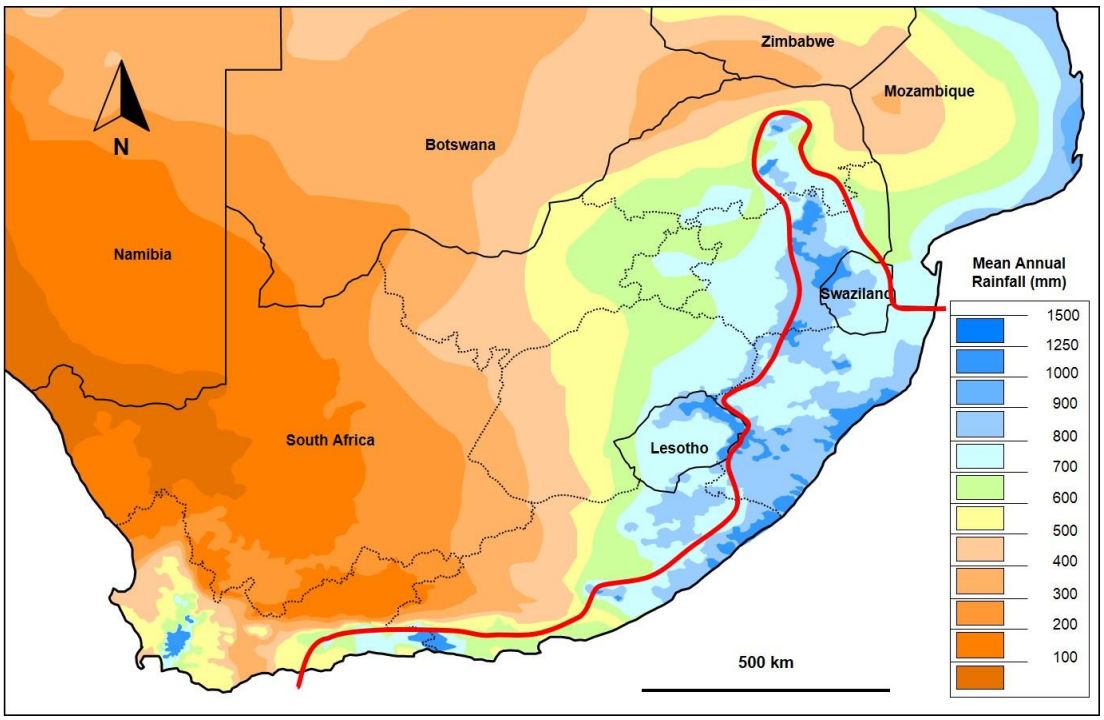

Figure 1. Map of southern Africa showing the distribution of mean annual rainfall. Red line shows the approximate distribution limit of *Polystachya* species in the higher rainfall areas of South Africa and Swaziland.

Errol Harrison (1981) listed some useful features that should be noted when trying to identify a *Polystachya* plant; these include:

- The location and type of habitat where the plant is found;
- The shape, size and arrangement of the pseudobulbs on each plant;
- The number, size, shape, arrangement and texture of the leaves on the plant;
- The size of the inflorescence and the arrangement of the flowers in each inflorescence; and
- The flower size and colour, plus the presence or absence of hairs on the flower and the pedicel.

In this paper I provide a simplified dichotomous key for the eleven *Polystachya* species and one hybrid recorded from South Africa and Swaziland, plus the possible *P. zambesiaca* which has not yet been confirmed for the country. This is followed by a pictorial record and brief descriptions of each taxon, plus a distribution map for each species, showing published localities drawn from McMurtry *et al*., 2008 and Johnson *et al*., 2015 plus my own field observations. I conclude with some suggestions as to how to improve the conservation of *Polystachya* species in South Africa and Swaziland, with particular emphasis on the five endemic species and the endemic hybrid.

The *Polystachya* species found in South Africa and Swaziland

I provide a simple identification key for the *Polystachya* species and the one hybrid found in South Africa and Swaziland; this key has been adapted and expanded from la Croix & Cribb (1988). The key is followed by brief descriptions of each species, plus photographs.

1a. Stems not thickened into pseudobulbs, even at the base……..……..2
1b. Stems thickened for all or part of their length to a distinct pseudobulb…….…….……..3
2a. Inflorescence without any side branches; leaves rounded to obtuse…….…...*P. transvaalensis*
2b. Inflorescence with many short side branches; leaves narrow, acute…….……..*P. albescens*
3a. Pseudobulbs or stems with one leaf at the apex…….……..*P. cultriformis*
3b. Pseudobulbs or stems with 2 or more leaves at the apex…..…….…….4
4a. Pseudobulbs or stems branched or superposed (stems emerging from nodes above the base of the previous year's pseudobulb)…….…….…..*P. fusiformis*
4b. Pseudobulbs or stems clustered or tufted; not branched or superposed…….…..5
5a. Peduncle with tubular sheathing bracts; inflorescence simple or branched…….....6
5b. Peduncle without tubular sheathing bracts, inflorescence relatively few flowered…….7
6a. Inflorescence branched; lip with a basal, longitudinal fleshy callus……..……*P. tessellata*
6b. Inflorescence simple, unbranched; lip lacks a basal callus…….…..*P. modesta*
7a. Pseudobulbs narrowly conical and erect; leaves long and linear; inflorescence often starting shorter than the leaves, then elongating to longer than leaves after prolonged flowering..…….……..……..*P. x nebulicola*
7b. Pseudobulbs conical, squat or laterally flattened; leaves relatively short and linear; inflorescence very slender, usually much longer than the leaves….…….……..…..8
8a. Pseudobulbs narrowly conical and erect; leaves long and grass-like; inflorescence very slender and much longer than the leaves; flowers pale mauve……...…..*P. zuluensis*
8b. Pseudobulbs conical, squat or flattened; leaves relatively short and linear; inflorescence usually as long as or slightly longer than the leaves…….…....…….9
9a. Pseudobulbs usually flattened; inflorescence usually slightly longer than the leaves; flowers variable in colour; lip with a central yellow callus ..…..……..*P. ottoniana*
9b. Pseudobulbs conical, erect; leaves relatively broad, not grass-like…....…….……..…..10
10a. Flowers very variable in colour, exterior of flower covered with fine hairs; lip hard, with distinct side lobes.....…….…..….11
10b. Flowers golden yellow or greenish-yellow, with distinct dark line markings on inner surface of lateral sepals……..…....…….……..…..12
11a. Flowers pale or dark cream, usually with distinct dark line markings or veining on the inner surface of lateral sepals; dark spots on central lobe of lip and pale purple lines on the inner surface of the side lobes of lip…….…….……..…..*P. sandersonii*
11b. Flowers very variable in colour, though colour is uniform except for white lip; flower exterior covered with fine hairs; hard white lip, side lobes with pale or dark purple lines on the inner surface of the side lobes……..……...… *P. zambesiaca*

12a. Flowers erect, opening wide; golden-yellow, usually with brown longitudinal stripes on upper half of lateral sepals; lip narrow, three-lobed, somewhat concave, with a prominent tuft of short white hairs on each of the side lobes…… *P. pubescens*

12b. Flowers usually pendant, not opening wide; pale yellow or greenish-yellow, with distinct dark line markings on inner surface of lateral sepals and the dorsal sepal; lip broad, three-lobed, with small tuft of white hairs on each side lobe……..…..*P. ngomensis*

Polystachya albescens subsp. *imbricata* (Rolfe) Summerh.

Polystachya albescens is relatively uncommon in South Africa and Swaziland. Normally found in cool riverine forests, growing in deep shade. This sub-species has also been found in Angola, Cameroon, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe.

Plants usually between 150-400 mm tall. The stems are reed-like, (not thickened into pseudobulbs), and are usually tightly clumped together. The upper part of the stem bears 2-5 leaves; each leaf is relatively narrow with an acute tips Inflorescence with many short side branches, often longer than the leaves. Flowering occurs from October to February and the flowers are usually yellow or whitish-yellow, occasionally light green; sometimes the sepals and petals are tipped withpale purple.

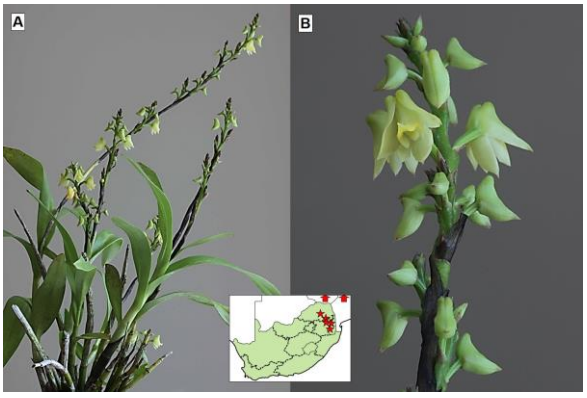

Figure 2. *Polystachya albescens* subspecies *imbricata*. **A**. Whole plant showing arrangement of leaves and stems; and **B** close-up of terminal part of inflorescence, showing short side branches and flower colour. Inset map shows recorded distribution of *P. albescens* in South Africa and Swaziland.

Polystachya cultriformis (Thouars) Lindl. ex Spreng.

Polystachya cultriformis is uncommon in South Africa. It is normally found in cool montane forests, growing in deep shade with mosses and ferns. The yellow-flowered form found in South Africa was previously known as *P. gerrardii*, before it was incorporated into *P. cultriformis*. In south-central Africa, the predominant flower colour tends to be white, while the flowers on plants from East Africa and Madagascar tend to be pink or purple. The species is widespread in Central and East Africa, as well as Madagascar and the Comoro Islands.

Plants normally between 150-350 mm tall, with a swollen pseudobulb that tapers from the base to the tip and bears a single leaf at the apex. The leaf is normally a dark green colour, often with wavy margins. The inflorescence arises at the tip of the pseudobulb, usually with several side branches, and may be erect or pendant. In South Africa, flowering occurs from October to February and the flowers are a bright yellow colour.

Figure 3. *Polystachya cultriformis*. **A**. Whole plant in natural habitat, showing tapering pseudobulbs with single leaves; and **B**. close-up of branched inflorescence with

yellow flowers. Inset map shows recorded distribution of *P. cultriformis* in South Africa.

Polystachya fusiformis (Thouars) Lindl.

Polystachya fusiformis is seldom found in South Africa, though it can locally common where it occurs. It is normally found on the margins of cool montane forests, growing in shaded conditions. The species is widespread in tropical Central and East Africa, as well as Madagascar and the Mascarene Islands.

Plants can reach up to about 600 mm in length and is usually pendant. The pseudobulbs are tapering in shape and superposed, with each new pseudobulb emerging from about the middle of the previous season's pseudobulb, forming long chains. Four to five leaves are borne on the apical half of the new growth, with each leaf being relatively broad with an acutely pointed tip. The multi-branched inflorescence arises at the tip of the pseudobulb. The flowers are small, green or yellow-green, often tinged with reddish-purple on the exterior surface, while the interior surface of petals and sepals have faint purple lines; the anther cap is purple. In South Africa, flowering occurs from October to January.

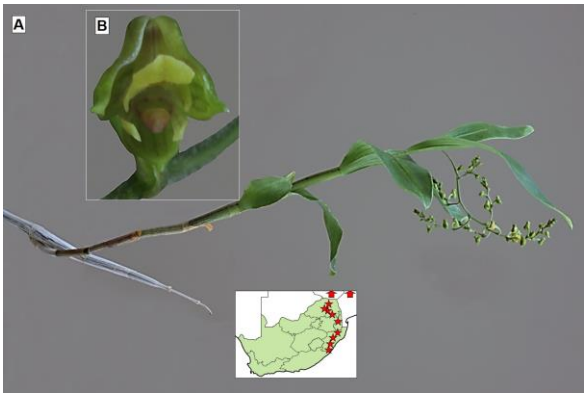

Figure 4. *Polystachya fusiformis*. **A**. Terminal portion of plant showing new pseudobulb emerging from middle of previous pseudobulb, and branched inflorescence; and **B**. close-up of single flower. Inset map shows recorded distribution of *P. fusiformis* in South Africa and Swaziland.

Polystachya modesta Reichb.f.

Polystachya modesta was previously considered only to have a limited distribution in the warm coastal regions of northern KwaZulu-Natal, though it is often locally common where it occurs. Recently, this species has been found growing near Port Shepstone on the KwaZulu-Natal South Coast (Herbert Stärker, personal communication, 26 January 2019). This new locality record represents a considerable range extension for the species in South Africa, suggesting that suitable habitats on the KwaZulu-Natal north coast should be examined carefully for this species. Elsewhere, *Polystachya modesta* is widespread in tropical south-central and eastern Africa, usually growing in riverine and coastal forests, high rainfall woodland and mist zone woodland.

Plants are slender and normally between 150-300 mm tall, with swollen conical pseudobulbs that are covered with old leaf bases. The pseudobulb bears 3 to 6 leaves that are narrowly elliptical and a densely-flowered terminal inflorescence that is usually slightly longer than the leaves. The inflorescence stalk is covered by a tubular sheathing bract. The flowers are usually yellow or yellow-green, but can also be stained reddish-purple or pink on their

exterior surface. The lip bears a dense tuft of short powdery white hairs on the disc. Flowering occurs from December to February.

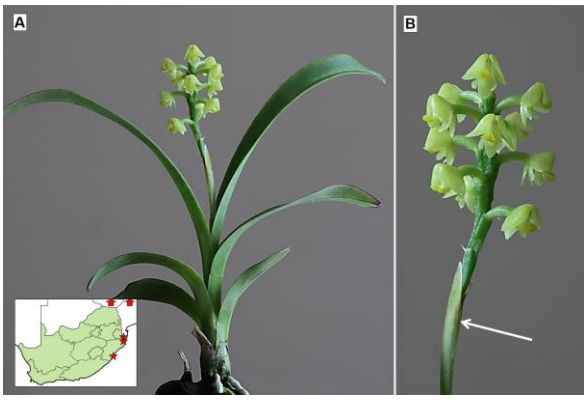

Figure 5. *Polystachya modesta*. **A**. Whole plant showing arrangement of leaves and inflorescence; and **B**. close-up of flower spike, showing tubular sheathing bract (arrowed). Inset map shows recorded distribution of *P. modesta* in South Africa.

Polystachya ngomensis McDonald & McMurtry

Polystachya nogmensis has a very limited distribution in the cool montane forests of Limpopo, Mpumalanga and KwaZulu-Natal Provinces and Swaziland, and is endemic to South Africa and Swaziland. It is often found growing epiphytically on *Xerophyta retinervis* plants.

The plants are small and slender, up to 120 mm tall, with swollen conical pseudobulbs that are covered with old leaf bases. The pseudobulb bears 2 to 3 leaves that are narrowly elliptical and, in some exposed localities, the normally dark green leaves turn a bright reddish-purple. The terminal inflorescence is usually slightly longer than the leaves and bears from 5 to 20 flowers that always face downwards. The lateral and dorsal sepals are striped with reddish-purple or brownish-purple lines. The lip is broad, triangular and faintly 3-lobed, with two wide patches of short white hairs on the interior surface of each side lobe. Flowering occurs from October to January.

Figure 6. *Polystachya ngomensis*. **A**. Whole plant showing typical pendant habit of the flowers; and **B**. view of interior of flowers, showing broad, flattened, heavily marked lip (arrowed), with tufts of white hairs, and markings on dorsal sepal. Inset map shows recorded distribution of *P. ngomensis* in South Africa and Swaziland.

Polystachya ottoniana Reichb.f.

Polystachya ottoniana has a relatively wide distribution in the cool coastal and montane forests from Swellendam in the Western Cape to the Soutpansberg in Limpopo province. The species is common and endemic to South Africa and Swaziland, and is known to hybridize with *Polystachya transvaalensis*.

A single record of this species from Zimbabwe was probably a cultivated plant taken from South Africa and therefore this species is not considered to occur naturally in Zimbabwe.

The plants are small, occasionally up to 150 mm tall, though usually less than 100 mm tall. The conical pseudobulbs are flattened dorsally, and form long chains, and can form large interwoven mats. Each pseudobulb bears 2 to 3 relatively long linear leaves. The terminal inflorescence is as long as or slightly longer than the leaves and bears from 1 to 5 flowers that are usually cup-shaped. The flower colour is very variable, ranging from yellow and green through white to pinkish-white (the commonest form found). Plants with yellow and green flowers are noticeably smaller than those with white or pink-tinted flowers. The petals are narrow and the lip has a central ridge-like callus which is yellow in colour. Flowering occurs from September to December.

Figure 7. *Polystachya ottoniana*. **A**. Whole plant of common pink-white flower form from Graskop; **B**. Small, yellow-brown flower form, Coffee Bay; **C**. Small, yellow-green flower form, Mbotyi Forest; **D**. Small yellow-white flower form, Vryheid; and **E**. large, greenish-white flower form, Ngome Forest. Inset map shows recorded distribution of *P. ottoniana* in South Africa and Swaziland.

Polystachya pubescens (Lindl.) Reichb.f.

Polystachya pubescens has a relatively wide distribution in the cool coastal and riverine forests from west of Port Elizabeth in the Eastern Cape through to the Drakensberg escarpment on the border between northern KwaZulu-Natal and Mpumalanga Province. The species is relatively common where it occurs and is endemic to South Africa. *Polystachya pubescens* has some morphological similarities with *P. ngomensis*; this has led to confusion in separating the two species. Detailed comparative phylogenetic studies of the two species will be needed to resolve the confusion between them and to establish whether or not they are indeed distinct species.

There is a single record of this species from south-eastern Zimbabwe; however, this was probably a cultivated plant taken from South Africa and therefore this species is not considered to occur naturally in Zimbabwe.

Polystachya pubescens plants tend to be small (up to 80 mm tall) when they grow as lithophytes on exposed rocks. Plants that grow in shaded, forest localities are larger (150 mm tall, occasionally up to 200 mm tall). Each conical pseudobulb bears from three to five leaves – these ae dark green in forest forms and reddish-purple in plants growing in exposed positions. The inflorescence is erect, taller than the leaves, bears from 6 to 18 flowers, and the flowers are normally erect and open wide. The flower colour is normally a deep yellow to orange-yellow, and the lip is small, folded and three-lobed, with two tufts of white hairs on the side lobes. The lip and lateral sepals

usually have distinctive orange-brown stripes. One colony of plants with pure yellow, unmarked, flowers has been recorded from Umtamvuna Gorge. Flowering normally occurs from August to December.

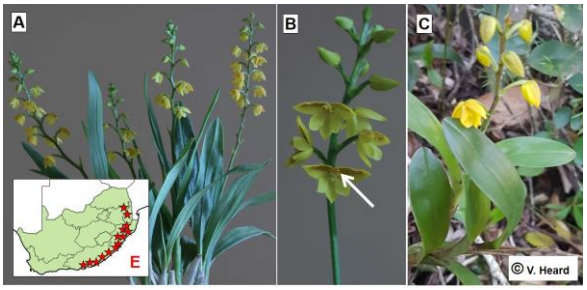

Figure 8. *Polystachya pubescens*. **A**. Whole plant from Pirie Forest, King Williamstown; **B**. single flower spike to show erect, wide open flowers with few dark markings and very small, folded lip (arrowed); and **C**. pure yellow flower form without markings from Umtamvuna Gorge (photo taken by V. Heard). Inset map shows recorded distribution of *P. pubescens* in South Africa.

Polystachya sandersonii Harv.

Polystachya sandersonii has a relatively wide distribution from the Mbotyi Forest of the Eastern Cape through Kwazulu-Natal and Mpumalanga to Limpopo Province. The species is relatively common in the localities where it occurs and it is endemic to South Africa. There has been considerable confusion between this species and *Polystachya zambesiaca*, and this needs to be resolved with detailed phylogenetic studies.

Polystachya sandersonii plants usually have relatively tall, conical pseudobulbs that are clumped together and each pseudobulb bears from three to five linear, strap-shaped leaves. The densely-flowered inflorescence is taller than the leaves, often bearing up to 20 flowers. Each flower and its stalk bear minute whitish hairs on the outer surface. The flowers can be very variable in their base colour, with or without distinct markings on the sepals, and there are distinct dark spots on the basal half of the three-lobed, white or pale cream-coloured lip. The side lobes of the lip have pale purple lines. Many plants have distinct dark brownish markings – like veins – on the inner surfaces of the sepals. The inner surface of the sepals on some plants from near Tzaneen are a dark maroon colour, the petals are pale yellowish, and the lip is a bright yellow colour. Flowering usually occurs from October to December.

Figure 9. *Polystachya sandersonii*. **A**. Whole plant from Mbotyi Forest, showing variously marked flowers with dark maroon spots on interior surface of lip; **B**. single flower from Lekgalameetse Forest, Limpopo Province, with very light markings; and **C**. portion of inflorescence on plant from Tzaneen, Limpopo Province, showing deep maroon colour on interior surface of sepals and yellow lip (photo taken by L. Grobler). Inset map shows recorded distribution of *P. sandersonii* in South Africa and Swaziland.

Polystachya tesselata Lindl.

Polystachya tesselata has been the subject of considerable discussion amongst orchid taxonomists and has been confused with *Polystachya concreta* and *Polystachya modesta*. However, *P. concreta* is considered to be present in Asia and the Americas but not in Africa. *Polystachya tesselata* is also considered to be synonymous with *Polystachya mauritiana* which is widespread in tropical Africa; the original name for plants growing in South Africa (*P. tesselata*) is retained here for convenience. *Polystachya tesselata* grows in subtropical riverine forests and warm coastal forests, usually in shaded conditions.

Polystachya tesselata plants have relatively tall (up to 55 mm tall), conical pseudobulbs that are often slightly flattened. Each pseudobulb bears from three to five dark green leaves and a terminal, many-branched inflorescence that can reach 500 mm in length. The inflorescence stalk is covered by several tubular sheathing bracts. The weight of the long inflorescence usually results in plant growing laterally outward from the host tree, with the side branches on the inflorescence growing vertically. The commonest flower colour recorded is yellow, though green and pink coloured flowers have also been found. Flowering occurs from October to January.

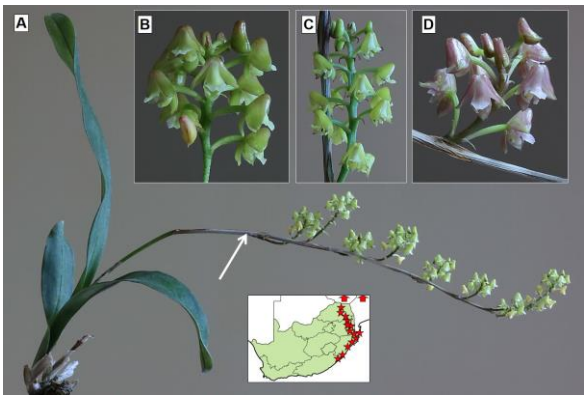

Figure 10. *Polystachya tesselata*. **A**. Whole plant, showing horizontal flower spike with numerous side branches and sheathing tubular bracts (arrowed); **B**. green flower form; **C**. yellow flower form; and **D**. pink flower form. Inset map shows recorded distribution of *P. tesselata* in South Africa and Swaziland.

Polystachya transvaalensis Schltr.

Polystachya transvaalensis is locally common in cool, moist montane forests in the eastern and south-eastern parts of South Africa, and is known to hybridize with the South African endemic species *Polystachya ottoniana*. The species is also widespread in suitable habitats across south-central and eastern Africa, being recorded from Burundi, Democratic Republic of Congo, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe.

Plants usually between 150-300 mm tall. The stems are reed-like, (not thickened into pseudobulbs), and are usually tightly clumped together, with blackish basal bracts. The upper part of the stem bears 3-8 leathery leaves; each leaf is somewhat elongated, with a rounded tip. The inflorescence can be unbranched or branched and is often slightly longer than the leaves, bearing up to 10-12

flowers. Flowering occurs from August to February and the flowers are quite variable in colour, ranging from greenish-yellow to green, brownish red and (rarely) reddish-purple, with a lip that is white on the interior surface. The flowers of plants found at a few localities along the eastern escarpment in the Mpumalanga and Limpopo provinces are often attractively coloured brownish-red or reddish-purple on the exterior surface of the sepals. The most common flower colour is yellow-green or pale green.

Figure 11. *Polystachya transvaalensis*. **A**. Whole plant, showing reed-like stems with black, sheathing bracts at the base of the stem; **B**. reddish-maroon flower form typical of the Graskop area; and **C**. green flower form typical of the Kaapsehoop area. Inset map shows recorded distribution of *P. transvaalensis* in South Africa and Swaziland.

Polystachya zuluensis L. Bolus

Polystachya zuluensis has a relatively limited distribution, occurring in Swaziland and a few localities on the Lebombo Mountains of northern KwaZulu-Natal. In 1968, the species was also found at a single locality south of Barberton in Mpumalanga Province, but the colony has since disappeared. Further searches are needed to determine whether or not this species still occurs in Mpumalanga Province. The species is endemic to South Africa and Swaziland.

Polystachya zuluensis plants are usually between 300-400 mm tall, with most of this length made up of the long, wiry inflorescence. The pseudobulbs are ovoid to conical, clustered closely together, most commonly found growing on plants of *Xerophyta retinervis*, though they are occasionally found growing on rocks. Each pseudobulb bears 2-5 thin, linear, grass-like leaves, which are lost during the winter months. The inflorescence is very thin and wiry, usually up to 400 mm long, and bears a series of short side branches. The flowers appear during the winter months of March to July and are usually a pale lilac colour with a central yellow line on the lip.

Figure 12. *Polystachya zuluensis*. **A**. Whole plant from Mbabane area, Swaziland,

showing the arrangement of the linear leaves, and the slim, elongated flower spike; and **B**. close-up of the flowers at the end of the flower spike. Inset map shows recorded distribution of *P. zuluensis* in South Africa and Swaziland. The yellow star indicates a locality near Barberton, Mpumalanga Province, where a colony of *P. zuluensis* was found in 1968 and which has now disappeared.

Natural hybrid

Polystachya x *nebulicola* McDonald & McMurtry

One natural hybrid between *Polystachya ottoniana* and *Polystachya transvaalensis* – with two distinctly different colour forms – has been recorded from a few localities across eastern South Africa. The green flowered form of the hybrid was first recorded from Nkandla Forest in KwaZulu-Natal and Kaapsehoop in Mpumalanga (Errol Harrison, 1972). Subsequent investigations revealed the presence of the green flowered form at two other localities in Mpumalanga, while a different form with attractive pinkish or purplish coloured flowers was found in one locality in the escarpment forests in Mpumalanga Province. The two forms were formally described as a variants of a single hybrid (McMurtry *et al*., 2008); this hybrid is endemic to South Africa.

Each plant consists of a small group of tapering pseudobulbs some 50-75 mm tall, topped by 2-5 thin, linear leaves, giving the plant a total height of 150-250 mm. The inflorescence is terminal, slightly shorter than the leaves when the first flowers open. However, the plants will produce some 20-30 flowers that open sequentially and the inflorescence then becomes considerably longer than the leaves when flowering is complete. The green-flowered form is the one that is most commonly found, even though it occurs at very few locations; the attractive pink-flowered form occurs at a single locality. Flowering of both colour forms occurs between September and February.

Figure 13. *Polystachya x nebulicola*. **A**. Whole plant of pink-flowered form; and **B**. whole plant of green-flowered form. The two inset distribution maps show the recorded distribution of *P. x nebulicola* in South Africa.

A possible additional species for South Africa

Polystachya zambesiaca Rolfe

To date, there has been much conflicting evidence regarding the presence of *Polystachya zambesiaca* in South Africa. The main confusion appears to have arisen as a result of a few morphological similarities that *Polystachya zambesiaca* shares with some forms of *Polystachya sandersonii* found in Limpopo Province. For

example, some authors have shown photographs of putative *Polystachya zambesiaca* plants that cannot be separated from *Polystachya sandersonii* plants. It is essential that careful investigations are carried out to determine whether or not putative *Polystachya zambesiaca* plants in South Africa are indeed that species.

Polystachya zambesiaca plants from Zimbabwe have very variable growth forms and flower colours, though they do share some important common characteristics. The pseudobulbs are conical in shape and relative short (10-16 mm tall) and bear 3-6 simple strap-shaped leaves. The terminal inflorescence is unbranched, densely shrouded in fine, short white hairs, while the flower pedicel and exterior surfaces of the sepals are also covered with a dense layer of fine, white hairs. The colour of the sepals and petals is almost uniform, in shades of yellow or green, while the upturned, three-lobed lip is hard and pure white, with distinct thin purple lines on the interior surface of the side lobes. Flowering normally occurs from September to February.

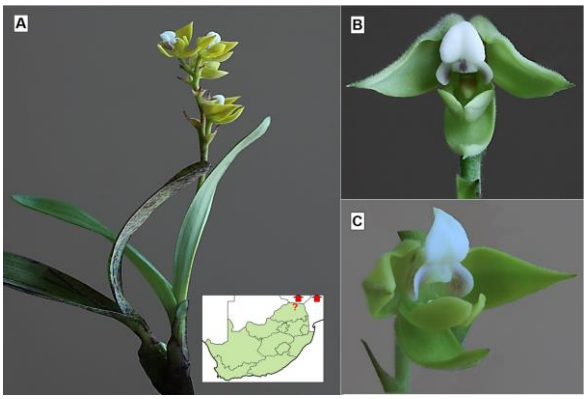

Figure 14. *Polystachya zambesiaca*. **A**. Whole plant of common, medium-sized (15 mm diameter), yellow-flowered form (Bvumba Mountains, Zimbabwe); **B**. Large (32 mm diameter) green flowered form (Chimanimani Mountains, Zimbabwe); and **C**. Medium-sized (12 mm diameter) greenish-yellow form (Mutare, Zimbabwe). All the colour forms of *P. zambesiaca* from Zimbabwe have uniform coloration on their exterior and interior surfaces, a dense cover of small hairs on the outer surface of the sepals, and a hard, white, three-lobed lip that has purple markings on the interior surface of the side lobes. Inset map shows most likely locality in the Soutpansberg where *P. zambesiaca* could occur in South Africa.

Concluding remarks

Arguably the greatest threat facing South Africa's *Polystachya* species – and indeed all other epiphytic orchids in the country – is habitat transformation. Four types of drivers of transformations are occurring: A. the expansion of housing and industrial developments that encroach on areas of forest and woodland; B. establishment of new forestry plantations, replacing original woodland and forest areas; C. uncontrolled fires ravage small areas of forest and woodland habitat, reducing these areas to open grassland; and D. the somewhat more insidious effects of climate change that result in more gradual changes to forest and woodland habitats, particularly their margins. As the type and size of habitat available to epiphytic orchids reduces, pollinating organisms are lost and species have to compete for suitable habitat.

On the positive side, South Africa has an excellent legal system, based on rights enshrined in the constitution, which affords sustained protection for sensitive and important areas, including forested upland

catchments. However, implementation of the various provisions for effective environmental protection that are part of the country's legal system seems to be variable at best.

For the genus *Polystachya* in South Africa, there are some key issues that need to be resolved:

1. Some of the superficial similarities between *P. ngomensis* and *P. pubescens* have led to errors in the separation of these two species. The two species share several morphological similarities in their flowers and the final decision as to whether or not the two are indeed separate species will need to be resolved by detailed phylogenetic studies.

2. Careful searches are needed to determine whether or not *P. zambesiaca* occurs in the Soutpansberg area as well as other suitable habitats in Limpopo Province. In addition, detailed phylogenetic studies need to be carried out on South African populations of *P. sandersonii* and putative *P. zambesiaca* plants to determine whether or not the two are separate species or simply variants of a single species.

3. The *Polystachya ottoniana* complex as it is now understood comprises several morphologically different forms. New phylogenetic studies are needed for the various forms recognized in the *Polystachya ottoniana* complex to establish whether or not any of the different growth and colour forms need to be separated out as distinct species of sub-species.

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