The genus *Bolandia* (Asteraceae: Senecioneae) expanded to include three discoid taxa previously treated as *Senecio scapiflorus*, and a note on the typification of *Brachyrrhynchos*

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Abstract

The southern African genus *Bolandia* Cron. was described for two species of perennial herbs with radiate, yellow capitula and diagnostic dimorphic cypselae. The ray and outer disc cypselae are falcate-fusiform and triangular in section, with a convex, sparsely puberulous outer surface and a keeled, glabrous inner surface, and the inner florets are fusiform and puberulous throughout. A small group of perennial herbs with discoid capitulae until now treated as *Senecio scapiflorus* (L’Hér.) C.A.Sm. sensu lato is shown to have the same dimorphic cypselae as *Bolandia*, and phylogenetic analysis of plastid and nuclear sequence data places these taxa in a clade with that genus and apart from other species of *Senecio*. Herbarium and field studies support the division of the *S. scapiflorus* complex into three groups of populations differing in leaf morphology, flower colour, geographical distribution and ecology. These are recognized at the rank of species and transferred to the genus *Bolandia* as *B. pinnatifida* (Thunb.) J.C.Manning & Cron, *B. glabrifolia* (DC.) J.C.Manning & Cron and *B. elongata* (L.f.) J.C.Manning & Cron respectively. The circumscription of *Bolandia*, which now includes five species, is emended to include discoid taxa with yellow, white or mauve florets. A complete taxonomic and nomenclatural revision, including numerous new synonyms, full descriptions and distribution maps, is provided for the discoid species. Finally, the later inclusion by Candolle (1838) of only *Brachyrrhynchos junceus* Less. in the type section of the genus is interpreted as effective lectotypification of the genus, precluding the possibility that it is an earlier name for *Bolandia*.

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1. Introduction

Phylogenetic relationships within the large and diverse tribe Senecioneae are being gradually resolved through the increasing application of molecular techniques (Pelser et al., 2007 and references therein). This includes the recircumscription of several genera in order to render them monophyletic. In a recent instance, the systematic study of the genus *Cineraria* L. resulted in the description of the allied genus *Bolandia* Cron for two southern African species that were anomalous in their cypsela morphology (Cron et al., 2006). *Bolandia* as currently circumscribed includes two species of ± tomentose, tufted perennial herbs or subshrubs with petiolate, ovate to pinnatifid leaves, and conspicuously pedunculate inflorescences bearing solitary, bright yellow, radiate capitula. The capitula are ecalyculate, with a uniseriate involucre of 10–12 phyllaries, female-fertile ray florets and bisexual disc florets. The funnel-shaped disc florets have with truncate styles with a central tuft of sweeping hairs protruding beyond the fringed apex. The genus is diagnosed by its dimorphic cypselae: the ray and outer disc cypselae are falcate-fusiform and triangular in section, with...
a convex outer surface bearing scattered, short mucilaginous hairs and a glabrous, strongly keeled inner face; the inner disc cypselae are fusiform and entirely covered with scattered, short mucilaginous hairs.

Examination of Senecio L. in the southwestern Cape during the preparation of a review of the species for the region revealed that a group of closely allied species centred on Senecio scapiflorus (L’Hér.) C.A.Sm. has the characteristic cypsela and stylar morphology of Bolandia. The S. scapiflorus group, which also includes Senecio glabrifolius DC. from Namaqualand and the variable S. diversifolius (DC.) Harv. from the southwestern Cape, comprises ± tomentose perennial herbs or short-stemmed subshrubs with petiolate, coarsely dissected leaves and long, bracteate peduncles bearing solitary, ecalyculate, moderate-sized, discoid capitula with a uniseriate involucre comprising relatively few phyllaries. The members thus resemble Bolandia in all respects except in their discoid capitula. The florets, which vary in colour from bright or pale yellow through cream-coloured, white or pink to mauve, all dry dull yellowish, even those that are white or purple in life, suggesting a fundamental chemical similarity in the floral pigmentation.

The fruit and stylar characteristics of the S. scapiflorus alliance suggest that these taxa should be transferred to Bolandia, thus expanding the circumscription of the genus to include discoid taxa with yellow, white or mauve florets. Although the capitula in Bolandia were originally described as radiate, additional collections of B. pedunculosa (DC.) Cron from the Roggeveld Escarpment not seen during the revision of the genus Cineraria include plants with sparsely radiate and discoid capitulae, thus expanding the range of the genus to include discoid plants. This material, as well as several other specimens located among herbarium collections of Senecio scapiflorus, is cited here.

A molecular analysis of plastid and nuclear sequence data in Senecio scapiflorus group and allied taxa was undertaken to confirm the relationship between the group and the genus Bolandia suggested by their morphology.

2. Materials and methods

2.1. Morphology

Type specimens or digital images of types from the relevant herbaria were examined for all species, as well as all available herbarium specimens in BOL, NBG and PRE. Particular use was made of high-resolution digital images on the Aluka website (www.aluka.org) of Drège isotype material in the Paris Herbarium that formed the basis of many species described by Candolle (1838) in his Prodromus systematis naturalis regni vegetabilis, and of the Herbarium of the Linnean Society of London (www.linnean-online.org).

2.2. Microstructure

Cypselae and florets were examined using a Zeiss V12 Discovery microscope and photographed with an Axiocam camera.

2.3. Molecular analysis

DNA was extracted from leaf material dried in silica gel or from herbarium specimens using the Qiagen DNeasy Minikit. The trnL–trnF chloroplast region was amplified using the ‘c’ and ‘f’ primers of Taberlet et al. (1991) using the Pyrostart Fast PCR mix in a 3 step procedure: premelt at 95 °C for 1 min, 30 cycles of denaturing at 95 °C for 1 s, annealing at 40 °C for 5 s and extension at 72 °C for 25 s, with a final extension of 10 s at 72 °C. The nuclear internal transcribed spacer (ITS) regions were amplified using the primers AB101 and AB102 of Sun et al. (1994) as described in Cron et al. (2008) or using Truestart taq (Fermentas) with a 2 min premelt at 95 °C and 35 cycles of 50 s denaturation at 95 °C, 45 s annealing at 54 °C, and 90 s extension at 72 °C, with a final extension for 7 min at 72 °C.

PCR products were purified using the Zymo DNA Clean and Concentrator kit. Forward and reverse sequences were generated on Applied Biosystems 3130xl genetic analyser (Applied Biosystems, Foster City, CA) at the Central DNA Sequencing Facility, University of Stellenbosch, using the same primers as in amplification. Consensus sequences were edited and included in a matrix of other Senecioneae (see Appendix A for accessions and vouchers) and aligned using Sequencher 4.1.2 (Genecodes Corp) and the alignment refined manually. Indels were coded in a separate matrix and analyses were performed including and excluding indels.

Parsimony analyses were conducted in PAUP* 4.0b10 (Swofford, 2001) using heuristic searches with 100 random addition sequences and TBR swapping; ACCTRAN and MULPARS options in operation. Multiple most parsimonious trees were combined as strict consensus trees. All characters were weighted equally. Bootstrap support (BS, Felsenstein, 1985) was estimated and reported from 100 replications and 10 random addition sequences, using the same settings as for the general heuristic search analyses, based on matrices containing point mutations only (i.e. excluding coded indels).

3. Results

3.1. Micromorphology

Cypselae are dimorphic in all members of the S. scapiflorus alliance. The outer or marginal cypselae are curved, with a convex, puberulous outer face covered with short mucilaginous hairs, and a keeled, glabrous inner face. The inner cypselae are subterete-angled and puberulous throughout, with a short carpopodium (Fig. 1A–D). The style branches of the florets are truncate with a central tuft and fringe of sweeping hairs (Fig. 1E, F).

3.2. Molecular analysis

Sequences from specimens of Senecio glabrifolius, S. scapiflorus and S. diversifolius aligned with those of Bolandia spp. with minimal differences in the sequence matrix, and parsimony analysis of the trnL–trnF and of the ITS regions
(Figs. 2 and 3) both grouped the alliance with *B. pedunculosa* and *B. argillacea* in a strongly supported clade.

There is insufficient variation in the *trnL–trnF* region to resolve species relationships within the *Bolandia–S. scapiflorus* clade (Fig. 2) but the ITS regions are more informative in this regard, although branch support is weak and the clade collapses when the specimen *Cron & Goodman 681* (*B. pedunculosa* from Bantams, Witteberg) is included in the analysis, as this specimen is polymorphic for four of the point mutations variable among the species of *Bolandia*. The ITS phylogeny (Fig. 3) resolves *Bolandia pedunculosa* and *S. diversifolius* [*B. pinnatifida* in Figs. 2 and 3] as sister to one another with weak support (BS 65%), and this pair in turn sister to the remaining species I the clade, with *S. scapiflorus* [*B. elongata* in Figs. 2
and 3] also weakly supported (BS 70%) as sister to the clade comprising *B. argillacea* and *S. glabrifolius* [B. glabrifolia in Figs. 2 and 3]. Resolution is lower in the trnL–trnF phylogeny (Fig. 2), which only resolves a weakly supported (BS 66%) sister relationship between *S. scapiflorus* and *S. diversifolius*. There is no resolution of relationships between *B. argillacea*, *S. glabrifolius* and *S. scapiflorus* when the indels are included in the analysis (not shown).

*Bolandia* and the *Senecio scapiflorus* group are placed together with *Emilia hantamensis* in a strongly supported clade in both plastid (BS 98%) and ITS (BS 100%) phylogenies, in turn sister to *Cineraria* according to the nuclear data. The relationship between *Emilia hantamensis* and the *Bolandia–Senecio scapiflorus* alliance is unresolved in the plastid phylogeny (Fig. 2) but they are resolved as sister taxa in the ITS phylogeny (Fig. 3), with the *Bolandia–S. scapiflorus* clade comprising a well supported branch (BS 87%). Other members of the *Cineraria–Bolandia* group not included in the analysis are *Mesogramma apiifolia* DC. and *Stilpnogyne belliodioides* DC. (P. Pelser pers. com.).

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**Fig. 2.** Strict consensus of five equally most parsimonious trees (124 steps) from unweighted Fitch parsimony analysis of the trnL–trnF plastid region of 32 members of the Senecioneae (including coded indels; CI=0.85 excluding uninformative characters, RI=0.97). Bootstrap support is indicated below the branches, minimum branch length above (point mutations/indels).
4. Discussion

Both the diagnostic morphological features of the cypsela and the molecular phylogenetic analyses clearly support the transfer of the members of the *Senecio scapiflorus* group to the genus *Bolandia.*

*Senecio scapiflorus*, as currently circumscribed, is a variable taxon that is widespread through the southwestern Cape (Goldblatt and Manning, 2000). Leaf morphology in the species is diverse, ranging from ovate and toothed to pinnately dissected, and several of these forms have received recognition at specific level (Candolle, 1838; Thunberg, 1800). Harvey (1865), who was the last to critically review the species complex, considered these forms to be essentially indistinguishable in other details of vegetative, floral and fruit morphology, and preferred to accommodate them in two varieties defined by the degree of leaf dissection. Plants with oblong, toothed leaves were recognized as var. *integri folius* Harv.
and those with pinnatifid leaves were accommodated in var. pinnatifidas Harv. Working from relatively few dried specimens without colour notes, Harvey was unaware of the significant variation in the colour of the florets in the group, which ranges from bright yellow through white or cream to mauve and purple. With the advantage of many more, annotated collections it is now evident that there is a good association between degree of leaf dissection, flower colour, distribution, and ecology. On this basis we are able to recognize three ± distinct clusters of populations, which could be treated either as subspecies within a single polymorphic species, or as distinct species. We adopt the latter option as consistent with the level of specific recognition that is currently adopted within the genus Bolandia between B. pedunculosa and B. argillacea (Cron) Cron, which are distinguished primarily on a similar degree of segregation between leaf morphs, without associated differences in floral pigmentation.

The type species of Bolandia, B. pedunculosa, occurs mainly at higher altitudes (>900 m for the tomentose form and >1500 m for the glabrescent form) in the mountains of the Western Cape, with a few collections known from the Northern Cape, Eastern Cape and Lesotho (Cron et al., 2006). The leaves are variably dissected, ranging from entire to lyrate–pinnatisect, often with a gradation of forms on one plant. The leaves in B. pinnatifida are more finely dissected than in B. pedunculosa, which also has a more strongly tufted habit.

Final resolution of relationships within the genus Bolandia requires further molecular study, especially genetic studies at population level.

5. Taxonomy

Bolandia Cron in Novon 16: 224 (2006), emend. Type species: Bolandia pedunculosa (DC.) Cron.

Short-lived perennial herbs or softly woody subshrubs, branching from the base and tufted or rhizomatous. Leaves alternate, petiolate, simple, lyrate–pinnatifid, pinnatisect or bipinnatisect, tomentose or glabrescent with scabrous margins, 10–25. Florets concolorous: ray florets (when present) female, corolla tube glandular–pubescent, yellow; disc florets hermaphrodite, yellow, white or pink to mauve, sometimes tipped reddish, corolla tube funnel-shaped, 5-lobed, lobes with median resin duct. Anthers with obtuse, triangular to ovate apical appendages, bases minutely sagitate, filament column balusterform. Style apices truncate with fringing apex and central tuft of acute sweeping hairs. Cypselaem dimorphic; marginal or ray cypsela and outer disc cypsela weakly arcuate, triangular in section, outer surface convex, sparsely pubescent with short, white mucilaginous duplex-hairs, inner surface keeled with median rib, glabrous; inner disc cypsela fusiform and quadrate in section, sparsely pubescent with short hairs; pappus caducous, bristles pluriseriate, delicate, scabrid.

5 spp., Lesotho and South Africa, mainly winter–rainfall areas.

5.1. Key to species

1a. Capitula radiate (rarely discoid); phyllaries 10–15; disc florets bright yellow.

2a. Leaves simple to lyrate–pinnatisect or pinnatisect, segments at least 2 mm wide; plants from inland mountains of the Northern, Western and Eastern Cape and Lesotho, mainly at high altitude (>900 m) . . . 1. B. pedunculosa.

2b. Leaves bipinnatisect, segments linear–oblong, 1–1.5 mm wide; plants only known from mountains near Worcester in the Western Cape . . . 2. B. argillacea.

1b. Capitula discoid (rarely sparsely radiate but then florets creamy yellow); phyllaries 12–25; disc florets bright or pale yellow to white or mauve.

3a. Leaf blades ± ovate to cordate, ± half as long as petiole, slightly incised or lyrate–pinnatisect; involucre shallowly campanulate, 10–15 mm diam., phyllaries 18–25; florets mauve or purple; plants from coastal southwestern and southern Cape below 100 m . . . 5. B. elongata.

3b. Leaf blades narrowly ovate to lanceolate, usually ± as long as petiole, pinnatisect or pinnatifid; involucre campanulate, mostly 7–10 mm diam., phyllaries 12–20; florets white to mauve or pale yellow; plants from inland southwestern Cape, mostly above 100 m . . . 3. B. pinnatifida.

3c. Leaf blades narrowly ovate to lanceolate in outline, usually ± as long as petiole, pinnatisect; involucre campanulate, 7–12 mm diam., phyllaries 12–15; florets bright yellow; plants from inland mountains of Namaqualand . . . 4. B. glabrisfolia.

5.2. Bolandia pedunculosa

(DC.) Cron in Novon 16: 226 (2006). Cineraria pedunculosa DC., Prodr. 6: 305 (1838). Type: South Africa, [Western Cape, Caledon, Zwartberg [Swartberg], Boontjesrievier, July 1835,. Ecklon & Zeyher 1519 (G-DC, holo.; S!, iso.).

5.2.1. Other material seen
Northern Cape.—3119 (Calvinia): Farm Vondelingsfontein, south of Calvinia, (–DC), 15 September 2009, Goldblatt, Manning & Porter 13352 (NBG). 3120 (Williston): Farm Dröekloof, southwest of Middelpos, (–CC), [mixed radiate and discoid], 15 September 2009, Goldblatt, Manning & Porter 13340 (NBG). 3220 (Sutherland): Roggeveld, Farm Uitkyk, 1600 m, (–AC), October 1920, Marloth 9733 (PRE); Farm Uitkyk, Sneeuwkrans, 1700 m, (–AC), October 1920, Marloth 9735 (PRE); Farm Uitkyk, 1541 m, 16 September 2008, Clark & O’Conner 396 (GRA, J); Roggeveld, Farm Geelhoek, (–BC), 4 September 1986, Cloete & Haselau 203 (NBG); Farm Geelhoek 103, Swaarweerberg near Farm Vredehoek, 1661 m, (BC), 6 March 2008, Clark & O’Conner 112 (GRA, J).

Western Cape.—3319 (Worcester): West of Gydo Pass, 28 October 1928, Hutchinson 1042 (BOL). 3320 (Montagu): Montagu, hot baths, (–CC), October 1921, Page BOL15442 (BOL); Dobbelaarskloof, (–DC), 1 October 1938, Levyns 6711 (BOL); near Barrydale, (–DC), October 1923, Levyns 576 (BOL).
5.3. Bolandia argillacea

(Cron) Cron in Novon 16: 225 (2006). *Cineraria argillacea* Cron in S. Afr. J. Bot. 63: 402 (1997). Type: South Africa, [Western Cape], Worcester, lower slopes of Brandwacht Peak, 12 November 1978, *Esterhuysen 35117* (BOL, holo.; K!, NBG!, S!, UPS!, iso.).

5.4. Bolandia pinnatifida

(Thunb.) J.C. Manning & Cron, comb. nov. *Doria pinnatifida* Thunb., Nov. gen. pl. 12: 168 (1800). Type: South Africa, without precise locality or date, *Thunberg UPS-THUNB 19834* (UPS-THUNB, holo.—microfiche!).

*Doria undulata* Thunb., Nov. gen. pl. 12: 163 (1800), syn. nov. Type: South Africa, Bockland [Bokkeveld], without date, *Thunberg UPS-THUNB 19838* (UPS-THUNB, holo.—microfiche!).

*Senecio petiolaris* DC., Prodr. 6: 434 (1838), replacement name for *Doria undulata* Thunb.: 163 (1800), not *S. undulatus* Thunb.: 157 (1800). Type: as for *D. undulata* Thunb.

*Brachyrhynchos diversifolius* DC., Prodr. 6: 439 (1838), syn. nov. *Senecio diversifolius* (DC.) Harv.: 375 (1894). Type: South Africa, [Western Cape], Riebeekkasteel [Riebeek Kasteel], without date, *Drège 1806* (G-DC, lecto., here designated—microfiche!; P, iso.—Aluka image!, website accessed 20-03-09).

*Brachyrhynchos diversifolius* var. *acutolobus* DC., Prodr. 6: 439 (1838), syn. nov. Type: South Africa, [Western Cape], Riebeekkasteel [Riebeek Kasteel], without date, *Drège 1806* (G-DC, lecto., here designated—microfiche!; P, iso.—Aluka image!, website accessed 20-03-09).

*Brachyrhynchos diversifolius* var. *cuneatus* E. Mey. ex DC., Prodr. 6: 439 (1838), syn. nov. Type: South Africa, [Western Cape], Riebeekkasteel [Riebeek Kasteel], without date, *Drège 1806* (G-DC, holo.—microfiche!).

*Brachyrhynchos trachycarpus* DC., Prodr. 6: 438 (1838), syn. nov. Type: South Africa, [Western Cape], Riebeekkasteel [Riebeek Kasteel], without date, *Drège 1806* (G-DC, lecto., here designated—microfiche!; P, iso.—Aluka image!, website accessed 20-03-09).

*Brachyrhynchos albicaulis* DC., Prodr. 6: 438 (1838), syn. nov. Type: South Africa, [Western Cape], Riebeekkasteel [Riebeek Kasteel], without date, *Drège 1806* (G-DC, holo.—microfiche!).

*Senecio diversifolius* var. *pinnatifidus* Harv. in Fl. cap. 3: 376 (1865), syn. nov. Type: South Africa, without precise locality or date, *Thunberg UPS-THUNB 19827* (UPS-THUNB, lecto. here designated—microfiche!).

Softly wooly subshrubs to 600 mm, ± cobwebbed, usually glabrescent but sometimes persistently tomentose on stem. peduncles and petioles, rarely subglabrous. *Leaves* mostly lyrate—pinnatifid to pinnatisect or bipinnatisect, rarely linear—oblanceolate and weakly toothed, tomentose or glabrescent, petiole mostly as long as or shorter than blade, 15–30 mm long, blade 20–70×(2–)10–40 mm, segments opposite, up to 7 pairs, oblong—cuneate, toothed. *Capitula* homogamous, discoid; involucre campanulate, 7–10–(12) mm diam., phyllaries 12–20, 7–10×1–2 mm. *Disc florets* white or cream-coloured to pink or mauve, rarely pale yellow. *Flowering time*: (late August) September to October. Figs. 1A, D, G; 4A, B.

5.4.1. Distribution and ecology

*Bolandia pinnatifida* ranges along the West Coast interior, from the Kamiesberg in central Namaqualand and the Kubiskou Mountains west of Loeriesfontein across the Hantam and Bokkeveld Mountains to around Middelpos, and southwards through the Cedarberg to Tulbagh, Piketberg and the hills around Moorreesburg and Malmsbury, with outlying populations on the hills above Saldanha (Fig. 5). The species is found mainly at higher altitudes, 600–1600 m (exceptionally near sea level at Saldanha), in a variety of stony or rocky habitats. It is primarily a component of renosterveld shrublands on shale or dolerite soils, rarely in coastal scrub on limestone, and is especially common in renosterveld communities along the higher parts of the Bokkeveld and Roggeveld and in the northern Cedarberg.

5.4.2. Diagnosis. *Bolandia pinnatifida* is the most variable of the species in the group in the dissection of its leaves, which range from linear—oblanceolate and weakly toothed to ± pinnatifid or pinnatisect, although the lower leaves may be only shallowly incised (Fig. 4A, B), and in the colour of the florets, which vary from white and creamy yellow to pink or mauve. The species overlaps on the edges of its distribution with several other species in the genus.

Populations of *Bolandia pinnatifida* from the Bokkeveld and Cedarberg southwards are uniformly white-flowered with dissected leaves but a range of forms occurs on the Hantam and Roggeveld, where plants may have white or mauve capitula and undivided or dissected leaves. Populations west of Middelpos are white to cream-flowered but those north of this as far as Calvinia are mainly mauve. Separate populations are mostly uniform for flower colour, although white-flowered populations may alternate with mauve- or purple-flowered ones. Sparingly radiate forms of the cream-flowered morphs have been collected from the Roggeveld north of Middelpos but are not known among mauve-flowered populations. The distribution of *B. pinnatifida* overlaps with that of radiate-flowered *B. pedunculosa* between Middelpos and Calvinia, and occasional forms of the latter species with discoid capitula are also known from here. The possibility presents itself, therefore, that the mix of discoid and radiate forms in the area of sympathy is the result of hybridisation but this requires investigation.

White- to mauve-flowered plants with lanceolate, toothed leaf blades (*Helme 6124*), here assigned to *Bolandia pinnatifida*, and yellow-flowered *B. glabrifolia* with pinnate leaves (*Leipold 3312*) have both been collected on the Farm Karas in the Kamiesberg in central Namaqualand, providing additional evidence that the two forms represent distinct species. Populations of *B. pinnatifida* with highly dissected leaves, especially those from the Cedarberg and Pakhuis Mountains (e.g. *Compton 9605 NBG, Pond 283 NBG, and Viviers 808 NBG*), are vegetatively indistinguishable from the
Namaqualand *B. glabrifolia* but can be recognized by their white to pale yellow, rather than bright yellow, florets.

Kamiesberg plants of *Bolandia pinnatifida*, as well as those from the Hantamsberg and Roggeveld with similar, entire, toothed leaves and mauve capitula (e.g. *Taylor 2628* NBG, and *Thomas 26* NBG), are difficult to distinguish from *B. elongata* but have generally smaller, more campanulate capitula, 8–10 mm diam. versus the larger, shallowly campanulate capitula, 10–15 mm diam. *B. elongata* is strictly a coastal taxon of sandy flats, but both species have been recorded at Mamre and around Saldanha, which represents the most coastal stations for *B. pinnatifida*. In these locations the two taxa are readily distinguished by floret colour and leaf shape.

Another distinct form of the species, represented by the type of *Doria undulata*, is restricted to the Bokkeveld Escarpment and Gifberg. It is distinguished by its especially narrow, linear–oblanceolate leaves, which are almost entire or at most coarsely serrate. The Gifberg populations (*Esterhuysen 21973* BOL) appear to be consistent for this leaf form but plants of this morph co-occur with and grade into the more usual forms with broader,
5.4.3. Taxonomic history

The variable nature of the leaves of this taxon has resulted in a plethora of names for forms with differing degrees of dissection. The earliest name for the common form with pinnatisect leaves is *Doria pinnatifida* Thunb. but later authors were unable to apply the name correctly, Candolle (1838) treating it as an unidentified species of *Senecio* (Candolle, 1838: 473) and Harvey (1865) including it in the synonymy of *Senecio tuberosus* (DC.) Harv. As a result of this uncertainty, the species was redescribed as *Brachyrhynchos diversifolius* DC. (1838), subsequently transferred to *Senecio* as *S. diversifolius* (DC.) Harv. (1865). At this time the taxon was broadly treated to include *Cineraria elongata* L.f. (here recognized as *B. elongata*) as well as specimens from Namaqualand that are recognized here as *B. glabrifolia*, and various leaf morphs were treated at varietal level by Harvey (1865). Two earlier names for the taxon, *B. albicaulis* DC. (1838) and *B. trachycarpus* DC. (1838) were relegated to synonymy by Harvey (1865) under the names *S. tuberosus* and *S. diversifolius* respectively.

*Doria undulata* Thunb. (1800) was based on a plant with linear–oblanceolate, weakly toothed leaves from the Bokkeveld Mountains. Collections matching it are now known from the adjacent Gifberg Mountains as well and although it is superficially distinct from typical *B. pinnatifida* other collections from the Bokkeveld Mountains (e.g. *Pretorius 299 NBG*) exhibit a complete transition between this leaf type and the pinnatifid or pinnatisect foliage of typical *B. pinnatifida* and it cannot be upheld as a separate taxon.

5.4.4. Other material seen

[Florets white or cream-coloured unless indicated otherwise.]

Northern Cape—3018 (Kamiesberg): Kamiesberg, roadside 4 km north of Karas, (–AC), 22 October 2009, *Helme 6124* (NBG). 3020 (Brandvlei): Kubiskou Mountains, west of Loeriesfontein, (–CD), 14 September 2006, *Goldblatt & Porter 12834* (MO, NBG). 3119 (Calvinia): top of Van Rhyn’s Pass, (–AC), 28 August 1941, *Barker 1092* (NBG); near Nieuwoudtville, (–AC), September 1930, *Lavis BOL40032* (BOL); Glenridge, (–AC), 20 August 1960, *Middlemost 2093* (NBG); Oorlogskloof Nature Reserve, 15 km SSW of Nieuwoudtville, 620 m, (–AC), 19 September 1995, *Pretorius 299* (NBG, PRE); 28 September 2000, *Pretorius 541* (NBG, PRE); Hantam Mts., 1650 m, (–BC), 4 September 1926, *Marloth 12803* (PRE); Akkerendam, (–BD), ±3700 ft [1130 m], (–BD), [dirty pink], 20 September 1955, *Leistner 386* (NBG); Ekerdam [Akkerendam], (–BD), [purple], 12 September 1947, *Taylor 2686* (BOL, NBG); near summit of Hantamsberg, 5400 ft [1650 m], (–BD), [pink mauve], 9 October 1983, *Thomas 26* (NBG); Menzieskraal, (–CA), [light purple], 29 September 1933, *Markötter s.n. STE 18450* (NBG); Lokenburg, (–CA), 25 September 1953, *Acocks 17219* (PRE); Farm Vaalfontein, south of Calvinia, (–DB), [mauve], 15 September 2009, *Goldblatt,
and Biedouw, (–) PRE. 3219 (Wuppertal): Pakhuis, (–) NBG, PRE); Welbedacht, (± 1700 ft [520 m], (NBG); Uitkyk Pass into Biedouw Valley, Guthrie 2632 Taylor 10789 south of Noordkrans, 780 m, (Clanwilliam) (PRE); Wuppertal, 2000 ft [610 m], (–) Tafelberg, ±1450 m, (–) NBG; Tafelberg, Sneeukop, (October 1953, fantsrivier, (–) Compton 5078 (NBG); Cedarberg, Gonnafontein, 900 m, (–) Cedarberg, Kromme River, (–) BB), 7 October 2000, – Versveld’ Pass, (–) Bolus 4295 (MO, NBG); 1878, –) PRE). 3318 (Cape Town): Groenekloof, (–) Hoedjies Bay, (–) CM), 1022 m, (–) van Rooyen et al (NBG, PRE); 30 km N of Prince Alfred’s Hamlet towards Citrusdal, 1022 m, (–) BA), 21 October 1976, Hugo 340 (NBG, PRE); Biedouwsuur, (–) AB), 20 September 1937, Lewis s.n. PRE 44863 (PRE); Wuppertal, 2000 ft [610 m], (–) October 1897, MacOwan 3234 (SAM); Cedarberg, Tafelberg, ±1450 m, (–) AC), 12 October 1986, Taylor 11620 (NBG); Tafelberg, Sneeukop, (–) AC), [yellow and red], 21 October 1923, Pocock 476 (NBG, PRE); Welbedacht, (–) AA), 20 September 1937, Compton 6907 (NBG); Uitkyk Pass into Biedouw Valley, ±1700 ft [520 m], (–) AA), 14 September 1976, Hugo 340 (NBG, PRE); Biedouwsuur, (–) AB), 20 September 1937, Lewis s.n. PRE 44863 (PRE); Wuppertal, 2000 ft [610 m], (–) October 1897, MacOwan 3234 (SAM); Cedarberg, Tafelberg, ±1450 m, (–) AC), 12 October 1986, Taylor 11620 (NBG); Tafelberg, Sneeukop, (–) AC), [yellow and red], 21 October 1923, Pocock 476 (NBG); Pakhuis Pass, Faith, 3150 ft [960 m], (–) AC), [cream to yellow], 24 November 1982, Viviers 808 (NBG, PRE); Algeria, (–) AC), September 1929, Levyens 2249 (BOL); Algeria Forest Station, (–) (NBG, PRU); 30 km N of Prince Alfred’s Hamlet towards Citrusdal, 1022 m, (–) BA), 21 October 1999, Van Wyk & Van Slageren MSEP 941 (PRE); Cedarberg, Matjiesrivier, (–) AC), Wagener 201 (NBG), Cedarberg, Kromme River, (–) BB), 27 September 1934, Compton 5078 (NBG); Cedarberg, Gonnafontein, 900 m, (–) CB), 7 October 2000, Pond 283 (NBG); Pakhuis Pass, bottom of Versveld’ Pass, (–) DD), 5 November 1034, Pillans 5330 (NBG). 3317 (Saldanha): limestone hilltops above Saldanha, (–) BB), 17 September 1976, Goldblatt 4109 (MO, NBG); Hoedjes Bay, (–) BB), September 1905, Bolus 12730 (BOL, PRE). 3318 (Cape Town): Groenekloof, (–) AD), October 1878, Bolus 4295 (BOL); Moorreesburg, Koringberg, 300 m, (–) BA), 12 September 2001, Helme 2340 (NBG); S of Moorreesburg, Neufontein se Berg, (–) BA), [white turning red with age], 17 September 1982, Van Zyl 3265 (NBG); 17 km northeast of Moorreesburg, Farm Misverstand, 175 m, (–) BB), [white, mauve when young], 18 September 2002, Helme 2724 (NBG). 3319 (Worcester): Tulbagh, Steendaal [Steindahl], (–) AC), October, without year, Pappe s.n. SAM 17005 (SAM); Tulbagh Road, (–) AC), 13 September 1896, Schlechter 9000 (NBG, PRE); Tulbagh, New Klooif, 15 September 1928, (–) AC), Gillett 385 (NBG); 14 September 1941, Compton 11690 (NBG); Tulbagh Klooif, (–) AC), 14 September 1941, Esterhuysen 6075 (BOL, PRE); September 1895, Bolus 11927 (PRE); west of Tulbagh, (–) AC), 15 September 1928, Hutchinson 366 (PRE); near Tulbagh, (–) AC), 29 September 1945, Leighton 3133 (PRE); Tulbagh, (–) AC), 13 September 1950, Esterhuysen 17477 (PRE); Malmesbury, Bothmas Pass over Riebeeck Kasteel, 24 September 1952, Esterhuysen 20420 (BOL, PRE). 3.5. Bolandia glabrifolia

(–) J.C. Manning & Cron, comb. nov. Senecio glabrotulifolius DC., Prodr. 6: 406 (1838). Type: South Africa, [Northern Cape], Camisberge [Kamiesberg], Ezelsfontein, 9 November 1830, Drège 2818 (G-DC, holo.-microfiche!; P, iso.-Aluka image!, website accessed 20-03-09).

Brachyrrhynchos diversifolius var. obtusilobus DC., Prodr. 6: 439 (1839), syn. nov. Type: South Africa, [Northern Cape], Camisberge [Kamiesberg], without date [1830], Drège 3869 (G-DC, lecto., here designated–microfiche!; P, iso.-Aluka image!, website accessed 20-03-09).

Softly woody subshrubs to 600 mm, ± cobwebbed, glabrescent but usually persistently tomentose on stem, peduncules and petals, rarely subglabrous. Leaves pinnatisect or bipinnatisect, tomentose or glabrescent, petiole mostly as long as or shorter than blade, 15–30 mm long, blade 20–70×10–40 mm, segments opposite, up to 7 pairs, oblong–cuneate, toothed. Capitula homogamous, discoid; involucral campanulate, 7–12 mm diam., phyllaries 12–15, 7–10×1–2 mm. Disc florets bright yellow. Flowering time: August and September, rarely October. Figs. 1E, F; 4C.

5.5.1. Distribution and ecology

Restricted to the higher-lying parts of central Namaqualand, at 800–1000 m, along the western escarpment between Springbok and Garies (Fig. 5). The species occurs on rocky granitic slopes, mainly in renosterveld but also succulent scrub.

5.5.2. Diagnosis

Bolandia glabrifolia is recognized by its pinnate leaves with rhomboid, subopposite or alternate pinnae (rather resembling those of Burnet, Sanguisorba officinalis L.), and bright yellow, discoid capitula (Fig. 4C). Dried specimens without notes on flower colour can be confused with specimens of B. pinnatifida from the Pakhuis and Nardouw Mountains south of Namaqualand that are vegetatively similar, with pinnate leaves, but these plants have white (e.g. Compton 6907, Wagener 201), cream-coloured to yellow (Viviers 808) or pale yellow (e.g. Esterhuysen 3277, Pocock 476) capitula. The two species co-occur only on the Kamiesberg in central Namaqualand, where they have both been collected on the Farm Karas. Unlike pinnate-leaved, yellow-flowered B. glabrifolia, the collection of B. pinnatifida from Karas (Helme 6124) has entire, toothed leaves and white to mauve capitula.

5.5.3. Taxonomic history

Senecio glabrotulifolius was described from a Drège collection made on the farm Ezelsfontein in the Kamiesberg in central Namaqualand, and was known to Harvey (1865: 364) only from...
'a frustule, without fl. [flower] heads'. Although described as being glabrous and taken to be so by Harvey, examination of isotype material at Paris shows the plants, especially the base of the stem and involucres, to be thinly cobwebby. The species is now known from several localities along the high ground of central Namaqualand but these collections have until now invariably been referred to S. scapiflorus. These specimens are a perfect match for Brachyrhynchos diversifolius var. obtusilobus DC., also based on Drège material from the Kamiesberg.

5.5.4. Other material seen

Northern Cape. — 2917 (Springbok): 5 miles from the 'stecke' of Springbok to Pofadder, (–BB), 13 September 1963, Merxmüller & Giess 3759 (PRE); near Spektakel, (–CA), 1883, Bolus 9577 (BOL); Spektakelpas, Farn Eselsfontein, ± 600 m, (–CA), 17 November 1985 P.C. & L. Zietsman 851 (PRE); Spektakel Hill, (–DA), 4 September 1951, Johnson 218 (NBG); Springbok, Hester Malan Nature Reserve (–DB), 3 October 1974, Rösch & Le Roux 824 (PRE); 22 October 1974, Rösch & Le Roux 1045 (PRE). 3017 (Hondelkliipbaai): Kamieskroon, (–BB), 27 August 1941, Esterhuysen 5969 (PRE); Kamieskroon, Skilpad Wildflower Reserve, (–BB), 13 July 1993, van Rooyen 2433 (PRE); Groot Vlei, (–BB), 29 August 1937, Compton 6833 (NBG); 7 September 1945, Barker 3756 (NBG), Compton 17283 (NBG); 3 September 1951, Maguire 976 (NBG); Grootvlei, west of Kamieskroon, (–BB), 23 September 1952, Acocks 16458 (BOL, PRE); 5 miles east of Kamieskroon, 3700 ft [1128 m], 12 October 1948, Acocks 15095 (PRE); about 10 miles [6 km] southwest of Kamieskroon, Groot Vlei, (–BB), 26 August 1954, Lewis 1227 (NBG, PRE, SAM); north of Darter’s Grave, (–BD), 7 September 1950, Maguire 301 (NBG); Garies, (–DB), 27 August 1941, Compton 11450 (NBG); 3018 (Kamiesberg): Kamiesberg, Ezelsfontein, (–AC), 20 September 1934, Markötter s.n. STE 19457 (NBG); near Leliefontein, (–AC), 27 September 1932, Levyns 4058 (BOL); De Kom (now Farm Karas), 3 miles from Leliefontein, 4300 ft [1310 m], (–AC), October 1940, Leipoldt 3312 (PRE); Farm Damsland, ±1130 m, (–AC), 29 October 2007, Snijman 2204 (NBG).

5.6. Bolandia elongata

(L.f.) J.C.Manning & Cron, comb. nov. Cineraria elongata L.f., Suppl. pl.: 374 (1782). Doria elongata (L.f.) Thunb., Nov. gen. pl. 12: 166 (1800). Brachyrhynchos elongatus (L.f.) Less., Syn. gen. Compos.: 393 (1832), DC., Prodr. 6: 439 (1839). Type: South Africa, without precise locality or date, Thunberg 355 (LINN 1000.31, lecto., here designated—Linnean Herbarium image!, website accessed 20-03-09).

Cineraria scapiflora L’Hér., Sert. angl.: 25 (1789), syn. nov. Senecio scapiflorus (L’Hér.) C.A.Sm. in Adamson & Salter, Fl. Cape Peninsula: 813 (1950). Type: South Africa, ‘Cap bonae spel‘, without precise locality or date, Masson s.n. (BM, holotype—digital image!).

Senecio diversifolius var. integrifolius Harv. in Fl. cap. 3: 376 (1865), syn. nov. Type: South Africa, without precise locality or date, Thunberg UPS-THUNB 19826 (UPS-THUNB, lecto., here designated—microfiche!).

Softly woody subshrubs to 600 mm, ± cobwebbed or glabrescent but usually persistently tomentose on stem, peduncles and petals. Leaves simple or lyrate–pinnatifid, tomentose or glabrescent, petiole mostly longer than blade, 30–70 mm long, blade ovate-cordate, 15–50 × 10–30 (–40) mm. Capitula homogamous, discoid; involucre broadly campanulate, 10–15 mm diam., phyllaries 18–25, 7–10 × 1–2 mm. Disc florets pink to mauve or purple. Flowering time: September and October. Figs. 1C, H; 4D.

5.6.1. Distribution and ecology

Bolandia elongata as construed here is strictly a coastal taxon found at altitudes below 100 m, mostly along the West Coast, from the Saldanha Peninsula to the Cape Peninsula, with scattered records along the southern Cape coast, notably at Still Bay (Fig. 5). Plants are largely restricted to neutral or calcareous sandy soils, typically on sandy flats or among limestone rocks, in coastal scrub or in coastal fynbos.

5.6.2. Diagnosis

Bolandia elongata is recognized by its simple or lyrate leaves with relatively long petioles, usually twice as long as the blade, which is ovate or almost cordate, mostly with irregularly toothed margins, narrowly and shallowly incised at intervals (Fig. 4D) but rarely weakly lyrate–pinnatisect. The large, shallowly campanulate capitula, 10–15 mm diam., consistently have mauve or purple florets (Fig. 1H).

The species can be confused with plants of B. pinnatifida from the Roggeveld and Hantam Plateau with less dissected leaves. Vegetatively similar collections of B. pinnatifida from the edge of the Bokkeveld Escarpment (e.g. Middlemost 2093 NBG) are readily recognized by their white florets but more problematical are plants from the Hantamsberg (Taylor 2686 NBG, Thomas 26 NBG). Although vegetatively indistinguishable from coastal forms of B. elongata, they have smaller, more deeply campanulate capitula that are 7–10 mm diam. B. elongata co-occurs with B. pinnatifida around Mamre and Saldanha.

5.6.3. Taxonomic history

The species was originally described under the name Cineraria elongata L.f. (1782) from an unlocalised collection of Thunberg’s, who offered no further information as to its origin (Thunberg, 1800, 1823). Although the corolla was described as yellow, Linnaeus f. (1782) only saw the material in its dried state, in which condition the florets in the discoid forms of B. elongata, they have smaller, more deeply campanulate capitula that are 7–10 mm diam. B. elongata co-occurs with B. pinnatifida around Mamre and Saldanha.
choosing the latter name as being ‘more expressive’ than Linnaeus’s *C. elongata* although this has priority (McNeil et al., 2006: Art. 11.3). Over half a century later, C.A. Smith, South African Liaison Officer at Kew during the mid-twentieth century (Gunn and Codd, 1981), had opportunity to examine the type of *Cineraria scapiflora* L’Hér. at the British Museum and recognized that it was conspecific with Harvey’s var. *integrifolius* and thus the earlier name for his broadly circumscribed *Senecio diversifolius*. The new combination *Senecio scapiflorus* (L’Hér.) C.A. Smith was made in Adamson and Salter (1950), and although no basionym is cited the combination is valid under ICBN Article 33.3 (McNeil et al., 2006) as it uses a previously and validly published epithet and was published before 1 January 1953. It is under this epithet that the species in its broad circumscription has been known until now (Goldblatt and Manning, 2000).

5.6.4. Other material seen

Western Cape.—3217 (Vredenburg): Cape Columbine (= DD), 17 November 1974, *Lavrannos 11707* (PRE). 3218 (Clanwilliam): Berg River, (=CD), 21 September 1940, *Compton 524* (NBG). 3317 (Saldanha): rocky hills at Saldanha, (=BB), 13 September 1951, *Parker 4638* (NBG, SAM); limestone hilltops above Saldanha, (=BB), 17 September 1976, *Goldblatt 4109* (MO, NBG); 10 km east of Velddrift (=CD), 6 October 1981, *Mauve* (PRE). 3318 (Cape Town): Langebaan Peninsula, Schrywershoek, ±15 m, (=AA), 25 November 1975, *Boucher 2931* (NBG, PRE); Hopefield, (=AB), September 1926, *Nel s.n. STE 15754* (NBG); 1.6 miles south east by east of Hopefield, 100 ft [30 m], (=AB), 13 October 1959, *Acoks 20673* (PRE); Malmesbury, Wilde Varkens Valley (=AC?), 11 October 1971, *Axelson 537* (PRE); Groenekloof, (=AD), October 1878, *Bolus 4293* (BOL); Baarhuis/Zonquasfontein boundary, ±300 ft [90 m], 4 October 1977, *Thompson 3509* (NBG, PRE); Bok Point, (=CB), 14 September 1940, *Barker 739* (NBG); Malmesbury, Buffels River, near Bokbaai, ±100 ft [30 m], (=CB), 18 October 1962, *Taylor 4168* (PRE); 5 miles north east of Langebaan, 1 November 1948, *Acoks 15216* (PRE). 3418 (Simonstown): Chapmans Bay, (=AB), 17 September 1938, *Lewis 31* (SAM); Hout Bay, (=AB), 4 September 1941, *Bond 1222* (NBG); Faure, Ollemans Vlei, (=BB), 24 September 1950, *Johns s.n. NBG 29819* (BOL, NBG). 3421 (Riversdale): Stilbaai, (=AD), 1 October 1933, *Jordaan s.n. STE 18469* (NBG); Platbosch, (=AD), September 1924, *Muir 3442* (PRE); Riversdale near coast, (=AD), October 1924, *Muir s.n.* (BOL).

Without precise locality: Swellendam, *Mund s.n. SAM 17004* (SAM).

5.7. Brachyrhynchos

Less., Syn. gen. compos.: 393 (1832). Type species: *Brachyrhynchos junceus* Less., lectotype, designated by DC., Prodr. 6: 437 (1838).

The genus *Brachyrhynchos* was established by Lessing (1832) to accommodate the three species, *B. junceus* Less. (= *Senecio junceus* (Less.) Harv.), *B. elongatus* (L.f.) Less. and *B. eupatorioides* Less. (= *Senecio othonniflorus* DC.), and was subsequently expanded by Candolle (1838) to include a further five taxa. Two of these species are currently included in *Senecio*, viz. *B. tuberosus* E.Mey. ex DC. (= *S. incertus* DC.) and *B. cymbalariifolius* (Thunb.) DC. (= *S. hastifolius* (L.f.) Less.). The remaining three species, *B. albicaulis* DC., *B. diversifolius* DC. and *B. trachycarpus* DC. are included here in *Bolandia elongata*.

*Brachyrhynchos* was not typified by Lessing (1832) but we interpret the inclusion by Candolle (1838) of only *B. junceus* in *Brachyrhynchos* sect. *Brachyrhynchos* [as ‘*Eubrachyrhynchos*’] as effective lectotypification of the genus against *B. junceus* Less., one of the original elements of the genus (McNeil et al., 2006: Art. 10.2). The remaining two original elements of the genus (*B. elongatus* and *B. eupatorioides*) were placed by Candolle (1838) in *B. sect. Trachycarpus* DC., thus excluding them as possible lectotypes of the typical section of *Brachyrhynchos*. This interpretation precludes the possibility that *Brachyrhynchos* might be an earlier name for *Bolandia*.

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Appendix A

Voucher specimens and Genbank Accession numbers for ITS and trnL–trnF regions respectively. All localities are in South Africa unless otherwise indicated.

*Bolandia argillacea* (Cron) Cron WESTERN CAPE, Worcester, Brandwag Peak, *Estherhuysen 35117* (BOL). AY953924; AY952914.

*Bolandia elongata* J.C. Manning & Cron WESTERN CAPE, Langebaan, *Goldblatt & Manning 13409A* (NBG) [not yet accessioned].

*Bolandia glabrifolia* J.C. Manning & Cron [1] NORTHERN CAPE, Kamiesberg, *Manning s.n.* (NBG) [not yet accessioned].

*Bolandia glabrifolia* J.C. Manning & Cron [2] NORTHERN CAPE, Kamiesberg, Farm Dansland, *Snijman 2204* (NBG) [not yet accessioned].

*Bolandia pedunculosa* (DC.) Cron [1] EASTERN CAPE, Witteberg, Joubert’s Pass, *Cron & Goodman 544* (J). AY953925; AY952915.

*Bolandia pedunculosa* (DC.) Cron [2] WESTERN CAPE, Witteberg, Bantam’s Farm, *Cron & Goodman 681* (J) [not yet accessioned].

*Cineraria albicans* N.E.Br. KWAZULU-NATAL, Umtamvuna Nature Reserve, *Cron 482* (J). AY275655; AY952894.
Cineraria alchemilloides DC. NAMIBIA, Nubib Mountain, Farm Erfstuk, Winter 284 (J). AY953913; AY952902.

Cineraria aspera Thunb. EASTERN CAPE, Naude’s Nek, Cron & Goodman 549 (J). AY275656; AY952903.

C. deltoidea Sond. KENYA, Aberdares, Musaya, Cron & Knox 9 (EA, J). AY953905; AY952893.

Cineraria erodioides DC. EASTERN CAPE, Joubert’s Pass, Cron & Goodman 338 (J). AY953914; AY952904.

Cineraria geofolia (L.) L. WESTERN CAPE, Dawidskraal, Cron & Goodman 679 (J) [not yet accessioned].

Cineraria lobata L’Hér. ssp. lobata WESTERN CAPE, Cape Point, Hodgkiss C2 (J). AY953904; AY952892.

Cineraria lyratiformis Cron KWAZULU-NATAL, Krom Ellenboog Farm, Cron & Balkwill 430 (J). AY953918; AY952908.

Cineraria mazoensis S.Moore ZIMBABWE, Hwedza Mountain, Cron & Balkwill 486 (J). AY953911; AY952900.

Cineraria mollis E.Mey. ex DC. EASTERN CAPE, Witteberg, Joubert’s Pass, Cron & Goodman 545 (J). AY953923; AY952913.

Cineraria vallis-pacis Dinter ex Mxm. NORTHERN CAPE, Olifantshoek, Balkwill & McDade 11802 (J). AY953915; AY952905.

Dendrosenecio kilimanjari (Mildbr.) E.B.Knox ssp. cottonii (Hutch. & G.Taylor) E.B.Knox TANZANIA, Mount Kilimanjaro, Knox 50 (MICHER). AY953933; AY952923.

Emilia discifolia (Oliv.) C.Jeffrey ZIMBABWE, Hwedza Mountain, Cron & Balkwill 490 (J). AY953930; AY952920.

Emilia hantansensis J.C.Manning & Goldblatt [1] NORTHERN CAPE, Trek path near Nieuwoudtville, Cron & Goodman 637 (J) [not yet accessioned].

Emilia hantansensis J.C.Manning & Goldblatt [2] NORTHERN CAPE, Calvinia, Goldblatt 13337 (NBG) [not yet accessioned].

Euryops brownii S.Moore KENYA, Aberdares, Musaya, Cron & Knox 10 (J). AY953926; AY952926.

Kleinia galpinii Hook.f. GAUTENG, Johannesburg, Hort. University of Witwatersrand, Cron 537 (J). AY953934; AY952924.

Oresbia heterocarpa Cron & B.Nord. WESTERN CAPE, Cederberg, Sneeuiberg, Cron, Hodgkiss, Standen & Cocks 322 (J). AY953935; AY952925.

Pericallis multiflora (L’Hér.) B.Nord. CANARY ISLANDS, Tenerife, Santos-Guerra 97–9 (ORT). AY953931; AY952921.

Pericallis murrayi (Borm.) B.Nord. CANARY ISLANDS, El Hierro, Santos-Guerra 97–10 (ORT). AY953932; AY952922.

Senecio cordifolius L.f. WESTERN CAPE, Table Mountain, Cron & Hodgkiss 369 (J). AY953926; AY952916.

Senecio hederiformis (Cron) Cron LIMPOPO, Blouberg, Cron, Knox & Winter 335 (J). AY953928; AY952918.

Senecio deltoideus Less. KWAZULU-NATAL, Groenvlei, Cron & Balkwill 373 (J). AY953927; AY952917.

Senecio achilleifolius DC. EASTERN CAPE, Naude’s Nek, Cron & Goodman 556 (J). AY953929; AY952919.

Tephroseris atropurpurea (Ledeb.) Holub YUKON, Whitehorse, Golden 318 (LEA). AF345306; AF345314.

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