

AN ILLUSTRATED AND ANNOTATED KEY
TO THE TASMANIAN SPECIES OF
SENECIO (ASTERACEAE)

Mark Wapstra, Ian Thompson and Alex Buchanan

Wapstra M., Thompson I.R., Buchanan A.M. 2008. An illustrated and annotated key to the Tasmanian species of *Senecio* (Asteraceae). *Kanunnah* 3: 49–93. ISSN 1832-536X. A key to the Tasmanian species of *Senecio* (Asteraceae) is presented, including all native and naturalised species, subspecies and varieties (41 taxa in total). Two species formerly placed in *Senecio*, *Delairea odorata* Lem. and *Brachyglottis brunonis* (Hook.f.) B.Nord., are also included. An illustrated glossary of terms is provided, together with comments on the identification and discrimination of taxa and distribution maps.

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Senecio is a large cosmopolitan genus comprising about 1250 species (Bremer 1994). Australia has 87 native species (Thompson 2006) and ten naturalised species, the latter mostly from South Africa and some from Europe. Curtis (1963) in Part 2 of the *Student's Flora of Tasmania* recognised 22 species in *Senecio*, four being naturalised and eighteen native. Two have since been transferred to other genera, these being the introduced *S. mikanioides* Otto ex Harv., now known as *Delairea odorata* Lem., and *S.*

centropappus F.Muell. for which the name *Brachyglottis brunonis* (Hook.f.) B.Nord. is current. Curtis (1963) did not recognise any varieties or subspecies in *Senecio*.

Buchanan (2005) in the *Census of Vascular Plants to Tasmania* updated the list of species of *Senecio* present in Tasmania, mainly from the recent taxonomic work of Thompson (2004a–d, 2005). Excluding hybrid taxa (only *S. Xorarius* J.M.Black is currently recognised in Buchanan (2005) but is herein not considered

worthy of taxonomic recognition) and *S. pectinatus* var. *major* F.Muell. ex Belcher (now recognised by Thompson (2006) as a mainland endemic), *S. linearifolius* var. *latifolius* (that is herein recognised as present) and *S. georgianus* (hitherto not recognised by Buchanan (2005)), 41 taxa of *Senecio* are now recognised in Tasmania (Buchanan 2005). Of the 29 native species, one is represented by two subspecies, one by one subspecies, two by one variety, one by four varieties and one by five varieties. Seven taxa are endemic to Tasmania. The four naturalised species are *S. angulatus*, *S. elegans*, *S. jacobaea* and *S. vulgaris*. All Tasmanian species, except *Senecio angulatus* which is a climber, are herbaceous and may be woody basally.

The almost doubling of the number of Tasmanian *Senecio* taxa since Curtis (1963) has prompted the construction of the following key. It is mainly intended to assist field workers to identify this complex suite of species without needing to delve into more complex taxonomic papers. However, for recent descriptions of Tasmanian species, the reader is referred to Thompson (2004a–d, 2005, 2006). With three species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995*, and several others known from very few records (including several that qualify as ‘presumed extinct’ because they have not been recorded for more than 50 years), it is important that field workers can correctly identify species of *Senecio*.

Some notes on using the key

As with most keys, it is difficult to avoid the use of technical terms, especially in the case of a genus like *Senecio*, in which the identification of species, subspecies

or varieties often requires microscopic examination of capitula, stems or leaves. However, an annotated and illustrated glossary is provided following the key to explain technical terms. Each species has some accompanying notes on its recognition (in particular, confusing species or characters), distribution and habitat (also following the key).

Fresh or dried material may be used in the key below. Working with fresh material, especially flowering material, is often much easier. Decisions at each couplet should be made after considering as many of the characters mentioned as possible. As with most complex keys, familiarity breeds confidence. It is recommended that users of the key try to identify taxa familiar to them to get used to the terminology.

What material needs to be collected

Some taxa of *Senecio* require very little material to identify them with confidence (e.g. some subalpine radiate species can be identified from basal rosettes of leaves with no flowering material), although many require carefully collected specimens that include the root system, representative parts of the stem, leaves from different parts of the stem and a range of flower ages (e.g. most of the non-radiate species, i.e. the disciform species). Several specimens collected from a site can make identification easier as the presence of characteristics such as coarse hairs on stems and leaves, cobwebby hairs on flowerheads and hairs on achenes can vary depending on the age of plants so it is often desirable to develop a ‘population picture’, rather than rely on identification

from a single specimen. With the disciform species, it is particularly important to collect mature achenes because young achenes will be considerably shorter and less hairy than their mature counterparts.

Collected material should be pressed promptly, especially for taxa with larger leaves prone to curling, and for those with large radiate flowerheads that wither quickly. If prompt curation is not possible, notes should be made on the length and number of ray florets in radiate species as this is easier to do with fresh material. Specimens will stay fresh if carefully wrapped in moist (but not wet) paper towel (or moss) and kept cool for transport. Some fleshy leaved species will require careful curation to avoid development of mould. Light pressing is recommended for all taxa to avoid overly deforming flowerheads (or measuring the diameter of the flowerheads upon collection is advised). If far enough advanced at the time of collection, achenes may develop to maturity during pressing.

Species nomenclature

Botanical nomenclature follows Buchanan (2005), except where indicated in the species' notes, and vernacular nomenclature follows Wapstra *et al.* (2005). An asterisk (*) next to the botanical name in the key and notes indicates that the species is naturalised in Tasmania.

A note on hybrids

Species of *Senecio* readily hybridise, both within and between the two morphologically distinct groups (i.e. the radiate and disciform species). Hybrids are not included in the present key but are discussed in the notes below each species in the key that may be possible parent species.

Hybrids between disciform and radiate species are usually identifiable by the presence of ligules that are shorter (mostly 0.5–4 mm long), and narrower than those seen in radiate species, and, in the field, by the identification of populations of parent species in the vicinity.

Several hybrids between radiate and disciform species have been recognised as occurring in Tasmania. One is a hybrid between *S. pinnatifolius* and *S. biserratus*. This entity was described as *S. Xorarius* (Black 1928). It occurs infrequently on the Victorian and South Australian coasts, and only one Tasmanian specimen at the Tasmanian Herbarium has been determined as this entity. It does not appear to form stable populations and plants are sterile (Lawrence 1980); thus is not considered worthy of taxonomic recognition. The other recognised hybrid is between *S. linearifolius* var. *linearifolius* and *S. minimus*. There are a few collections of this hybrid from both Tasmania and Victoria. Hybrids between *S. linearifolius* (unknown variety but probably var. *linearifolius*) and *S. hispidulus* have also been observed recently (M. Wapstra, pers. obs.) in the north-east (Elephant Pass) and the south-east (Surges Bay).

Hybrids between disciform species may key with difficulty to a recognised taxon and users of the key should be cautious if a hybrid is suspected – collection of additional possible parent material from the vicinity may be necessary to help confirm identification of such entities. Hybridisation between non-radiate parents has been recorded from mainland Australia and is a possibility in Tasmania wherever species co-occur (up to five species of *Senecio* can co-occur together).

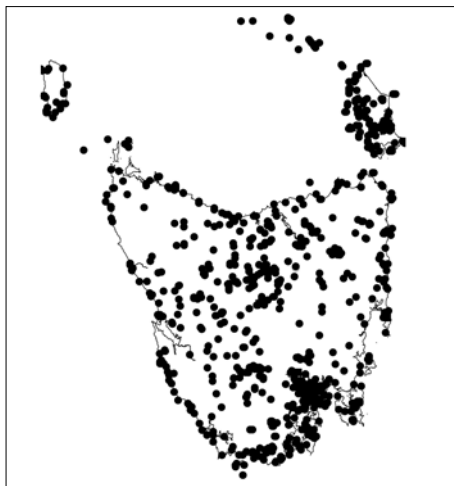


Fig. 1. Distribution records for all Tasmanian species of *Senecio*.

Distribution maps

Maps are based on specimens held by the Tasmanian Herbarium (excluding unidentified specimens), specimens from Mark Wapstra's personal herbarium, and records of threatened taxa held by the Threatened Species Section of the Department of Primary Industries and Water. It should be noted that not all the records from the latter source are supported by confirmed herbarium specimens. Distribution maps and notes are provided as a guide only and should not be used as a reliable method of identification. Several species, for example, are currently known only from the Bass Strait islands or from scant records from one part of the state, but such species may be more widespread.

All records for Tasmanian *Senecio* are shown in Fig. 1. This map clearly demonstrates that several parts of the state are represented by very few or no collections: in particular, several parts of the south-west

(generally difficult to access), many parts of the central, eastern and northern Midlands (mainly private property), parts of the north-east and several areas in the north-west (notably much of the private property areas and two offshore islands). This map also shows that many areas of the state are represented by numerous collections. Of note are the coastal areas, many of the Bass Strait islands, parts of the Central Highlands and around the major population centres in the Tamar (Launceston) and Derwent (Hobart) river systems. Macquarie Island, a sub-antarctic island administered by Tasmania, is not included on the distribution maps because no species of *Senecio* are known from there (Buchanan 2005).

Conservation status

Three species are presently listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* (*S. macrocarpus* as extinct, and *S. squarrosus* and *S. velleioides* as rare). Several other species, most notably *S. campylocarpus*, *S. extensus*, *S. georgianus*, *S. hispidissimus*, *S. longipilus*, *S. microbasis*, *S. phelleus*, *S. psilocarpus*, *S. tasmanicus* and *S. vagus* are represented by limited and/or early collections. It may be premature, however, to consider these species as either extinct (in the case of species not recorded for many decades) or threatened (in the case of species represented by only a few collections). The recent rediscovery of *S. campylocarpus* from the heart of Campbell Town and recent collections of *S. phelleus* from a popular walking track just south of Hobart attest to the need for more collecting. Through increased familiarity with Tasmanian species of *Senecio*, it is likely that further collections will be made of species that are currently poorly represented in herbaria.

KEY TO THE TASMANIAN SPECIES OF *SENECIO* (AND SOME ALLIED TAXA)

- 1a Plants glabrous, scrambling, twining or climbing; leaves distinctly petiolate and with a lobate lamina 1–2 times as long as broad — 2
- 1b Plants glabrous or hairy, not growing as above; leaves various, not entirely as above — 3
- 2a Capitula radiate; leaves dark green, with lamina generally longer than broad and with base truncate to cuneate; petiole 1–4 cm long; stipules absent — *S. angulatus**
- 2b Capitula discoid; leaves pale green, lamina about as broad as long and with base strongly cordate (heart-shaped); petiole 4–7 cm long; kidney-shaped stipules present — *Delairea odorata**
- 3a Capitula radiate — 4
- 3b Capitula not radiate — 23
- 4a Woody shrubs or trees, 2–4 m high; leaves linear, with margins entire, viscid (Mts Wellington and Dromedary) — *Brachyglottis brunonis*
- 4b Herbaceous plants (sometimes woody basally), to 2 m high; leaves various, not viscid (distribution various) — 5
- 5a Ligules of ray florets crimson to purple, or rarely white (and if white, then inflorescences of several capitula) — *S. elegans**
- 5b Ligules of ray florets yellow, or if ever cream or whitish then inflorescences of a single capitulum — 6
- 6a Involucre < 5.5 mm long, < 2 mm diameter; disc florets < 30; ray florets 4–8; leaves never lobate or pinnatisect — 7 (*S. linearifolius*)
- 6b Involucre 4–15 mm long, > 2 mm diameter; disc florets > 30; ray florets c. 13, or more; leaves sometimes lobate or pinnatisect — 10
- 7a All leaves appearing entire — *S. linearifolius* var. *linearifolius*
- 7b At least the stem leaves callus-denticulate, denticulate or dentate — 8
- 8a New axillary growth densely cobwebby to woolly; involucre mostly > 4.0 mm long — *S. linearifolius* var. *arachnoideus*
- 8b New axillary growth glabrous or only sparsely cobwebby; involucre 2.5–4.0 mm long — 9
- 9a Mid- to upper-stem leaves less than 25 mm wide and with length:width ratio > 4; leaf-base attenuate to cuneate — *S. linearifolius* var. *denticulatus*
- 9b Mid- to upper-stem leaves more than 25 mm wide, or if narrower then length:width ratio < 4 and/or with leaf-base broad-cuneate, truncate or cordate (heart-shaped) — *S. linearifolius* var. *latifolius*
- 10a Leaves bi- or tri-pinnatisect, with ultimate segments variable in width; calycular bracteoles narrow-lanceolate, to c. 0.5 mm wide; achenes of ray florets glabrous but those of disc florets hairy — *S. jacobaea**
- 10b Leaves not bi- or tri-pinnatisect, or if so with all ultimate segments of leaves similarly narrow and with calycular bracteoles ovate to lanceolate, 0.7–1.6 mm wide; achenes either all hairy or all glabrous — 11

- 11a Plants rosette-forming; leaves/bracts above mid-stem much smaller than basal leaves; calycular bracteoles narrow-oblong, > 4 mm long (mostly montane to alpine) — 12
- 11b Plants not rosette-forming, or if so then calycular bracteoles ovate, ≤ 3 mm long; largest leaves occurring along stems (mostly lowland) — 16
- 12a Leaves distinctly hairy; stem leaves/bracts up to 5 (excluding distal-most 1 cm of stem) — 13
- 12b Leaves glabrous or nearly so; stem leaves/bracts 5–15 (excluding distal-most 1 cm of stem) — 14
- 13a Basal leaves not spatulate (demarcation between petiole and blade more or less abrupt), usually at least some > 15 mm wide; upper surface lacking broad-based coarse hairs; inflorescences of 1–4 capitula — *S. primulifolius*
- 13b Basal leaves spatulate, < 15 mm wide; upper surface with broad-based coarse septate hairs to c. 1.5 mm long (or their stout residual bases); inflorescences of a single capitulum — *S. papillosus*
- 14a Leaves deeply lobate to pinnatisect, with 3–6 more or less oblong segments per side, concolorous or nearly so; inflorescences of 1 capitulum (rarely 2); ligules yellow — *S. pectinatus* var. *pectinatus*
- 14b Leaves less dissected than above, with 1–several serrations or somewhat triangular lobes per side, markedly discoloured; inflorescences of 1 or more capitula; ligules yellow, white, or cream — 15
- 15a Leaves 4–10 mm wide, with teeth or lobes 3 or more per side; inflorescences mostly of 3 or more capitula; ligules yellow — *S. leptocarpus*
- 15b Leaves 1–4 mm wide, with teeth 1 or 2 per side; inflorescences of a single capitulum; ligules white or cream — *S. albogilvus*
- 16a Leaves entire or denticulate to dentate, strongly amplexicaul; calycular bracteoles up to 4; plants often glaucous — *S. velleioides*
- 16b Leaves variously dissected, not or hardly amplexicaul; calycular bracteoles 6 or more; plants not glaucous — 17
- 17a Calycular bracteoles 5–10 mm long; phyllaries with conspicuous dark hairs; ligules 7- or 8-veined — *S. vagus* subsp. *vagus*
- 17b Calycular bracteoles 1–3 mm long; phyllaries glabrous; ligules mostly 4-veined — 18
- 18a Leaves bi- or tri-pinnatisect; stems succulent; capitula and leaves rather crowded (Bass Strait islands) — *S. pinnatifolius* var. *capillifolius*
- 18b Leaves not bi-pinnatisect, or if so then stems not or hardly succulent; capitula and leaves crowded or lax (widespread) — 19
- 19a Stereome of inner phyllaries more than twice as broad as stereome of outer phyllaries measured c. 1 mm below apex, and usually bordered by a purple chevron; margins of outer phyllaries c. as broad as the stereome 1 mm below apex — *S. pinnatifolius* var. *lancoelatus*
- 19b Stereome of inner phyllaries less than twice as broad as that of outer phyllaries measured c. 1 mm below apex, usually not bordered by a purple chevron but

- sometimes weakly so; margin of outer phyllaries narrower than stereome 1 mm below apex — 20
- 20a Leaves halfway to 2/3 along stems/major branches broadest beyond mid-leaf and/or with marginal points or segments clearly more numerous in distal half of leaf; peduncles commonly hairy at flowering (montane to alpine) — *S. pinnatifolius* var. *alpinus*
- 20b Leaves halfway to 2/3 along stems/major branches not broadest beyond mid-leaf and with marginal points or segments not more numerous in distal half; peduncles commonly glabrous at flowering (generally lower than montane) — 21
- 21a Leaves generally only slightly fleshy (although succulent on coast); base of upper-branch leaves (excluding any lobes or segments) generally not broader than the branch (east coast and inland) — *S. pinnatifolius* var. *pinnatifolius*
- 21b Leaves fleshy; base of upper-branch leaves commonly broader than branch (west coast) — 22
- 22a Achenes 3.0–5.5 mm long; pappus persistent; broadest stereomes of phyllaries well over 1 mm wide (sandy sites only) — *S. spathulatus* var. *spathulatus*
- 22b Achenes < 3.0 mm long; pappus not persistent; broadest stereomes of phyllaries to c. 1 mm wide (rocky sites as well as on sand) — *S. pinnatifolius* var. *maritimus*
- 23a Involucres all or mostly of 7–10 phyllaries — 24
- 23b Involucres all or mostly of more than 11 phyllaries (mostly c. 13, but sometimes more) — 30
- 24a Capitula discoid, with florets 10–16; corolla of all florets 5-lobed and markedly dilated distally; plant aromatic, usually quite glaucous — *S. odoratus*
- 24b Capitula disciform with florets mostly more than 16; corolla of outer florets hardly dilated distally and less than 5-lobed; plants not usually aromatic, not glaucous — 25
- 25a Plants greyish in appearance with a cottony to woolly indumentum of fine hairs at least on stems and lower surface of leaves; coarse hairs absent — *S. quadridentatus*
- 25b Plants not greyish in appearance with fine hairs rather sparse except on newest growth; if ever somewhat greyish overall then the indumentum of coarse hairs — 26
- 26a Achenes lageniform, > 2.8 mm long, with hairs rather sparse in lines; secondary roots slightly tuberiform; — *S. prenanthoides*
- 26b Achenes not lageniform and/or < 2.8 mm long, with hairs variously dense; secondary roots not tuberiform — 27
- 27a At least lower- to mid-stem leaves lobed; marginal teeth scattered (< 3 per cm) — 28
- 27b Stem leaves not lobed; margins often crowded-toothed (c. 5 per cm) — 29
- 28a Lobation of leaves markedly angled forwards, with acute teeth on the lobes also angled forwards; upper surface of upper-stem leaves nearly glabrous; achenes (2.0–)2.5–3.2 mm long — *S. biserratus*

- 28b Lobation of leaves nearly at right-angles to midrib, with subacute teeth on the lobes hardly angled forwards; upper surface of all leaves with scattered coarse hairs; achenes 1.5–2.2 mm long; achenes red-brown — *S. hispidulus*
- 29a Leaf margins smooth or with scattered points; inflorescences of few to c. 30 capitula — *S. microbasis*
- 29b Leaf margins with numerous crowded denticulations; inflorescences of 100s of capitula — *S. minimus*
- 30a Capitula discoid; calycular bracteoles conspicuously jet black in distal 0.5–1 mm; near glabrous annuals to 0.5 m high — *S. vulgaris**
- 30b Capitula disciform, or if discoid then plants densely hairy; calycular bracteoles with black pigmentation absent or inconspicuous and confined to very tip; short-lived perennials of various height, hairy or not — 31
- 31a At least lower-stem region developing coarse hairs (these sometimes partly obscured by overlying wispy extensions), these hairs sometimes becoming lost with age — 32
- 31b Stems glabrous or with all hairs very fine (appressed-cottony or woolly), nowhere developing any coarse hairs — 38
- 32a Involucre < 2.0 mm diameter (see glossary), 3.0–6.0 mm long or to 9 mm long but then achenes markedly lageniform (neck 0.3–1.0 mm long); achene hairs forming lines or bands narrower than ribs — 33
- 32b Involucre mostly > 2.0 mm in diameter, (5.0–)6.0–12.0 mm long; achenes not or only slightly lageniform (neck c. 0.2 mm long); achene hairs forming bands c. as wide as ribs — 36
- 33a Involucre 6.0–9.0 mm long; achenes lageniform, 2.8–4.5 mm long; secondary roots slightly tuberiform — *S. prenanthoides*
- 33b Involucre 3.0–6.0 mm long; achenes obloid, 1.0–2.2 mm long; secondary roots not tuberiform — 34
- 34a Peduncle and capitulum glabrous at flowering; calycular bracteoles 4–8 — *S. hispidulus*
- 34b Peduncle and capitulum (in region of bracteoles) cobwebby to woolly at flowering; calycular bracteoles 6–12 — 35 *S. glomeratus*
- 35a Achenes < 1/3 of phyllary length (phyllaries 4.0–6.0 mm long; achenes 1.0–1.7 mm long); peduncles and lower parts of capitulum moderately cobwebby to woolly; pappus usually > 5 mm long — *S. glomeratus* subsp. *glomeratus*
- 35b Achenes > 1/3 of phyllary length (phyllaries 3.0–5.0 mm long; achenes 1.3–2.2 mm long); peduncles and lower parts of capitulum sparsely to moderately cobwebby; pappus usually < 5 mm long — *S. glomeratus* subsp. *longifructus*
- 36a Upper-stem leaves not or hardly auriculate; apex of phyllaries black-tipped but without a zone of purple below this; achenes commonly slightly lageniform — *S. longipilus*
- 36b Upper-stem leaves usually auriculate; apex of phyllaries black-tipped or not, commonly with a zone of purple immediately below; achenes narrow-obloid — 37

- 37a Coarse hairs on stems persisting throughout; achenes light to mid brown; phyllaries c. 13 — ***S. hispidissimus***
- 37b Coarse hairs on stems giving way to cottony hairs above mid-stem; achenes sometimes dark-brown to blackish; phyllaries c. 13, or often 16–20 — ***S. squarrosus***
- 38a Capitula discoid — ***S. georgianus***
- 38b Capitula disciform — 39
- 39a Achenes lageniform, 2.0–7.0 mm long — 40
- 39b Achenes obloid to ellipsoid, 1.5–3.0 mm long — 43
- 40a Involucre > 3.0 mm diameter; calycular bracteoles > 3.0 mm long; achenes with hairs in bands c. as broad as ribs — ***S. macrocarpus***
- 40b Involucre < 3.0 mm diameter; calycular bracteoles < 3.0 mm long, appressed; achenes with hairs in lines or bands much narrower than ribs 41
- 41a Leaves in lower third of stems with scattered coarse hairs; achenes 5–7 mm long, markedly lageniform with a very long slender neck (> 1 mm long) — ***S. tasmanicus***
- 41b Leaves in lower third of stems lacking coarse hairs; achenes 2.0–4.5 mm long, with neck shorter (< 1 mm long) — 42
- 42a Plants with a grey appearance; taproot stout; at start of flowering lower-stem region densely cottony to woolly and capitula and peduncles either glabrous or cobwebby; outer achenes usually red — ***S. quadridentatus***
- 42b Plants with a greenish appearance; taproot inconspicuous; at start of flowering lower-stem region glabrous or sparsely cottony and capitula and peduncles cobwebby; outer achenes dark brown — ***S. campylocarpus***
- 43a Calycular bracteoles 1.0–2.0 mm long, 3–5 per capitulum; capitulum glabrous at flowering — 44
- 43b Calycular bracteoles 2.0–5.0 mm long, more than 5 per capitulum or if 3–5 then capitula (in region of bracteoles) cobwebby at flowering — 45
- 44a Involucre 1.0–1.5 mm diameter; florets up to 25; mature receptacle 1.0–2.0 mm diameter — ***S. microbasis***
- 44b Involucre 1.5–2.0 mm diameter; florets more than 25; mature receptacle 2.5–3.0 mm diameter — ***S. phelleus***
- 45a Peduncles and capitula glabrous at flowering (swamp plants) — ***S. psilocarpus***
- 45b Peduncles and capitula (in region of bracteoles) cobwebby at flowering (not swamp plants) — 46
- 46a Achenes with dense hair-bands c. as broad as ribs, mid-brown or blackish between bands; involucre 2.0–4.0 mm diameter (lowland) — ***S. squarrosus***
- 46b Achenes glabrous or hairs in lines much narrower than ribs, olive-brown or red-brown; involucre 1.7–2.0 mm diameter (montane or higher altitudes) — 47
- 47a Achenes 2.5–4.0 mm long, olive-brown; calycular bracteoles extending up to c. one-quarter of way along involucre; upper-stem leaves entire or denticulate — ***S. gunnii***
- 47b Achenes 2.0–2.2 mm long, red-brown; calycular bracteoles extending c. one third to halfway along involucre; upper-stem leaves lobate — ***S. extensus***

**NOTES ON TASMANIAN
SPECIES OF *SENECIO***

***Senecio albogilvus* I.Thomps.,
Muelleria 20: 130 (2004)
'white alpine groundsel'
(Fig. 2)**

This is one of the subalpine species endemic to Tasmania. It was formerly known as *S. pectinatus* var. *ochroleucus* but Thompson (2004c) raised it to specific rank. It is widespread in central-western and southern Tasmania (including Mt Wellington) at higher altitudes, where it grows in rocky sites in herbfields, heathlands and shrublands.

This species is distinct from *S. pectinatus* on the basis of leaf morphology, and is perhaps more similar to *S. leptocarpus* (both have similarly toothed or lobed, discoloured leaves but those of *S. albogilvus* are considerably smaller). The white-cream colour of the ligules is perhaps the most

distinctive feature and makes confusion with other species unlikely. Belcher (1996) notes that the recognition of this species in dried material is easy because of the distinctive leaves and bracts, even though the rays usually undergo discoloration during drying and are not then reliably different in colour from dried material of *S. pectinatus*.

An old specimen collected by a Dr Milligan from Tasmania (MEL667723) has leaves similar to *S. albogilvus* but an inflorescence of six capitula. It is unclear what the original colour of the ligules was in this specimen. This may be an aberrant plant or possibly a hybrid between *S. albogilvus* and *S. leptocarpus*.

****Senecio angulatus* L.f., Suppl. 369
(1782) 'scrambling groundsel'
(Fig. 3)**

This is a vigorous, fleshy leaved climber that is becoming very common in parts of

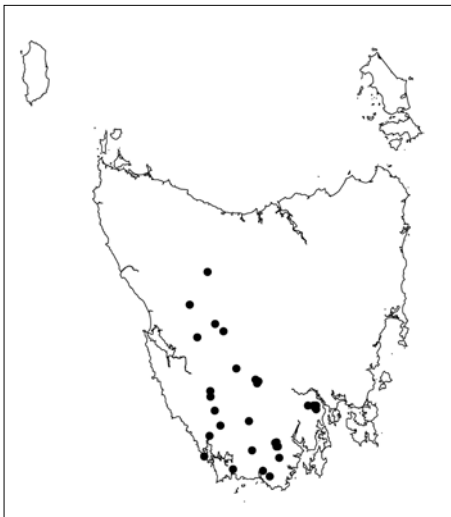


Fig. 2. Distribution of *Senecio albogilvus*.

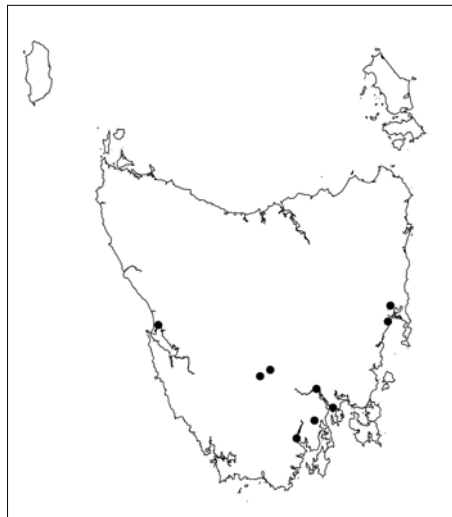


Fig. 3. Distribution of *Senecio angulatus*.

the state's south-east and east (e.g. Tasman Highway north of Swansea, township of Swansea, a few sites around Hobart) and scattered localities elsewhere (e.g. Strahan, upper Derwent Valley, Eddystone Point). It is a native of South Africa.

***Senecio biserratus* Belcher, Ann.**

Miss. Bot. Gard. 43: 43 (1956)

'jagged fireweed'

(Fig. 4)

This is a distinctive species that grows to 1 m. It resembles *S. minimus* but differs most obviously by the degree of dissection and shape of the leaf segments. In Tasmania, prior to the major revision of *Senecio*, many jagged-leaved specimens (including many 'inland' records) of *Senecio* are likely to have been attributed to this species. It was possibly previously confused with other jagged-leaved taxa such as *S. glomeratus*, *S. hispidulus* and the more recently described *S. hispidissimus*.

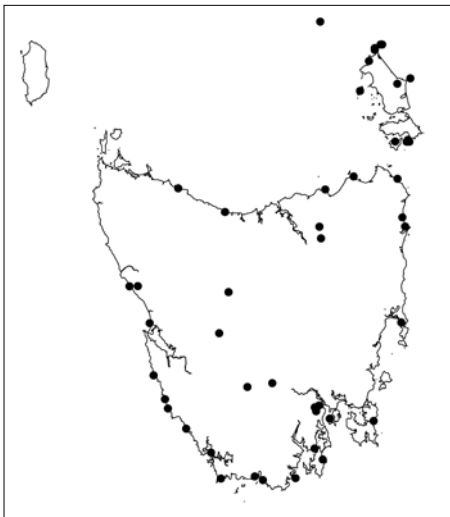


Fig. 4. Distribution of *Senecio biserratus*.

The species is widespread and common in Tasmania, especially along coasts (including islands) and major coastal river systems; there are, however, also several inland records. *Senecio pinnatifolius* var. *lanceolatus* and *S. biserratus* occasionally hybridise. This hybrid entity was described as *S. Xorarius* but is not considered worthy of taxonomic recognition. See notes under *S. pinnatifolius* var. *lanceolatus* for further discussion.

***Senecio campylocarpus* I.Thomps.,**

Muelleria 20: 139 (2004)

'bulging fireweed'

(Fig. 5)

In Tasmania, the species is known from three collections: one from 'near Launceston' in 1888, another from a 'swamp near Cressy' in 1943, and most recently from the banks of the Elizabeth River, Campbell Town, in 2006. This species usually occurs in lowland forest and

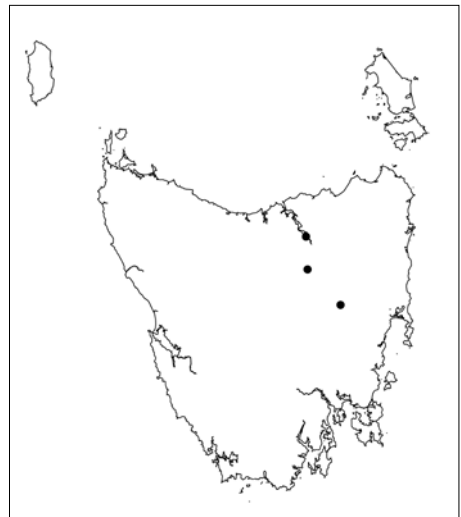


Fig. 5. Distribution of *Senecio campylocarpus*.

woodland subject to seasonal inundation. The recent collection from Campbell Town is from the grassy banks of the river and from seasonal rocky rapids at the water's edge. The species is likely to be more widespread than currently indicated by the paucity of records. It is common in Victoria, and also occurs in disturbed sites.

It is similar to *S. quadridentatus* but differs from this species by its sparsely haired to glabrous leaves and stems, broader leaves tapering distinctly to each end, broader phyllaries reflexed rather than spreading at maturity, shorter florets with more corolla-lobes, curved achenes and the smaller taproot and fleshier secondary roots. The receptacle undergoes relatively little expansion as the achenes develop and, because of this, the capitula often develop a more urn-shaped appearance than those of other species.

This species was previously known as *S. glandulosus* (DC.) Sch.Bip. but this name has recently been shown to be illegitimate. The new epithet alludes to the characteristic curved outer achenes that appear more pronounced than in any other disciform species.

****Senecio elegans* L., *Sp. Pl.* 2: 869
(1753) 'purple groundsel'
(Fig. 6)**

In Tasmania the species is most widespread on the east and north coasts (including Bass Strait islands) but is apparently absent from the west and south coasts. This is an almost wholly coastal species (usually on dune sand) and has distinctive crimson to purple (or occasionally white) ligules. Even when not in flower, the broad cup-shaped involucre buds with prominently black-

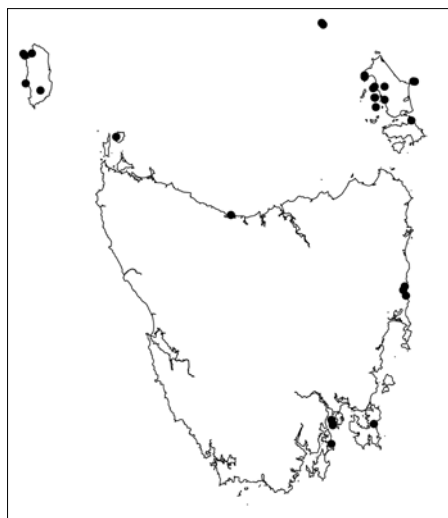


Fig. 6. Distribution of *Senecio elegans*.

tipped bracts combined with the thick and more or less hollow branches and the fleshy deeply divided leaves make it easily recognised. It is a native of South Africa. Walsh (1999) reports apparent hybrids between *S. elegans* and *S. pinnatifolius* from near Portland and Wilsons Promontory in Victoria, which have more narrowly lobed or subentire leaves and pale mauve to whitish ligules (rather than the usual rich purple). Such hybrids have not been reported from Tasmania.

***Senecio extensus* I.Thomps.,
Muelleria 19: 150 (2004)
'subalpine fireweed'
(Fig. 7)**

Senecio extensus grows to 0.5 m. It is readily distinguished by its long calycular bracteoles. Its glabrous, lustrous achenes also usually help to distinguish this species; however, a few collections from Victoria with hairy achenes have recently

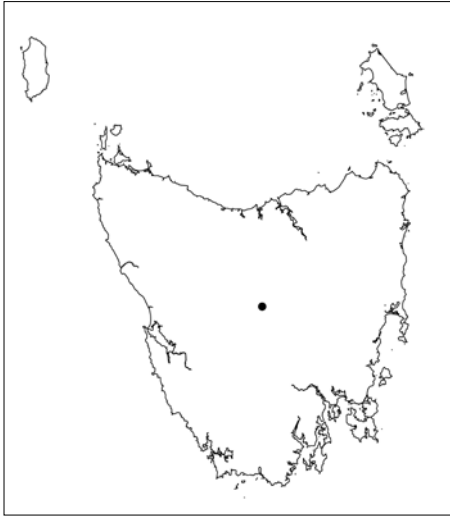


Fig. 7. Distribution of *Senecio extensus*.

been found. In Tasmania this species is only known from a single record collected in 1984 (from Mackenzies Tier, on the Central Plateau). It is widespread in grasslands, herfields and open shrublands in subalpine areas in New South Wales and Victoria, so it is likely to be more common in Tasmania than currently recognised.

***Senecio georgianus* DC., Prodr. 6: 371 (1838) 'grey fireweed'**

This species has been recorded only once for Tasmania and, like all mainland records of this species, this was in the 1800s. The single Tasmanian collection is apparently that of Gunn, held at Kew, and is simply labelled 'Van Diemen's Land'. Later in his career Gunn forwarded mainland collections of other collectors to Hooker. J.D. Hooker described *Erechtites candicans* from this Gunn material, later recognised as synonymous with *S.*

georgianus. As such, it is possible that *S. georgianus* is not present in Tasmania, but has been included in the key because of the Gunn collection. Although discoid, in other aspects of its morphology it conforms to the disciform group of Australian *Senecio*. It resembles *S. gunnii* vegetatively. Herbarium labels (from mainland specimens) suggest that it occurs at moderate altitudes and may be an autumn flowering species.

***Senecio glomeratus* Desf. ex Poir., Encycl. Suppl. 5: 130 (1817) 'purple fireweed'**

(Fig. 8)

This species grows to 2 m and is widespread in Tasmania in a range of habitats, at various elevations, and it often occurs in disturbed sites. It is sometimes confused with *S. hispidulus* because both species have similar-sized capitula; however, the latter are more slender, always green and never cobwebby, contain fewer florets on longer peduncles and fewer and generally shorter calycular bracteoles; and the upper-stem leaves have only coarse hairs.

Two subspecies of this species are recognised, largely separated on the dimensions and characters of the achenes. Hybridisation between either *S. hispidulus* and *S. minimus* and either of the two subspecies of *S. glomeratus* is likely and it may be difficult to distinguish such hybrids from *S. glomeratus* subsp. *longifructus*. However, as *S. hispidulus* and *S. minimus* have narrower capitula than *S. glomeratus*, one would expect hybrids to have capitula that are noticeably narrower than those of subsp. *longifructus*.

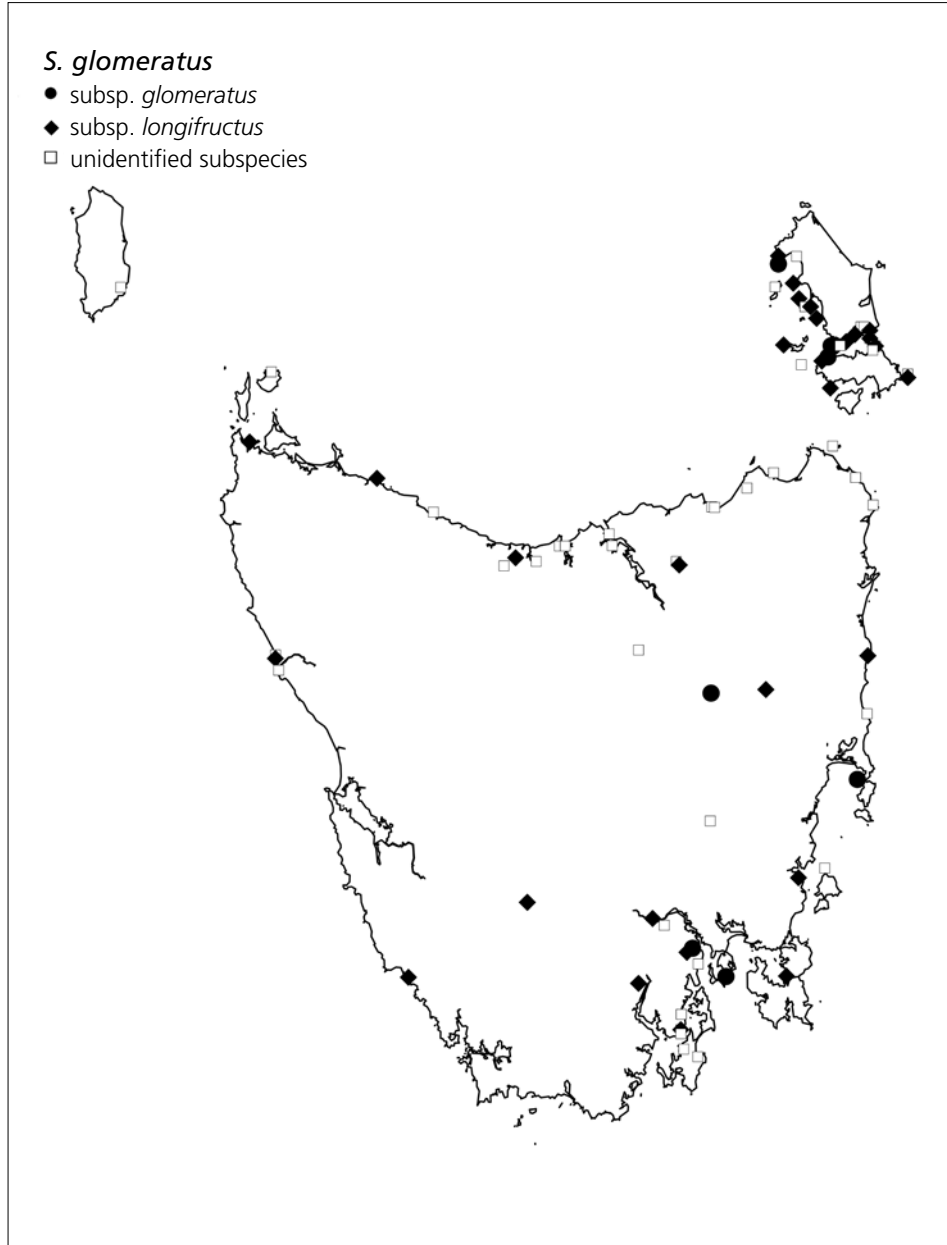


Fig. 8. Distribution of *Senecio glomeratus*.

Senecio glomeratus subsp.
glomeratus
 'shortfruit purple fireweed'

This subspecies has numerous, crowded, small and often purple capitula surrounded basally by many cobwebby calycular bracteoles. Often a rather tall plant in forest environments, it sometimes grows near water and then is sometimes sympatric with subsp. *longifructus*. It is likely that hybridisation takes place between subspecies in these environments, and this is a probable reason for difficulties in assigning some specimens to either subspecies (intermediate specimens have been collected on the Bass Strait islands).

Senecio glomeratus subsp.
longifructus I.Thomps., *Muelleria*
 19: 148 (2004)
 'longfruit purple fireweed'

This subspecies grows adjacent to streams and swamps (sometimes in coastal areas such as river mouths and estuaries). Apart from the characters in the key, subsp. *longifructus* tends to be a shorter plant than subsp. *glomeratus* and appears to be more consistently associated with water. Inflorescences generally have fewer and less congested capitula with overtopping more pronounced. The capitulum involucre is less commonly all purple although this may be simply because it is more often in shaded environments. Outer achenes of subsp. *longifructus* are often greenish, olive or brown, whereas others are medium brown. In contrast, achenes of subsp. *glomeratus* are commonly all medium to dark red-brown.

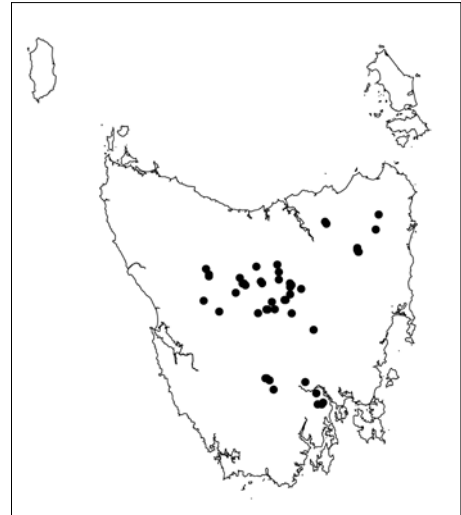


Fig. 9. Distribution of *Senecio gunnii*.

Senecio gunnii (Hook.f.) Belcher,
Ann. Miss. Bot. Gard. 43: 60 (1956)
 'mountain fireweed'
 (Fig. 9)

This species grows to 1 m and it is generally a species of higher elevations, widespread in north-eastern, central and southern Tasmania, most often in *Eucalyptus delegatensis* and *E. coccifera* forest/woodland. It resembles *S. quadridentatus* in the type and density of the indumentum, but it differs in having broader, narrow-elliptic leaves, phyllaries with more convex stereomes, bisexual florets with 5-lobed corollas rather than 4-lobed, female florets with larger corolla lobes and more sparsely haired and non-lageniform achenes.

Senecio hispidissimus I.Thomps.,
Muelleria 19: 138 (2004)
 'coarse fireweed'
 (Fig. 10)

This species is similar to *S. squarrosus* but is more densely coarse-hairy, and has smaller capitula with usually fewer phyllaries. It is also similar to *S. hispidulus* but is more densely coarse-hairy and with usually broader capitula and longer phyllaries that are purple or that have an apical zone that is purple. A few collections from the north-west coast of Tasmania have unusually short capitula and achenes.

It is generally a lowland species, represented by only a few collections from scrub, dune and heath vegetation, close to the north and east coast. The widespread distribution of these records indicates that this species is likely to be more common than currently indicated.

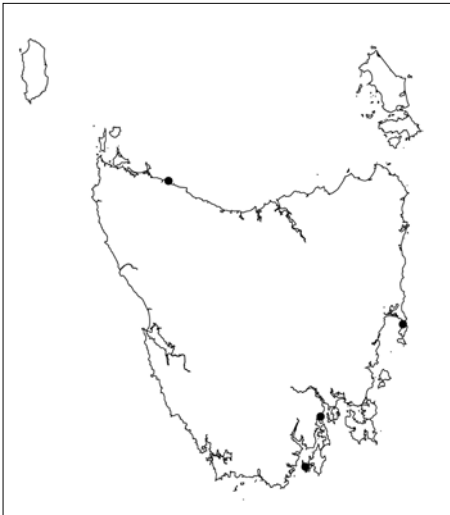


Fig. 10. Distribution of *Senecio hispidissimus*.

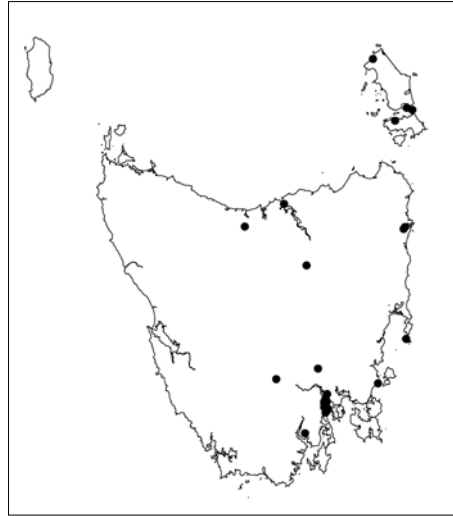


Fig. 11. Distribution of *Senecio hispidulus*.

Senecio hispidulus A.Rich., Voy.
Astrolabe 2: 94 t.34 (1834)
 'rough fireweed'
 (Fig. 11)

Senecio hispidulus is an erect herb that grows to 1.5 m. It is widespread in Tasmania, mainly in eastern, southern and north-eastern parts at lower elevations. It has been possibly previously confused with other jagged-leaved taxa such as *S. glomeratus*, *S. biserratus* and *S. hispidissimus*.

Involucres of this species mostly comprise 11–14 phyllaries, but occasional plants have involucres of predominantly 9 or 10. Achenes of this species are usually hairy but occasional populations have plants with glabrous achenes.

****Senecio jacobaea*** L., *Sp. Pl.* 2: 870
 (1753) 'ragwort' (Fig. 12)

Ragwort is one of the state's worst agricultural weeds and is known to cause death by liver damage in stock. It is subject

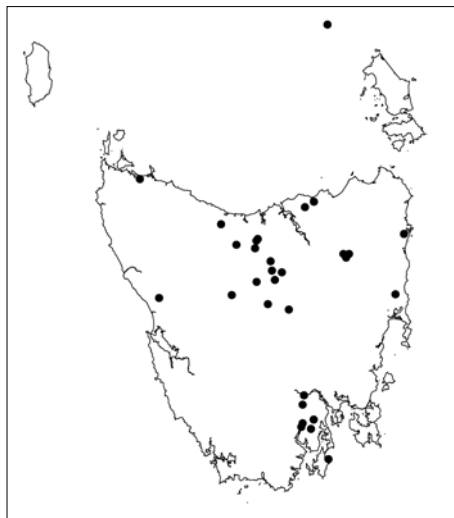


Fig. 12. Distribution of *Senecio jacobaea*.

to a Statutory Weed Management Plan under the Tasmanian *Weed Management Act 1999*.

Plants are biennial and only form rosettes in the first year. These rosettes are distinctive and unlikely to be confused with any other species. The irregularly divided second-year stem leaves are distinctive. It is a native of Europe but is now established in most parts of the world. The species is widespread in Tasmania occurring mainly at lower elevations, and is often associated with major centres of cultivation. It can also be found at higher elevations in relatively undisturbed sites. The paucity of herbarium records is typical of common and widespread weeds, so the distribution map is not a true indication of its current widespread distribution.

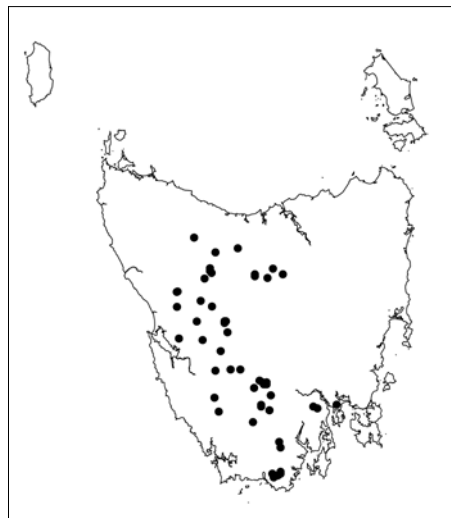


Fig. 13. Distribution of *Senecio leptocarpus*.

***Senecio leptocarpus* DC., Prodr.**
6: 372 (1838) 'western groundsel'
(Fig. 13)

This subalpine species is easily recognised by its distinctive leaf morphology. It is widespread on western, southern and some central northern mountains. A record from Mt Rumney near Hobart (collected in 1929 by F.H. Long) is well outside the expected range of the species. The record is questionable as the species has not been subsequently recorded from this part of the state and Mt Rumney is a low altitude hill supporting grassy dry sclerophyll forest.

***Senecio linearifolius* A.Rich., Voy.**
Astrolabe 2: 129 (1834)
'fireweed groundsel'
(Fig. 14)

The species is an aromatic perennial, often weakly shrubby, which grows to 2 m. The taxonomic revision of Thompson

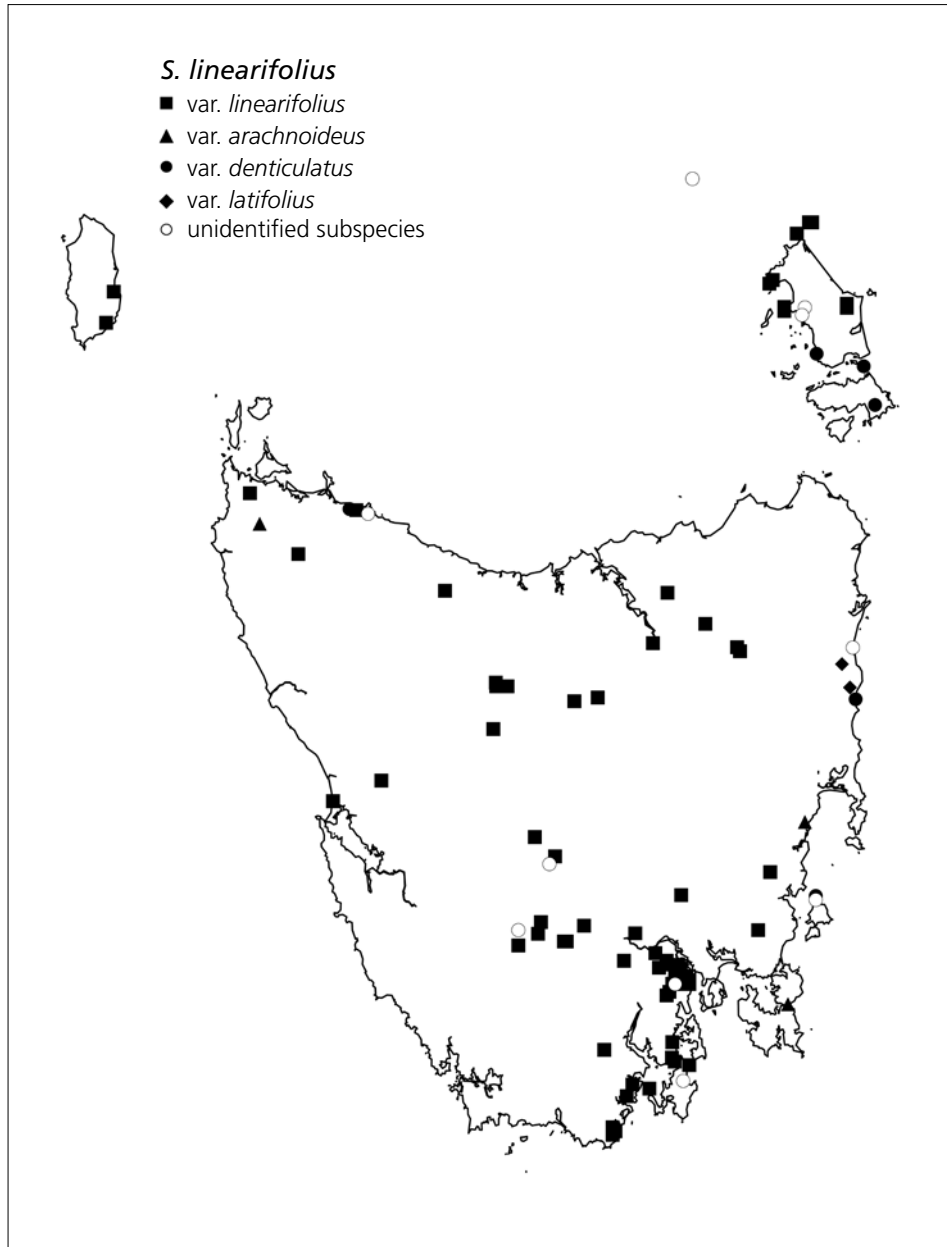


Fig. 14. Distribution of *Senecio linearifolius*.

(2004b) recognised nine varieties of *S. linearifolius*, of which four are known from Tasmania. These varieties can be distinguished mainly by leaf characters. Only the common and widespread var. *linearifolius* has been adequately collected. Further collecting of material of the other varieties is necessary to gain a better understanding of their features, any intergrading between varieties, and a clearer understanding of their distribution.

***Senecio linearifolius* var.
linearifolius
'fireweed groundsel'**

This taxon commonly colonises disturbed ground, e.g. clearfelled forestry coupes and margins of recently constructed roads and tracks. It often forms dense thickets up to 1.5 m. It is widespread throughout Tasmania, although most commonly in higher rainfall areas. The lack of records for some parts of the state probably reflects the usual problem of common species not being adequately collected. It is readily distinguished by the dark green, very narrow and long leaves with smooth margins and relatively inconspicuous venation. The secondary venation on the lower surface is not raised or only slightly raised and tertiary venation is not usually discernible.

This variety hybridises with *S. minimus* in Victoria and Tasmania. A study of this hybrid on Mt Macedon in Victoria is documented by Thomas (2004). Such hybrids will key to *Senecio linearifolius* if ray florets are present. Ligules of these florets would be smaller and narrower than the range of sizes occurring in *S. linearifolius* (mostly 0.5–4 mm long). Another hybrid, *S. pinnatifolius* var. *lanceolatus* X *S. biserratus*, may also key here

although capitula may be longer and ray florets more numerous than the couplet requires. It is likely to occur only on the coast.

***Senecio linearifolius* var.
arachnoideus I.Thomps. *Muelleria*
20: 98 (2004)
'cobweb fireweed groundsel'**

This taxon is only known in Tasmania from three sites: Mayfield Beach on the state's east coast where it occurs in relative abundance, Tessellated Pavement on the Tasman Peninsula, and Montagu Swamp in the north-west. It is likely to also occur along rocky coastlines along eastern Tasmania. On the mainland the variety grows in forest and coastal scrub.

Although there is a little overlap in dimensions and numbers, capitula in var. *arachnoideus* are generally larger (3.5–4.5 mm long, 1.5–2.5 mm diameter) than in var. *denticulatus*, var. *linearifolius* and var. *latifolius*; and number of ray florets is also generally greater (more often 6–8). Immature leaves and stems are commonly clothed with a more or less dense white wool early in development; upper-stem leaves mostly narrow to very narrow-elliptic (occasionally wider), to 12 cm long, with length:width ratio 4.5(–6–12); margin of stem leaves mostly denticulate to dentate (but sometimes entire to callus-denticulate), not revolute, frequency of teeth 2–5 per cm; upper surface of leaves with venation sometimes strongly impressed, the surface at first usually appressed-cobwebby, glabrescent; lower surface of leaves with scattered, weak, coarse spreading hairs or moderately cobwebby (hairs variably fine or coarse-based), glabrescent, secondary venation sharply raised and tertiary venation distinct.

There is a gradation in var. *arachnoideus* from northern New South Wales to south-east Tasmania in the degree of cobwebbiness of the leaf undersurface, dentition of the leaf margins, and achene indumentum (grading to papillose-hairy achenes further south).

Senecio linearifolius* var. *denticulatus I.Thomps. *Muelleria* 20: 93 (2004)
'toothed fireweed groundsel'

This taxon is similar in habit to var. *linearifolius* but appears to be much less widespread. The variety is most prevalent in the north-east in dry to wet sclerophyll forest, with herbarium records from the eastern Bass Strait islands, the St Marys area and the northern tip of Maria Island. More recently the variety has been collected from the East Risdon Nature Reserve near Hobart, where it is sympatric with var. *linearifolius*. Although similar in habit to var. *linearifolius*, the leaf margins of stem leaves are always denticulate, secondary venation of the lower surface is more prominent and tertiary venation is more distinct. There is a possibility of intergrading with var. *linearifolius* (as recorded east of Melbourne) and var. *arachnoideus* (as recorded near Eden, New South Wales). Note that leaves of secondary inflorescence branches may be sufficiently reduced such that denticulations do not show.

Senecio linearifolius* var. *latifolius I.Thomps., *Muelleria* 20: 96 (2004)
'broadleaf fireweed groundsel'

This taxon is localised in north-eastern Tasmania based on three collections from the Lower Marsh Creek-Elephant Pass-St

Marys Pass area. On the mainland it occurs at moderate to high altitudes and the Tasmanian collections are from steep slopes in eucalypt forest at lower elevations.

Senecio linearifolius var. *latifolius* has upper-stem leaves that are commonly lanceolate and with a low length:width ratio, broad-cuneate to cordate at the base with auricles continuous with the lamina, the lower surface usually glabrous (rarely cobwebby) and with distinct (sharply raised) reticulate venation. Capitula are at the smaller end of the range for the species (2.5–4.0 mm long, 1.0–1.6 mm diameter). Some specimens are intermediate between this variety and var. *denticulatus*.

Senecio longipilus I.Thomps., *Muelleria* 19: 193 (2004)
'longhair fireweed'
(Fig. 15)

This species grows to 0.5 m and occurs in far south-eastern New South Wales and in northern Tasmania. There are three specimens in the Melbourne Herbarium (with none held at the Tasmanian Herbarium). One was collected from near Perth, South Esk River, whereas the locality for the other two is unclear. On the mainland the species occurs in sand or loam soils in grassland, herbfield, shrubland and woodland, mostly at elevations above 1000 m but also in lowland areas. If the locality given was accurate, the Tasmanian record indicates a lowland distribution in this state.

It is distinguished from other species with broad capitula by the relatively long (1–2 mm) coarse hairs on stems, leaves and bracts, and the relatively long bracts and calycular bracteoles. Phyllaries are fewer than in *S. macrocarpus* and are usually

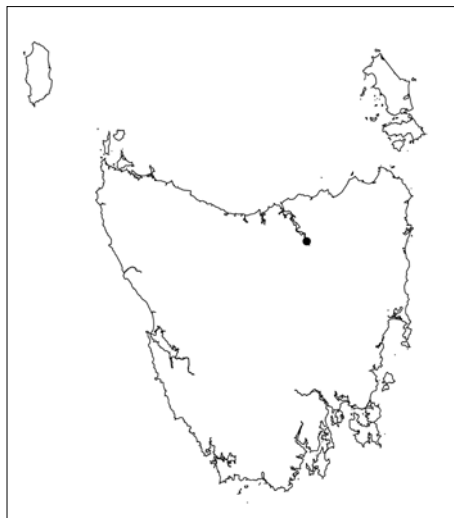


Fig. 15. Distribution of *Senecio longipilus*.

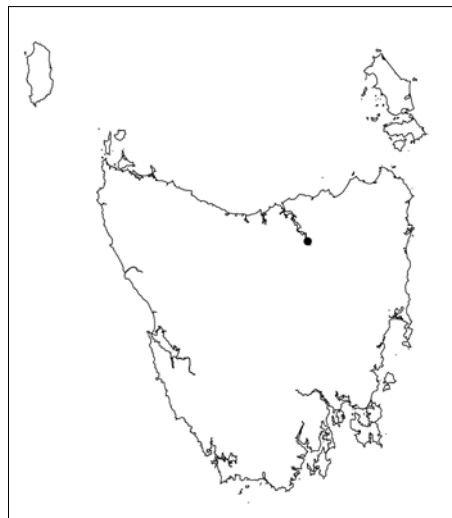


Fig. 16. Distribution of *Senecio macrocarpus*.

fewer than in *S. squarrosus*. The pappus is usually relatively densely bristly and relatively long, and it commonly exceeds the florets by c. 1 mm, obscuring them at anthesis. Pappus bristles are more scabrid-barbellate (i.e. with small projections as seen under x 20 or greater magnification) than in other related species. Compared to *S. squarrosus* the stereomes of the phyllaries are broader, and this distinction is most evident in the distal 1.5 mm of the phyllary.

***Senecio macrocarpus* Belcher,**
***Muelleria* 5: 119 (1983)**
 'largefruit fireweed'
 (Fig. 16)

Senecio macrocarpus grows to 0.6 m. It is listed as extinct on the Tasmanian *Threatened Species Protection Act 1995* and as vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is represented by a single

old record from northern Tasmania (South Esk River area close to Launceston/Perth). On the mainland it typically grows in low-lying areas, and has been recorded from basalt-derived clay or clay-loam soils in grassland, sedgeland and woodland. This species is readily recognisable by its narrow-linear branch-leaves, small number of very large capitula, and long, densely papillose-hairy, lageniform achenes.

***Senecio microbasis* I.Thomps.,**
***Muelleria* 19: 175 (2004)**
 'narrow fireweed'
 (Fig. 17)

This species grows to 0.6 m. It is similar to *S. phelleus* but differs in narrower leaves near the base of the plant, leaf-bases never sagittately auriculate, capitula narrower and with fewer florets, phyllaries thinner and finally reflexed, corolla lobes fewer and less thickened apically, and the achenes with a more slender neck. It could also be

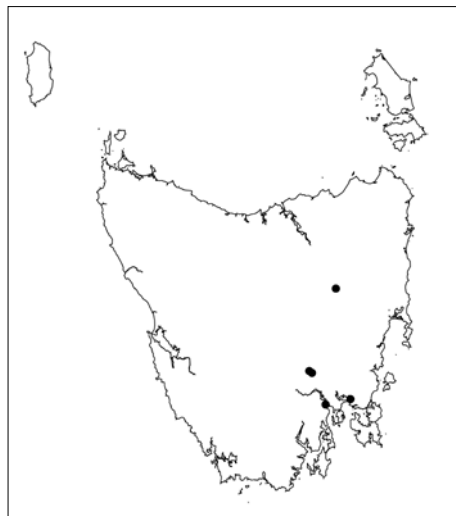


Fig. 17. Distribution of *Senecio microbasis*.

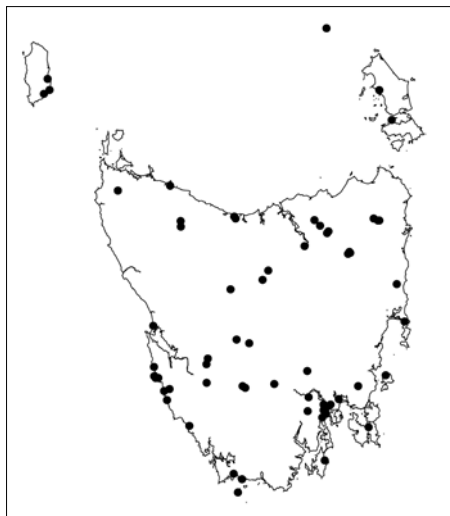


Fig. 18. Distribution of *Senecio minimus*.

confused with *S. prenanthoides* but differs in that the lower-stem lacks coarse hairs and the achenes are shorter and not distinctly lageniform. It is currently known from a few scattered localities in the south around Hobart, and in the southern and northern Midlands. The quite widespread distribution of these records indicates that this species is likely to be more common than the few records suggest.

Senecio minimus* Poir., *Encycl. Suppl.

5: 130 (1817)

'shrubby fireweed'

(Fig. 18)

Senecio minimus grows to 2 m. It is readily identified by inflorescence with numerous, small, slender capitula, and large leaves with more or less regular, crowded denticulations and distinct reticulate venation. It is most common on fertile sites, e.g. rich soils in moister sites such as beside swamps and streams, and occurs

throughout Tasmania at most elevations. In Tasmania, prior to the major review of *Senecio*, many specimens (of several species) are likely to have been erroneously attributed to this species. This species often forms dense shrubby stands on disturbed sites such as roadsides and clear-felled coupes.

Senecio odoratus* Hornem., *Hort. Bot.

Hafn. 2: 809 (1815)

'scented groundsel'

(Fig. 19)

This species is a shrubby plant that grows to 1.7 m, and is unlikely to be confused with any other species due to its distribution, which is almost wholly coastal, its glaucous and aromatic character, large entire leaves, discoid capitula, small number of involucre bracts, and the prominently bell-shaped corollas. It occurs mainly in the north of the state, including the Bass Strait islands, and also on the north-west and west coast,

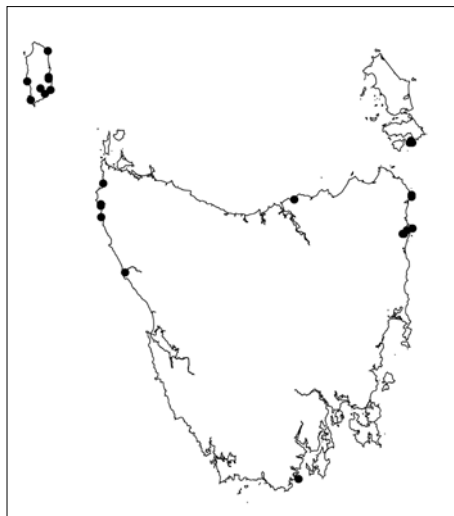


Fig. 19. Distribution of *Senecio odoratus*.

with a single record from the south at Actaeon Island near Southport (although the identification of this collection has not been confirmed). *Senecio odoratus* grows on rocky slopes, clifftops, or sand dunes in shrubland, woodland and forest.

***Senecio papillosus* F.Muell., *Trans. Philos. Inst. Vict.* 2: 69 (1857)**
 'warty groundsel'
 (Fig. 20)

This is one of the subalpine species endemic to Tasmania. However, this species appears to be one of the most restricted of the highland species, so far known only from Adamsons Peak, Mt La Perouse, Mt Bobs and Pindars Peak. The species is distinctive because the upper leaf surface is densely studded with clear short straight or curved multicellular hairs with tuberculate bases.

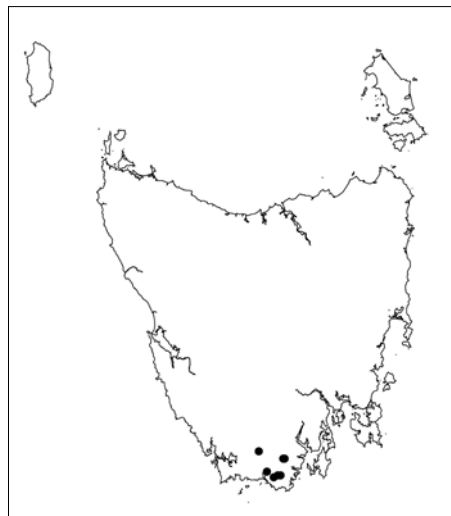


Fig. 20. Distribution of *Senecio papillosus*.

Senecio pectinatus* DC., *Prodr.* 6: 372 (1838) var. *pectinatus
 'yellow alpine groundsel'
 (Fig. 21)

This variety is endemic to Tasmania, occurring on southern, central and north-eastern mountains, including Mt Wellington. Some specimens from Ben Lomond (e.g. *M.G.Noble* 28274; Tasmanian Herbarium) were recently included by Thompson (2004c), and consequently Buchanan (2005), in var. *major* based on their capitular dimensions that exceeded those presented by Belcher (1996) and later Thompson (2004c) for var. *pectinatus*. In a later paper Thompson (2006) referred these specimens to var. *pectinatus* because of their foliar morphology. In the absence of a clear-cut discriminating character, however, the Ben Lomond form remains taxonomically problematic. On the basis of Thompson's reassessment, var. *major* is considered endemic to the Australian mainland.

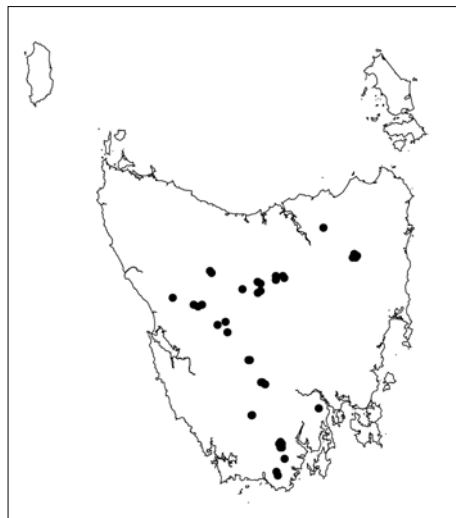


Fig. 21. Distribution of *Senecio pectinatus*.

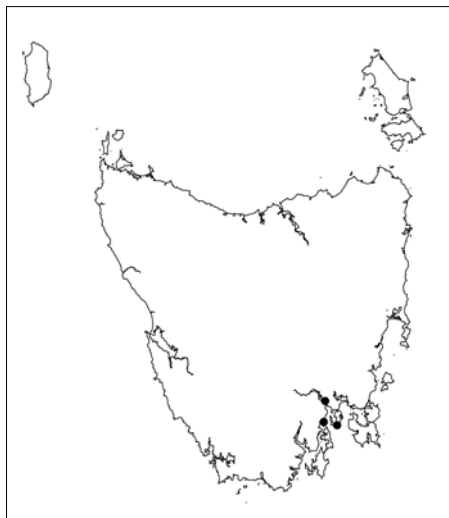


Fig. 22. Distribution of *Senecio phelleus*.

***Senecio phelleus* I.Thomps., *Muelleria*
19: 171 (2004) 'rock fireweed'**
(Fig. 22)

This species grows to 1.5 m. It is represented by two herbarium collections in Tasmania: one from near Hobart and the other from Betsey Island. Recent collections from Tinderbox Hills, south of Hobart, and Knocklofty, west of Hobart, indicate that it is probably more widespread in the state than currently recognised. It occurs in south-eastern Australia, from Bathurst in central-eastern New South Wales south to eastern Victoria and westwards to Adelaide in south-eastern South Australia, and disjunctly further west on the Eyre Peninsula. It grows in sandy or heavy soils, often in rocky sites in heathland and in, usually, drier forest and woodland.

It may previously have been identified as *S. quadridentatus* and more recently as either *S. prenanthoides* or *S. microbasis*. It is similar to *S. quadridentatus* but differs in having a

small taproot, often sagittate leaf-bases, shorter capitula, always glabrous peduncles and capitula, corollas of bisexual florets 5-lobed, with lobes more thickened, and achenes not lageniform. It is also similar to *S. prenanthoides* in habit, indumentum of leaves and bracteole number, but differs in having the lower-stem region with an appressed-cobwebby indumentum, more florets per capitulum, secondary roots not tuberiform, leaf-bases commonly sagittate, and achenes shorter and not lageniform. It could also be confused with *S. microbasis* but its lower leaves are broader, its capitula are larger and with more florets, the leaf-bases are sagittate, and the neck of achenes is less slender.

***Senecio pinnatifolius* A.Rich., *Voy.*
Astrolabe 2: 117 (1834)**
(Fig. 23)

Five varieties of *S. pinnatifolius* are recognised in Tasmania, and together with *S. spathulatus*, the infra-specific limits within the complex

have been difficult to resolve. Most Tasmanian specimens of *Senecio* previously labelled as *S. lautus* are *S. pinnatifolius*.

Senecio pinnatifolius* var. *alpinus
(Ali) I.Thomps., *Muelleria* 21: 52 (2005)
'highland groundsel'

This variety grows to 1 m, and is commonly erect or suberect, or ascending from a horizontal rhizome and then the aerial branches are few or absent. It occurs in moderate to high altitudes in forest, woodland and alpine meadows. The distribution map shows only a limited number of specimens held at the Tasmanian Herbarium that have been identified as this variety, although it is expected to be more widespread. This variety is largely separated geographically and altitudinally from other varieties. It has oblanceolate leaves with relatively distally positioned marginal points or segments; however, smaller-leaved forms are sometimes difficult to distinguish from var. *pinnatifolius*. *Senecio pinnatifolius* var. *alpinus* is also characterised by short curled hairs on both the peduncle and margin of calycular bracteoles.

Senecio pinnatifolius* var. *capillifolius (Hook.f.) I.Thomps.,
Muelleria 21: 51 (2005)
'fineleaf coast groundsel'

This variety grows to 0.8 m, and is erect or sprawling. It is currently only known from the Bass Strait islands including some small and close to shore islands off the north-east coast. This variety is distinctive because of its much-dissected leaves, succulent branches (generally quite flattened after pressing), and congested corymbiform inflorescences that are held only a short distance above the often congested upper-

branch leaves. Ligules are relatively short, not or hardly longer than the involucre in pressed specimens, and achenes are relatively short compared to those of var. *pinnatifolius* and var. *alpinus*. Although always finely dissected, there is variation from long filiform primary and secondary segments to those with smaller intricately divided often tri-pinnatisect leaves with segments rather crowded. Forms of var. *lanceolatus* with bi-pinnatisect leaves, some of which occur on the Bass Strait islands, resemble var. *capillifolius* but these forms have different phyllary morphology, their upper-stem region and inflorescences are less congested, and the ligules are longer than the involucre.

Senecio pinnatifolius* var. *lanceolatus (Benth.) I.Thomps.,
Muelleria 21: 49 (2005)
'lanceleaf coast groundsel'

This variety grows to 2 m, and is commonly erect, sometimes sprawling. It is widespread, mainly in coastal areas but occasionally inland in the south, east and north. Only specimens from the eastern Bass Strait islands have been positively identified as this variety in the collection at the Tasmanian Herbarium.

This variety differs from the other varieties most significantly in phyllary morphology; in particular the relatively large disparity in width between the stereomes of the inner and outer phyllaries (measured c. 1 mm below the apex); and the relatively broad hyaline margin of the outer phyllary in the distal third (Fig. 45). A bold purple chevron (upside-down V), visible with the naked eye or with low power magnification, usually delineates the stereome of inner phyllaries. Also

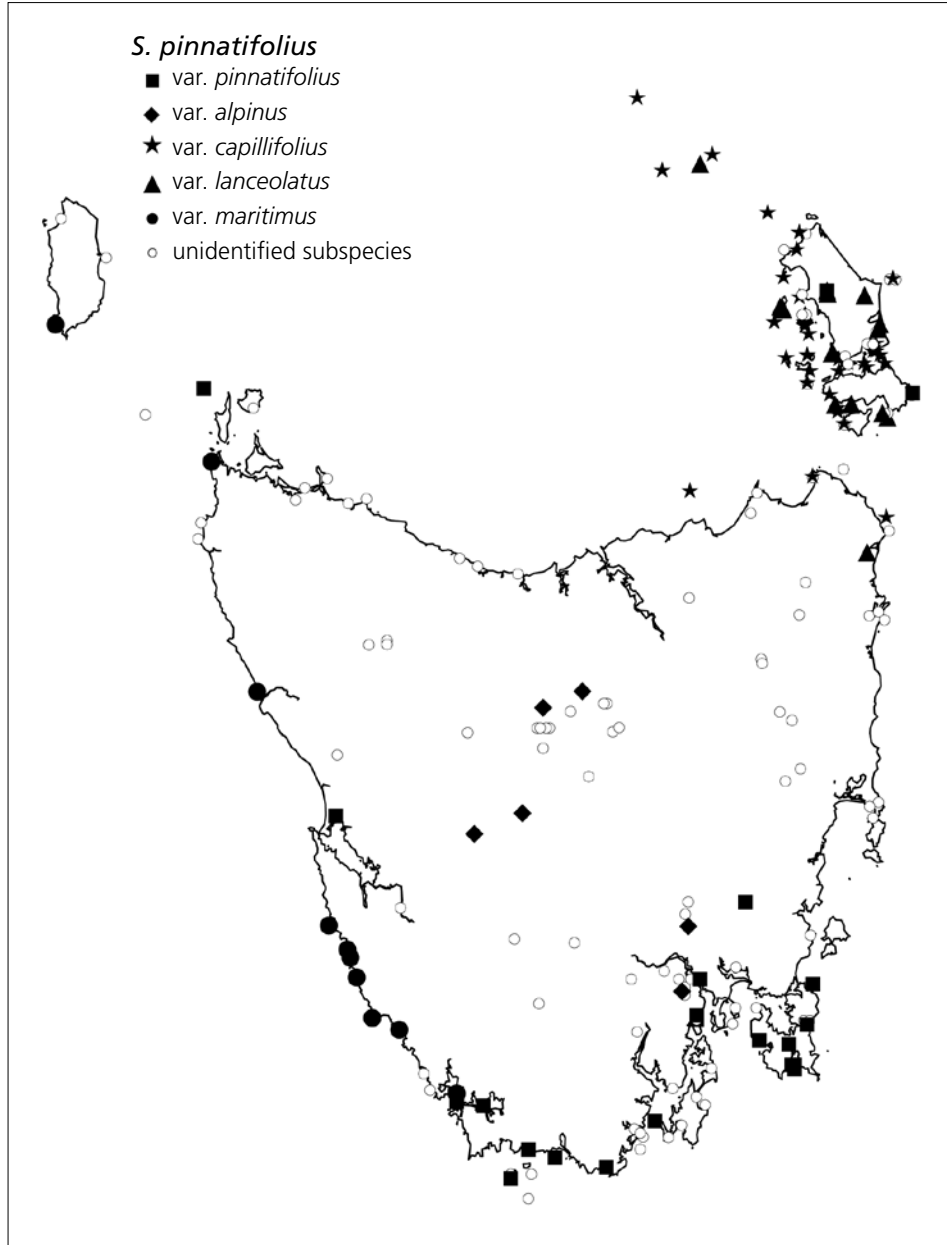


Fig. 23. Distribution of *Senecio pinnatifolius*.

in this variety the leaves tend to have a relatively high number of marginal points, the number of capitula per inflorescence is often high (up to 40), and the taproot is poorly developed. In dried specimens, the distal portion of the stereome that the chevron outlines may be pale beside the chevron rather than green.

The degree of leaf division can vary enormously in some populations; however, populations of purely serrate-leaved plants or purely pinnatisect-leaved plants also occur. Plants of var. *lanceolatus* growing on coastal dunes have smaller more succulent leaves with reduced numbers of marginal points, compared to plants growing slightly more inland.

Senecio pinnatifolius var. *lanceolatus* and *S. biserratus* form an occasional hybrid that was described as *S. Xorarius* (Black 1928). Only one Tasmanian specimen at the Tasmanian Herbarium (collected by L. Rodway in 1893 from the mouth of the Little Henty River on the west coast) is known. Hybrids between other varieties of *S. pinnatifolius* and *S. biserratus* or other disciform species, such as *S. minimus*, are also likely to occur; however, the hybridisation between *S. pinnatifolius* var. *lanceolatus* and *S. biserratus* appears to be by far the most common.

Senecio pinnatifolius* var. *maritimus
(Ali) I.Thomps., *Muelleria* 21: 54 (2005)
'western coast groundsel'

This variety grows to 0.4 m and is sprawling to prostrate. It is restricted to the west coast and King Island. *Senecio pinnatifolius* var. *maritimus* can be difficult to distinguish from var. *lanceolatus* and var. *pinnatifolius*. Compared to the mainland form of var. *maritimus*, the Tasmanian form has uppermost leaves more dilated

basally, smaller calycular bracteoles and differently coloured achenes (olive-brown and golden rather than reddish and brown). The var. *maritimus* can be difficult to distinguish from *S. spathulatus* var. *spathulatus*, which occupies similar coastal habitats (see also comments under *S. spathulatus*, 19a). *Senecio pinnatifolius* var. *maritimus* differs from coastal forms of var. *pinnatifolius* that are widespread along the east coast of Australia including Tasmania, by having fleshier leaves, generally fewer leaf segments (if present) and with a lower length:width ratio, shorter achenes relative to the length of the phyllaries, and of upper-branch leaves (excluding any segments) broader near the base and never developing strap-like basal segments.

Senecio pinnatifolius* var. *pinnatifolius
'common coast groundsel'

This variety grows to 1.5 m and is erect, sprawling or prostrate. It grows in a range of environments including dry hills and coastal dunes, in forest, woodland and scrubland, mainly in the state's east and south but also in scattered locations on the west and north coasts, including the Bass Strait islands, and a few inland locations, e.g. the Midlands.

This variety represents a complex of subtly different forms that currently resist discrimination. A widespread form extends along the coasts of Queensland, New South Wales and eastern Tasmania. It has somewhat succulent leaves and the rachis is usually narrowly oblanceolate. Achenes are typically relatively long and slender, extending more than half the length of the phyllaries. Compared to *S. pinnatifolius* var. *maritimus* its leaves are less fleshy, narrower

basally, with generally more marginal points, and often with slender basal segments, and its achenes are distinctly longer and relatively slender, with finer, shorter hairs in narrower grooves.

***Senecio prenanthoides* A.Rich., Voy.**
Astrolabe 2: 96 (1834)
 'common fireweed' (Fig. 24)

This species grows to 0.6 m. It was first described in 1834 but was treated as synonymous with *S. quadridentatus* until recently resurrected by Thompson (2004a). This is a widespread and common species, mainly in eastern Tasmania, growing in sandy and loamy soils in scrub, woodland and forest from sea-level to c. 1500 m.

This is one of several species forming a rosette of leaves until the phase of rapid elongation leading up to flowering. As flowering commences, leaves tend to be relatively crowded and are significantly broader in the lower half of the plant. In

this respect, as well as in the type of leaf indumentum and capitular dimensions, *S. prenanthoides* is similar to *S. phelleus* but differs from that species by having slightly tuberiform roots, basal regions of stems with coarse hairs, auricles when present not sagittate or amplexicaul, phyllaries sometimes fewer and usually finally reflexed, and achenes longer and lageniform. The leaf shape in *S. prenanthoides* is diverse but most characters are very consistent.

***Senecio primulifolius* F.Muell., Trans.**
Philos. Inst. Vict. 2: 69 (1857)
 'showy alpine groundsel'
 (Fig. 25)

This is a subalpine species endemic to Tasmania and is one the most restricted of the highland species, occurring only on the southernmost mountains of the state. The species has distinctive *Primula*-like leaves with conspicuous venation.

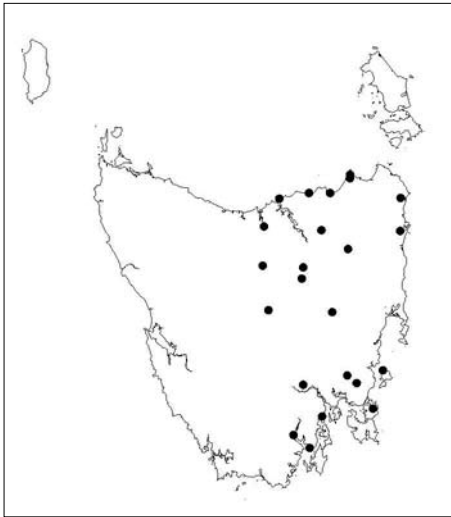


Fig. 24. Distribution of *Senecio prenanthoides*.



Fig. 25. Distribution of *Senecio primulifolius*.



Fig. 26. Distribution of *Senecio psilocarpus*.

***Senecio psilocarpus* Belcher & Albr.,
Muelleria 8: 113 (1994)
'swamp fireweed' (Fig. 26)**

This species grows to 0.8 m. It is currently represented by very few Tasmanian collections. It is historically known from Flinders Island and Cressy (as shown on map) and more recently (and not shown on map) from King Island (Nook Swamps), Dukes Marsh (central east) and Mt William National Park (far north-east), indicating a possibly much wider distribution than previously thought.

Senecio psilocarpus most closely resembles *S. squarrosus* but has a sparser indumentum, shorter capitula and glabrous achenes. The two species have a similar distribution but *S. psilocarpus* has a stronger preference for aquatic habitats. It has been recorded from herb-rich wetlands. Associated with its aquatic nature, *S. psilocarpus* can develop long underground 'rhizomes' or decumbent stems that root at the nodes

with stems arising from these horizontal structures to emerge above the surface of the water. This extensive growth habit has not been observed in *S. squarrosus* (Belcher and Albrecht 1994). Belcher and Albrecht (1994) also suggested that the smell emanating from bruised leaves (carrot-like in *S. psilocarpus*; tomato-like in *S. squarrosus*) may distinguish the species, but this has not been assessed by the authors.

***Senecio quadridentatus* Labill., Nov.
Holl. Pl. 2: 48 t.194 (1806)
'cotton fireweed' (Fig. 27)**

This is the distinctive grey-white, softly hairy, usually quite tall and erect plant of various habitats including disturbed sites such as roadside batters, gardens and suburban streets. It is a widespread species in Tasmania occurring from sea-level to higher altitudes. The paucity of herbarium records is typical of common and widespread species and the distribution map is not a true indication of

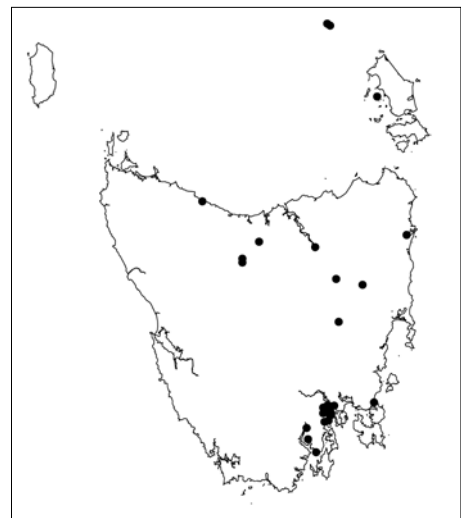


Fig. 27. Distribution of *Senecio quadridentatus*.

how widespread it is. The usually narrow-linear, revolute leaves are typically numerous along stems and are relatively crowded, and the precocious leafy axillary growth is usually evident in axils above mid-stem as the initial flowering period commences. The capitula are relatively slender. This species is unlikely to be confused with any other currently recognised taxa in Tasmania.

***Senecio spathulatus* A.Rich.,
Voy. *Astrolabe* 2: 125 (1834) var.
spathulatus
'dune groundsel' (Fig. 28)**

Of the three varieties of *S. spathulatus*, only var. *spathulatus* is present in Tasmania where it is endemic. At present it is known only from the southern and western coasts and from King Island. This species is characterised by short fleshy leaves, large fleshy capitula, and large achenes with a persistent pappus. *S. spathulatus* is sympatric and possibly hybridises with *S. pinnatifolius* var. *maritimus*,

but appears restricted to frontal dunes and shifting sands, unlike the latter.

***Senecio squarrosus* A.Rich., Voy.
Astrolabe 2: 107 t.35 (1834)
'leafy fireweed' (Fig. 29)**

Senecio squarrosus grows to 0.8 m. It is widespread in south-eastern South Australia, southern Victoria and in northern and southern Tasmania. This species is listed as rare (Schedule 5 of the Tasmanian *Threatened Species Protection Act 1995*), although the widespread distribution combined with its occurrence in several reserves and in disturbed areas suggest a re-assessment of its conservation status is warranted. Around Hobart a form occurs with relatively narrow capitula and phyllaries predominantly 13. The more typical form from northern Tasmania and the mainland has 16–20 phyllaries. Otherwise the Hobart form is typical of the species. Not uncommonly, the corolla-lobes of *S. squarrosus* are purple

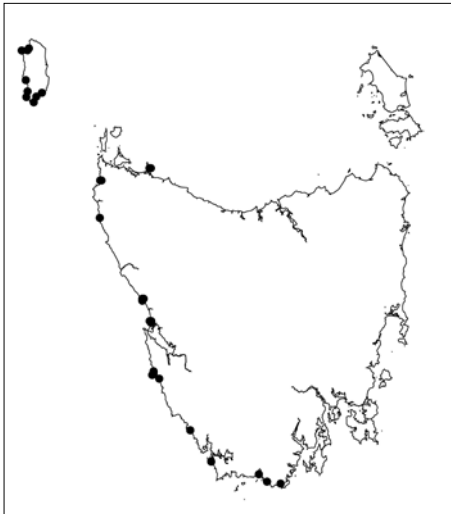


Fig. 28. Distribution of *Senecio spathulatus*.

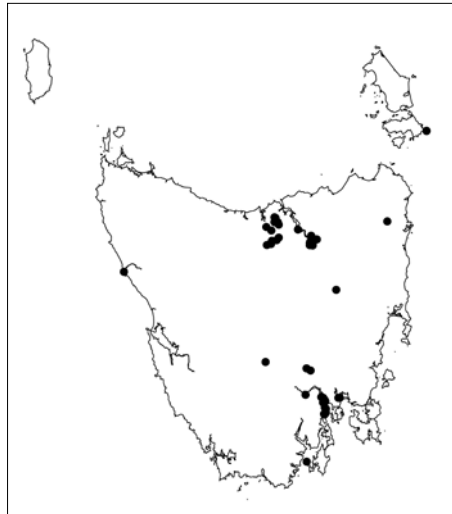


Fig. 29. Distribution of *Senecio squarrosus*.

rather than yellow or yellowish-green. This coloration has not been recorded for other disciform species.

Senecio tasmanicus I.Thomps.,
Muelleria 19: 158 (2004)
'tasmanian fireweed' (Fig. 30)

This species grows to 0.4 m. It is a Tasmanian endemic but has not been recorded since the mid-1800s and is possibly extinct. There are only two records for the species, the type collection by Archer labelled Tasmania (date unknown) and another by R.C. Gunn from the property 'Formosa' in the northern Midlands. The most likely habitat is lowland plains near swamps. The species may have been overlooked, but it is also likely that its habitat has been severely modified by land clearing since the 1800s. More focused attention in the field on entire-leaved, relatively short (less than 0.5 m) specimens is recommended.

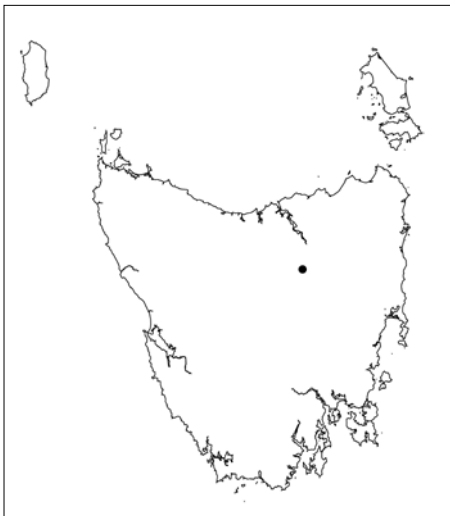


Fig. 30. Distribution of *Senecio tasmanicus*.

The very long slender capitula and very long lageniform achenes are distinctive. Based on the few specimens collected, mid-stem leaves are oblanceolate to very narrow-elliptic, 3–8 cm long, with length:width ratio c. 6–15, entire or denticulate to coarse-dentate, with phyllaries 8–12 mm long; and with up to 20 capitula per stem.

Although the species has been listed as 'extinct' in Buchanan (2005), it is considered premature, on the basis of only two collections, to list this species as threatened under the Tasmanian *Threatened Species Protection Act 1995*. The recent 'rediscovery' of *S. campylocarpus* from the heart of Campbell Town lends weight to this argument.

Senecio vagus F.Muell., *Trans. Philos.*
Soc. Vict. 1: 46 (1855) subsp. ***vagus***
'sawleaf groundsel' (Fig. 31)

This species is represented by a single specimen at the Tasmanian Herbarium, collected in 1965 from Walkers Hill on

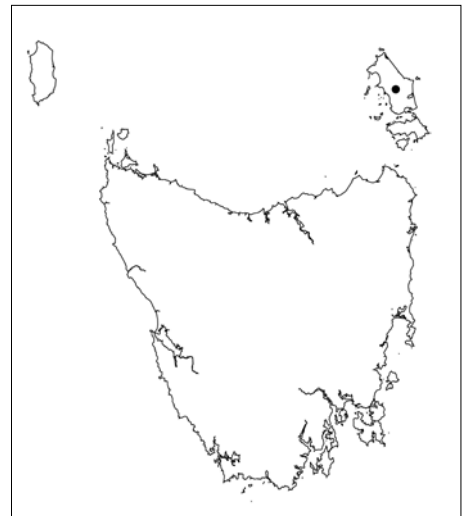


Fig. 31. Distribution of *Senecio vagus*.

Flinders Island by John Whinray. The subsp. *eglandulosus*, which occurs only on the Australian mainland, has glabrous phyllaries and achenes with hairs in lines along ribs.

***Senecio velleioides* A.Cunn. ex DC.,
Prodr. 6: 374 (1838)**

'forest groundsel' (Fig. 32)

Although widespread and often very common, this species is listed as rare (Schedule 5) on the Tasmanian *Threatened Species Protection Act 1995*. It is a distinctive, robust species often more than 1 m tall, often glaucous and fleshy with distinctive amplexicaul leaves. Leaves are frequently light-green on upper surface and glaucous beneath. It often grows with other *Senecio* species on disturbed sites (often in the thousands) especially after fire, but populations are usually short-lived, disappearing with canopy closure.

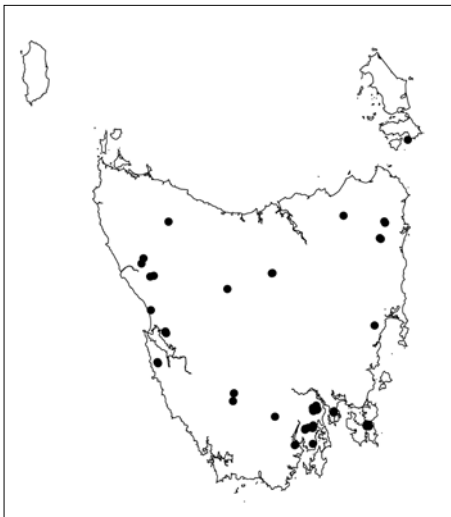


Fig. 32. Distribution of *Senecio velleioides*.

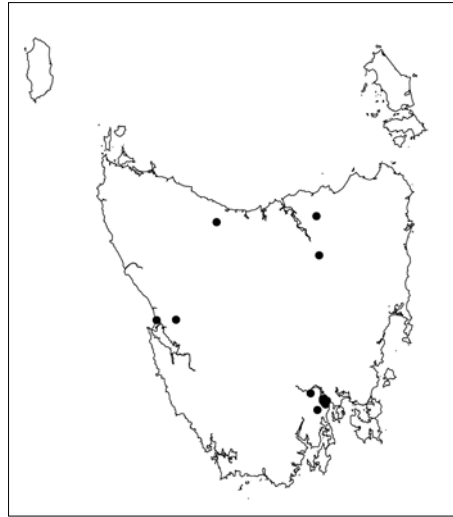


Fig. 33. Distribution of *Senecio vulgaris*.

****Senecio vulgaris* L., Sp. Pl. 2: 867
(1753) 'common groundsel'
(Fig. 33)**

This distinctive species has lobed to pinnatisect somewhat fleshy leaves and strongly black-pigmented calycular bracteoles, and is unlikely to be confused with any other. Also distinctive is the abrupt transition in the corollas of florets from tube to limb, which occurs 1–1.5 mm below the apex. In disciform species this transition is extremely gradual. A native of Europe, it is now established virtually globally. The paucity of herbarium records is typical of common and widespread species, especially exotic species, and the distribution map is not a true indication of its distribution. It is mainly a weed of cultivation and suburbia.

DEFINITION AND ILLUSTRATION OF TERMS

All technical terms used in the key are indicated by bold type and are defined below (listed alphabetically) under relevant broader headings, e.g. terms to describe leaf shapes and margins are found under the heading 'leaf'. Terms defined separately are in italics.

Achene: A dry one-seeded fruit not opening by valves or regular lines, often also called a cypsela (e.g. Curtis 1963; Walsh 1999). Achenes in *Senecio* can be divided into a carpodium (the foot by which they attach), a longitudinally ribbed body and a pappus (Fig. 34). Papillose hairs (small hair-like protuberances) are often present in the grooves between the ribs, arranged lengthwise and forming lines or bands of varying density and width (Fig. 35). Immature achenes may have imperfectly developed hair bands, while in over-mature achenes the hairs may have been shed. The pappus is a ring of very fine bristles or hairs at the tip of the achene, which can be persistent but more often is caducous (shed as the achene matures).

Achenes vary in shape (Fig. 35). They can be cylindrical (parallel sides with flattened ends), obloid (cylindrical but with rounded ends), ellipsoid (elliptic, tapering over the whole length to narrow rounded ends) or lageniform (narrowly bottle-shaped, that is, with the distal third more tapered than the proximal third). The distinction between lageniform and non-lageniform is important for keying out disciform species. Most achenes are straight, although outer achenes can be distinctly curved (e.g. as in *S. campylocarpus*).

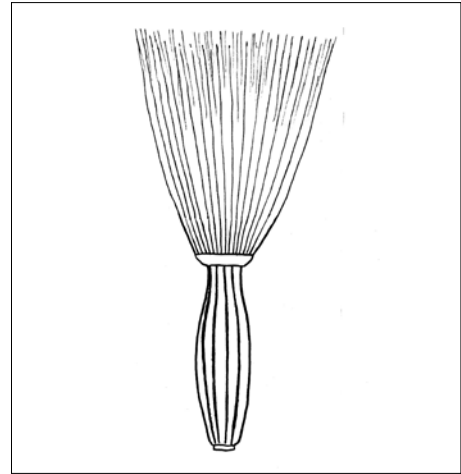


Fig. 34. General achene morphology showing (from bottom to top) carpodium, body with longitudinal ribs, pappus ring and pappus.

Bract: A leaf-like structure that is significantly smaller than the true leaves. There may be a clear distinction between leaves and bracts or the change from leaf to bract may be gradual. Although the stems of rosette-forming species in Tasmania are not entirely leafless, full-sized leaves are only found in the lower-stem region, if at all, and they are replaced by bracts above mid-stem. Very small structures subtending inflorescence branchlets and peduncles are also termed bracts, and other more specialised bracts in *Senecio* are termed *calycular bracteoles* and *phyllaries*.

Calycular bracteoles: Small bracts arising from the *receptacle* of the *capitulum*, and from the distal most part of the sometimes partially arising from the end of the *peduncle* (Fig. 36). Long fine hairs arising from the margin of *bracteoles* in some species give the lower *capitulum* a *cobwebby* or *woolly* appearance.

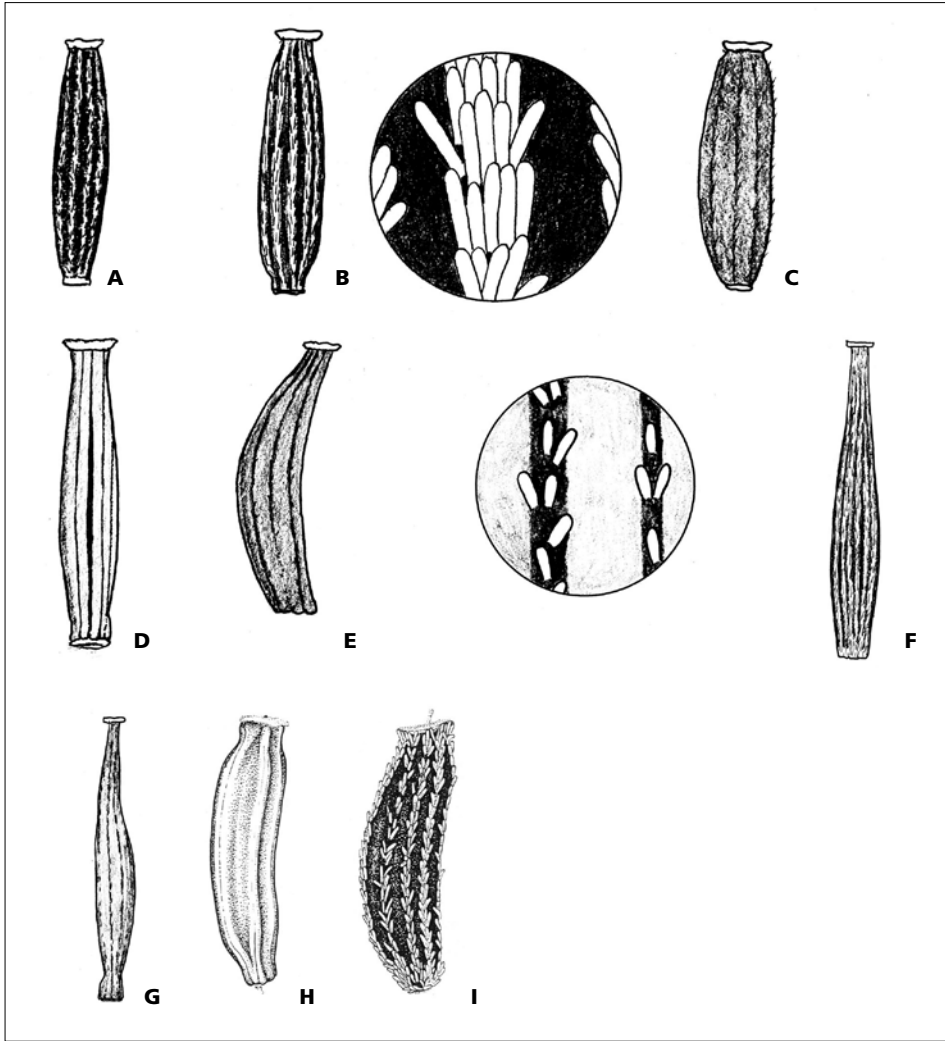


Fig. 35. Detailed achene morphology (**A–H** adapted from Thompson 2004a; **I** from Belcher and Albrecht 1994). **A.** Narrow oblong-ellipsoid with papillose hairs in dense bands (*S. biserratus*). **B.** Narrow-obloid to narrow oblong-ellipsoid, hairs scattered or in dense bands (*S. phelleus*). **C.** Narrow-obloid to narrow-ellipsoid with relatively fine papillose hairs in lines or somewhat scattered (*S. hispidulus*). **D.** Narrow oblong-ellipsoid, glabrous (*S. gunnii*). **E.** Lageniform, the most curved achene of the disciform species, close-up of lines of short papillose hairs (*S. campylocarpus*). **F.** Lageniform with papillose hairs in dense bands (*S. macrocarpus*). **G.** Lageniform, extremely attenuate apically (*S. tasmanicus*; note that *S. prenanthoides* and *S. quadridentatus* have the same lageniform shape but with a shorter neck). **H.** Narrow-obloid, glabrous (*S. psilocarpus*). **I.** Narrow-obloid with papillose hairs in dense bands (*S. squarrosus*).

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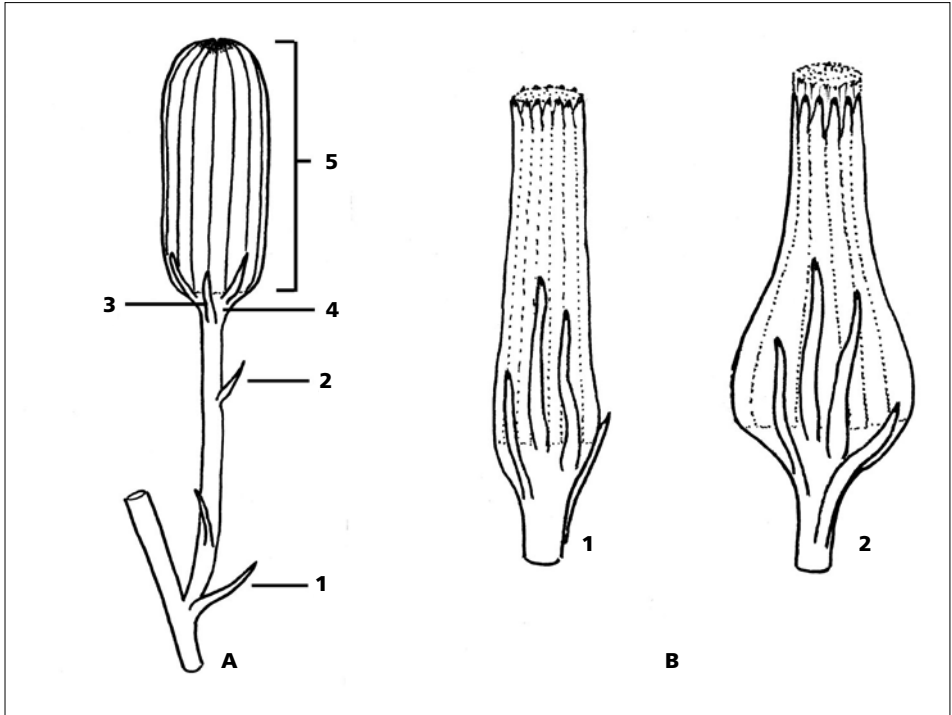


Fig. 36. **A.** Capitulum and peduncle: **1.** peduncular bract; **2.** peduncular bracteole; **3.** calycular bracteole; **4.** receptacle; **5.** involucre. **B.** Capitulum shape change through time: **1.** just prior to anthesis (flowering); **2.** bulging basally towards fruit maturity.

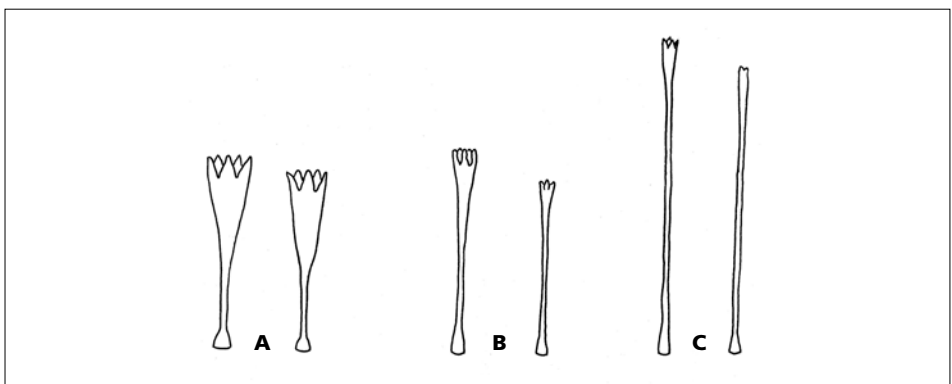


Fig. 37. Tubular florets: corollas of central (left) and outer (right) florets: **A.** A discoid species (*S. odoratus*). **B–C.** Two disciform species, *S. hispidulus* (**B**) and *S. dolichocephalus* (**C**). Note: corollas of *S. quadridentatus* are similar but slightly shorter than those of *S. dolichocephalus* (a non-Tasmanian species).

Capitulum (pl. capitula): The compound reproductive structure in the daisy family, the flowerhead, in gardeners' language simply the flower (Fig. 36). It consists of a dense cluster of florets (tiny sessile flowers) placed on a common receptacle (the expanded summit of the *peduncle*) and surrounded by an *involucre* of *phyllaries* around the rim. As *achenes* fall away at maturity, the receptacle becomes exposed but it is still possible to determine how many florets were present by counting the minute pits or indentations where the achenes were attached.

In *Senecio* the corolla (collective term for petals) is of two basic types and florets are named on this basis. In tubular florets the corolla consists of a tube with 3 to 5 distal lobes (Fig. 37), whereas in ray florets it is a long strap-like structure termed a *ligule*, which extends from a very short tubular base. *Senecio* species are categorised by the type of capitulum, of which there are three: radiate, disciform and discoid. Radiate capitula (Fig. 38) can be seen in the typical garden daisy, with a heart of tubular florets (disk florets) surrounded by ray florets with their radiating ligules. Non-radiate capitula do not have ray florets. They are categorised as disciform if the central florets are bisexual and the outer florets are female and, in Australian *Senecio*, the outer florets have a more slender and fewer-lobed corolla, or discoid if all florets are bisexual. In Tasmania the three discoid species are *Senecio georgianus*, *S. odoratus* and *S. vulgaris*. Examples of capitula are presented in Figs 38–40.

Distal: Remote from the point of origin or attachment; the free end, cf. *proximal*.

Fleshy: Of leaves and roots, indicating thickness due to tissue rather than fluid content (cf. *succulent*). Fleshy parts often have an almost leathery texture and remain thick on drying.

Glaucous: Of surfaces, blue-green in colour, usually due to a waxy bloom. The bloom can usually be rubbed off and may be most evident in younger plants or on younger stems and leaves of older plants.

Indumentum (Fig. 41): The nature and density of hairs on plant surfaces. Organs without hairs are glabrous. Glabrescent means becoming glabrous, usually with age, through loss of hairs. Hairs may be coarse or fine and individual plants may have one type or both. Coarse hairs are thick, c. 0.1 mm diameter, multicellular and septate, with the partitions (septa) between the individual cells visible under low microscopic magnification. When fresh these hairs are transparent, straight and perpendicular to the surface. When dried they become quite distorted but the septa often remain discernible. Coarse hairs range in length from 0.2–2.0 mm and taper to a short point. They may have a wispy extension (resembling a fine hair) that in some cases can partially or totally obscure the coarser portion. When coarse hairs break off, the tubercle-like bases generally persist and the surface is called tuberculate. Fine hairs are white and entirely thread-like (c. 1/10 the diameter of coarse hairs) and have no visible internal structure when magnified. Along stems, fine hairs are commonly arranged longitudinally and closely pressed to the stem (appressed). When fine hairs are dense and closely appressed (obscuring all or most of the

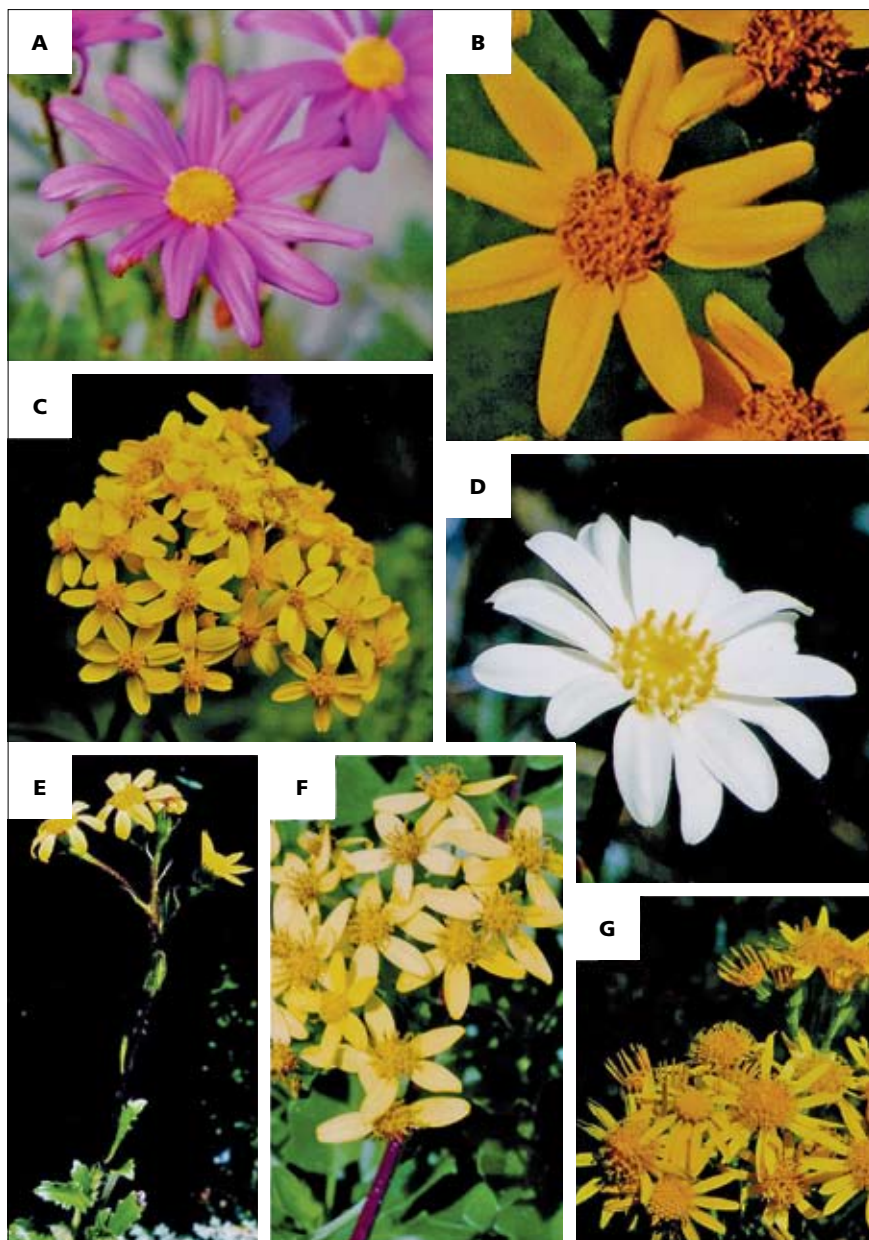


Fig. 38. Capitula of various species of *Senecio*. Radiate capitula: **A.** *S. elegans*. **B.** *S. velleioides*. **C.** *S. linearifolius* var. *linearifolius*. **D.** *S. albogilvus*. **E.** *S. leptocarpus*. **F.** *S. angulatus*. **G.** *S. jacobaea*.
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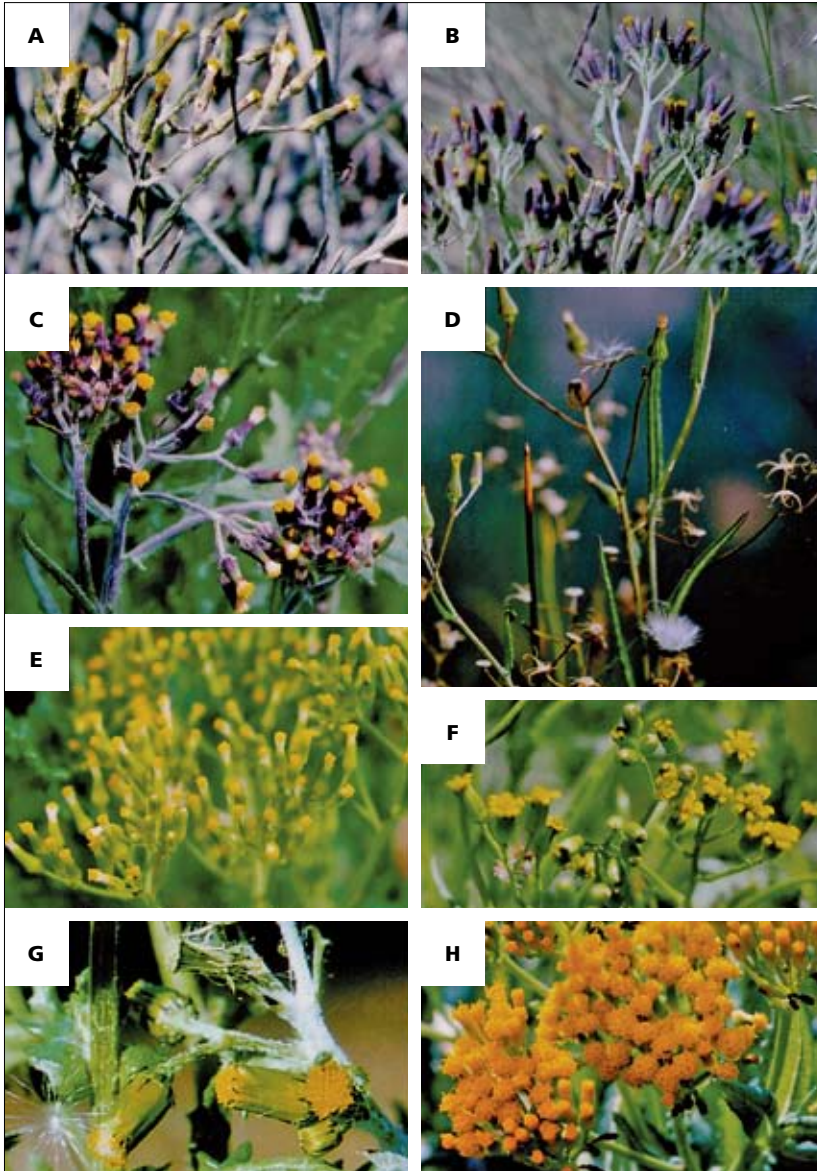


Fig. 39. Capitula of various species of *Senecio*. Disciform capitula. **A.** *S. quadridentatus*. **B.** *S. gunnii*. **C.** *S. glomeratus* subsp. *glomeratus*. **D.** *S. campylocarpus*. **E.** *S. biserratus*. **F.** Hybrid between radiate and disciform species (possibly *S. biserratus* or *S. minimus* and *S. linearifolius* var. *arachnoideus* or *S. pinnatifolius* var. *pinnatifolius*). Note the smaller ligules (compare with figure 38C). Discoid capitula. **G.** *S. vulgaris*. **H.** *S. odoratus*.

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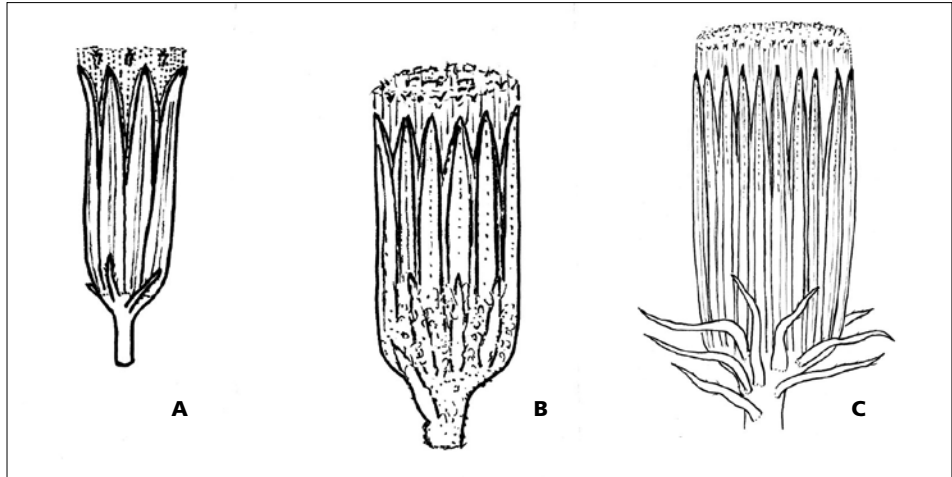


Fig. 40. Disciform capitula (examples drawn from pressed material). **A.** Involucre of c. 8 phyllaries (*S. minimus*). **B.** Involucre of c. 13 phyllaries (*S. glomeratus* subsp. *glomeratus*: note basal wooliness). **C.** Involucres of c. 20 phyllaries (*S. macrocarpus*: note spreading calycular bracteoles in this species).

underlying surface) the indumentum is called cottony. When fine hairs (or wispy extensions of coarse hairs) are tangled and sparse or moderately dense (partially obscuring the underlying surface), the indumentum is called cobwebby. If tangled and dense and more or less completely obscuring the underlying surface, the indumentum is called woolly.

Inflorescence: Although technically a *capitulum* is an inflorescence (a group or clustered arrangement of flowers), in the daisy family the term inflorescence usually refers to the arrangement of groups of capitula. A unit inflorescence is a cluster of capitula at the end of an axis where all associated branch structures are leafless (Fig. 42). A primary inflorescence is a unit inflorescence terminating a stem (in some rosette-leaved species, a single unbranched stem with one or more capitula form the unit inflorescence). Secondary

inflorescences commonly develop on leafy branches that arise immediately below the base of the primary inflorescence. Overtopping is used to describe inflorescences where lateral capitula or clusters extend above the central capitulum or cluster. This architecture is common among the *disciform* species and is variable in extent depending on the species.

Involucre (adj. involucral): A ring of specialised bracts (*phyllaries*) surrounding the florets of a *capitulum*. The diameter of the involucre is defined in this paper as the diameter in unpressed specimens measured a little more than halfway along the involucre. At this point the diameter is more or less constant through the phases of development (the lower half of the involucre often expands substantially after fertilisation to accommodate developing fruits and the diameter of the apex can be affected by reflexion of the phyllaries).

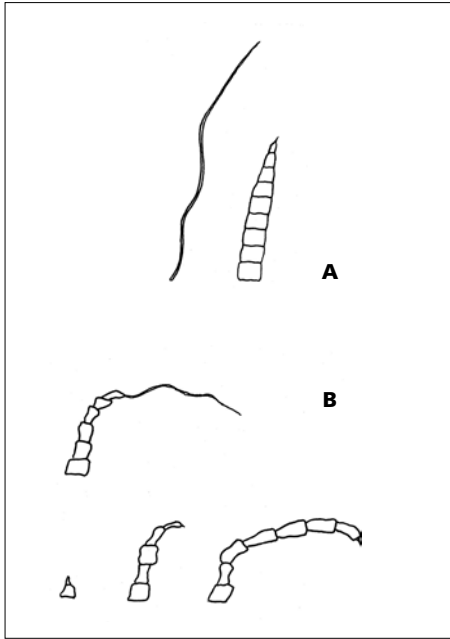


Fig. 41. Indumentum. **A.** Fine hair (left) and coarse, septate hair (right). **B.** Coarse hairs showing variation in length and degree of wispy extension (hairs desiccated and variously collapsed and crumpled as seen in herbarium specimens). (x 30).

In pressed specimens, the involucre often becomes flattened, so allowance needs to be made for this.

Leaves: Within a single plant of *Senecio* leaves will tend to vary in size, shape and degree of dissection between lower and upper regions. Leaves of secondary inflorescences will tend to be smaller and less dissected than stem leaves. It is important therefore that leaves from the same region of a plant are used when comparing species. In this key, references to leaves apply to the leaves that arise from the middle third of stems (i.e. not branch

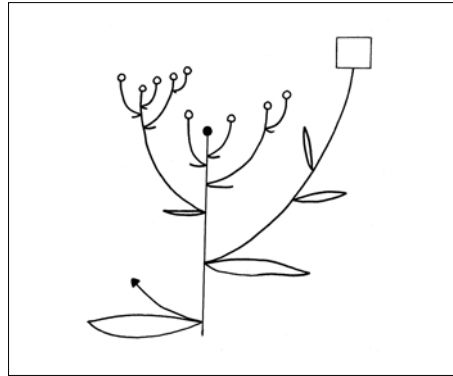


Fig. 42. Inflorescence architecture. The primary unit inflorescence with capitula represented by circles and the initial capitulum shown as a closed circle. A secondary inflorescence, defined by presence of leaves, is also shown (cluster of capitula represented by a square). Moderate overtopping is demonstrated in this example.

leaves or uppermost or lowermost leaves), unless otherwise specified.

Leaves of most species of Tasmanian *Senecio* are not truly petiolate (petiole is a leaf stalk), although often their leaves are attenuate (tapering to a narrow base). If the base of the leaf clasps the stem to some degree, the leaf is said to be amplexicaul (Fig. 43). Leaf-bases can be auriculate (with auricles or ear-shaped lobes at their base), sagittate (with acute auricle lobes directed backwards), cuneate (wedge-shaped, with straight sides converging at the base) or truncate (cut off squarely, with an abrupt transverse end). The apex of undivided leaves is typically acute. Although there is some variation in the shape of leaf apices in Australian *Senecio*, it has not generally been found to be a useful character for discriminating taxa.

Leaf shapes (Fig. 43) mentioned in the key are defined as follows: elliptic (evenly

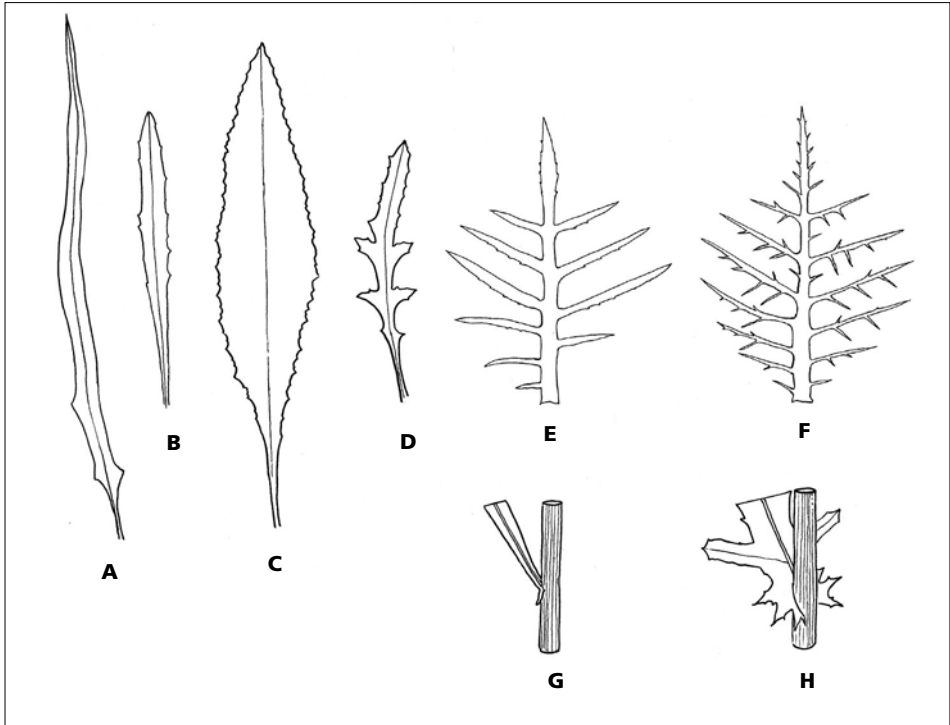


Fig. 43. Leaf outlines (leaves from midstem region $\times 0.5$; basal auricles not included except as indicated (**G–H**)). **A.** Undivided except for a few proximal lobes, margins entire (*S. phelleus*). **B.** Undivided, margin scattered-denticulate (*S. prenanthoides*). **C.** Undivided, margin crowded-denticulate (*S. minimus*). **D.** Coarse-dentate to deeply lobate, margin denticulate, segments and dentition proximal (*S. hispidulus*). **E.** Pinnatisect, once divided (*S. pinnatifolius*). **F.** Bipinnatisect, twice divided (*S. pinnatifolius*). **G.** Base of leaf showing small, entire auricles, non-amplexicaul (upperstem leaf of *S. quadridentatus*). **H.** Base of leaf showing large, dissected auricles, somewhat amplexicaul (*S. biserratus*).

oval like a flattened circle), ovate (egg-shaped, broadest in the proximal half), lanceolate (three or more times as long as broad, broadest in the proximal half), linear (very narrow in relation to length, with the sides mostly parallel), oblanceolate (reverse lanceolate, attached by the narrower end), and spatulate (spoon-shaped, broad at the tip and narrowed towards the base). The terms narrow and broad are often

used to further qualify leaf shape. The term length:width ratio (l:w ratio) refers to the ratio between the length of the leaf measured from apex to base of petiole and width measured at right angles to the axis at the widest points (several leaves should be measured to obtain an average l:w ratio).

Leaf margins can be entire (smooth, without teeth or other interruptions) or variously lobed, divided or toothed.

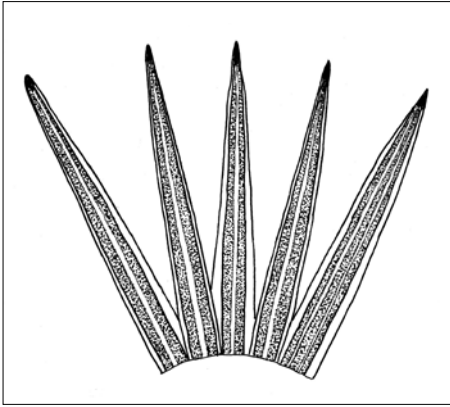


Fig. 44. Phyllary morphology: five consecutive phyllaries of an involucre demonstrating the three major types of phyllary. From right to left: inner (margin broad, stereome with two resin ducts); outer (margin narrow, stereome with one resin duct); inner (stereome with only one resin duct); outer and intermediate (margin narrow on one side, broad on the other).

Margins can be recurved (curved under towards the midrib but not sufficiently to hide the lower leaf surface), revolute (rolled under towards the midrib so as to hide part of the lower leaf surface) or flat. Major divisions of leaves are termed segments. A notch or major indentation of the leaf margin is called a sinus. Teeth, lobes and segments are collectively referred to as marginal points.

The leaf blade is called the lamina. The following terms are used to describe the degree of division (incursion of the sinuses): coarse-dentate (30–50%), lobate (50–75%) and pinnatisect (> 75%). Bipinnatisect describes pinnatisect leaves where primary segments themselves are deeply divided. Tripinnatisect indicates a further order of division. Division can be regular (most species) or irregular (as in *S. jacobaea*).

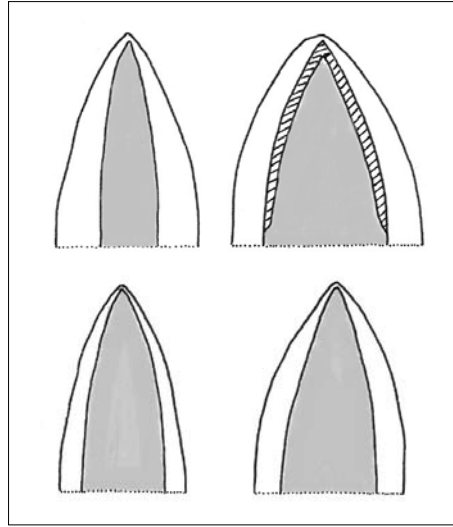


Fig. 45. Distal portion (c. 1 mm) of outer (left hand side in each pair) and inner (right hand side in each pair) phyllaries of *S. pinnatifolius* var. *lanceolatus* (above) and var. *pinnatifolius* (below).

Leaves with less severe dissection (dentation of the margin) are termed dentate (with spreading, evenly triangular teeth), denticulate (finely dentate with smaller teeth), serrate (unevenly triangular teeth angled forwards), serrulate (finely serrate with smaller teeth) or callus-denticulate (with small points protruding but with little or no sinus formation).

Venation refers to the arrangement of veins in a leaf. The midrib or midvein is termed the primary vein and is usually the most prominent. Veins arising from the primary vein are termed secondary, and veins arising from these are tertiary. Venation can be reticulate (forming an interconnected network of small veins).

Peduncle: The stalk bearing a single *capitulum* (Fig. 36). Peduncles gradually

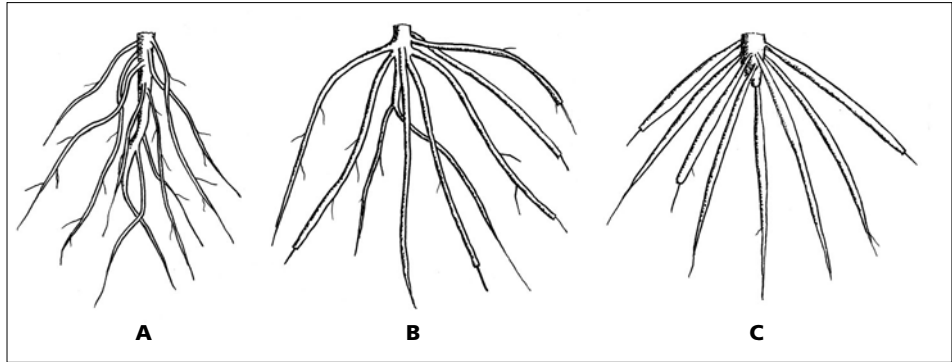


Fig. 46. Root systems. **A.** Taproot well-developed, stouter than secondary roots (*S. hispidulus*). **B.** Taproot slender, not stouter than fleshy secondary roots (*S. phelleus*); **C.** Taproot slender or lost, secondary roots very fleshy and slightly tuberiform (*S. prenanthoides*). (x 0.5).

increase in length prior to and during flowering. Bases of peduncles and branchlets are subtended by bracts. Peduncles are bracteolate with up to 5 bracts scattered along the peduncle and 3–12 *calycular bracteoles* inserted on or just below the receptacle, and typically more or less appressed around the base of the *involucre*. Peduncles, inflorescence branchlets and the margins of bracteoles are often woolly or cobwebby, or sometimes coarse-hairy, and this *indumentum* is variably persistent.

Phyllaries (Fig. 44): The specialised bracts surrounding the florets of a *capitulum*. Collectively they form the *involucre*. Phyllaries consist of an herbaceous lamina (the *stereome*) which is tinged green or purple and a hyaline (thin, translucent, colourless) margin. One or two longitudinal resin ducts are usually evident in *stereomes*. Phyllaries overlap along these margins and so can be categorised as inner phyllaries or outer phyllaries. As well, intermediate phyllaries occur in

many *involucres*; they are half and half with the margin on one side overlapping and on the other being overlapped. In *S. pinnatifolius* in particular it is important to recognise these distinctions. Notably, in *S. pinnatifolius* var. *lanceolatus*, there is an inverted V-shaped pigmentation mark delineating the distal portion of the *stereome* of the inner phyllaries. This mark is termed a *chevron* herein (Fig. 45).

Proximal: Nearer to the point of attachment, cf. *distal*.

Rosette (of leaves): Several to many leaves radiating from the base of the stem.

Roots: The root system (Fig. 46) may consist of a single stout taproot (the primary root descending straight down), which may branch into a number of slender secondary roots, or the taproot may be unbranched but may be slender and be accompanied by secondary roots of equal thickness arising separately from the base of the stem. Root systems can also comprise secondary

roots only, without a taproot being present. The relative size (fleshiness) of the primary roots compared to secondary roots is variable, and is an important distinguishing character for many *disciform* species. For example, in species such as *S. quadridentatus* and *S. hispidulus* the taproot is considerably stouter than the secondary roots, which are rather fine and hardly fleshy. Conversely, in species such as *S. phelleus* and *S. hispidissimus*, the taproot is slender and no stouter than the secondary roots, which are distinctly fleshy and generally unbranched except for occasional fine rootlets. Secondary roots of *S. prenanthoides* become particularly fleshy and are characteristically slightly tuberiform (resembling a tuber, i.e. fleshy and tapering at each end).

Stems: Stems of most species are erect, occasionally somewhat sprawling, and in species mainly at higher altitudes or along the coast, sometimes creeping and/or ascending before becoming erect (e.g. *S. pinnatifolius* var. *alpinus*). Some species are rhizomatous (having a rhizome, an underground stem, usually growing horizontally). Two species in the key have scrambling, twining or climbing stems, often forming extensive tangled infestations (*Delairea odorata* and *S. angulatus*).

Succulent: Thickened due to a high fluid content. Plants may be both *fleshy* and succulent or may be succulent only. In the latter case, leaves or stems will press quite thin.

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and have appeared in his previous manuscripts as cited in the references. Kim Hill extracted data records from the Tasmanian Herbarium. The anonymous referees commented on an earlier version of the manuscript.

References

- Belcher RO (1996) Australian alpine scapose radiate taxa of *Senecio* (Asteraceae). *Muelleria* **9**, 115–131.
- Belcher RO, Albrecht DE (1994) *Senecio psilocarpus* (Asteraceae), a new species of erchthitoid *Senecio* from western Victoria and south-eastern South Australia. *Muelleria* **8**, 113–117.
- Black JM (1928) Additions to the flora of South Australia, No. 26. *Transactions of the Royal Society of South Australia* **52**, 230.
- Bremer K (1994) 'Asteraceae: Cladistics and Classification.' (Timber Press: Portland: Oregon)
- Buchanan AM (2005) 'A Census of the Vascular Plants of Tasmania & Index to the Student's Flora of Tasmania.' Fourth Edition. (Tasmanian Herbarium, Tasmanian Museum and Art Gallery, Occasional Publication No. 7: Hobart)
- Curtis WM (1963) 'The Student's Flora of Tasmania Part 2 Angiospermae: Lythraceae to Epacridaceae.' (Government Printer: Hobart)
- Lawrence ME (1980) *Senecio* L. (Asteraceae) in Australia: Chromosome numbers and the occurrence of polyploidy. *Australian Systematic Botany* **13**, 409–423.

- Thomas DC (2004) Hybridisation between radiate and erechthitoid species of *Senecio* L. on Mount Macedon, Victoria. *The Victorian Naturalist* **121**(1), 23–31.
- Thompson IR (2004a) Taxonomic studies of Australian *Senecio* (Asteraceae): 1. the disciform species. *Muelleria* **19**, 101–214.
- Thompson IR (2004b) Taxonomic studies of Australian *Senecio* (Asteraceae): 2. the shrubby, discoid species and the allied radiate species *Senecio linearifolius*. *Muelleria* **20**, 67–110.
- Thompson IR (2004c) Taxonomic studies of Australian *Senecio* (Asteraceae): 3. radiate, arid region species allied to *S. magnificus* and the radiate, alpine species *S. pectinatus*. *Muelleria* **20**, 111–138.
- Thompson I (2004d) A new name for *Senecio glandulosus* (Asteraceae). *Muelleria* **20**, 139–140.
- Thompson IR (2005) Taxonomic studies of Australian *Senecio* (Asteraceae): 5. the *S. pinnatifolius*/*S. lautus* complex. *Muelleria* **21**, 23–76.
- Thompson IR (2006) A taxonomic treatment of tribe Senecioneae (Asteraceae) in Australia. *Muelleria* **24**, 51–110.
- Walsh NG (1999) *Senecio*. In 'Flora of Victoria Vol 4'. (Eds NG Walsh, TJ Entwisle) pp. 941–965. (Inkata Press: Melbourne)
- Wapstra H, Wapstra A, Wapstra M, Gilfedder L (2005) 'The Little Book of Common Names for Tasmanian Plants.' (Department of Primary Industries, Water and Environment: Hobart)