

## Taxonomic studies of Australian *Senecio* (Asteraceae): 2. The shrubby, discoid species and the allied radiate species *Senecio linearifolius*

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### Abstract

A morphological study of Australian shrubby, discoid *Senecio* has resulted in the recognition of one new species, *Senecio euclaensis* I.Thomps., one new subspecies, *S. anethifolius* DC. subsp. *brevibracteolatus* I.Thomps., and one new variety, *S. cunninghamii* DC. var. *flindersensis* I.Thomps. In addition, *Senecio cunninghamii* DC. var. *serratus* M.E.Lawr. is elevated to the rank of species becoming *S. lanibracteus* I.Thomps. The shrubby, discoid species plus three radiate species are recognised here as forming a group. A key encompassing this group and the remaining discoid species in Australia is presented. One of the three radiate species, *Senecio linearifolius* A.Rich., is revised and nine varieties are described, seven of them new, and one a new combination. They are: var. *arachnoideus* I.Thomps., var. *dangarensis* I.Thomps., var. *denticulatus* I.Thomps., var. *gariwerdensis* I.Thomps., var. *graniticola* I.Thomps., var. *intermedius* I.Thomps., var. *latifolius* I.Thomps., and var. *macrodonatus* (DC) I.Thomps. A key to these varieties is presented.

### Introduction

The shrubby, discoid species of *Senecio* in Australia appear to form a natural group and are endemic. Other features of this group include: a tendency to glaucosity, capitula in congested corymbiform clusters, slender capitula with relatively few phyllaries and florets, narrow-margined phyllaries convex and alternating with broad-margined phyllaries that commonly have narrow stereomes, stereomes with prominent resin ducts, and florets extending well above the phyllaries at anthesis. The capitula are showy and self-incompatible in contrast to the disciform species of *Senecio* in Australia with which they might be confused (Lawrence 1985a).

The taxonomic history of the discoid members of the group has been relatively straightforward. *Senecio odoratus* Hornem., *S. anethifolius* A.Cunn. ex DC., *S. cunninghamii* DC. and *S. hypoleucus* F.Muell. ex Benth. were described in the early to mid-1800s, *S. odoratus* var. *obtusifolius* J.M. Black was described in 1912, and *S. georgianus* DC. var. *latifolius* Black in 1929. Lawrence (1985b) elevated *S. georgianus* DC. var. *latifolius* to the rank of species as *S. gawlerensis* M.E.Lawr., and described two varieties, *S. cunninghamii* var. *serratus*, and *S. odoratus* var. *longifolius* M.E.Lawr. Taxonomic changes to and descriptions of species in this group are presented in the first part of this paper.

The shrubby, discoid group can also be considered to be part of a larger group including three radiate species, here informally named the Odoratus group. The three radiate species are *S. linearifolius* A.Rich., *S. garlandii* F.Muell. ex Belcher, and *Senecio behrianus* Sond. & F.Muell. ex Sond. The former two in particular are similar to the large-leaved, discoid species *S. odoratus* and *S. hypoleucus*., whereas the woolly capitulum of *S. behrianus* is reminiscent of the discoid species, *S. cunninghamii* var. *serratus* M.E.Lawr. The Odoratus group occurs in central and south-eastern Australia and occurs in a wide range of environments. *Senecio linearifolius* and *S. odoratus* occur further south and east than the other species and in more mesic environments.

Two of the radiate species of the Odoratus group, *S. garlandii* and *S. behrianus* do not form part of this taxonomic study, although they are included in the key. *Senecio garlandii* is an uncommon species occurring in southern New South Wales and recently recorded from north-eastern Victoria. *Senecio behrianus* was collected from several

localities in south-eastern Australia in the 19th century, but there were no records in the 20th century until discovered in north-central Victoria in the 1980s. It has recently been recorded from near Ballarat in south-central Victoria. The third radiate species, *Senecio linearifolius*, is a widespread, variable species and a taxonomic revision of this species is presented in the second part of this paper.

There are several discoid species endemic to Australia that do not conform to the *Odoratus* group. Two of these, *S. ramosissimus* DC. and *S. gilbertii* Turcz., occur in south-western Western Australia and are allied to *S. leucoglossus* F.Muell. a radiate species with 1–3 ray florets from the same region. These three species, all herbaceous perennials, are gynodioecious, i.e. some plants of a species have capitula with entirely bisexual disc florets (or 1–3 female in the case of *S. leucoglossus*), whereas other plants have capitula with entirely female florets. Two further discoid species, *S. georgianus* DC. and *S. helichrysoides* F.Muell., from eastern Australia, have not been collected since the 19th century. They appear closer to the disciform group, e.g. *S. quadridentatus* Labill., in terms of habit and capitular morphology. A third species, *Senecio interpositus* I.Thomps., is typically disciform but it appears to provide a link between *S. georgianus*, *S. helichrysoides* and the disciform group by being discoid in the Armidale area of New South Wales (Thompson 2004).

## Materials and Methods

Herbarium specimens from AD, BRI, CANB, DNA, HO, MEL, NE, NSW, and PERTH, were examined. The circumscriptions of, and morphological variation within, previously recognised taxa was critically assessed and new taxonomic hypotheses developed and tested. Distribution maps were generated using ArcView computer program.

*Terminology for descriptions and keys:*

**Mid-branch** leaves refers to leaves in the middle third of the longer branches, i.e. not the shorter inflorescence branches.

**Unit inflorescence** here refers to the cluster of capitula at the end of axes where all the supporting inflorescence branches are leafless.

**The diameter of the involucre** is for unpressed specimens measured approximately mid-involucre. At this level the diameter is relatively constant.

**Papillose hairs** on achenes form longitudinal bands between the ribs and are themselves more or less longitudinally-arranged.

## Key to discoid and allied radiate species in Australia

The species included in this key are contained within the following circumscription:

Capitula discoid, homogamous (mostly all bisexual, rarely all female), florets all tubular and  $\pm$  identical in form OR

Capitula radiate; involucre < 5.5 mm long, < 3.0 mm diam.; calycular bracteoles 4–8; ligules 1–8(–9), > 2 mm long; leaves never divided or if so ligules white or pink; achenes homomorphic.

- 1 Capitula radiate
  - 2 Ligules 1–3, white or pink; plants gynodioecious (Western Australia).....*S. leucoglossus*
  - 2: Ligules 4–9, yellow; plants hermaphrodite (eastern Australia)
    - 3 Plants extensively rhizomatous, aerial stems to 0.5 m high; unit inflorescences of 1–5 capitula; involucre appressed-woolly.....*S. behrianus*
    - 3: Plants not extensively rhizomatous, aerial stems to 2.0 m high; unit inflorescences of several to 100s of capitula; involucre glabrous

- 4 Leaves with l:w ratio 1.5–4; lower surface of leaves densely tomentose.....  
.....*S. garlandii*
- 4: Leaves with l:w ratio > 4, or if less, the lower surface of leaves  $\pm$  glabrous  
.....**8. *S. linearifolius***
- 1: Capitula discoid
- 5 Annuals; calycular bracteoles conspicuously pigmented (pigment jet black in distal 2/5–4/5); phyllaries 14–23; florets > 40; corolla-limb shorter than tube (introduced species; mostly urban or cultivated environments).....*S. vulgaris*
- 5: Perennial herbs or shrubs; calycular bracteoles generally inconspicuously pigmented (pigment only ever black in distal 1/5); phyllaries 7–13; florets < 40, corolla-limb similar in length to tube
- 6 Shrubs, glaucous or not; always hermaphrodite; corollas of outer florets exceeding phyllaries by 2–5 mm
- 7 Leaves lobate to deeply pinnatisect, and if lobate, then involucre glabrous, > 5.5 mm long and phyllaries 11–13; reticulate venation pattern of leaves not or hardly discernible
- 8 Leaves deeply pinnatisect, axes of primary segments with l:w ratio > 8  
.....**1. *S. anethifolius***
- 8: Leaves lobate to subpinnatisect, axes of primary segments with l:w ratio < 8
- 9 Leaves fleshy, lobes/segments commonly c. oblong; phyllaries predominantly 8–10, 4.5–6 mm long (Eucla region, south-eastern Western Australia).....**2. *S. euclaensis***
- 9: Leaves not fleshy, lobes usually triangular; phyllaries predominantly 11–13, 5–8 mm long (south-central South Australia).....  
.....**3. *S. gawlerensis***
- 7: Leaves entire or dentate, or sometimes lobate but then involucre usually somewhat lanate, < 5.5 mm long, and phyllaries 8–10; reticulate venation of leaves clearly visible or not
- 10 Leaves of major branches to 15 mm wide; margin entire or if not then involucre usually lanate and/or 2–3 mm diam.; reticulate venation of leaves obscure
- 11 Mid-branch leaves with l:w ratio < 10, margin of most leaves of at least major branches denticulate, dentate, or lobate, margin flat or finely recurved, rarely leaves  $\pm$  entire; auricles if present often bidentate; calycular bracteoles to 3 mm long, with l:w ratio mostly > 3; peduncles and capitula mostly patchily to densely woolly as flowering commences, occasionally glabrous; florets per capitulum 10–18 .....**4. *S. lanibracteus***
- 11: Mid-branch leaves with l:w ratio > 7, margin of leaves of branches entire, revolute (margin of stem leaves may be dentate), auricles if present entire; calycular bracteoles to 2 mm long, with l:w ratio mostly < 2; peduncles and capitula glabrous or sometimes patchily woolly as flowering commences; florets per capitulum 8–12(–14)..  
.....**5. *S. cunninghamii***
- 10: Leaves of major branches to 50 mm wide, commonly  $\pm$  crowded-denticulate or crowded-dentate, reticulate venation clearly defined on one or both surfaces; involucre glabrous, mostly 1.5–2 mm diam.
- 12 Plant not glaucous; mid-branch leaves tapering strongly to a petiole-like proximal portion 1–4 cm long, auricles absent or small, lower surface  $\pm$  completely obscured by indumentum ....**6. *S. hypoleucus***
- 12: Plant often glaucous; mid-branch leaves not tapering strongly to a petiole-like proximal portion, auricles commonly well-developed

- and usually moderately stem-clasping; lower surface mostly glabrous or sparsely indumented, rarely moderately obscured by indumentum .....7. *S. odoratus*
- 6: Non-glabrous herbaceous perennials, sometimes gynodioecious (i.e. plants hermaphrodite or female); corolla of outer florets exceeding phyllaries by 0–2 mm
- 13 All plants hermaphrodite; leaves undivided with margin entire, rarely lobate; involucre 2–3 mm wide (eastern Australia)
- 14 Leaves densely woolly on both surfaces, inflorescence branchlets, peduncles and bracts densely woolly; calycular bracteoles > 4 mm long .....*S. helichrysoides*
- 14: Leaves densely appressed woolly on lower surface only, inflorescence branchlets, peduncles and bracts sparsely woolly; calycular bracteoles < 4 mm long .....*S. georgianus*
- 13: Plants hermaphrodite or female; leaves pinnatisect or undivided and then crowded-dentate; involucre 1.5–2 mm wide (Western Australia)
- 15 Leaves undivided with margin crowded-dentate, glabrous; inflorescence narrow-pyramidal (lateral capitula/clusters not reaching to medial capitulum/cluster) .....*S. ramosissimus*
- 15: Leaves pinnatisect, lower surface appressed-woolly; inflorescence not pyramidal (lateral capitula/clusters equal to or overtopping medial capitulum/cluster).....*S. gilbertii*

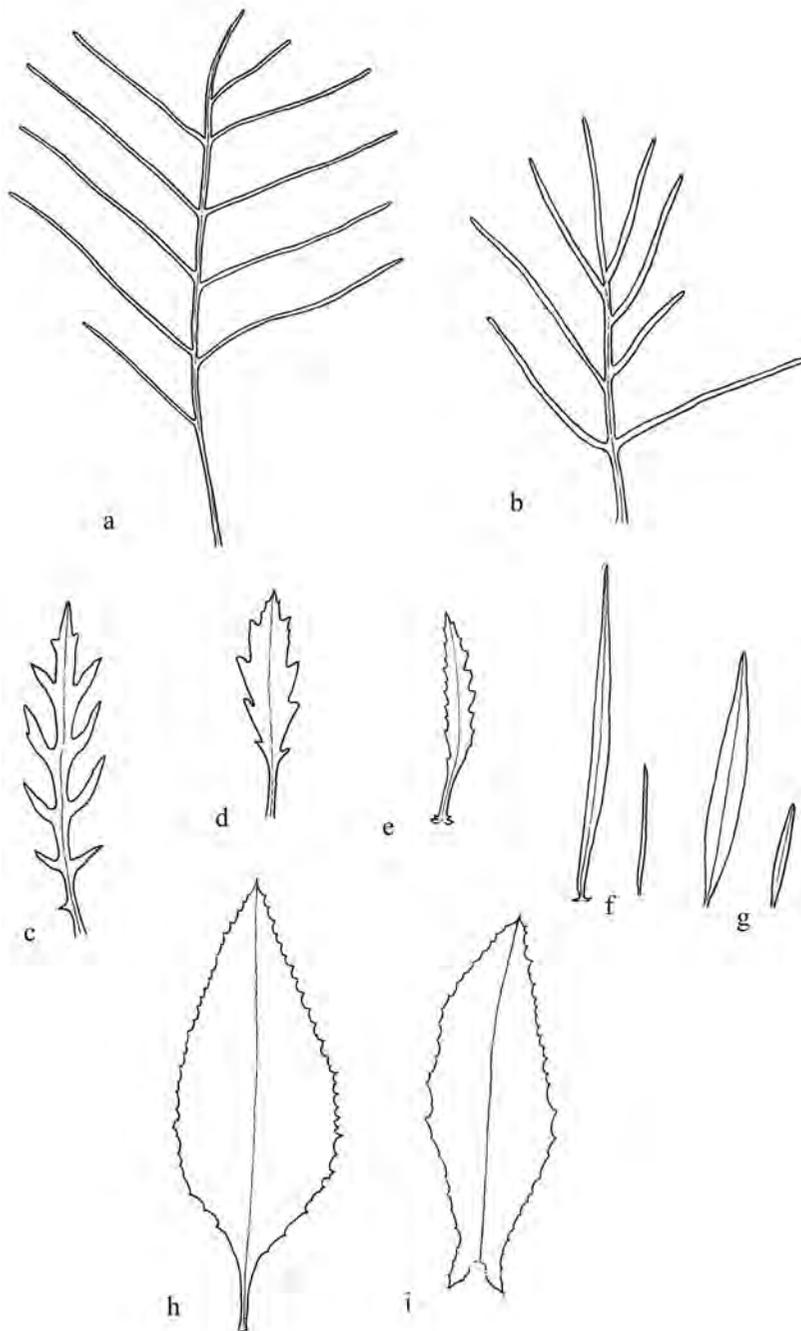
### Part 1. Taxonomy of the Australian shrubby, discoid *Senecio*

*Shrubs or subshrubs*, often glaucous, nearly glabrous or with hairs on peduncles, capitula and leaves, particularly the lower surface. *Leaves* undivided or less often lobate or pinnatisect; margin dentate, serrate or entire. *Unit inflorescences* commonly corymbiform, of c. 10–80 somewhat congested capitula; peduncles finally 10–15 mm long. *Capitula* discoid; calycular bracteoles 3–6, ovate to narrow-lanceolate or linear, 1.0–6.0 mm long, 0.3–1.0 mm wide, with resin ducts commonly prominent; involucre ± cylindrical, 3–8 mm long, 1.5–3.0 mm diam.; phyllaries 7–13, free; stereome flat or convex, often firm, often drying yellow, glabrous or with an appressed wool, with resin ducts 1 or 2, often orange or red; outer phyllaries with a vestigial scarious margin. *Florets* 7–25; corolla-limb equal to or slightly longer than tube. *Achenes* homomorphic, narrow-obloid, 1.6–4 mm long, ribs ± flat, moderately papillose-hairy, with l:w ratio of hairs c. 3–5, diam. of annulus c. 1/3–1/2 of diam. of achene. *Pappus* caducous; bristles nearly smooth or minutely scabrid-barbellate.

#### 1. *Senecio anethifolius* A.Cunn. ex DC., *Prodr.* 6: 371 (1838)

*Type*: [New South Wales], ‘in Nova-Hollandia interiori in collibus rupestris prope Peel’s Range Anglorum’ [Cocoparra Range], A. *Cunningham*; holo: G n.v. (microfiche seen MEL).

*Shrubs* to 2.0 m high, glabrous or sometimes transiently hairy on new growth, glaucous or not. *Leaves* slightly fleshy; mid-stem/mid-branch leaves to 13 cm long, with l:w ratio c. 1.5–3, deeply pinnatisect, c. orbicular, ovate or elliptic in outline; primary axis linear to narrow-linear; major divisions 2–6 per side, linear to filamentous, to 6 cm long, 0.3–2.5 mm wide (dry), sometimes again divided; base attenuate or sometimes with small undivided lobes; margin entire; reticulate venation obscure. *Unit inflorescences* typically of c. 20–80 capitula. *Capitula*: calycular bracteoles 2–6, 0.5–5.0 mm long; involucre 3.5–8.0 mm long, 2.0–2.5(–3.0) mm diam.; phyllaries 7–9; stereome mostly convex, with resin ducts variously developed, pale, orange or red; inner phyllaries most often with a single duct. *Florets* 7–15; corolla 5–8 mm long, with lobes 0.5–1.5 mm long. *Achenes*



**Figure 1.** Typical leaves of the shrubby, discoid species. a. *S. anethifolius* subsp. *anethifolius*; b. *S. anethifolius* subsp. *brevibracteolatus*; c. *S. euclaensis*; d. *S. gawlerensis*; e. *S. lanibracteus*; f. *S. cunninghamii* var. *cunninghamii*; g. *S. cunninghamii* var. *flindersensis*; h. *S. hypoleucus*; i. *S. odoratus*.

narrow-obloid, 2.0–3.0 mm long, pale to dark brown, with papillose hairs in bands a few hairs wide, with l:w ratio of hairs c. 3. *Pappus* 3.5–5.0 mm long.

*Flowers* mostly winter to summer.

*Distribution and Habitat:* Occurs in south-eastern Australia from the Flinders Ranges in south-eastern South Australia east to central New South Wales. Grows among rocks and/or in sand, sometimes in or beside watercourses, in open woodland and shrubland.

*Notes:* There are two subspecies. Putative hybrids between *S. lanibracteus* I.Thomps. and one or both of the subspecies have been recorded at several places in South Australia and near Broken Hill in western New South Wales.

- 1 Plants not glaucous, or rarely slightly glaucous; segments of leaves very fine (of major branches mostly 0.8–2.0 mm wide; of secondary branches mostly 0.3–0.8 mm wide (dried)); calycular bracteoles (1.5–)2.0–5.0 mm long; involucre 5.0–8.5 mm long, with resin ducts of phyllaries and bracteoles fine, not raised; corolla lobes mostly 1.0–1.6 mm long (dried) ..... **1a.** subsp. *anethifolius*
- 1: Plants glaucous at least on newer growth; segments of leaves generally broader than above (of major branches mostly 1.5–3.5 mm wide, of secondary branches mostly 0.6–1.5 mm wide (dried)); calycular bracteoles 0.5–2.0 mm long; involucre 3.5–6.0(–7.0) mm long, with resin ducts of phyllaries and bracteoles commonly broad and often raised; corolla lobes mostly 0.6–1.0 mm long (dried) .....  
..... **1b.** subsp. *brevibracteolatus*

**1a. *Senecio anethifolius*** A.Cunn. ex DC. subsp. *anethifolius*

*Senecio angustilobus* F.Muell., *Linnaea* 25: 418 (1853); *Senecio angustifolius* Sond., *Linnaea* 25: 526 (1853) [An error by Sonder who was intending to present Mueller's *S. angustilobus*].

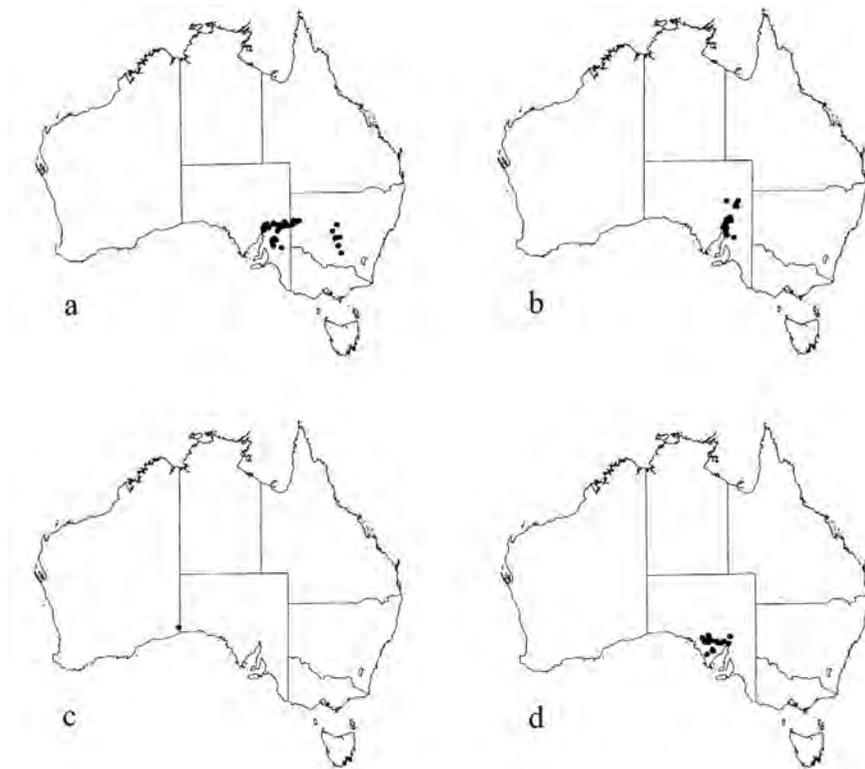
*Type:* South Australia, 'In cacuminibus montium petraeorum Cudnaka versus' [Kanyaka, Flinders Ranges], *F. Mueller*, Oct 1847; lecto (**here selected**): MEL 275094; isolecto: MEL.

*Plants* not glaucous, or rarely slightly glaucous. *Leaves:* segments 3–6 per side, 0.3–2.0 mm wide (dried). *Peduncles* at anthesis mostly 2–6 mm long. *Capitula:* calycular bracteoles (1.5–)2.0–5.0 mm long; involucre 5.0–8.5 mm long; phyllaries often not black-tipped, with resin ducts usually narrow, not raised, orange. *Florets* 7–12; corolla-lobes mostly 1.0–1.6 mm long (dried). (Figs 1a, 3)

*Distribution:* Occurs in south-eastern Australia from the Flinders Ranges in south-eastern South Australia south-east to Robertstown in South Australia and east to Broken Hill in far western New South Wales, and disjunctly further east in central New South Wales where it occurs from the Merrimurriwa Range south to the Narrandera district (Fig. 2a).

*Notes:* This subspecies is sympatric with and possibly hybridises with subsp. *brevibracteolatus* in the Southern Flinders Ranges.

*Selected specimens examined:* **SOUTH AUSTRALIA:** Southern Flinders Ranges. Yourambulla Caves area, c. 10 km SW of Hawker, *R.V. Smith* 89/29, 16.ix.1989 (AD, MEL); ca. 16 km west of Gordon, *H.M. Cooper*, 20.ix.1969 (AD); Bumbumbii Springs. Koonamore, *T.B. Paltridge* 7, 21.ix.1928 (AD); 'Dome Rock', 30 miles [48 km] W of Mingary, *A.G. Spooner* 3771, 16.xi.1974 (AD); S slope of Warren Gorge, 21 km N of Quorn, Flinders Ranges, *A. Sikkes* AS641, 21.ix.1973 (AD, CBG). **NEW SOUTH WALES:** 42 km from central Broken Hill on road to Mt Robe, roadside, *R.B. Hadlow* 86 & *A.B. Court*, 8.x.1981 (CBG, NSW); Cocopara National Park, Woolshed Creek area, *J.W. Wrigley*, 4.x.1971 (CBG); Euriowie Creek, 55 miles [90 km] S of Packsaddle, *C.R. Dunlop* CD1384, 29.viii.1969 (CBG); 'Yathong' Station, N of Hillston, *W.E. Mulham* W615, Oct. 1972 (CANB).



**Figure 2.** Distribution of a. *S. anethifolius* subsp. *anethifolius*; b. *S. anethifolius* subsp. *brevibracteolatus*; c. *S. euclaensis*; d. *S. gawlerensis*.

**1b. *Senecio anethifolius* subsp. *brevibracteolatus* I.Thomps., subsp. nov.**

A subspecies typica paginis glaucis, segmentis foliorum latoribus paucioribus, pedunculis longioribus, bracteolis brevioribus, capitulis brevioribus pluribus, corollis minoribus differt.

*Type:* South Australia, in Buckaringa Gorge, *L. Haegi* 3480 & *B.R. Moore*, 12 Dec. 1985; holo: AD; iso: BRI, CBG, MEL.

*Plants* glaucous, sometimes only slightly on stems, leaves, peduncles, and capitula. *Leaves:* segments 2–4 per side, 0.6–3.5 mm wide (dried). *Peduncles* at anthesis mostly 3–10 mm long. *Capitula:* calycular bracteoles 0.5–2.0 mm long; involucre 3.5–6.0(–7.0) mm long, phyllaries often black-tipped, with resin ducts usually broad, raised, orange, red or blackish-red. *Florets* 10–15; corolla-lobes 0.6–1.0 mm long (dried). (Figs 1b & 4)

*Distribution:* Occurs in central-eastern South Australia from Mt Livingston in the Gammon Ranges south to the Flinders Ranges and also slightly further south-east at Mt Bryan (Fig. 2b).

*Etymology:* The epithet alludes to the short bracteoles of this subspecies (*L. brevis*, short and *bracteolatus*, bracteolate).

*Selected specimens examined:* **SOUTH AUSTRALIA:** Horrocks Pass, 9.5 km from Wilmington towards Port Augusta, *R.J. Bayer* SA-99021 & *G.T. Chandler*, 27.x.1999 (AD, CANB); Slopes of Mt Brown Creek on E slopes of Mt Brown, *D.E. Symon* 8530, 24.iv.1973 (AD, CANB); Waterfall Creek, Baroota Reservoir, *R. Filson* 3170, 18.ix.1960 (MEL); Flinders Range – Entrance Wilpena Pound (about 30 miles [48 km] N of Hawker), *R. Hill*, 25.x.1955 (AD); 5 km S of Leigh



Figure 3. *S. anethifolius* subsp. *anethifolius* (R.V. Smith 89/29 MEL).



Figure 4. *S. anethifolius* subsp. *brevibracteolatus* (holotype: L. Haegi 3480 & B.R. Moore AD).



Figure 5. *S. euclaensis* (holotype: G.J. Keighery 906 & J.J. Alford PERTH).

Creek township, *D.N. Kraehenbuehl* 7312, 20.ix.1993 (AD); Dutchman's Stern Range, 3 km W of Quorn, *F. Mollenmans* 1205, 10.x.1981 (AD); In Bolla Bollana Creek, *V.J. Levitzke* 0507, 28.xi.1980 (AD); Near the summit of Mt Bryan, *D.N. Kraehenbuehl* 7280, May 1988 (AD, CANB).

## 2. *Senecio euclaensis* I.Thomps., *sp. nov.*

A *S. gawlerensis* M.E.Lawr. foliis carnosis segmentis plerumque oblongis, bracteolis brevioribus, phyllariis paucioribus brevioribus differt.

*Type:* Western Australia, 2 km west of Western Australia/South Australia border; Eucla National [Park], *G.J. Keighery & J.J. Alford* 906, 12 Oct. 1986 (PERTH).

*Shrubs* to 1.5 m high, glabrous, or sometimes sparsely and transiently cobwebby, not glaucous. *Leaves* fleshy; mid-stem/mid-branch leaves narrow-elliptic or oblanceolate, to 10 cm long, with l:w ratio c. 2.5–4, deeply lobate to subpinnatisect; major divisions 2–5 per side, strongly antrorse, triangular, oblong, narrow-oblong or obovate; base attenuate, petiole-like; margin  $\pm$  entire or few-denticulate or dentate, revolute; surfaces  $\pm$  glabrous; reticulate venation inconspicuous. *Unit inflorescences* of c. 60 capitula. *Capitula:* calycular bracteoles 4–6, 1.5–2.5 mm long; involucre 4.5–6.0 mm long, 3.0–3.5 mm diam.; phyllaries predominantly 8–10, a small percentage with 11–13, glabrous or cobwebby; stereome  $\pm$  flat, with resin ducts broad, reddish; inner phyllaries most often with 2 ducts. *Florets* 15–25; corolla c. 6 mm long, with lobes c. 1 mm long. *Achenes* not known at maturity, immature achenes with papillose hairs. *Pappus* c. 4–5 mm long. (Figs 1c, 5)

*Flowers* spring.

*Distribution:* Occurs in the Eucla area, including Eucla National Park, in the far south-east of Western Australia (Fig. 2c).

*Etymology:* The epithet alludes to the distribution of this species.

*Notes:* Known only from two collections near Eucla. Similar to *S. gawlerensis* but differs in having fleshy leaves with major divisions more deeply dissected and generally more oblong or obovate rather than triangular, shorter calycular bracteoles and involucre with fewer, less convex, and at first slightly cobwebby phyllaries.

*Selected specimens examined:* WESTERN AUSTRALIA: Eucla, *Carey*, 1877 (MEL).

## 3. *Senecio gawlerensis* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 292 (1985)

*Senecio georgianus* DC. var. *latifolius* J.M.Black, *Fl. S. Australia* 613 (1929).

*Type:* [South Australia], 10 miles [16 km] W. Yardea, E.P. [Eyre Peninsula], *J.B. Cleland*, 24 Aug. 1928; lecto: AD, *fide* M.E.Lawrence, *loc. cit.*

*Shrubs* to 1.5 m high, glabrous, or sometimes sparsely and transiently cobwebby, not glaucous. *Leaves* hardly fleshy; mid-stem/mid-branch leaves lanceolate, elliptic to narrow-elliptic, or oblanceolate, to 12 cm long, with l:w ratio c. 2–3, coarse-dentate to subpinnatisect; major divisions several per side, strongly antrorse, triangular; base attenuate, petiole like; margin  $\pm$  entire or few-denticulate or dentate. *Unit inflorescences* typically of c. 20–80 capitula. *Capitula:* calycular bracteoles 4–8, 2.0–4.5 mm long, often somewhat spreading; involucre (5.5–)6.0–8.0 mm long, c. 3.0 mm diam.; phyllaries 11–14, glabrous; stereomes convex, with resin ducts fine, reddish; inner phyllaries most often with a single duct. *Florets* 15–25; corolla 6–7 mm long, with lobes 0.6–0.8 mm long. *Achenes* narrow-obloid, 2.0–3.0 mm long, brown, with papillose hairs forming bands several hairs wide, with l:w ratio of hairs c. 4. *Pappus* c. 6 mm long. (Fig. 1d, 6)

*Flowers* mostly late winter–spring.

*Distribution and Habitat:* Occurs in south-central South Australia from Hiltaba east to Quorn in the Flinders Ranges and south-south-east to Corunna Hill on the Eyre Peninsula (Fig. 2d). Grows commonly among rocks on hillsides, also on sandy flats beside creeks, in open woodland and shrubland

*Selected specimens examined:* **SOUTH AUSTRALIA:** Miccollo Hill, 68 km NW (by road) from Iron Knob, Gawler Ranges, *B.J. Conn 1816*, 28.viii.1985 (AD, MEL, NSW); Gawler Ranges, E slope of Mt Gairdner, *P. Price*, 3.x.1972 (AD, CANB); Lower Flinders Ranges. Hancock's Lookout, ca. 42 km south-east of Port Augusta, near Wilmington, *coll. unknown* (Adelaide Botanical Garden collection), 2.x.1960 (AD).

#### 4. *Senecio lanibracteus* I.Thomps., *nom. and stat. nov.*

*Senecio cunninghamii* DC. var. *serratus* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 291 (1985).

*Type:* [South Australia], S. Aust., Chintapanna Dam, Witchelina Station, *F. Badman 182*, 13 Mar. 1979; *holo:* AD; *iso:* HO.

*Shrubs* to 1.8 m high, typically with a close, short wool usually present on younger parts, variably dense and persistent, rarely  $\pm$  glabrous, sometimes mildly glaucous. *Leaves* subfleshy to coriaceous; mid-branch leaves narrow to very narrow-elliptic, to 10 cm long, with l:w ratio 2–11, undivided or coarse-dentate to lobate; major divisions 3–7(–12) per side, antrorse, mostly triangular, rarely c. oblong, with l:w ratio 1–2; base attenuate or auriculate, with auricles entire or bilobed, hardly amplexicaul; margin dentate or denticulate, with teeth often frequent, rarely entire; both surfaces often appressed-woolly at least when young, variably glabrescent, sometimes glabrous; reticulate venation obscure. *Unit inflorescences* of c. 5–40 capitula; peduncles commonly somewhat woolly at anthesis. *Capitula:* calycular bracteoles 2–6, mostly lanceolate, 1.2–3.0 mm long; involucre 3.0–6.0 mm long, 2.0–3.0 mm diam.; phyllaries 8–10(–12), slightly to densely appressed-woolly, variably glabrescent, rarely glabrous; stereome flat to slightly convex, with resin ducts moderately broad, pale or orangish; inner phyllaries with 1 or 2 ducts. *Florets* 10–18(–22); corolla 5–6 mm long, with lobes 0.6–0.8 mm long. *Achenes* narrow-obloid, 2.5–4.0 mm long, straw-coloured, with papillose hairs usually in bands several hairs wide, with l:w ratio of hairs c. 5. *Pappus* 4–7 mm long. (Figs 1e, 8)

*Flowers* most of year, probably dependent on moisture.

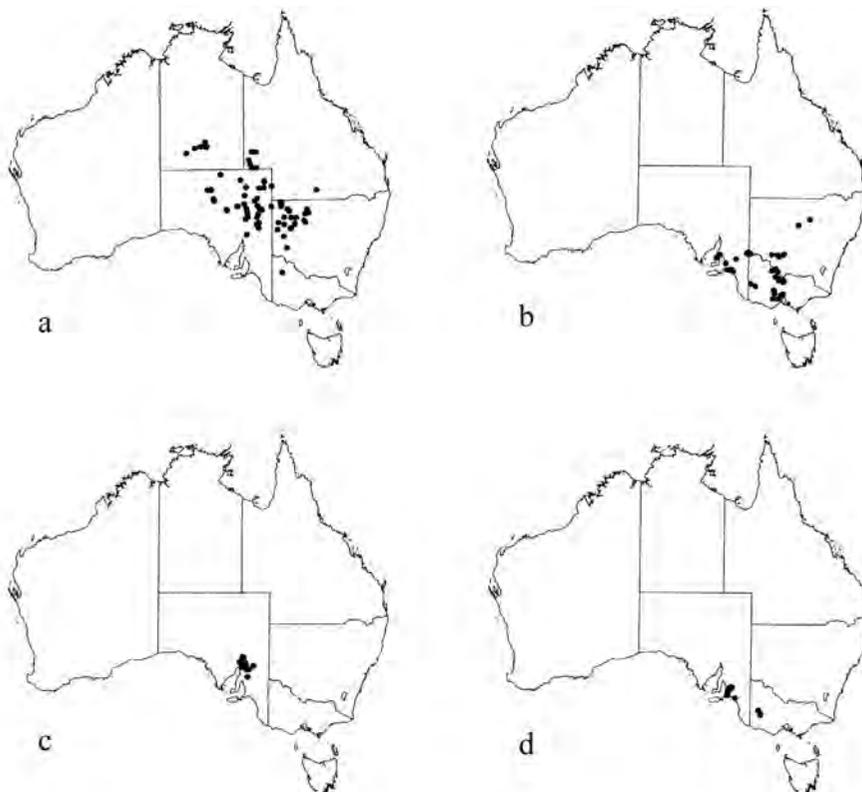
*Distribution and Habitat:* Occurs in central to central-eastern Australia from the George Gill Ranges in southern Northern Territory south-east to Pooncarie in far south-western New South Wales and east to Birdsville in far south-western Queensland. There are also a few very old records from the Geraldton area in far western Western Australia (Fig. 7a). Grows commonly in or near drains or watercourses in plains, on various soils, often saline, in shrubland and woodland.

*Etymology:* The epithet alludes to the indumentum covering the phyllaries (*L. lanus*, wool and *bracteus*, bract).

*Notes:* Previously treated as a variety of *S. cunninghamii*, although it is not clear from this study that this species is its closest relative. Elevating the rank of this taxon necessitates the creation of a new epithet because the name *Senecio serratus* has already been taken. *Senecio lanibracteus* differs from *S. cunninghamii* in leaf shape and dentition and, usually, in the presence of indumentum on phyllaries, leaves and new growth, in the length and shape of calycular bracteoles, and in the number of florets per capitulum. Phyllaries of *S. lanibracteus* are  $\pm$  rigid and narrow-ovate or narrow-elliptic whereas those of *S. cunninghamii* are more flexible and are closer to narrow-oblong. A glabrous



Figure 6. *S. gawlerensis* (S.A. N.P.W.S. Gawler Ranges Survey 7549 MEL).



**Figure 7.** Distribution of a. *S. lanibracteus*; b. *S. cunninghamii* var. *cunninghamii*; c. *S. cunninghamii* var. *flindersensis*; d. *S. hypoleucus*; e. *S. odoratus*.

form of this species occurs in far north-eastern South Australia and far south-western Queensland. In other respects it is typical of the species. At Dalhousie Springs in northern South Australia (e.g. *D.E. Symon 14462*, AD, CANB) plants differ from typical *S. lanibracteus* in having larger capitula with 12 phyllaries. These two variants warrant further investigation. Specimens from Macquarie Marshes in central New South Wales are intermediate in form between *S. lanibracteus* and *S. cunninghamii*. Hybridisation between these two species is a possible explanation but there are no records of typical examples of these species from this locality.

*Selected specimens examined:* **NORTHERN TERRITORY:** ca. 2.5 km E on Col. Rose Drive; Sth Stuart Hwy; ca. 7.5 km SE Heavitree Gap, *D.E. Albrecht 5761*, 8.ii.1994 (AD, DNA, MEL, NT); East side, Alice Springs, *P.K. Latz 1015*, 21.xii.1970 (DNA). **SOUTH AUSTRALIA:** Lake Eyre Basin, Coongie Lake, *P.E. Conrick 2263*, 5.vi.1987 (AD, MEL); 8 m [13 km] NE of Marree on Birdsville Track, *A.C. Beauglehole 28136*, 1.viii.1968 (AD, MEL); 26 km N of Copley on road to Lyndhurst, *I.C. Clarke 3002*, *J. Vaganiance*, *W. Hyke* & *O. Sherlock*, 25.x.1999 (MEL); Lake Eyre, Joe's dam. Millers Creek Station, *F.J. Badman 7569*, 14.iv.1995 (AD, MEL). **QUEENSLAND:** Mulligans River, *A. Henry*, 1889 (MEL). **NEW SOUTH WALES:** Mootwingee National Park, Homestead Gorge, 112 km NE of Broken Hill, *I. Crawford 1062*, 23.x.1988 (CBG, NSW, PERTH); Opera Tank, Channel Paddock, Lake Mere Station, *T.R. Lally 268*, 24.iii.1994 (CANB, MEL); 40 km N of Tibbooburra on Wittabrenna Creek floodplain, Sturt National Park, *P.E. Conrick 642*, 5.ix.1981 (AD, MEL); Menindee Lakes, near the road at the S end of Lake Pamamaroo and about 2 km SW of the outlet regulator, *J.H. Browne 309*, 3.x.1985 (MEL); 2 km SE of Carruranna WH. Cooper Creek, *F.J. Badman 1566*, 24.ii.1984 (AD, CBG). **VICTORIA:** Wyperfeld National Park, south west side of Lake Brambruk, 3.5 km north of Wonga Hut, *A.C. Beauglehole 57048* & *E. Harberger*, 14.xi.1977 (MEL).

**5. *Senecio cunninghamii* DC., *Prodr.* 6: 371 (1838), as *Cunninghamii*.**

*Type*: [New South Wales], 'In Nova-Hollandia verisim. ad lacum Georgii' [Lake George], *A. Cunningham*; *holo*: G n.v. (microfiche seen at MEL)

*Shrubs* to 1.8 m high, ± glabrous except for transiently woolly newer growth, sometimes glaucous especially on younger growth. *Leaves* sub-fleshy to fleshy; mid-branch leaves narrow-elliptic, narrow oblong-elliptic or linear to narrow-linear, to 14 cm long, with l:w ratio c. 7–40, undivided (stem leaves sometimes dentate); base attenuate or upper leaves with small undivided auricles, not amplexicaul; margin entire, revolute, or sometimes larger leaves with scattered teeth; reticulate venation not conspicuous. *Unit inflorescences* of c. 5–25 capitula. *Capitula*: calycular bracteoles 1–4, 0.7–1.5(–2.0) mm long; involucre 3.0–5.0 mm long, c. 1.5–2.0 mm diam.; phyllaries (6–)7–9, slightly convex, patchily woolly at or prior to anthesis or glabrous, and then often glaucous; stereome mostly convex, with resin ducts fine or well-developed, pale or orangish; inner phyllaries usually with 1 duct. *Florets* 8–12(–14); corolla 4–6 mm long, with lobes 0.6–0.8 mm long. *Achenes* narrow-obloid, 2–4 mm long, olive-brown, with papillose hairs in bands 2 or 3 hairs wide or hairs somewhat dispersed, with l:w ratio of hairs c. 5. *Pappus* 4–6 mm long.

*Flowers* mostly summer–autumn.

*Distribution and Habitat*: Occurs in south-eastern South Australia, south-central New South Wales and western to central Victoria, with outlying populations in north-central New South Wales. There is one old record (MEL 2167322) labelled Darling Downs (South-eastern Queensland), *W. Hill*, which is likely to have been mislabelled. Grows in various soils commonly associated with watercourses or in drains or depressions in shrubland, woodland and forest.

There are two varieties.

- 1 Length:width ratio of mid-branch leaves (of longer branches) 15–40; peduncles and capitula glabrous, often glaucous at and before anthesis .....**5a. var. *cunninghamii***
- 1: Length:width ratio of mid-branch leaves (of longer branches) 7–15(–20); peduncles and capitula patchily woolly before anthesis, lost or persistent at anthesis, not glaucous .....**5b. var. *flindersensis***

**5a. *Senecio cunninghamii* DC. var. *cunninghamii***

*Senecio brachylaenus* DC., *Prodr.* 6: 370 (1838). *Type*: [New South Wales], 'In Nova-Hollandia interiore ad ripas flum. Lachlan' [Banks of the Lachlan River], *A. Cunningham* 142, June 1817; *holo*: G n.v. (microfiche seen at MEL).

*Stem leaves* with l:w ratio > 10; margin usually entire; mid-branch leaves with l:w ratio 15–40. *Peduncles and capitula* glabrous at and before anthesis, often glaucous. (Figs 1f, 9)

*Distribution*: Occurs in south-eastern Australia from the Fleurieu Peninsula in south-eastern South Australia east to Hay in south-central New South Wales and south-east to the western outskirts of Melbourne in south-central Victoria. Also occurs disjunctly in the Macquarie Marshes area in north-central New South Wales (Fig. 7b).

*Selected specimens examined*: **SOUTH AUSTRALIA**: Yorke Peninsula. Ca. 3 km east of Port Victoria, *J.B. Cleland*, 17.iii.1959 (AD, CANB); 7 km N of Renmark, Wookual Bend on River Murray, *M.E. Lawrence* 778, 4.vi.1977 (AD); Lake Alexandrina, south-east margin, ca. 90 km south-east of Adelaide, *P. Wilson* 1414, 22.xi.1959 (AD). **NEW SOUTH WALES**: 30 miles [48 km] N of Hay, *W.E. Mulham* S37, 26.ix.1963 (CANB); North side of the Lachlan River bridge, Oxley, *R.G. Coveny* 18692, *G. Chapple*, *P.G. Kodela*, & *H. McPherson*, 4.x.2000 (AD, BRI, MEL, NSW). **VICTORIA**: north of Benjeroop State Forest, *A.C. Beaglehole* 83197, 29.xii.1985 (AD, CANB); Koondrook. Top of steep Murray R. banks just E of junction with Gunbower Creek, *J.H. Willis*, 21.iii.1972 (MEL); Jilpanger Flora and Fauna Reserve, c. 50 km SW of Horsham, *D. Cook*



Figure 8. *S. lanibracteus* (B. Nordenstam & A. Anderberg 982 MEL).

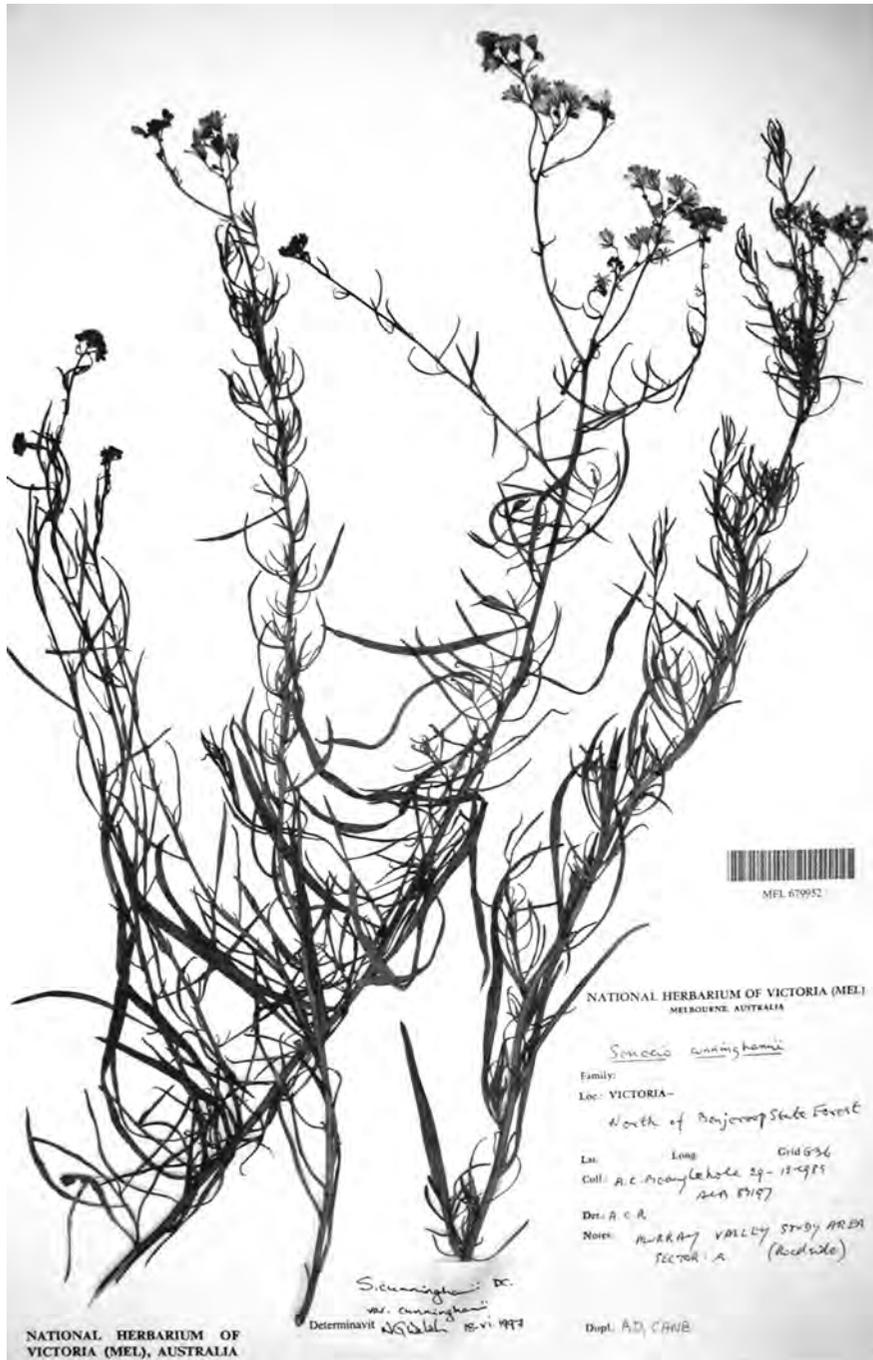


Figure 9. *S. cunninghamii* var. *cunninghamii* (A.C. Beauglehole 83197 MEL).

s.n., Sept. 1991 (MEL); Diggers Rest, *P.R.H. St.John*, 25.iii.1901 (MEL); Bannockburn [NW of Geelong]. Rail reserve (W side) 2 km N of Bannockburn station, on railway side of fence line, *K. McDougall s.n.*, 25.iv.1992 (MEL); Mullaroo creek, Lindsay Island, 12 m. [19 km] N of Sturt Highway,  $\pm$  54 m. [88 km] W of Mildura PO, *A.C. Beauglehole 40614*, 20.x.1972 (AD, MEL); Ballarat–Clunes road, 2 km south of Clunes, *R. Thomas*, 2.viii.1990 (MEL); 19 km W of Goroke PO, 84 km W of Horsham PO, *A.C. Beauglehole 66844*, 29.xi.1979 (AD, MEL, NSW); Boort–Durham Ox Rd, c. 1 km W of Durham Ox, between Serpentine and Flume Creeks, N side of Rd, *A.C. Cochrane 549 & N.G. Walsh*, 2.iii.1999 (AD).

**5b. *Senecio cunninghamii* DC. var. *flindersensis* I.Thomps., var. nov.**

A varietate typica, foliis 7–15(–20)plo longioribus quam latioribus, pedunculis et capitulis non glaucus, paulo lanatibus differt.

*Type*: South Australia, Lower Flinders Range, Melrose (Melrose is ca. 60 km south-east of Port Augusta), *H. Amtsberg*, 20 Aug. 1972; holo: AD.

*Stem leaves* with l:w ratio < 10; margin often dentate; mid-branch leaves with a l:w ratio of 7–15(–20). *Peduncles and capitula* mostly patchily woolly at and before anthesis, not glaucous. (Figs 1g, 10)

*Distribution*: Occurs in south-eastern South Australia from near Hawker in the Flinders Ranges south-south-east to Clare (Fig. 7c).

*Etymology*: The epithet alludes to the Flinders Ranges where this variety occurs.

*Notes*: This variety was alluded to by Lawrence (1985b) when she noted the existence of specimens intermediate in morphology between *S. lanibracteus* (as *S. cunninghamii* var. *serratus*) and typical *S. cunninghamii*. The affinity of these specimens is clearly with *S. cunninghamii* but they resemble *S. lanibracteus* in developing some wool on their capitula.

*Selected specimens examined*: **SOUTH AUSTRALIA**: Port Augusta, *T.S. Lea*, 25.i.1886 (AD); near Wonaka, *R.J. Bates 37424*, 29.iv.1994 (AD, CANB, MEL); Morchard, *R.J. Bates 9383*, 28.ii.1987 (AD); Ca. 5 km south of Kanyaka at roadside, *W.R. Barker 312*, 4.iii.1968 (AD); Quorn, 2 miles (3.22 km) West, *H.M. Cooper*, Mar. 1941 (AD); Peterborough, *L.D. Williams 2776*, 10.iv.1966 (AD); Between Hammond and Amyton, *R. Bates 14312*, 17.v.1988 (AD); North of Terowie, *R. Bates 9443*, 1.ii.1987 (AD); 42 km ex Yunta, road from Oodla Wirra, *G. Leske 60*, 17.iii.1997 (AD).

**6. *Senecio hypoleucus* F.Muell. ex Benth., *Fl. Austral.* 3: 672 (1867)**

*Type*: [Victoria], Wimmera, *Dallachy*; ?syn: *K n.v.*, MEL; [South Australia], Mount Lofty, *Wilhelmi*; syn: *K n.v.*; [South Australia], Mount Lofty, *Whittaker*; syn: *K n.v.*

*Senecio odoratus* Hornem. var. *petiolata* Sond., *Linnaea* 25: 526 (1853), as  $\beta$  *petiolata*. *Type*: [South Australia], 'Ad fluv. Torrens [River Torrens]', 1849, *F. Mueller*; syn: MEL; [South Australia], in tractu montium Bugle-range [Bugle Range], *F. Mueller*, 23 Nov. 1848; syn: MEL

*Shrubs* to 1.5 m high, with hairs on leaves and stems, not glaucous. *Leaves* not fleshy; mid-stem/mid-branch leaves to 14 cm long, with l:w ratio c. 2–6, proximal 1–4 cm petiole-like, blade portion elliptic to narrow-elliptic, or lanceolate, undivided; base attenuate; margin dentate or denticulate, with teeth frequent; upper surface sparsely appressed-cobwebby, denser along midrib, glabrescent, reticulate venation impressed; lower surface moderately to densely appressed-woolly, with hairs entirely wispy or coarse at base; secondary and sometimes reticulate venation usually distinct. *Unit inflorescences* typically of c. 20–80 capitula. *Capitula*: calycular bracteoles 3–6, 1.5–2.0 mm long; involucre 4.0–6.0 mm long, c. 1.5–2.0 mm diam., glabrous; phyllaries 7–10; stereome convex, with



Figure 10. *S. cunninghamii* var. *flindersensis* (holotype: H. Ampsberg s.n. AD).



Figure 11. *S. hypoleucus* (A.C. Beauglehole 87552 & L. Heubner MEL).



Figure 12. *S. odoratus* (A.R.R. Higgins MEL).

resin ducts fine, pale to reddish; inner phyllaries with 1 or 2 ducts. *Florets* 11–14; corolla 5–7 mm long, with lobes 0.8–1.0 mm long. *Achenes* narrow-obloid, 1.8–2.2 mm long, brown, with papillose hairs forming bands 3 or 4 hairs wide, with l:w ratio of hairs c. 5. *Pappus* 4–5 mm long. (Figs 1h, 11)

*Flowers* mostly late spring–summer.

*Distribution and Habitat*: Occurs in south-eastern South Australia on the Fleurieu Peninsula and in western Victoria on Mt Arapiles and Mitre Rock near Natimuk (Fig. 7d). Grows in rocky sites, including granite and sandstone outcrops, and in gullies in forest and woodland.

*Notes*: Relatively common in the Mount Lofty Ranges in South Australia and in this region it hybridises with *S. odoratus* and the introduced species, *S. pterophorus* DC.

*Selected specimens examined*: **SOUTH AUSTRALIA**: Mount Lofty Range. Between first and second waterfalls, Morialta Gorge, ca 10 km east of Adelaide, *R. Schodde* 1035, 25.xii.1958 (AD, CANB). **VICTORIA**: Mount Arapiles–Tooan Park, Mitre Rock, *J.E. Tonkin* 377 & *J.H. Ross*, 13.xii.1995 (MEL).

## 7. *Senecio odoratus* Hornem., *Hort. Bot. Hafn.* 2: 809 (1815)

*Cacalia odorata* (Hornem.) Desf., *Cat. Hort. Paris* 400 (1829).

*Type*: [State unknown], ‘Hab. in Nov. Hollandia’; probable syn: MEL [Presumably a specimen grown in botanic garden at Copenhagen from achenes sent from England].

*Senecio odoratus* Hornem. var. *obtusifolius* J.M.Black, *Trans. & Proc. Roy. Soc. S. Australia* 36: 24 (1912). *Type*: [South Australia], ‘Along the coast at Port Elliot’, *J.M. Black*; holo: AD.

*Senecio odoratus* Hornem. var. *longifolius* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 289 (1985). *Type*: [South Australia], Ravine des Casoars [Kangaroo Island], 2 Feb. 1948, *J.B. Cleland*; holo: AD; iso: AD.

*Senecio odoratus* A.Rich., *Voy. Astrolabe* 2: 109 (1834), *nom. illeg. non* Hornem. (1815). *Type*: [South Australia], ‘Crescit in Nova-Hollandia, loco vulgo dicto Ile des Kangourous [west coast of Kangaroo Island]’; holo: P n.v.

*Shrubs* to 1.7 m high, nearly glabrous except for leaves, often glaucous. *Leaves* not or slightly fleshy; mid-stem/mid-branch leaves oblanceolate, elliptic to narrow-elliptic or narrow-oblong, to 14 cm long, with l:w ratio c. 2–15, undivided; base attenuate, cordate or auriculate, commonly somewhat amplexicaul; margin dentate to coarse-dentate, or ± entire; upper surface glabrous or with coarse hairs; lower surface glabrous or cobwebby or with coarse hairs, the coarse portions sometimes somewhat obscured by cobwebby overlay; reticulate venation usually conspicuous, especially below. *Unit inflorescences* typically of c. 20–80 capitula. *Capitula*: calycular bracteoles 3–6, 1.0–2.0 mm long; involucre 3.5–6.0 mm long, c. 1.5–2.0 mm diam., glabrous, sometimes glaucous; phyllaries 7–10; stereome convex, with resin ducts mostly fine, pale, orange or reddish; inner phyllaries with 1 or 2 ducts. *Florets* 10–16; corolla 4–6 mm long, with lobes 0.6–1.0 mm long. *Achenes* narrow-obloid, 1.6–2.8 mm long, brown, with papillose hairs in bands, with l:w ratio of hairs c. 4. *Pappus* 4–5 mm long. (Figs 1i, 12)

*Flowers* spring–autumn.

*Distribution and Habitat*: Occurs in southern South Australia east from Pearson Island off the west coast of Eyre Peninsula; in south-western Victoria mostly along the coast; in coastal eastern Victoria, and also in Tasmania (Fig. 7e). Grows on rocky slopes, cliff-tops, or sand dunes in shrubland, woodland and forest.

*Notes*: An aromatic species displaying considerable subtle morphological variation

particularly in south-eastern South Australia where it is common. Leaves are usually crowded-dentate and the reticulate venation is usually evident. Common but less consistent features of the leaves include glaucosity and a stem-clasping base.

The two varieties of *S. odoratus* that have been recognised represent the two extremes of leaf length:width ratio; however the range of length:width ratios appears to form a continuum in this species and further characters corroborating these varieties could not be identified in this study. The pattern of variation across all specimens of *S. odoratus* appears to be considerably more complex than is represented by the recognition of these varieties, and therefore it is considered better not to recognise them formally.

The type of *Senecio odoratus* var. *longifolius* is from Kangaroo Island and is characterised largely on the basis of relatively narrow leaves. Plants with similarly narrow leaves occur on islands west of Kangaroo Island, e.g. Pearson Island but these have different capitular features. Plants with relatively broad and crowded leaves correspond to Black's var. *obtusifolius* and these occur along the coast of South Australia between Port Eliot and Victor Harbour.

There is variation in leaf shape, degree of auricular development, development of hair on both surfaces and size and glaucosity of the capitula, but there seems to be no consistent pattern. Plants with leaves attenuate basally and moderately woolly on the lower surface are intermediate between the more common forms of *S. odoratus* and *S. hypoleucus* and may represent specimens of hybrid swarms. The capitula of some forms are smaller than usual and are not glaucous; these are reminiscent of capitula of *S. linearifolius* but without the ligulate florets. Leaf venation, indumentum and dentition are also reminiscent of this species suggesting a close relationship. (Mueller determined a few specimens of *S. linearifolius* as *S. odoratus* var. *radiatus*.)

Hybridisation with other species of the *Odoratus* group is likely to occur, e.g. in the Flinders Ranges, and hybridisation with disciform species, e.g. *S. glomeratus* Desf. ex Poir. and *S. minimus* Poir., have also been recorded.

*Selected specimens examined:* **SOUTH AUSTRALIA:** Kangaroo Island. Breakneck River on West Bay Track, Flinders Chase National Park, *B.M. Overton 2416*, 3.i.1994 (AD, MEL). c. 2 km NW of Melrose - Mount Remarkable - new walking track from War Memorial, *I.C. Clarke 2931*, *J. Vaganiance, W. Hyke, & O. Sherlock*, 17.x.1999 (AD, MEL). **VICTORIA:** South-west. Warrnambool area; Childers Cove, *M.G. Corrick 7904*, 17.xii.1981 (AD, CANB, MEL); Long Forest Flora Reserve, Bacchus Marsh (55 km west of Melbourne), Coimadai Creek area, *V. Stajsic 26*, 27.ix.1990 (HO, MEL, NSW, PERTH). **TASMANIA:** Furneaux Group, Penguin Island, *J.S. Whinray 8428*, date unknown (AD, CANB, HO, MEL, NSW).

## Part 2: A revision of *Senecio linearifolius* A.Rich.

*Senecio linearifolius* is a variable species which, despite its radiate capitula, has a close affinity to the discoid species *Senecio odoratus*. Both species are sometimes glaucous and the nature of the variation in leaf indumentum is similar. Of the radiate species, *S. linearifolius* is probably closest to *S. garlandii*. *Senecio linearifolius* is characterised by small, radiate capitula and relatively large and mostly narrow to very narrow-elliptic undivided leaves with an entire or toothed margin.

*Senecio linearifolius* occurs in south-eastern Australia, including Tasmania, where it occurs in more mesic environments and can be a dominant component of understorey vegetation especially in disturbed sites such as road verges. On the mainland it occurs mostly on and to the coastal side of the Great Dividing Range, and it occurs from sea-level to alpine altitudes.

The name *Senecio linearifolius* was not adopted until 130 years after the taxon was first recognised. It was known as *S. australis* Willd. through the mid-1800s until the type of *S. australis* was found to be referable to the *S. lautus* complex. The initial misapplication became entrenched by the work of Richard and persisted until the late 1800s

(Belcher 1992). A synonym, *S. dryadeus*, began to be used in Australia from the late 1800s presumably as the use of *S. australis* was shown to be erroneous. However, this name was not validly published by Sieber or Sprengel. Willis (1957) pointed out that this name was validly published in 1888 when Mueller published the name with a description. Well before this, however, several valid names had been published by Richard for forms of this entity and Willis nominated *Senecio linearifolius* A.Rich. as the correct name in 1957.

The site of collection of one the three specimens of *S. linearifolius* from Richard's herbarium is given as Port Jackson. This is likely to be an error as the typical form has not otherwise been collected from that area.

### Materials and Methods

Herbarium specimens from all Australian herbaria were examined. This was supplemented with field assessment and collections at several sites in southern Victoria and eastern New South Wales. The nature of the morphological variation was assessed and taxonomically useful characters were identified. Several morphological groups that were largely geographic were elucidated. A small percentage of specimens at geographical interfaces between these groups were intermediate in morphology. Whether these specimens represent occasional hybridisation between groups or a more extensive gradation from one form to the other is unclear, and for this reason it is considered most appropriate to recognise these groups in *Senecio linearifolius* at the level of variety.

### Taxonomy

**8. *Senecio linearifolius*** A.Rich., in J.S.C. Dumont d'Urville, *Voy. Astrolabe* 2: 129 (1834).

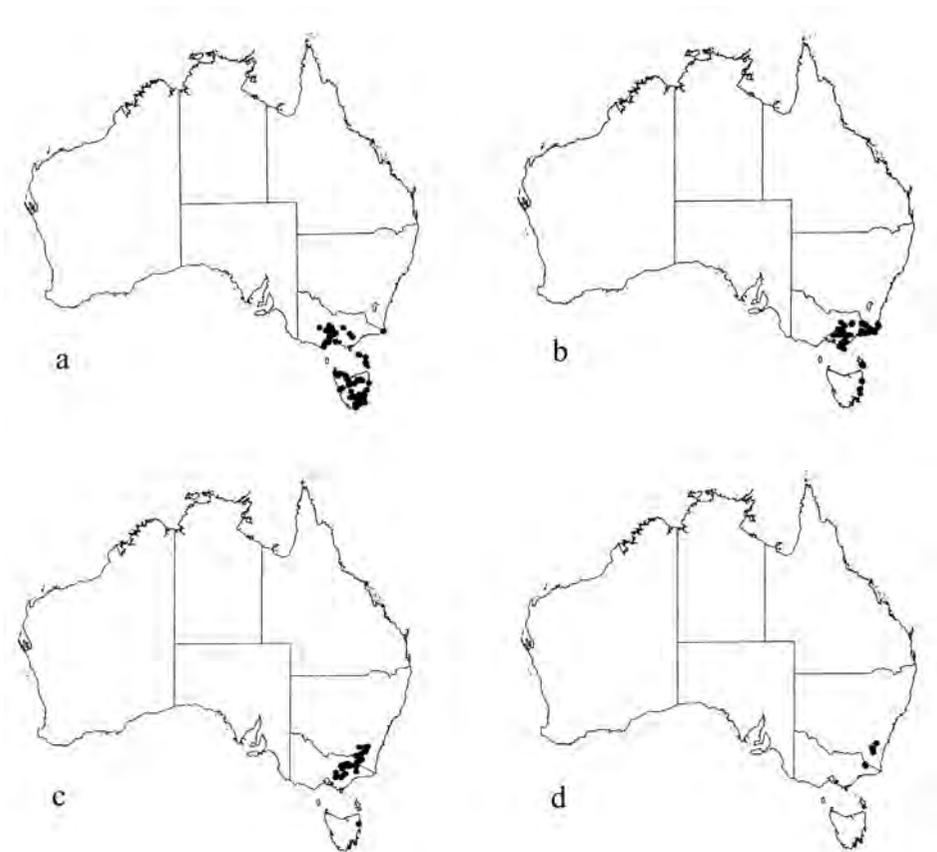
*Type*: [Tasmania], 'Crescit in Novâ-Hollandiâ', A. Lesson; holo: P.

[*S. australis* auct. non Willd.: A. Richard, *Voy. Astrolabe* 2: (1834); A.P. de Candolle, *Prodr.* 6: 374 (1838); G. Bentham, *Fl. Austral.* 3: 669 (1867)]

*Aromatic perennials*, often weakly shrubby, to 2 m high, glabrous or nearly so except on lower surface of leaves, sometimes glaucous. *Stems* becoming many-stemmed from base, branching mostly in upper half. *Leaves* commonly  $\pm$  thin to coriaceous, rarely somewhat fleshy; leaves in middle to upper third of stems narrow to very narrow-elliptic, narrow-ovate, lanceolate, or linear, 2–20 cm long, 1–40 mm wide, with l:w ratio c. 1.5–30, undivided; base attenuate, truncate, cordate, or variously auriculate, with auricles divided or not, slightly amplexicaul or not; margin entire, denticulate, dentate or serrate; upper surface glabrous, occasionally sparsely appressed-cobwebby, glabrescent, sometimes sparsely and minutely hispid; lower surface glabrous, or variously cobwebby to woolly, with hairs all fine and  $\pm$  appressed or sometimes spreading; secondary and tertiary venation variably distinct. *Unit inflorescences* of several to many capitula; peduncles finally to c. 15 mm long. *Capitula*: calycular bracteoles 2–6, 1.5–3.0 mm long; peduncle and margin of bracteole glabrous or cobwebby at anthesis, sometimes glaucous; involucre cylindrical to weakly campanulate, 2.5–5.5 mm long, 1.5–3.0 mm diam.; phyllaries 7–12(–14); stereome slightly to moderately convex, usually glabrous. *Florets* 12–30; ligulate florets 4–8, ligules 3–8 mm long, with nerves commonly 4; disc florets 4.0–5.5 mm long; limb mostly slightly longer than tube. *Achenes* narrow-obloid or narrow oblong-ellipsoid, 1.3–2.5 mm long, brown, glabrous or with papillose hairs in bands, hairs with a l:w ratio of 2–3; carpopodium small, slightly exerted. *Pappus* 4–6 mm long.

*Flowers* mostly spring–autumn.

*Distribution*: Occurs in south-eastern Australia from north-eastern New South Wales south to far eastern Victoria, from there west to south-eastern South Australia, and



**Figure 13.** Distribution of a. *S. linearifolius* var. *linearifolius*; b. *S. linearifolius* var. *denticulatus*; c. *S. linearifolius* var. *latifolius*; d. *S. linearifolius* var. *intermedius*.

throughout Tasmania. Naturalised in New Zealand. Grows within a few hundred kilometres of coastlines in medium to high rainfall areas in woodland and forest.

*Notes:* *Senecio pauciligulatus* A.Rich. resembles *S. linearifolius* but has a few atypical features including opposite panicle branches and ligule number fewer than four. The shape of leaves differs from other forms of the species. It is known only by the type and is considered most likely to be an aberrant specimen. There are eight varieties of *S. linearifolius*.

**Key**

*Note:* In the following key, leaves refer to leaves of stems rather than of inflorescence branches. The latter are generally similar to stem leaves and have a similar indumentum, but commonly have a higher length to width ratio, reduced dentition, and different basal morphology. In the descriptions of varieties, the upper-stem leaves are specified as plant specimens are typically broken off in this region and variation in shape and auricle development is more apparent in this region.

- 1 Lower surface of mature leaves woolly (surface largely to entirely obscured); leaves lacking auricles or auricles present only on uppermost leaves and very small and entire; achenes with papillose hairs (Victoria: Grampians and Strathbogie Ranges)
- 2 Hairs of lower surface of leaves basally coarse, multicellular and spreading; florets per capitulum 20–30 (Strathbogie Ranges).....**8i.** var. *graniticola*

- 2: Hairs of lower surface of leaves entirely fine; florets per capitulum 16–20 (Grampians Ranges).....**8h.** var. *gariwerdensis*
- 1: Lower surface of mature leaves glabrous or slightly to moderately cobwebby (surface only slightly obscured) ; leaves often with prominent and/or divided auricles; achenes glabrous or with papillose hairs (New South Wales, Victoria, Tasmania)
- 3 Upper-stem leaves with l:w ratio mostly < 10; involucre 3.5–5.5 mm long; achenes glabrous, or if not then lower surface of leaves strongly glaucous or younger growth moderately woolly/cobwebby and ligulate florets 6–8 (New South Wales, east coast of Tasmania)
- 4 Plants not glaucous; undersurface of leaves slightly to moderately obscured by tangled wispy hairs, developing leaves at first ± densely woolly; upperstem leaves shortly petiolate basally (mostly Northern Tablelands and Coast and South Coast of New South Wales, also Tasmania) .....**8e.** var. *arachnoideus*
- 4: Plants usually glaucous; lower surface of leaves glabrous or hairs short and spreading with wispy extensions weakly developed, developing leaves at first not woolly (Central Tablelands and Central Coast of New South Wales)
- 5 Leaves mostly dentate, commonly with hairs on lower surface, mildly glaucous or occasionally not glaucous; achenes glabrous .....**8f.** var. *macrodontus*
- 5: Leaves entire to denticulate, glabrous, strongly glaucous; achenes with papillose hairs (Mt Dangar, north-west of Sydney).....**8g.** var. *dangarensis*
- 3: Upper-stem leaves with l:w ratio various, up to 30; involucre 2.5–4(–5) mm long; achenes with papillose hairs (Victoria, Tasmania, Southern Tablelands of New South Wales and Australian Capital Territory)
- 6 Plant slightly to moderately glaucous; lower surface of leaves usually with scattered, spreading, rather weak multicellular hairs (may need low power magnification), glabrescent (Southern Tablelands of New South Wales, Australian Capital Territory and far north-eastern Victoria). .....**8d.** var. *intermedius*
- 6: Plant not glaucous; lower surface of leaves glabrous or indumentum cobwebby (hairs not multicellular and spreading); widespread
- 7 Margin of stem leaves commonly entire, sometimes callus-denticulate, revolute; l:w ratio of upper-stem leaves 5–30; lower surface of leaves with secondary veins not or only slightly raised; tertiary venation not usually discernible.....**8a.** var. *linearifolius*
- 7: Margin of stem leaves denticulate to dentate, often slightly acutely, commonly not or hardly recurved; l:w ratio of upper-stem leaves 1.5–15; lower surface of leaves with secondary veins commonly distinctly raised; tertiary venation usually discernible
- 8 Leaves to 20 mm wide; upper-stem leaves with l:w ratio 4–15, with base (excluding auricular segments) attenuate to cuneate; auricles consisting of segments almost discontinuous with lamina; teeth frequency along margin of leaves 1–3 per cm (sea-level to montane) .....**8b.** var. *denticulatus*
- 8: Leaves to 50 mm wide; upper-stem leaves with l:w ratio 1.5–6, with base broad-cuneate to cordate; auricles typically continuous with lamina; teeth frequency along margin of leaves 3–5 per cm (montane to alpine) .....**8c.** var. *latifolius*

**8a. *Senecio linearifolius* A.Rich. var. *linearifolius***

*Plants* not glaucous. *Upper-stem leaves* very narrow-elliptic, narrow-lanceolate or linear to narrow-linear, to 15 cm long, with l:w ratio 5–30, commonly > 10; base (excluding auricles) narrow-cuneate to attenuate; auricles often present, largely discontinuous with lamina, entire, with l:w ratio c. 3–6, or with a smaller lobe or segment near base and on

proximal margin; margin entire or callus-denticulate, mostly narrowly revolute; lower surface glabrous or slightly or occasionally moderately  $\pm$  appressed-cobwebby; secondary venation not or slightly raised; tertiary venation usually obscure. *Inflorescences*: peduncles glabrous or nearly so at anthesis. *Capitula*: involucre 3.0–5.0 mm long, 1.5–2.5 mm diam.; phyllaries 8–13. *Florets* 12–22; ligulate florets 4–8; disc florets 8–14. *Achenes* 1.3–2.0 mm long, brown, with appressed papillose hairs in bands. (Fig. 14)

*Distribution and Habitat*: Occurs in south-eastern Australia; on the mainland from Tanunda in south-eastern South Australia east through southern Victoria to near Moe in south-central Victoria and disjunctly further east in the far east on the coast; in Tasmania widespread (Fig. 13a). Grows in forest and woodland.

*Notes*: A form of this variety with very narrow and sometimes slightly woolly leaves occurs in and around the Brisbane Ranges in south-central Victoria. A fleshy-leaved variant occurs in coastal environments in far eastern Victoria. Some specimens in south-western Victoria approach var. *gariwerdensis* in terms of leaf indumentum but they have narrower leaves and better developed auricles. Var. *linearifolius* possibly intergrades with var. *denticulatus* east of Melbourne. Var. *denticulatus* differs from var. *linearifolius* by its denticulate to dentate leaves and more prominent venation on the lower surface.

*Selected specimens examined*: **SOUTH AUSTRALIA**: Tanunda, *F. Muell.* (MEL). **VICTORIA**: 14 km S of Bendoc, Errinundra Flora Reserve, Goonmirk Rocks, *G.A. Savage 19*, 29.iii.1988 (CBG, MEL); Eynesbury estate. About 8 km S from Melton Post Office, *V. Stajsic 603*, 26.x.1992 (MEL, NSW); Croajingalong National Park, opposite Tullaberga Island, *P.C. Heyligers 84049*, 15.xi.1984 (CANB, MEL); Gabo Island, *J.H. Willis*, 5.xi.1969 (MEL). **TASMANIA**: Blythe River Crossing, 4 km W of South Riana, *P.C. Jobson 3390*, 26.ii.1995 (HO, MEL, NSW); Flinders Island, South Patriarch Trig., 20 km NE of Whitemark, *I. Crawford 1109*, 8.xii.1988 (CBG, HO, PERTH); Everall's Point, 3 km north of Cockle Creek, *A.E. Orchard 5299*, 26.i.1981 (AD, BRI, CANB, HO, MEL, NSW).

#### 8b. *Senecio linearifolius* var. *denticulatus* I.Thomps., var. nov.

A varietate typica, foliis denticulatis vel dentatis, rete venularum prominentiore differt.

*Type*: Victoria, Tali Karng, Gippsland, *T.B. Muir 2978*, 31 Dec. 1963; holotype: MEL.

*Plants* not glaucous. *Upper-stem leaves* very narrow-elliptic, narrow-lanceolate or linear, with l:w ratio 4–15; base (excluding auricles) cuneate; auricles if present  $\pm$  disjunct from lamina, with l:w ratio c. 3–6, lobes or segments 1 or 2; margin denticulate or dentate/seriate, mostly not or only minutely recurved or revolute, teeth frequency usually c. 1–3 per cm; lower surface glabrous or somewhat cobwebby; secondary venation usually distinct, raised; tertiary venation usually faintly discernible. *Inflorescences*: peduncles glabrous or nearly so at anthesis. *Capitula*: involucre 2.5–4.0 mm long, 1.5–2.0 mm diam.; phyllaries 7–11. *Florets* 12–22; ligulate florets 4–8; disc florets 8–14. *Achenes* 1.5–1.8 mm long, brown, with appressed papillose hairs in bands. (Fig. 15)

*Distribution and Habitat*: Occurs in far south-eastern Australia; from the Dandenong Ranges in south-central Victoria east to Mallacoota in far eastern Victoria, in far south-eastern New South Wales as far N as Mt Gingera on the border with the Australian Capital Territory, in far north-eastern Tasmania and adjacent islands in the Furneaux Group, and in south-eastern Tasmania (Fig. 13b). Grows mostly in forest.

*Etymology*: The epithet alludes to leaf margins which are commonly denticulate.

*Notes*: Similar to var. *linearifolius* but leaf margins of stem leaves are always at least denticulate, secondary venation of the lower surface is more prominent and tertiary venation is more distinct. The two varieties possibly intergrade in eastern Victoria east of Melbourne. There are no definite records of this variety from New South Wales; however it is likely to occur in the far south-east of that state. A specimen from Jigamy Creek

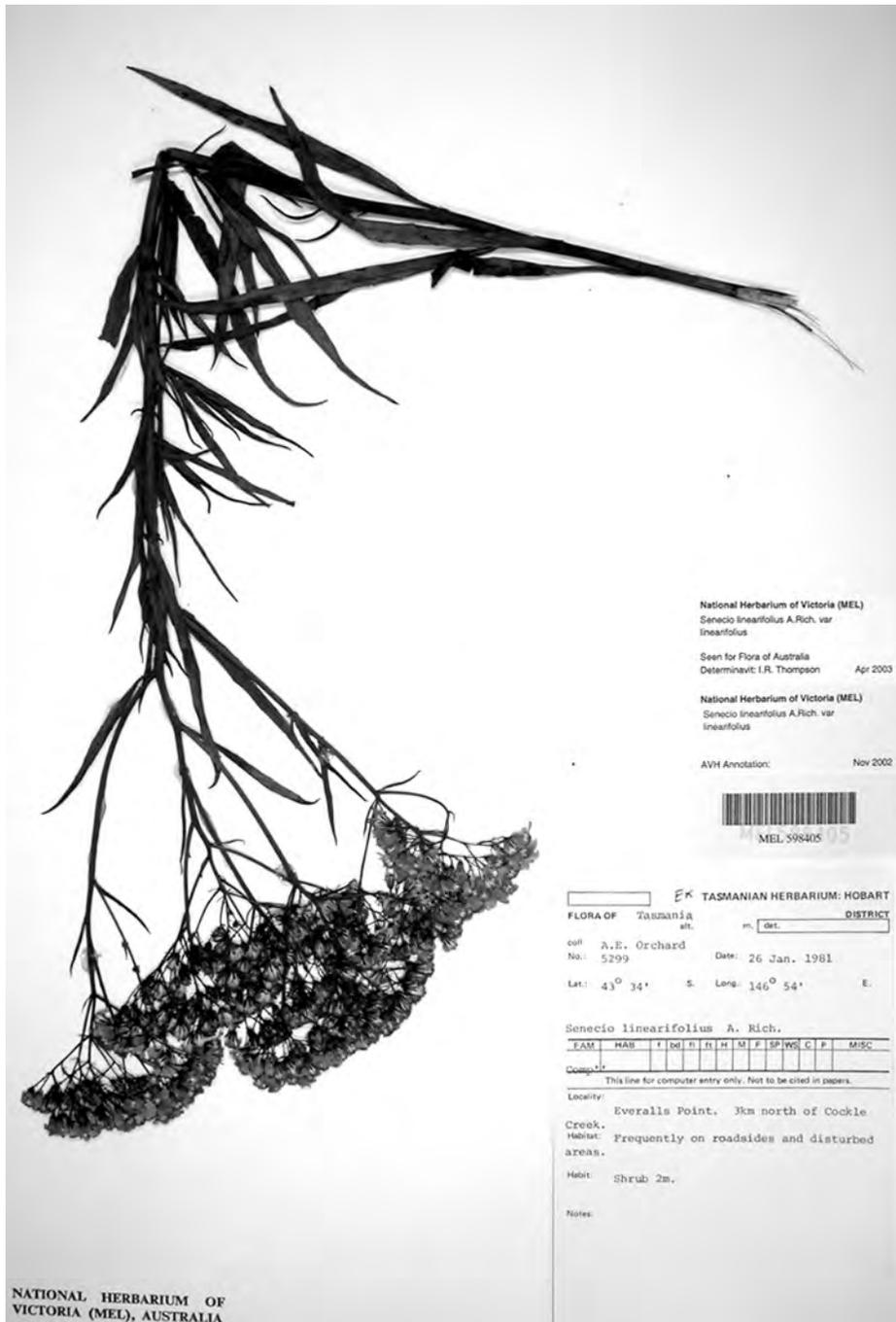


Figure 14. *S. linearifolius* var. *linearifolius* (A.E. Orchard 5299 MEL).

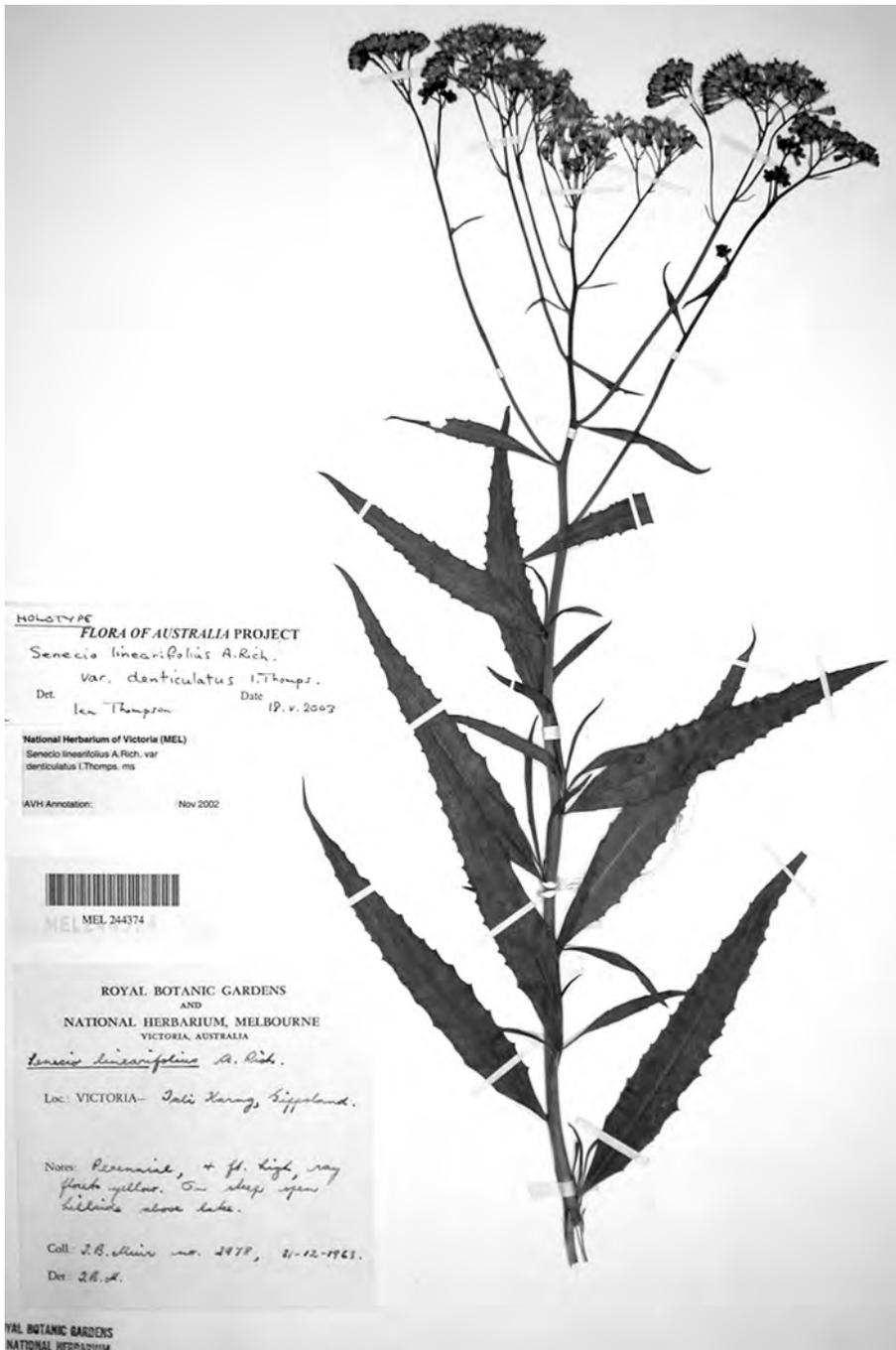


Figure 15. *S. linearifolius* var. *denticulatus* (holotype: T.B. Muir 2978 MEL).

near Eden (*T.B. Muir 2472*) appears to be intermediate between var. *arachnoideus* and var. *denticulatus*. Also similar to and intergrades with var. *latifolius* q.v. which occurs at higher altitudes.

*Selected specimens examined:* **VICTORIA:** Walkerville, *S.I. Ali*, 5.xi.1961 (MEL); Alfred National Park, *A.C. Beauglehole 32078* & *E.W. Finck*, 25.xi.1969 (MEL); Mt Buffalo 12 miles [19 km] up the road, *S.I. Ali*, 1962 (AD, HO, MEL); Drummer State Forest, East Gippsland. Horseshoe Road, at bridge which is ca. 2.1 km N of Princes Highway T.O., *T.J. Christensen 292*, 29.iv.1984 (AD, MEL); 14 km S of Bendoc, Errinundra Flora Reserve, Goonmirk Rocks, *G.A. Savage 19*, 29.iii.1988 (CBG, MEL). **TASMANIA:** Mt Kerford, Cape Barren Island, *P. Cullen*, 11.xii.1989 (HO); Lower Marsh Creek, *A.M. Buchanan 11830*, 27.xii.1990 (HO).

**8c. *Senecio linearifolius* var. *latifolius*** I.Thomps., *var. nov.*

A varietate typica, foliis 1.5–6plo longioribus quam latioribus basi truncata vel cordata margine dentato differt.

*Type:* Australian Capital Territory, Namadgi National Park, Leura Gap, c. 3 km direct NNW of Bimberi Peak, *A.M. Lyne 1961* & *D. Mallinson*, 5 Mar. 1996; holotype: CANB; isotype: AD, MEL, NSW.

*Plants* not glaucous. *Upper-stem leaves* narrow-elliptic or lanceolate, to 14 cm long, with l:w ratio 1.5–5(–6); base broad-cuneate, truncate, or cordate; auricles sometimes present, usually continuous with lamina, entire or with a much smaller second lobe present; margin denticulate or dentate/serrate, minutely recurved, teeth usually crowded, frequency c. 3–5 per cm; lower surface glabrous or nearly so, rarely cobwebby; secondary venation usually sharply raised; tertiary venation usually clearly discernible. *Branch leaves* with l:w ratio 2–8. *Inflorescences:* peduncles glabrous or nearly so at anthesis. *Capitula:* involucre 2.5–4.0 mm long, 1.0–1.6 mm diam.; phyllaries 8–11. *Florets* 12–19; ligulate florets 4–5; disc florets 8–14. *Achenes* 1.5–2.0 mm long, brown, with appressed papillose hairs in bands. (Fig. 16)

*Distribution and Habitat:* Occurs in far south-eastern Australia from Powelltown in south-central Victoria east-north-east to the Brindabella Ranges in the Australian Capital Territory (Fig. 13c). Grows at altitudes over 1000 m in forest and woodland.

*Etymology:* The epithet alludes to the leaves that are broad especially relative to their length (*L. latus*, broad and *folius*, leaf).

*Notes:* A variety with upper-stem leaves commonly lanceolate and with a low length:width ratio, broad-cuneate to cordate at the base with auricles continuous with the lamina, and the lower surface usually glabrous and with distinct reticulate venation. Capitula are at the smaller end of the range for the species. Some specimens seen are intermediate between this variety and var. *denticulatus* which occurs at lower altitudes.

*Selected specimens examined:* **NEW SOUTH WALES:** Southern Tablelands. South side of Alpine Way, 11 km south-west of Thredbo, *P. Jobson 447*, 24.i.1989 (MEL, NSW); 7 miles from Guthega, *S.I. Ali*, 19.i.1962 (MEL, NSW); Gibraltar Creek Falls, *C.R. Dunlop 245*, 27.xii.1968 (CBG). **AUSTRALIAN CAPITAL TERRITORY:** Summit area of Mt Gingera; Cotter River District, *R.D. Hoogland 8469*, 28.ii.1962 (CANB, MEL). **VICTORIA:** Echo Flat, Lake Mountain, 21 km ENE of Marysville, *P.C. Jobson 1959*, 28.ii.1993 (MEL); Granite Flat, on Mitta River, ca. 50 km SSE of Tallangatta, *J.M. Wilson*, 24.xii.1961 (MEL); About 5 miles [8 km] south of Harrietville on the Alpine Highway, *L.A. Craven 1555*, 2.ii.1969 (CANB, MEL, NSW); Mt Buffalo National Park, NE Alps, *J.H. Willis*, 21.ii.1963 (MEL); Blue Range Rd. near the crossing at Storm Creek, *M.G. Corrick 8587*, 2.1.1983 (AD, CBG, MEL); Bogong High Plains. Lookout on McKay Portal Road, *S.I. Ali*, 12.i.1962 (HO, MEL).



Figure 16. *S. linearifolius* var. *latifolius* (holotype: A.M. Lyne 1961 & D. Mallinson CBG).

**8d. *Senecio linearifolius* var. *intermedius*** I.Thomps., *var. nov.*

A varietate typica, paginis glaucis, foliis plerumque dentatis pilis patentibus differt.

*Type:* Victoria, Bridle Creek, ca. 500 m N Ballantyne Gap, 4.5 km by road south of Suggan Buggan, 22 km north of Wulgulmerang, *F.A. Zich 29*, 4 Jan. 1991; holo: CANB; iso: MEL, NSW.

*Plants* mildly glaucous at least on newer growth. *Upper-stem leaves* narrow to very narrow-elliptic, narrow-lanceolate or linear to narrow-linear, to 12 cm long, with l:w ratio 6–30; base (excluding auricles) attenuate or cuneate; small auricles sometimes present; margin entire, denticulate, or sometimes serrate; lower surface usually glaucous, with weak, coarse, spreading hairs commonly present mostly between veins, glabrescent; secondary venation ± distinct; tertiary venation variably discernible. *Inflorescences:* peduncles mostly glabrous, variably glaucous, rarely cobwebby shortly prior to anthesis. *Capitula:* involucre 3.0–4.0 mm long, 1.6–2.5 mm diam.; phyllaries 8–12. *Florets* 15–22; ligulate florets 4–6, rarely 8; disc florets 11–14. *Achenes* 1.6–2.3 mm long, with appressed papillose hairs in bands. (Fig. 17)

*Distribution and Habitat:* Occurs in south-eastern New South Wales from Lake George south to Bredbo including localities in the Australian Capital Territory, and in far north-eastern Victoria around Suggan Buggan and Mt Wheeler (Fig. 13d). Grows in forest and woodland.

*Etymology:* The epithet alludes to its intermediate morphology (see Notes).

*Notes:* A variety of restricted distribution that is intermediate in morphology, combining the glaucosity and leaves with coarse, spreading hairs of var. *macrodontus*, with the small capitula and papillose-hairy achenes of var. *denticulatus*, var. *latifolius* and var. *linearifolius*.

*Selected specimens examined:* **NEW SOUTH WALES:** Eastern edge of Lake George, *W.J.M. Streatmens*, Jan. 1958 (CANB, MEL); Southern Tablelands: 'Mirrunga', 5 km WNW of Mt Michelago, *I. Crawford 3494*, 8.xii.1995 (CBG, NSW). **AUSTRALIAN CAPITAL TERRITORY:** Angle Crossing, west side of Murrumbidgee River, on border with N.S.W., *N.M. Taws 462*, 22.x.1995 (CBG, NSW). **VICTORIA:** Suggan Buggan Valley, about 3 miles [5 km] towards Black Mountain, *S.I. Ali*, 15.i.1962 (CANB, HO, MEL); Mt Wheeler, ca. 10 km east of Wulgulmerang, *A.E. Orchard 2659*, 5.xii.1970 (AD, MEL).

**8e. *Senecio linearifolius* var. *arachnoideus*** I.Thomps., *var. nov.*

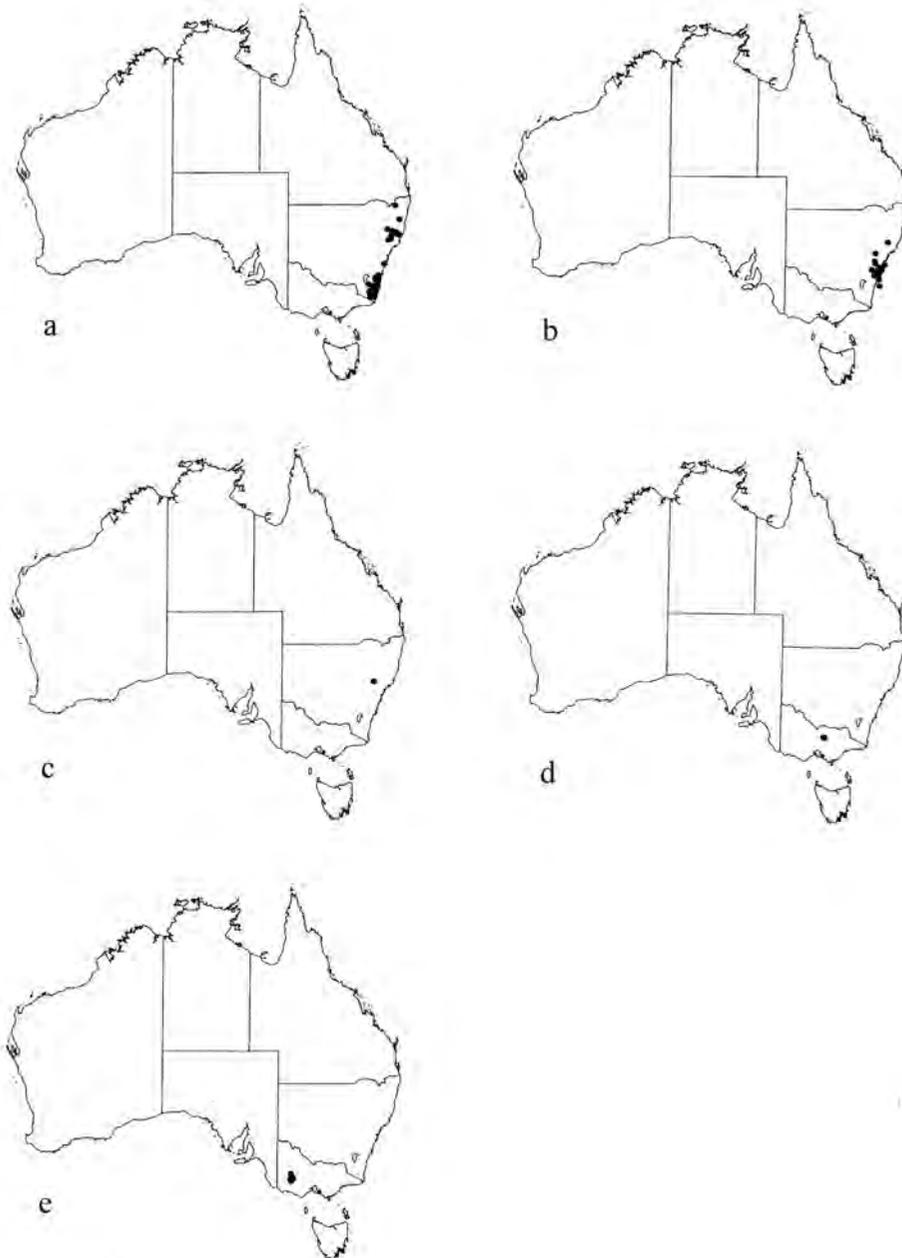
A varietate typica, foliis dentatis, auriculis foliorum latioribus, structuris juvenibus lanatioribus, acheniis plerumque glabris differt.

*Type:* New South Wales, 10 km east of Nowendoc on Nowendoc–Wingham road, *R.H. Holtkamp 14*, 4 Dec. 1992; holo: MEL; iso: CBG, MEL, NE, NSW.

*Plants* not glaucous, with immature leaves and stems commonly clothed with a ± dense white wool early in development. *Upper-stem leaves* narrow to very narrow-elliptic, to 12 cm long, with l:w ratio (4.5–)6–12; base (excluding auricles) ± attenuate and petiole-like or cuneate; auricles if present ± disjunct from or only narrowly connected to lamina, sometimes rather large, entire, with l:w ratio 1–3, or more often lobed; margin of leaves mostly denticulate to dentate, not revolute, frequency of teeth 2–5 per cm; upper surface: veins sometimes strongly impressed, at first usually appressed-cobwebby, glabrescent; lower surface with scattered, weak, coarse spreading hairs or moderately cobwebby, the hairs fine or sometimes coarse-based, glabrescent; secondary venation sharply raised; tertiary venation distinct; *Inflorescences:* peduncles often cobwebby at or shortly prior to anthesis. *Capitula:* involucre 3.5–4.5 mm long, 1.5–2.5 mm diam.; phyllaries 9–13. *Florets* 18–25; ligulate florets 5–8, commonly 6–8; disc florets 13–17. *Achenes* 2.0–2.5 mm long, glabrous, or occasionally with papillose hairs in bands. (Fig. 19)



Figure 17. *S. linearifolius* var. *intermedius* (holotype: F.A. Zich 29 CANB).



**Figure 18.** Distribution of a. *S. linearifolius* var. *arachnoideus*; b. *S. linearifolius* var. *macrodontus*; c. *S. linearifolius* var. *dangarensis*; d. *S. linearifolius* var. *graniticola*; e. *S. linearifolius* var. *gariwerdensis*.

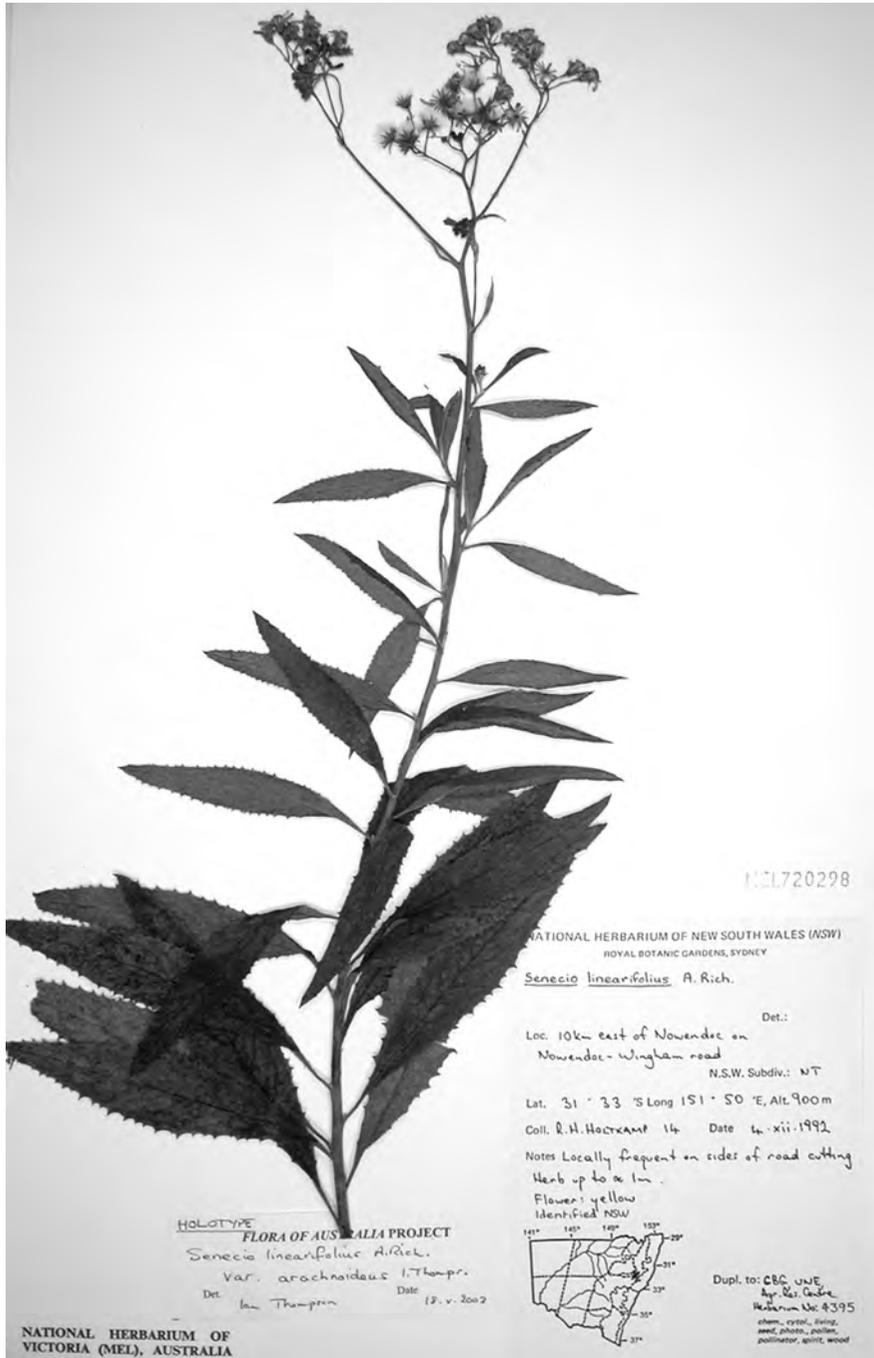


Figure 19. *S. linearifolius* var. *arachnoideus* (holotype: R.H. Holtkamp 14 MEL).

*Distribution and Habitat:* Occurs in eastern New South Wales from Tenterfield in the far north south to Mt Royal and disjunctly further south from Bulli Pass south to Green Cape in the far south. Also a single record from the east coast of Tasmania at Mayfield Beach (Fig. 18a). Grows in forest and coastal scrub.

*Etymology:* The epithet alludes to the cobwebby undersurface of its leaves (*L. arachnoideus*, resembling a spiderweb)

*Notes:* Similar to var. *denticulatus* but differs by having glabrous achenes, (although papillose-hairy at southern limits of range), by having a denser indumentum, by leaves being more reduced in width basally and with relatively broader auricles and auricle-lobes, and with slightly larger capitula with more ray florets. The petiole-like, dentate leaves of var. *arachnoideus* are sometimes reminiscent of leaves of *Senecio amygdaliifolius*, a species with much larger capitula.

*Selected specimens examined:* **NEW SOUTH WALES:** Pigeon Top and track, c. 3000' [950 m], 12 miles south of Nowendoc, *J. Carrick* 3289, 7.xi.1972 (AD, MEL); Tantawangalo State Forest, spur between Devils Creek and McCartheys Creek, *I. Crawford* 1206, 22.viii.1990 (CBG, MEL, NSW); Brockelos Creek crossing on Bega to Bermagui Road, c. 15 km S of Bermagui, *L. Haegi* 1736, 9.ii.1979 (MEL, NSW); Near summit of Brown Mountain; west side. 14 miles [24 km] east of Nimmitabel on the Bega road, *M. Evans* 2594, 21.iv.1967 (AD, CANB, MEL, NSW); c. 9 km from Cathcart along road to Burragate, *P.S. Short* 4014, 6.ii.1993 (CANB, MEL, NSW). **TASMANIA:** North end of Mayfield Beach, *A.M. Buchanan* 8627, 10.vi.1986 (HO).

**8f. *Senecio linearifolius* var. *macrodontus* (DC) I.Thomps., *comb. nov.***

*S. persicifolius* A.Rich., *Voy. Astrolabe* 2: 123 (1834), *nom. illeg. non* Ram. (1799); *S. macrodontus* DC., *Prodr.* 6: 373 (1838); *S. australis* var. *macrodontus* Benth., *Fl. Austral.* 3: 669 (1867); *S. dryadeus* var. *macrodontus* (DC.) Ewart, *Fl. Victoria* 1176 (1931), *nom. inval., p.p.* *Type:* [New South Wales], Nova Hollandia, Port Jackson, 1828, *A. Lesson*; *holo:* P.

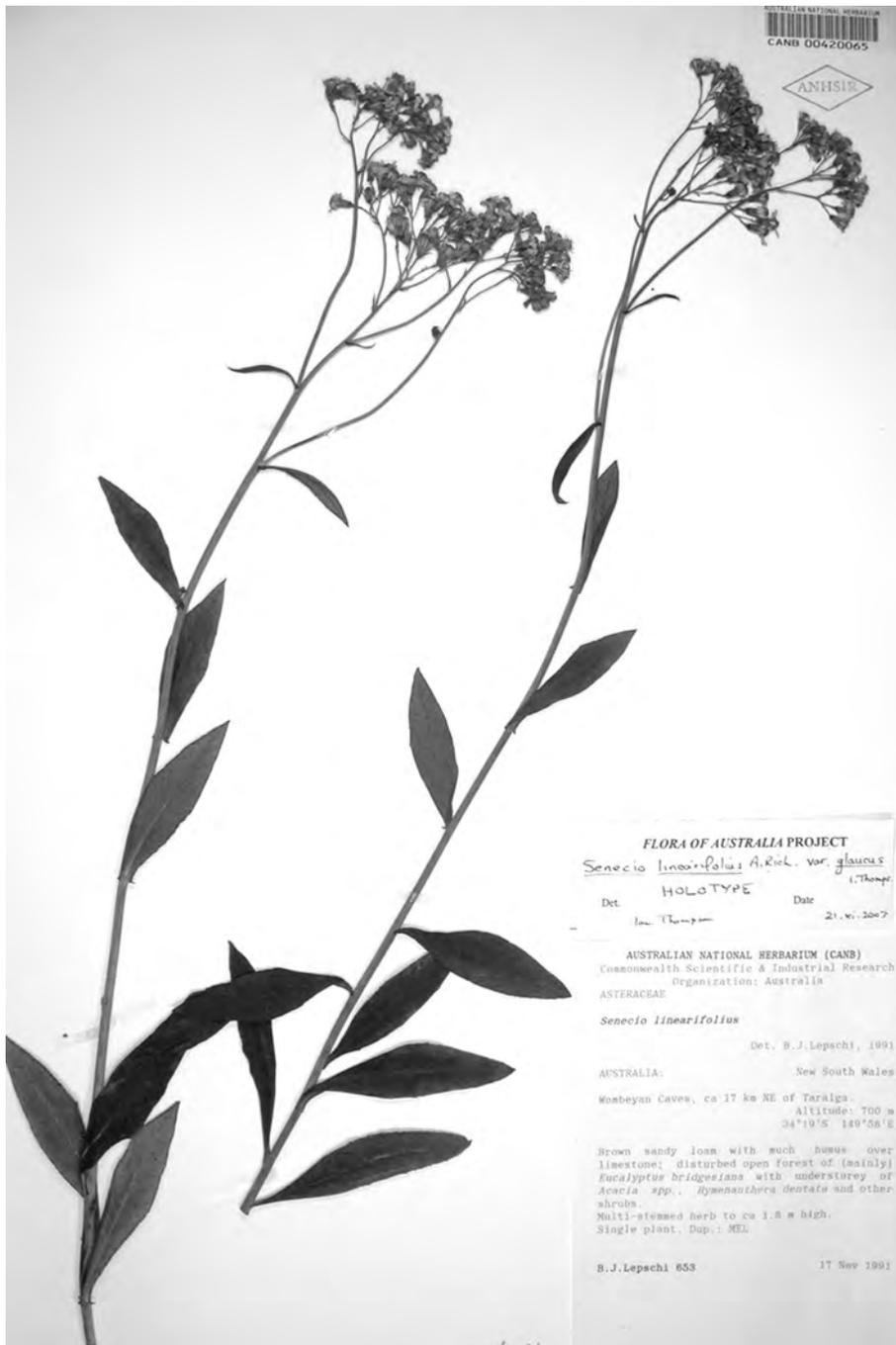
*S. dryadeus* Spreng., *Syst. Veg.* 3: 562 (1826) *nom. inval.* [cited in synonymy]. *Type:* [New South Wales], Novae Holl., *Sieber* 337, [1823]; *syn:* MEL.

*S. cinerarioides* A.Rich., *Voy. Astrolabe* 2: 128 (1834), *nom. illeg. non* Kunth (1820); *S. richardianus* DC., *Prodr.* 6: 373 (1838). *Type:* [New South Wales], Port Jackson, *C. Gaudichaud* 348; *holo:* P.

*Plants* slightly to moderately glaucous on stems, leaves (particularly lower surface), peduncles and capitula. *Upper-stem leaves* narrow to very narrow-elliptic, with l:w ratio 5–8; base (excluding auricles) attenuate, cuneate, or cordate; auricles if present narrowly to broadly connected to lamina, entire or once lobed; margin of leaves denticulate to dentate, frequency of teeth 3–5 per cm; lower surface usually with scattered, spreading, coarse hairs, with or without short wispy extensions; secondary venation sharply raised; tertiary venation usually discernible. *Inflorescences:* peduncles glabrous. *Capitula:* involucre 4.5–5.0(–5.5) mm long, 1.8–2.8 mm wide; phyllaries mostly 9–12. *Florets* 18–25; ligulate florets mostly 5–8; disc florets 13–17. *Achenes* 2.0–2.5 mm long, glabrous. (Fig. 20)

*Distribution and Habitat:* Occurs in central-eastern New South Wales from Barrington Tops south to Saddleback Mountain (Fig. 18b). Grows in basaltic and sandstone-derived loams and sand in dry and wet forest and in woodland.

*Notes:* Similar to var. *arachnoideus* which also has glabrous achenes. The distribution of var. *arachnoideus* is to the north and south of var. *macrodontus*. Var. *macrodontus* differs by having glaucous leaves, stems and peduncles, by having leaf-bases cuneate rather than petiole-like, by having newer growth more sparsely haired, and by having slightly



**Figure 20.** *S. linearifolius* var. *macrodontus* (B.J. Lepschi 653 CANB).

longer capitula. In the Barrington Tops area plants sometimes have cobwebby as well as glaucous peduncles. The specimen in Fig.20 and specimens returned to several Australian herbaria have been incorrectly determined with a manuscript name *S. linearifolius* var. *glaucus* I.Thomps.

*Selected specimens examined:* **NEW SOUTH WALES:** 287B Kangaroo Valley Road, Berry, *E.H. Norris 461*, 5.i.1986 (MEL, NSW); Katoomba, Ruined Castle Track from bottom of Golden Stairs, *W. Bishop 452* & *J. Brown*, 29.iii.1986 (MEL, NSW); The Gib, Mittagong, *C. Burgess*, 6.i.1962 (CANB); Booderee National Park, 1 km at 124° from Budderoo Geodetic Station, *I. Crawford 938*, 13.vii.1988 (CBG, NSW); Jervis Bay, W end of Steamers Beach, *R.J. Rudd 127*, *A.M. Lyne*, *B. Rafferty* & *M.Kubis*, 30.viii.1991 (CBG); Coricudgy State Forest, Mt Darcy, c. 2 km E from summit on The Army Road, *F.E. Davies 1632*, *G. Butler* & *G. Corsini*, 10.xii.1991 (CBG, NSW, PERTH); 35.1 km from Hartley on road to Jenolan Caves, *M.E. Lawrence 1388*, 28.xii.1978 (AD).

**8g. *Senecio linearifolius* var. *dangarensis*** Belcher ex I.Thomps., *var. nov.*

A varietate typica, paginis glaucis, foliis latioribus sine auriculis, capitulis majoribus, flosculis ligulatis pluribus differt.

*Type:* New South Wales, Mt Dangar, southeast of Gungal, *R.O. Belcher 2678*, 13 Dec. 1986; holo: NSW.

*Senecio* sp. *C sensu* G.J. Harden in G.J. Harden, *Fl. New South Wales* 4: 311 (1992).

*Plants* glaucous, in parts strongly so, on stems, lower surface of leaves, peduncles and capitula ± glabrous. *Upper-stem leaves* narrow to very narrow-elliptic, with l:w ratio 5–8; base cuneate to broad-cuneate; auricles absent; margin denticulate; lower surface glabrous; secondary venation ± distinct; tertiary venation distinct. *Inflorescences:* peduncles glabrous, or rarely cobwebby, at anthesis. *Capitula:* involucre 3.5–5.0 mm long 2.0–2.8 mm diam.; phyllaries mostly c. 12. *Florets* 20–31; ligulate florets mostly 7–9; disc florets 13–22. *Achenes* c. 2.0 mm long, with appressed papillose hairs in bands. (Fig. 21)

*Distribution and Habitat:* Occurs only on Mt Dangar, south-east of Gungal (Fig. 18c). Grows on a basalt scree on a steep eastern slope.

*Etymology:* The epithet alludes to the only known locality of this variety.

*Notes:* This variety is typically the most strongly glaucous of the three glaucous varieties, and unlike var. *macrodontus* and var. *intermedius* the lower surface of leaves are always glabrous. Differs from var. *macrodontus* also by having papillose achenes and differs further from var. *intermedius* by having much larger capitula with more numerous ray and disc florets.

*Selected specimens examined:* **NEW SOUTH WALES:** Goulburn River National Park, E side of Mt Dangar, c. 70 m below summit, *F.E. Davies 1585*, *R. Hallett* & *M.M. Richardson*, 1.v.1991 (CBG, MEL, PERTH); Mt Dongal [Mt Dangar], approx. 32°21' S, 150°29' E, *G.L. Webster 19049* & *D.J. McGillivray*, 14.xi.1973 (NSW).

**8h. *Senecio linearifolius* var. *gariwerdensis*** I.Thomps., *var. nov.*

A varietate typica, foliis majoribus, inferne lanatioribus, acheniis longioribus differt.

*Type:* Victoria, Grampians, ± 9 km [5 1/2 miles] S of Halls Gap, Glenbower Creek, Grampians Road, *A.C. Beauplehole 16404*, 12 Dec. 1967; holo: MEL.

*Plants* not glaucous. *Upper-stem leaves* very narrow-elliptic, narrow-lanceolate or linear, to 17 cm long, with l:w ratio c. 7–12; base petiole-like, attenuate, or cuneate; auricles lacking, or uppermost leaves broad-cuneate and sometimes with small, entire auricles; margin entire, callus-denticulate or rarely denticulate, often revolute; upper surface transiently appressed-cobwebby; lower surface densely appressed-woolly; secondary



Figure 21. *S. linearifolius* var. *dangarensis* (holotype: R.O. Belcher 2678 NSW).

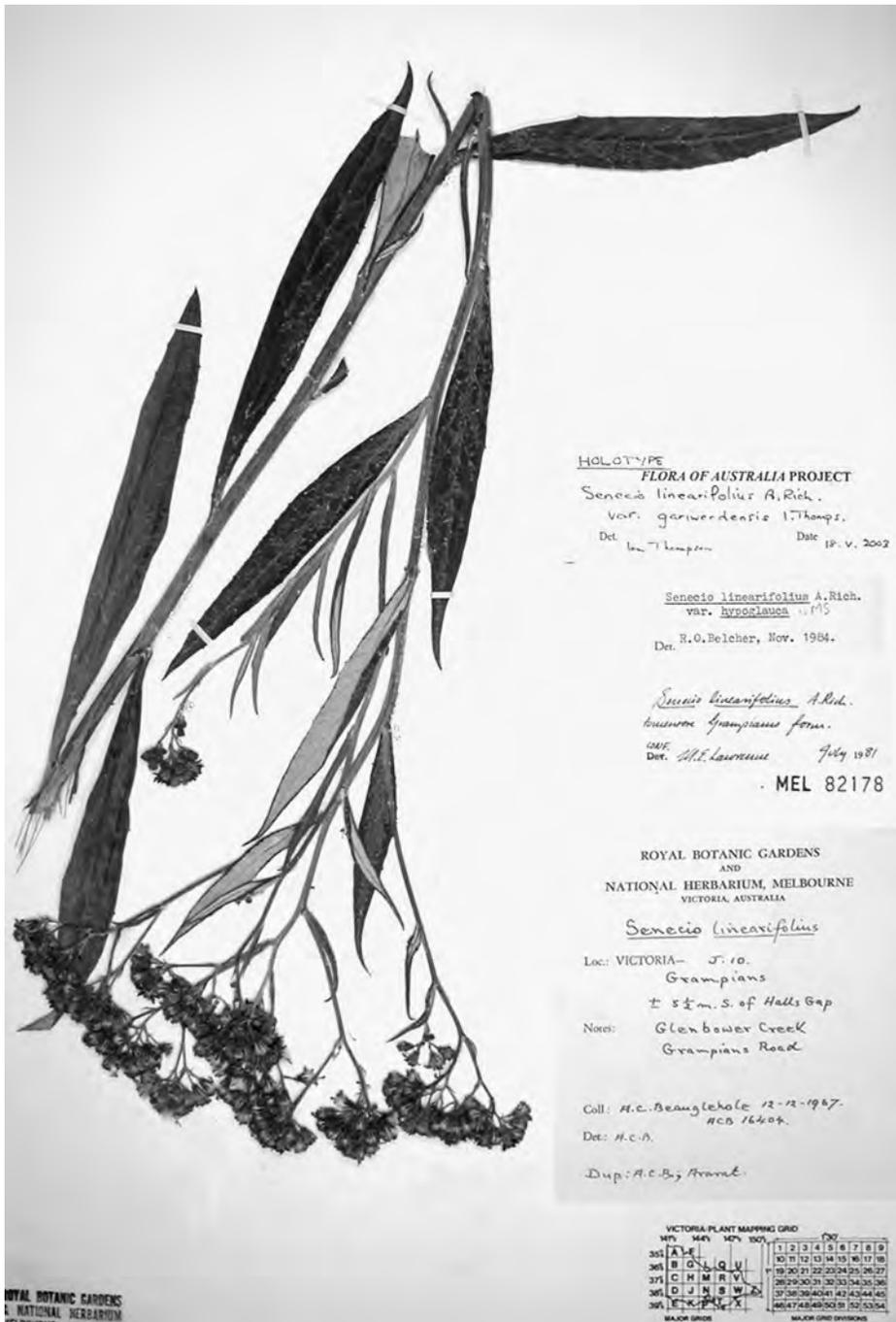


Figure 22. *S. linearifolius* var. *gariwerdensis* (holotype: A. C. Beaglehole 16404 MEL).

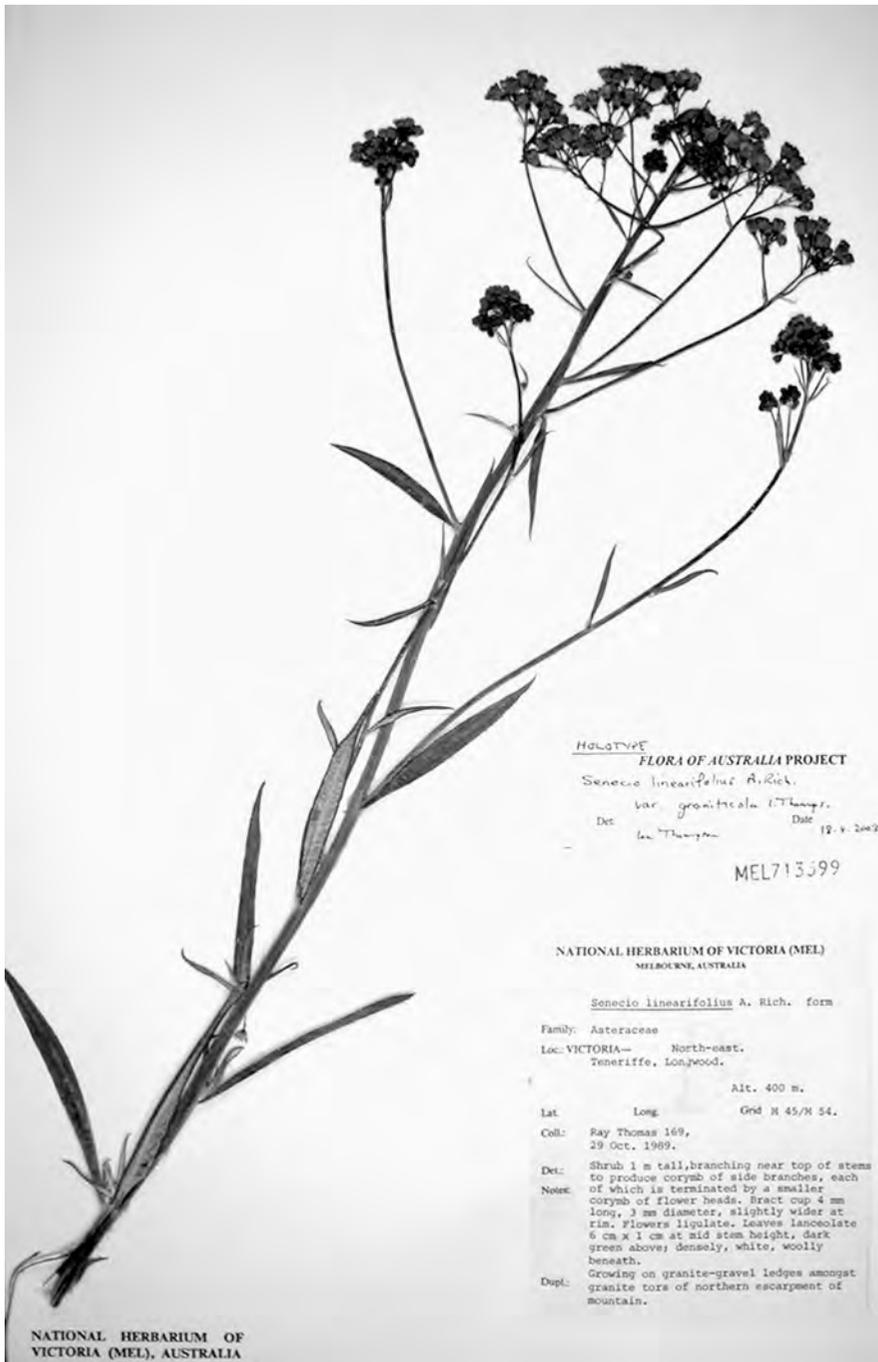


Figure 23. *S. linearifolius* var. *graniticola* (holotype: R. Thomas 169 MEL).

venation usually discernible; tertiary venation usually indistinct. *Inflorescences*: peduncles glabrous or somewhat cobwebby at anthesis. *Capitula*: involucre 3.5–4.5 mm long, c. 1.5–2.0 mm diam.; phyllaries mostly 8–10, occasionally sparsely cobwebby. *Florets* 13–19; ligulate florets mostly 5; disc florets 8–14. *Achenes* 2.0–2.5 mm long, tan or brown, with appressed papillose hairs in bands. (Fig. 22)

*Distribution and Habitat*: Occurs in the Grampians Ranges in western Victoria from Mt Zero south to Victoria Valley (Fig. 18e). Grows in forest.

*Etymology*: The epithet alludes to the area to which it is endemic. Gariwerd is an aboriginal word for the Grampians Ranges

*Notes*: A variety with rather large leaves and a distinctive, dense, appressed wool on the lower surface. The leaf-bases lack auricles, or if present they are small and inconspicuous. Leaves of var *graniticola* have a superficially similar indumentum but the wool overlays and is an extension of coarse hairs evident on close examination. This variety also differs by having smaller leaves and broader capitula with more phyllaries and florets. The typical variety of *S. linearifolius* has also been recorded from the Grampians but is readily distinguished from var. *gariwerdensis*.

*Selected specimens examined*: **VICTORIA**: Jimmy's Creek, Grampians, at southern foot of Major Mitchell Plateau, *J.H. Willis*, 8.xii.1962 (MEL); 3.8 km north along the Victoria Range track from its intersection with Sawmill Track, *D.E. Albrecht 3105*, 7.iii.1987 (MEL); Mt Zero, Grampians, 24 km SE of Horsham, *H. Streimann 2622*, 11.xii.1975 (CBG, NSW, PERTH).

#### **8i. *Senecio linearifolius* var. *graniticola* I.Thomps., var. nov.**

A varietate typica, foliis sine auriculis inferne lanatioribus, flosculis pluribus differt.

*Type*: Victoria, north-east, Teneriffe near Longwood, *R. Thomas 169*, 29 Oct. 1989; holotype: MEL.

*Plants* not glaucous. *Upper-stem leaves* very narrow-elliptic to linear, to 13 cm long, with l:w ratio c. 8–15; base narrow-cuneate; auricles lacking; margin entire, revolute, occasionally denticulate; upper surface somewhat appressed-cobwebby; lower surface densely woolly, with the wool overlying spreading, coarse, basal portion of hairs; secondary venation generally indistinct. *Inflorescences*: peduncles slightly to moderately cobwebby at anthesis. *Capitula*: involucre 3–4 mm long, c. 2–3 mm diam.; phyllaries mostly 12–14. *Florets* 15–24; ligulate florets 5–8, often more than 5; disc florets 10–16. *Achenes* 1.6–2.0 mm long, with appressed papillose hairs in bands. (Fig. 23)

*Distribution and Habitat*: Occurs in the Strathbogie Ranges in north-eastern Victoria (Fig. 18d). Grows in soils of granitic derivation in woodland.

*Etymology*: The epithet alludes to the geology of its habitat (*L. granitus*, granite, and *cola*, dwelling).

*Notes*: Similar to var. *gariwerdensis* and also to *Senecio garlandii* in terms of lower surface indumentum and in the number of florets per capitula.

*Selected specimens examined*: **VICTORIA**: Longwood–Ruffy Road, *A.C. Beaglehole 92855*, 23.i.1988 (MEL); Midlands. Neil Devanny's farm, 10 km magnetic S of Euroa. Top of Bushland block on Creighton's Creek escarpment of the range, *R. Thomas 635*, 4.xii.1993 (MEL).

#### **Excluded Names**

*Senecio dryadeus* Ewart, *Fl. Victoria* 1176 (1931). Type: 'Widely spread, except in N.W. Victoria, usually on swampy or damp places, near Melbourne on the basalt and silurian areas, and sporadic after bush fires'.

As no type specimen was cited, it is unclear to which variety *S. dryadeus* Ewart is referable.

### Acknowledgements

I am grateful for the assistance given by the School of Botany, University of Melbourne and the Royal Botanic Gardens, Melbourne for the use of their facilities, Neville Walsh for his assistance with field work and many other aspects of my research, Dr Niels Klazenga and Dr Teresa Lebel for their assistance with maps and images, and the technical staff at MEL for their assistance with loans. I would also like to thank the directors of AD, BRI, CANB, DNA, HO, NE and NSW for the loan of specimens. This study was funded by a three-year ABRS grant (Grant No: 2000/3192).

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### Index of Scientific Names

Epithets of accepted names are in roman (with bold type for new names) and synonyms are in italics. The numbers refer to the number of the accepted species or subspecies as given in the taxonomy section. ‘Excl.’ refers to names listed under Excluded names. Key indicates that the name only appears in the Key and Introduction.

Name	No.	Page no.
<i>Cacalia</i>		
<i>odorata</i> (Hornem.) Desf.	7	88
<i>Senecio</i>		
<i>anethifolius</i> A.Cunn. ex DC.	1	70
<i>anethifolius</i> subsp. <i>anethifolius</i>	1a	72
<i>anethifolius</i> subsp. <b><i>brevibracteolatus</i></b> I.Thomps.	1b	73
<i>angustilobus</i> F.Muell.	1a	72
<i>angustifolius</i> Sond.	1a	72
<i>australis</i> auct. non Willd	8	90
<i>australis</i> Willd. var. <i>macrodontus</i> (DC.) Benth.	8f	102
<i>behrianus</i> Sond. & F.Muell. ex Sond.	key	

Name	No.	Page no.
<i>brachylaenus</i> DC.	5a	81
<i>cinerarioides</i> A.Rich.	8f	102
<i>cunninghamii</i> DC.	5	81
<i>cunninghamii</i> DC. var. <i>cunninghamii</i>	5a	81
<i>cunninghamii</i> var. <b>flindersensis</b> I.Thomps.	5b	84
<i>cunninghamii</i> var. <i>serratus</i> M.E.Lawr.	4	78
<i>dryadeus</i> Spreng.	8f	102
<i>dryadeus</i> Ewart	Excl.	
<i>dryadeus</i> var. <i>macrodontus</i> (DC.) Ewart	8f	
<b>euclaensis</b> I.Thomps.	2	77
<i>garlandii</i> F.Muell. ex Belcher	key	***
<i>gawlerensis</i> M.E.Lawr.	3	77
<i>georgianus</i> DC.	key	***
<i>georgianus</i> DC. var. <i>latifolius</i> J.M.Black	3	77
<i>gilbertii</i> Turcz.	key	***
<i>hypoleucus</i> F.Muell. ex Benth.	6	84
<b>lanibracteus</b> I.Thomps.	4	78
<i>leucoglossus</i> F.Muell.	key	***
<i>linearifolius</i> A.Rich.	8	90
<i>linearifolius</i> var. <b>arachnoideus</b> I.Thomps.	8e	98
<i>linearifolius</i> var. <b>dangarensis</b> I.Thomps.	8g	104
<i>linearifolius</i> var. <b>denticulatus</b> I.Thomps.	8b	93
<i>linearifolius</i> var. <b>gariwerdensis</b> I.Thomps.	8h	104
<i>linearifolius</i> var. <b>graniticola</b> I.Thomps.	8i	108
<i>linearifolius</i> var. <b>intermedius</b> I.Thomps.	8d	96
<i>linearifolius</i> var. <b>latifolius</b> I.Thomps.	8c	96
<i>linearifolius</i> var. <b>macrodontus</b> I.Thomps.	8f	102
<i>linearifolius</i> A.Rich. var. <i>linearifolius</i>	8a	102
<i>odoratus</i> Hornem.	7	88
<i>odoratus</i> A.Rich.	7	88
<i>odoratus</i> var. <i>longifolius</i> M.E.Lawr.	7	88
<i>odoratus</i> var. <i>obtusifolius</i> J.M.Black	7	88
<i>odoratus</i> var. <i>odoratus</i>	7	88
<i>odoratus</i> var. <i>petiolata</i> Sond.	6	84
<i>pauciligulatus</i> A.Rich.		91
<i>persicifolius</i> A.Rich.	8f	102
<i>ramosissimus</i> DC.	key	***
<i>richardianus</i> DC.	8f	102
<i>vulgaris</i> L.	key	***