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## A taxonomic revision of *Petopentia* (Apocynaceae: Periplocoideae)



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### ABSTRACT

The generic name *Petopentia* Bullock is reinstated. Two species are recognized, namely *Petopentia natalensis* (Schltr.) Bullock, first described in 1894, and *Petopentia undulata*, a new species. Both species are found in the subtropical eastern region of South Africa, *P. natalensis* being associated with moist forest and *P. undulata* with drier lowveld savanna.

Both species are climbers with root tubers, glabrous plant parts, glossy patently veined leaves with petioles and abaxial surfaces purple, pale yellow to pale green corollas with inverted tubes and purple pollinator guides.

A taxonomic revision of the genus is presented which includes complete nomenclature and typification, generic and species descriptions, a key to the species and notes on geographic distribution and ecology.

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### 1. Introduction

*Petopentia* Bullock forms part of the African compliment of the Periplocoideae, subfamily of the Apocynaceae. The African periplocoid taxa are adapted to a variety of environments, ranging from moist forest to savanna, grassland, semi-desert and even desert, but are most abundant in more moist tropical vegetation. The majority of the 99 known African species are slender twining climbers, a few are large lianas, a small number are shrubs or small trees and some are geophytic herbs. Most of the periplocoid genera have five or less species. *Petopentia* is one of these small genera and is only known from the eastern region of South Africa.

Schlechter (1894) described specimens collected near Durban in KwaZulu-Natal Province as *Pentopentia natalensis*. However, as the genus *Pentopentia* Decne. is endemic to Madagascar, placing the new species in this genus was erroneous. Brown's (1907) solution was to make a new combination, *Tacazzea natalensis* (Schltr.) N.E.Br. Realizing that the new species did not belong in *Tacazzea*, Bullock (1954) coined a new genus name, *Petopentia*, to accommodate this species. Venter and Verhoeven (2001) sunk *P. natalensis* into *Ischnolepis* Jum. & H.Perrier based on morphological similarities. Subsequent molecular evidence (Ionta and Judd, 2007) proved this to be an error and the genus name *Petopentia* is, therefore, reinstated.

For more than a century *Petopentia* remained monotypic, consisting of *P. natalensis* only. However, the discovery of a second species necessitates a revision of the genus. Consequently the nomenclature and description of the genus and its two species, notes on their

geographic distribution and ecology, a key to these species and lists of herbarium specimens studied are presented.

### 2. Materials and methods

Fresh as well as herbarium material was studied. Information on geographic distribution and ecology of the species was obtained by the authors in person, but also from herbarium specimen labels. Specimens from BLFU, BOL, K, NH, NU, PRE and SAM (acronyms after Holmgren et al, 1990) were studied. All herbarium specimens mentioned were seen by the first author. Relevant literature was obtained from the libraries of K and PRE.

Pollen and translators, obtained from fresh and herbarium material, were photographed with a Shimadzu SSX-550 scanning microscope at the Centre for Microscopy, Faculty of Agriculture and Natural Sciences, University of the Free State.

### 3. Results and discussion

The monotypic *Petopentia* has undergone a number of name changes due to its floral resemblance to *Pentopentia* (Schlechter, 1894), *Tacazzea* Decne. (Brown, 1907) and the monotypic *Ischnolepis* (Venter and Verhoeven, 2001) as all four genera had rotate flowers with filiform corona lobes. The morphological similarity of *P. natalensis* with *Ischnolepis graminifolia* (Constantin & Gallaud) Klack. was even more evident in the maroonish, wax-like stem bark, presence of root tubers and the conspicuous similarity in their greenish yellow corollas and triangular corolla lobes having acute apices and a rather thick texture (Klackenberg, 1999).

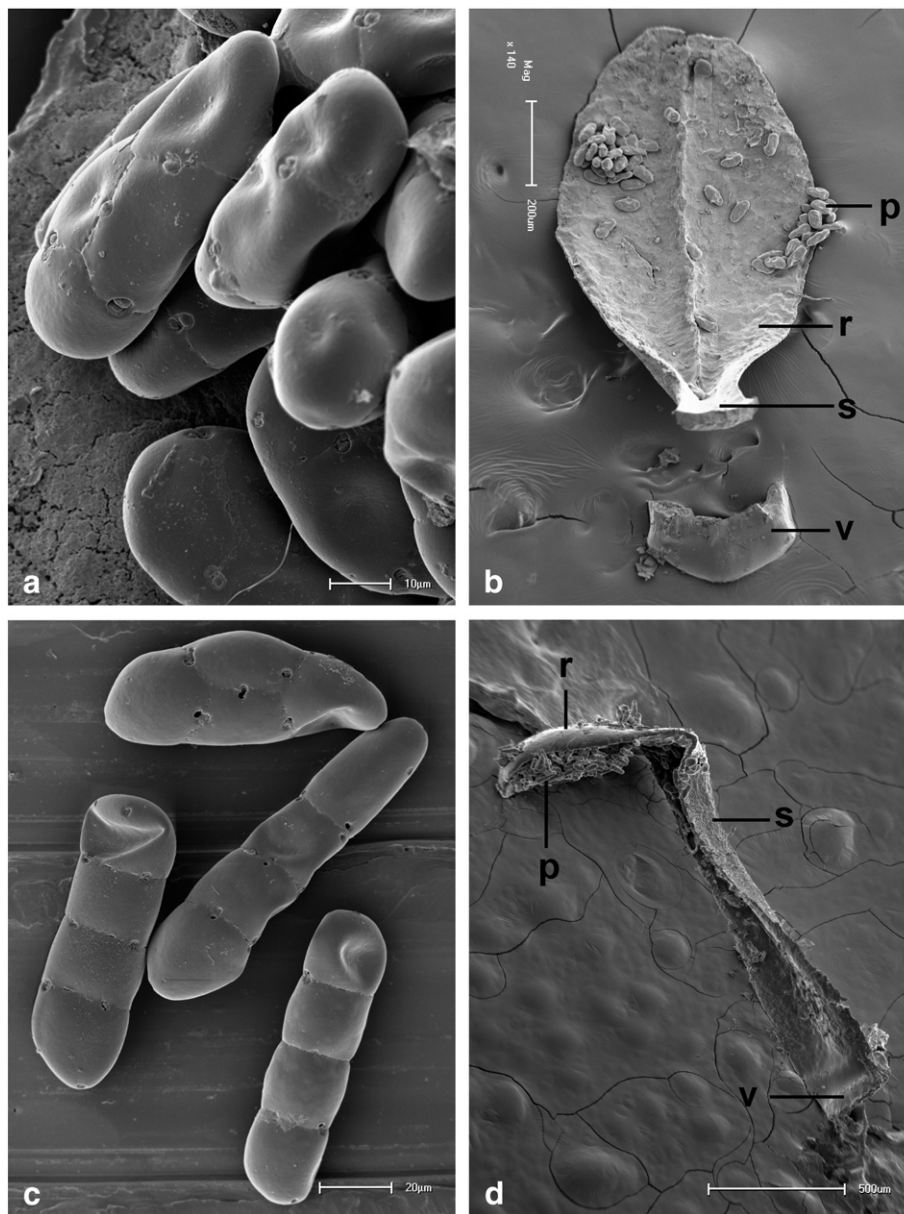
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E-mail address: [venterhj@ufs.ac.za](mailto:venterhj@ufs.ac.za) (H.J.T. Venter).

However, phylogenetic analyses of the Periplocoideae by Ionta and Judd (2007) and Ionta (2009) indicated that *P. natalensis* does not form part of any of the clades containing the above genera. Their analyses further revealed that molecular relationships in the Periplocoideae do not necessarily coincide with morphological similarities. The morphological resemblance between the above genera is clearly more an instance of convergence than of phylogenetic relationship. Based on this evidence it became clear that *Petopentia* should be separated from *Ischnolepis* and reinstated as the former monotypic genus.

Discovery of a new periplocoid species with morphological affinity to *Petopentia* and molecular evidence, with 94% bootstrap value, supporting the inclusion thereof in *Petopentia* (Ionta, personal communication, 2006; University of Florida, Gainesville, Florida, U.S.A.), necessitated adapting the generic concept. This species, *Petopentia undulata*, is characterized by salver-shaped flowers with a pronounced corolla tube, refuting the floral similarities of *Petopentia* with the above mentioned genera and confirming its unique status.

Although both *Petopentia* species are climbers, *P. natalensis* is a huge liana in moist forest and, in contrast, *P. undulata* is a frail climber in dry savanna. Both species have spherical or ellipsoid tubers on their secondary roots with their leaves patently veined, glabrous, adaxially glossy green and abaxially purple, however, different in shape, being more or less oblong-elliptic in *P. natalensis*, but lanceolate and conspicuously undulate in *P. undulata*. The inverted corolla tube with the corona and stamens fused into an annulus on this inversion is characteristic of the genus, but the species differ with regard to the appearance of the corolla tube, corona lobes and stamens. In *P. natalensis* the flower is rotate because of a shallowly campanulate corolla tube, corona lobes are filiform and the stamens are glabrous, but in *P. undulata* the salver-shaped flower has a prominent corolla tube, the corona lobes are falciform and the stamens are hairy. The translator shape in *P. natalensis* is a flat spatula (Fig. 1b) as found in most members of the Periplocoideae. However, the angled translator (erect receptacle forming a 90° angle with the stype) of *P. undulata* is unusual (Fig. 1d) and distinctive.



**Fig. 1.** Pollen and translators. *Petopentia natalensis*: (a) linear pollen tetrads; (b) translator with scattered pollen tetrads on receptacle and detached viscidium. *P. undulata*: (c) linear pollen tetrads; (d) translator with angled receptacle and pollen tetrad mass. Scale bars: (a) = 10 µm, (b) = 200 µm, (c) = 20 µm and (d) = 500 µm (p = pollen tetrads, r = receptacle, s = stype, v = viscidium (detached from stype in *P. natalensis*)) [(a and b) Venter H.J.T. 9003 (BLFU); (c and d) Venter H.J.T. 10767 (BLFU)].

Ionta and Judd (2007) further indicated that *Petropentia*, represented by *P. natalensis*, together with the Australian *Phyllanthera grayii* (P.I. Forst.) Venter, are sister to the rest of the Periplocoideae. Even with more species included in the analysis of Ionta (2009) the position of *P. natalensis* and *P. grayii* remains unchanged in the cladograms resulting from the ITS and combined ITS and plastid sequences, even though the position of *P. natalensis* is unresolved in both the plastid and morphological analyses. One should keep in mind that these two species, one from the African continent and the other from the Australian continent, are separated by thousands of kilometers, a fact which may lead to interesting hypotheses on the origin of the Periplocoideae.

#### 4. Taxonomic treatment

##### 4.1. Generic description

*Petropentia* Bullock in Kew Bull. 1954: 362 (1954); Venter et al. in S. Afr. J. Bot. 56: 393 (1990); Venter & R.L. Verh. in Ann. Missouri Bot. Gard. 88: 565 (2001). Type: *P. natalensis* (Schltr.) Bullock.

Climbers with white latex. Roots: with spherical to ellipsoid tubers on secondary roots. Stems: woody, twining, glabrous, verrucose; interpetiolar collars with narrowly turbinate colleters. Leaves: opposite, simple, semi-coriaceous, glabrous, axils with narrowly turbinate and trichome-like colleters; petiole adaxially grooved, glabrous; blade pinnately veined, midrib prominent, secondary veins patent and looped, adaxially green and glossy, abaxially purple, margin entire. Inflorescences: terminal and axillary at terminal nodes, 1 or few lax dichasia ending in a few monochasial branches, each monochasium few-flowered; bracts ovate or triangular, naviculate. Flowers: bisexual, actinomorphic, pentamerous, semi-epigynous. Sepals: free, with colleters at inner bases. Corolla: rotate or salver-shaped, pale green to yellow, glabrous; tube shallowly campanulate or narrowly obconical, apically inverted, inner surface opposite corolla lobes with purple pollinator guides terminating at nectaries; lobes overlapping anticlockwise in bud. Corona: corolline, glabrous; lobes alternating with corolla lobes, 5, inserted on inversion of corolla tube, coronal feet laterally dilated, fused sideways with one another forming an annulus on corolla inversion, coronal annulus channeled between coronal feet directly above pollinator guides and directly beneath translator viscidia. Stamens: alternating with corolla lobes, fused to inner base of coronal feet, free from one another, glabrous or hairy; filaments filiform with bases dilated; anthers 2-theous with inner bases fused to style-head ridges, dehiscence latrorse with slits, connective apices connivent over style-head; pollen grains smooth, 4–6-porate, fused into rhomboid, linear or T-shaped tetrads shed onto interstaminal translators. Nectaries: located on lower half of corolla tube, alternating with corona lobes and stamens. Gynoecium: ovaries semi-inferior, 2, free, sub-globose, many-ovuled, glabrous; styles two, basally free, but fused and terete towards dilated style-head; style-head very broadly pentangular-conical with central erect column, vertically ridged between grooves; pollen translators embedded in style-head grooves, alternating with stamens, spatulate with receptacle, stype and viscidium; viscidium disk-shaped, protruding over margin of style-head. Gynostegium: elevated above corolla tube mouth, leaving 5 pollinator apertures to pollinator chutes directly beneath translator viscidia. Fruit: single or paired follicles.

##### 4.1.1. Diagnostic characters

*Petropentia* is distinguished by a number of characteristics: its climbing habit, the presence of more than one root tuber per plant, glabrous stems and leaves that are abaxially purple, patent secondary venation, lax inflorescences terminating in few-flowered monochasial branches, flowers with pale green to pale yellow corollas, corolla tube apically inverted with a coronal annulus bearing 5 lobes and stamens bearing unique linear pollen tetrads. The only

change in diagnostic characters to accommodate the new species concerns the corolla shape that was given as rotate but which does not apply to *P. undulata* with its salver-shaped corolla.

##### 4.1.2. Distribution

*Petropentia* is a ditypic genus from the eastern region of South Africa.

##### 4.2. Key to the species of *Petropentia*

Leaves broadly oblong-elliptic, oblong-elliptic or oblong-obovate, margins not undulate; corolla rotate with shallowly campanulate tube, corona lobes filiform, stamen connectives glabrous..... *P. natalensis*.

Leaves lanceolate to narrowly lanceolate, narrowly oblong-lanceolate or narrowly elliptic, margins conspicuously undulate; corolla salver-shaped with a conspicuous tube, corona lobes falcate, stamen connectives villous..... *P. undulata*.

##### 4.3. Species descriptions

###### 4.3.1. *Petropentia natalensis*

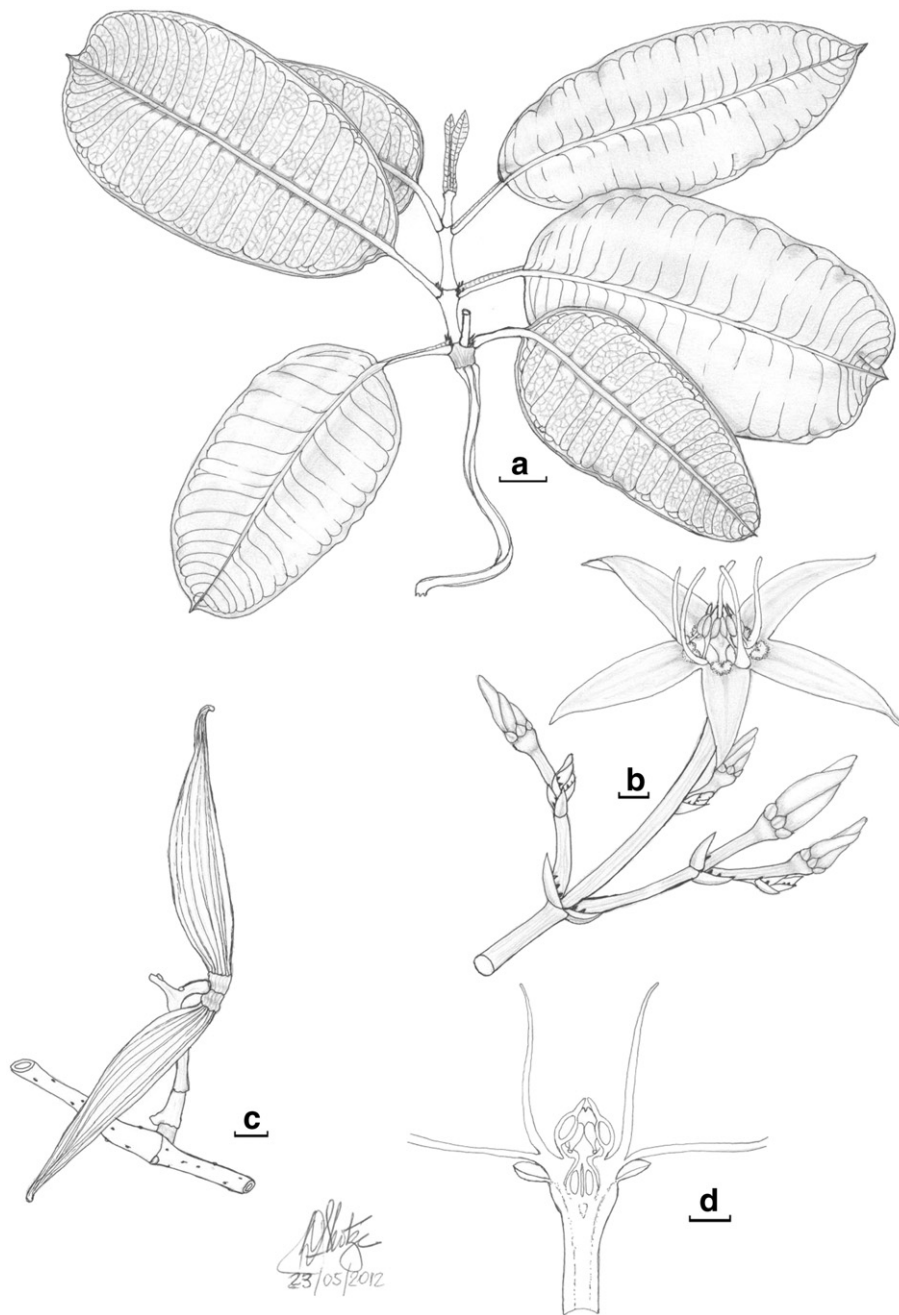
(Schltr.) Bullock in Kew Bull. 9: 362 (1954); Venter et al. in S. Afr. J. Bot. 56: 394 (1990). *Pentopetia natalensis* Schltr. in London J. Bot. 32: 257 (1894). *Tacazzea natalensis* (Schltr.) N.E.Br. in Fl. Cap. 4: 541 (1907); *Ischnolepis natalensis* (Schltr.) Venter in Ann. Missouri Bot. Gard. 88: 565 (2001).

Type: South Africa. KwaZulu-Natal, Port Shepstone (3030), "Umbogotwino" [Umbogintwini] (–BB), not far from "Umlaas" [Umlazi], flowered in the Natal Botanic Garden in July 1886, Wood 3634 (K!, neo., here designated) (Section 4.3.1.1).

A liana of up to 15 m high. Roots: with ellipsoid to sub-spherical tubers of up to 0.6 m in diameter. Stems: up to 15 mm in diameter; young stems purplish; older stems reddish-brown, sometimes suberous, glossy. Leaves: petiole (5–)10–25 mm long; blade oblong-elliptic to broadly oblong-elliptic or oblong-obovate, (50–)70–110(–130) × (10–)30–50(–60) mm, secondary veins 30–35 on each side of the midrib, tertiary veins netted, apex acuminate to cuspidate or emarginate and mucronate, base rounded, obliquely rounded or cordate. Inflorescences: glabrous; peduncles robust, primary 2–20 mm long, secondaries 4–5 mm long; pedicels 5–12 mm long; bracts ovate, 2 × 1–1.5 mm, apex acute to acuminate. Buds: narrowly conical, 9–10 mm long, apices apiculate and full turn helically twisted. Sepals: ovate to broadly ovate, 1–2 × 0.5–1 mm, semi-succulent, pale green, apices acute to acuminate, with 5 sub-orbicular colleters or 5 pairs of ovate colleters at inner bases. Corolla: pale green to pale yellow, rotate; tube shallowly campanulate, 1–2 mm long; lobes reflexed, narrowly triangular to narrowly triangular-ovate, 12–14 × 4 mm, semi-succulent, apices narrowly attenuate. Corona: lobes filiform, 5–6 mm long, purple; coronal annulus dark greenish-brown. Stamens: glabrous; filament filiform with conical base, 0.5 mm long; anther oblong, 2 mm long, whitish, dehiscence with full length slits, connective apex attenuate; pollen tetrads rhomboidal-, linear- or T-shaped. Nectaries: pocket-like at base of corolla tube and terminating in lobules around style, dark colored. Gynoecium: ovary 1 mm long; styles basally free for ±0.5 mm, terminally fused for 1 mm; style-head 1.5 × ± 1.5 mm, apex conical or bilobed; translator ±1.2 mm long, flat, yellow-brown, receptacle elliptic, ridged down center and apex obtuse, stype shorter than receptacle. Follicles: narrowly ovoid with apices attenuate and reclinate, (60–)90–110 × 12–17 mm, glabrous. Seed: compressed, narrowly sub-ovate, blackish-brown, keeled on concave side, 4 mm long; coma silky, silvery-white, 25 mm long (Figs. 1a and b, 2).

4.3.1.1. Note. Schlechter (1894) based his description of *P. natalensis* (Schltr.) Bullock [= *Pentopetia natalensis* Schltr.] on material that Medley Wood, Curator of the Natal Botanic Garden (NH) at the time, collected near Isipingo, KwaZulu-Natal. Venter et al. (1990) indicated the type





**Fig. 2.** *Petropentia natalensis*: (a) twig with leaves; (b) inflorescence with buds and an open flower; (c) twig with follicles; (d) longitudinal section of flower. Scale bars: (a and c) = 10 mm, (b) = 2 mm, (d) = 1 mm [drawing by Anet Kotze; (a–d) Venter H.J.T. 9003 (BLFU)].

specimen for *P. natalensis* as Wood *s.n.* (K, holotype). However, at present the only *P. natalensis* specimen of Medley Wood at Kew (K) is Wood 3634, collected at Umlazi, KwaZulu-Natal. This specimen reached Kew in November 1886 (David Goyder (K), personal communication).

Schlechter accompanied Wood on collecting trips from June to September 1893 and again in March 1895 before leaving for Europe (Gunn and Codd, 1981). The description of *P. natalensis* was published by Schlechter in the Journal of Botany in September 1894, so it is reasonable to assume that he based his description on material seen in KwaZulu-Natal during his visit in 1893. Schlechter did not reach London until the summer of 1895, when he spent “some weeks at the Department of Botany” of the British Museum (Rendle, 1926). He is, therefore, unlikely to have seen the Wood 3634 specimen at Kew before he published his article on *P. natalensis* in 1894.

The specimen, Wood 3634, cannot be the holotype as its collecting locality differs from the locality given in the type description. The only *P. natalensis* specimen of Medley Wood at the Natal Herbarium (NH) is number 11532, a number much too late for being Schlechter’s type (Hugh Glen (NH), personal communication). Bullock (1954) cited the Kew collection of Wood 3634 as an isotype, but without supporting argument. Considering the fact that Isipingo and Umlazi fall in the same quarter degree square (Leistner and Morris, 1976) and taking into account the other aspects mentioned above, the authors designate Wood 3634 as neotype for the species.

**4.3.1.2. Geographic distribution and ecology.** *P. natalensis* is found in the eastern and south-eastern subtropical, humid, mainly coastal regions of KwaZulu-Natal and Eastern Cape in South Africa (Fig. 3). This species

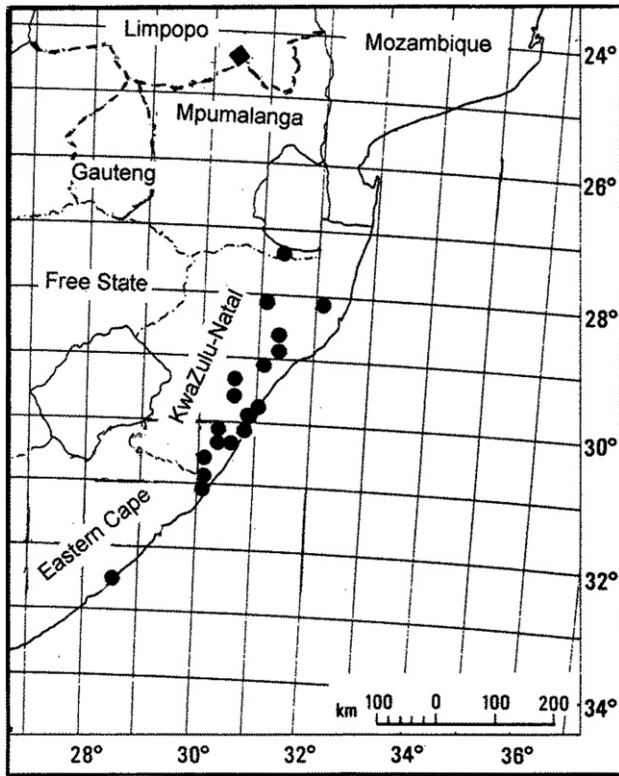


Fig. 3. Known geographic distribution of *Petopentia natalensis* (\*) and *P. undulata* (♦).

grows in environments ranging from riverbank forest to forested sandstone cliff faces and may be locally quite common. *P. natalensis* flowers from late September to December and mature fruit shedding seed is encountered from March to May.

**4.3.1.3. Red List assessment.** *P. natalensis* has a LC status in the Red List of South African Plants (Raimondo et al., 2009).

**4.3.1.4. Additional specimens examined.** South Africa. KWAZULU-NATAL: 2731 (Louwsburg): Ingwavuma District on northern banks of Pongola River, 1.6 km from Pongola Gorge Dam (–AD), Edwards 2922 (K, M, NU). 2831 (Shongweni): Umlazi Valley (–AA), Ward 5884 (K, NH); Shongweni Dam (–AA), Morris 915 (NU, PRE), 1031 (NU, PRE); Mfuli Valley near Melmoth (–CB), Acocks 13000 (K); Eshowe, Old Mill at Umlalazi River (–CD), Lawn 2334 (NH); Eshowe, Umlazi (–CD), Gerstner 3833 (NH). 2832 (Mtubatuba): Hluhluwe Game Reserve (–AA), Ward 2664 (PRE, NU). 2930 (Pietermaritzburg): Applebosch Mission Station (–BC), Strey 6032 (NH, PRE); Pinetown, Kloof Nature Reserve (–DD), Gibson 58 (NU). 2931 (Stanger): Mapumulo, Umshaba Waterfall (–AA), Edwards 1810 (K); Durban Botanic Garden (–CC), Buthelezi 304 (NH), Venter 8977 (BLFU); Sydenham (–CC), Asian Collector 18943 (NH). 3030 (Port Shepstone): Near Ifafa River (–AB), Rudatis 1702 (PRE, NBG, WAG, Z); Ifafa (–AB), Anon 2591 (NBG); Umdoni Park (–BC), Van Wyk 5050 (PRU); Oribi Gorge (–CA), Lubke 1451 (J); Umtamvuna Nature Reserve, 2 km west of Clearwater (–CC), Venter 9003 (BLFU), 9189 (BLFU); Umtamvuna Nature Reserve, Gonioma Heights (–CC), Abbott 1421 (NH). EASTERN CAPE PROVINCE: 3130 (Port Edward): River Reserve (–AA), Nicholson 1786 (PRE). 3228 (Butterworth): Kentani (–DA), Pegler 916 (BOL, K, NH, SAM).

#### 4.3.2. *Petopentia undulata*

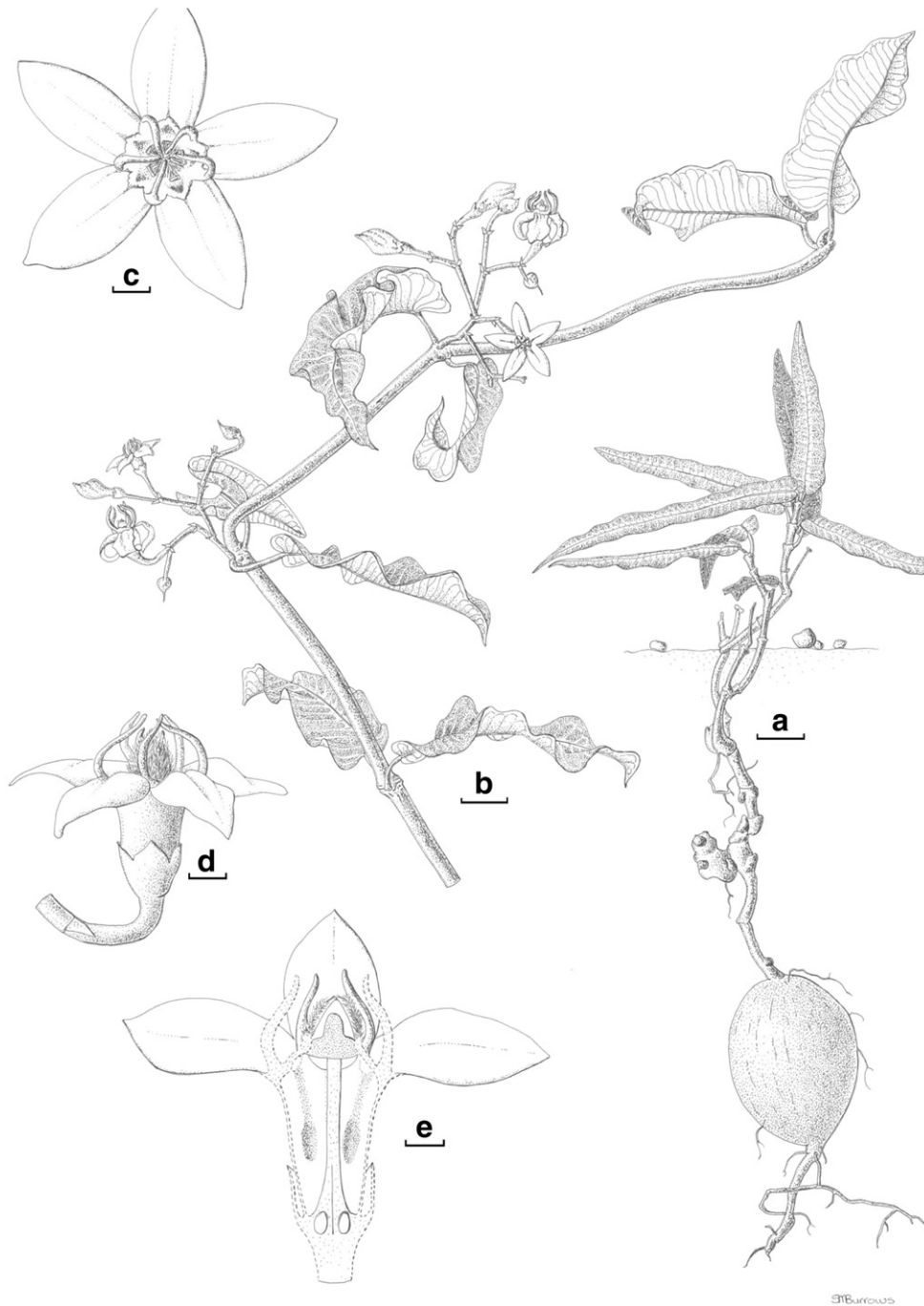
Venter & A.M.Venter, *sp. nov.* shares the climbing habit, presence of root tubers, leaves with patent venation and purple abaxial

surfaces, flowers with creamy to pale green inverted corollas, fusion of corona lobes and stamens, prominent vertical ridges and grooves on the style-head and unique linear pollen tetrads with *P. natalensis*. However, *P. undulata* is clearly distinguished from *P. natalensis* by its slender growth form, narrowly undulate leaves, salver-shaped corolla, falcate corona lobes and hairy anther connectives.

Type: South Africa. Limpopo Province, Pilgrim's Rest (2439), about 4 km N of Penge near bridge across Olifants River, alt. 639 m (–AD), (cultivated from sterile material collected on 29 Oct. 2002, flowering at Bloemfontein on 31 Apr. 2012), Venter 10767 (BLFU, *holo.*; PRE, *iso.*) (Section 4.3.2.1).

A slender climber, up to 6 m high, latex white. Roots: with narrowly ellipsoid to sub-spherical tubers of 60–120 × 60–100 mm, lateral roots sprout suckers. Stems: woody, slender, twining; young stems green to purple; older stems 4–6 mm diameter, brown, bark fissured. Leaves: petiole 10–15 mm long, purple becoming green with age; blade lanceolate to narrowly lanceolate, narrowly oblong-lanceolate or narrowly elliptic, 80–175 × 20–50 mm, adaxially dark green, glossy, abaxially purple sometimes becoming green with age, secondary veins 25–36 on each side of midrib, tertiary veins invisible, apex attenuate or acuminate, base cordate, margin prominently undulate, revolute. Inflorescences: with 4–5 flowers per monochasium; peduncles glabrous, primary 15–25 mm long, secondaries 9–15 mm long; pedicels muricate, 5–10 mm long; bracts triangular, glabrous, apices acute, margins membranous. Buds: with bases tubular, terminally ovoid to broadly ovoid with corolla lobes half-turn helically twisted. Sepals: ovate to triangular-ovate, 3 × 2 mm, succulent, outside muricate, green and tinged with purple, apices acute; with 5 pairs of ovate colleters at inner base of sepals, two of adjacent sepals sometimes fused into broadly ovate colleters. Corolla: salver-shaped; tube narrowly obconical, 6–7 × 3–4 mm, outside glabrous, green tinged with purple, inside glabrous, pale green with purple pollinator guides in upper 1/3 terminating at pale green nectary pads in lower 2/3; corolla lobes at first spreading becoming reflexed in mature flowers, ovate, 8–10 × 5–7 mm, semi-succulent, creamy pale green to greenish-yellow, glabrous, inner base rugose, apices acute. Corona: lobes falcate, connivent over staminal column, 6–7 mm long, glabrous, green, apices attenuate; coronal annulus green. Stamens: filament filiform with base columnar, 1.5–2 mm long, glabrous, pale green; anther narrowly triangular, 3 × 1.5 mm, pale green to whitish, glabrous, upper half fertile and dehisce by half slits, connective on outside densely hirsute with silvery-white hair, connective appendage acute, glabrous and pale green; pollen tetrads blackish-brown, rhomboidal or linear in shape. Nectary: pads on inner surface of corolla tube elliptic, nectar copious, filling lower 2/3 of corolla tube. Pistil: styles basally free for 1 mm, terminally fused for 4 mm, green turning purple towards style-head; style-head 2.5 × 3 mm, green, apex bilobed; translators 2.5–3 mm long, brown to dark yellow, angled with receptacle erect, oblong-elliptic, concave, not ridged, apex obtuse and not split, stipe horizontal and longer than receptacle (Section 4.3.2.2). Fruit: only very young observed, paired, very narrowly ovoid follicles. Seed: unknown (Figs. 1c and d, 4, 5).

**4.3.2.1. Note: Specimen collecting.** During a field trip to the Olifants River Valley in 2002 an unfamiliar plant species, without flower or fruit, was pointed out to the first author. However, its vegetative appearance suggested affinity with the Periplocoideae, in particular with *Petopentia*. A specimen (Strey 3778 (PRE)) of a similar plant was collected, probably in the 1950s, about 40 km towards the east in the Abel Erasmus Pass, but this specimen was also sterile. A plantlet, with tuber, small branch and few leaves, was transplanted to Bloemfontein. Ten years later, in March 2012, inflorescences appeared on this plant in cultivation and the first flowers opened six weeks later, at the end of April. The species was positively identified as belonging to *Petopentia*, and is herewith described and named *P. undulata* after its conspicuously undulate leaves. The wild population, under natural field conditions, similarly



**Fig. 4.** *Petopentia undulata*: (a) juvenile plant with tuber, stems and leaves; (b) twig with leaves and flowers; (c) flower seen from above showing corolla lobes, corona lobes and staminal column; (d) external view of flower from the side; (e) longitudinal section of flower with 2/5 removed. Scale bars: (a and b) = 15 mm, (c and d) = 3 mm; (e) = 2 mm [drawing by Sandy Burrows; (a–e) Venter H.J.T. 10767 (BLFU)].

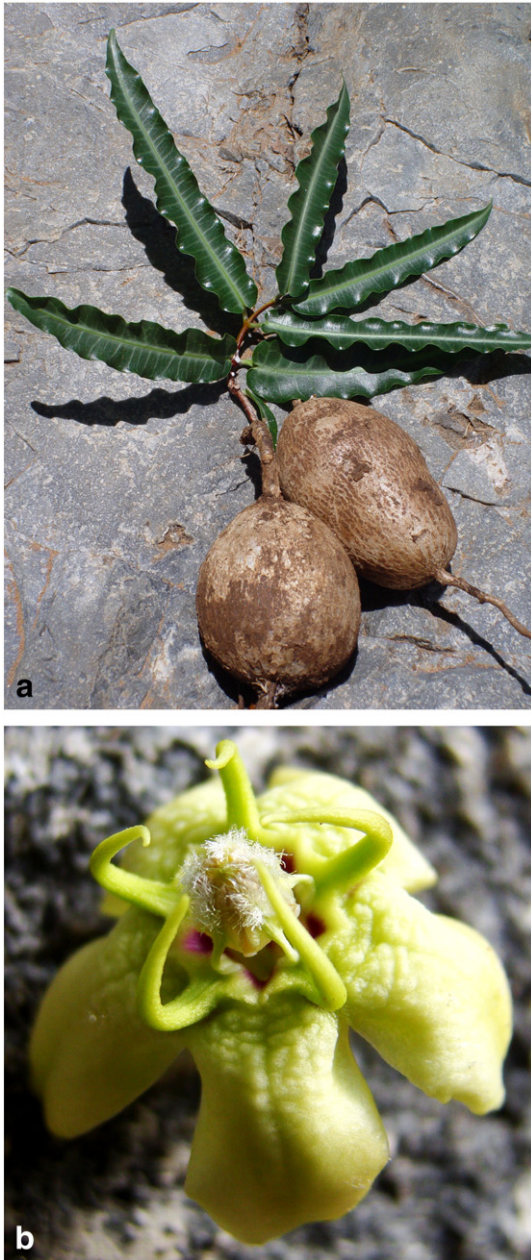
flowered in the autumn of April/May 2012 at Penge, the original finding locality (observation by John and Sandy Burrows (BNRH), Lydenburg, Mpumalanga Province).

**4.3.2.2. Note: Translator shape.** How the erect translator receptacle of *P. undulata* facilitates pollen transfer to the receptive stigmatic underside of the style-head is unclear. A more or less similarly angled translator is found in *Hemidesmus indicus* L., a species of India, but here successful transfer seems clear as the erect receptacle is beaker-shaped and open at the top thus exposing the pollinia it carries to the receptive stigmatic surface of the flower being pollinated.

**4.3.2.3. Distribution and ecology.** *P. undulata* is a component of the flora of the Wolkberg Centre of Endemism (Van Wyk and Smith, 2001). This center is located just east of the Sekhukhuneland Centre of Endemism where *Raphionacme villicorona* Venter, with VUD2 categorization, was discovered (Venter et al., 2007). The Wolkberg Centre is rich in endemic/near endemic species, with more than 40 species having been recorded for the dolomites (Van Wyk and Smith, 2001) on which *P. undulata* was also found growing.

*P. undulata* is a component of dense semi-deciduous savanna in association with woody species such as *Acacia tortilis* subsp. *heteracantha* (Burch.) Brenan, *Euclea divinorum* Hiern, *Kirkia willemssii* Engl., *Clausena*





**Fig. 5.** *Petropentia undulata*: (a) plant with tubers, stem and leaves; (b) flower with green corolla and corona, villous staminal column and purple pollinator guides. Photos by (a) Andor Venter and (b) Magdil Pienaar.

*anisata* (Willd.) Hook.f. ex Benth., *Pappea capensis* Eckl. & Zeyh., *Schotia brachypetala* Sond. and *Stomatostemma monteiroae* (Oliv.) N.E.Br., typical lowveld savanna species. Plants of *P. undulata* inhabit a narrow zone at the base of calcareous scree that has collected at the foot of extensive dolomite cliffs bordering the Olifants River at an altitude of 600–700 m. The area is very hot in summer, but cooler in winter. According to Van Wyk and Smith (2001) this northern part of the dolomite outcrop of the Wolkberg Centre falls within the rain and mist shadow of the main escarpmental crest and is therefore relatively arid.

**4.3.2.4. Red List assessment.** The only population that could be located by the authors is in danger of extermination because of a newly constructed tarmac road that runs close by, thus exposing the area for fire wood collection, as could already be observed. Therefore the authors advise a Red List status of VU2, according to the categories of Raimondo et al. (2009), for *P. undulata*.

**4.3.2.5. Additional specimens examined.** South Africa. LIMPOPO PROVINCE: 2430 (Pilgrim's Rest): Sekhukhuneland, Penge District(–AD), November 2002, Venter 9888 (BLFU); Abel Erasmus Pass, Prinsshof (-DA), Strey R.G. 3778 (PRE).

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