

# Outcomes of the 2011 Botanical Nomenclature Section at the XVIII International Botanical Congress

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## Abstract

The Nomenclature Section held just before the 18<sup>th</sup> International Botanical Congress in Melbourne, Australia in July 2011 saw sweeping changes to the way scientists name new plants, algae, and fungi. The changes begin on the cover: the title was broadened to make explicit that the Code applies not only to plants, but also to algae and fungi. The new title will now be the *International Code of Nomenclature of algae, fungi, and plants*. For the first time in history the Code will allow for the electronic publication of names of new taxa. In an effort to make the publication of new names more accurate and efficient, the requirement for a Latin validating diagnosis or description was changed to allow either English or Latin for these essential components of the publication of a new name. Both of these latter changes will take effect on 1 January 2012. The nomenclatural rules for fungi will see several important changes, the most important of which is probably the adoption of the principle of “one fungus, one name.” Paleobotanists will also see changes with the elimination of the concept of “morphotaxa” from the Code.

## Keywords

Algae, electronic publication, fungi, names, nomenclature, paleobotany, plants

## Introduction

The Nomenclature Section (the Section), held in conjunction with the XVIII International Botanical Congress (IBC), met at the University of Melbourne from 18–22 July 2011. Some 200 delegates, most of them members of the International Association for

Plant Taxonomy (IAPT), attended the Section, which meets once every six years on the occasion of the IBC. The Section is typically devoted to amending the *International Code for Botanical Nomenclature*, the detailed rules by which botanists name plants, fungi, and algae, but the meeting this July produced several momentous changes that will have major impacts on the way scientists communicate and organize information about these organisms.

The work of the Section is a broadly participatory international collaboration, intended to provide clear, fair rules that provide stability to the fundamental process of naming organisms and reflect changes in technology and in the science underpinning this process. Very briefly, proposals to amend the *Code* are submitted by any interested individual and are published in *Taxon* (the journal of IAPT) during the six years between Congresses. Prior to each IBC/Nomenclature Section, all members of IAPT and authors of proposals may vote on proposals to modify the Code. The proposed amendments are then discussed, debated, and voted on at the Nomenclature Section. All approved amendments are examined for conflicts by the Editorial Committee, which then finalizes the text for the new Code. Everyone who works on this process does so as a volunteer and the community can be proud that we have such an open process for making decisions on nomenclature.

## Results of the Nomenclature Section

One of the first changes involved altering the title of the *Code* to more accurately reflect its purview: following the meeting in Melbourne, it will be called the *International Code of Nomenclature for algae, fungi, and plants* (ICN). This change reflects efforts to ensure that the communities of biologists that study algae and fungi, which traditionally have been treated as plants, understand that this Code applies to their organisms. In addition, this explicit reference to algae and fungi on the cover signals the desire of the Section to continue to work with phycologists and mycologists to address their unique nomenclatural challenges within one code of nomenclature. This change lays the foundation for the acceptance of numerous rules that address the specific needs of various communities that study organisms that are quite different both in their biology and in the specific challenges they face in consistently applying names to their organisms.

After having rejected several similar proposals in several previous meetings, the Section approved a proposal to allow the names of new taxa to be considered effectively and validly published in specified types of electronic journals and books. Throughout the history of botany, effective publication of names has been accomplished only by hard-copy print materials. The new article in the Code, effective 1 January 2012, allows names to be accepted when they appear either in electronically published journals and books (e.g. Penev 2010) or in conventional printed material. As many universities and research institutions in the developing world cannot afford to subscribe to large numbers of journals, it is hoped that this will improve access for a greater number of the world's taxonomists.

In another sweeping change, the long-standing historical requirement that all newly published names for plants, fungi, and algae be accompanied by a Latin description or diagnosis was significantly altered by the Section. Beginning 1 January 2012 names of new plants, algae, and fungi may now be published with a validating diagnosis or description that is written in either Latin or English. In an age where almost certainly 20% of the world's plant species, and undoubtedly much greater percentages of fungi and algae, remain to be discovered, described, and named, this step will hopefully help taxonomists in their race to document biological diversity before it is lost to the deforestation and habitat degradation that threatens their extinction.

As molecular data have demonstrated that some large genera are polyphyletic, one of the most debated issues at the 2011 Nomenclature Section was related to the application of the generic name *Acacia*. The Section decided not to adopt any extraordinary exception into the Code and therefore approved the decision of the Vienna Congress to conserve an Australian species as the type of the genus.

Several changes in the Code have important consequences for the way names are applied for fungi. Historically, different names were applied to the sexual and vegetative forms of some fungi, but from now on, only a single name applies to each fungal species: a principle that has been articulated as "one fungus, one name." In addition, starting 1 January 2012, names of new fungi will require the citation of a unique identifier issued by a recognized repository that will register the name.

Finally, the nomenclature of fossil plants (and fossil algae and fungi) will also see a significant change. Because organisms tend to fall apart after death and these dissociated fossilized parts are discovered and described independently, the naming of fossils can be complicated. Previous Codes have provided for "form-genera," "organ-genera," and most recently "morphotaxa" to accommodate different degrees of precision in understanding the taxonomic relationships of these fossils. The new Code clarifies for taxonomists that plant fossils are named (vs. fossil plants; Cleal and Thomas 2010) and it eliminates the concept of morphotaxa. In essence paleobotany has adopted the principle of "one fossil, one name," analogous to the changes in mycological nomenclature. Efforts to assemble complete plants out of the separately named parts are important, but these whole plant reconstructions are hypotheses and are not governed by the principle of priority.

## References

- Cleal CJ, Thomas BA (2010) Botanical nomenclature and plant fossils. *Taxon* 59: 261–268.
- Penev L, Kress WJ, Knapp S, Li D-Z, Renner S (2010) Fast, linked, and open – the future of taxonomic publishing for plants: launching the journal *Phytokeys*. *PhytoKeys* 1: 1–14 doi: 10.3897/phytokeys.1.642.





# The identity of *Albuca caudata* Jacq. (Hyacinthaceae) and a description of a new related species: *A. bakeri*

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## Abstract

The name *Albuca caudata* Jacq. has been widely misunderstood or even ignored since its description in 1791. After studying herbarium specimens and living populations in South Africa, plants fitting Jacquin's concept of that species are found to be widely distributed in the Eastern Cape, mainly in the Albany centre of Endemism. Furthermore, some divergent specimens matching Baker's concept of *A. caudata* are described as a new related species: *A. bakeri*. Data on typification, morphology, ecology, and distribution are reported for both taxa. Affinities and divergences with other close allies are also discussed.

## Keywords

*Albuca bakeri* sp. nov., *Albuca caudata*, distribution, taxonomy, typification

## Introduction

The genus *Albuca* L. is accepted to include about 60 species in recent treatments (cf. Speta 1998; Manning et al. 2002), although up to 131 when considered in a wider sense (Phillips 1951), with over 180 names available in its traditional sense (cf. IPNI 2011). Recent molecular works have however considered the circumscription of *Albuca* in quite different ways. On the one hand, Manning et al. (2009) enlarged the tradi-

tional concept of *Albuca* to include other genera such as *Stellarioides* Medik., *Coilonox* Raf., *Trimelopter* Raf. and *Battandiera* Maire, reaching a total of 110–180 species, and hence being very heterogeneous in morphology. On the other, Martínez-Azorín et al. (2011) recovered the traditional concept of *Albuca* on the basis of phylogenetic, morphologic and biogeographic evidences.

Taxa of *Albuca* in its traditional sense (cf. Martínez-Azorín et al. 2011) are distributed mainly in southern and eastern Africa, with only a few species extending to Ethiopia, Saudi Arabia and north of Chad and Nigeria. The only comprehensive revision of *Albuca* is that of Baker (1897, 1898), who focused on South African and tropical African taxa. Recent accounts (cf. Müller-Doblies 1994, 1995, 2006; Manning and Goldblatt 2009) have greatly increased the knowledge of groups with nodding-flowers, namely *A.* subg. *Albuca* and *A.* subg. *Falconera* (Salisb.) Baker. However, information on groups with erect-flowers, e.g. *A.* subg. *Mitrotepalum* U. Müll.-Doblies (= *A.* sect. *Branciona* (Salisb.) J.C. Manning & Goldblatt), has remained almost unchanged from the late 19<sup>th</sup> century, and is the focus of our current research (Martínez-Azorín et al. in press a, b). In addition, no identification keys are available for all currently accepted taxa of *Albuca*, most of which are still poorly known or in need of further studies (cf. Phillips 1926; Dyer 1947). For instance, *Albuca caudata* Jacq., a plant described from the Cape, has long been misinterpreted or even ignored. The study of herbarium specimens as well as natural populations of wild plants has revealed the existence of different biological entities to which the name *A. caudata* has been applied. In the present contribution, the name *A. caudata* is typified to warrant further usage in the sense it was originally published, and data are also presented to describe a new species to which that name was applied erroneously.

## Materials and methods

Herbarium specimens from the following herbaria were studied: BOL, BNRH, GRA, J, K, KEI, KMG, NBG, NH, NU, PEU, PUC, UFH, WIND (acronyms according to Thiers 2011). Moreover, a detailed morphological study of both taxa was undertaken based on plants from natural populations. Authors of the cited taxa follow IPNI (2011).

## Results and discussion

*Albuca caudata* was described by Jacquin (1791) and later illustrated (Jacquin 1795) (Fig. 1) after plants collected in “Promontorio bonae Spei”, which “Apud nos in caldariis floret Decembri & Januario”. The characters mentioned by Jacquin (1791) are: bulb roundish to ovate; leaves scarce, glabrous, linear-lanceolate, canaliculate, acute, with terete apex; stem weak and inclined; raceme lax, with patent pedicels; tepals white with green bands, the inner tepals with yellowish apices; all six stamens bearing anthers; and style clavate, thick and trigonous. Plants fitting this description are widespread in the Eastern Cape. They are



**Figure 1.** *Albuca caudata* Jacq. from Jacquin, Ic. Pl. Rar. 2(16): 20, t. 442. 1795.

usually easy to recognise by their solitary partially hypogeal bulbs, covered by short, papery, brown to grey scales that reach different heights, and their inclined unilateral racemes with all pedicels erect. However, a wide range in variation of vegetative and reproductive features can be observed, such as morphology of the scales of the bulb neck, leaf length and width, and flower disposition with regard to the inflorescence axis. A number of herbarium specimens labelled *A. caudata* differ significantly from Jacquin's description, but match Baker's concept of that taxon (cf. Baker 1869). These plants are characterized by their hypogeal roundish bulbs with fleshy outer tunics, all of them reaching the top of the bulb and ending into a long epigeal neck surrounded by transversally banded cataphylls. The particular characteristics of those collections, which were illustrated by Baker (1869) (Fig. 2), do not fit any of the known species of *A.* subg. *Mitrotepalum*. As differences with the typical *A. caudata* are remarkable, segregation at the species rank is here favoured and a new species is described for them. Information on both taxa is provided below.

***Albuca caudata* Jacq., Collectanea 4: 203 (1791).**

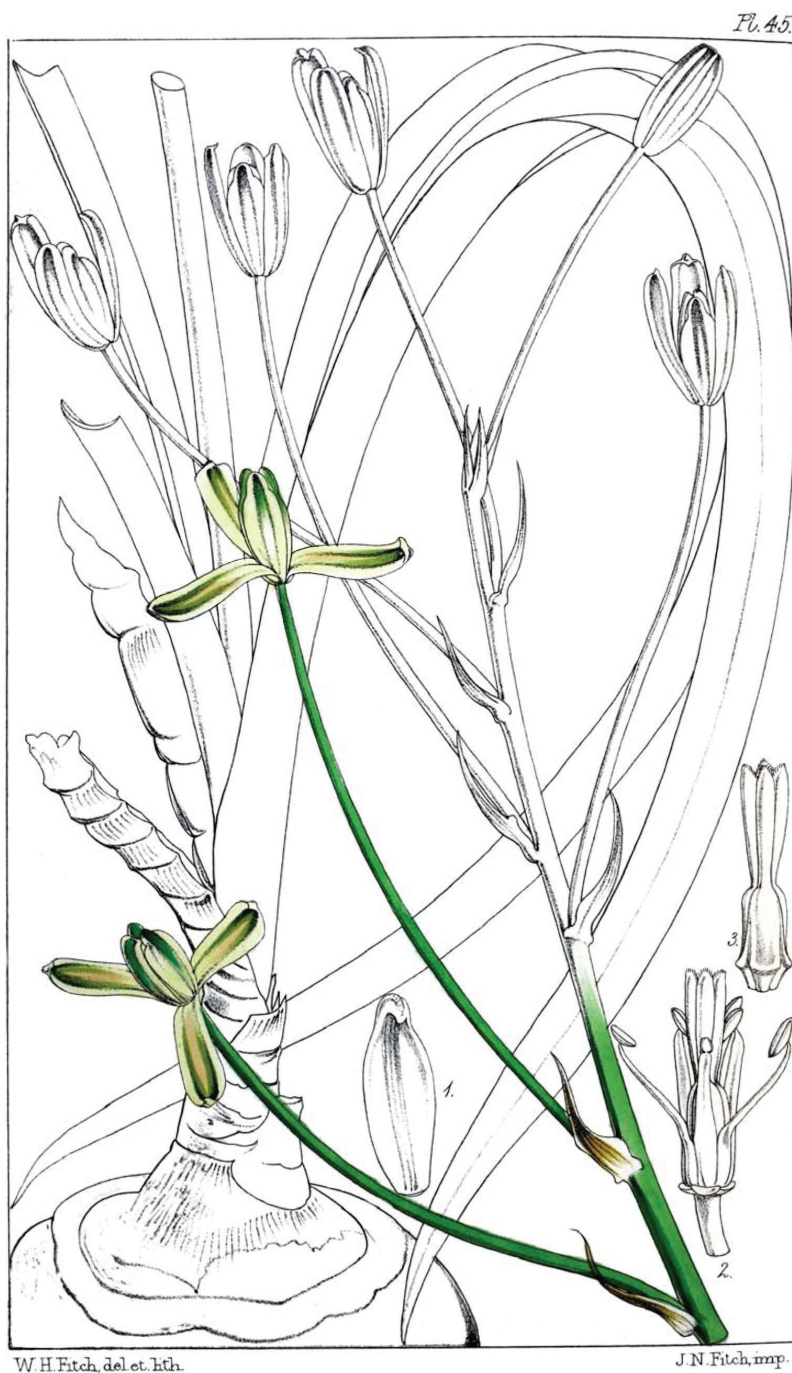
[http://species-id.net/wiki/Albuca\\_caudata](http://species-id.net/wiki/Albuca_caudata)

**Neotype (here designated).** Jacquin, Ic. Pl. Rar. 2(16): 20, t. 442 (1795), ex Promontorio bonae Spei. Apud nos in caldariis floret Decembri & Januario (Fig. 1).

**Epitype (here designated).** SOUTH AFRICA. **Eastern Cape:** Alexandria, Addo National Park, 400 feet, 29.X.1954, *S.M. Johnson* 1077 (GRA).

**Description.** Evergreen bulbous plants. Bulb mostly solitary and hypogeal, ovoid to oblong, up to 10 × 6 cm, usually with its wide basal plate elongated into a domed axis where the fleshy scales are attached; tunics fleshy, short and usually not reaching the top of the bulb, imbricate, persistent, papery grey or brownish in the upper part, sometimes with transversal prominent dark ridges, giving a brownish multiscaled appearance to the bulb in outline. Roots fleshy, thick and usually tuberose, white, numerous, up to 200 × 4 mm. Leaves 4–10, disposed in an apical rosette, linear-lanceolate, 15–120 × 0.5–2 cm, straight up and curving down when old, infolded, canaliculate, persistent, pale bright green to glaucous, glabrous, usually minutely papillate on nerves and margins, with a terete apex evident in young leaves. Inflorescence inclined, unilateral raceme, 11–40 cm long; peduncle 12–55 cm long; pedicels 3.5–9 cm long at base becoming smaller, up to 0.2–1 cm long near top, patent and being usually all erect; bracts ovate-lanceolate to triangular, long acuminate, 11–25 × 5–9 mm, papery white with brownish distant nerves that converge at the tips, much shorter than pedicels in the lower part of the inflorescence. Flowers erect; tepals white with a green median stripe 2–4 mm wide, sometimes with the tips yellowish; outer tepals oblong, 18–28 × 4–7 mm, apex slightly cucullate; inner tepals ovate, 15–24 × 4–10 mm, with apex strongly cucullate. Stamens all six bearing fertile anthers; outer anthers 1.5–2.5 mm long; inner anthers 3–4 mm long; outer filaments 10–16 × 1.5–2 mm, linear lanceolate to narrowly oblong, not pinched down; inner filaments 10–17 × 1.5–3 mm, linear oblong, wider and pinched in the lower half. Ovary oblong to obovate, up to 6–8 × 2–3.5 mm, stipitate, with prominent paraseptal crests that





*Albuca caudata*, Jacq

**Figure 2.** *Albuca bakeri* Mart.-Azorín & M.B. Crespo from Baker, Refug. Bot. (Saunders) vol. 1, t. 45. 1869 (as *A. caudata*).

are divergent in the lower part and form three prominent ridges; style subobpyramidal or clavate, trigonous, up to  $7\text{--}10 \times 2$  mm, stigma yellowish green. Capsule ovate,  $14\text{--}20 \times 10\text{--}14$  mm, trigonous to subsphaerical in section, pale-brown when mature; valves splitting in the upper quarter. Seeds flat, c.  $5\text{--}6 \times 4\text{--}5$  mm, dark brown to black, flattened and semidiscoidal, biseriate and horizontally stacked in each locule. (Fig. 3)

**Flowering time.** September to November; capsules dehiscing at the end of November and December.

**Habitat.** Plants of *A. caudata* are often associated with bush-clumps, where the inclined inflorescence is supported by woody plants.

**Distribution.** Currently known from Addo in the west to Grahamstown in the east, below 600 m, with an outlying population as far inland as Somerset East, reaching 900 m (Fig. 4).

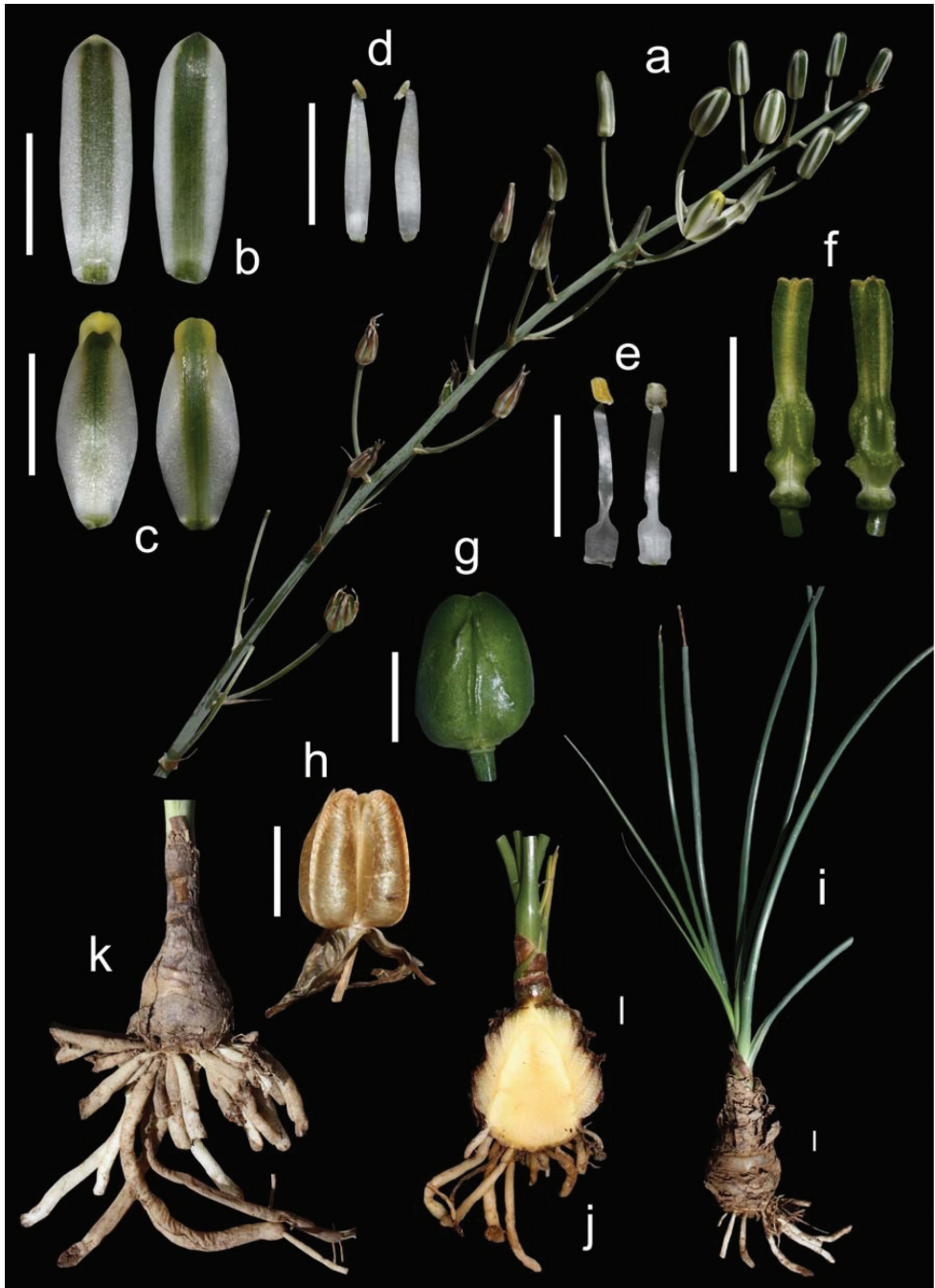
**Diagnostic characters.** *Albuca caudata* can be easily identified by its bulb mostly solitary covered by brownish papery scales usually disposed at different heights and bearing long thick tuberose roots, its long and narrow canaliculate or infolded leaves, its inclined raceme, with usually all pedicels patent and erect, giving a unilateral appearance to the inflorescence, and its white erect flowers with a median green stripe (Fig. 3).

**Etymology.** The specific epithet '*caudata*' presumably refers to the rather pointed, tail-like leaves, although Jacquin did not specifically mention it (E.E.A. Gledhill, unpubl. ms. in NBG).

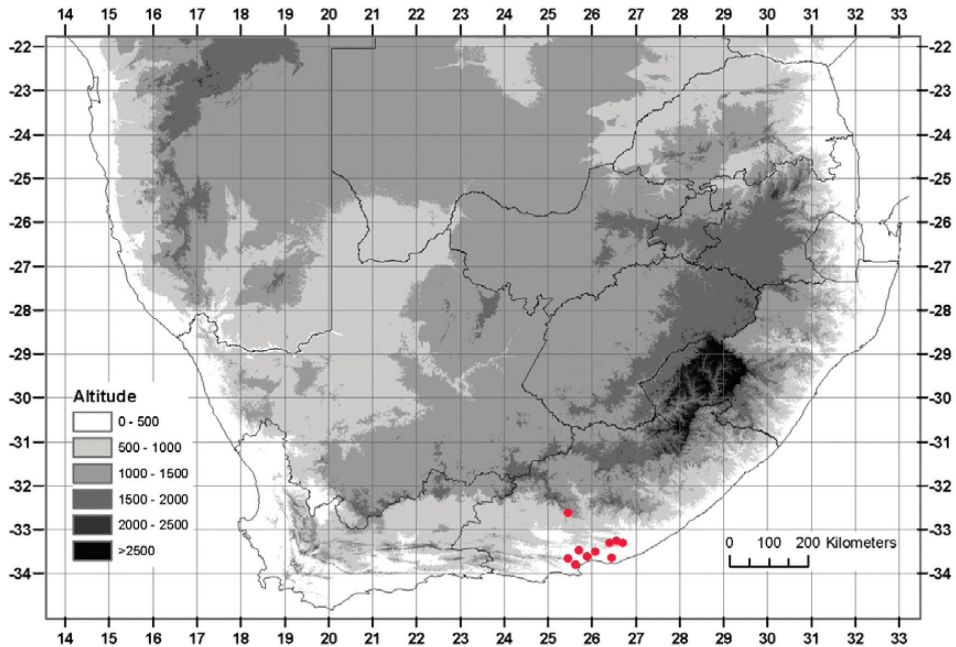
**Relationships.** The recently described *Albuca batteniana* Hilliard & B.L. Burt (Hilliard and Burt 1985) shares some morphological characters with *A. caudata*, such as the inclined scape bearing a horizontally arcuate inflorescence with erect pedicels, and the flower morphology. This species, however, differs in the coriaceous recurved much broader and flattened leaves, the longer tepals (30–42 mm long), and the structure of the bulb, being proliferous, epigeal, and composed by scales truncate at the top, disposed into a long domed axis and ending at different heights, without membranous neck (Table 1).

**Observations.** *A. caudata* shows some variability in the colour of the membranous bulb scales, being pale coloured with orange transversal ridges in some inland populations whilst those from the coastal areas are usually brown coloured with darker transversal ridges.

**Selected specimens studied.** SOUTH AFRICA. Alexandria, 4 miles east of Sandflats, 1000 feet, 17/12/1953, *E.E.A. Archibald* 5431 (GRA); Eastern Cape, along road in Springs Reserve, north of Uitenhage, 39 m, 21.X.2009, *A.B. Low* 16732 (GRA); Addo Elephant National Park, in main Botanical Reserve, 20.X.1996, *K. Johnson* 241 (GRA); Alexandria, Nanaga, opposite Glen Rosa turn-off, 1100 feet, 23.X.1953, *E.E.A. Archibald* 5315 (GRA); Eastern Cape, Albany, Queen's Road, 10 miles north of Grahamstown, 2000 feet, 05.X.1953, *S. Johnson* 774 (GRA); Eastern Cape, Albany, a few yards from *Archibald* 5636, Pluto's Vale, 2000 feet, 22.IX.1954, *E.E.A. Archibald* 5636 (GRA); Eastern Cape, Grahamstown, c. 5 miles on Cradock road, 626 m, 11.XII.2009, *M. Martínez-Azorín* & *A.P. Dold* 85 (GRA); Eastern Cape, Redhouse, thicket west of village, 6 m, 27.XI.2009, *M. Martínez-Azorín*, *A.P. Dold* & *A. Martínez-Soler* 45 (GRA).



**Figure 3.** *Albuca caudata* Jacq. Eastern Cape, Redhouse (M. Martínez-Azorín, A.P. Dold & A. Martínez-Soler 45 GRA) **a** Inflorescence **b** Outer tepals **c** Inner tepals **d** Outer stamen **e** Inner stamen **f** Ovary, lateral views **g** Mature capsule **h** Dehiscent capsule **i** Bulb and leaves **j** Bulb in longitudinal section **k** Bulb with tuberose roots. Scales 1 cm.



**Figure 4.** Known distribution of *A. caudata* Jacq.

***Albica bakeri* Mart.-Azorín & M.B. Crespo, sp. nov.**

urn:lsid:ipni.org:names:77112770-1

[http://species-id.net/wiki/Albica\\_bakeri](http://species-id.net/wiki/Albica_bakeri)

**Holotype.** SOUTH AFRICA. **Eastern Cape:** North of Grahamstown, on Cradock Road turn off to Kwandwe, 592 m, 05.IX.2010, 33°12'39"S, 26°24'07"E, *M. Martínez-Azorín* & *A. Martínez-Soler* 218 (GRA Holo.; ABH, K, NBG, PRE Iso.).

**Diagnosis:** Species insignis ex *Albica* subg. *Mitrotepalum* characteribus floralibus ad *Albucam caudatam* accedit, sed valde differt et facile distinguitur bulbo hypogaeo solitario carnoso tunicis omnibus apicem attingentes in collum angustum supra solum desinentes, e basi cataphyllis albido-membranosis manifeste transversaliter fusco-striatis obtectum qui habitum pulchre zebrinum exhibent, insuper racemo subdeltoideo non secundo floribus spiraliter dispositis.

**Illustrations:** Baker (1869) in *Refugium Botanicum*, vol. 1, tab. 45 (Fig. 2); Fig. 5.

**Description.** Evergreen or deciduous bulbous plants. Bulb mostly solitary, occasionally growing in small clumps, hypogaeal, ovoid to spherical, 3.2–7 × 2.5–6.5 cm, with soft outer tunics that are pale and fleshy, ending in a long epigeal neck, up to 10 × 2 cm, covered with whitish open and sheathing membranous cataphylls bearing transversal sinuous ridges with their lower side pale to dark brown coloured, giving a zebra banding horizontal pattern; tunics fleshy, whitish, all reaching the top of the bulb, concentrically arranged. Roots fleshy, narrow, white, up to 90 × 2 mm. Leaves

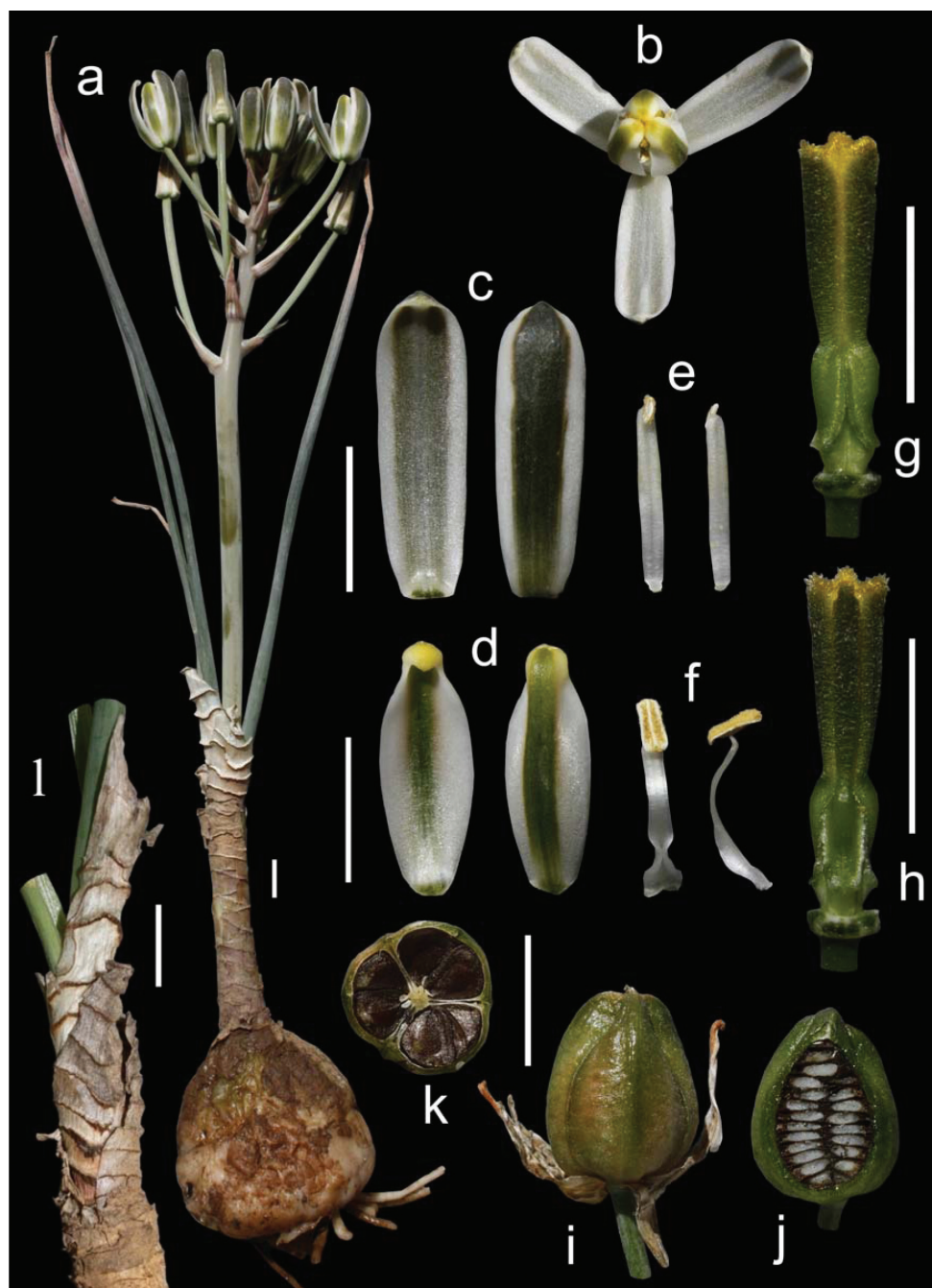


**Table 1.** Main diagnostic characters among *Albuca caudata*, *A. bakeri* and *A. batteniana*.

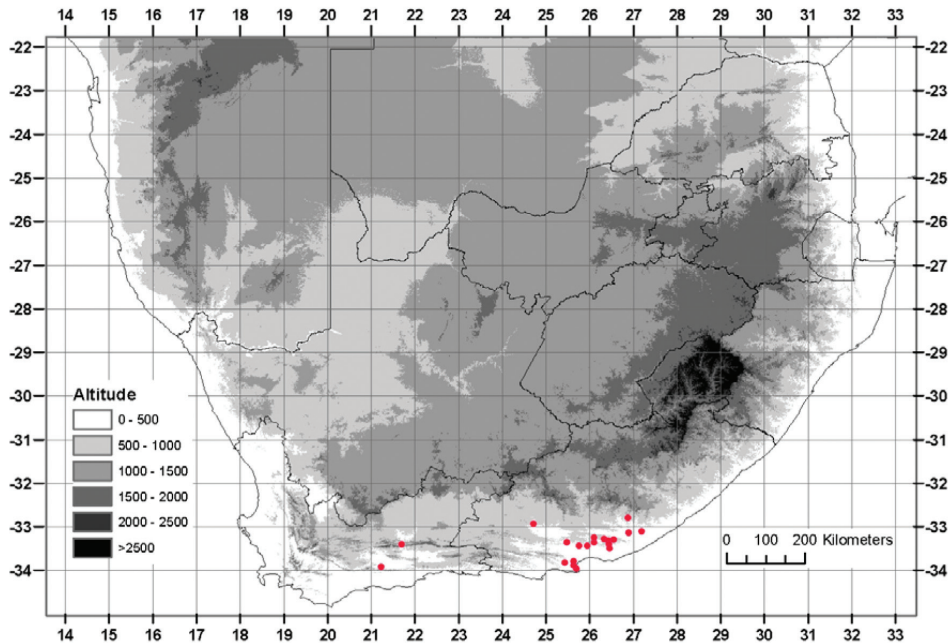
|                      | <i>A. caudata</i>  | <i>A. bakeri</i>   | <i>A. batteniana</i>                             |
|----------------------|--|--|--|
| <i>Bulb</i>          | Mostly solitary  | Mostly solitary  | Proliferous                                      |
|                      | Ovoid to oblong  | Ovoid to spherical   | Narrowly oblong                                  |
|                      | Outer tunics membranous, brown to grey                                     | Outer tunics fleshy, white to yellow                                     | Outer tunics somewhat coriaceous, green to brown |
|                      | Mostly hypogaeal   | Hypogaeal  | Mostly epigeal                                   |
|                      | Imbricate scales mostly ending at different heights                        | All scales reaching the top of the bulb                                  | Imbricate scales ending at different heights     |
|                      | Neck absent or short and thick, covered by brown to grey membranous scales | Neck long and thin, covered by transversally banded sheathing cataphylls | Neck usually absent                              |
| <i>Roots</i>         | Usually numerous, thick and tuberose                                       | Thin and scarce  | Thin or slightly thickened                       |
| <i>Leaves</i>        | Narrow, infolded and canaliculate  | Narrow, infolded and canaliculate  | Wide, flattened and usually recurved             |
| <i>Inflorescence</i> | Inclined and secund  | Erect and helicoidal   | Inclined and secund                              |
| <i>Outer tepals</i>  | 18–28 mm   | 19–23 mm   | 30–42 mm   |
| <i>Seeds</i>         | 5–6 × 4–5 mm   | 4–5 × 3–4 mm   | 5–7 × 4–5 mm                                     |

2–6, disposed in an apical rosette, linear-lanceolate to oblong, 9–40 × 0.4–1.3 cm, erect when young and later curving downwards, infolded, canaliculate, persistent or usually deciduous, pale bright green to glaucous, glabrous, usually minutely papillate on nerves and margins, exceptionally with long papillate margins. Inflorescence an erect raceme or subcorymb, 3–15 cm long; peduncle 9–22 cm long; pedicels helicoidally disposed, 3–7.5 cm long, longer at the base, up to 0.2–0.7 cm long near top, erect-patent; bracts ovate-lanceolate to triangular, long acuminate, 9–27 × 4–10 mm, papery white with brownish separated nerves that converge at the tips, much shorter than pedicels at least in the lower part of the inflorescence. Flowers erect; tepals white with a green median stripe 2–3 mm wide, sometimes with the tips yellowish; outer tepals lanceolate-oblong, 19–23 × 5–7 mm, with apex slightly cucullate; inner tepals ovate, 13–17 × 6–7 mm, with apex strongly cucullate. Stamens all six bearing fertile anthers; outer anthers 1.5–3 mm long, inner anthers 4–6 mm long; outer filaments 10–13.5 × 1.5–2 mm, linear lanceolate to narrowly oblong, not pinched down; inner filaments 10.5–14.5 × 2–3.5 mm, linear oblong, wider and pinched in the lower half. Ovary oblong to obovate, up to 6–7 × 2–3.5 mm, stipitate, with prominent paraseptal crests that are divergent in the lower part and form three prominent ridges; style subobpyramidal or clavate, trigonous, up to 7–11 × 3.5–4.5 mm, stigma yellowish green. Capsule ovate, 14–16 × 11–12 mm, trigonous to subsphaerical in section, pale-brown when mature; valves splitting in the upper quarter. Seeds flat, c. 4–5 × 3–4 mm, dark brown to black, flattened and semidiscoidal, biseriate and horizontally stacked in each locule. (Fig. 5)

**Flowering time.** July to September; capsules dehiscing at the end of September and November.



**Figure 5.** *Albuca bakeri* Mart.-Azorín & M.B. Crespo. North of Grahamstown, turn off to Kwandwe (holotype: M. Martínez-Azorín & A. Martínez-Soler 218 GRA) **a** Plant **b** Flower **c** Outer tepals **d** Inner tepals **e** Outer stamen **f** Inner stamen **g–h** Ovary, lateral views **i** Mature capsule **j** Capsule, longitudinal section **k** Capsule, transversal section **l** Bulb neck with membranous banded cataphylls. Scales 1 cm.



**Figure 6.** Known distribution of *A. bakeri* Mart.-Azorín & M.B. Crespo.

**Habitat.** *Albuca bakeri* is found growing singly in dry, stony, open ground at low altitude reaching c. 650 m.

**Distribution.** from Jansenville to Alice and the Keiskamma river in the Eastern Cape, with two outlying populations near Calitzdorp in the Western Cape karroo (Fig. 6).

**Diagnostic characters.** *Albuca bakeri* can be easily identified by its solitary hypogeal fleshy bulb ending in an epigeal neck, covered by whitish transversally banded membranous cataphylls, giving a conspicuous zebra banding pattern (Fig. 5). Moreover, its erect and helicoidal raceme with white and green erect flowers, and the smaller seeds (c.  $4-5 \times 3-4$  mm), separate it from *A. caudata*.

**Etymology.** Name honouring John Gilbert Baker (1834–1920), a leading expert on monocotyledons, who worked at the Royal Botanic Gardens, Kew, and was the keeper of the herbarium K.

**Relationships.** No other *Albuca* with erect flowers have been described with the characteristic long, thin, zebra banded bulb neck of *A. bakeri*. The closest species appears to be *A. caudata*, though the structure of the bulb and inflorescence clearly distinguish them (Table 1).

**Observations.** The peculiar zebra banded cataphylls of *A. bakeri* are similar to those found in some other groups of Hyacinthaceae. As pointed out by Müller-Doblies and Müller-Doblies (1981), zebrine cataphylls are present in evolutive distant taxa such as *Rhadamanthus fasciatus* B. Nord., *Tenicroa exuviata* (Jacq.) Speta (Urgineoideae), several species of *Ledebouria* Roth (Scilloideae), *Coilonox zebrinum* (Baker) Speta and some species of *Nicope* Raf. [= *Ornithogalum* sect. *Vaginaspasia* U. Müll.-Doblies

& D. Müll.-Doblies] (Ornithogaloideae). Moreover, *Stellarioides arida* (Oberm.) Speta and *Battandiera stapffii* (Schinz) Mart.-Azorín, M.B.Crespo & Juan show the neck of the bulb covered with membranose transversally banded cataphylls, indicating that the zebrine cataphylls could have evolved independently in at least five lineages of the Ornithogaloideae (e.g. *Albuca*, *Battandiera*, *Coilonox*, *Nicipe* and *Stellarioides*), possibly as a result of convergent evolution in dry climates of southern Africa.

Some morphological variation has been found within *A. bakeri*. Some individuals from Janseville and Port Elizabeth have a slightly setose bulb neck with the characteristic transversally banded membranous cataphylls of this species. Other specimens from Grahamstown and Port Elizabeth showed somewhat proliferous bulbs, resulting in a small clump of plants growing together, and with shorter scales not so markedly banded.

When Baker (1897) described and illustrated his concept of *A. caudata* (Fig. 2), he mentioned: “Bulb two to three inches thick, round or oblong, crowned as in the preceding [*A. fastigiata* Dryand.] with brown fibres. Leaves about a foot long, four lines broad, more rigid than in the preceding, clasping the stem at the base and more or less concave on the face upwards, and keeled on the back”. This description is vague and inaccurate, since the illustration he presented did not show “fibres” at all, and no specific comments on the transversal banding of the upper scales of the bulb were made. However, when Baker reconsidered *A. caudata* in later works, his previous concept was changed to “Bulbus globosus 2–3 poll. crassus viridis apice squamosus” (Baker 1872), or “bulb globose, 2–3 in. diam.; tunics not splitting into fibres at the top” (Baker 1897), or “Bulb globose, 2–3 in. diam.” (Baker 1898).

**Materials studied.** SOUTH AFRICA. Eastern Cape, Alexandria, 1½ miles east of Paterson, 1000 feet, 24.VIII.1953, *E.E.A. Archibald* 5972 (GRA); Eastern Cape, Alexandria, south-west end of Zuurkop, Addo National Park, 1000 feet, 23.IX.1953, *S.M. Johnson* 751 (GRA); Eastern Cape, Albany, 5 miles north of Alicedale, on Riebeck East road, 1500 feet, 21.IX.1954, *E.E.A. Archibald* 5638 (GRA); Victoria East: Alice, dry stony places on Sandilis Kop on north east side, 08.IX.1934, *M.H. Giffen* 614 (GRA); Victoria East: Alice, Sandilis Kop western side among grass, 13.IX.1935, *M.H. Giffen* 618 (GRA); Hillside, Gowie’s Kloof, Grahamstown, IX.1947, *Hill* s.n. (GRA); Grahamstown, West Hill, Pine plantation, VIII.1956, *V. van Niekerk* s.n. (GRA); Cradock road, Grahamstown, 01.IX.1945, *E. Barrat* 28 (GRA); In graminosis prope Grahamstown, *M. Daly* & *M. Sole* 316 (BOL); In graminosis prope Grahamstown, 2000 feet, VIII.1893, *Schonland* s.n. (NBG); Grahamstown (3326 BC): Ecce Reserve, south near old Queens Road/Quarry, 20.VIII.1992, *T. Dold* 153 (GRA); Leander Beacon, VIII.1943, *L. Miles* s.n. (GRA); Port Elizabeth, Summerstrand, grassy roadside, IX-X.1990, *H.J. Vanderplank* s.n. (GRA); Port Elizabeth (3325CD): 3 km south of Uitenhage towards van Stadens, 01.IV.1978, *P.L. Perry* 601 (NBG); Port Elizabeth (3325CB): Kirkwood District, farm Brakleegte, 300 m, 28.VIII.1985, *M.T. Hoffman* 1064, 1065 (NBG); *ibidem*, 14.IX.1985, *M.T. Hoffman* 1002 (NBG); Graaff-Reinet (3224DC): District Janseville, just south of Janseville (+/- 1 km) in municipal-owned land, 11.VIII.1985, *M.T. Hoffman* 1063 (NBG);

Ladismith (3321BC): Calitzdorp dam, 22.II.1981, *P.L. Perry* 1521 (NBG); Ladismith (3321CC): Sopieshoogte, north entrance to Garcia's Pass, Riversdale, 1600 feet, 15.IX.1981, *A. Fellingham* 149 (NBG); Eastern Cape, Grahamstown, hills above Botanic Garden, 591 m, 14.XI.2009, 33°19'04"S, 26°31'15"E, *M. Martínez-Azorín & A. Martínez-Soler* 12 (GRA); Eastern Cape, Grahamstown, Burnkraal, 649 m, 24.XI.2009, 33°16'40"S, 26°29'41"E, *M. Martínez-Azorín & A.P. Dold* 34 (GRA); Eastern Cape, Redhouse, thicket west of village, 6 m, 27.XI.2009, 33°50'01"S, 25°33'56"E, *M. Martínez-Azorín, A.P. Dold & A. Martínez-Soler* 44 (GRA); Eastern Cape, north of Grahamstown, Table Hill farm, 587 m, 11.XII.2009, 33°15'21"S, 26°27'17"E, *M. Martínez-Azorín & A.P. Dold* 83 (GRA); Eastern Cape, north of Grahamstown, on Cradock road turn off to Kwandwe, 594 m, 31.I.2010, 33°12'38"S, 26°24'07"E, *M. Martínez-Azorín, M.B. Crespo & A. Martínez-Soler* 118 (GRA); Eastern Cape, Quamnyana, between Breakfast Vlei and Commitees Drift, 411 m, 14.VIII.2010, 33°06'56"S, 22°55'57"E, *C. Peter* (GRA); *ibidem*, 27.VIII.2010, *M. Martínez-Azorín & A.P. Dold* 207 (GRA); Eastern Cape, Port Elizabeth, Settler's Park, 28 m, 03.IX.2010, 33°58'21"S, 25°36'09"E, *M. Martínez-Azorín & A.P. Dold* 210 (GRA); Eastern Cape, Grahamstown, Sunny side, Hillview street, 570 m, 07.IX.2010, 33°19'08"S, 26°32'00"E, *M. Martínez-Azorín & A. Martínez-Soler* 221 (GRA); Eastern Cape, Alicedale, railway cross to Burchell Game Reserve, 288 m, 14.IX.2010, 33°18'51"S, 26°06'01"E, *M. Martínez-Azorín & A. Martínez-Soler* 226 (GRA); Eastern Cape, Alice, Fort Hare University, Sandili's Kop, 582 m, 17.IX.2010, 32°47'02"S, 26°51'38"E, *M. Martínez-Azorín & A. Martínez-Soler* 235 (GRA); Eastern Cape, Keiskamma River, Linedrift, 141 m, 12.XI.2010, 33°04'29"S, 27°13'02"E, *M. Martínez-Azorín, A.P. Dold & A. Martínez-Soler* 525 (GRA).

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# A new Australian species of *Luffa* (Cucurbitaceae) and typification of two Australian *Cucumis* names, all based on specimens collected by Ferdinand Mueller in 1856

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## Abstract

As a result of his botanical explorations in northern Australia, Ferdinand von Mueller named several Cucurbitaceae that molecular data now show to be distinct, requiring their resurrection from unjustified synonymy. We here describe and illustrate *Luffa saccata* F. Muell. ex I. Telford, validating a manuscript name listed under *L. graveolens* Roxb. since 1859, and we lectotypify *Cucumis picrocarpus* F. Muell. and *C. jucundus* F. Muell. The lectotype of the name *C. jucundus*, a synonym of *C. melo*, is mounted on the same sheet as the lectotype of *C. picrocarpus*, which is the sister species of the cultivated *C. melo* as shown in a recent publication.

## Keywords

Ferdinand Mueller, melon, wild relatives, *Cucumis picrocarpus*, *Cucumis jucundus*, *Luffa saccata*, lectotypification

## Introduction

Ferdinand von Mueller (1825–1896) was the botanist on the North Australian Exploring Expedition that in 1855 and 1856 explored North Australia under the command of A. C. Gregory (Gregory 1858; maps of the expedition are available at <http://nla.gov.au/nla.map-rm2807>). In mid-September 1855, the expedition's two ships reached the

mouth of the Victoria River, and the explorers then spent eight months exploring the surrounding country. They started their return journey on 21 June 1856. Mueller is not known to have visited the Northern Territory again later (see Orchard 1999, and literature cited there), and although many of his specimens are undated they can be associated with confidence with the North Australian Exploring Expedition on the basis of the locality data.

Many new taxa were collected on that expedition, including two new species of melon described as *Cucumis jucundus* F. Muell. and *C. picrocarpus* F. Muell. (Mueller 1859). Both names were subsumed into *C. trigonus* Roxb. by Bentham (1866), who however noted that they might be forms of *C. melo* L. In 1993 (pp. 104 and 114), Kirkbride included both as synonyms under *C. melo* without assigning them to a definite infraspecific taxon. Some of the specimens in CANB and MEL thus referred to *C. melo* had earlier (in 1986) been annotated by Charles Jeffrey as *C. melo* subsp. nov., and Kirkbride (1993) also commented on the Australian material's polymorphism in the degree of leaf dissection and the indumentum of the hypanthium of female flowers.

A phylogenetic reconstruction of *Cucumis* that includes over 100 accessions from Asia and Australia now indicates that some of the Australian material previously referred to *C. melo* constitutes distinct species (Sebastian et al. 2010). The molecular data show that Australia harbors seven native species of *Cucumis*, five of them new to science and described elsewhere (Telford et al. 2011). Examination of Mueller's collections and protologues indicates that Mueller's name *C. picrocarpus* applies to the Australian sister species of the worldwide crop *C. melo* (and its wild progenitor forms native in India), while Mueller's *C. jucundus* is a synonym of *C. melo*. The possible importance to plant breeders of this Australian sister to *C. melo* makes it expedient to designate the types of Mueller's Australian *Cucumis* names, a task carried out here.

Ongoing molecular-phylogenetic work on *Luffa* vindicates another of Mueller's suspected new species, this one never formally described by him. Like the two melon species, he discovered it in the Victoria River region, and there are at least two specimens labeled by Mueller as '*Luffa saccata*.' Mueller's manuscript name was listed as a synonym under *L. graveolens* Roxb. by Naudin (1859), a famed Cucurbitaceae specialist, with the result that Mueller's name went unnoticed for the next 150 years. *Luffa graveolens* occurs in India, Nepal, Bangladesh, and Burma, and is morphologically distinct from the Australian species. We here validate the name *L. saccata*, describe the morphological differences between *L. graveolens* and *L. saccata*, and provide illustrations.

## Taxonomic results and discussion

### Emended lectotypification of *Cucumis jucundus*:

***Cucumis jucundus*** F. Muell., *Trans. Philos. Inst. Victoria* 3: 45 (1859) as 'jucunda'.

Lectotype (designated here): AUSTRALIA. Northern Territory: Victoria River, undated, *F. Mueller* (K000634446!, p.p., excluding upper stem with fruit attached;

isolectotypes: Same locality, undated, GH000312219! [as '*Cucurbita jucunda*'], K000634445!, MEL000592946! [as '*Cucurbita jucunda*']. A second sheet at GH from "Depot Creek" and one at MEL000592947 from "Victoria River, Depot Creek" are possible further isolectotypes.

Kirkbride (1993) designated a sheet in the Kew Herbarium (now K000634446; our Fig. 1) as 'neotype' of *Cucumis jucundus* and another one (now K000634445) as 'neoisotype' [sic]. In fact, the material on K000634446 represents two species, *C. jucundus* and *C. picrocarpus*, both discovered by Mueller during the North Australian Exploring Expedition and described by him (Mueller 1859) on the basis of his own collections. Kirkbride's 'neotype' thus comprises original material for both *C. jucundus* and *C. picrocarpus*. Under the Vienna Code (McNeill et al. 2006: Art. 9.8), the term neotype is, in such cases, correctable to lectotype. However, the sheet referred to by Kirkbride is not a specimen as defined in the Code (Art. 8.2), because it does not consist of 'a single species'. A "second stage lectotypification" as provided for in Art. 9.12 is therefore necessary, to ensure that the name *Cucumis jucundus* F. Muell. remains attached to those plant parts on K000634446 that "correspond most nearly with the original description or diagnosis." At least five other sheets annotated by Mueller as *Cucumis jucundus* or *Cucurbita jucunda* and coming from different collecting localities (without collecting dates) are kept at MEL, the herbarium of Mueller's home institution, and the protologue statement about the geographic range of *C. jucundus* is accordingly broad: 'In Arnhem's Land and on the Gulf of Carpentaria, particularly on the banks of rivers, also in eastern tropical Australia, and in Central Australia observed with certainty as far south as Cooper's River' (Mueller 1859: 45). The sheet MEL000592946, with male flowers, was collected at 'Victoria River' and is undoubtedly a duplicate of our lectotype, same as one of the two specimens kept at GH. A second sheet at GH from "Depot Creek" and one at MEL from "Victoria River, Depot Creek" are possible further isolectotypes.

### Lectotypification of *Cucumis picrocarpus*:

***Cucumis picrocarpus*** F. Muell., *Trans. Philos. Inst. Victoria* 3: 46 (1859), as '*picrocarpa*'.

Lectotype (designated here): AUSTRALIA. Northern Territory: Victoria River, undated, *F. Mueller* (K000634697!, p.p., upper stem on sheet, with fruit attached, excluding lower stems).

The upper stem on the sheet K000634697 (our Fig. 1), with an attached fruit, is the only extant specimen of *C. picrocarpus* known to have been collected prior to publication of the name. Neither a specimen annotated as *C. 'picrocarpa'* by Mueller nor any other original material has been located in MEL. There is thus no option than designating K000634697 as lectotype. The specimen exhibits the deeply lobed leaves and fruit indumentum described in Mueller's protologue, which does not cite a specimen, only a distributional statement: 'In many parts of tropical Australia' (Mueller 1859: 46). Ac-



**Figure 1.** The Kew sheet K000634697 and K000634446 with the mixed collection of two species of *Cucumis* collected by Ferdinand von Mueller in Australia. The stem with the deeply lobed yellowish leaves and the attached fruit is the lectotype of *Cucumis picrocarpus* F. Muell., while the branch with the more green and much less lobed leaves is the lectotype of *Cucumis jucundus* F. Muell.



cording to label information on K000634697, Mueller's plant was collected in the Victoria River region, where *C. picrocarpus* grows sympatrically with feral forms of *C. melo*, also collected there by Mueller and annotated by him as *Cucurbita jucunda* or *Cucumis jucundus* (compare our first lectotypification, above). An emended description of *C. picrocarpus*, a distribution map, and an illustration are provided in Telford et al. (2011).

### Description of *Luffa saccata*:

#### *Luffa saccata* F. Muell. ex I. Telford sp. nov.

urn:lsid:ipni.org:names:77112771-1

[http://species-id.net/wiki/Luffa\\_saccata](http://species-id.net/wiki/Luffa_saccata)

**Holotype.** AUSTRALIA. Northern Territory: Baines Creek [=Baines River, a tributary of the Victoria River], May 1856, *F. Mueller* (MEL000593093!), the fragment pocket contains three seeds; isotypes: K000634638, K000634639, K000634640, the latter with a tag in Mueller's handwriting '*Luffa saccata* Ferd. Mueller. Tropical Australia. Victoria River. May 1856').

*A Luffa graveolente* floribus masculis longe pedicellatis in racemo elongato dispositis (nec brevissime pedicellatis subfasciculatis) et pedicellis fructiferis quam 15 mm brevioribus (nec plusquam 15 mm longis) differt. Our Figs. 2 and 3.

Trailing or climbing annual herb, monoecious; stems to 7 m long, 2–3 mm diam., ± glabrous, ribbed. Tendrils 3–5-branched, the stem 4.5–8 cm long, branches 5–9 cm long. Leaves: petiole 1.5–6.5 cm long; lamina ovate to broadly ovate in outline, 3–14 cm long, 2.5–13 cm wide, with 3 or 5 broad rounded or obtuse lobes, the lobes crenate, base cordate with the sinus wide, apex acute, hispid on both surfaces. Inflorescences usually unisexual, rarely with male and female flowers. Male flowers in elongate racemes, rarely solitary; racemes 10–16-flowered, 3–10(–30) cm long; peduncles 1.5–12 cm long; bracts ovate, 2–3 mm long, glandular; pedicels of racemose inflorescences 5–20 mm long, of solitary flowers 8–64 mm long; hypanthium broadly campanulate, 2–3 mm long; calyx lobes 5, triangular, 4–10 mm long, puberulous abaxially; corolla lobes 5, ovate–broadly spatulate, 12–20 mm long, ± glabrous, yellow; stamens 3, inserted towards the base of the hypanthium; anthers one 1-theous, two 2-theous, flexuose; disc absent. Female flowers: solitary, sometimes paired in axils; pedicels 3–15(–20) mm long; ovary ovoid, 8–12 mm long, long-attenuate, pilose, shortly echinate; hypanthium above the constriction and perianth similar to male; staminodes 3; style c. 3 mm long; stigmas 3, 2-lobed, c. 2 mm long. Fruit ovoid, 2.5–4.5 cm long, 2–4 cm diam., glabrescent, echinate, many-seeded, dehiscing by an apical operculum; fruiting pedicel 2–15(–20) mm long. Seeds elliptic, 7–8 mm long, 4–5 mm wide, smooth or slightly rugose, dark brown mottled black, the margin narrowly winged.

**Representative specimens examined.** AUSTRALIA. Western Australia: Fitzroy River floodplain, river road from Minnie River bridge to Udialla homestead, 27 Apr.

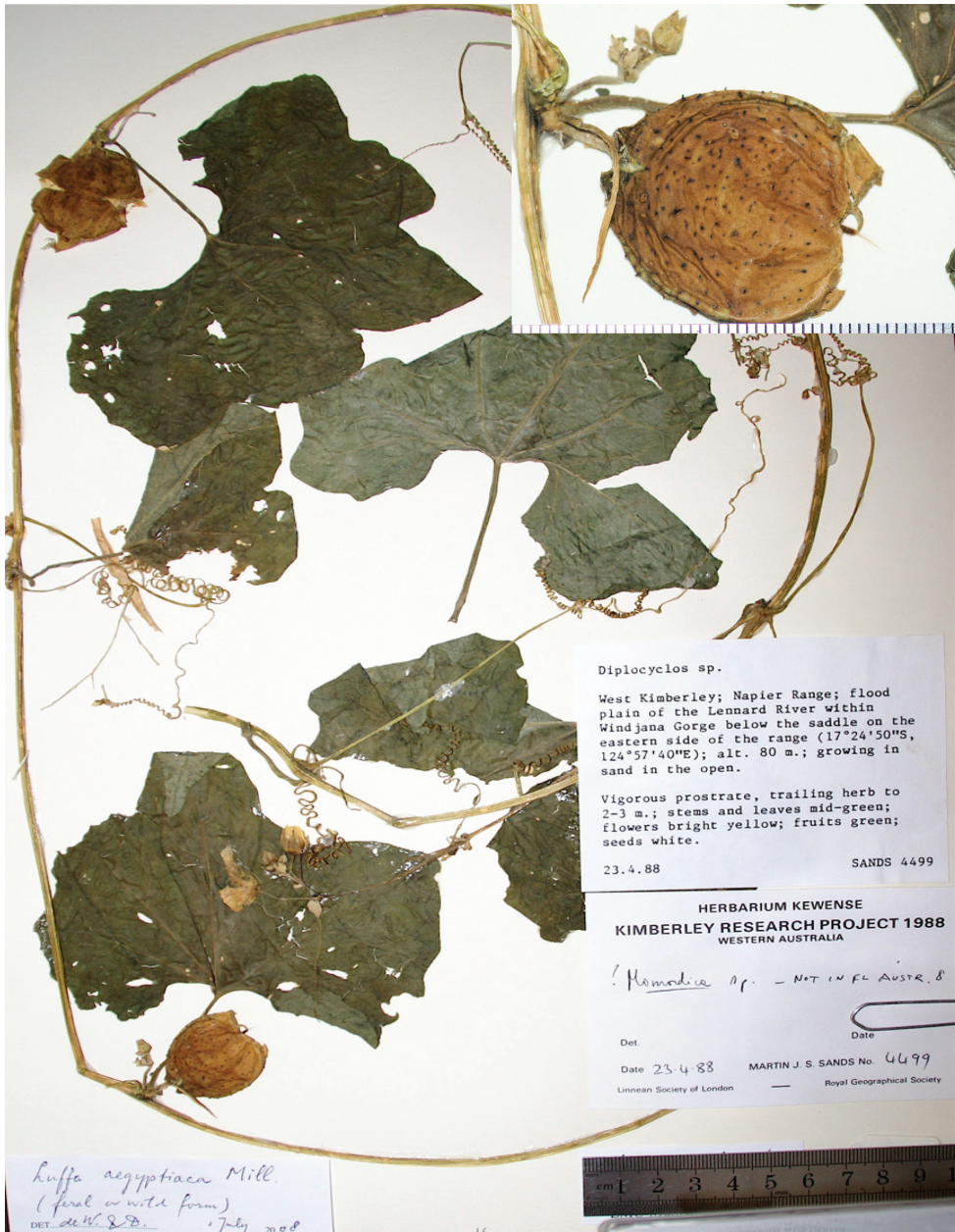


**Figure 2.** **a** Habit of *Luffa saccata* F.Muell. ex I.Telford **b** Old fruits. Photos taken near the type locality, Gregory National Park, Northern Territory, by A. Rodd.

1993, *A.A. Mitchell* 3040 (CANB); Geikie Gorge, mouth of gorge, 14 May, 1992, *I.R. Telford* 11721 (CANB); Napier Range, flood plain of Lennard River within Windjana Gorge, 23 Apr. 1988, *M.J.S. Sands* 4499 (K, L, PERTH); Napier Range, Tunnel Creek, 8 Apr. 1988, *C.R. Dunlop* 7757 (BRI, DNA); c. 2 km SW of Crystal Heads, *A.A. Mitchell* 3352 (CANB, PERTH); Mitchell River Falls, Mitchell Plateau, 22 Jan. 1982, *K.F. Kenneally* 7896 (BRI, PERTH); Lower Ord River, 4 km W of Tarara Bar, 6 July 1994, *K.F. Kenneally* 11519 (CANB, PERTH); Ord River, *C.R. Dunlop*, seeds cultivated at Bloomington University, *C.B. Heiser* 1979 (IU). Northern Territory: Victoria River, 12 km W of Timber Creek, 14 Jul. 1977, *J. Must* 1630 (BRI, CANB, DNA, NT); Lejeune Station, Barramundi Dam, 21 Feb. 1994, *G.J. Leach* 4086 (BRI, DNA); Wickham River, *J. Russell-Smith* 7752 & *D.E. Lucas* (BRI, CANB, DNA); McArthur River area, sandstone plateau above Glyde River, 17 Feb. 1977, *L.A. Craven* 3898 (CANB, DNA).

**Distribution.** Widespread in the Kimberley, Western Australia and the adjacent north-western Northern Territory, with a disjunction to the McArthur River area of the Northern Territory. Australia's Virtual Herbarium (<http://avh.rbq.vic.gov.au/avh/>





**Figure 3.** Typical herbarium specimens of *Luffa saccata*: Sands 4499 (L).

accessed 23 March 2011) provides locations for some 50 collections in Australian herbaria, still under the name *Luffa graveolens*.

**Habitat.** *Luffa saccata* grows in riverine or littoral habitats on sand or clay, sometimes on rocky ridges of limestone or sandstone to 300 m of altitude. Associated species recorded include *Eucalyptus camaldulensis*, *Melaleuca leucadendra* and *Barringtonia*

*acutangula* in gallery forest or woodland, and *Eucalyptus miniata*, *Adansonia gregorii*, *Brachychiton* spp. and *Triodia* spp. on ridges and littoral *Cenchrus* grassland.

**Phenology.** Flowers and fruits March to October.

**Conservation Status.** The species is widespread and common, and we therefore do not consider it at risk. Conserved in Mitchell River and Bungle Bungle National Parks in Western Australia and Gregory National Park in the Northern Territory.

**Etymology.** From Latin *saccatus*, bag-like, obviously in reference to the fruit (Figs 2, 3).

**Notes.** The MEL holotype has two labels in Mueller's handwriting, one with '*Luffa saccata* Baines Creek, May 1856', the other with '*L. graveolens*, Tributaries of the Victoria River, N.W. Australia, May 1856,' the latter obviously attached after communication with, or reading of, Naudin (1859). It is surprising that Naudin failed to accept Mueller's Australian *Luffa* as a good species, since C.B. Clarke (1832–1906), who knew the Indian cucurbits well, made a note on one of the three Kew specimen, saying 'not near [*Luffa*] *graveolens* which has the males [male flowers] on very short subfasciculate pedicels.' This is indeed one of the differences between the Indian and the Australian species, the latter having the male flowers mostly in elongate racemes. Detailed measurements of living Indian *L. graveolens* plants, black and white photos, and observations on their chromosome numbers are contained in Dutt and Roy (1969, 1971).

No material of *Luffa graveolens* from India is held in the following major herbaria: CGE, E, GH, L, MO, NY, US. This lack of material in western herbaria probably contributed to the Indian and Australian species having been confused for so long. The confusion also affected a recent treatment of Cucurbitaceae in the *Flora Malesiana* series (De Wilde and Duyfjes 2010), which states that *Luffa aegyptiaca* forma *sylvestris* (Miq.) W.J.de Wilde & Duyfjes is common in Australia (and elsewhere) and comprises "all wild-growing and naturalized small-fruited feral forms" of *Luffa*. Several Australian specimens of *Luffa saccata*, such as Sands 4499 (Fig. 3), thus are annotated as *Luffa aegyptiaca* forma *sylvestris*. The *Luffa* specialist C.B. Heiser, on the other hand, cultivated both Australian species, *L. aegyptiaca* and *L. saccata* (under the name *L. graveolens*), and distinguished them without hesitation (Heiser and Schilling 1988).

## Acknowledgements

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# ***Psoralea margaretiflora* (Psoraleeae, Fabaceae): A new species from the Sneeuwgberg Centre of Floristic Endemism, Eastern Cape, South Africa**

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## **Abstract**

A new species of *Psoralea* is described. *Psoralea margaretiflora* C.H. Stirton & V.R. Clark is endemic to the Sneeuwgberg Centre of Floristic Endemism, Eastern Cape, South Africa. This resprouter is characterised by its small greenish-white flowers with a small trifid purple nectar patch and translucent veins; 5(–7)-pinnate leaflets; multi-branching erect short seasonal flowering shoots; and tall habit of many stiff bare stems with the seasonal shoots massed at the apex. It is most similar to *P. oligophylla* Eckl. & Zeyh., a widespread species found in the Eastern Cape. The reseeded *P. oligophylla* differs in its lax virgate spreading habit with numerous long glaucous seasonal shoots; single stem, 1(–3)-glaucous leaflets; more numerous white flowers; and standard petals with a purple ring surrounding a bright yellow nectar patch.

## **Keywords**

Eastern Cape, endemic, Fabaceae, Great Escarpment, Leguminosae, new species, Psoraleeae, *Psoralea*, Sneeuwgberg Centre, South Africa, taxonomy

## Introduction

There are eight species of *Psoralea* L. in eastern and south-eastern South Africa. Although well-collected and well-represented in herbaria, the known species names are mostly misapplied. These *Psoralea* species are quite variable and are now in much need of revision following Forbes' (1930) original treatment. *P. margaretiflora* – the new species described here – was not seen by Miss Helena Forbes, and occurs in the Sneeu-berg, in the Eastern Cape Province of South Africa. The Sneeu-berg was designated the Sneeu-berg Centre of Floristic Endemism by Clark et al. (2009), and *P. margaretiflora* is the latest addition to a suite of ca. 28 endemics (Goldblatt and Manning 2007, Clark et al. 2009, Nordenstam et al. 2009) known from there.

## Species treatment

***Psoralea margaretiflora* C.H. Stirton & V.R. Clark sp. nov.**

urn:lsid:ipni.org:names:77112772-1

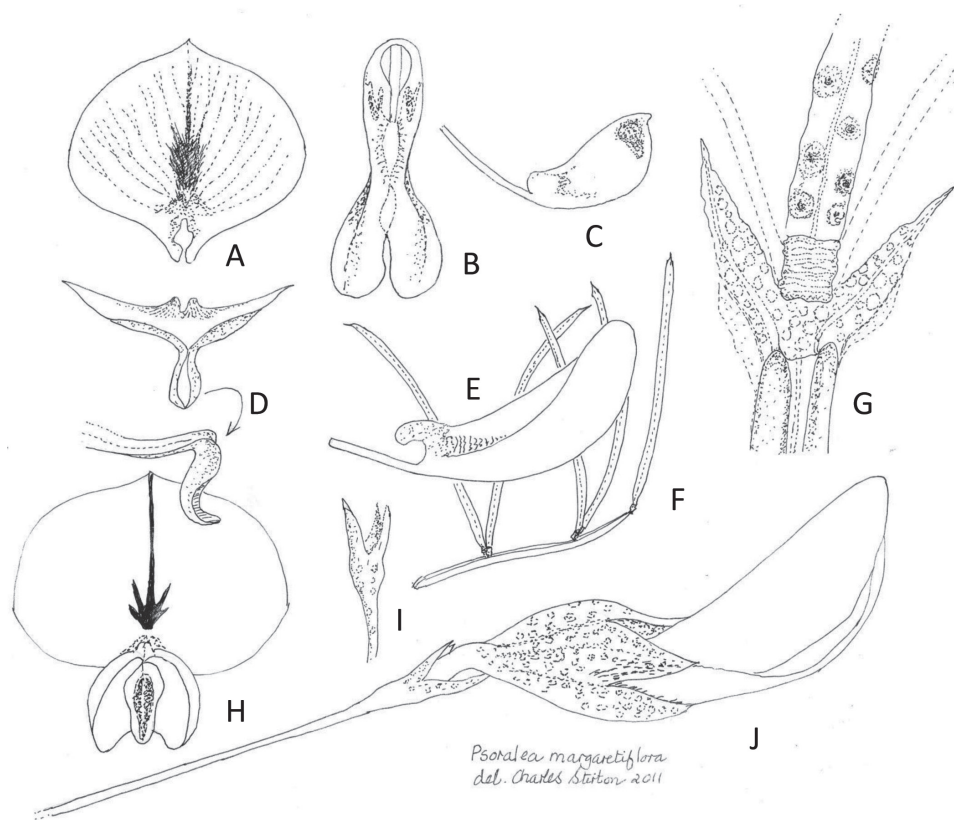
[http://species-id.net/wiki/Psoralea\\_margaretiflora](http://species-id.net/wiki/Psoralea_margaretiflora)

Figs 1, 2; Plate 1

*Psoralea oligophylla* Eckl. & Zeyh. affinis, sed floribus parvis viridi-albis, cum macula nectarifera purpurea trifida, venis petalorum translucentibus; foliolis 5(–7)-pinnatis; brachyblastis floriferis vernalis brevibus erectis ramosis; habitu repullulanti caulibus nudis rigidis elatis multis, brachyblastis ad apicem acervulatis differt.

**Type.** South Africa: Eastern Cape: Graaff-Reinet Dist., Farm 360, Petersburg, Asante Sana Private Game Reserve, Suurkloof in the Sneeu-berg mountains, 32°16'20"S 25°00'05"E (3225AC), Afro-montane shrubland on lower slopes, 1 400 m, March 2008, V.R. Clark & I. Crause 4 (holotype: GRA!; isotypes: BOL! K! NBG! NSW! PRE! S!).

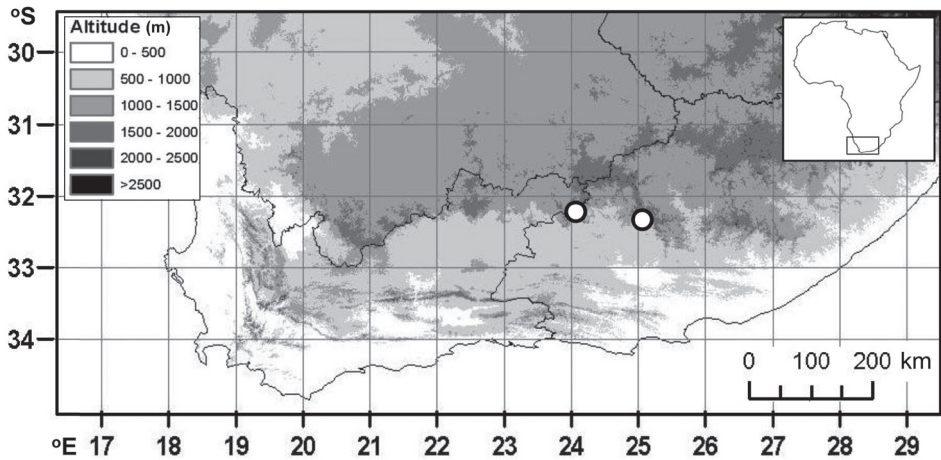
**Description.** Erect resprouter, up to 2 m. Stems 1–30, bare except for seasonal shoots in the upper axils; greyish-brown, covered in white storied lenticels; young seasonal shoots bright green, glabrous, glandular; shoots produced seasonally on old stems, leafy along entire length. Stipules 2–3 (4) mm long, rigid, triangular, semi-patent; longer, green and arching on water shoots; rapidly senescent on flowering shoots. Leaves 7-foliolate at base of each seasonal shoot, 5-foliolate thereafter, glabrous. Leaf size variable, larger (48–55 mm long, 48–60 mm wide) on water shoots from the root-stock; petiole 2–3 (17) mm long. Leaflets of variable length in a leaf; basal pair longest (25–33 mm long), mid-pair shortest (19–26 mm long), and terminal leaflet second longest (18–31 mm long); all 1.0–1.3 mm wide; glabrous, dark green; apex acuminate, base rounded. Peduncles (10) 15–17 mm long, terminated by a tri-toothed cupulum; lower tooth longest, acuminate, upper two teeth fused for half their length; yellowish, rapidly senescent, 1.0–1.2 mm long; pedicels 1–2 mm long. Flowers 10–12 mm long, greenish white, borne 1–5 in leaf axils along flowering shoot. Standard broadly elliptic, 10 mm long, 8 mm wide, claw 3 mm long; greenish-white, nectar flash purple, trifid



**Figure 1.** *Psoralea margaretiflora* C.H. Stirton & V.R. Clark **A** Standard petal - abaxial view (x9) **B** wing and keel petals viewed abaxially showing androecial fenestration at the base (x9) **C** keel petal (x9) **D** standard petal: abaxial and side views in reflexed position, showing raised callosities at the base above the claw (x9) **E** wing petal (x11) **F** leaf from seasonal shoot (x3.5) **G** paired stipules fused across their base (x30) **H** flower viewed from the front (x10) **I** trifid cupulum (x14) **J** flower subtended by a filiform peduncle terminating in a trifid cupulum of fused bracts (x14). Line drawing by Charles Stirton from voucher V.R. Clark, C.H. Stirton, & P. Weston 91 (GRA).

above the strongly developed auricles. *Calyx* 5–6 mm long, pale green, glabrous on outside, finely black-haired on inner face of teeth, tube glabrous; teeth and tube equal, teeth triangular, all 3 mm long, carinal tooth cucullate at apex; ribbed, glandular. *Wing petals* 9–10 mm long, 4 mm wide, claw 3 mm long; locked into keel but not fused; longer than the keel; petal sculpturing present, upper basal, comprising 7–8 transcostal parallel lamellae. Keel petals 6 mm long, 3 mm wide, claw 5 mm long, apex deep purple. *Androecium* 9 mm long; tenth stamen free; sheath split adaxially, fenestrate. *Pistil* 9 mm long; ovary 1.5 mm long, stipitate, glabrous; thickened at point of flexure, height of curvature 2 mm, erect, penicillate. *Fruits* and seeds unknown.

**Discussion.** *Psoralea margaretiflora* is characterised by its small greenish white flowers with a small trifid purple nectar patch and translucent veins; 5(–7)- pinnate



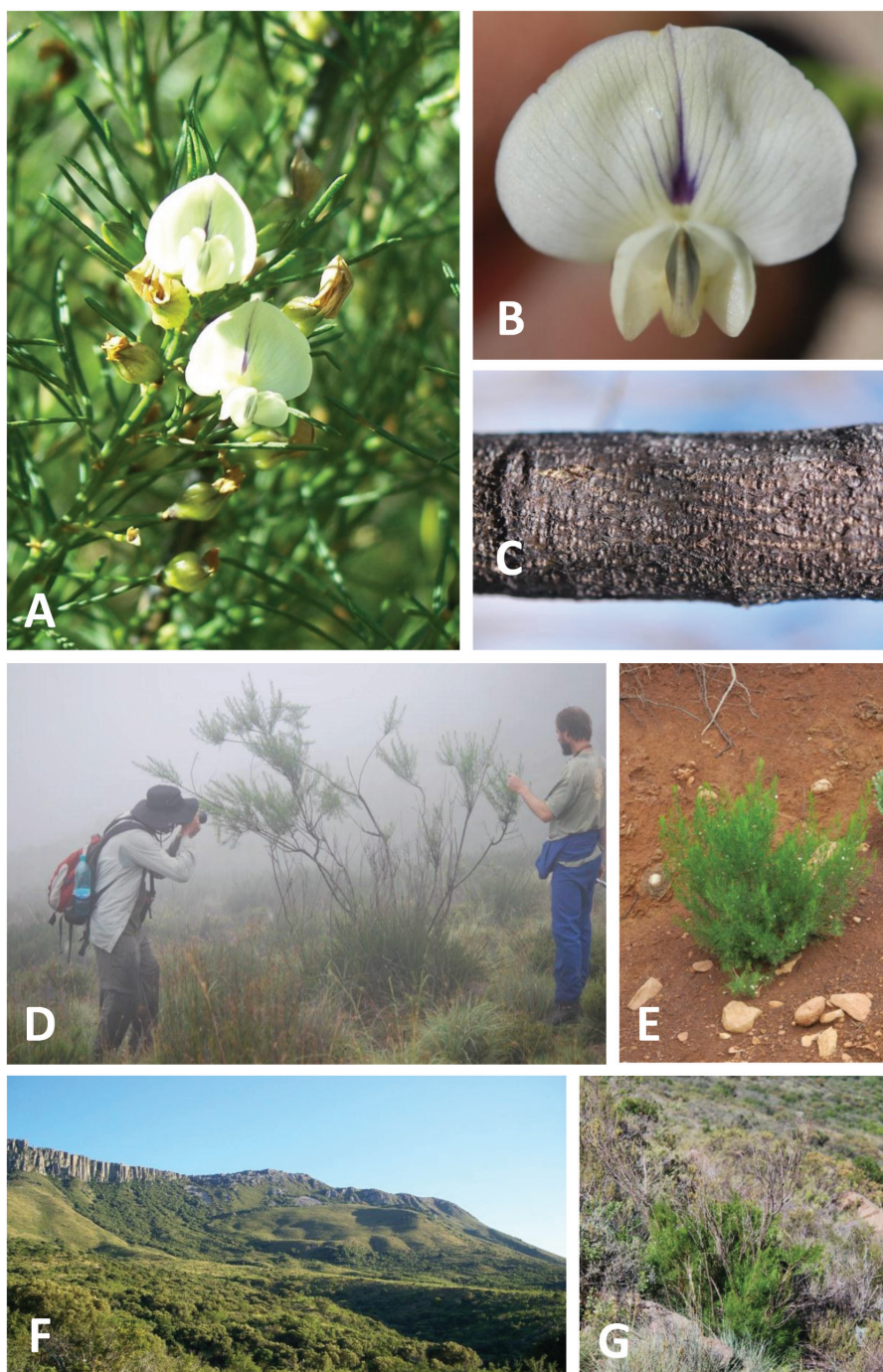
**Figure 2.** Distribution of *Psoralea margaretiflora* C.H. Stirton, & V.R. Clark.

leaves; erect multi-branching short seasonal flowering shoots and tall habit of many stiff bare stems with the seasonal shoots burst-branching from the apex. It is most similar to *P. oligophylla* Eckl. & Zeyh., a widespread species found in the Eastern Cape. *P. oligophylla*, a reseeder, differs in its lax virgate spreading habit with numerous long glaucous seasonal shoots; single stem; 1–3-foliolate glaucous leaves; more numerous white flowers; and standard petals with a purple ring surrounding bright yellow nectar patch.

Two other species occur in the Eastern Cape that might be confused with *P. margaretiflora*: *P. glabra* Harv. and *P. latifolia* (Harv.) C.H.Stirt. The four species can be distinguished as follows:

- 1a Flowers white or greenish white; standard petal without large white V-shaped nectar patch, veins either translucent or pale violet; wing petals white; calyx glabrous, glaucous or pale green; stipules triangular, flat, erect to semi-patent, not prominent or persistent on old shoots; shrubs up to 3 m tall with many rigid branchless stems bearing clusters of seasonal flowering shoots radiating either terminally from stems or along older shoots giving a broom-like appearance.....**2**
- 1b Flowers mauve or purple; standard petal with large white V-shaped nectar patch, veins purple; wing petals mauve or purple; calyx variously hairy, dark green or purplish; stipules subulate, swollen, recurved, woody and persistent on old shoots; shrubs or small trees from 3–3.5 m tall with erect leafy stems and short seasonal shoots, not broom-like in appearance .....**3**
- 2a Robust woody shrubs up to 2 m tall with stiff erect habit; young seasonal shoots erect, upcurving, bright green; 7-foliolate at the base of seasonal shoot, 5-foliolate thereafter; flowers 2–3 per axil; nectar guide of trifid violet flashes above the strongly developed auricles, veins translucent .... *P. margaretiflora*





**Plate I.** *Psoralea margaretiflora* C.H. Stirton & V.R. Clark **A** Flowers **B** flower, face view **C** main stem wood **D** mature plant **E** coppicing plant in bare ground **F** typical mountain habitat (in this case Goewermentsberg, Kamdebooberge) **G** coppicing plant in mature vegetation. Photos A & F by Ralph Clark; B – E, & G by Charles Stirton.

- 2b Slender woody shrubs to 3m tall with lax virgate untidy spreading habit; young seasonal shoots arching, glaucous; 3-foliolate at the base of seasonal shoot, 1(3)-foliolate thereafter; flowers 1 (2) per axil; nectar guide bright yellow with very small white V-shaped apex surrounded by violet flashes, veins violet..... *P. oligophylla*
- 3a Reseeder; flowers as long as or shorter than the subtending leaflets; leaflets dark green, flattish, 1.5–4.5 mm wide; calyx hairy ..... *P. latifolia*
- 3b Resprouter; flowers longer than the subtending leaflets; leaflets yellowish green, somewhat canaliculate, less than 1 mm wide; calyx sparsely hairy.....  
..... *P. glabra*

**Distribution and ecology.** *P. margaretiflora* is abundant on the lower and mid-Escarpment slopes (1 200–1 800 m) of the Sneeuberg, Graaff-Reinet District, being concentrated on the Kamdebooberge, Koudeveldberge and Toorberg in the west, and from the Nardousberg to Aasvoëlkrans (behind Pearston) in the east. *P. margaretiflora* can form dense stands, and is a typical component of riparian thicket/bush vegetation along streams, but is not restricted to such habitats. The vegetation types of which this species inhabits are difficult to classify. It occurs variously in Karoo Escarpment Grassland / “Afro-montane Grassland” verging into Mountain Fynbos, and also occurs in closed *Otholobium macradenium* shrubland. The plant grows primarily on rich turf soils and colluvium associated with dolerite. On the Boschberg – the eastern, wetter end of the Sneeuberg – *P. margaretiflora* is replaced by *P. glabra*.

Flowering takes place between October and January but can occur as late as April.

**Etymology.** The plant name alludes to the appearance of its pearl white flowers as seen in early morning mountain mist and is derived from *margaritaceus* (L) = pearl-like.

**Other specimens examined.** South Africa: Eastern Cape: Graaff-Reinet Dist.:

Petersburg, Asante Sana Private Game Reserve, Suurkloof in the Sneeuberg, ca. 32°16'S 25°00'E (3225AC), thicket-shrubland on lower slopes, 1 300 m, December 2005, V.R. Clark & G. Coombs 101 (GRA! PRE!).

Farm Stockdale 387, Sneeuberg, in upper reaches of Naudeshoekspruit valley, 32°26'19"S 25°14'56"E (3225AD), montane riparian shrubland, 1 461 m, October 2006, V.R. Clark & S. Ramdhani 197 (GRA!).

Farm Onbedacht 294, eastern slopes of Koudeveldberge (Sneeuberg), 32°10'14"S 24°03'06"E (3224AA), Afro-montane grassland-shrubland, 1 600–1 800 m, November 2006, V.R. Clark & T. Te Water Naudé 140 (GRA!).

Farm Buffelshoek 25, Sneeuberg, lower slopes west of Aasvoëlkrans, 32°26'6"S 25°12'3"E (3225AC), along watercourse in kloof in *Olea europaea* riparian thicket, 1 204 m, November 2007, V.R. Clark & M.C. Rose 20 (GRA!).

Farm Onbedacht 294, Koudeveldberge (Sneeuberg), 32°11'S 24°03"E (3224AA), afro-montane shrubland along stream, 1 600 m, December 2007, V.R. Clark & C. Pienaar 369 (GRA!).



- Farm Oaklands 104, mid- and lower slopes of Goewermentsberg, Kamdebooberge, 32°21'15"S 23°53'27"E (3223BD), Afro-montane grassland-fynbos-shrubland, 1 421 m, April 2008, *V.R. Clark & I. Crause 140* (BOL! GRA! PRE!).
- Farm Oaklands 104, lower slopes of Goewermentsberg, Kamdebooberge, 32°20'58"S 23°54'31"E (3223BD), Afro-montane grassland-fynbos-shrubland, 1 283 m, December 2008, *V.R. Clark & C. Cloete 1* (BOL! GRA! K! NSW! PRE!).
- Plaas 96, Kamdebooberge, 32°23'35"S 23°50'35"E (3223BD), upper slopes of mountain in shrubland, January 2011, *V.R. Clark, C.H. Stirton & P. Weston 2* (BOL! GRA! K! NSW! PRE!).
- Farm Oaklands 104, mid-slopes of Goewermentsberg, Kamdebooberge, 32°21'15"S 23°53'27"E (3223BD), Afro-montane grassland—fynbos-shrubland, 1 421 m, January 2011, *V.R. Clark, C.H. Stirton & P. Weston 91* (BOL! GRA! K! NSW! PRE!).

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*Psoralea margaretiflora* was first encountered by VRC during fieldwork for his PhD. Many thanks are thus extended to Richard & Kitty Viljoen (Asante Sana), Geoff Kroon (Onbedacht), Koos & Suzanne Lategan (Waterkloof), Oom Pen & Mev. Marx (The Ranges), the Glennies (Stockdale), Kevin and Cathy Robertson, and Etienne & Barbara Hiscock (Buffelshoek) for warm Karoo hospitality and permissions to collect on their farms. Many thanks also to the field assistants on these expeditions – Gareth Coombs, Ivan Crause, Theo Te Water Naudé, Matthew Rose, Syd Ramdhani, Charl Pienaar and Carl Cloete. Buk'Indalo Consultancy cc, the National Research Foundation (NRF) in the form of grant GUN 2069059, a free-standing NRF South African Biosystematics Initiative (SABI) grant from 2006–2009 to VRC, the National Geographical Society Committee for Research and Exploration (Grant 8521-08) and the Cape Tercentenary Foundation are thanked and acknowledged for research funding during the PhD. Rhodes University is acknowledged and thanked for the post-doctoral research fellowship (2011) during which this paper was constructed. Tony Dold (Curator: Selmar Schonland Herbarium) and the Department of Botany (Rhodes University) is thanked for office space, Herbarium stationery and access to field equipment. Anonymous reviewers are thanked for their comments.

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# *Allophylastrum*: a new genus of Sapindaceae from northern South America

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## Abstract

The new genus *Allophylastrum* (Sapindaceae) is described from Roraima, Brazil and Guyana. *Allophylastrum* resembles the genus *Allophylus* in its vegetative morphology but differs by its apetalous flowers with a cupular nectary disc, 5–6 unequal stamens, and 4- to 5- porate pollen grains. A key is provided to differentiate *Allophylastrum* from *Allophylus*. The new species *Allophylastrum frutescens* is described and illustrated.

## Keywords

*Allophylastrum*, *Allophylus*, Sapindaceae, Roraima, Brazil, Guyana

## Introduction

While working on a treatment of Sapindaceae for the Flora of the Guianas Project (Acevedo-Rodríguez in prep.), I came across a new species that although Sapindaceous in appearance, did not fit any of the known genera of Sapindaceae. A second collection of the new species from the adjacent Brazilian state of Roraima, was discovered later at Kew Gardens and New York Botanical Garden herbaria. The new genus resembles *Allophylus* because of its vegetative morphology, but its flowers and inflorescences definitely do not belong with it. Examination of pollen grains and DNA sequences (Wurdack et al. in prep.) indeed confirm the new genus to belong in Sapindaceae. However, because its flowers and inflorescences are so distinctive from *Allophylus*, a new genus is here proposed to accommodate the new species. *Allophylastrum* is preliminarily placed sister to *Allophylus* in the Paullinieae tribe (sensu Acevedo-Rodríguez et al. 2011) awaiting results from the analyses of additional genera of Sapindaceae.

## Taxonomic treatment

### *Allophylastrum* Acev.-Rodr., gen. nov.

urn:lsid:ipni.org:names:77112773-1

<http://species-id.net/wiki/Allophylastrum>

*A. Allophylus flore solitario, apetalos, nectaris cupulato differt*

**Type.** *A. frutescens* Acev.-Rodr.

**Description.** Small trees or shrubs. Stipules wanting. Leaves alternate, trifoliolate; leaflets serrate. Flowers solitary, axillary or in short racemes, actinomorphic, unisexual with staminate flowers sometimes bearing a rudimentary 2-locular gynoecium; pedicels elongated, non-articulate; calyx 4-merous, sepals of similar length, in two whorls; petals wanting; disc cupular; stamens (5)6, the filaments slightly of unequal length, connate at base, ovary 2-locular, with a single ovule per locule. Fruit of 1–2 basally connate, indehiscent monocarps, with fleshy exocarp, and a semi-woody endocarp; seeds exarillate, with papery testa.

**Distribution.** One species, known only from Guyana and Brazil (Roraima).

**Discussion.** The new genus is morphologically similar to *Allophylus* as they share similar shrubby-arboreal habit, and trifoliolate leaves without stipules (Acevedo-Rodríguez et al. 2011).

### Key to *Allophylastrum* and *Allophylus*

- 1 Flowers actinomorphic, apetalous, solitary, or in short axillary racemes; nectary disc cupular; pedicel non-articulate, >4 times as long as the calyx; pollen 4- to 5-porate, 4- or 5-angled in polar view..... ***Allophylastrum***
- Flowers zygomorphic, petaliferous, on lateral cincinni in a racemiform or paniculate thyrse; nectary disc unilateral, semi-annular, 2- to 4-lobed, or rarely annular; pedicels articulate, 1–2 times as long as the sepals; pollen 3-porate, triangular in polar view..... ***Allophylus***

**Etymology.** The name *Allophylastrum* is proposed to indicate its close resemblance to *Allophylus*.

### *Allophylastrum frutescens* Acev.-Rodr., sp. nov.

urn:lsid:ipni.org:names:77112774-1

[http://species-id.net/wiki/Allophylastrum\\_frutescens](http://species-id.net/wiki/Allophylastrum_frutescens)

Fig. 1

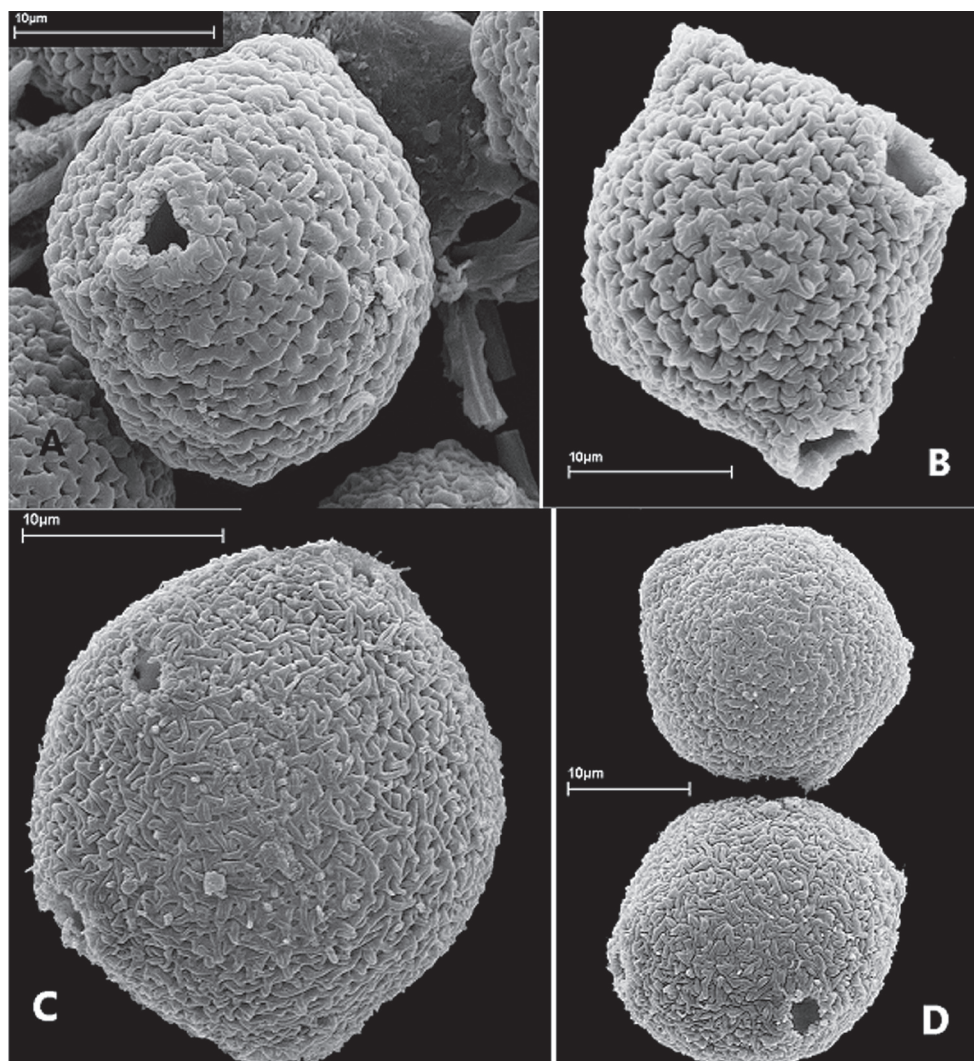
*Frutex vel arbor parva; folia trifoliolata; foliola chartacea, elliptica, margine serrato; flores apetalae, monocarpus ellipsoideus, glabrus.*

**Type.** Brazil. Roraima, Sema Ecological Station, Ilha de Maracá, 3°22'N, 61°25'W, E.S. Silva & J. Lima 5828 (holotype NY!, isotypes INPA, K!-2, U-2!).



**Figure 1.** *Allophylastrum frutescens*. **A** Flowering branch **B** Detail of branch with leaf subtending a single flower, detail of a raceme **C** Pre-anthesis staminate flower and l.s. of same **D** Detail of staminate flower nectary disc, stamens, and pistillode **E** Staminate flower at anthesis, showing nectary disc and stamens **F** l.s. of staminate flower **G** Stamen, frontal and lateral views **H** Pistillode **I** Fruiting branch **J** Fruit with two monocarps and detail of monocarp insertion **K** Fruit showing fully developed monocarp with seed, and an undeveloped monocarp **L** Embryo, lateral and frontal views. **A–H** from Silva and Lima 5828 (NY); **I–L** from Lima 812 (NY).





**Figure 2.** Pollen of *Allophylastrum frutescens*. **A** Equatorial view showing pore **B** Oblique polar view of 4-angular grain showing 2 pores **C** Oblique equatorial view of a 5-angular grain showing 3 pores **D** Polar view of 5-angular grain (top), oblique equatorial views of a 5-angular grain showing 3 pores. All from *R.H. Schomburgk 336* (W).

**Description.** Shrub or small tree to 7 m tall. Branches terete, glabrous, brown with grayish lineate lenticels. Leaves trifoliolate; petioles flattened-canaliculate adaxially, 1.6–4.5 cm long, minutely puberulent; leaflets elliptic, 6–10.8 × 1.3–3.4 cm (the lateral ones smaller), chartaceous, the base cuneate on distal leaflets, obtuse-acute and asymmetrical on lateral ones, the apex acute to acuminate, the margins serrate. Flowers axillary, solitary or in short (1–2 cm long), axillary racemes; pedicels 8–10 mm long; sepals 4, concave, obovate, rounded at apex, puberulent, ca. 2 mm long; disc cupular, glabrous, with sub-fimbriate margin; filaments glabrous, 4–5 mm long; pistillode ca.



0.4 mm long; pistillate flowers unknown. Monocarps ellipsoid, divaricate, glabrous, 1–1.2 cm long; exocarp red, fleshy and thin; endocarp subwoody. Seed obovoid, ca. 1 cm long, with papery testa.

**Pollen.** Pollen grains in *Allophylastrum frutescens* are subglobose in equatorial view and obtusely 4- or 5-angled in polar view, 4–5-porate, with rugulate ornamentation (Fig. 2a-d). Size as measured from 20 pollen grains using light microscopy varies from 24.57–31.96  $\mu\text{m}$  long by 21.86–28.10  $\mu\text{m}$  wide. Generally, Sapindaceae pollen is 3-aperturate or less often 2- or 4-aperturate (Acevedo-Rodríguez et al. 2011). Therefore, this is the first time a 5-aperturate pollen is reported for the family. *Allophylastrum* pollen resembles that of *Allophylus* by being porate and having a rugulate ornamentation (Acevedo-Rodríguez et al. 2011); however the shape and the number of apertures is quite distinctive from that of *Allophylus*, where the pollen is triangular in polar view, oblate in equatorial view, and triporate.

**Distribution and ecology.** Known only from Brazil (Roraima) and Guyana, on terra firme forest.

**Specimens examined.** Guyana: Without locality, *M.R. Schomburgk* 505 (B), *R.H. Schomburgk* 336 (BM, K, NY, W). Brazil. Roraima, Mun. Boa Vista, road to Santa Rosa, secondary forest, *J. Lima* 812 (INPA, K).

**Note.** The above cited collections by *Schomburgk* were studied by L.A.T. Radlkofer (1829–1927) but wrongly identified as *Allophylus edulis* (St. Hil.) Hieron. ex Niederlein, a vegetatively similar species.

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