A taxonomic revision of *Pentzia* (Asteraceae, Anthemideae) I: the *P. incana* group in southern Africa, including the description of the new species *P. oppositifolia* Magee

A.R. Magee a, b, *, P.M. Tilney b

* a South African National Biodiversity Institute, Compton Herbarium, Private Bag X7, Claremont 7735, Cape Town, South Africa
* b Department of Botany and Plant Biotechnology, University of Johannesburg, P.O. Box 524, Auckland Park 2006, Johannesburg, South Africa

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Abstract

A taxonomic study is presented of an informal group of morphologically similar species, referred to here as the *Pentzia incana* group. The group is distinguished by the combination of smaller (≤ 8 mm broad), shortly-pedunculate, solitary, terminal capitula, often with 1 to 3 additional capitula from the leaf axils below; ovate to broadly elliptic involucral bracts with broadly membranous margins that apically enclose the young capitula; absence of resin canals in the involucral bracts; and general absence of secondary basal lobes in the lower and middle leaves. A key to all six species in the *P. incana* group is presented, as well as a taxonomic revision of the four southern African species. Six species are recognised, one of which, *Pentzia oppositifolia* Magee, is described as new. *Pentzia bolusii*, a species known only from a single depauperate specimen, is reduced to synonymy under *P. incana*. Four of the species within the *P. incana* group are endemic to southern Africa (*P. calcarea*, *P. calva*, *P. incana* and *P. oppositifolia*), one to Somalia (*P. somalensis*) and the other to Yemen (*P. arabica*). The species were found to differ in the arrangement of the leaves and capitula, the shape of the involucre, and the presence or absence of a pappus. Differences in the fruit anatomy were also observed.

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1. Introduction

The genus *Pentzia* Thunb. currently comprises ±27 shrubby species (Magee and Manning, 2010) with a highly disjunct distribution (Thulin, 2001). Almost all the species are restricted to southern Africa, with the centre of diversity in the Karoo-Namib Region, and only three species recorded in North Africa (Maire, 1929, 1936; Thulin, 2001) and a fourth in Yemen (Thulin, 2001). The genus was last revised by Hutchinson (1917) and this synopsis has now become severely outdated with the transfer of the annual species to other genera within the subtribe Pentziinae (Källersjo, 1988). The species of *Pentzia* are all highly aromatic shrubs and many are important fodder plants in the arid Karoo region of South Africa (Le Roux et al., 1994; Shearing, 1994; Van Breda and Barnard, 1991), contributing a unique flavour to the world-renowned mutton that is farmed in the area. Some species are also used in traditional medicines, particularly against colds and stomach problems (Palmer, 1985; Shearing, 1994; Van Wyk et al., 2008; Von Koenen, 2001; Watt and Breyer-Brandwijk, 1962).

Examination of herbarium collections as part of a taxonomic revision of *Pentzia* has revealed the existence of a new species, described here as *P. oppositifolia* Magee. This species forms part of an informal group of six morphologically similar species...
that we refer to here as the *Pentzia incana* group. The *P. incana* group is distinguished by the combination of smaller (≤8 mm broad), shortly-pedunculate, solitary, terminal capitula, often with 1 to 3 additional capitula from the leaf axils below; ovate to broadly elliptic involucral bracts with broadly membranous margins that apically enclose the young capitula; absence of resin canals in the involucral bracts; and the general absence of secondary basal lobes in the lower and middle leaves. Four of the species in the group are endemic to southern Africa [*P. calcarea* Kies, *P. calva* S. Moore, *P. incana* (Thunb.) Kuntze and *P. oppositifolia*], one to Somalia (*P. somalensis* E.A. Bruce ex Thulin) and the other to Yemen (*P. arabica* Thulin). Within the southern African species, the high percentage of misidentified specimens, particularly of *P. calcarea*, *P. calva* and *P. incana*, highlights the need for a comprehensive taxonomic study.

In this paper we present a key to all six species within the *P. incana* group and a detailed treatment of the four southern African species.

2. Material and methods

All of the southern African species were observed and sampled *in situ*. Supplementary data was obtained from a study of loan material from the following herbaria: BOL, K, NBG (including SAM and STE), PRE, S, UPS and WIND. Drawings were made by the first author using a stereoscope (WILD M4A) with a camera lucida attachment. Author citations are provided in the taxonomic section and not repeated elsewhere.

For the fruit anatomical study, mature cypselas from fresh and rehydrated herbarium specimens were placed in FAA for a minimum of 24 h. These samples were subsequently treated according to the method of Feder and O’Brien (1968) for embedding in glycol methacrylate (GMA) and sectioned using a Porter-Blüm ultramicrotome. The sections were stained using the periodic acid Schiff/toluidine blue (PAS/TB) method of Feder and O’Brien (1968). Vouchers for the fruit anatomical study are as follows. *Pentzia arabica*: Thulin, Eriksson, Gifri & Langstrom 8097 (K); *P. calcarea*: Schlieben 8754 (PRE); *P. calva*: Giess 13448 (PRE), Magee & Boatwright 224 (NBG); *P. incana*: Magee & Boatwright 174 (NBG), Magee & Boatwright 182 (NBG); *P. oppositifolia*: Herman 1496 (PRE), Magee & Roux 265 (NBG); *P. somalensis*: Thulin 10923 (UPS).

3. Results and discussion

3.1. Vegetative morphology

Most of the species in the *P. incana* group are sparsely leafy (Fig. 1a), spreading or rounded shrublets, with erect to spreading stems and divaricate branches. The habit of *P. calcarea* is diagnostic in the group, in that it is a sprawling, luxuriantly leafy (Fig. 1b) shrublet with diffuse to procumbent stems and prominently fastigiate branches.

The leaves are usually arranged alternately in the upper parts of the branches, except in *P. oppositifolia* where they are opposite and often basally connate (Fig. 1d). The leaves are usually 3-fid or pinnately 3- to 7-lobed, but in *P. calcarea* the upper-most leaves are often entire (Fig. 1b). The lower portion of the leaf is usually narrowed into a petiole-like base. In *P. calcarea* the relative length of this petiole-like leaf base, 5–14 (−20) mm long, is an important diagnostic character, comprising at least the lower two-thirds of the leaf (Fig. 1b). In the other species the petiole-like leaf base comprises the lower half or less of the leaf and is usually less than 4 mm long (Fig. 1a), although in some larger leaves it may be up to 9 mm in length. The leaf lobes are ovate to narrowly oblong with the lateral lobes usually spreading semi-obliquely to horizontally or, in *P. oppositifolia* and sometimes *P. calva*, spreading obliquely.

3.2. Reproductive morphology and anatomy

The capitula are discoid, usually relatively shortly pedunculate and solitary but in *P. calva*, *P. incana* and *P. oppositifolia*...
often with 1 to 3 additional capitula from the leaf axils below (Fig. 1a). Only *P. calcarea* has consistently solitary capitula (Fig. 1b). The two North African species, *P. somalensis* and *P. arabica*, have a more reduced synflorescence with the capitula often arranged in small, subsessile aggregates of two to five (Thulin, 2001). The involucre is hemispherical to narrowly campanulate or obconical in most of the species within the group. *Pentzia calcarea* differs from the other species in that the involucre is prominently constricted at the rim, due to the strongly falcate inner involucral bracts (Fig. 1c). In the other species the rim is spreading to erect. The involucral bracts are ovate to broadly elliptic, with broadly membranous margins and apices (Fig. 6d–g) that apically enclose the young capitula. Similar involucral bracts are also found in the anomalous *P. tortuosa* but this species differs from members of the *P. incana* group in the tortuous branching, smooth cortex, leaves that are almost rosulate at the branch tips, sclerified scale-like leaf sheaths, and the presence of a median resin duct in the involucral bracts.

The florets are typical for the genus in being bisexual, yellow and five lobed. The anthers are slightly sagittate at the base, with an ovate to broadly ovate, obtuse apical appendage.

As in the rest of the genus, *P. arabica*, *P. incana*, *P. calcarea* and *P. somalensis* have an obliquely cup-shaped pappus, but *P. calva* and *P. oppositifolia* lack a pappus entirely, although the cypselar wall tissue may rarely be produced as teeth at the apices of some cypselas in *P. calva*.

The cypselas are oblong to oblancoate and five-ribbed [evidently six-ribbed in *P. arabica* (Fig. 2a) but with clearly differentiated vascular tissue only in five of the ribs], mucilaginous, with glandular trichomes between the ribs. The myxogenic cells are usually scattered around the entire fruit (Fig. 2c, d) except in *P. somalensis* where they appear to be restricted to the ribs (Fig. 2b, e). The degree of thickening of the cell walls of the epidermal and mesocarp cells varies in transverse section (Fig. 2e–i). The outer pericinal cell walls of the epidermal cells are only slightly thickened in *P. arabica* and *P. calcarea* (Fig. 2f) compared to the other species. In *P. calva* (Fig. 2g) and *P. oppositifolia* (Fig. 2i), and occasionally in *P. somalensis*, the inner walls may be heavily thickened by an additional inner lignified layer. The mesocarp cell walls of the southern African species tend to be thicker than those of the two North African and Arabian species, *P. arabica* (Fig. 2a) and *P. somalensis* (Fig. 2b, e). In *P. calcarea* and *P. calva* (Giess 13448), the walls are so thick that very little lumen is visible (Fig. 2f, g). In *P. oppositifolia* (Herman 1496), the outer pericinal cell walls are considerably thicker than the other walls (Fig. 2i). From the variation in colour obtained on staining, it appears that the cell

Fig. 2. Transverse sections through the cypselas of all species of the *Pentzia incana* group. (a) *P. arabica*, note the six ribs; (b) *P. somalensis*, note the myxogenic cells restricted to the ribs; (c) *P. incana*, note the ruptured myxogenic cells around the entire fruit; (d) *P. oppositifolia*; (e) fruit rib of *P. somalensis*, with myxogenic cells restricted to ribs; (f) cypsel wall of *P. calcarea*, showing thickened, blue-staining mesocarp cell walls; (g) cypsel wall of *P. calva*, showing thickened, green-staining mesocarp cell walls; (h) cypsel wall of *P. incana*; (i) cypsel wall of *P. oppositifolia*. Vouchers: (a) Thulin et al. 8097 (K); (b, e) Thulin 10923 (UPS); (c, h) Magee & Boatwright 174 (NBG); (d) Magee & Roux 265 (NBG); (f) Schlieben 8754 (PRE); (g) Giess 13448 (PRE); (i) Herman 1496 (PRE). Scale: 200 μm.
walls differ in composition, e.g., the cell walls of _P. calva_ (Giess 13448, Fig. 2g) stained green (indicating the presence of lignin) whereas those of _P. calcarea_ (Fig. 2f) were purplish.

### 4. Key to the species of the _Pentzia incana_ group

1a. Pappus absent (rarely with cypselar wall tissue produced as teeth at apices of some cypselas):
   2a. Leaves opposite, often basally connate ........................................ _P. oppositifolia_
   2b. Leaves alternate, free ................................................................. _P. calva_

1b. Pappus present:
   3a. Capitula mostly arranged in subsessile, corymbose clusters of 2 to 5 heads; plants from South Africa and Arabia:
      4a. Capitula hemispherical, wider than long, usually arranged in subsessile pairs; plants from Somalia ...........
          _P. somalensis_
      4b. Capitula obconical, longer than wide, usually arranged in subsessile clusters or 3 to 5 heads; plants from Yemen .................................................. _P. arabica_
   3b. Capitula solitary, often with 1 to 3 additional, shortly pedunculate capitula from the leaf axils below (Fig. 1b); plants from southern Africa:
      5a. Involucre not prominently constricted at rim; terminal capitula solitary or often with 1 to 3 additional capitula from leaf axils below; petiole-like leaf bases usually ≤4 mm long; sparsely leafy shrublets with usually divericate branches ........................................ _P. incana_
      5b. Involucre prominently constricted at rim (Fig. 1c); terminal capitula always solitary; petiole-like leaf base usually ≥5 mm long; densely leafy shrublets with fastigate branches ................................................................. _P. calcarea_

### 5. Taxonomic treatment

#### 5.1. _Pentzia calcarea_


Free State, Jagersfontein (2925): ‘Kaffersfontein’ (−CB), 1 Apr. 1944, _Kies_ 310 (PRE, holo.; PRE! [2 sheets], iso.)

Sprawling, usually densely leafy, aromatic shrublet, 0.1–0.4 m tall; stems diffuse to procumbent, well-branched, branches prominently fastigate, younger branches white- or grey-felted; cortex rough. _Leaves_ alternate, regularly arranged along upper parts of branches, spreading, 5.0–35.0 × 2.0–8.0 (10) mm, 3-fid to pinnately 3- to 7(9)-lobed, uppermost often entire, lower two-thirds or more narrowed into prominent petiole-like base, 5.0–14.0 (−20) mm long, densely white- or grey-felted on both surfaces, rarely glabrescent, canescent; lobes ovate to narrowly oblong, 0.5–3.0 (−5.0) × ±0.5–1.0 mm, lateral lobes spreading semi-obliquely; sheath not differentiated from lamina, without secondary basal lobes, remnants of leaf ± persistent. _Capitula_ discoid, homogamous, always solitary; peduncle 4–35 mm long, sparsely to densely felted, greenish to light brown. _Involucre_ hemispherical, 2.0–3.0 × 4.0–8.0 mm, prominently constricted at rim; involucral bracts 4- or 5-seriate, median resin canal absent, margins and apices scarious, membranous apices of inner and innermost bracts 0.8–1.5 mm long; outer bracts lanceolate to narrowly ovate, 1.5–2.0 mm long; middle bracts ovate, 2.0–2.5 mm long; inner bracts ovate, 2.0–3.0 mm long, strongly falcate, innermost bracts narrowly obovate, 2.5–4.0 mm long, falcate. _Receptacle_ convex, epaleate, alveolate. _Florets_ bisexual, numerous. _Corolla_ 2.0–3.0 mm long, yellow, with glandular trichomes; tube 1.0–1.2 mm long; limb cupuliform to campanulate, 0.6–0.8 mm long (excluding lobes), 5-lobed; lobes triangular, spreading, ±0.5 mm long. _Anthers_ 0.8–1.0 mm long including apical appendages, slightly sagitate at base; apical appendages ovate to broadly ovate, obtuse. _Style_ terete with thickened base; branches ±0.5 mm long, truncate, papillate apically–dorsally. _Pappus_ obliquely cup-shaped, adaxially longer, membranous, white, irregularly lobed. _Cypselas_ oblong, ±1.5 × 0.5 mm, 5-ribbed, glandular trichomes between ribs, mucilaginous when soaked.

#### 5.1.1. Diagnostic characters

This species shares the prominent pappus with _P. incana_ but is distinguished by the sprawling, usually densely leafy habit (Fig. 1b), the prominently fastigate branches, the long petiole-like leaf base, 5.0–14.0 (−20) mm long, and the solitary capitula with the involucre prominently constricted at the rim (Fig. 1c) due to the strongly falcate inner involucral bracts.

#### 5.1.2. Distribution and ecology

_Pentzia calcarea_ occurs predominantly in the central regions of South Africa, extending into Namibia and Botswana (Fig. 3). The species favours seasonally waterlogged or moist soils often in or around pans and occurs almost exclusively on calcareous soils. Flowering is from November to June.

#### 5.1.3. Additional specimens examined

Namibia. 2118 (Steinhausen): Farm Zwergstrauch GOB 195 (−CD), Giess 3935 (PRE, WIND); Stuirenfeld (−DB), Schwedtfleger 4113 (WIND). 2217 (Windhoek): Farm Alt

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**Fig. 3. Distribution of _Pentzia calcarea_.**
Seis, 20 km from Seis (–DA), Zimmermann & Joubert 93 (WIND).


South Africa. Limpopo: 2329 (Pietersburg): Farm Melkboomfontein 919, to the east of Masele Hill (–DC), Fourie 1373 (PRE).

North West. 2523 (Pomfret): ±50 km from Bray on the Bray-Vergeulee road (–DB), Bourgoyne & Snow 4786 (PRE). 2524 (Vergeleé): Dalys Pan (–CD), Pole-Evans 2468 (PRE). 2527 (Rustenburg): Farm Boschkop, near Crocodile River on road to Beestekraal (–BA), Welman 559 (PRE). 2623 (Morokweng): Netherway, 6 mi from Armadillo (–DD), Burt-DAvy 13840 (PRE). 2624 (Vryburg): Groot Chwaing (–DB), Rossouw s.n. sub specie 60046 (PRE); Vryburg town lands (–DC), Foley s.n. (PRE). 2724 (Taung): Farm Drieport (–BA), MacDonald 76/17 (NBG, PRE); Tiger Kloof near Vryberg (–BB), Magee & Roux 264 (NBG); Boetsap (–CD), Brueckner 129 (PRE); Andalusia (–DD), Herre s.n. sub specie 60675 (PRE). 2725 (Bloemhof): S.A. Lombard Nature Reserve (–CB), Leisner 44 (PRE), Pettifer 421 (PRE); Christiana, town commonage (–CC), Burtt-DAvy 12481 (PRE).

Free State: 2725 (Bloemhof): Between Hooopstad and Bloemhof (–DB/DD), Hutchinson 2989 (PRE). 2727 (Kroonstad): Farm Enkeldoorn 67, just S of road to Zyterfontein 344 (–CA), Scheepers 1747 (PRE); Farm Greenhill (–CA), Fuls 281 (PRE). 2824 (Kimberley): Koompomfontein Agricultural Research Station (–AA), Herman 1470 (PRE); near Schmidtsdrift (–CA), Theron 817 (PRE); Benfontein (–DD), Gub s.n. (PRE). 2826 (Brandfort): Deelhoek, Krugerdriftdam Nature Reserve (–CC), Muller 1719B (PRE). 2829 (Harrismith): Harrismith (–AC), Phillips 3503 (PRE). 2924 (Hopetown): Farm Bleskop, 29 km from Luckhoff on road to Petrusville via Heuningkop (–DC), Herman 319 (PRE); Farm Boschard (–DD), Potts 2904 (PRE). 2925 (Jagersfontein): Heuwelsig (–AA), Hanekom 599 (PRE); Leeuwenfontein (–AA), Smith 5446 (PRE); Leeuw Vley 593 (–BB), Muller 1369 (PRE); Groenveli (–CC), Smith 3921 (PRE); Wheelendon (–CC), Henrici 2433 (PRE). 2926 (Bloemfontein): 11 mi SW of Bloemfontein (–AA), Sidey 291 (PRE). 3025 (Colesberg): Knoffelfontein (–AD), Smith 3599 (PRE). Precise locality unknown: Boshof Road, Brueckner 33 (PRE).

Northern Cape: 2621 (Khiis): W. of Vanzylsrus on R313 to Namibia on the Middelputts road (–DD), Smook 10528 (PRE). 2721 (Telleriepan): 74 km WSW of Van Zylsrus (–AA), Leisner 3532 (PRE). 2722 (Olfantshoek): ±14.7 km along dirt road bearing off of R380 highway, ca. 0.3 km from Gamagama River, ±65 km N of Kuruman (–BB), Snow & Bourgoyne 7132 (PRE). 2723 (Kuruman): Kuruman (–AD), Gerster 6303 (PRE); 3 mi NE of Kuruman (–AD), Leisner 975 (PRE); Farm Newstead (–CB), Gubb s.n. (PRE); Farm Killernay (–DD), Gubb s.n. (PRE). 2724 (Taung): Farm Rietgat (–AC), Gubb s.n. (PRE). 2820 (Kakamas): Farm Beadles, road north of Neusberg (–DA), Makgagga 213 (PRE). 2821 (Upington): Upington station grounds (–AC), Smith 2372 (PRE); past Kleinbegin on road to Groblershoop, near dam (–DC), Germishuizen 8403 (PRE). 2822 (Glen Lyon): +100 km from Upington to Oliphantshoek (–AB), Jordaan 2570 (PRE); 15 mi NE. of Germishuizen (–CB), Codd 1275 (PRE); 8 mi NWNW of W entrance of Parkloof (–DA), Leisner 1751 (PRE). 2823 (Griekwastad): Farm Ouplaas (–AB), Gubb s.n. (PRE); pan next to road from Koompomfontein to Danielskuit (–BB), Magee & Bootwright 216 (NBG), Magee & Roux 254 (NBG); Papkuil (–BC), Wilman 46664 (SAM); 34 mi from Kuruman on road to Upington (–CC), Verdoorn & Dyer 1765 (PRE); Rietfontein Farm, N of Campbell on road to Papkuil (–DA), Germishuizen 8542 (PRE); Brakpan (–DB), Eck 11 (PRE). 2824 (Kimberley): Kareean (–CD), Hanekom 2076 (PRE); Kenilworth (–DB), Brueckner 714A (PRE); Kimberley (–DD), Estherhuysen 933 (NBG), Lewis 53975 (SAM); 10 mi E of Kimberley (–DD), Schieben 8754 (NBG, PRE); Benaauwheidsfontein (–DD), Marloth 879 (NBG); Du Toits Pan (–DD), Tuck 16962 (SAM). 2922 (Prieska): Marydale (–AC), Henrici 4213 (PRE). 2923 (Douglas): 35 mi W of Douglas (–AA), Compton 23995 (NBG). 2924 (Hopetown): Hopetown commonage (–CA), Schweickerdt 1185 (PRE). 3023 (Briottown): Farm Vrolskap (–AD), Retief & Germishuizen 193 (PRE). Precise locality unknown: Barkley West Division, Marloth 948 (PRE).

5.2. Pentzia calva S. Moore in Bull. Herb. Boissier Ser. 2, 4: 1020 (1904); Hutch. in Bull. Misc. Inform. Kew 1916: 250 (1917); Merxmüller, Prodr. Fl. S.W. Afr. 139: 143 (1967). Type: Namibia. Windhoeck (2217): ‘Hereroiland, Auasberge’ (–CA), 1903, Dinter 290 (BM, lecto.—image!, designated here). [Note: of the two syntypes cited by Moore (1904), Dinter 290 and Dinter 319, only a single specimen of Dinter 290 could be found in BM. As this specimen is housed in the collection where Moore was based and as it is in agreement with the protologue it is selected as lectotype.]

P. microcephala Dinter ex Range,in Feddes Repert. 39: 57 (1935), nom. nud.

Compact, rounded, sparsely leafy, aromatic shrublet, 0.15–0.6 m tall; stems spreading to usually erect, well-branched, branches divaricate, younger branches white- or grey-felted; cortex rough. Leaves alternate, regularly arranged along upper parts of branches, suberect to spreading, 2.5–24.0 × ±1.5–6.0 mm, pinnately 3- to 7(9)-lobed, lower half to one-third usually narrowed into petiole-like base 0.5–9.0 mm long; densely white- or grey-felted on both surfaces when young, sometimes glabrescent and often canescent, lobes ovate to narrowly oblong, 0.5–3.0 (–5.0) × ±0.5–1.0 mm, lateral lobes spreading semi-obliquely to obliquely or sometimes horizontally; sheath not differentiated from lamina, only uppermost leaves with 1 to 3 pairs of secondary basal lobes, remnants of leaf ± persistent. Capitula disoid, homogamous, solitary or often with 1 or 2 additional capitula from leaf axils below; peduncle 2–28 mm long, sparsely to densely felted, greenish to light brown. Involucre hemispherical to broadly campanulate, 2.0–5.0 × 3.5–8.0 mm, erect spreading at rim; involucral bracts 4- or 5-seriate, median resin canal
absent, margins and apices broadly scarious, membranous apices of inner bracts 0.7–2.0 mm long; outer bracts lanceolate to ovate, 1.5–2.5 mm long; middle bracts ovate to broadly ovate, 2.0–3.0 mm long; inner bracts ovate to broadly elliptic, (2.0) 3.0–5.0 mm long, very slightly incurvate apically; innermost bracts obovate to oblanceolate, 2.0–3.5 mm long. Receptacle convex, epaleate, alveolate. Florets bisexual, numerous. Corolla 1.5–3.0 mm long, yellow, with glandular trichomes; tube 1.0–1.5 (2.0) mm long; limb capilliform to campanulate, ±0.5–1.0 mm long (excluding lobes), 5-lobed; lobes triangular, spreading, ±0.5 mm long. Anthers ±0.6–1.2 mm long including apical appendages, slightly sagittate at base; apical appendages ovate to broadly ovate, obtuse. Style terete with thickened base; branches ±0.5 mm long, truncate, papillate apically–dorsally. Pappus absent (cypsela or cypselal wall tissue rarely produced as rudimentary teeth at apices of some cypsela). Cypsela oblong, ±1.5 × 0.5 mm, 5-ribbed, glandular trichomes between ribs, mucilaginous when soaked.

5.2.1. Diagnostic characters

This species is distinguished from the similar P. incana by the absence of a pappus on the ovary or fruit. Rarely, the cypsela wall tissue may be produced as rudimentary teeth at the apices of some cypsela. Although P. oppositifolia also lacks a pappus, it is easily distinguished from P. calva by the opposite, often basally connate leaves.

5.2.2. Distribution and ecology

Pentzia calva was previously thought to be restricted to Botswana and Namibia (Germishuizen and Meyer, 2003) but it has become clear that many specimens were previously misidentified as P. incana. As a result, the distribution of P. calva is now known to extend from Namibia and Botswana southwards into South Africa, where the species has been recorded from North West Province as well as the eastern portion of the Northern Cape Province as far south as De Aar and slightly east into the flanking areas of the Free State Province (Fig. 4). Flowering is from October to June.

5.2.3. Additional specimens examined

Namibia. 2216 (Otjimbingwe): Farm Otjomuapa WIN 40 (–DB), Giess 15045 (WIND); Farm Claratal (–DD), De Winter & Giess 7150 (PRE); Harris (–DD), Strohbach 4954 (WIND); Farm Lichtenstein 366 (–DD), Kolberg & Mannheimer 413 (WIND), Mannheimer 2679 (WIND). 2217 (Windhoek): Farm Schoongelegen WIN 152 (–AB), Seydel 2645 (WIND); Neudam Experimental Farm 20 mi E of Windhoek (–AD), De Winter 2371 (PRE), Farm Neudam 63, just after farm Ludwig 64, 30 km E of Windhoek (–AD), Wannotp & Wannotp 682 (PRE); Windhoek and surroundings (CA), Bohlmann 88/35 (WIND); Aris Hotel (–CA), Kers 1151 (WIND); Schieferhahn, Immental (–CA), Von Koenen 531 (WIND); Farm Finkenstein WIN 71 (–CB), Seydel 4200 (WIND); Farm Voigtländ WIN 77 (–CB), Volk 11303 (WIND). 2218 (Gobabis): Farm Saalie (–DC), Klaassen 561 (WIND). 2316 (Nauchas): along C26, Gamsberg to Solitaire road (–AB), Klaassen, Maggs-Kölling & Mannheimer 1248 (WIND); Farm Isabis (–AD), Giess 7828 (PRE, WIND); Farm Weissenfels (–AD), Volk 11480 (WIND); Farm Gamsberg WIN 23 (–AD), Kers 181 (WIND); Farm Duruchaus (–BB), Wittneben 4–262 (WIND); Farm Gollschau (–BC), Walter 1747 (WIND); Farm Namibgrens REH 154 (–CA), Giess 13552 (WIND); Farm Remhgote (–CC), Giess 13448 (PRE); Nauzerus 229 W, at natural spring (–CD), Triffin s.n. (WIND). 2416 (Maltahoë): Naukluft, sandstone plateau at Kapokvlakte (–AA), Günster 9460 (WIND); Mountain Zebra Park, Maltahoë (–AD), Giess 10424 (PRE, WIND); Bulspoort (–AD), Liebenberg 5116 (PRE, WIND); Naukluft Plateau (–AB), Müller & Tolson 855 (WIND). 2419 (Aranos): Farm Mooigelee, 14 mi E of Aranos (–AB), Van Vuuren & Giess 1083 (PRE). 2516 (Helmeringhausen): Farm Kleinfontein (–BB), Giess 13345 (PRE, WIND); Farm Lisbon (–BB), Giess 10676, 10701 (WIND); in river next to gravel road S of Maltahoë (–BD), Bremer & Strohbach 3 (UPS, WIND); Farm Goais (–DD), Giess 8814 (NBG). 2616 (Ausz): Farm Frisgewaagd BET 124 (–BA), Giess 10269 (WIND), 10293 (PRE, WIND); Aus (–CB), Dinter 6071 (NBG, PRE); Farm Gamochas BET 31 (–BA), Giess & Robinson 13242 (PRE, WIND); Farm 38 Plateau (–CB), Owen-Smith 1153 (WIND); Farm Aar (–DA), Wendi 185 (WIND); N of railway at Schakalskuppe (–DA), Pearson 4221 (NBG). 2716 (Witputz): ±25 km E of Witputz North (–DB), Lavranos & Pehleman 21244 (WIND). 2718 (Granau): Farm Rishon 365, on top of Gräberberg along road to telecom tower (–BC), Strohbach & Dauth 3838 (WIND); Farm Witmond 162A (–BC), Strohbach, Kubiške & Sheuyange 2869 (WIND); Farm Sandmund (–BD), Giess, Volk & Blessner 7174 (PRE); Farm Genadendal 264, plain below hill of western escarpment of Karas Mountains (–DA), Strohbach, Sheuyange, Calitz, Chivel 3331 (WIND).

Pentzia virgata
Manning, Cape Pl. 351. 2000.

Merxmüller, Prodr. Fl. S.W. Afr. 139: 144 (1967); Retief and Prieska on road to Vanwyksvlei, at Grootfourieskolk (Marydale & Boatwright 225)

Tein, near De Aar (PRE)

Carnavon (3024): Kafferfontein (NBG); Newlands (3025) (Twee Rivieren): Kaverfontein, in camp above homestead (–AD), Smith 3674 (PRE)

Northern Cape: 2520 (Mata Mata): Kaekana, Kalahari Gemsbok National Park (–CA), Brynard 219 (PRE).

2620 (Twee Rivieren): Kalahari Gemsbok National Park, ±1 km from Gemsbok plain wind pump (–BA), De Beer 25 (PRE); Kalahari Gemsbok National Park, Samevloeiing (–BC), Van Rooyen 4498 (PRE). 2821 (Uptoning): Farm Thornlea, 55 km from Uptoning on Kleinbegin road (–DA), Smook & Harding 727 (PRE).

2822 (Glen Lyon): 12 mi ESE of Skeurberg (–AG), Leisner 2027 (PRE); Dunmurray (–BC), Pole-Evans 50 (PRE). 2823 (Griekwastad): 39 km from Griekwastad towards Kimberley (–DC), Magee & Roux 259 (NBG).

2824 (Kimberley): Honderdoorn (–AA), Esterhuysen 99 (NBG); Newlands (–AB). 2922 (Prieska): 20 km from Abrahamsdam to Koegas (–AD), Magee & Boatwright 224 (NBG); 24 km from Abrahamsdam to Koegas (–AD), Magee & Boatwright 225 (NBG); at turn off to Witkop on road to Marydale (–CA), Germishuizen 8336 (PRE); Spitzkop Farm (–DB), Bryant 71 (PRE).

3022 (Carnavon): 80 km from Prieska on road to Vanwyksvlei, at Grootforieskolk (–AA), Germishuizen 8204 (PRE).

3024 (De Aar): Potfontein, near De Aar (–AA), Schweikerdt 1195 (PRE); De Aar (–CA), Pole-Evans 18818 (PRE).


*Pentzia cotuloides* DC., Prodr. 6: 138 (1838). Type: South Africa. Precise locality unknown: ‘Cap. Bonae Spaie’, 1835, Drege 551 (G-DC, leeto.—image!, designated here; P–image!, HBG–image!, isolecto.). [Note: the specimen from De Candolle’s own collection in G-DC is designated here as the lectotype.]

*Pentzia cotuloides* var. *affinis* DC., Prodr. 6: 138 (1838), Type: South Africa. Eastern Cape. Precise locality unknown: ‘Albany’, 1835, Drege 2125 (G-DC, leeto.—image!, designated here; P! [3 sheets], isolecto.) [Note: Drege 2125 is selected here as it has an accurate collection locality and consists of several duplicates, all of which closely match the protologue. The specimen from De Candolle’s own collection in G-DC is designated as the lectotype.]

*Pentzia virgata* var. *microcephala* Harv. in Harv. and Sond., Fl. Cap. 3: 174 (1865), syn. nov. *P. incana* var. *microcephala* (Harv.) Hutch. in Bull. Misc. Inform. Kew 1916: 248 (1917). Type: South Africa. Western Cape Province, Beaufort West (3222): ‘Renosterkop’ (–BB), 1850, Zeyher 854 (TCD, leeto.—image!, here designated; SAM!, P—image!, isolecto.) [Note: this is the only collection cited by Harvey (1865) and the specimen from Harvey’s own collection in Trinity College Dublin is selected as lectotype.]

*Pentzia bolusii* Hutch., Bull. Misc. Inform. Kew 1916: 252 (1917), syn. nov. Type: South Africa. Western Cape, Victoria West (3123): ‘In apertis circa Murraysburg’ (–DD), Tyson 360 (BOL, holotype.). [Note: This species is known only from a depauperate specimen comprising a small branchlet with a few capitula. Following examination of the specimen and field investigations in the area where it was collected we are confident that it is a specimen of *P. incana* and reduce it to synonymy.]

Compact, rounded or spreading, sparsely leafy, aromatic shrublet, 0.15–0.6 m tall; stems erect to spreading, well-branched, branches divaricate or rarely somewhat fastigate, younger branches white- or grey-felted; cortex rough. *Leaves* alternate, regularly arranged along upper parts of branches, suberect to spreading, 2.0–15.0×±1.5–7.0 mm, pinnately 3- to 7(9)-lobed, lower half to one-third usually narrowed into petiole-like base up to 7 mm long; densely white- or grey-felted on both surfaces when young, sometimes becoming sparsely felted when mature, often canescent; lobes ovate to narrowly oblong, 0.5–5.0×±0.5–1.0 mm, lateral lobes spreading semi-obliquely to often horizontally; sheath not differentiated from the lamina, only uppermost leaves with 1 to 3 pairs of secondary basal lobes, remnants of leaf somewhat persistent. *Capitula* discoid, homogamous, solitary or usually with 1 to 3 additional capitula from leaf axils below; peduncle 0.5–110 mm long, sparsely to densely felted, greenish to light brown. *Involucre* hemispherical to broadly or sometimes narrowly campanulate, 2.0–4.0×3.0–7.0 mm, erect to spreading at rim; involucral bracts 4- or 5-seriate, median resin canal absent, margins and apices scarious, membranous apices of inner and innermost bracts 0.6–1.5 mm long; outer bracts lanceolate to ovate, 1.5–3.0 mm long; middle bracts ovate to broadly ovate, 2.0–3.5 mm long; inner bracts ovate to broadly elliptic, 2.5–3.5 mm long, very slightly incurved; innermost bracts oblong to obovate, 2.5–4.0 mm long. *Receptacle* convex, epyaleate, alveolate. *Florets* bisexual, numerous. *Corolla* ±2.0–2.5 mm long, yellow, with glandular trichomes; tube ±1.0 mm long; limb cupuliform to campanulate,
±0.5 mm long (excluding lobes), 5-lobed; lobes triangular, spreading, 0.4 mm long. *Anthers* ±1.0 mm long including apical appendages, slightly sagittate at base; apical appendages ovate to broadly ovate, obtuse. *Style* terete with thickened base; branches ±0.5 mm long, truncate, papillate apically–dorsally. *Pappus* present, auriculate or obliquely cup-shaped, adaxially longer, membranous, white, irregularly lobed. *Cypselas* oblong, ±1.5 × 0.5 mm, 5-ribbed, glandular trichomes between ribs, mucilaginous when soaked.

5.3.1. Diagnostic characters

*Pentzia incana* is distinguished from the superficially similar *P. calva* and *P. oppositifolia* by the presence of a distinct pappus. It differs from *P. calcarea* in the sparser foliage with usually divaricate branches; the mostly shorter (≤4 mm long) petiole-like leaf bases; the capitula are often arranged in small groups of 2 to 4 due to the development 1 to 3 additional capitula in the leaf axils below the terminal capitulum (Fig. 1a); and the inner involucral bracts are only very slightly apically incurved so that the involucre rim is erect to spreading but never prominently constricted as in *P. calcarea*.

5.3.2. Distribution and ecology

This widespread and dominant species occurs throughout the more arid regions of the Western and Northern Cape Provinces, extending slightly eastwards into the Eastern Cape and Free State Provinces and northwards into southern Namibia (Fig. 5). As this species occurs in both summer and winter rainfall regions, flowering specimens have been recorded throughout the year.

5.3.3. Additional specimens examined

Namibia. 2618 (Keetmanshoop): Keetmanshoop (−AC), Rauh 49107 (WIND); 35 mi SW of Narubis (−DC), Acoks 18041 (WIND). 2716 (Witputz): Farm Zebrafontein LU 87 (−DD), Giess, Volk & Bleissner 5350 (WIND). 2718 (Grünau): Farm Pieterskloof KEE370 (−BB), Giess & Muller 11928 (PRE); Farm Rishon 365 on plateau of Groot Karas Mountain (−BC), Stohbach, Kubirschke & Sheuange 2818 (PRE); Farm Witmond, on plateau on E part of farm (−BC), Strohbach & Dauth 3798 (PRE, WIND); Farm Sandmund WAR 270 (−BD), Giess, Volk & Bleissner 7174 (WIND); Karasberg, Graberberg, Farm Rishon, near Post Office tower (−BD), Van Wyk 8674 (WIND); 19 mi N of Grünau (−CB), Theron 1938 (PRE).

South Africa. Free State: 2924 (Hopetown): Farm Skuilhoek 829, W of Luckhoff (−CB), Muller 1377 (PRE); Klein Gryskop (−DC), Pole-Evans & Smith 1892 (PRE); Smith 523 (PRE); Farm Deelfontein (−DD), Anderson 8 (PRE). 2925 (Jagersfontein): Kraaiapoort near end of dam (−CA), Acoks 708 (PRE); Farm Samar, ±6 mi NW of Fauresmith (−CB), Smith 3903 (PRE); Farm Goedehoep (−CC), Rabie 7089 (PRE); Groenblv (−CC), Rabie P5 (PRE); Verdoorn 1656, 2189 (PRE); Sandy Mount Park (−CC), Du Preez 2273 (PRE); Fauresmith Botanical Reserve (−CD), Smith 3987, 3991, 4105 (PRE); Verdoorn 2091 (PRE).

Northern Cape: 2722 (Olifantshoek): Sishen, 25 km E of Olifantsfontein (−DD), Germishuizen 2811 (PRE). 2817 (Vioolsdrif): near Kuboes, Vanderbergh, behind fountain (−AC), Van Jaarsveld 13476 (WIND); Vanderbergh (−AC), Oliver, Tölken & Venter 149 (NBG); large kloof on N side of Lelieshoek (−AC), Oliver, Tölken & Venter 335 (NBG). 2820 (Kakamas): Witkloofpoort, 10 mi N of Augrabies (−CB), Marloth 12453 (NBG, PRE). 2822 (Glen Lyon): Steinkopf on Kosies on Kosies Mountains (−BA), Verdoorn & Dyer 1862 (PRE); Klipfontein Koppie (−BA), Compton 5448 (NBG); Anenous Pass, just W of summit on S facing slope amongst granite domes (−BA), Snijman 1583 (NBG); Near Bulletrap, 2 km W of N7 on road to Bulletrap (−BD), Le Roux 3203 (NBG); Die Brand Farm, Komaggas (−CB), Cowell 18 (NBG); 25 km from Springbok on road to Spetskalkberg (−DA), Kruger 291 (PRE); Hester Malan Nature Reserve (−DB), Struck 6 (NBG); Van Wyk 5734 (PRE); Springbok (−DB), Van der Schijff 8141 (PRE); 3.5 km E of Nababee and 1.5 km N of Dinkel Copper Mine (−DB), Hilton-Taylor 2091 (NBG); Namakwa National Park, near Kanariesfontein turn off (−DC), Koekemoer 3006 (PRE); Droëdp (−DD), Compton 11557 (NBG). 2918 (Gamoep): Goegap Nature Reserve, at guesthouse (−CA), Zietsman 3895 (PRE). 2920 (Boommvier): ±90 km from Brandvlei on R27 between Kenhardt and Brandvlei (DB), Magee & Boatwright 230 (NBG). 2921 (Kenhardt): ±20 mi E of Kenhardt (−BD), Schliepen 8821 (NBG, PRE); 23 mi S of Kenhardt (−CA), Hutchinson 968 (PRE). 2922 (Prieska): Farm Spiitkop, Spiitkop Hill (−BA), Gubb 12555 (PRE); Farm Doringberg, 30 mi S of Prieska (−DD), Stander 2 (NBG). 2924 (Hopetown): Loich View, near Havenga bridge (−DC), Weger 1304 (PRE). 3017 (Hondeklipbaai): Kamiesberg, Skiplap Wildflower Reserve (−BB), Cruz 160 (NBG); Kamiesberg, lower slopes of pass, Kamieskroon side (−BB), Koekemoer 1189 (PRE); 1 km S of kamieskroon (−BB), Hugo 2886 (NBG); 4 km E of Kamieskroon, along road to Leliefontein (−BB), Greater 21718 (PRE); just beyond Grootvlei Pass on

![Fig. 5. Distribution of *Pentzia incana*.](image-url)
to Soebatsfontein (−BB), Joffe 104 (PRE). 3018 (Kamiesberg): N of Darters Grave (−AC), Leighton 1245 (PRE); Studer’s Pass, 13.7 mi from Garie to Kamiesberg (−AC), Thompson 425 (NBG, PRE); Studer’s Pass (−AC), Evard 9000 (PRE); Farm Bonostveile near Kliprand (−BC), Schlieben & Van Breda 9873 (NBG). 3019 (Loeriesfontein): 34 km N of Loeriesfontein, turn off to Lospersplaas (−CD), Crosby 831 (PRE). 3020 (Brandveile): Kareekop, between Kareekop Farm and Bleskrantz Farm, N of turnoff to Brandveile from Williston (−DC), Germishuizen 6400 (PRE); Kareekop, NW of Williston (−DC), Meyer 110 (PRE). 3021 (Vanwyksvlei): SE of Vanwyksvlei on Humansdam Farm (−BD), Harding 593 (PRE). 3022 (Carnavon): Carnavon (−CC), Botha 3003 (PRE). 3023 (Britstown): 20 km on Britstown-Prieska road (−AD), Le Roux 231 (PRE); 30.7 km from Britstown on Prieska road, Jagskern turn off (−AD), Herman 1177 (NBG); Farm Smouskloof (−BA), Retief & Germishuizen 87 (PRE); Farm Volstruispoort, edge of Brinkspan (−BC), Retief & Germishuizen 16 (NBG); Kwaggafontein, 14 mi W of De Aar (−DB), Stony 1081 (PRE). 3024 (De Aar): De Aar (−CA), Esterhuyzen 942 (NBG), Pole-Evans s.n. sub H18818 (PRE); Rogers 8 (PRE). 3119 (Calvina): Rheebokfontein SW of Loeriesfontein (−AB), Thompson 2888 (NBG); Nieuwoudtville, Glenlyon (−AC), Van Wyk 1438 (NBG, PRE); Nieuwoudtville Wild Flower Reserve (−AC), Perry & Snijman 2046, 2082, 2182 (NBG); Oorlogskloof Nature Reserve (−AC), Pretorius 28 (NBG); Rondekop road to Groothoek between Nieuwoudtville and Calvina, ±8 km from turn off (−AD), Koekemoer 2703 (NBG); Hantam, Matjiesfontein, Geelboslande (−AD), Rosch 269 (NBG); Hantam Peak (−BC), Wisura 3539 (NBG); Akkerdam Nature Reserve, 5 km N. of Calvina (−BC), Theron 226 (PRE); 20 km from Calvina on road to Loeriesfontein, Klein Toren (−BC), Coetzer 830 (PRE); Calvina (−BD), Compton 19488 (NBG); Schmidt 63, 172 (PRE); Schlieben & Van Breda (PRE); Hantamsberg, Farm Van Rynshoek (−BD), Thompson 2357 (NBG). 3120 (Williston): 30 km from Calvina on Williston road (−AC), Ueckermann 7375 (PRE); Farm Rietpoort, 42 km N of Williston on road to Bropas (−BB), Germishuizen 6331, 6332 (PRE). 3121 (Fraserburg): Farm Grootfontein (−AA), Meyer 49 (PRE); Droëputs, 20 km from Williston on road to Carnavon (−BA), Meyer 142B (PRE); Fraserburg (−DC), Nel s.n. (NBG). 3123 (Victoria West): 36 km from Victoria West on main road to Britstown, Farm Rietpoort (−AA), Herman 1161 (NBG, PRE), 1119 (NBG). 3124 (Hanover): Grootfontein (−AA), Theron 565 (PRE); Verdoorn 1403, 1483, 2684 (PRE); 2 mi N of Grootfontein (−AA), Bakker 1110 (PRE). 3220 (Sutherland): Soekop, Huis Kamp Camp (−AA), Rösch 309, 557 (NBG); Soekop, Bo-hoek Camp (−AA), Rösch 290 (NBG); Tankwa National Park, Gannaga top (−AA), Rösch 754 (NBG); Foot of Roggeveld Escarpment, bottom of Gannaga Mountain Pass (−AA), Rösch 426 (NBG); Ouberg Pass (−AD), Brusse 3285 (NBG, PRE); Half way up Ouberg Pass (−AD), Moffett 3801 (NBG); Houthoek (−CA), Hanekom 1100 (PRE); Farm Kraai Rivier 173, 0.5 km N of Ceres turn off on Matjiesfontein/Sutherland road (−CB), Cloete & Hasselau 12 (NBG); Windheuwel between Sutherland and Ceres (−CB), Hugo 396 (NBG). 3221 (Merweville): Lemoenskalk, S slopes of Gifkop in Nuweveld Mountains (−AC), Hugo 251 (NBG); Layton (−BB), Shearing 450 (PRE).

Western Cape: 3018 (Kamiesberg): Grootdrink N of Kliprand (−DA), Welman 60 (PRE). 3118 (Vanrhynsdorp): Farm Kwaggaskop, 6 mi W of Nuwerus (−AB), Le Roux 2269 (NBG); flats below Gifberg (−DA), Forest & Manning 534 (NBG); Sandkraal near Gifberg (−DB), Steyn 419 (NBG); Heerenlong flats (−DC), Bond 1065 (NBG). 3123 (Victoria West): Victoria West Station (−AC), Smith 2413, 2423 (PRE); Kromrivier Station (−CC), Rodin 3412 (PRE). 3221 (Merweville): Fraserburg Road (−DD), Smith 2502 (PRE). 3222 (Beaufort West): Stolsheoek next to staff huts, Karoo National Park (−AD), Bengis 425 (PRE); Karoo National Park, at foot of Coronet Crescent (−AD), Bengis 325 (PRE); Klipbank (−AD), Rogers 1711, 23740 (PRE); Beaufort West (−BC), Davidson 24923, 24924 (PRE); foot of Nuweveld Mountains, Beaufort West (−BD), Gibbs Russell, Robinson & Herman 520 (PRE); Farm Aardooms, along road to Blouwater (−DD), Retief & Reid 84 (PRE). 3223 (Rietbron): Farm Roodiam, roadside turn off to Rietbron from Aberdeen–Beaufort West main road (−CA), Retief & Reid 40 (PRE); Farm Kalkdam (−CD), Retief & Reid 371 (PRE). 3319 (Worcester): near Osplaats station, De Doorns (−BC), Walters 1716 (NBG); Worcester Veld Reserve (−CB), Olivier 116 (NBG, PRE); Van Breda & Joubert 3003 (NBG, PRE); Van Rensburg 335 (NBG, PRE); Karoo Garden Veld (−CB), Bayer 201 (NBG); road to Karoo Gardens, Worcester (−CB), Thompson 1221 (NBG); Farm Doringkloof, southern foothills of Voetpadberg (−DA), Morley 397 (NBG); Farm Nuwerus near Nuy Station (−DA), Van Breda & Joubert 1898 (PRE); 3 mi from McGregor to Bonniveille (−DD), Marsh 983 (NBG, PRE); 10 km W of Robertson on road to Worcester, S. side of road just before Langvlei Lime Works (−DD), Hugo 9266 (NBG); Robertson (−DD), Schmidt 34 (PRE); Vrolijkhout Nature Reserve (−DD), Theron et al. 3134 (PRE), Van der Merwe 2367 (PRE). 3320 (Montagu): 5 mi E of Touws River (−AC), Balfour 8 (NBG); Farm Avondrus, 30 km SE of Touwsrivier (−AC), Hilton-Taylor 1954 (NBG); Whitehill (−BA), Compton 8534 (NBG); Gillett 1710 (NBG); 17 km N of Matjiesfontein next to national road (−BA), Hugo 2552 (NBG); Laingsberg (−BB), Bond 839 (NBG), Compton 10856 (NBG); Anysegny Nature Reserve, next to road leading to Leenders Kraal (−BC), Martin 88 (PRE); Ouberg Pass on road to Montagu (−CC), Magee & Boatwright 174 (NBG); Montagu Baths (−CC), Page s.n. (PRE). 3321 (Ladismith): Seweweeksoort, S end (−AD), Van Wyk 541 (NBG); Gamkapoort Nature Reserve (−BC), Laidler 630 (NBG); Matjiesvlei (−BC), Bayliss 257 (PRE); W of Kruisrivier (−BD), Hugo 189 (NBG); 1.9 km from dam on circular drive, Nolukofu Nature Reserve (−CA), Laidler 34 (NBG); on R62, 25 km W of Ladismith (−CA), Watson & Panero 94–90 (NBG); Muiskraal (−CA), Bohnen 8202 (NBG); 2 mi from Ladismith on Barrydale road (−CB), Wells 3761 (PRE); Rooiberg, ridge W of summit of the pass (−DA), Oliver 5317 (NBG). 3322 (Oudtshoorn): Sand River Mountains, Prince Albert (−AA), Marloth 4487 (PRE); 5 km
from Beaufort West-Laingsburg road on way to Oudshoorn (−BC), Van Wyk 1872 (PRE); De Rust, Farm Doornkraal (−DA), Dahlstrand 1435 (NBG, PRE), Dahlstrand 3591 (PRE); Farm Aangenaam, near De Rust (−DA), Dahlstrand 2230 (PRE). 3323 (Willmore): Georgiada (−AD), Oliver 5317 (NBG). 3420 (Bredasdorp): Swellendam (−AB), Anon s.n. sub. PRE43721 (PRE); Kathoek, N slopes of limestone hills above Kathoek (−AD), Burgers 2494 (NBG); Wydgellegen (−AD), Compton 19552 (NBG). 3421 (Riversdale): Riversdale (−AB), Schlechter 1793 (NBG). Precise locality unknown: Buffelsrivier, Beaufort West District, Zeyher s.n. (SAM).

Eastern Cape: 3125 (Steynsburg): 3 mi NW of Middelburg (−AC), Leistner 632 (NBG); Farm Grooffontein (−DC), Retief & Germishuizen 379 (PRE). 3224 (Graaf-Reinet): near Klipplas, Aberdeen (−AC), Hoffman 569 (NBG); Karoo Nature Reserve, along boundary fence at Spitskop (−BC), Allardice 1537 (PRE); Kendrew Station (−DA), Nel s.n. (NBG). 3225 (Somerset East): Mountain Zebra National Park (−AB/AD), Brynard 342 (PRE); Cookhouse (−DB), Rogers s.n. (NBG). 3324 (Steytlerville): Blaaubosch Game Reserve (−BD), Kemp 14 (PRE). 3325 (Port Elizabeth): S of Cradock (−BA), Maguire 684 (NBG); Zuurberg National Park (−BC), Van Wyk & Van Wyk 1387 (PRE); Addo Elephant National Park (−BC/AD), Liebenberg 6327 (NBG); Addo Elephant National Park, Renosterkamp (−BD), Hall Martin 1918 (PRE); Uitenhage (−CD), Zeyher 775 (NBG). 3326 (Grahamstown): Cradock road turn off right to Adelaide gravel road, 10.8 mi from Botanical Research Unit (−AB), Booit 115 (PRE); Piggotts Bridge (−AB), Bayliss 4997 (NBG); Glen Merville (−BA), Taylor & Edwards 8773 (PRE); 6 mi from Grahamstown, Botha Valley (−BA), Dyer 3 (PRE); Grahamstown (−BC), Anon. sub NH782 (NBG).

5.4. Pentzia oppositifolia Magee sp. nov. P. incanae foliis lobatis pinnatim, capitulis breviter pedunculatis et bracteis involucrorum ovatis marginibus late membranaceis similis, sed dispositione foliorum contraria, plurumque connata (in P. incana alterna et libera) et absentia pappi (in P. incana preansens) differt. Type: South Africa. Free State, Kimberley (2825): ‘upper slopes of dolomitic limestone pan along road from Hertzogville to Boshof (−AD), 23 May 2010, Magee & Roux 265 (NBG, holo.!, BOL!, K!, PRE!, NBG!, S!, iso.).

Compact, rounded, densely leafy, aromatic shrublet, 0.1–0.15 m tall; stems erect to spreading, well-branched, branches divaricate or somewhat fastigate, younger branches white- or grey-felted; cortex rough. Leaves opposite, regularly arranged along upper parts of branches, suberect, 3.0–6.0 × ±1.5 mm, pinnately 3- to 7-lobed, lower half usually narrowed into petiole-like base 1.5–3.0 mm long, often basally connate; densely white- or grey-felted on both surfaces when young, sometimes glabrescent, often canescent; lobes ovate to narrowly ovate, 0.5–1.0 × ±0.5 mm, lateral lobes spreading obliquely; sheath not differentiated from lamina, only uppermost leaves with 1 to 3 pairs of secondary basal lobes, remnants of leaf ± persistent. Capitula discoid, homogamous, solitary or sometimes with 1 or 2 additional capitula from the leaf axils below; peduncle 3–10 mm long, densely felted, greenish to light brown. Involucule hemispherical to broadly or narrowly campanulate, 3.0–4.0 × 2.5–5.0 mm, erect to spreading at rim; involucral bracts 4-seriate, median resin canal absent, margins and apices scarious, membranaceous apices of inner and innermost bracts 0.7–1.0 mm long; outer bracts narrowly ovate to ovate, 1.5–2.0 mm long; middle bracts ovate, 2.0–2.5 mm long; inner bracts ovate, ca. 3.0 mm long, slightly to prominently incurved; innermost bracts oblancoelate to narrowly obovate, 3.0–3.5 mm long. Receptacle convex, epaleate, alveolate. Florets bisexual, numerous. Corolla 2.0–2.5 mm long, yellow, with glandular trichomes; tube 1.2–1.5 mm long; limb capiliform, ±0.7 mm long (excluding the lobes), 5-lobed; lobes triangular, spreading, ±0.25–0.4 mm long. Anthers ±1.0 mm long including apical appendages, slightly sagittate at base; apical appendages ovate to broadly ovate, obtuse. Style terete with thickened base; branches ±0.5 mm long, truncate, papillate apically–dorsally. Pappus absent. Cypselas oblong, ±1.5 × 0.5 mm, 5-ribbed, glandular trichomes between ribs, mucilaginous when soaked (Fig. 6).

5.4.1. Diagnostic characters

This distinctive species is readily identified by the conspicuous opposite, often basally connate leaves (Fig. 6a, b) and the absence of a pappus (Fig. 6h).

5.4.2. Distribution and ecology

Pentzia oppositifolia is restricted to the alluvium in and around the dolomitic limestone pans around Danielskuil in the Northern Cape Province and Boshof in the Free State Province (Fig. 7). Flowering is from January to May.

5.4.3. Additional specimens examined

South Africa. Free State: 2825 (Boshof): Biesievlei farm, ±55 km from Christiana, on road to Boshof (−CB), Germishuizen
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References