

## A taxonomic treatment of tribe Senecioneae (Asteraceae) in Australia

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### Abstract

A concise taxonomic treatment of the tribe Senecioneae (Asteraceae) in Australia is presented, with descriptions of 39 species from 13 of the 14 genera in the tribe in Australia (*Bedfordia* is excluded). Keys to all genera and to all species in the tribe are presented, including a key to all species of *Senecio* in Australia. Also for *Senecio*, a new, informal subgeneric classification is presented. Taxonomic changes presented include the recognition of *Senecio esleri* C.J.Webb as an earlier valid name for *S. brevitubulus* I.Thomps., the resurrection of *Senecio barkhausioides* Turcz., and the recognition of *Emilia fosbergii* Nicolson as a new alien species.

### Introduction

The tribe Senecioneae in the Asteraceae comprises over 3000 species and is widely distributed in both hemispheres. In Australia the tribe is represented by 14 genera and 114 species. Ninety-six species are native, with 87 of these in *Senecio*, and 18 species are introduced. All but four of the native species are also endemic. *Senecio* is the only genus in the tribe in Australia containing both native and introduced species. Of the genera containing only native species, *Abrotanella* is represented by three native species, *Gynura* by one, *Arrhenechthites* by one, *Bedfordia* by three, and *Brachyglottis* by one. The last two of these genera are endemic. The remaining eight genera are represented by introduced species only. The native species *Senecio gregorii*, which in recent years has been included in the South African genus *Othonna*, is here included in *Senecio*.

The taxonomic review presented here is drawn from a *Flora of Australia* account of the Senecioneae recently prepared by the author. As it is likely to be several years before the *Flora* account is published, it is considered desirable to present the findings of my research at this time.

The Senecioneae are herbs, shrubs or small trees with distinctive involucre bract morphology. The inner bracts, termed phyllaries in this paper, form a single even-heighted series, and are neatly arranged side-by-side with their hyaline margins overlapping. An outer series (termed calycular bracteoles in this paper) is occasionally absent and otherwise is composed of conspicuously smaller and more loosely arranged parts. These bracteoles are more or less identical to the bracteoles commonly seen along peduncles. The achenes in members of the Senecioneae are commonly homomorphic or nearly so and the pappus is composed of fine, non-plumose bristles.

Although the genus *Bedfordia* was not included in the author's recent taxonomic research, a generic description, key to species and a list of taxa for the genus is presented below. For a detailed treatment of species the reader is referred to Orchard (2004). For *Senecio*, a new informal classification describing seven native groups is detailed herein. A complete key to species of Australian *Senecio* and descriptions of 22 of the 97 species are presented, including nine of the ten introduced species. The

remaining species are listed. For detailed accounts of these species, the reader is referred to recent papers by Thompson (2004a, 2004b, 2004c, 2004d, 2005a, 2005b).

### **Tribe SENECEONEAE**

Herbs, shrubs or subshrubs, trees or climbers, sometimes dioecious or gynodioecious, taprooted or not; latex lacking. Hairs mostly eglandular, glandular in *Petasites* and *Bedfordia*, not furcate. Leaves mostly alternate, occasionally rosulate, pinnately or palmately veined, not spiny, glandular in *Abrotanella* and *Brachyglottis*. Inflorescences terminal, or axillary in *Bedfordia*. Capitula radiate, disciform or discoid, mostly pedunculate, sessile at first in *Abrotanella*; involucre comprising an even-heighted inner series of bracts (phyllaries); phyllaries free or rarely connate, without outgrowths; an outer series of bracts (calycular bracteoles\*) present or not; receptacle epaleate, usually  $\pm$  flat. Florets of radiate capitula: disc florets actinomorphic, bisexual\*\*, or functionally male in *Petasites fragrans*; ray florets fewer than disc florets, zygomorphic, female, or pistillate but sterile in *Petasites fragrans*, with corolla-tube mostly glabrous; ligule commonly yellow, but also of other colours, with apex obtuse, 3-lobed. Florets of disciform capitula: central florets actinomorphic, bisexual, or functionally male sometimes in *Arrhenechthites*; outer florets actinomorphic, or zygomorphic in *Arrhenechthites*, female, mostly more numerous than central florets. Florets of discoid capitula all actinomorphic, bisexual. Anthers ecalcarate, ecaudate or caudate, with apical appendage ovate, lanceolate or oblong. Style in bisexual florets glabrous or with obtuse hairs; style-branches short to long, not tapering, often penicillate apically, occasionally with a tapering terminal appendage, commonly each with two stigmatic zones. Achenes homomorphic, sometimes mildly dimorphic in *Senecio*, terete, compressed in *Cineraria*, with ribs smooth, sometimes with papillose hairs, unbeaked or sometimes short-beaked in *Senecio*. Pappus homomorphic, absent in *Abrotanella*, white, pink in *Erechtites*; bristles uniform within a pappus, capillary, smooth, scabridulous or barbellate.

*Notes:* \*Calycular bracteoles are significantly smaller and less regularly arranged than phyllaries. They arise proximal to the phyllaries, on or just proximal to the common receptacle, and form a variably crowded cluster or “calyx”. They are more or less identical in form to the peduncular bracteoles which commonly occur along the peduncle.

\*\*The terms female, male and bisexual for florets indicates the sexual structures present and their fertility, i.e. a female floret will have a pistil only and will be fertile. Functionally male indicates that both pistil and stamens are present, that viable pollen is produced, but that achenes do not develop.

### **Key to genera**

- 1 Capitula radiate (ligules sometimes very small, never deeply and acutely lobed; ray florets fewer than disc florets)
  - 2 Largest leaves with a sharp division between petiole and lamina, with petiole > 5 cm long, and with lamina 1–1.5 times longer than wide, truncate to cordate
    - 3 Rosetted, dioecious herbs to 0.4 m high (plants male in Australia); ligules white ..... **4. *Petasites***
    - 3: Hermaphrodite shrubs to 3 m high; ligules yellow ..... **5. *Roldana***
  - 2: Largest leaves not as above or if so then petiole < 5 cm long, and with

lamina > 2 times longer than wide, attenuate to cuneate

- 4 Capitula solitary on a long, naked peduncle densely woolly at base, ecalyculate; phyllaries connate proximally ..... **7. *Euryops***
- 4: Capitula solitary or not, peduncle various, not densely woolly at base, mostly calyculate; phyllaries free, or if fused then leaves not dissected.
  - 5 Trees to 3.5 m high; leaves viscid, upper surface gland-dotted ..... **2. *Brachyglottis***
  - 5: Herbs to 2.5 m high; leaves not viscid or gland-dotted.
    - 6 Achenes compressed, winged ..... **8. *Cineraria***
    - 6: Achenes  $\pm$  terete, not winged ..... **9. *Senecio***
- 1: Capitula discoid or disciform (if outer florets rarely bearing a ligule c. 1 mm long, then ligule deeply and acutely lobed and outer female florets more numerous than the bisexual central florets)
  - 7 Plants climbing; petiolate, with reniform auricles at base of petiole; lamina of approximately equal length to petiole; lamina about as broad as long, strongly cordate ..... **6. *Delairea***
  - 7: Plants not climbing; not petiolate or if so then petiole much shorter than lamina and without reniform auricles at base; lamina longer than wide, with base variously shaped
    - 8 Inflorescences axillary; lower surface of leaves, peduncles and capitula densely woolly; capitula discoid; shrubs or trees; leaves entire .... **3. *Bedfordia***
    - 8: Inflorescences terminal; lower surface of leaves, peduncles and capitula usually not all at once densely woolly, or if so then plants herbaceous with capitula disciform; capitula discoid or disciform; herbs or shrubs; leaves entire or variously divided or toothed
      - 9 Capitula ecalyculate
        - 10 Plants generally < 10 cm high, often forming cushions; leaves to 5 mm wide; capitula disciform with involucre 1–4 mm long; pappus absent (south of latitude 36° S, montane to alpine) ..... **1. *Abrotanella***
        - 10: Plants generally > 10 cm high, not forming cushions; largest leaves more than 5 mm wide; capitula discoid with involucre 7–12 mm long; pappus present (north of latitude 30° S, lower than montane) ..... **13. *Emilia***
- 9: Capitula calyculate
  - 11 Calycular bracteoles narrow-linear with l:w ratio > 10, 0.1–0.2 mm wide; receptacular pits all raised; style-branches purple distally
    - 12 Leaves undivided, or if pinnatisect then segments not present beyond mid-leaf; capitular buds pendent; capitula discoid; corolla-lobes orange or red; achenes purple; pappus white ..... **11. *Crassocephalum***
    - 12: Leaves pinnatisect with segments beyond mid-leaf; capitular buds erect, capitula disciform; corolla-lobes pink; achenes pale brown; pappus pink ..... **10. *Erechtites***

- 11 Calycular bracteoles variously shaped with l:w ratio < 10, or if ever more than c. 0.4–0.8 mm wide; receptacular pits not or hardly raised; style-branches yellow
- 13 Herbs; capitula discoid; style-branches terminating with a tapering, hairy appendage; achenes > 5 mm long.....**14. *Gynura***
- 13: Herbs or shrubs; capitula disciform or discoid; style-branches without a tapering hairy appendage; achenes < 5 mm long or if > 5 mm long then capitula disciform
- 14 Involucre 12–20 mm long and length 5–7 times that of diameter (mid-involucre unpressed); capitula disciform with outer florets bearing a rudimentarylacerately lobed ligule c. 1 mm long; central florets 2–5 .....**12. *Arrhenechthites***
- 14: Involucre shorter and/or less slender than above; capitula discoid or if disciform then with outer florets without a ligule; bisexual central florets mostly more 5 .....**9. *Senecio***

**1. *Abrotanella*** (Gaudich.) Cass., *Dict. Sci. Nat.* 36: 27 (1825)

Perennial herbs. Leaves sessile, with sunken glands, with venation obscure. Capitula disciform, sessile or sub-sessile at anthesis, but sometimes subsequently developing a peduncle, ecalyculate; phyllaries free. Florets: central florets sometimes functionally male (all Australian species); corolla-limb variously coloured. Anthers caudate. Style undivided (functionally male florets) or shortly branched, with apex truncate, crowned by papillae if functional, without terminal appendage. Achenes homomorphic, obovoid. Pappus absent.

A genus of 18 species predominantly of subantarctic distribution from southern South America, New Zealand, New Guinea, and Australia. Three species in Australia. Its tribal placement is problematic; it was placed in the Anthemideae until transferred to subtribe Blennospermatinae of the Senecioneae by Nordenstam (1977). Several molecular studies, e.g. Wagstaff & Breitwieser (2002) and Pelsner *et al.* (2002), have not clarified its phylogenetic position. The Australian species of *Abrotanella* have functionally-male central florets. Other features of this genus not seen in other senecionoid genera in Australia include the loose and irregular overlapping and uniform shape of the phyllaries, and the poor differentiation of the corolla into basal cone, tube and limb regions.

**Key to species**

- 1 Inflorescences of 2 or more capitula.....**3. *A. scapigera***
- 1: Inflorescences of 1 capitulum
- 2 Plants forming dense cushions, with stems closely packed; leaves sub-erect, lanceolate, 3–8 mm long, with apex acute .....**1. *A. forsteroides***
- 2: Plant habit not as above; leaves somewhat spreading, linear, 8–20 mm long, with apex ± rounded .....**2. *A. nivigena***

**1. *Abrotanella forsteroides*** (Hook.f.) Benth., Fl. Austral. 3: 554 (1867), as *forsterioides* *Scleroleima forsteroides* Hook.f., in W.J.Hooker, *London J. Bot.* 5: 444, t. 14 (1846).

Type: Tasmania, 1839–43, *J.D.Hooker Antarct. Exp.*; lecto: K, *vide* U.Swenson, *Pl. Syst. Evol.* 197: 161 (1995).

Cushion-plants to 7 cm high, ± glabrous, with adventitious roots c. 1 mm diam. Leaves suberect, ovate to lanceolate, 3–8 mm long, convex abaxially; base dilated; margin entire or denticulate; apex acuminate, mucronate. Capitula 1 per stem; peduncle to c. 8 mm long at maturity, with bracteoles lacking; involucre c. 1 mm long; phyllaries 3–7, c. oblong, finally erect; stereome flat, thin, without resin ducts. Florets: outer florets 1–3; central florets 1–3; corolla 2.0–2.5 mm long; limb greenish-yellow, 4-lobed. Achenes obovoid, 1.5–1.8 mm long, slightly to markedly 4-ribbed, brown, glabrous.

*Notes:* Occurs in north-western, north-eastern and south-central Tasmania. Grows in summit moors, screens and wet places such as below snowbanks at altitudes over 1000 m. Flowers mid-spring–summer

Grows with other cushion plants in alpine communities forming cushions to several metres in diameter. The stems and leaves are closely crowded with older leaves brown and persistent. The involucre is hidden within upper leaves at anthesis but is exposed at fruiting. Unlike the other two species in Australia, the one or two achenes in each capitulum strongly exceed the involucre at maturity.

*Representative specimens:* TASMANIA: Ben Lomond National Park, Hamilton Crags, 1.5 km east of Legges Tor, *F.E.Davies 1182*, *P.Ollerenshaw*, & *R.Burns* (AD, CANB, HO, MEL); 0.5 km NW of Second Bar L., *A.Moscal 6949* (HO).

**2. *Abrotanella nivigena*** (F.Muell.) F.Muell., *Pl. Victoria* 2: t. 40 (1865).

*Trineuron nivigenum* F.Muell., *Trans. Philos. Soc. Victoria* 1: 105 (1855).

Type: Mynyang Mtns, New South Wales, Jan. 1855, *F.Mueller*; lecto: MEL, *vide* U.Swenson *op. cit.* 172; isolecto: MEL.

Cushion-plants to 3 (–5) cm high, largely glabrous, with adventitious roots c. 0.5 mm diam. Leaves somewhat spreading, narrow oblong to linear, 8–20 mm long, ± flat; base slightly dilated; margin entire; apex ± rounded to truncate. Capitula 1 per stem; peduncle 5–20 mm long at maturity, with bracteoles present; involucre 2.5–4.0 mm long; phyllaries 8–14 (–16), c. oblong, finally erect; stereome flat, fleshy, with 1 or 3 longitudinal ducts. Outer florets 7–17; central florets 4–12; corolla 1.5–3 mm long; limb white or purple, 3- or 4-lobed. Achenes obovoid, 2 mm long, slightly to markedly 4-ribbed, pale but purple distally, glabrous. *Snow-wort*.

*Notes:* Occurs in the Kosciuszko region of south-eastern New South Wales and in eastern Victoria. Grows in alpine bogs, herbfields, grasslands, in rock crevices, and often associated with small waterfalls. Flowers summer.

*Abrotanella papuana* S.Moore resembles *A. nivigena* and was regarded as synonymous by Swenson (1995); however, it differs in several ways. *Abrotanella papuana* lacks 3-lobed central florets, has fewer outer florets, sometimes has hairs on peduncles and has leaves that are more erect. Additionally, leaves are more tapered distally, with an apex subacute to obtuse, with scattered translucent multicellular hairs

on upper surface of leaves especially near margins; peduncular bracts are fewer (1–4); and the involucre shorter (2.5–3 mm long).

*Representative specimens*: NEW SOUTH WALES: Snowy R. near bridge below Seaman's Hut, Kosciuszko area, *M.Gray 6611* & *C.Totterdell* (CANB, MEL, NSW); Below Mt Stillwell, Kosciuszko area, *A.B.Costin 36* (CANB). VICTORIA: Southern head of Big R., c.1.6 km east of Spion Kopje summit, Bogong High Plains, 3 Feb. 1949, *J.H.Willis* (MEL).

### 3. *Abrotanella scapigera* (F.Muell.) Benth., *Fl. Austral.* 3: 554 (1867)

*Trineuron scapigerum* F.Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 301 (1857).

Type: Mt La Perouse, Tasmania, *C.Stuart*; lecto: K, *fide* U.Swenson, *op. cit.* 169 (1995).

Tufted scapiform herbs to 10 cm high, with brownish hairs on scape and leaf-margins, with adventitious roots mostly 0.3–0.5 mm diam. Leaves suberect, narrow spatulate or very narrow-elliptic, 10–40 mm long, ± flat or convex abaxially; base slightly dilated; margin entire; apex obtuse to acute, mucronate. Capitula 2–10 per stem; peduncle to c. 15 mm long at maturity, with bracteoles present; involucre c. 3.0–3.5 mm long; phyllaries 8–12 (–14), c. oblong, finally erect; stereome flat, fleshy, with 3 longitudinal ducts. Female florets 8–17; male florets 3–11; corolla 1–2 mm long; limb white, 4 (–5)-lobed. Achenes obovoid, 1.7–2.2 mm long, slightly to markedly 4-ribbed, brown, glabrous.

*Notes*: Occurs in north-western and south-central Tasmania. Grows in moist low alpine grasslands, amongst cushion plants, sometimes in the shelter of low shrubs and in rock crevices, altitudes over 950 m. Flowers summer.

The flowering stem of this species has one or a few bracteal leaves, an unusual feature in *Abrotanella*.

*Representative specimens*: TASMANIA: Eldon Bluff, *A.M.Buchanan 9993* (HO); Between L. Dobson and summit of Mt Field, *D.N.McVean 22* (CANB); Mt Field National Park, Naturalist Peak, *P.S.Short 3427*, *A.Griffen*, *M.C.Looker* & *N.G.Walsh* (MEL).

### 2. *Brachyglottis* J.R.Forst. & G.Forst., *Char. Gen. Pl.* 91, t. 46 (1775).

Trees (in Australia), shrubs, lianes, or perennial herbs. Leaves petiolate or sessile, sometimes with glands, pinnately veined. Capitula radiate (in Australia) or disciform, pedunculate, calyculate (in Australia) or not; phyllaries free. Florets: corolla-limbs yellow, creamy white or white. Anthers caudate or not. Style-branches with apex obtuse to truncate, crowned by papillae, without terminal appendage. Achenes homomorphic, obloid to obovoid. Pappus ± persistent.

A genus of 29 species, all from New Zealand and the Chatham Is. except for one species endemic to Australia. The Australian representative, *B. brunonis*, was transferred to *Brachyglottis* by R.B.Nordenstam, *op. cit.* 25; however, the author acknowledged the unique suite of features of this species and gave consideration to reinstating it in *Centropappus*. Molecular studies by Wagstaff & Breitwieser (2004) have indicated that *Brachyglottis brunonis* and *Bedfordia* together form a monophyletic group, and that this group is nested within a large clade containing New Zealand species of *Brachyglottis* as well as several other genera endemic to New Zealand. Their suggestion for a revised classification based on the molecular evidence is to place all taxa in this clade in the genus *Brachyglottis*. In contrast, Orchard (2004) indicated that *Bedfordia* and *Brachyglottis brunonis*, although probably closely related, were

sufficiently different morphologically to be separated at a generic level, and suggested, contingent on further molecular proof, that *B. brunonis* be returned to *Centropappus*.

***Brachyglottis brunonis*** (Hook.f.) B.Nord., *Opera Bot.* 44: 30 (1978)

*Centropappus brunonis* Hook.f., in W.J.Hooker, *London J. Bot.* 6: 124 (1847); *Senecio brunonis* (Hook.f.) J.H.Willis, *Muelleria* 1(3): 162 (1967).

Type: Mt Wellington, Tasmania, *R.C.Gunn s.n.*; holo: K *n.v.*, *fide* R.B.Nordenstam *loc. cit.*

*Senecio centropappus* F.Muell., Catalogue of Plants under Cultivation in the Melbourne Botanic Gardens 26 (1858), *nom. illeg.* Type: not designated.

Small trees to 3.5 m high, glabrous, with dark, laminating bark. Leaves crowded, narrow-linear, 5–10 cm long, entire, viscid, upper surface gland-dotted. Capitula many per stem; peduncle to c. 15 mm long at maturity; calycular bracteoles 3–5, ovate, c. 2 mm long; involucre 3–5 mm long, c. 3 mm diam.; phyllaries 8, oblong-elliptic to narrow-oblong-elliptic, fimbriate distally; stereome convex, with 1–3 resin ducts; margin of receptacular pits slightly raised. Florets: ray florets 5; ligules c. 5 mm long, 5–8-veined, yellow; disc florets c. 15–20; corolla exceeding phyllaries by c. 2 mm, c. 4–5 mm long; base c. 0.6 mm diam.; limb c. 2/5 of total length, with lobes narrow-oblong, revolute. Achenes slightly obovoid, 2.5–3 mm long, 5–8-ribbed, pale brown, glabrous; basal annulus narrow. Pappus c. 4 mm long, white; bristles scabrid-barbellate to sub-plumose. *Tree Ragwort*.

*Notes:* Occurs in south-eastern Tasmania where restricted to Mt Wellington and Mt Dromedary. Grows on dolomite, on moderate to steep slopes, in tall open forest at altitudes from 490–1160 m. Flowers summer.

A distinctive species, but similar in several ways including involucre morphology to *Bedfordia* and to a lesser extent *Abrotanella*, although the latter is a dwarf herb. Leaves when crushed and flowers are pleasantly fragrant suggestive of apricots according to one collector.

*Representative specimens:* TASMANIA: Mt Wellington, Pinnacle Rd, c. 3 km from summit at start of Organ Pipes track, *F.E.Davies 780* & *P.Ollerenshaw* (AD, CANB, HO, MEL); c. 2 km below Mt Wellington summit on Mt Wellington Rd (c. 19 km south by Rd from Hobart), *P.C.Jobson 1901*, *N.G.Walsh* & *I.R.Telford* (BRI, HO, MEL).

### 3. *Bedfordia* DC., in A.-J.Guillemin, *Arch. Bot.* 2: 332 (1833)

Small trees or shrubs, with a dense wool on most younger parts. Leaves shortly petiolate, with glandular hairs on newer growth, pinnately veined. Capitula discoid, pedunculate, calyculate; phyllaries free. Florets: corolla-limbs orange, yellow, or creamy white. Anthers caudate. Style-branches with apex obtuse to truncate, crowned by papillae, without terminal appendage. Achenes homomorphic, c. obloid. Pappus ± persistent.

The species in this genus are closely related to *Brachyglottis brunonis* *q.v.* but readily distinguished from the latter and other senecionoid species in Australia by the woolly indumentum covering branches, abaxial surfaces of leaves, peduncles and involucre. The calyculus is weakly developed and is usually represented by only a few linear or lanceolate bracteoles.

A genus of three species endemic to south-eastern Australia. This genus was not included in the author's examination of the Senecioneae. The reader is referred to a recent revision by Orchard (2004).

### Key to species

- 1 Leaves to 3 mm wide (Tasmania)..... **1. *B. linearis***
- 1: Leaves generally more than 10 mm wide
- 2 Leaves generally less than 20 mm wide; lower surface of leaves with a shallow appressed indumentum from which secondary veins conspicuously protrude (Tasmania)..... **2. *B. salicina***
- 2: Leaves generally more than 20 mm wide; lower surface of leaves with a deep tangled indumentum in which the secondary veins are submerged (mainland Australia and Cape Barren Is., Tasmania)..... **3. *B. arborescens***

### List of taxa

1. *Bedfordia linearis* (Labill.) DC., *Prodr.* 6: 441 (1838)
- a. *Bedfordia linearis* subsp. *linearis*
- b. *Bedfordia linearis* subsp. *oblongifolia* Orchard, *Muelleria* 19: 90 (2004)
- i. *Bedfordia linearis* subsp. *oblongifolia* var. *oblongifolia*
- ii. *Bedfordia linearis* subsp. *oblongifolia* var. *curvifolia* Orchard, *Muelleria* 19: 93 (2004).
2. *Bedfordia salicina* (Labill.) DC., *Prodr.* 6: 441 (1838).
3. *Bedfordia arborescens* Hochr., *Candollea* 5: 332 (1934).

### 4. *Petasites* Mill., *Gard. Dict. Abr.* 4th edn (1754).

Perennial dioecious or gynodioecious herbs. Leaves petiolate, palmately veined. Capitula radiate (in Australia) discoid or disciform, pedunculate, calyculate; phyllaries free. Florets: corolla-limbs yellow, white, greenish, pink or purple. Anthers caudate. Style-branches short, with apex obtuse, with terminal appendage unknown. Achenes homomorphic, narrow-obloid, ribbed. Pappus persistence not known.

A genus of c. 19 species from Eurasia and North America.

### \**Petasites fragrans* (Vill.) C.Presl, *Fl. Sicul.* 1: 28 (1826)

*Tussilago fragrans* Vill., *Actes Soc. Hist. Nat. Paris* 1: 72 (1792).

Type: *n.v.*

Dioecious, rhizomatous herbs to c. 0.4 m high, with glandular hairs on most parts. Basal leaves: petiole 10–30 cm long, sheathing basally; lamina suborbicular to reniform, 5–20 cm long; base strongly cordate; margin crowded-denticulate. Stem leaves 2–7, c. 2–6 cm long, comprising a well-developed sheath and a small lamina reducing to vestigial upwards. Capitula several per stem; peduncle to c. 30 mm long at maturity; calycular bracteoles 2–6, ± linear, 3–8 mm long; involucre 7–12 mm long, c. 3–6 mm diam.; phyllaries c. 13; stereome flat. Capitula (for all Australian material): ray florets c. 12, pistillate but sterile; ligule 4–6 mm long, rounded to truncate, white, sometimes tinged purplish, 3–5-veined; disc florets c. 20, functionally male; corolla c. 8 mm long,

with base c. 0.5 mm diam.; limb c. 2/5 of total length, white, with narrow-oblong lobes. Achenes obloid, 1.5–2.0 mm long. Pappus 4–8 mm long, white; bristles scabrid-barbellate. *Winter Heliotrope*.

*Notes:* Native to northern Africa. Occurs in south-central Victoria and in south-eastern Tasmania. Grows in damp shady places such as roadside ditches. Flowers winter.

Plants recorded in Australia have all been functionally male. Spreads vegetatively from disturbed sites into bushland. Flowers are vanilla-scented. The dark purple anther-tube of disc florets contrasts with the white corolla and strongly protruding stigma.

*Representative specimens:* VICTORIA: On the northern side of the railway line, c. 100 m west of Upper Ferntree Gully Railway Station, *D.E.Albrecht 1856* (MEL). TASMANIA: Recreation area of Huon Hwy, Franklin, *D.I.Morris 8255* (HO).

**5. *Roldana*** La Llave, in P. de La Llave & J.J.M. de Lexarza, *Nov. Veg. Descr.* 2: 10 (1825)

Herbs, shrubs or small trees. Leaves petiolate, palmately (in Australia) or pinnately veined. Capitula radiate (in Australia), discoid or disciform, pedunculate, calyculate or not; phyllaries free. Florets: ligule yellow (in Australia), orange, white or greenish; disc florets with corolla-limbs yellow (in Australia). Anthers caudate. Style-branches linear, with apex truncate, without terminal appendage. Achenes homomorphic, obloid to obovoid. Pappus caducous.

A genus of c. 55 species predominantly from Mexico and Central America.

**\**Roldana petasitis*** (Sims) H. Rob. & Brettell, *Phytologia* 27: 423 (1974)

*Cineraria petasitis* Sims, *Bot. Mag.*, t. 1536 (1813); *Senecio petasitis* (Sims) DC., *Prodr.* 6: 431 (1838).

Type: cultivated, not designated.

Shrubs to c. 3 m high, with short coarse hairs on all parts. Leaves: petiole 5–15 cm long; lamina sub-orbicular to broad-ovate, 8–15 cm long; base cordate; margin finely denticulate. Capitula many per branch; peduncle to 20 mm long at maturity; calycular bracteoles 1–3, linear, 1–5 mm long; involucre 9–11 mm long, 3–5 mm diam.; phyllaries c. 8; stereome flat. Florets: ray florets 3–6; ligule 6–10 mm long, 4- or 5-veined, yellow; disc florets 10–15; corolla c. 8 mm long, with base c. 0.8 mm diam., with limb c. 2/3 of total length, with narrow-triangular lobes. Achenes obloid, 2.5–4.5 mm long, yellowish, 10-ribbed, glabrous. Pappus 7–10 mm long, white; bristles scabrid-barbellate. *Roldana*.

*Notes:* Native to Central America. Recorded from northern and central coastal areas of New South Wales and south-central Victoria. A garden escape preferring moister environments. Flowers mainly spring.

A widely-cultivated tall shrub characterised by an even, short pubescence, large, petiolate leaves, and purple stems, peduncles and phyllaries.

*Representative specimens:* NEW SOUTH WALES: North Coast, Forbes Forest Rd, Mt Boss State Forest, *P.Gilmour 5848* (CANB). VICTORIA: Dollar, c. 1.5 km south of township on the Dollar–Gippsland Hwy Rd, Nov. 1995, *S.Kaiser s.n.* (MEL).

**6. *Delairea*** Lem., *Ann. Sci. Nat. Bot.* ser. 3, 1: 379 (1844)

Climbing perennials. Leaves petiolate, palmately veined, auriculate. Capitula discoid, pedunculate, calyculate; phyllaries free. Florets: corolla-limbs yellow. Anthers caudate. Style-branches with apex truncate, crowned with papillae, without terminal appendage. Achenes homomorphic, obloid. Pappus caducous.

A monotypic genus native to South Africa. The only member of tribe Senecioneae in Australia to have auricles developed at the base of petiolate leaves. Similar in habit and leaf form to climbing species of *Senecio*, but readily differentiated by the presence of auricles and the discoid capitula.

\**Delairea odorata* Lem., *Ann. Sci. Nat. Bot.* ser. 3, 1: 380 (1844)

*Senecio mikanioides* Otto ex Walp., in C.F.Otto & A.Dietrich, *Allg. Gartenzeitung* 13: 42 (1845).

Type: cult., not designated.

*Senecio scandens* DC., *Prodr.* 6: 404 (1838), *nom. illeg. non* D.Don (1825), *p.p.*  
Type: South Africa [several syntypes]: *n.v.*

Climbers to c. 3 m high, ± glabrous. Leaves: petiole 4–7 cm long; lamina to c. 8 cm long, broad-ovate to rotund, lobate; base deeply cordate; margin entire. Capitula many per branch; peduncle to c. 10 mm long at maturity; calycular bracteoles 2–4, narrow-oblong to oblanceolate, 2–3 mm long; involucre 3–4 mm long, c. 2 mm diam.; phyllaries 7–10; stereome flat or slightly ridged proximally, thin, with 1 (–2) ducts; margin of receptacular pits raised. Florets c. 10–12; corolla exceeding involucre by 3–4 mm, c. 5 mm long; base c. 0.5 mm diam.; limb c. 2/5 of total length. Achenes obloid, c. 2 mm long, pale brown, prominently 10-ribbed, glabrous or with hairs sparse. Pappus 5–6 mm long, white; bristles minutely scabrid-barbellate. *Ivy Groundsel*, *Cape Ivy*.

*Notes:* Occurs in south-eastern Australia from Kempsey in north-eastern New South Wales south to eastern Victoria and from there west across southern Victoria to Adelaide and Robe in south-eastern South Australia; also in Tasmania. Grows in sandy soils in forest and heathland. Flowers winter.

The inflorescences of *D. odorata* are densely corymbiform. It is vegetatively similar to the three introduced climbing species of *Senecio* in Australia *Senecio angulatus*, *S. tamoides* and *S. macroglossus*, but its leaves have prominent reniform auricles and a more strongly cordate lamina.

*Representative specimens:* SOUTH AUSTRALIA: Mt Lofty Ra., Gorge Rd, opposite Trout Nursery Dam, *N.N.Donner 754* (AD, MEL). NEW SOUTH WALES: Alongside Macleay R., about 1 km from Kinchela towards Jerseyville, *J.R.Hosking 1714*, *G.R.Hosking & T.L.Hosking* (CANB, MEL, NE, NSW); Lower slopes of Mt Dromedary, c. 1 km west of Tilba Tilba, *P.C.Jobson 4696* (BRI, NSW). VICTORIA: Labertouche Rd c. 70 m south of Tarago R., c. 2 km NE of Longwarry North, *I.C.Clarke 2691*, *L.Dean & P.Dourmisis* (AD, CANB, MEL). TASMANIA: Taroona, near Hobart, July 1947, *W.M.Curtis* (AD, HO, MEL).

**7. *Euryops*** (Cass.) Cass., *Dict. Sci. Nat.* 16: 49 (1820).

Shrubs or subshrubs, rarely herbs. Leaves sessile, pinnately veined. Capitula radiate (in Australia) or rarely discoid, pedunculate, ecalyculate; phyllaries often connate proximally. Florets: ligule yellow; disc florets rarely functionally male; corolla-lobes yellow or orange. Anthers ecaudate. Style-branches flattened to sub-terete, with apex

truncate, often crowned by papillae, without terminal appendage. Achenes homomorphic, obovoid. Pappus caducous or absent.

An entirely African genus of c. 97 species, with most species in southern Africa. Part of the othonnoid complex of genera (as described by Jeffrey in 1986). The large capitula, long naked peduncles and the presence of wool at the base of the peduncle are distinctive features of the genus. Some capitula arise from very short branches and plants will therefore appear to have inflorescences with multiple capitula. *Euryops pectinatus* is a widely grown garden shrub with grey-green pectinately-lobed leaves. There is no evidence that it has become naturalised.

### Key to species

- Leaves deeply pinnatisect, with segments linear; phyllaries connate in proximal 1/3–1/2; pappus forming a tangled wool ..... **1. *E. abrotanifolius***
- Leaves lobate to subpinnatisect, with segments triangular; phyllaries connate in proximal 1/5 to 1/4; pappus absent..... **2. *E. chrysanthemoides***

#### 1. \**Euryops abrotanifolius* (L.) DC., *Prodr.* 6: 443 (1838)

*Othonna abrotanifolia* L., *Sp. Pl.* 2: 926 (1753).

Type: Locality unknown, Herb. Linn. 1038:5; lecto: LINN, *vide* B.Nordenstam, *Opera Bot.* 20: 272 (1968).

Shrubs to c. 2 m high, largely glabrous. Leaves 2–6 cm long, pinnatisect, with rachis and segments narrow-linear; base narrow; margin entire. Capitula 1 per branch but often with a few branches clustered; peduncle to c. 200 mm long; involucre 8–11 mm long, c. 8–10 mm diam.; phyllaries c. 13, sometimes more, fused in proximal 1/3–1/2; stereome ± flat, firm, with 3–5 distinct resin ducts; margin of receptacular pits raised. Ray florets c. 13, sometimes more; ligule to 25 mm long, commonly c. 7-veined; disc florets numerous; corolla c. 4 mm long; with base c. 1 mm diam.; limb c. 1/2 of total length, with narrow-triangular lobes. Achenes oblong-ellipsoid, c. 2.5–5 mm long, pale brown, 10-ribbed, glabrous, with stylophore appended distally. Pappus white; bristles tangled, some reflexed, 3–6 mm long, scabrid-barbellate. *Winter Euryops*, *Euryops*.

*Notes:* Occurs in the Mount Lofty Ra. in south-eastern South Australia, Heywood in south-western Victoria, the eastern fringe of Melbourne in south-central Victoria, and around Hobart in south-eastern Tasmania. Grows in areas recently disturbed such as roadsides, railway cuttings etc., in grassland and forest. Flowers winter–early spring.

A garden escape that is well-established in a few areas and capable of increasing numbers rapidly. The stylophore and tangled pappus do not occur in other species of Senecioneae in Australia.

*Representative specimens:* SOUTH AUSTRALIA: Mt Lofty Ra., Forest Ra., c.20 km east of Adelaide, *H. van Dam 194* (AD). VICTORIA: 2.3 km east along the Lilydale–Monbulk Rd from its intersection with the Lilydale–Montrose Rd, Mt Evelyn, *D.E. Albrecht 2840* (CANB, MEL). TASMANIA: Mt Stuart, Hobart, *A.M. Buchanan 3786* (AD, HO).

#### 2. \**Euryops chrysanthemoides* (DC.) B.Nord., *Opera Bot.* 20: 365 (1968)

*Gamolepis chrysanthemoides* DC., *Prodr.* 6: 443 (1838).

Type: South Africa, *Ecklon & Zeyher 10.9*; lecto: G, *vide* B.Nordenstam, *loc. cit.*

Shrubs to c. 1.5 m high, largely glabrous. Leaves crowded, slightly fleshy; narrow-elliptic to obovate, to 8 cm long, pinnatisect reducing to lobate distally, segments c. narrow-oblong, margins entire. Capitula 1 per branch but often with a few branches clustered; peduncle to c. 200 mm long; involucre broad-campanulate, 5–8 mm long; phyllaries 8–15, connate in proximal 1/5–1/4, stereome flat, resin ducts inconspicuous; margin of receptacular pits raised. Ray florets 8–15; ligule to c. 20 mm long, commonly 4-veined. Disc florets numerous; corollas c. 4.5 mm long, with base c. 0.5 mm diam; limb c. 2/3 of total length. Achenes obovoid, 3–5 mm long, 10-ribbed, glabrous, without stylophore. Pappus absent. *Paris Daisy*.

*Notes:* Native to South Africa. Occurs in central coastal New South Wales from Wollongong north to Northbridge, Sydney. A weed of roadsides. Incipiently naturalised at Leongatha in south-eastern Victoria. Flowers winter.

A common garden plant, occasionally escaping into adjoining bushland.

*Representative specimens:* NEW SOUTH WALES: Central Coast, Northbridge, L.A.S.Johnson 7517 (NSW). VICTORIA: Leongatha township, public land between Young St and Haw St, G.W.Carr 0205-77 (AD, CANB, HO, MEL, NSW).

### 8. *Cineraria* L., *Sp. Pl.* 2nd edn, 2: 1242 (1763)

Herbs or subshrubs. Leaves sessile, pinnately veined. Capitula radiate (in Australia) or rarely discoid, pedunculate, calyculate; phyllaries free. Florets: ligule yellow; disc florets rarely functionally male; corolla-limbs yellow. Anthers obtuse or shortly sagittate. Style-branches recurved, with apex truncate, crowned with papillae, with terminal appendage minute, conical. Achenes  $\pm$  homomorphic, obovate, compressed. Pappus caducous.

A genus of c. 30 species from Africa and Madagascar.

\**Cineraria lyratiformis* G.V.Cron., *S. African J. Bot.* 65: 287 (1999)

*Cineraria lyrata* DC., *Prodr.* 6: 308 (1838), *nom. illeg. non* Ledeb. (1818).

Type: Northern Cape Nieuweveld, between Beaufort and Rhinosterkop, South Africa, *Drege 711*; holo: G n.v., *vide* G.V.Cron, *loc. cit.*

Herbs to c. 0.6 m high, glabrous or cobwebby. Leaves to 8 cm long, with l:w ratio c. 2–3, lyrate-pinnatifid; base auriculate; margin denticulate to dentate. Capitula several to many per stem; mature peduncle to c. 20 mm long; calycular bracteoles 3–6, narrow-ovate, 1–2 mm long; involucre 3.5–5 mm long; phyllaries 12–14, with resin ducts 3–5; receptacle smooth. Ray florets usually 7 or 8; ligule 3.5–6 mm long, yellow, usually 4-veined; disc florets 32–40, with corollas 3–4 mm long, exceeding phyllaries by c. 1–2 mm; basal cone c. 0.3 mm diam., limb c. 3/5 of total length, with triangular lobes. Achenes: body c. obovoid, 2–2.5 mm long, black or dark-brown; wings broad, pale, glabrous or minutely ciliate. Pappus 3–4 mm long, minutely and sparsely scabrid-barbellate. *Cineraria*, *African Marigold*.

*Notes:* Native to South Africa. Occurs in the Rylstone district, in central-eastern New South Wales. Grows in a wide range of soils in wasteland, cultivated land and on roadsides. Flowers summer.

A noxious weed in the mid-western county of eastern New South Wales. In South Africa it is reported to taint dairy products and to have poisoned pigs. Similar to some radiate species of *Senecio* but distinguished most readily by its compressed achenes.

*Representative specimens:* NEW SOUTH WALES: Central Western Slopes, 3 km east of Rylstone, 17 Feb. 1995, *G.Hennessy s.n.* (NSW); Oz Mtn, between Rylstone and Bylong, Wollemi National Park, *W.Cherry 98/3a, J.Allen, E.A.Brown & C.Pavich* (NSW).

### 9. *Senecio* L., *Sp. Pl.* 2: 866 (1753)

Herbs, shrubs or climbers, rarely gynodioecious. Leaves sessile, rarely petiolate, pinnately veined. Capitula radiate (with ligules much reduced in *Glossanthus* group) discoid or disciform, calyculate or ecalyculate; phyllaries free, rarely connate. Florets: ligule mostly yellow, occasionally pink or purple, rarely cream or white; disc florets with corolla-limbs mostly yellow or yellow-green, rarely pink or red. Anthers ecaudate. Style-branches recurved, with apex truncate or obtuse, crowned by papillae, without terminal appendage. Achenes homomorphic, rarely slightly dimorphic, obloid or oblong-ellipsoid, sometimes lageniform. Pappus caducous or persistent.

A diverse assemblage of species of this enormous genus occur in Australia, and the 87 native representatives have been informally classified here into seven morphological groups. Nine of the ten introduced species in Australia are grouped here for convenience, whereas the tenth, *S. madagascariensis* is placed in one of the eight native groups, the Lautusoid group. Five of the native groups are endemic to Australia, and the other two are composed largely of endemic species. The Disciform group in Australia contains only native species, but a few species also occur naturally in New Zealand. The Lautusoid group contains only endemic species with the exception of *S. madagascariensis*.

A complete key to groups, species, and infraspecific taxa in *Senecio* is presented below following descriptions of groups. The majority of species have recently been described in a series of papers by Thompson (2004a, 2004b, 2004c, 2005a, 2005b) and the reader is referred to these for details. Concise descriptions and supplementary notes for species in the Macranthus and Ramosissimus groups and for nine introduced species are presented here, these species not having been described in the aforementioned papers.

#### A. Disciform Group

Erect or sprawling, usually perennial herbs, sometimes weakly shrubby, not rhizomatous, or rarely shortly so, not glaucous. Coarse spreading hairs often present, conspicuous or not; fine hairs often present, conspicuous or not. Leaves generally thin. Capitula disciform, rarely discoid, calyculate, with bracteoles parallel-sided or nearly so, 1–5 mm long, 0.1–0.7 mm wide at mid-point, with hyaline margin absent or obscure; involucre 1–5 mm diam. (measured mid-involucre, unpressed); phyllaries 7–25, free; stereome drying green, flat or ridged, with resin ducts pale, generally inconspicuous, glabrous, or occasionally cobwebby, rarely woolly. Florets 12–c. 100, with corolla-limb much shorter than the tube; outer florets (50–) 65–80% of total number, with diam. at base of lobes 0.1–0.2 mm; central florets with diam. at base of lobes 0.2–0.4 (–0.7) mm. Achenes homomorphic, ± obloid or narrowly lageniform, 1–6 mm long, with ribs mostly flat, with papillose hairs (l:w ratio 1–6) or glabrous; carpodium 1/4–1/2 diam. of body. Pappus caducous; scabridulous to ± smooth.

A widespread group of 40 species, recently revised by Thompson (2004a). Endemic except for four species which are also native to New Zealand. Outer florets have extremely reduced corollas with 2–4 minute lobes. Central florets also have rather slender corollas that are 4 or more often 5-lobed. The peduncle and base of the capitulum are often transiently or persistently cobwebby in this group. The

cobwebbiness around the base of the capitulum is largely due to fine hairs arising from the margin of the bracteoles. Species that are described as having peduncle and calyculus not cobwebby at anthesis generally have a glabrous peduncle but minute hair-bases may be present on the margin of the bracteoles.

### Disciform Species

1. *Senecio minimus* Poir., *Encycl. suppl.* 5: 130 (1817)
2. *Senecio diaschides* D.G.Drury, *New Zealand J. Bot.* 12: 522 (1974)
3. *Senecio biserratus* Belcher, *Ann. Missouri Bot. Gard.* 43: 43 (1956)
4. *Senecio picridioides* (Turcz.) M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 292 (1985)
5. *Senecio bipinnatisectus* Belcher, *Ann. Missouri Bot. Gard.* 43: 41 (1956)
6. *Senecio distalilobatus* I.Thomps., *Muelleria* 19: 129 (2004)
7. *Senecio esleri* C.J.Webb, *New Zealand J. Bot.* 27: 565 (1989)
8. *Senecio bathurstianus* (DC.) Sch.Bip., *Flora* 28: 498 (1845)
9. *Senecio hispidulus* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 92, t. 34 (1834)
10. *Senecio hispidissimus* I.Thomps., *Muelleria* 19: 138 (2004)
11. *Senecio multicaulis* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 105 (1834)
  - a. *Senecio multicaulis* A.Rich. subsp. *multicaulis*
  - b. *Senecio multicaulis* subsp. *stirlingensis* I.Thomps., *Muelleria* 19: 143 (2004)
12. *Senecio glomeratus* Desf. ex Poir., *Encycl. suppl.* 5: 130 (1817)
  - a. *Senecio glomeratus* Desf. ex Poir. subsp. *glomeratus*
  - b. *Senecio glomeratus* subsp. *longifructus* I.Thomps., *Muelleria* 19: 148 (2004)
13. *Senecio extensus* I.Thomps., *Muelleria* 19: 150 (2004)
14. *Senecio laceratus* (F.Muell.) Belcher, *Ann. Missouri Bot. Gard.* 43: 51 (1956)
15. *Senecio runcinifolius* J.H.Willis, *Proc. Roy. Soc. Queensland* 62: 106, t. 7 (1952).
16. *Senecio longicollaris* I.Thomps., *Muelleria* 19: 156 (2004)
17. *Senecio tasmanicus* I.Thomps., *Muelleria* 19: 158 (2004)
18. *Senecio campylocarpus* I.Thomps., *Muelleria* 20: 139 (2004)
19. *Senecio glabrescens* (DC.) Sch.Bip., *Flora* 28: 498 (1845)
20. *Senecio quadridentatus* Labill., *Nov. Holl. Pl.* 2: 48, t. 194 (1806)
21. *Senecio dolichocephalus* I.Thomps., *Muelleria* 19: 167 (2004)
22. *Senecio queenslandicus* I.Thomps., *Muelleria* 19: 169 (2004)
23. *Senecio phelleus* I.Thomps., *Muelleria* 19: 171 (2004)
24. *Senecio microbasis* I.Thomps., *Muelleria* 19: 175 (2004)
25. *Senecio scabrellus* I.Thomps., *Muelleria* 19: 177 (2004)
26. *Senecio tenuiflorus* (DC.) Sieber ex Sch.Bip., *Flora* 28: 498 (1845)
27. *Senecio gunnii* (Hook.f.) Belcher, *Ann. Missouri Bot. Gard.* 43: 64 (1956)
28. *Senecio niveoplanus* I.Thomps. *Muelleria* 19: 183 (2004)

29. *Senecio prenanthoides* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 96 (1834)
30. *Senecio psilophyllus* I.Thomps., *Muelleria* 19: 189 (2004)
31. *Senecio lageniformis* I.Thomps., *Muelleria* 19: 189 (2004)
32. *Senecio nigrapicus* I.Thomps. *Muelleria* 19: 191 (2004)
33. *Senecio longipilus* I.Thomps., *Muelleria* 19: 193 (2004)
34. *Senecio oldfieldii* I.Thomps., *Muelleria* 19: 195 (2004)
35. *Senecio psilocarpus* Belcher & Albr., *Muelleria* 8: 113 (1994)
36. *Senecio squarrosus* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 107 (1834)
37. *Senecio macrocarpus* F.Muell. ex Belcher, *Muelleria* 5: 119 (1983)
38. *Senecio interpositus* I.Thomps., *Muelleria* 19: 205 (2004)
39. *Senecio georgianus* DC., *Prodr.* 6: 371 (1838)
40. *Senecio helichrysoides* F.Muell., *Trans. Proc. Victoria Inst. Adv. Sci.* 39 (1855)

*Notes and Amendments to Thompson (2004a):* An earlier legitimate name for *S. brevitubulus* I.Thomps. has now been identified based on examination of material of *Senecio esleri* sent from New Zealand. *Senecio esleri* was described by Webb (1989) from New Zealand collections made in and around Auckland where it apparently is a common weed. In Australia it has been recorded from only five localities; however, as they predate the New Zealand collections and because some collections appear to be from natural areas, the species appears more likely to be native to Australia. A collection not cited by Thompson, *J.H.Maiden & J.L.Boorman*, Brunswick River (NSW), has now also been identified as *S. esleri*.

A new name *S. campylocarpus* was published in Thompson (2004d) to replace the earlier but illegitimate name *S. glandulosus* (DC.) Sch.Bip. that was used in Thompson (2004a). The key to species has been modified from that of Thompson (2004a) to better characterise the distinction between *S. campylocarpus* and *S. longicollaris*. This involves small modifications to involucre length and achenial length specifications, and the addition of length ranges for the neck portion of the achenes.

An old specimen from eastern New South Wales, *coll. unknown*, Parramatta (MEL22507) that was placed with *S. longicollaris* is now excluded from that species. It is close to this species and to *S. campylocarpus*, but it has glabrous capitula, and its leaf shape, leaf-dentition and achenial shape in combination sets it apart. New collections are required to better characterise this entity.

Information regarding the occurrence of *Senecio dolichocephalus* in northern New South Wales was not detailed in the protologue of Thompson's revision. It has been recorded from Cobar, Fowlers Gap, Narromine and Euston in this state.

*Senecio extensus* is now recognised to occasionally have papillose hairs on its achenes. Two specimens from Victoria, *I.R.Thompson 757* MEL, CANB and *A.C.Beauglehole 37001* MEL, have longitudinal bands of hairs on their achenes but otherwise conform to the original circumscription of *S. extensus*. The key given below has been amended to accommodate this change in circumscription.

The description of *S. squarrosus* states on line 5 that leaves become "broader upwards". This is a typographical error and it should have read "narrower upwards".

## B. Odoratus Group

Erect shrubs, subshrubs or perennials, not rhizomatous, or extensively rhizomatous in *S. behrianus*, glaucous or not. Coarse spreading hairs uncommon, generally inconspicuous; fine hairs sometimes present, mostly inconspicuous, sometimes forming a short wool. Leaves thin or somewhat fleshy. Capitula discoid or radiate, calyculate, with bracteoles ovate-lanceolate, or  $\pm$  parallel-sided, 1–5 mm long, 0.1–0.5 mm wide at midpoint, with hyaline margin absent or obscure; involucre 1.5–3 mm diam.; phyllaries 7–14, free; stereome often gently ridged, glabrous or tomentose, with resin ducts often conspicuous, orange or reddish. Florets 8–40; ray florets absent or 4–8; ligule yellow; disc florets with corolla-limb equal to or longer than tube, with diam. at base of lobes 0.5–1.0 mm. Achenes homomorphic,  $\pm$  obloid, 1.5–4 mm long, with ribs  $\pm$  flat, with papillose hairs of l:w ratio 2–6 or glabrous; carpopodium 1/3–1/2 diam. of body. Pappus caducous; bristles scabridulous to  $\pm$  smooth.

A group of ten species endemic to Australia, recently revised by Thompson (2004b). The group is largely confined to south-eastern Australia, but also extend westwards as far as Eucla in far eastern Western Australia and north-westwards into central Australia. *Senecio linearifolius* is adventive in New Zealand. The species have slender capitula, and discoid members can resemble species of the Disciform and Ramosissimus groups in capitular morphology. Generally speaking however, in the Odoratus group the disc is showier, i.e. with corollas more exerted and with larger limbs. Closer inspection also reveals differences in the sex of the florets in most instances.

### List of species

1. *Senecio anethifolius* A.Cunn. ex DC., *Prodr.* 6: 371 (1838)
  - a. *Senecio anethifolius* A.Cunn. ex DC. subsp. *anethifolius*
  - b. *Senecio anethifolius* subsp. *brevibracteolatus* I.Thomps., *Muelleria* 20: 73 (2004)
2. *Senecio euclaensis* I.Thomps., *Muelleria* 20: 77 (2004)
3. *Senecio gawlerensis* M.E.Lawr., *J. Adelaide Bot. Gard.* 7: 292 (1985)
4. *Senecio lanibracteus* I.Thomps., *Muelleria* 20: 78 (2004)
5. *Senecio cunninghamii* DC., *Prodr.* 6: 371 (1838).
  - a. *Senecio cunninghamii* DC. var. *cunninghamii*
  - b. *Senecio cunninghamii* var. *flindersensis* I.Thomps., *Muelleria* 20: 84 (2004)
6. *Senecio hypoleucus* F.Muell. ex Benth., *Fl. Austral.* 3: 672 (1867)
7. *Senecio odoratus* Hornem., *Hort. Bot. Hafn.* 2: 809 (1815)
8. *Senecio linearifolius* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 129 (1834)
  - a. *Senecio linearifolius* var. *linearifolius*
  - b. *Senecio linearifolius* var. *denticulatus* I.Thomps., *Muelleria* 20: 93 (2004)
  - c. *Senecio linearifolius* var. *latifolius* I.Thomps., *Muelleria* 20: 96 (2004)
  - d. *Senecio linearifolius* var. *intermedius* I.Thomps., *Muelleria* 20: 98 (2004)
  - e. *Senecio linearifolius* var. *arachnoideus* I.Thomps., *Muelleria* 20: 98 (2004)
  - f. *Senecio linearifolius* var. *macrodontus* (DC.) I.Thomps., *Muelleria* 20: 102 (2004)

- g. *Senecio linearifolius* var. *dangarensis* Belcher ex I.Thomps., *Muelleria* 20: 104 (2004)
  - h. *Senecio linearifolius* var. *gariwerdensis* I.Thomps., *Muelleria* 20: 104 (2004)
  - i. *Senecio linearifolius* var. *graniticola* I.Thomps., *Muelleria* 20: 108 (2004)
9. *Senecio behrianus* Sond. & F.Muell. ex Sond., *Linnaea* 25: 527 (1853)
10. *Senecio garlandii* F.Muell. ex Belcher, *Muelleria* 6: 173 (1986)

*Notes and Amendments to Thompson (2004b)*: Achenes of *Senecio linearifolius* A.Rich. var. *arachnoideus* were described as 2.0–2.5 mm long. Further investigations have revealed shorter achenes in this variety and the range is amended here to (1.1–) 1.6–2.5 mm long. Although it was indicated that this variety occurred on the east coast of Tasmania, the distribution map did not mark its occurrence at Mayfield Beach. It has since also been recorded much further south at Tesselated Pavement. At both Tasmanian locations achenes have been papillose-hairy.

### C. Ramosissimus Group

Erect gynodioecious perennial herbs, not rhizomatous, not glaucous. Coarse spreading hairs absent or inconspicuous; fine hairs sometimes present, sometimes conspicuous. Leaves generally thin. Capitula discoid with all florets female with concealed staminodes or on different plants all florets bisexual, or capitula radiate, calyculate, with bracteoles 1–2 mm long, 0.2 mm wide,  $\pm$  parallel-sided, with hyaline margin absent or obscure; involucre 1.2–2.5 mm diam.; phyllaries 7–14, free; stereome nearly flat or convex, glabrous, with resin ducts inconspicuous, pale. Florets 9–25; all tubular and uniform in size and either bisexual or female (with staminodes present), or 1–3 ligulate, female; ligule white or pink; disc florets with corolla-limb equal to tube, diam. at base of lobes 0.5–1.0 mm (bisexual); c. 0.3–0.5 mm (female). Achenes homomorphic,  $\pm$  obloid, 1.0–2.0 mm long, with ribs  $\pm$  flat, with short papillose hairs (l:w ratio c. 2–3); carpodium 1/3–1/2 diam. of body. Pappus caducous; bristles nearly smooth.

A group of four species endemic to far south-western Western Australia. Unique among Australian species of *Senecio* in being gynodioecious. The florets of female plants have five staminodes which generally do not exceed the corolla and the corolla has a less dilated limb than in bisexual plants. *Senecio gilbertii* and *S. barkhausioides* are both poorly known and there have been no recent collections of these species. Further investigation into this group is desirable.

#### 1. *Senecio leucoglossus* F.Muell., *Fragm.* 2: 15 (1860)

Type: Harvey and Murray R. region, W.A., *A. Oldfield*; possible iso: MEL.

Herbs to c. 1.0 m high,  $\pm$  glabrous. Leaves to c. 10 cm long, with l:w ratio c. 2–3, coarse-dentate to pinnatisect, with 2–5 projections per side; base with well-developed auricles. Capitula several to many per stem; calycular bracteoles 2–4, 1 mm long; involucre c. 3.5 mm long, 1.2–1.5 mm diam.; phyllaries 7–9. Florets 9–13; ray florets 1–3, with ligules 4 mm long, white, sometimes tinged pink. Achenes 1.5 mm long, with papillose hairs in bands. Pappus c. 3 mm long.

*Notes*: Occurs in far south-western Western Australia south of Perth. Grows in red-brown gravelly clay and sandy clay in forest. Flowers late winter–spring.

Readily distinguished by its small capitula with a few, white or pink-tinged ligules. The lower leaves are distinctive in being entire and narrow proximally before

broadening abruptly. The broad portion of lamina is about as long as broad. A few old specimens from Perth area are more robust and leaf shape is slightly atypical; further collections of this form are desirable.

*Representative specimens*: WESTERN AUSTRALIA: Serpentine, 24 Sept. 1899, *coll. unknown* (AD, BRI, CANB, HO, MEL, NSW, PERTH); track off Sandalwood Rd towards Mornington Mills, SE of Harvey, *T.R.Lally TRL1502 & B.Fuhrer* (CANB, PERTH).

## 2. *Senecio gilbertii* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(1): 208 (1851)

Type: Locality unknown, *Gilbert 289; n.v.*

Herbs to c. 1.0 m high. Stems transiently woolly. Leaves to c. 10 cm long, with l:w ratio c. 1.5–3, pinnatisect, with 2–5 oblong to obovate segments per side; base with well-developed auricles; margin with scattered denticulations; upper surface glabrous or sparsely hispid; lower surface somewhat densely appressed-cobwebby or woolly. Capitula numerous per stem; calycular bracteoles 3–6 1.5–2.0 mm long; involucre 4.0–5.0 mm long, c. 1.5 mm diam.; phyllaries 12–14. Florets 20–25, all tubular. Achenes narrow-obloid, c. 2 mm long, with papillose hairs in broad bands. Pappus 5 mm long.

*Notes*: Occurs in the Darling Ranges of south-western Western Australia. Habitat unknown. Flowers mostly winter–spring.

There have been no recent records of this species. The deeply pinnatisect leaves with very acute denticulations and a more or less dense indumentum on the lower surface are diagnostic.

*Representative specimens*: WESTERN AUSTRALIA: Wooroloo, Sept. 1907, *M.Koch s.n.* (PERTH); Darling Ra., *M.Koch 1692* (MEL).

## 3. *Senecio ramosissimus* DC., *Prodr.* 6: 371 (1838)

Type: Bald-Head hill, King George Sound, W.A., 1822, *A.Cunningham s.n.*; holo: G; microfiche seen MEL.

*Senecio cygnorum* Steetz, *Pl. Preiss* 1: 483 (1845). Type: Swan River, near Fremantle, W.A., 1843, *J.A.L.Preiss 70*; holo: MEL; iso: MEL.

Herbs to c. 1.5 m high, glabrous. Leaves to c. 17 cm long, with l:w ratio c. 3–6, undivided; base of upper-stem leaves with well-developed auricles, or truncate to sagittate; margin with frequent to crowded denticulations. Capitula numerous to 100s per stem; calycular bracteoles 2–4, c. 1 mm long; involucre 3.0–4.5 mm long, c. 2 mm diam., glabrous; phyllaries 9–13. Florets 15–20, all tubular. Achenes obloid, 1.0–1.5 mm long, with papillose hairs somewhat scattered. Pappus 3–4 mm long.

*Notes*: Occurs in far south-western Western Australia. Grows in sand and gravelly loam over limestone or granite, in coastal swamps, heathland, woodland and forest. Flowers spring–summer.

The inflorescences of *S. ramosissimus* are unusual for *Senecio* in Australia in being pyramidal, i.e. with lateral clusters of capitula not reaching to medial clusters.

*Representative specimens*: WESTERN AUSTRALIA: Small un-named lake/swamp 0.5 km north of Ledge Point, *A.E.Orchard 5931* (HO, MEL, PERTH).

**4. *Senecio barkhausioides*** Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 24(2): 86 (1851)  
Type: 'Nova Hollandia' [Swan River, W.A.], *J. Drummond V*, 378; iso: PERTH.

Herbs to c. 0.6 m high, with stems densely hispid basally. Leaves to c. 15 cm long, with l:w ratio c. 20–40, undivided or lobate, with 1–4 c. triangular lobes per side; base without auricles; margin entire or with a few teeth; upper surface hispid or sometimes upper-stem leaves glabrous; lower surface glabrous or with coarse hairs on midrib and major veins. Capitula several per stem; calycular bracteoles 6–8 2.0–3.0 mm long; involucre c. 7 mm long, c. 2.5 mm diam.; phyllaries 12–14. Florets numerous, all tubular. Achenes narrow-obloid, c. 2.5 mm long, with papillose hairs in bands. Pappus 6–7 mm long.

*Notes:* Occurs in far south-western Western Australia. Ecological preferences unknown. Flowering time unknown.

*Senecio barkhausioides* is a poorly known species that on the limited material available belongs in the Ramosissimus group. It has not been collected since the 1800s (One specimen, Parkers Range, 1890, *E. Merrall* is at MEL). Although placed in this group because of evidence that it is gynodioecious, it resembles species in the disciform group such as *S. oldfieldii* and *S. longipilus* in terms of leaf and stem indumentum, and *S. interpositus* and *S. georgianus* in terms of its phyllaries which have a fleshy stereome and strongly recurved apex.

*Representative specimens:* WESTERN AUSTRALIA: Parkers Ra., 1890, *E. Merrall* (MEL).

#### D. Magnificus Group

Erect, annual or perennial herbs or shrubs, not rhizomatous, often glaucous. Coarse spreading hairs sometimes present, generally not conspicuous; fine hairs  $\pm$  absent. Leaves mostly somewhat fleshy. Capitula radiate, 1–several, or sometimes numerous, ecalyculate or calyculate, with bracteoles 1–5 mm long, 0.2–0.5 mm wide at mid-point, with hyaline margin absent or obscure; involucre 3–10 mm diam.; phyllaries 12–22, free or occasionally fused; stereome flat, glabrous except in *S. tuberculatus*, with resin ducts fine, pale. Florets mostly numerous, rarely 20–30; ray florets (4–) 6–12 (–16), rarely sterile, with ligule yellow; disc florets with corolla-limb shorter, equal to, or longer than tube, diam. at base of lobes c. 1 mm. Achenes homomorphic, obloid or lageniform, 2–10 mm long, with ribs absent or not, sometimes much raised; with papillose hairs (l:w ratio 4–20) or granular papillae; carpopodium 1/3–1/2 diam. of body. Pappus persistent, or caducous in *S. velleioides*; bristles scabridulous or barbellate (mainly in proximal half) or rarely prominently barbellate.

A group of ten endemic species, widespread in southern and central Australia, particularly in arid and semi-arid environments. The peduncles in members of this group are often markedly dilated distally, a character not seen in other Australian species.

#### List of species

1. *Senecio platylepis* DC., *Prodr.* 6: 371 (1838)
2. *Senecio tuberculatus* Ali, *Kew Bull.* 19: 423 (1965)
3. *Senecio murrayanus* Wawra, in H.R. von F. Wawra & G.R. von M. Beck, *Itin. Princ. S. Coburgi* 2: 48 (1888)
4. *Senecio gregorii* F. Muell., *Enum. Pl. Coll. Gregory* 7 (1859)

5. *Senecio conferruminatus* I.Thomps., *Muelleria* 20: 117 (2004)
6. *Senecio gypsicola* (R.Bates) I.Thomps., *Muelleria* 20: 117 (2004)
7. *Senecio megaglossus* F.Muell., *Linnaea* 25: 419 (1853)
8. *Senecio magnificus* F.Muell., *Linnaea* 25: 418 (1853)
9. *Senecio pilosicristus* I.Thomps., *Muelleria* 20: 121 (2004)
10. *Senecio velleioides* A.Cunn. ex DC., *Prodr.* 6: 374 (1838)

### E. Macranthus group

Erect sometimes scapiform perennial herbs or semi-shrubs, rhizomatous or not, not glaucous. Coarse hairs sometimes present, mostly inconspicuous; fine hairs sometimes present, mostly inconspicuous. Leaves thin or slightly fleshy. Capitula radiate, calyculate, with bracteoles parallel-sided or nearly so, (2.5–) 4–9 mm long, 0.6–1.2 mm wide at mid-point, with hyaline margin absent; involucre 3–15 mm diam.; phyllaries 10–30, free, nearly flat or rarely ridged, glabrous, or with hairs in *S. vagus*, with resin ducts inconspicuous. Florets 20–numerous; ray florets (5–) 8–20; ligule yellow, or cream in *S. albogilvus*; disc florets with corolla-limb equal to or slightly longer than tube, with diam. at base of lobes, 0.7–1.0 mm. Achenes homomorphic, ± obloid, 2–8 mm long, with ribs raised or not, with papillose hairs (l:w ratio 6–12) in *S. vagus* or glabrous; carpodium nearly as broad as body in scapiform species, otherwise much narrower. Pappus persistent or not; bristles scabridulous.

Species in this group occur in south-eastern Australia in mesic environments with the exception of *S. daltonii* which occupies semiarid regions inland from the Great Dividing Range. Relatively large, herbaceous, strap-shaped calycular bracteoles characterise this group, and most species have glabrous achenes. Several species have leaves with a somewhat abrupt transition from a petiole or petiole-like portion to the broad laminar portion. This is not seen in other native species of *Senecio* in Australia with the exception of *S. hypoleucus* and *S. linearifolius* (in a few varieties) in the *Odoratus* group. The term scapiform means that the plant develops a persistent rosette of basal leaves and all or most leaves on the flowering stem are much reduced.

#### 1. *Senecio vagus* F.Muell., *Defin. Austral. Pl.* 13 (1855)

Type: Mt Dandenong Ranges, Jan. 1853, *F. Mueller*; lecto: MEL, *fide* S.I.Ali, *Kew Bull.* 19: 426 (1965); isolecto: MEL.: Mt Disappointment, *F. Mueller*; remaining syn: MEL.

Perennials to c. 1.5 m high, with rhizome not known, with hairs generally sparse. Leaves usually somewhat abruptly broadening from petiole-like to broad-laminate, to 15 cm long, with l:w ratio 1–4, pinnatisect proximally, with 1–3 segments per side, reducing to lobate beyond mid leaf (branch leaves may be undivided); base without auricles; margin entire or with occasional teeth or denticulations; venation ± distinct below; scattered hairs usually present, mainly marginal and on veins. Capitula several or sometimes numerous per stem; calycular bracteoles 10–16, 5–10 mm long; involucre 7–13 mm long, c. 4–6 mm diam.; phyllaries 12–16, flat, with multicellular, pigmented hairs, or glabrous. Florets numerous; ray florets 8; ligule 10–20 mm long, 7- or 8-veined. Achenes obloid, 3–4 mm long, glabrous or with papillose hairs along summit of ridges; l:w ratio of hairs 6–12. Pappus caducous, 5–7.5 mm long. *Saw Groundsel*.

*Notes:* A species of wetter forests readily recognisable by the shape of leaves, the number of veins on the ligule, and the strongly ridged achenes. The calycular bracteoles

somewhat unusually tend to curl and becoming divergent from the capitulum. There are two subspecies which appear to be allopatric.

**a. *Senecio vagus* F.Muell. subsp. *vagus***

*S. vagus* F.Muell. var. *alpestris* F.Muell., *Trans. Proc. Phil. Soc. Victoria* 1: 46 (1855).  
Type: Mount Buller, 5000', *F.Mueller*; ?holo: MEL.

Leaves with short hispid hairs along margin and veins. Capitula: calycular bracteoles with margin appearing denticulate due to coarse hair-bases; phyllaries and peduncles with scattered plump hairs. Achenes usually glabrous.

*Notes:* Occurs in eastern Victoria from the Dandenong Ranges east of Melbourne east to Mt Kaye; also occurs in Nullica State Forest in far south-eastern New South Wales, and on Flinders Is. in Bass Strait. Grows mostly in tall open forest. Flowers spring–autumn.

Readily distinguishable by the dark hairs scattered over the surface of phyllaries. The hairs are relatively plump and multicellular in 1–several series.

*Representative specimens:* NEW SOUTH WALES: Mt Comerang, 8 km c. SW of Bodalla, South Coast, *E.F.Constable 4148* (NSW). VICTORIA: Small fenced gully at 449 Main Rd, Mt Macedon, *D.E.Albrecht 472* (MEL). TASMANIA: Walkers Hill, 495 m WSW of the summit, Flinders Is., Furneaux Group, *J.Whinray 6* (HO).

**b. *Senecio vagus* subsp. *eglandulosus* Ali, *Kew Bull.* 19: 427 (1965)**

Type: New South Wales, Wilson R., Bellangry S.F., NW of Wauchope, 31 Oct. 1956, *E.F.Constable s.n.*; holo: NSW.

Leaves glabrous or nearly so. Capitula: calycular bracteoles with margin nearly smooth; phyllaries and peduncle glabrous. Achenes usually with hairs in lines along ribs.

*Notes:* Occurs in north-eastern and central-eastern New South Wales from the Gibraltar Ra. south to Picton. Grows in tall open forest or closed forest. Flowers mostly spring.

*Representative specimens:* NEW SOUTH WALES: Ballengarra State Forest, SW of Kempsey, *P.Gilmour 7344* (AD, CANB, MEL, NSW); Wingen Maid Nature Reserve, *J.R.Hosking 805* (CANB, MEL, NE, NSW).

**2. *Senecio macranthus* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 126 (1834)**

Type: New South Wales, Port Jackson, [probably collected inland from here], 1826–1829, coll. unknown; holo: P.

Perennials to c. 1 m high, not rhizomatous, largely glabrous. Leaves gradually broadening from base, to 12 cm long, with l:w ratio 12–25, undivided; base attenuate, with narrow auricles; margin entire or serrulate; venation inconspicuous. Capitula few to several per stem; calycular bracteoles 8–12, 4–9 mm long; involucre 8–12 mm long, c. 7–8 mm diam.; phyllaries 14–22. ridged proximally. Florets numerous; ray florets 8–13; ligule 15–25 mm long, 4–7-veined. Achenes obloid–narrow-obloid, 3–5 mm long. Pappus caducous, 8–10 mm long.

*Notes:* Occurs in eastern New South Wales from Wollomombi Falls west to the Warrumbungle Ranges and SSW to Tallong. Grows in moister gullies, often in rocky sites, including granite, sandstone and basalt, in forest. Flowers late winter–spring.

*Representative specimens:* NEW SOUTH WALES: Killiecrankie Pass, 9.1 km west of Goodmans Ford on the Wombeyan Caves Rd, *R.Coveny 12169*, *W.Bishop* & *R.Makinson* (AD, NSW); Track from Wollomombi Falls to Chandler R., Oxley Wild Rivers National Park, *P.Gilmour 7844* (CANB).

### 3. *Senecio amygdalifolius* F.Muell., *Fragm.* 1: 232 (1859)

Type: New South Wales, Hastings R., *Dr Beckler*; syn: MEL.

Perennials to c. 3 m high, with rhizome villous, otherwise  $\pm$  glabrous. Leaves  $\pm$  abruptly broadening from petiole-like to broad-laminate, to 20 cm long, with l:w ratio 3–7; base without auricles; margin with crowded serrulations; reticulate venation distinct on lower surface. Capitula several to many per stem; calycular bracteoles 5–10, 2.5–8 mm long; involucre 7–10 mm long; 3–5 mm diam.; phyllaries 10–12. Florets 20–35; ray florets 5–8; ligule 10–15 mm long, 4- or 5-veined. Achenes narrow-obloid, 4–6 mm long. Pappus caducous, 6–8 mm long.

*Notes:* Occurs within 200 km of the coast in far eastern Australia from Mt Molangul in south-eastern Queensland south to Morrissett in central-eastern New South Wales with a disjunct occurrence near Coonabarabran much further inland in north-eastern New South Wales. Grows in open and closed forest. Flowers mostly winter–spring.

Readily distinguished by its petiolate, serrulate leaves.

*Representative specimens:* QUEENSLAND: Mount Ballow foothills, McPherson Ra., *P.I.Forster PIF7459* & *G.Leiper* (BRI, MEL, PERTH). NEW SOUTH WALES: Undercliffe Falls, 10 km east of Liston, *A.R.Bean 6634* (BRI, MEL, NSW).

### 4. *Senecio daltonii* F.Muell., *Fragm.* 6: 27 (1861), as *Daltoni*

Type: Warrego R., Currewillighi, Queensland, *J.D.Dalton*; holo: MEL.

Perennials to c. 0.5 m high, with extensive villous rhizomes, with stem hairs mostly inconspicuous. Leaves gradually broadening from base, to 12 cm long, with l:w ratio 8–15, undivided; base attenuate, without auricles; margin entire, or with occasional denticulations; venation inconspicuous; scattered coarse hairs sometimes present. Capitula 1 or few per stem; calycular bracteoles 6–8, 4–7 mm long; involucre 8–14 mm long, c. 7–10 mm diam.; phyllaries 14–25, with scattered coarse hairs. Florets numerous; ray florets 10–15; ligule 6–12 mm long, 4- or 5-veined. Achenes  $\pm$  narrow-obloid, c. 3–5 mm long. Pappus persistent, 12–20 mm long.

*Notes:* Occurs in central-eastern Australia from Toowoomba in far south-eastern Queensland SW to Forbes in central New South Wales and WSW to Brewarrina in north-central New South Wales. Grows in heavier soils in swampy country and in cultivated paddocks. Flowers at most times of year, dependent on rains.

Much maligned as a weed of cultivation during the 1930s–60s as it apparently could survive ploughing. Information about its natural habitat is limited and there have been no recent reports of it being troublesome in cultivation.

*Representative specimens:* QUEENSLAND: Darling Downs District, 13 May 1948, *C.S.Clydesdale* (BRI). NEW SOUTH WALES: 5 km north of Brewarrina, *J.Thompson 1870a* (BRI, NSW); Rowena district, 6 Oct. 1966, *J.Crosby* (NSW).

**5. *Senecio leptocarpus*** DC., *Prodr.* 6: 372 (1838)*S. pectinatus* DC. var. *pleiocephalus* Benth., *Fl. Austral.* 3: 665 (1867).Type: Mt Wellington, Tasmania, *R.C.Gunn* 268; holo: G; iso: NSW both *n.v.*, *fide* R.O.Belcher, *Muelleria* 9: 122 (1996).

Scapiform perennials to 0.5 m high, rhizomatous, nearly glabrous except for upper peduncle. Basal leaves gradually broadening from base, to 10 cm long, with l:w ratio 3–9, undivided or lobate, with 4–7 lobes per side; base attenuate or cuneate, without auricles; secondary venation sub-parallel, generally distinct on both sides. Cauline leaves c. 10, undivided, becoming much smaller than basal leaves. Capitula (1–) 3–8 per stem; peduncle with coarse hairs distally; calycular bracteoles 4–8, 4–7 mm long; involucre 5–9 mm long, 3–5 mm diam., phyllaries c. 13, glabrous. Florets numerous; ray florets 10–15; ligule 8–12 mm long, 4–6-veined. Achenes narrow-obloid, 3–4 mm long, unribbed. Pappus persistent, 4–5 mm long.

*Notes:* Occurs in central and western Tasmania from St Valentines Peak in the far north-west south to Pindars Peak in the far south. Grows in alpine shrubland, heathland and herbfields. Flowers summer–autumn.

Differs from *S. pectinatus* by its strongly discoloured leaves with distinct sub-parallel or very acute secondary venation. The leaves are similar to those of *S. albogilvus* but are larger and with more lobes. It also differs from *S. albogilvus* in that the inflorescences are usually not solitary, and ligules are yellow. Although there are a few old records from the mainland, there is some doubt about their provenance.

*Representative specimens:* TASMANIA: Lake Hwy, 5.7 km north from Breona, Great Western Tiers, *F.E.Davies* 983 & *P.Ollerenshaw* (CANB, MEL); Dunning Rivulet, *A.Moscal* 12524 (HO).

**6. *Senecio albogilvus*** I.Thomps., *Muelleria* 20: 130 (2004)*S. pectinatus* var. *ochroleucus* F.Muell., *Papers & Proc. Roy. Soc. Tasmania* 1870, 16 (1871), as *ochroleuca*.Type: Mt Wellington, Tasmania, Jan. 1869, *F.Mueller*; lecto: MEL, *fide* R.O.Belcher, *Muelleria* 9: 119 (1996); syn: MEL.

Scapiform perennials to c. 0.3 m high, rhizomatous, nearly glabrous. Basal leaves gradually broadening from base, to 4 cm long, with l:w ratio 8–15, undivided; base attenuate, without auricles; margin entire or more often with 1 or 2 distal serrations per side; venation indistinct. Cauline leaves 10–15, becoming much smaller than basal leaves, mostly bract-like, undivided; base without auricles. Capitula 1 per stem; distal peduncle sparsely hairy, with hairs fine; calycular bracteoles 6–10, 4–9 mm long; involucre 5–11 mm long, 3–7 mm diam; phyllaries 12–22, glabrous. Florets numerous; ray florets 10–15; ligule 8–12 mm long, cream-white, 4- or 5-veined. Achenes narrow-obloid, 2–3 mm long, unribbed, glabrous. Pappus uncertainly persistent, 4.5–6 mm long.

*Notes:* Occurs in north-western and southern Tasmania from Cradle Mountain south to Pindars Peak. Grows in rocky sites in herbfield, heathland and shrubland in montane to alpine regions. Flowers summer–autumn.

The undivided, discoloured leaves of this species are reminiscent of those of *S. leptocarpus*, although considerably smaller. A further distinctive feature of this species is the white-cream colour of the ligules. An old specimen collected by a Dr Milligan

from Tasmania (MEL667723) has the leaves of *S. albogilvus* but has an inflorescence of six capitula. It is unclear from the specimen what the colour of the ligules are. This may be an aberrant plant or possibly a hybrid between *S. albogilvus* and *S. leptocarpus*.

When elevated to species rank (Thompson 2004c) the authority was incorrectly cited as (F.Muell.) I.Thomps.

*Representative specimens*: TASMANIA: Eastern edge of Cradle Mountain c. 100 m below summit, Cradle Mountain National Park, *P.S.Short 1786* (HO, MEL); Hartz Mountain track, 500 m from base of track, Hartz Mountains National Park, *F.E.Davies 878 & P.Ollerenshaw* (AD, CANB, HO, MEL).

### 7. *Senecio pectinatus* DC., *Prodr.* 6: 372 (1838)

Type: Precise locality unknown, Tasmania, 1832, *R.C.Gunn 107*; holo: G *n.v.*, *fide* R.O.Belcher, *Muelleria* 9: 115–131.

Scapiform perennials to 0.5 m high, rhizomatous, nearly glabrous except for scape and peduncle. Basal leaves gradually to somewhat abruptly broadening from petiole-like portion to lamina, to 15 cm long, with l:w ratio 2–6, dentate to pinnatisect, with 3–6 major projections per side; base petiole-like, without auricles. Cauline leaves 5–12, becoming much smaller than basal leaves, mostly undivided; base without auricles or slightly dilated. Capitula 1 per stem, or rarely 2; distal peduncle moderately hairy, with hairs to c. 1 mm long; calycular bracteoles 6–12, (4–) 5–10 mm long; involucre 6–12 mm long, 5–12 mm diam.; phyllaries 12–30, glabrous or nearly so. Florets numerous; ray florets 13–20; ligule 10–20 mm long, 4- or 5-veined. Achenes narrow-obloid 4–8 mm long. Pappus uncertainly persistent, 4–7.5 mm long.

*Notes*: There are two varieties of this species differing mainly in their dimensions, although there are subtle differences in leaf morphology also. Although the demarcation of the varieties is not always clear, particularly due to collections from Ben Lomond National Park, Tasmania, I consider that the varietal status should be maintained. Geographically varieties are clearly separated. The high chromosome number of  $2n = 80$  for var. *major* (Lawrence 1980) is suggestive of polyploidy. A chromosome count for the typical variety has not been made.

#### 7a. *Senecio pectinatus* DC. var. *pectinatus*

Plants to c. 0.2 m high, with scape 0.5–1.8 mm diam. Rosette leaves 1–5 (–8) cm long, deeply lobate to pinnatisect, with medial zone of uninterrupted lamina not or only slightly broadening distally, 1–2 (–4) mm wide at widest. Capitula: calycular bracteoles (4–) 5–6.5 mm long, 0.6–1.1 mm wide; involucre 6–8 (–9) mm long, 8–15 (–20) mm wide when pressed, with phyllaries c. 13–20. Corolla of disc florets mostly < 6 mm long. Achenes 4–5 mm long. Pappus 4–5 mm long.

*Notes*: Occurs in Tasmania from Mt Arthur in the far north to Mt La Perouse in the far south. Robust, larger-headed specimens from Ben Lomond Natl Park and Mt Field Natl Park are considered to be var. *pectinatus* based on leaf morphology although in other respects dimensions overlap with those of var. *major*. Apart from these occasional specimens at these localities, specimens in Tasmania are readily distinguished from var. *major* using all or most of the characters presented in the descriptions. A specimen from Mount Buffalo, Victoria, referred to var. *pectinatus* by Thompson 2004c is now

considered to be var. *major*. Grows in alpine or sub-alpine herbfields, heathland and shrubland, commonly near streams or seepage areas. Flowers summer–autumn.

*Representative specimens*: TASMANIA: Between Ladies Tarn and Hartz Peak, Hartz Mtns National Park, *P.S.Short 1892* (MEL); Hamilton Crags, 1.5 km east of Legges Tor, Ben Lomond National Park, *F.E.Davies 1167* (AD, CANB, HO, MEL).

**7b. *Senecio pectinatus* var. *major*** F.Muell. ex Belcher, *Muelleria* 9: 120 (1996)

Type: Cobberas Mts, Victoria, [1854], *F.Mueller*; holotype: MEL; synonym: MEL.

Plants to 0.3 (–0.5) m high, with scape 1–3 mm diam. Rosette leaves (3–) 4–15 cm long, dentate to pinnatisect, with medial zone of uninterrupted lamina clearly broadening distally, usually 4–15 mm wide at widest in at least some leaves. Capitula: calycular bracteoles 6–10 mm long, 1.0–2.0 mm wide; involucre 8–12 mm long, 15–30 mm wide when pressed, with phyllaries c. 20–30. Corolla of disc florets > 6 mm long. Achenes 4–8 mm long. Pappus 5–7 mm long. *Alpine Groundsel*.

*Notes*: Occurs in far south-eastern Australia. On the mainland it extends from Mt Kelly in southern parts of the Australian Capital Territory SW through south-eastern New South Wales to Mt Baw Baw in southern Victoria. Specimens from Ben Lomond, Tasmania, included by Thompson 2004c in var. *major* are now considered better placed in var. *pectinatus*. Grows in alpine or sub-alpine herbfields, heathland and shrubland, commonly near streams or seepage areas. Flowers summer–autumn.

*Representative specimens*: NEW SOUTH WALES: c. 1 km along Summit Rd from parking area, Mt Stillwell, Charlottes Pass, Kosciuszko National Park, *P.Hind 5520* & *G.D'Aubert* (MEL, NSW). VICTORIA: beside road from "Ruined Castle", at head of ?McKay Ck, Bogong High Plains near Mt McKay, *M.G.Corrick 11500* (CANB, MEL); Wall of Death, Hotham Heights, *D.E.Albrecht 4949* (MEL).

**8. *Senecio papillosus*** F.Muell., *Trans. Phil. Inst. Victoria* 2: 69 (1857)

Type: Mt La Perouse, Tasmania, 1 Mar. 1857, *C.Stuart 1870*; lectotype: MEL, *vide* R.O.Belcher, *Muelleria* 9: 124 (1996); Mt La Perouse, Tasmania, *Stuart s.n.*; synonym: MEL.

Scapiform perennials to 0.3 m high, rhizomatous, somewhat hairy on most parts. Basal leaves to 4 (–7) cm long, with l:w ratio 2–7, undivided; base petiole-like; margin entire or with scattered teeth; upper surface hispid with hairs rather robust; lower surface with long hairs along midrib; secondary venation ± distinct on lower surface. Cauline leaves much smaller than basal, 1–5, undivided; base without auricles. Capitula 1 per stem; distal peduncle and margin of bracteoles with coarse hairs; calycular bracteoles 6–8, 5–8 mm long; involucre 7–10 mm long, 3–5 mm diam.; phyllaries 12–24, sparsely hairy; Florets numerous; ray florets 12–20; ligule 10–20 mm long, ?4- or 5-veined. Achenes narrow-obloid, c. 3–4 mm long, unribbed. Pappus uncertainly persistent, c. 6 mm long.

*Notes*: Occurs in far southern Tasmania from Federation Peak to Mt La Perouse. Grows in sub-alpine areas. Flowers summer–autumn.

Recognised by its scapiform habit and small spatulate leaves with rather coarse septate hairs on the upper surface. Very localised in mountains in south-western Tasmania.

*Representative specimens*: TASMANIA: Precipitous Bluff, east face, *A.M.Buchanan 11347* (HO).

**9. *Senecio primulifolius*** F.Muell., *Trans. Phil. Inst. Victoria* 2: 69 (1857)

Type: Mt La Perouse, Tasmania, 1 Mar. 1857, *C.Stuart 1871*; lecto: K, *fide* R.O.Belcher, *Muelleria* 9: 125 (1996); isolecto: MEL (2 sheets).

Scapiform perennials to 0.3 m high, rhizomatous, somewhat hairy on leaves and scape. Basal leaves abruptly broadening from petiole-like portion to cordate-based lamina, to 22 cm long, with l:w ratio 2–6, undivided; base without auricles; margin crenate or dentate; secondary venation distinct; upper surface somewhat appressed-cobwebby or woolly; lower surface somewhat woolly. Cauline leaves 1–4, becoming much smaller than basal leaves; base becoming auriculate upwards. Capitula 1–4 per stem; peduncle hairy; calycular bracteoles 6–8, 5–8 mm long; involucre 7–10 mm long, 3–5 mm diam.; phyllaries 14–20, nearly glabrous. Florets numerous; ray florets c. 12; ligule 10–20 mm long, 4- or 5-veined. Achenes narrow-obloid, 3–4 mm long, unribbed, glabrous. Pappus persistent, 6–8 mm long.

*Notes:* Occurs in far southern Tasmania in the area of Mt La Perouse. Grows in sub-alpine areas, where recorded from under shrubs and from rocky cliffs. Flowers summer–autumn.

Recognised by its scapiform habit and distinctive leaf morphology. Like *S. papillosus*, it has a very localised distribution in mountains in south-western Tasmania.

*Representative specimens:* TASMANIA: Moonlight Ridge, *A.M.Buchanan 2961* (HO); Mt La Perouse, *L.Rodway 427* (HO).

**F. *Glossanthus* group**

Erect annuals, not rhizomatous, not glaucous. Coarse hairs sometimes present, conspicuous or not; fine hairs absent. Leaves commonly slightly fleshy. Capitula radiate, with ligule short, or appearing disciform with ligule of female florets vestigial, calyculate, with bracteoles narrow-ovate to lanceolate, 0.8–3.0 mm long, 0.2–0.8 mm wide at mid-point, with hyaline margin absent or obscure; involucre 1–3 mm diam.; phyllaries 7–13, free; stereome flat, with resin ducts inconspicuous, pale. Florets 15–numerous; ray florets (4–) 5–13, with ligule much reduced, yellow; disc floret: corolla-limb ± as long as tube, with diam. at base of lobes, 0.3–0.5 mm. Achenes homomorphic or dimorphic (ray achenes larger, hairs more robust and carpopodium broader), ± obloid or slightly lageniform, 2.0–5.5 mm long, with ribs ± flat, with papillose hairs (l:w ratio 3–8); carpopodium c. 1/3–1 times diam. of body. Pappus caducous, occasionally hardly developed on outer achenes; bristles scabridulous.

A group of four species occurring in the southern half of Australia, distinguished from other radiate species by the short ligules of the female florets. The species in this group were recently revised by Thompson (2005a). The ligule in some specimens is vestigial but these can be distinguished from species of the Disciform group by the low proportion of female florets and the relatively short corolla of these florets, and in three of the species, the dimorphism of the achenes. The group is probably most closely allied to the Lautusoid group to which it is most obviously connected by *S. condylus*, a species placed in the Lautusoid group because of its long-ligulate female florets, but with features including leaf shape and achenial dimorphism that associate it with members of the *Glossanthus* group.

**List of species**

1. *Senecio glossanthus* (Sond.) Belcher, *Ann. Missouri Bot. Gard.* 43: 80 (1956)
2. *Senecio productus* I.Thomps., *Muelleria* 21: 10 (2005)
  - a. *S. productus* I.Thomps. subsp. ***productus***
  - b. *S. productus* subsp. ***magnus*** I.Thomps., *Muelleria* 21: 10 (2005)
3. *Senecio halophilus* I.Thomps., *Muelleria* 21: 13 (2005)
4. *Senecio serratiformis* I.Thomps., *Muelleria* 21: 14 (2005)
  - a. *S. serratiformis* I.Thomps. subsp. ***serratiformis***
  - b. *S. serratiformis* subsp. ***stenophyllus*** I.Thomps., *Muelleria* 21: 18 (2005)

*Notes:* *Senecio brachyglossus* var. *major* Benth., a homotypic synonym of *S. halophilus*, was lectotypified in Thompson (2005a). Since then, a duplicate has been found at MEL and this specimen is designated as an isolectotype. There are two remaining syntypes that were cited by Bentham. The syntype from Wilsons Promontory has now been seen at MEL and is determined to be a hybrid between *S. biserratus* and *S. pinnatifolius* var. *lanceolatus*. A photograph of the syntype from Western Australia has been seen (specimen at K); this syntype is likely to be *S. serratiformis* I.Thomps.

The range of *S. productus* subsp. *productus* has increased with the recent identification of seven further specimens from central and southern inland New South Wales (all specimens held at NSW). The association with *S. glossanthus* alluded to in Thompson (2005a) was confirmed by several more mixed collections.

**G. Lautusoid group**

Erect, sprawling or nearly prostrate annuals, perennials, or semi-shrubs, not rhizomatous or scapiform except for *S. pinnatifolius* var. *pleiocephalus*, not glaucous. Coarse hairs generally caducous if present, except sometimes on peduncles, and lower surface of leaves (only *S. condylus*); fine hairs absent. Leaves commonly slightly to strongly fleshy. Capitula radiate, calyculate, with bracteoles broad-ovate to narrow-lanceolate, 1–5 mm long, 0.3–2.0 mm wide at mid-point, with hyaline margin absent, obscure or well-developed; involucre 1.2–12 mm diam.; phyllaries (8–) 13–22, free; stereome flat or ridged proximally, with resin ducts broad and prominent or not, orange or pale. Florets numerous; ray florets 8–13 (–20), with ligule yellow; disc floret: corolla-limb  $\pm$  as long as tube, 0.4–0.6 mm diam. at base of lobes. Achenes homomorphic or less often dimorphic (achenes of female florets larger, with hairs more robust and carpopodium broader),  $\pm$  obloid, 1.5–7 mm long, with ribs flat to mildly raised, with papillose hairs (l:w ratio c. 3–8) or glabrous; carpopodium mostly c. 1/2 diam. of body. Pappus caducous, or persistent in *S. spathulatus*; bristles scabridulous.

A group of eleven species occurring throughout most of Australia south of latitude 20°S. This group was revised by Thompson (2005b). It has been termed the Lautusoid group because of the similarity of its members to *Senecio lautus*, now considered a New Zealand endemic. Belcher (1994) coined the term pseudolautusoid, but to me the prefix “pseudo” is misleading as I consider Australian taxa to be closely related to New Zealand taxa. Prior to Walsh (1999) and Thompson (2005b), the name *S. lautus* had been used for all native Australian species of this group. The introduced species *S. madagascariensis*, native to southern Africa and Madagascar, is included in this group.

The morphology of the phyllaries in some cases helps to distinguish species in this group and it is important therefore to be able to identify that there are three types of phyllary in any one capitulum: inner, outer and intermediate. The narrower outer

phyllaries have margins that overlap the margins of inner phyllaries to the outside. One or two intermediate phyllaries are likely to be present in any one capitulum; they are a chimera of outer and inner phyllaries, and so one margin will overlap to the inside while the other overlaps to the outside. Species in this group are listed below.

*Corrigenda to Thompson 2005b*: The illegitimate name *Senecio carnulentus* DC., *Prodr.* 6: 372 (1838) should have been placed in synonymy under *Senecio pinnatifolius* A.Rich.

In *S. lacustrinus*, phyllaries have recently been measured in some specimens in northern New South Wales, e.g around Bourke, to be less than 5.0 mm long (5.0 mm was given as the minimum length given in the protologue). In other respects these plants are typical of the species.

The image of *Senecio brigalowensis* in Thompson is of the isotype, not the holotype as indicated in the caption.

### List of Species

1. *Senecio condylus* I.Thomps., *Muelleria* 21: 18 (2005)
2. *Senecio spathulatus* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 125 (1834)
  - a. *Senecio spathulatus* A.Rich. var. *spathulatus*
  - b. *Senecio spathulatus* var. *latifructus* I.Thomps., *Muelleria* 21: 35 (2005)
  - c. *Senecio spathulatus* var. *attenuatus* I.Thomps., *Muelleria* 21: 35 (2005)
3. *Senecio warrenensis* I.Thomps., *Muelleria* 21: 38 (2005)
4. *Senecio pinnatifolius* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 117 (1834)
  - a. *Senecio pinnatifolius* A.Rich. var. *pinnatifolius*
  - b. *Senecio pinnatifolius* var. *latilobus* (Steetz) I.Thomps., *Muelleria* 21: 45 (2005)
  - c. *Senecio pinnatifolius* var. *serratus* I.Thomps., *Muelleria* 21: 47 (2005)
  - d. *Senecio pinnatifolius* var. *lanceolatus* (Benth.) I.Thomps., *Muelleria* 21: 49 (2005)
  - e. *Senecio pinnatifolius* var. *capillifolius* (Hook.f.) I.Thomps., *Muelleria* 21: 51 (2005)
  - f. *Senecio pinnatifolius* var. *alpinus* (Ali) I.Thomps., *Muelleria* 21: 52 (2005)
  - g. *Senecio pinnatifolius* var. *maritimus* (Ali) I.Thomps., *Muelleria* 21: 54 (2005)
  - h. *Senecio pinnatifolius* var. *leucocarpus* I.Thomps., *Muelleria* 21: 58 (2005)
5. *Senecio spanomerus* I.Thomps., *Muelleria* 21: 58 (2005)
6. *Senecio brigalowensis* I.Thomps., *Muelleria* 21: 63 (2005)
7. *Senecio depressicola* I.Thomps., *Muelleria* 21: 64 (2005)
8. *Senecio eremicola* I.Thomps., *Muelleria* 21: 66 (2005)
9. *Senecio lacustrinus* I.Thomps., *Muelleria* 21: 68 (2005)
10. *Senecio hamersleyensis* I.Thomps., *Muelleria* 21: 72 (2005)
11. \**Senecio madagascariensis* Poir., *Encycl.*, suppl. 5: 130 (1817)

## H. The Exotic Species

The nine exotic species grouped here, predominantly from South Africa, are somewhat diverse but are placed together here for convenience. They are radiate except for the discoid *S. vulgaris* and the group contains three climbing species. All naturalised species in Australia are placed here except for *S. madagascariensis* which has been placed in the Lautusoid Group.

### 1. \**Senecio pterophorus* DC., *Prodr.* 6: 389 (1838)

*S. pterophorus* var. *verus* Harv., *Fl. Capensis* 3: 386 (1865), *nom. inval.*

Type: Southern Africa, *Drege*; holo: G; microfiche seen MEL.

*S. pterophorus* var. *apterus* Harv., *Fl. Capensis* 3: 386 (1865), *nom. illeg.* Type: Southern Africa, *Drege*; *n.v.*

Erect perennials to c. 2 m high, with fine hairs sparse, denser on leaves. Leaves narrow-oblongate or narrow to very narrow-elliptic, to 14 cm long, with l:w ratio c. 4–8, shallowly to deeply serrate, occasionally ± entire or appearing so, with 2–7 projections per side; base attenuate, often with decurrent laminar tissue; upper surface sometimes sparsely tuberculate; lower surface appressed-woolly. Capitula several to many per stem; calycular bracteoles 14–20, 2–3 mm long, 0.3–0.5 mm wide; involucre 3.5–5 mm long, 3.5–4 mm diam.; phyllaries 18–22, glabrous. Florets numerous; ray florets 8–13, with ligule 4–7 mm long, 4-veined, yellow. Achenes obloid, 1.5–1.8 mm long, pale-brown, tapering more marked basally, with papillose hairs forming bands or evenly dispersed. Pappus caducous, 4–5 mm long. *African daisy*, *Rough Senecio*.

*Notes:* Native to South Africa. Occurs in south-eastern Australia from the Eyre Peninsula ESE to Garfield in south-central Victoria, and disjunctly further north-east in central-eastern New South Wales from Newcastle SW to the Blue Mountains east of Sydney. Grows mostly in disturbed sites in grasslands, woodland, and forest. Flowers mostly summer.

Readily distinguished by the usually acutely lobed leaves, sublustrous above and appressed woolly below, and often decurrent down the stems. Hybridises with disciform species such as *S. hispidulus* and *S. picridioides* and with the discoid species *S. hypoleucus* in the Mt Lofty Ranges of S.A.

*Representative specimens:* SOUTH AUSTRALIA: Cleland National Park, 10 km east of Adelaide, *S.L.Everist 9995* (AD, BRI). NEW SOUTH WALES: Mt Druitt, *R.G.Coveny 13911* (AD, BRI, CANB, MEL, NSW). VICTORIA: on Hamilton–Horsham Hwy adjacent to Cattle Station Ck, 7 Jan. 1986, *J.M.Pollock* (AD, CANB, MEL).

### 2. \**Senecio jacobaea* L., *Sp. Pl.* 2: 870 (1753)

Type: Europe; *n.v.*

Erect biennials or perennials to c. 1.8 m high, with sparse to moderate cobwebby hairs. Leaves elliptic to narrow-elliptic, to 25 cm long, with l:w ratio c. 1.5–3, complexly 2–3-pinnatisect with c. 5–10 major segments per side; base attenuate or slightly auriculate, with auricles pinnatisect, slightly clasping. Capitula numerous to 100s per stem; calycular bracteoles 3–6, 2–3.5 mm long, 0.2–0.3 mm wide; involucre 3.5–5 mm long, c. 4 mm diam.; phyllaries 11–13, glabrous. Florets numerous; ray florets 10–15; ligule 6–10 mm long, 4-veined, yellow. Achenes obloid, 1.6–2.2 mm

long, pale-brown, tapering more marked basally; achenes of disc florets with papillose hairs in rows; achenes of ray florets glabrous. Pappus caducous, 4–5 mm long. *Ragwort*.

*Notes:* Native to Europe. Occurs in far south-western Western Australia west of Albany, far south-eastern Australia from the Mt Lofty Ra. in south-eastern South Australia east to Sale in eastern Vic, and in north-western and eastern Tasmania. A common weed in other temperate parts of the world. Grows in forest and in agricultural and disturbed land such as roadsides. Flowers summer–autumn.

A species with large intricately dissected leaves and inflorescences of numerous crowded capitula with relatively narrow ligules. In its first season it forms a basal rosette.

*Representative specimens:* WESTERN AUSTRALIA: Walpole, *R.D.Royce 2566* (PERTH). SOUTH AUSTRALIA: Sturt Creek, Upper Surt District, 15 Nov. 1954, *V.Lohmeyer s.n.* (AD). NEW SOUTH WALES: Goulburn, 9 May 1938, *A.T.R.Brown s.n.* (NSW). VICTORIA: Beech Forest, *R.V.Smith 75/5* (AD, BRI, CANB, HO, MEL, NSW, PERTH). TASMANIA: Pine L., northern Central Plateau, *A.E.Orchard 5820* (AD, HO, MEL).

### 3. \**Senecio elegans* L., *Sp. Pl.* 2: 869 (1753)

Type: ‘Aethiopia’, northern Africa, cult., seed from South Africa, Herb. Clifford 406, *Senecio 4*; lecto: ?LINN *vide* R.O.Belcher, *Fl. Australia* 49: 617 (1994).

*S. elegans* var. *diffusus* Ewart, *Fl. Victoria* 1173 (1931). Type: not designated.

*S. elegans* var. *erectus* Ewart, *Fl. Victoria* 1173 (1931). Type: not designated.

Erect or sprawling annual, to 1.0 m high, nearly glabrous. Leaves to 20 cm long, with l:w ratio c. 2–4, sub-pinnatisect with 2–5 major segments per side; segments typically broadest distally and irregularly lobed; base slightly to moderately auriculate, slightly clasping. Capitula few to numerous per stem; calycular bracteoles 12–16, 3–5 mm long, c. 1.5–2 mm wide; involucre 7–8 mm long, c. 5–7 mm diam.; phyllaries 12–16, glabrous. Florets numerous; ray florets usually 12–17; ligule 7–15 mm long, rich magenta, occasionally pink or white, 4-veined. Achenes narrow-obloid, 2.5–3.2 mm long, brown or olivaceous, with papillose hairs forming lines. Pappus caducous, 5–7 mm long.

*Notes:* Native to South Africa. Occurs along the coastline; in south-western Western Australia from Perth south to Cape Leeuwin and east to Ledge Point east of Albany; in the south-east of Australia from Yorke Peninsula in south-eastern South Australia ESE to Orbost in south-eastern Victoria; and in Tasmania on the Bass Strait Is. and on the east coast. Grows in coastal sites on sand dunes and among rocks, in shrubland. Flowers mostly spring and summer.

Widespread along south-western and southern coastlines and readily recognised by virtue of its purple ligules and pinnatifid leaves. The capitula of *S. glastifolius* *q.v.* are similar but the shape of its leaves is very different. Hybrids between *S. elegans* and *S. pinnatifolius* have been recorded. Plants with paler or white ligules or doubled ligules have occasionally been recorded.

*Representative specimens:* WESTERN AUSTRALIA: Small unnamed lake/swamp 0.5 km north of Ledge Point, *A.E.Orchard 5930* (HO, PERTH). SOUTH AUSTRALIA: Lower Coorong, 40 km south of Salt Ck, almost due west of Pitlockry Stn, *D.E.Symon 10460* (AD, PERTH). VICTORIA: Pea Soup Shearwater Colony, Port Fairy, *J.C.Reid 2184* (CANB, MEL). TASMANIA: South Arm, *A.Buchanan 14278* (HO).

**4. \**Senecio glastifolius* L.f., *Suppl. Pl.* 372 (1782)**

Type: Cape of Good Hope, South Africa, *Thunberg; n.v.*

Erect perennials to c. 1.5 m high, glabrous. Leaves oblanceolate to narrow-elliptic, to 12 cm long, with l:w ratio c. 2–4, lobate, with lobes antrorse; base hardly to moderately narrower; margin dentate or denticulate. Capitula few to numerous per stem; calycular bracteoles 10–16, 3–4 mm long, c. 0.8 mm wide; involucre c. 7 mm long, c. 5–8 mm diam.; phyllaries 20–22. Florets numerous; ray florets c. 13; ligule 10–20 mm long, 4-veined, pink to purple. Achenes narrow-obloid, 2.0–2.5 mm long, brown or olive-brown, with papillose hairs in narrow bands. Pappus caducous, c. 7 mm long. *Holly-leaved Senecio*.

*Notes:* Native to South Africa. Recorded from south-western Western Australia at Albany and Manjimup, and on the central coast of New South Wales at Bundeena. Also naturalised in New Zealand. Grows in coastal sites on sand dunes and among rocks, in heathland and shrubland. Flowers spring–summer.

*Representative specimens:* WESTERN AUSTRALIA: SE slopes of Mt Adelaide, especially along Hare St, Albany, *G.J.Keighery 8327* (AD, CANB, MEL, PERTH). NEW SOUTH WALES: south from Eric St, Bundeena, Central Coast, 29 Oct. 1999, *A.Horton s.n.* (NSW).

**5. \**Senecio tamoides* DC., *Prodr.* 6: 403 (1838)**

Type: ‘Omsamwoubu’, southern Africa, *Drege*; holo: G *n.v.*; microfiche seen MEL

Climber to c. 2 m high, glabrous. Leaves to c. 12 cm long, with petiole c. half of length; lamina ± orbicular to ovate, with l:w ratio c. 1–1.5, with 1–3 lobes per side; margin entire or with a few denticulations. Capitula several to numerous per branch; calycular bracteoles 3–5, 1–1.5 mm long, c. 0.3 mm wide; involucre 7–8 mm long, c. 2.5 mm diam.; phyllaries 5–8. Florets 15–20; ray florets 3–6; ligule 10–20 mm long, 4-veined, yellow. Achenes not seen at maturity, glabrous. Pappus persistence unknown, 6–7 mm long.

*Notes:* Native to South Africa. Occurs in far south-eastern Queensland. Grows at margins of rainforest. Flowers autumn–winter.

An occasional garden escape. The relatively long corolla of the disc florets (corolla c. 10 mm compared to 5–7 mm long) and relatively small calycular bracteoles distinguish this species from *S. macroglossus* and *S. angulatus*.

*Representative specimens:* QUEENSLAND: Mt Glorious Rd just south of Mt Glorious village, near lower end of Bryce's Rd, *S.P.Phillips 381* (BRI, MEL).

**6. \**Senecio macroglossus* DC., *Prodr.* 6: 404 (1838)**

Type: Table Mountain, Cape of Good Hope, South Africa, *Zeyher*; syn: *n.v.*; ‘Zwarte Omsamcaba and Omsamcubo’, *Drege*; syn: *n.v.*; ‘Albany’, *Drege*; syn: *n.v.*

Climber to c. 3 m high, glabrous. Leaves to c. 6 cm long, with petiole c. half of length; lamina ± triangular, with l:w ratio 0.9–1.2, with a basal lobe on each side; margin entire or with small denticulations usually only near base. Capitula 1–3 per branch; calycular bracteoles 8–12, c. 10 mm long, c. 1.5 mm wide; involucre 9–11 mm long, c. 5 mm diam.; phyllaries c. 10. Florets numerous; ray florets c. 12; ligule 10–20 mm long, 8–10-veined, yellow. Achenes ± narrow-obloid, c. 2.5–3 mm long, pale-brown, glabrous. Pappus persistence unknown, 7–8 mm long. *Natal Ivy*, *Wax Vine*.

*Notes:* Native to South Africa. Occurs in south-eastern Queensland and in New South Wales near the coast. Grows in sandy soils in low coastal rainforest, woodland and mangroves. Flowers most of the year.

The triangular leaf-lamina, fewer and larger capitula and much larger bracteoles distinguish this species from *S. tamoides* and *S. angulatus*.

*Representative specimens:* QUEENSLAND: Boonooroo, *S.P. Phillips 601* (BRI). NEW SOUTH WALES: Sawtell, *B.Kemp 227* (MEL, NSW); near northern end of Grevillea Rd, off Tamarind Ave., Cudgen Nature Reserve, Bogangar, *J.R.Hosking 2023* (CANB, MEL, NE, NSW).

### 7. \**Senecio angulatus* L.f., *Suppl. Pl.* 369 (1782)

Type: Cape of Good Hope, South Africa, *Thunberg; n.v.*

Scrambling or climbing plants to c. 3 m high, glabrous. Leaves to c. 10 cm long, with petiole c. half of length; lamina ovate, with l:w ratio c. 1–2, usually with 1–3 commonly obtuse lobes per side; margin entire or with a few denticulations. Capitula several to numerous per branch; calycular bracteoles 3–6, 1.5–2.5 mm long, c. 0.5 mm wide; involucre 5–6 mm long, c. 3 mm diam.; phyllaries 7–10. Florets 15–20; ray florets 3–6, mostly 5; ligule 8–12 mm long, 4-veined, yellow. Achenes narrow-obloid, 2.0–2.5 mm long, brown, with papillose hairs. Pappus caducous, 5–7 mm long.

*Notes:* Native to South Africa. Occurs in mesic parts of southern Australia, mostly in urban areas especially in the capital cities of southern states. Grows in various soils in shrubland and woodland in disturbed environments. Flowers late autumn–winter.

Similar to *Senecio tamoides* and *S. macroglossus* *q.v.* Also vegetatively similar to the discoid *Delairea odorata* *q.v.*

*Representative specimens:* WESTERN AUSTRALIA: Swan R., Sunset, Nedlands, *G.J.Keighery 13775* (PERTH). SOUTH AUSTRALIA: 4 km north of Palmer, *R.Bates 9898* (AD). NEW SOUTH WALES: east side of Carlisle Ave, Mt Druitt, *R.G.Coveny 16539* (MEL, NSW). VICTORIA: Red Bluff, Sandringham, *D.E.Albrecht 1838* (CANB, MEL). TASMANIA: No records seen. (Present in Tasmania *vide* A.Buchanan pers. comm.)

### 8. \**Senecio crassiflorus* (Poir.) DC., *Prodr.* 6: 412 (1838)

*Cineraria crassiflora* Poir., *Encycl. suppl.* 2: 267 (1811).

Type: Buenos Aires, Brazil, *Commerson; holo: ?P* (Herb. Lam.) *n.v., fide* J.L.M.Poiret, *loc. cit.*

Sprawling subshrub forming mounds to c. 2 m high, densely appressed-woolly throughout. Leaves undivided, spatulate to oblanceolate, to c. 8 cm long, with l:w ratio c. 2–6; base attenuate; margin ± entire or distally crenulate or denticulate. Capitula 1–8 per branch; calycular bracteoles 3–6, 2–6 mm long, c. 1 mm wide; involucre 12–16 mm long, c. 10 mm diam.; phyllaries 20–22. Florets numerous; ray florets 12–22; ligule 15–30 mm long, 4-veined, yellow. Achenes narrow-obloid, 4–7 mm long, pale brown, strongly ribbed, with papillose hairs forming broad bands. Pappus caducous, 10–15 mm long.

*Notes:* Native to South America. Occurs in central and north-eastern New South Wales on the coast from Sawtell south to Cronulla. Grows on coastal dunes. Flowers most of year.

A silvery-grey plant grown as an ornamental and also once planted for coastal erosion control. Naturalised in a few places along the New South Wales coast.

*Representative specimens:* NEW SOUTH WALES: Sawtell Beach, 10 May 1967, *C.Burgess* (CANB).

**9. \**Senecio vulgaris* L., *Sp. Pl.* 2: 867 (1753)**

Type: Europe, Herb. Clifford 406, *Senecio* 1A; lecto: BM, *vide* C.Jeffrey, *Regnum Veg.* 127: 87 (1993).

Annuals to c. 0.5 m high, glabrous except for cobwebby newer growth. Leaves commonly lobate to subpinnatisect, to 10 cm long, with l:w ratio c. 2–5; primary segments c. oblong to triangular; base auriculate, moderately stem-clasping; margin denticulate. Capitula discoid, several to many per stem; calycular bracteoles 8–16, 1.5–3 mm long, 0.4–0.6 mm wide; involucre 5–7 mm long, c. 2–3 mm diam.; phyllaries 13–22, glabrous. Florets numerous. Achenes narrow oblong-ellipsoid, 2.0–3.0 mm long, light brown, with papillose hairs in bands. Pappus caducous, 5–6 mm long.

*Notes:* Native to Europe. Occurs mostly in southern Australia in all capital cities and a few provincial cities. A widespread weed of cool-temperate regions. Grows mostly in urban environments, in garden beds and footpaths. Also occurring in orchards and occasionally invading woodland and forest. Flowers most of the year.

Differs from native discoid species by being a small annual, by having capitula with more numerous florets and phyllaries and calycular bracteoles that are conspicuously jet-black distally. Similar in habit and leaf shape to *S. glossanthus*, *S. halophilus* and *S. productus*, but in these native species the marginal florets are female and minutely ligulate, and the achenes are dimorphic.

*Representative specimens:* WESTERN AUSTRALIA: Western Australian Herbarium grounds, Kensington, Perth, *B.J.Lepschi* 1931 (CANB, MEL, PERTH). SOUTH AUSTRALIA: Mitcham, *R.V.Southcott* B1082 (AD, MEL). QUEENSLAND: Forest Hill, *M.Bodman* (BRI, NSW). NEW SOUTH WALES: Nashdale, Central Tablelands, *M.Dally* 2222 (NSW). AUSTRALIAN CAPITAL TERRITORY: CSIRO grounds, Black Mtn, Canberra, A.C.T., *M.Gray* 6229 (CANB). VICTORIA: corner of Pumps Rd and Axford Rd, Wantirna, *T.B.Muir* 6548 (MEL). TASMANIA: Hobart, 21 Jan. 1930, *F.H.Long* (HO).

**Key to *Senecio***

- 1 Capitula discoid: all florets bisexual, or all florets female, and the corolla-limb of similar size in all florets, to 1.0 mm diam. at base of lobes OR capitula radiate but with only 1–3 ligules; achenes homomorphic
- 2 Annuals; calycular bracteoles pigmented black for 1/2 to 4/5 of length; phyllaries 14–23; florets > 40; corolla-limb shorter than tube ..... **\**S. vulgaris*** (see also **H**)
- 2: Perennial herbs or shrubs; calycular bracteoles not as extensively or darkly pigmented as above; phyllaries 7–13; florets < 40; corolla-limb c. equal to tube
- 3 Gynodioecious herbaceous perennials (plants female or hermaphrodite), not glaucous; achenes < 2 mm long (south-western W.A.) ..... **C. Ramosissimus group**
- 3: Hermaphrodite shrubs or subshrubs, rarely herbaceous perennials, often glaucous; achenes > 2 mm long, or if less then unit inflorescences congested, corymbiform (not south-western W.A.)
- 4 Herbaceous perennials; apex of phyllaries mostly reflexed at anthesis ..... **A. Disciform group**

- 4: Shrubs; apex of phyllaries erect or nearly so at anthesis ..... **B. Odoratus group**
- 1: Capitula radiate or disciform: if disciform, the corolla-limb to 0.5 mm diam. at base of lobes, with corolla-limb of marginal florets significantly smaller than that of central florets; if radiate, ligules 4 or more, sometimes inconspicuous; achenes homomorphic or dimorphic
- 5 Capitula radiate with ligule < 2 mm long, or if ligule vestigial then female marginal florets in a clear minority and the corolla-tube shorter than the achene ..... **F. Glossanthus group**
- 5: Capitula radiate with ligule > 2 mm long, OR disciform with a majority of florets female and the corolla tube longer than the achene
- 6 Capitula disciform ..... **A. Disciform group**
- 6: Capitula radiate
- 7 Involucre < 5.5 mm long, < 3 mm diam., disc florets 8–30; calycular bracteoles 4–8; ligules 4–8 ..... **B. Odoratus group**
- 7: Capitula not entirely as above
- 8 Ligules purplish or rarely white and then inflorescences of several capitula, OR plants climbers with petiolate leaves and lamina with l:w ratio < 2, OR plants grey-woolly all over with entire leaves and ligules 15–30 mm long ..... **H. Exotics**
- 8: Plants not as above
- 9 Plants not glaucous, scapiform or not, rhizomatous or not; calycular bracteoles 4–10 mm long, > 0.5 mm wide at mid-point, parallel-sided or nearly so, ± entirely herbaceous, or if ever shorter than 4 mm long, then leaves with an abrupt transition from a petiole to an undivided lanceolate lamina with margin serrulate ..... **E. Macranthus group**
- 9: Plants glaucous or not, not scapiform or rhizomatous (except in *S. pinnatifolius* var. *alpinus*); calycular bracteoles absent or 1–5 mm long, < 0.5 mm wide at mid-point, or if wider then not parallel-sided, ± entirely herbaceous or with a hyaline margin
- 10 Lower surface of leaves with a dense, closely appressed wool; calycular bracteoles 14–20 ..... **\*S. pterophorus (H)**
- 10: Lower surface of leaves without a dense, closely appressed wool; calycular bracteoles 3–20
- 11 Biennials with plants a rosette of leaves in first season; stem leaves 2- or 3-pinnatisect, with venation of pinnae and pinnules raised on lower surface; capitula numerous per stem; achenes of ray florets glabrous but those of disc florets papillose-hairy ..... **\*S. jacobaea (H)**
- 11: Annuals or perennials with plants developing flowering stems in first season; stem leaves not entirely as above; capitula 1 to many; achenes of ray and disc florets not differing in indumentum as above
- 12 Plants glaucous or not; phyllaries fused or not, with stereome ± flat on drying; calycular bracteoles 0–4(–6); achenes various, sometimes lageniform, sometimes with pairs of ribs forming prominent ridges and with hairs restricted to the groove atop each ridge ..... **D. Magnificus group**

- 12:** Plants not glaucous; phyllaries not fused, with stereome commonly ridged basally on drying; calycular bracteoles 5 or more; achenes various, never lageniform, never with hairy ridges as above  
 ..... **G. Lautusoid group (including \**S. madagascariensis*)**

**A. Disciform Group** (Capitula generally small, mostly disciform)

Terminology: The diameter of the involucre as given below is based on measurement at the junction of middle and upper thirds of the involucre in fresh material (a zone where diameter is fairly constant through developmental stages). Essentially the diameter is a reflection of the number of florets contained within the involucre. Although capitula are nearly cylindrical up until flowering, the basal half changes diameter progressively after flowering as achenes develop and capitula develop a conical shape. Pressed specimens can not reliably be used for this measurement, although measurement across the base of the involucre in only lightly pressed capitula at or slightly prior to anthesis gives a good approximation.

Lageniform achenes are achenes in which the tapering is such that the distal third is distinctly narrower than the proximal third, and so resembles a narrow bottle.

- 1** Mid to upper-stem leaves deeply pinnatisect, often approaching bipinnatisect, with pinnate segments in both distal and proximal halves, or if leaves a little less dissected then segments retrorse
- 2** Leaf segments retrorse; involucre 7.0–11.0 mm long..... **15. *S. runcinifolius***
- 2:** Leaf segments not retrorse; involucre 3.5–7.0 mm long
- 3** Stems ± glabrous; involucre length 3–4 times the diameter; phyllaries predominantly c. 8–10 ..... **5. *S. bipinnatisectus***
- 3:** Stems sparsely to densely coarse-hairy; involucre length 2–3 times the diameter; phyllaries predominantly c. 12–14
- 4** Leaves coarse-hairy; achenes 1.5–2.0 mm long, with papillose hairs ± scattered ..... **8. *S. bathurstianus***
- 4:** Leaves glabrous or with hairs on mid-rib only; achenes 2.0–2.7 mm long, with papillose hairs in bands ..... **7. *S. esleri***
- 1:** Mid- to upper-stem leaves less dissected than above and segments not retrorse
- 5** All or most capitula comprising 7–10 phyllaries
- 6** Leaves glabrous or nearly so on both surfaces (margin may have some short hairs)
- 7** Plants erect; taproot well-developed; mid-stem leaves commonly antrorsely lobate; phyllaries 4.5–6.5 mm long; achenes oblong-ellipsoid ... **2. *S. diaschides***
- 7:** Plants sprawling; taproot inconspicuous; mid-stem leaves entire or with spreading teeth; phyllaries 6.0–8.0 mm long; achenes narrowly lageniform ..... **30. *S. psilophyllus***
- 6:** Leaves with fine and/or coarse hairs on one or both surfaces
- 8** Plants lacking coarse hairs; stems and lower surface of leaves with a somewhat dense indumentum of fine hairs ..... **19. *S. quadridentatus***

- 8: Plants with coarse hairs (sometimes only base coarse and evident as tubercle-like projections) or if not, then indumentum not as above
- 9 Upper-stem leaves scabridulous on upper surface due to coarse hair-bases, woolly on lower surface, with the wool overlying coarse basal portion of hairs (Queensland/New South Wales border).....**25. *S. scabrellus***
- 9: Upper-stem leaves not entirely as above
- 10 Leaves not dissected or with only 1 or 2 segments per side; leaf-margins not crowded-denticulate; base of leaves above mid stem not or hardly amplexicaul, with auricles entire, or small, or absent.
- 11 Secondary roots fleshy and usually slightly tuberiform; lower stem bearing spreading coarse hairs; achenes narrowly lageniform, 2.8–4.0 mm long.....**29. *S. prenanthoides***
- 11: Secondary roots slightly to moderately fleshy but not tuberiform; lower stem appressed-cottony or near glabrous, stem not developing coarse hairs; achenes not or indistinctly lageniform, 2.0–2.8 mm long
- 12 Leaves often with prominent basal lobes > 2 mm long; papillose hairs rather sparse, usually recessed in deep grooves.....**26. *S. tenuiflorus***
- 12: Leaves without basal lobes, or lobes < 2mm long; papillose hairs ± crowded in bands in shallow grooves.....**24. *S. microbasis***
- 10: Leaves regularly dissected, with 3–6 segments per side or not dissected but then margin crowded-denticulate; base of leaves above mid stem somewhat amplexicaul, with auricles well-developed, usually toothed or lobed
- 13 Coarse hairs rather sparse; leaves usually not dissected, with sinuses typically < 25% of distance to midrib.....**1. *S. minimus***
- 13: Coarse hairs scattered to moderately dense; leaves dissected with sinuses typically > 25% of distance to midrib
- 14 Stems and lower surface of leaves often intensely purple; segments of leaves roughly semicircular in outline and with margin crowded-denticulate; uppermost leaves clearly broadest at auricles.....**4. *S. picridioides***
- 14: Stems and lower surface of leaves mostly green, sometimes slightly to moderately purple; segments of leaves not as above; uppermost leaves broadest at auricles or not
- 15 Mid- to upper-stem leaves with coarse hairs on both surfaces, cobwebby overlay not conspicuous; phyllaries predominantly 11–13, or if rarely predominantly 9–10 then achenes red-brown, < 2.2 mm long, and segmentation of mid to upper-stem leaves confined to proximal two-thirds.
- 16 Apex of phyllaries without purple pigmentation; achenes red-brown.....**9. *S. hispidulus***
- 16: Apex of phyllaries with purple pigmentation; achenes tan or light brown.....**10. *S. hispidissimus***
- 15: Mid- to upper-stem leaves as above or one or both surfaces ± glabrous or with a conspicuous cobwebby overlay; phyllaries predominantly 8–10, or if sometimes predominantly 11 or 12 then achenes 3–4 mm long, pale olive-brown, glabrous

- 17 Leaves with roughly triangular segments restricted to proximal 50–60% of leaf; achenes 3.0–4.0 mm long, pale olive-brown, glabrous..... **28. *S. niveoplanus***
- 17: Leaves with triangular, oblong or obovate segments and primary dissection extending into distal third of leaf; achenes 2.0–3.0 mm long, brown and with papillose hairs or red-brown with very fine papillose hairs
- 18 Secondary roots dominant; leaves with the continuous medial band of lamina (see fig. 2) roughly oblong and the distal centimetre commonly with an oblong section 2–8 mm long; achenes with a l:w ratio of c. 4–5, reddish-brown, with fine hairs in lines or somewhat scattered (montane ..... **6. *S. distalilobatus***
- 18: Primary root dominant; leaves with the continuous medial band of lamina somewhat elliptic and the distal cm roughly triangular; achenes with a l:w ratio of c. 6–7, brown, with plump papillose hairs crowded in bands (coastal, occasionally montane)..... **3. *S. biserratus***
- 5: All or most capitula comprising (11–) 13–25 phyllaries
- 19 At least lower stem region developing coarse spreading hairs (which are sometimes partly obscured by overlying wispy extensions), these hairs sometimes becoming lost with age.
- 20 Involucre < 2.0 mm in diameter at junction of middle and upper thirds (unpressed); phyllaries 3.0–6.5 mm long or to 9 mm long but then achenes markedly bottle-shaped (neck 0.3–1.0 mm long); achenes with papillose hairs sparse to dense, forming lines or bands clearly narrower than ribs
- 21 Secondary roots at least as stout as the slender indistinct taproot, distinctly fleshy and commonly slightly tuberiform; achenes lageniform, 2.8–4.5 mm long, with papillose hairs short (with l:w ratio c. 1–2), and sparse to scattered in lines narrower than the ribs ..... **29. *S. prenanthoides***
- 21: Secondary roots finer than the stout taproot, hardly fleshy and not tuberiform; achenes obloid, 1.0–2.2 mm long, with papillose hairs longer than above (with l:w ratio c. 3), scattered to dense in lines or bands
- 22 Peduncle and lower capitulum not cobwebby at anthesis; calycular bracteoles 4–8..... **9. *S. hispidulus***
- 22: Peduncle and lower capitulum cobwebby to woolly at anthesis; calycular bracteoles 6–12..... **12. *S. glomeratus*\***
- 20: Involucre mostly > 2.0 mm in diameter at junction of middle and upper thirds (unpressed); phyllaries 4.0–12.0 mm long; achenes not or only minutely lageniform, with papillose hairs rather dense, forming bands of similar width to than ribs
- 23 Upper-stem leaves without auricles or leaves clearly broadest at mid-leaf and with auricles hardly stem-clasping; phyllaries mostly to 15, rarely c. 18; apex of phyllaries usually with a conspicuous black tip and without a zone of purple pigmentation; achenes commonly minutely lageniform
- 24 Involucre 8.5–10 mm long..... **34. *S. oldfieldii***
- 24: Involucre 5–8 mm long

- 25 Coarse hairs on leaves often 1–2 mm long, usually numerous on uppermost leaves ..... **33. *S. longipilus***
- 25: Coarse hairs on leaves to c. 1 mm long, sparse or absent on uppermost leaves ..... **32. *S. nigrapicus***
- 23: Upper-stem leaves usually auriculate, often broadest at the auricles and with auricles weakly to strongly stem-clasping; phyllaries up to 25; apex of phyllaries with black tip absent or inconspicuous and commonly with a zone of purple pigmentation c. 0.5–1 mm long; achenes narrow-obloid
- 26 Uppermost leaves and inflorescence bracts with long coarse hairs typically numerous on the margin; capitula 1.8–2.5 mm diam.; achenes generally tan to light brown ..... **10. *S. hispidissimus***
- 26: Uppermost leaves and inflorescence bracts with coarse hairs usually absent or few; capitula 2.0–4.0 mm diam.; achenes brown or red-brown or often some achenes blackish
- 27 Taproot poorly developed; involucre 6–11 mm long, 2.8–4.0 mm diam.; phyllaries (12–) 16–25 ..... **36. *S. squarrosus***
- 27: Taproot usually well-developed; involucre 5–8 mm long, 2.0–2.8 mm diam.; phyllaries 12–14 ..... **11. *S. multicaulis*\***
- 19: Stems glabrous or only developing appressed fine hairs
- 28 All florets in a capitulum bisexual and  $\pm$  identical in shape with all corolla-limbs 5-lobed, or disciform with up to c. half of florets female with 4-lobed corollas (in c. 1 marginal series); apex of phyllaries typically strongly reflexed at least on drying
- 29 Leaves glabrous ..... **38. *S. interpositus***
- 29: Leaves densely woolly on one or both surfaces
- 30 Leaves densely woolly on both surfaces; inflorescence branchlets, peduncles and bracts densely woolly; calycular bracteoles > 4 mm long ..... **40. *S. helichrysoides***
- 30: Leaves densely woolly on lower surface only, inflorescence branchlets, peduncles and bracts sparsely woolly; calycular bracteoles < 4 mm long ..... **39. *S. georgianus***
- 28: At least 2/3 of florets in a capitulum female (in c. 2–3 marginal series), with the corolla 2–4-lobed; apex of phyllaries usually not strongly reflexed
- 31 Plants glabrous or nearly so on all parts; leaves elliptic, with a l:w ratio of c. 2–4, often lobed; margin of leaves denticulate or dentate, with apex of lobes and teeth acuminate; involucre 4.0–5.0 mm long ..... **14. *S. laceratus***
- 31: Plants variously hairy or nearly glabrous; leaves not entirely as above; involucre 5.0–13.0 mm long
- 32 Achenes lageniform, 2.0–7.0 mm long
- 33 Stems creeping before arching to erect; leaves in basal third of stem to 8 cm long, markedly broader than mid-stem leaves; lower surface of leaves green, lacking coarse hairs and nearly glabrous (sub-alpine) ..... **31. *S. lageniformis***
- 33: Stems  $\pm$  erect from base; leaves not entirely as above (lowland to montane)

- 34 Unit inflorescences of few to c. 10 capitula; involucre > 3.0 mm diam.; calycular bracteoles > 3.0 mm long, commonly divergent; achenes with papillose hairs in bands covering > 40% of surface, with l:w ratio of hairs c. 4 ..... **37. *S. macrocarpus***
- 34: Unit inflorescences of several to many capitula; involucre < 3.0 mm diam.; calycular bracteoles < 3.0 mm long, appressed; achenes with papillose hairs in lines or bands covering < 40% of surface, with l:w ratio of hairs c. 1–2
- 35 Phyllaries < 8 mm long
- 36 Plant branching all along primary stem at anthesis; primary stem leaves with 1 or 2 near-basal teeth per side **19. *S. glabrescens***
- 36: Plant not branching along primary stem at anthesis except from upper axils; primary stem leaves lacking near-basal teeth
- 37 Plants with taproot distinctly stouter than the slightly fleshy secondary roots; at anthesis capitula and peduncles ± glabrous or if cobwebby then lower stems cottony to woolly also; marginal achenes commonly red
- 38 Plants with mature stems and lower surface of mature leaves not or hardly obscured by indumentums ..... **22. *S. queenslandicus***
- 38: Plants with mature stems and lower surface of mature leaves somewhat obscured by indumentums ..... **20. *S. quadridentatus***
- 37: Plants with taproot inconspicuous, not stouter than the distinctly fleshy secondary roots; at anthesis, capitula and peduncles cobwebby to woolly but lower stems ± glabrous; marginal achenes not red
- 39 Involucre 5–7(–7.5) mm long; achenes 2.5–4.0 mm long, with neck 0.5–1 mm long ..... **18. *S. campylocarpus***
- 39: Involucre > 7 mm long; achenes 4.0–6.0 mm long, with neck 1–2 mm long ..... **16. *S. longicollaris***
- 35: Phyllaries > 8 mm long
- 40 Plants with taproot inconspicuous, not stouter than the distinctly fleshy secondary roots; mid-stem leaves with l:w ratio < 12; capitula cobwebby but mid-stem region ± glabrous at anthesis ..... **16. *S. longicollaris***
- 40: Plants with taproot distinctly stouter than the slightly fleshy secondary roots; mid-stem leaves with l:w ratio > 12 (excluding any lobes); capitula cobwebby or not at anthesis but if so then mid-stem region also cobwebby
- 41 Leaves in lower third of stems ± lacking coarse hairs, linear to narrow-linear, and similar through middle third ..... **20. *S. quadridentatus***
- 41: Leaves in lower third of stems with scattered coarse hairs, oblanceolate to narrow-oblanceolate, becoming wider spaced,

obviously narrower and without coarse hairs through middle third

- 42 Achenes 5–7 mm long (Tasmania) ..... **17. *S. tasmanicus***
- 42: Achenes 3–4 mm long (semi-arid regions of south-eastern Australia) ..... **21. *S. dolichocephalus***
- 32:** Achenes obovoid or oblong-ellipsoid, 1.5–3.0 mm long
- 43** Capitula with involucre 1–1.5 mm diam. (mature receptacle 1–2 mm diam.) and florets 12–25
- 44** Leaves often with spreading basal lobes > 2 mm long; papillose hairs rather sparse, usually recessed in deep grooves ..... **26. *S. tenuiflorus***
- 44:** Leaves without basal lobes, or lobes < 2mm long; papillose hairs ± crowded in bands in shallow groove ..... **24. *S. microbasis***
- 43:** Capitula with involucre 1.6–3 mm diam. (mature receptacle 2–6.5 mm diam.) florets 26–60
- 45** Achenes glabrous or hairs occasional in narrow grooves
- 46** Plants typically growing in water; involucre 2.3–2.8 mm diam.; achenes glabrous, with ribs ± flat ..... **35. *S. psilocarpus***
- 46:** Plants not typically growing in water; involucre 1.5–2.0 mm diam.; achenes glabrous or sparsely papillose-hairy, with ribs flat to convex
- 47** Mid-stem leaves undivided and linear or with 1 or 2 lobes per side confined to proximal half (altitudes below montane) ..... **26. *S. tenuiflorus***
- 47:** Mid-stem leaves undivided and narrowly elliptic or with lobes or teeth extending into distal half of leaf (montane to alpine)
- 48** Plants commonly greyish; leaves above mid-stem usually not divided (although often denticulate to dentate), if ever lobate then lobes spreading to slightly antrorse; calycular bracteoles to 2.0–3.5 mm long; achenes 2.5–4.0 mm long, olive-brown ..... **27. *S. gunnii***
- 48:** Plants mostly greenish; leaves above mid-stem lobate, with lobes moderately antrorse; calycular bracteoles to (2.0–) 3.0–5.0 mm long; achenes 2.0–2.2 mm long, red-brown ..... **13. *S. extensus***
- 45:** Achenes with moderately to very dense narrow to broad bands of papillose hairs
- 49** Base of mid- to upper-stem leaves sagittate due to shape of auricles, or base without auricles; calycular bracteoles 3–5, 1.0–2.0 mm long ..... **23. *S. phelleus***
- 49:** Base of mid- to upper-stem leaves not sagittate, with small auricles usually present; calycular bracteoles 6–10, 1.0–5.0 mm long
- 50:** Calycular bracteoles generally c. half of length of involucral bracts; achenes with bands of hairs narrower than adjacent surfaces (sub-alpine) ..... **13. *S. extensus***
- 50:** Calycular bracteoles generally a quarter to a third of length of involucral bracts; achenes with bands of hairs c. as broad as adjacent surfaces (low altitudes)

- 51** Plants with taproot inconspicuous, not stouter than the distinctly fleshy secondary roots; involucre 6–11 mm long, 2.8–4.0 mm diam.; phyllaries (12–) 16–25..... **36. *S. squarrosus***
- 51:** Plants with taproot usually distinctly stouter than the slightly fleshy secondary roots; involucre 5–8 mm long, 2.0–2.8 mm diam.; phyllaries 12–14 ..... **11. *S. multicaulis*\***

**\*Subspecies of *S. multicaulis***

Length: width ratio of mid to upper-stem leaves (excluding auricles) mostly > 6; lower surface glabrous or indumentum sparse to moderate; involucre 5–8 mm long, length:diam. ratio c. 2.5–3.5..... subsp. ***multicaulis***

Length: width ratio of mid to upper-stem leaves (excluding auricles) mostly < 6; lower surface moderately to densely woolly; involucre 4–6 mm long, length:diam. ratio 2.0–2.5..... subsp. ***stirlingensis***

**\*Subspecies of *S. glomeratus***

Achenes < 1/3 of phyllary length (phyllaries 4.0–6.0 mm long; achenes 1.0–1.7 mm long), commonly all medium to dark red-brown; pappus usually > 5 mm long..... subsp. ***glomeratus***

Achenes > 1/3 of phyllary length (phyllaries mostly 3.0–5.0 mm long; achenes 1.3–2.2 mm long), with marginal ones greenish or olive, and central ones medium brown; pappus usually < 5 mm long..... subsp. ***longifructus***

**B. Odoratus Group** (Often glaucous; capitula small, discoid or radiate and then capitula with 4–8 ligules)

**1** Capitula radiate

- 2** Plants extensively rhizomatous; inflorescences of 1–5 capitula; involucre appressed-woolly..... **9. *S. behrianus***
- 2:** Plants not extensively rhizomatous; inflorescences usually of 20 or more capitula; involucre glabrous
- 3** Leaves with l:w ratio 1.5–3, with base strongly cordate, with lower surface densely woolly..... **10. *S. garlandii***
- 3:** Leaves not entirely as above..... **8. *S. linearifolius*\***

**1:** Capitula discoid

- 4** Leaves ± glabrous, lobate to deeply pinnatisect with 2–6 strongly antrorse lobes/segments per side; reticulate venation obscure; short appressed wool absent
- 5** Leaves deeply pinnatisect, sometimes bipinnatisect, segment axes with l:w ratio > 10..... **1. *S. anethifolius*\***
- 5:** Leaves lobate to subpinnatisect, segment axes with l:w ratio < 5
- 6** Leaves fleshy, lobes/segments commonly c. oblong; phyllaries predominantly 8–10, 4.5–6 mm long (south-eastern Western Australia)..... **2. *S. euclaensis***
- 6:** Leaves not fleshy, lobes usually triangular; phyllaries predominantly 11–13, 5–8 mm long (south-central South Australia)..... **3. *S. gawlerensis***
- 4:** Leaves glabrous or variously indumented, not divided (margins may be toothed), or if lobate then involucre, peduncles and often younger stems and leaves with a

short appressed wool; reticulate venation of leaves sometimes distinct on one or both surfaces

- 7 Leaves to 15 mm wide; margins entire or if denticulate or dentate then involucre lanate; reticulate venation of leaves not apparent
- 8 Mid-branch leaves l:w < 10, margins of all or most leaves ± crowded-denticulate to dentate, sometimes lobate, rarely most leaves ± entire; auricles if present often bidentate; calycular bracteoles to 3 mm long, with l:w ratio mostly > 3; at anthesis, peduncles and capitula patchily to densely woolly, rarely ± glabrous; florets per capitulum 10–18 ..... **4. *S. lanibracteus***
- 8: Mid-branch leaves l:w > 7, margins entire, revolute, auricles if present not divided; calycular bracteoles to 2 mm long, with l:w ratio mostly < 2; at anthesis, peduncles and capitula glabrous or less often patchily woolly; florets per capitulum 8–12 (–14) ..... **5. *S. cunninghamii*\***
- 7: Leaves to 50 mm wide; commonly ± crowded-denticulate or dentate; reticulate venation of leaves apparent on one or both surfaces; involucre glabrous
- 9 Plant not glaucous; mid-branch leaves tapering strongly to a petiole-like proximal portion 1–4 cm long, auricles absent or small, upper surface green, lower surface ± completely obscured by a ± appressed indumentum ..... **6. *S. hypoleucus***
- 9: Plant often glaucous; mid-branch leaves not tapering strongly to a petiole-like proximal portion, auricles commonly well-developed and usually moderately stemclasping; lower surface mostly glabrous or sparsely indumented, rarely moderately obscured by a loosely appressed indumentum ..... **7. *S. odoratus***

**\*Subspecies of *S. anethifolius***

Plants not glaucous, or rarely slightly glaucous; segments of leaves very fine (of major branches mostly 0.8–2.0 mm wide; of secondary branches mostly 0.3–0.8 mm wide, dried); calycular bracteoles (1.5–) 2.0–5.0 mm long; involucre 5.0–8.5 mm long; resin ducts of phyllaries and bracteoles fine, not raised; corolla-lobes mostly 1.0–1.6 mm long (dried) ..... subsp. ***anethifolius***

Plants glaucous at least on newer growth; segments of leaves generally broader than above (of major branches mostly 1.5–3.5 mm wide, of secondary branches mostly 0.6–1.5 mm wide, dried); calycular bracteoles 0.5–2.0 mm long; involucre 3.5–6.0 (–7.0) mm long; resin ducts of phyllaries and bracteoles commonly broad and often raised; corolla-lobes mostly 0.6–1.0 mm long (dried) ..... subsp. ***brevibracteolatus***

**\*Varieties of *S. cunninghamii***

Length:width ratio of mid-branch leaves (of longer branches) 15–40; peduncles and capitula glabrous, often glaucous at and before anthesis ..... var. ***cunninghamii***

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

**\*Varieties of *S. linearifolius***

- 1 Lower surface of mature leaves woolly, with surface largely to entirely obscured; leaves lacking auricles or auricles present only on uppermost leaves and very small and entire; achenes with papillose hairs
- 2 Hairs of lower surface of leaves basally coarse, multicellular and spreading; florets per capitulum 20–30 ..... var. *granitcola*
- 2: Hairs of lower surface of leaves entirely fine; florets per capitulum 16–20 ..... var. *gariwerdensis*
- 1: Lower surface of mature leaves glabrous or slightly to moderately cobwebby, with surface only slightly obscured; leaves often with prominent and/or divided auricles; achenes glabrous or with papillose hairs
- 3 Upper-stem leaves with l:w ratio mostly < 10; involucre 3.5–5.5 mm long; achenes glabrous, or if not then lower surface of leaves strongly glaucous or younger growth moderately woolly/cobwebby
- 4 Plants not glaucous; lower surface of leaves slightly to moderately obscured by mostly cobwebby hairs, new growth ± densely woolly ..... var. *arachnoideus*
- 4: Plants usually glaucous; lower surface of leaves glabrous or hairs coarse, spreading with cobwebby extensions weakly developed, new growth not woolly
- 5 Leaves mostly dentate, commonly with hairs on lower surface, mildly glaucous or occasionally not glaucous; achenes glabrous ..... var. *macrodontus*
- 5: Leaves entire to denticulate, glabrous, strongly glaucous; achenes with papillose hairs ..... var. *dangarensis*
- 3: Upper-stem leaves with l:w ratio various; involucre 2.5–4 (–5) mm long; achenes with papillose hairs
- 6 Plant usually at least slightly glaucous; lower surface of leaves usually with scattered, spreading, rather weak multicellular hairs, glabrescent ..... var. *intermedius*
- 6: Plant not glaucous; lower surface of leaves glabrous or hairs not as above
- 7 Margin of stem leaves entire or appearing so, (minute callus points sometimes developed but these projecting medially due to revolute margin); l:w ratio of upper-stem leaves (5–) 10–30 ..... var. *linearifolius*
- 7: Margin of stem leaves not entire, callus-denticulate, denticulate or dentate; l:w ratio of upper-stem leaves 1.5–10 (–15)
- 8 Mid to upper-stem leaves less than 25 mm wide and with l:w ratio > 4; leaf-base attenuate to cuneate, with basal segments hardly fused with lamina; callus-denticulate or denticulate, with points variably crowded (mostly 1–3 per cm) ..... var. *denticulatus*
- 8: Mid to upper-stem leaves more than 25 mm wide, or if narrower then l:w ratio < 4 and/or with leaf-base broad-cuneate to truncate or cordate; basal lobes commonly broadly fused with lamina; denticulate to dentate to slightly serrate, with points commonly moderately crowded (c. 3–5 per cm) ..... var. *latifolius*

**C. Ramosissimus Group** (Capitula small, not radiate, or with ligules few and white or pink)

- 1 Capitula radiate, with 1–3 small pink or white ligules ..... **1. *S. leucoglossus***
- 1: Capitula discoid
- 2 Plants ± glabrous; leaves undivided, with margin crowded-denticulate; inflorescence narrow-pyramidal (lateral capitula/clusters terminating well below medial capitulum/cluster) ..... **3. *S. ramosissimus***
- 2: Plants conspicuously hairy on stems and/or leaves; leaves divided or not, with margin not crowded-denticulate; inflorescence not narrow-pyramidal
- 3 Leaves pinnatisect; lower surface of leaves appressed-woolly; capitula 4–5 mm long; phyllaries not recurved ..... **2. *S. gilbertii***
- 3: Leaves undivided or lobate; lower surface of leaves glabrous or with coarse hairs on veins; capitula c. 7 mm long; phyllaries strongly recurved ..... **4. *S. barkhausioides***

**D. Magnificus group** (Often glaucous; capitula large, radiate; calycular bracteoles absent or few; mostly arid or semi-arid)

- 1 Leaves linear, with margin entire; calycular bracteoles absent; all or most phyllaries ± seamlessly fused to adjacent phyllaries for more than half their length at anthesis (splitting later into 3 or 4 sections); pappus to 30 mm long
- 2 Ray florets 5 (–7); achenes 2/3–3/4 of length of phyllaries; achenes 5–10 mm long, with papillose hairs c. 0.3 mm long; pappus 5–17 mm long at maturity ..... **5. *S. conferruminatus***
- 2: Ray florets 7–11; achenes c. 1/2 of length of phyllaries; achenes 4–8.5 mm long, with papillose hairs c. 0.6–1.0 mm long; pappus 10–30 mm long at maturity ..... **4. *S. gregorii***
- 1: Leaves not as above; calycular bracteoles present or not; all phyllaries free or fusion less complete than above at anthesis; pappus < 12 mm long
- 3 Annuals; leaves not divided, to 4 cm long; phyllaries fused in groups ..... **6. *S. gypsicola***
- 3: Annuals, perennials or shrubs; leaves divided or not, to 12 cm long; phyllaries usually all free
- 4 Annuals perennials or shrubs to 1.8 m high; usually slightly to strongly glaucous; outermost tubular florets 5–9 mm long; achenes not lageniform
- 5 Inflorescences of 1–5 capitula; phyllaries 10–15 mm long; ligules 12–20-veined; achenes 5–7.5 mm long ..... **7. *S. megaglossus***
- 5: Inflorescences of 3–30 capitula; phyllaries 5–11 mm long; ligules 4-13-veined; achenes 2–6 mm long
- 6 Calycular bracteoles 3–6; achenes 4–5 mm long, with pairs of ribs forming prominent ridges, long hairs arising only from grooves along summit of ridges; pappus persistent ..... **9. *S. pilosicristus***
- 6: Calycular bracteoles 0–4; achenes not with ridges and indumentum as above, or if so then achene < 4 mm long and pappus caducous

- 7 Leaves strongly stem-clasping; inflorescences commonly with more than 20 capitula; achenes 2–4 mm long, with hairs confined to grooves along summit of ridges, pappus caducous, c. 5 mm long ..... **10. *S. velleioides***
- 7: Leaves hardly stem-clasping; inflorescences commonly with less than 20 capitula; achenes 3–7 mm long, not indumented and ridged as above; pappus persistent, > 6 mm long ..... **8. *S. magnificus***
- 4:** Annuals to 0.5 m high; not glaucous; outermost tubular florets 4–6 mm long; achenes lageniform or not
- 8** Leaf-segments lobate, with lobes moderately crowded; leaves often with scattered long hairs, somewhat caducous; achenes not tapered distally, densely hairy, with hairs long ..... **1. *S. platylepis***
- 8:** Leaf-segments entire or lobes well-spaced; leaves usually glabrous or nearly so; achenes lageniform, with granular papillae
- 9** Leaves dentate to deeply lobate, axis of segments to 15 mm long; phyllaries glabrous; achenes largely covered throughout by whitish papillae ..... **3. *S. murrayanus***
- 9:** Leaves lobate–pinnatisect, axis of segments to 40 mm long; phyllaries with a few coarse hairs; achenes with sparse to moderately dense often translucent papillae, often sparser on neck ..... **2. *S. tuberculatus***

**E. *Macranthus* Group** (Capitula large, radiate; calycular bracteoles narrow-oblong; most species in areas of moderate to high rainfall)

- 1** Larger leaves all or mostly cauline at anthesis; most leaves above mid-stem > 3 cm long (lowland to montane)
- 2** Plants extensively rhizomatous; pappus 12–20 mm long (lowland plains) ..... **4. *S. daltonii***
- 2:** Plant not extensively rhizomatous; pappus 5–10 mm long (hills and mountains)
- 3** Stem leaves with l:w ratio 1–4, deeply pinnatisect proximally (branch leaves may be undivided and then margin with occasional teeth); phyllaries with pigmented hairs or not; ligules 7 (–8) nerved ..... **1. *S. vagus*\***
- 3:** Stem leaves with l:w ratio 3–25, undivided, with margin entire or crowded-denticulate; phyllaries glabrous; ligules 4- or 5- (or rarely to 7-) nerved
- 4** Leaves linear, gradually tapering to base; phyllaries 18–22 ..... **2. *S. macranthus***
- 4:** Leaves with an abrupt transition from petiole to lamina, with lamina narrow-elliptic; phyllaries 12–16 ..... **3. *S. amygdalifolius***
- 1:** Larger leaves all or mostly basal at anthesis; all leaves/bracts above mid-stem < 3 cm long (mostly montane to alpine)
- 5** Leaves hairy; stem leaves/bracts up to 5 (excluding distalmost 1 cm of stem)
- 6** Basal leaves ± sharply demarcated into petiole and blade, usually at least some > 15 mm wide; upper surface lacking broad-based coarse hairs; lower surface with secondary venation raised, conspicuous; capitula 1–4 ..... **9. *S. primulifolius***
- 6:** 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); lower surface with inconspicuous secondary venation; capitulum 1 ..... **8. *S. papillosus***
- 5:** Leaves ± glabrous; stem leaves/bracts 5–15 (excluding distalmost 1 cm of stem)

- 7 Leaves deeply lobate to pinnatisect, with 3–6 c. oblong segments per side, concolorous or nearly so; inflorescence of a solitary capitulum; ligules yellow ..... **7. *S. pectinatus*\***
- 7: Leaves not divided or lobate, with 1–several serrations or c. triangular lobes per side, markedly discolorous; inflorescences of 1 or more capitula; ligules yellow, white, or cream
- 8 Leaves 4–10 mm wide, with teeth or lobes 3 or more per side; inflorescences mostly of 3 or more capitula; ligules yellow..... **5. *S. leptocarpus***
- 8: Leaves 1–4 mm wide, with teeth 1 or 2 per side; inflorescences of a solitary capitulum; ligules white or cream..... **6. *S. albogilvus***

**\*Subspecies of *S. vagus***

- Margin of leaves, peduncle and margin of calycular bracteoles with coarse hairs; phyllaries with pigmented coarse hairs; achenes usually glabrous.....subsp. ***vagus***
- Margin of leaves, peduncle and margin of calycular bracteoles glabrous or nearly so; phyllaries glabrous; achenes usually with hairs in lines along ribs.....subsp. ***eglandulosus***

**\*Varieties of *S. pectinatus***

- Rosette leaves 1–5 (–8) cm long, with medial zone of unbroken lamina not or only slightly increasing in width distally, 1–2 (–4) mm wide at widest; calycular bracteoles (4–) 5–6.5 mm long; involucre 6–9 mm long, 8–15 (–20) mm wide at widest point when pressed..... var. ***pectinatus***
- Rosette leaves (3–) 4–15 cm long, with medial zone of unbroken lamina clearly broadening distally and generally > 4 mm wide in at least some leaves; calycular bracteoles 6–10 mm long; involucre 8–12 mm long, 15–30 mm wide at widest point when pressed .....var. ***major***

**F. *Glossanthus* Group** (Capitula small; capitula radiate with rays inconspicuous or capitula disciform; achenial dimorphism in most species)

- 1 Achenes all similar in length; attachment points on receptacle not dimorphic as below; corolla-tube of female florets distinctly longer than the mature achene..... **4. *S. serratifomis*\***
- 1: Achenes of female florets longer than those of bisexual florets; attachment points on receptacle for achenes of female florets thickened and usually projecting (in contrast to attachment points for bisexual achenes); corolla-tube of female florets shorter than or equal to the mature achene
- 2 Phyllaries 12 or 13 in a majority of capitula; female florets 8–13; achenes of female florets 3–6 mm long, slightly lageniform..... **2. *S. productus*\***
- 2: Phyllaries 7–10, or occasionally to 13, in a majority of capitula; female florets predominantly 4–8; achenes of female florets 2–3.5 mm long, not lageniform
- 3 Involucre 3.5–6 mm long; calycular bracteoles 0.2–0.5 mm wide; mature receptacle 1–2 (–2.5) mm diam.; ligules generally exceeding involucre; hairs on achenes of bisexual florets < 0.15 mm long, barely exceeding pappus ring..... **1. *S. glossanthus***

- 3: Involucre 5–7 mm long; calycular bracteoles 0.5–1 mm wide; mature receptacle mostly 2–3.5 mm diam.; ligules not exceeding involucre; hairs on achenes of bisexual florets > 0.2 mm long, clearly exceeding pappus ring.....**3. *S. halophilus***

**\*Subspecies of *S. productus***

Ligule vestigial; achenes of female florets < 4.5 mm long ..... subsp. ***productus***

Ligule c. 1 mm long; achenes of female florets > 4.5 mm long ..... subsp. ***magnus***

**\*Subspecies of *S. serratiformis***

Mid-stem leaves with l:w ratio < 7; margin with several to many serrations; involucre 7–8 mm long..... subsp. ***serratiformis***

Mid-stem leaves with l:w ratio > 7; margin subentire or few-toothed; involucre 6–7 mm long..... subsp. ***stenophyllus***

**G. Lautusoid Group** (Capitula radiate; rays mostly 8–13; calycular bracteoles several to many, ovate to lanceolate)

- 1** All or most capitula in an inflorescence with phyllaries c. 13 or c. 20 and number of ligules several fewer than number of phyllaries, i.e. ligules 8–10, phyllaries 13; ligules c. 13, phyllaries c. 20 (arid, semiarid or mesic environments)
- 2** Stem and major branch leaves commonly undivided, sometimes with a few lobes per side; leaf margin with frequent often minute marginal points per side (often difficult to ascertain in pressed material); phyllaries mostly c. 20; achenes 1.5–2.2 mm long, 0.3–0.5 mm diam..... **11. *S. madagascariensis***
- 2:** Stem and major branch leaves divided or not; leaf margin with few to numerous marginal points per side, but if numerous then leaves generally markedly serrate, lobate or pinnatisect; phyllaries mostly c. 13 or mostly c. 20; achenes (1.8–) 2.0–5.0 mm long, 0.5–0.8 mm diam.
- 3** Lower surface of leaves often with numerous somewhat persistent coarse hairs or hair-bases; calycular bracteoles with intense purple pigmentation in distal half to one third; achenes of ray florets c. 1 mm longer than those of disc florets and with a much broader carpopodial ring (Perth region and Busselton, Western Australia) ..... **1. *S. condylus***
- 3:** Lower surface of leaves commonly glabrous or nearly so, sometimes occasional long hairs persistent; calycular bracteoles with pigmentation usually not as intense and/or extensive as above; ray achenes not dimorphic as above or if ever approaching this degree of dimorphism, then only the distal quarter or less of calycular bracteoles pigmented (widespread)
- 4** Phyllaries usually > 5.0 mm long and mature achenes of ray florets > 3.0 mm long; achenes of ray florets slightly longer than those of disc florets; attachment zones on receptacle for achenes of female florets more prominent than those for achenes of disc florets
- 5** Phyllaries mostly c. 20; ligules mostly c. 13 (central Australia between latitudes 22° and 27°) ..... **8. *S. eremicola***

- 5: Phyllaries mostly c. 13; ligules mostly c. 8; (arid southern Australia south of latitude 26°)..... **9. *S. lacustrinus***
- 4: Phyllaries < 5.0 mm long and/or mature ray achenes < 3.0 mm long, or if phyllaries and achenes slightly longer then achenes or receptacle not as above
- 6 Annuals, not developing bark on lower stems and taproot; leaves pressing thin; margin of mid-stem leaves with several to numerous denticulations/teeth per side; in dried specimens paler involucre commonly contrasting with a brown to dark-brown receptacle (in some or most capitula) (southern Queensland and adjacent eastern parts of Northern Territory and South Australia)
- 7 Phyllaries mostly 13 (and ligules c. 8), occasionally phyllaries mostly c. 18; achenes 1.6–2.5 mm long; achenes of female florets with surface fully obscured by coarse papillose hairs, with these hairs strongly overtopping pappus-ring (L. Eyre basin, far south-western Queensland, north-eastern South Australia, also eastern Northern Territory) ..... **7. *S. depressicola***
- 7: Phyllaries mostly c. 18–22 (and ligules c. 13); achenes 2.5–3.0 mm long; achenes of female florets with surface partly obscured by fine hairs, with these hairs hardly overtopping pappus-ring (semiarid to arid south-eastern to south-central Queensland)..... **6. *S. brigalowensis***
- 6: Perennials (commonly), with bark developing on lower stems and major branches and taproot; leaves pressing thin or somewhat fleshy; margin of stem/major branch leaves with 0–2 (–4) denticulations/teeth per side; in dried specimens involucre and receptacles similar in colour or if contrasting as above then marginal points on mid-stem (mid-branch) leaves few per side (north-western and south-eastern Australia)
- 8 Leaves not fleshy, pressing thin, above mid-branch tapering to subpetiolate basally; margin of leaves entire (Hamersley Ra. and environs and Cape Ra., Western Australia)..... **10. *S. hamersleyensis***
- 8: Leaves often slightly fleshy, pressing thin or thick, above mid-branch often very narrow but generally not tapering basally; margin of leaves entire or with denticulations (southern and eastern Australia)
- 9 Mid-branch leaves 2–3-pinnatisect (including leaves with only single lobes on primary segments)..... **4. *S. pinnatifolius*\***
- 9: Mid-branch leaves (entire or) 1-pinnatisect
- 10 Segments of leaves narrow-linear to filamentous (l:w ratio generally > 20 and/or segments < 0.5 mm wide); narrow basal segments often arising from a narrow rachis; calycular bracteoles often purple-tipped (under magnification) (hills, often rocky sites)..... **4. *S. pinnatifolius*\***
- 10: Segments of leaves mostly narrow-oblong to narrow-linear (l:w ratio generally < 20 and larger segments > 0.5 mm wide); narrow basal segments not developed except from a broadened rachis; calycular bracteoles not purple-tipped (semi-arid plains)..... **5. *S. spanomerus***
- 1: All or most capitula in an inflorescence with number of phyllaries c. 13, and number of ligules similar (semiarid or mesic environments)
- 11 Leaves very fleshy, to 5 cm long; involucre 5–11 mm long; broader stereomes to 3.0 mm wide, not ridged on drying; achenes 3.0–7.0 mm long; pappus usually persistent (coastal or near coastal dunes)

- 12 Undivided leaves with l:w ratio < 4 (rachis of divided leaves with l:w ratio < 15); margin of leaves usually serrate or serrulate; calycular bracteoles not or hardly overlapping at anthesis; achenes glabrous or variously hairy (eastern Australia) ..... **2. *S. spathulatus*\***
- 12: Undivided leaves with l:w ratio > 4 (rachis of divided leaves with l:w ratio > 15); margin of leaves entire or nearly so; calycular bracteoles overlapping at anthesis; achenes densely hairy (south-western Western Australia) ..... **3. *S. warrenensis***
- 11: Leaves thin to fleshy, to 15 cm long; involucre 3–8 mm long; broader stereomes to 1.5 mm wide, commonly ridged on drying; achenes 1.6–4.5 mm long; pappus mostly caducous (habitat various)
- 13 Outer phyllaries with hyaline margin slender but distinct (> 0.1 mm wide) under low magnification in proximal 2/3 of phyllary ..... **4. *S. pinnatifolius*\***
- 13: Outer phyllaries with hyaline margin hardly developed (to c. 0.1 mm wide) in proximal 2/3 of phyllary
- 14 Plants with taproot usually poorly to moderately developed; undivided leaves or rachis of divided leaves of major branches variously shaped; segments 0–6 per side, arising up to 80% of the way along leaves, variously shaped, with margin entire or variously toothed or lobed (Choose leaves in middle third of major branches)..... **4. *S. pinnatifolius*\***
- 14: Plants developing a stout taproot; undivided leaves or rachis of divided leaves always more or less narrow-linear; segments (0–) 1 or 2 (–3) per side, generally not arising beyond 60% of the way along leaves, narrow-oblong to narrow-linear and with margin quite entire (Choose leaves in middle third of major branches)
- 15 Segments of leaves narrow-linear to filamentous (l:w ratio generally > 20 and/or segments < 0.5 mm wide); narrow basal segments often arising from a narrow rachis; calycular bracteoles often purple-tipped (under magnification) (hills, often rocky sites)..... **4. *S. pinnatifolius*\***
- 15: Segments of leaves mostly narrow-oblong to narrow-linear (l:w ratio generally < 20 and larger segments > 0.5 mm wide); narrow basal segments not developed except from a broadened rachis; calycular bracteoles not purple-tipped (semi-arid plains) ..... **5. *S. spanomerus***

**\*Varieties of *S. spathulatus***

- 1 Mid-branch leaves usually tapering somewhat basally (width 3 mm from base commonly < 1/3 of the maximum width); achenes ± densely hairy ..... var. *attenuatus*
- 1: Mid-branch leaves not tapering or tapering slightly basally (width 3 mm from base commonly > 1/3 of the maximum width); achenes glabrous or sparsely to moderately hairy
- 2 Achenes 4.0–7.0 mm long, c. 0.8–1.2 mm diam., straw coloured to pale brown, glabrous, rarely with scattered hairs (eastern Victoria, far south-eastern New South Wales) ..... var. *latifructus*
- 2: Achenes 3.0–5.5 mm long, c. 0.5–0.8 mm diam., sparsely to moderately hairy or glabrous, surface golden or dark brown (Tasmania) ..... var. *spathulatus*

**\*Varieties of *S. pinnatifolius***

- 1 Leaves bi- or tri-pinnatisect; stems succulent; capitula and leaves rather crowded; ligules not or hardly longer than involucre in pressed specimens (Bass Strait Is.)..... var. ***capillifolius***
- 1: Leaves not bi-pinnatisect, or if so then stems not or hardly succulent, capitula and leaves crowded or lax; ligules generally distinctly longer than involucre in pressed specimens
- 2 Distal portion of stereome of inner phyllaries more than twice as broad as stereome of outer phyllaries (both measured c. 1 mm below apex), usually bordered by a purple chevron (distinct under low magnification); margins of outer phyllaries c. as broad as the stereome 1 mm below apex; tap-root generally poorly developed (south-eastern mostly south of latitude 35°30S)..... var. ***lanceolatus***
- 2: Distal portion of stereome of inner phyllaries not bordered by a purple chevron, or only faintly bordered, generally less than twice as broad as that of outer phyllaries (both measured c. 1 mm below apex); margin of outer phyllaries narrower than stereome 1 mm below apex; tap-root often well-developed (widespread)
- 3 Calycular bracteoles 10–16, broad-ovate to ovate, > 0.8 mm wide at mid-point and length less than twice the width at mid-point, largely hyaline; apex of stereome of inner phyllaries commonly with a faint chevron (south-western Western Australia)..... var. ***latilobus***
- 3: Calycular bracteoles 6–12, ovate to lanceolate, either < 0.8 mm wide at mid-point or length more than twice the width at mid-point, usually predominantly herbaceous; chevron generally absent
- 4 Leaves thin, markedly discolorous; marginal points, mostly as serrulations, generally 15 or more per side; upper-branch leaves with base not narrower than mid-leaf (forests of northern New South Wales and southern Queensland)..... var. ***serratus***
- 4: Leaves usually somewhat fleshy and or succulent, not or only slightly discolorous; marginal points fewer than 15 per side, or if more then upper-branch leaves with base narrower than mid-leaf (widespread).
- 5 Plants often rhizomatous, with aerial stems ± unbranched; leaves oblanceolate in outline and/or marginal points and segments clearly more numerous beyond mid-leaf; usually both peduncle and margin of calycular bracteoles moderately pubescent (montane to alpine regions)..... var. ***alpinus***
- 5: Plants not rhizomatous, with stems generally branched; leaves not as above or if so then not peduncle and margin of bracteole not both pubescent
- 6 Leaves crowded, fleshy, 1–2 cm long; achenes c. 4 mm long, with surface completely obscured by hairs (Western Australia)..... var. ***leucocarpus***
- 6: Leaves various; achenes < 4 mm long or if longer then surface clearly visible (distribution various)
- 7 Leaves generally only slightly fleshy, pressing fairly thin; leaves often developing straplike basal segments from a narrow rachis; rachis of upper-branch leaves generally narrower than stem at base; achenes to 4.5 mm long, usually c. half to two-thirds of the length of phyllaries..... var. ***pinnatifolius***
- 7: Leaves fleshy, pressing thick, and often coarsely wrinkled; leaves not developing straplike basal segments from a narrow rachis; rachis of

upper-branch leaves often as broad as or broader than stem at base; achenes to 3 mm long, generally less than half the length of phyllaries

- 8** Sprawling to prostrate plants; length:width ratio of rachis of leaves mostly 1–10; hairs of achenes of ray florets exceeding pappus-ring (southern coast, including western Tasmania)..... var. *maritimus*
- 8:** Erect plants; length:width ratio of rachis of leaves 6–50; hairs of achenes of ray florets not exceeding pappus-ring (Western Australia)..... var. *pinnatifolius*

## H. Exotic Species

- 1** Erect annuals to c. 0.5 m high; capitula discoid ..... **9.** *S. vulgaris*
- 1:** Annuals or perennials, erect or not, sometimes climbing, to c. 3 m high; capitula radiate
- 2** Scrambling or climbing plants; leaves (excluding uppermost leaves) with a petiole-like portion comprising nearly half of its length, abruptly widening into an undivided or lobate lamina  $\leq$  twice as long as broad
- 3** Basal lateral lobes of leaves with apex acute, margin of leaves entire or nearly so between basal lobes and apex; inflorescences of 1–3 capitula; calycular bracteoles c. 10 mm long; ray florets c. 12 ..... **6.** *S. macroglossus*
- 3:** Basal lateral lobes of leaves with apex acute to rounded; margin of leaves usually dentate or lobed between basal lobes and apex; inflorescences mostly of 10 or more capitula; calycular bracteoles 1–3 mm long; ray florets 3–6
- 4** Corolla of disc florets 9–12 mm long ..... **5.** *S. tamoides*
- 4:** Corolla of disc florets 5–6 mm long ..... **7.** *S. angulatus*
- 2:** Plants habit not as above; leaves not entirely as above
- 5** Ligule white, pink or purple
- 6** Leaves usually lobate with lobes/segments not dilated distally; calycular bracteoles < 1 mm wide; phyllaries 20–22 ..... **4.** *S. glastifolius*
- 6:** Leaves pinnatisect with primary segments dilated distally; calycular bracteoles > 1 mm wide; phyllaries 12–16..... **3.** *S. elegans*
- 5:** Ligule yellow
- 7** Plants grey, woolly throughout; leaves entire; involucre 12–16 mm long ..... **8.** *S. crassiflorus*
- 7:** At least part of plants green; leaves usually toothed or deeply dissected; involucre 3.5–5 mm long
- 8** Leaves dentate, sometimes appearing entire; lower surface  $\pm$  completely obscured by a close, dense indumentum; calycular bracteoles 14–20; phyllaries 18–22 ..... **1.** *S. pterophorus*
- 8:** Leaves pinnatisect, lower surface not or slightly obscured by hairs; calycular bracteoles 3–6; phyllaries 11–13 ..... **2.** *S. jacobaea*

## 10. *Erechtites* Raf., *Fl. Ludov.* 65 (1817).

Annuals or perennial herbs. Leaves sessile, with veins pinnate. Capitula disciform, pedunculate, calyculate; phyllaries free. Florets: corolla-limbs greenish-white or

pinkish. Anthers not known. Style-branches recurved; apex with a short conical appendage. Achenes oblong-ellipsoid. Pappus caducous.

A genus of six species, all native to the New World.

\**Erechtites valerianifolius* (Wolf) DC., *Prodr.* 6: 295 (1838) forma *valerianifolius*.

*Senecio valerianifolius* Wolf, *Ind. Sem. Hort. Berol.* (1825), as *valerianaefolius*.

Type: cult, '*Senecio valerianaefolius* ex Herb. Raffeliano, 1825', Herb. Reichenbach f. 16256; neo: W, *vide* R.O. Belcher, *op. cit.* 26.

Annuals to c. 2 m high. Hairs rather sparse on mature stems, peduncles and leaves. Leaves to c. 20 cm long, with l:w ratio c. 2–3, usually deeply lobed to pinnatisect, petiole-like basally, margin serrate. Capitula numerous per stem; mature peduncle to c. 20 mm long; calycular bracteoles 6–10, linear, 1.5–3 mm long; involucre 7–10 mm long, 2–3 mm diam.; phyllaries c. 12–14; stereome flat, with 4 or 5 resin ducts; mature receptacle with pits raised, concave. Florets numerous; corollas c. 8 mm long, exceeding phyllaries by c. 1–2 mm, with basal cone much elongated, c. 0.3 mm diam., with limb 1/4–1/3 of total length, very narrow-obconical, pink, usually pale yellow when dry. Style-branches purple. Achenes narrowly oblong-ellipsoid, 2.5–4 mm long, with c. 10 narrow convex ribs, pale brown, darker in grooves, with scattered hairs in grooves. Pappus 8–12 mm long, pink; bristles minutely and sparsely scabrid-barbellate. *Brazilian Fireweed*.

*Notes:* Native to Central and South America, but widespread as a weed. Occurs in far south-eastern Queensland south to the Sydney region in central-eastern New South Wales. Grows in disturbed sites in mesic environments, including forests. Flowers mostly summer–autumn.

*Erechtites valerianifolius* is similar to the Australian disciform species of *Senecio*, but has lyrate divided leaves, raised receptacular pits, corolla-bases tapering very gradually upwards from the base, different style-branch morphology, and a pink pappus. It is occasionally confused with the sometimes sympatric *Crassocephalum crepidioides*.

*Representative specimens:* QUEENSLAND: Utchee Ck, *D.R. Bailey 50* (BRI); Near Brummies Lookout, SE of Tyalgum, *A.R. Bean 14559* (BRI). NEW SOUTH WALES: Tooloom Falls, *N.S. Lander 322* (BRI, NSW); Lane Cove National Park, *M. Gray 5209* (CANB).

### 11. *Crassocephalum* Moench, *Methodus* 516 (1794).

Annual herbs. Leaves sessile, pinnately veined. Capitula discoid (in Australia) or radiate, pedunculate, calyculate; phyllaries free or rarely fused. Florets: corolla-limbs variously coloured. Anthers ecaudate. Style-branches angled upwards; apex crowned with papillae, with a long tapering terminal appendage. Achenes homomorphic, obloid. Pappus caducous.

A genus of c. 40 species native to Arabia, tropical Africa and Madagascar.

\**Crassocephalum crepidioides* (Benth.) S. Moore, *J. Bot.* 50: 211 (1912)

*Gynura crepidioides* Benth., in W.J. Hooker, *Niger Fl.* 438 (1849).

Type: Sierra Leone, *G. Don*; lecto: BM, *vide* A.J.C. Grierson in M.D. Dassanayake & F.R. Fosberg (eds) *Revis. Handb. Fl. Ceylon* 1: 248 (1980).

Annual herbs to c. 1.2 m high. Hairs moderately dense on most parts except leaves. Leaves to 20 cm long, with l:w ratio mostly c. 2–3, undivided or lobate to pinnatisect in proximal half; base petiole-like or sub-basal segments present, margins irregularly serrate. Inflorescence of few–several discoid capitula (capitula nodding at anthesis); mature peduncle to c. 40 mm long; calycular bracteoles 8–12, narrow-linear, 2–5 mm long; involucre 8–12 mm long, 3–5 mm diam.; phyllaries commonly c. 16, sparsely pubescent, glabrescent; stereome  $\pm$  flat, with 1 or 2 inconspicuous resin ducts, with coarse hairs or glabrous; mature receptacle with pits strongly elevated. Florets numerous; corolla c. 10 mm long, exceeding phyllaries by 2–3 mm, with base c. 0.2 mm diam, with limb c. 2/5 of total length, very narrow-obconical, orange to reddish-brown (drying pink); style-appendage purple. Achenes oblong-ellipsoid, 2.0–2.3 mm long, with c. 10 narrow convex ribs, purple, with scattered hairs in grooves. Pappus 8–14 mm long; bristles minutely and sparsely scabrid-barbellate. *Thickhead*.

*Notes:* Native to tropical Africa. Occurs in eastern Queensland south from Mt Mulligan in the far north to the Queensland/New South Wales border, and in eastern New South Wales extending as far south as Wollongong. A widespread weed extending from India ESE through South-east Asia to northern Australia. Grows in predominantly disturbed and cultivated sites in various soils in woodland, forest, and grassland. Flowers most of year.

*Crassocephalum crepidioides* has raised receptacular pits identical to those seen in *Erechtites valerianifolius*. These two species have often been confused; however, they are easily distinguished by the colour of the pappus, and their leaf morphology is significantly different. Phylogenetic studies using molecular data by Pelsner *et al.* (2002) show *Crassocephalum* and *Erechtites* to be closely related and this corresponds to the closeness in receptacle morphology seen in naturalised species of each genus in Australia.

*Representative specimens:* QUEENSLAND: Amys Peak, Kroombit Tableland, c. 60 km SW of Gladstone, *M.D.Crisp 2847* (CANB, BRI); creek behind Cannon Park Racecourse, Cairns City, *R.L.Jago 4244* (BRI, DNA, MEL). NEW SOUTH WALES: Tweed R., Duranbah, *H.S.McKee 11651* (CANB); Formerly Ring's property, above Mt Keira Scout Camp, c. 8 km west of Wollongong, *P.C.Jobson 4305* (BRI, CANB, NSW).

## 12. *Arrhenechthites* Mattf., *Bot. Jahrb. Syst.* 69(2): 288 (1938)

Erect, perennial herbs. Leaves sessile, pinnately veined. Capitula disciform, pedunculate, calyculate; phyllaries free. Florets: outer florets with corolla zygomorphic (in Australia) with a rudimentary ligule; central florets functionally male (not in Australia) or bisexual, with corolla-limbs yellow or tinged purple. Anthers ecaudate. Style-branches erect, with apex truncate or obtuse, crowned with papillae, without terminal appendage. Achenes homomorphic, narrow-obloid. Pappus caducous.

A genus of five species from New Guinea and Australia. The single species in Australia is endemic. The genus is characterised by the functionally male central florets with short, astigmatic style-branches with papillose-hairy outer faces (Belcher 1956). In some instances, however, the Australian species has been found to have bisexual central florets.

*Arrhenechthites mixtus* (A.Rich.) Belcher, *Ann. Missouri Bot. Gard.* 43: 75 (1956), as *mixta*.

*Senecio mixtus* A.Rich., in J.S.C.Dumont d'Urville, *Voy. Astrolabe* 2: 112 (1834); *Erechtites mixtus* (A.Rich.) DC., *Prodr.* 6: 297 (1838), as *mixta*.

Type: Port-Jackson [most likely collected from the Blue Mtns to the west of Port Jackson], New South Wales, *C.Gaudichaud-Beaupré*; holo: P.

Plants to c. 0.9 m high, with fleshy subtuberous roots, with scattered hairs; hairs multicelled, pale or purplish basally, terminating in a long fine whitish portion that is soon lost. Leaves often somewhat abruptly broadening from petiole-like to broad-laminate, to 12 cm long, with l:w ratio c. 3–5, lobate to pinnatisect, with degree of dissection reducing distally, with 3–9 segments per side; base often with 1 or 2 narrow segments; margin entire or with a few denticulations or teeth; lamina ± glabrous except for short coarse hairs on or near margins (but new growth briefly cobwebby); secondary venation evident; abaxial surface purple. Capitula few to c. 20 per stem; mature peduncle mostly to c. 50 mm long; calycular bracteoles 3–6, 4.0–6.0 mm long, 0.4–0.6 mm wide; involucre 12–20 mm long, 2–3 mm diam.; phyllaries 7–10, flat, glabrous or hairy. Florets 10–15; outer florets 8–10, with a pale yellow or purplish, irregularly deeply and peracutely lobed ligule c. 1 mm long. Achenes narrow obloid, 6–8 mm long, prominently ribbed, glabrous. Pappus c. 12 mm long. *Purple Fireweed*.

*Notes:* Occurs in south-eastern Australia from Mt Spirabo in north-eastern New South Wales south to eastern Victoria. Grows on soils of various derivation including granite, greywacke, quartzite and conglomerate, in open forest, at moderate altitudes (to 1560 m). Flowers mid-spring–late summer.

*Arrhenechthites mixtus* is a peculiar species which was originally described as a *Senecio*, then transferred to *Erechtites*, and finally transferred to *Arrhenechthites*, an otherwise entirely New Guinean genus in 1956. It differs from other species of *Arrhenechthites* in having inflorescences with fewer capitula, sometimes bisexual central florets, outer florets with a more pronounced ligule, markedly longer fruits and capitula, leaves intensely purple on the abaxial surface, and pigmented multicellular hairs on the phyllaries. This casts some doubts as to its suitability to be classified in *Arrhenechthites*, and ultimately *A. mixtus* may be best placed in a genus of its own. The phylogeny of tribe Senecioneae is currently under investigation using molecular data (Pieter Pelsers pers. comm.), and initial findings using plastid and nuclear (ITS region) data indicate that *Arrhenechthites mixtus* is most closely related to *Arrhenechthites novoguineensis*, *Dendrocacalia crepidifolia* and *Senecio thapsoides*. The clade formed by these species is sister to a clade comprising species of *Erechtites*, *Crassocephalum* and many species of *Senecio* (*Senecio sensu stricto*).

Morphologically, *A. mixtus* resembles *Gynura drymophila* in phyllary and fruit morphology, but its style-branch morphology is significantly different. Curiously, it combines features of two Australian species of *Senecio* with which it more or less sympatric. It resembles the radiate species *Senecio vagus* subsp. *vagus* in leaf morphology and by having similar pigmented multicellular hairs, and it resembles the disciform species *S. prenanthoides* in terms of leaf pigmentation, its slender capitula, low numbers of florets per capitulum, and its subtuberous secondary roots. The minutely ligulate female florets could also be interpreted as being intermediate in morphology between these species.

*Representative specimens:* NEW SOUTH WALES: 12 km south of Tantawangalo, south of Chalkhills Fire Trail, Tantawangalo State Forest, *I.Crawford 2255* (CANB, MEL, NSW).

VICTORIA: Fork Track area, between Tulach Ard Rd and Snowy R. Gorge, *A.C.Beauglehole* 37347 (MEL; 2 sheets).

**13. *Emilia*** Cass., *Bull. Sci. Soc. Philom. Paris* 68 (1817).

Annual to perennial herbs. Leaves sessile, pinnately veined. Capitula discoid (in Australia), or radiate, pedunculate, ecalyculate; phyllaries free. Florets: corolla-limbs pink, red, sometimes yellow. Anthers ecaudate. Style-branches with apex truncate to obtuse, crowned with papillae, with or without terminal appendage. Achenes homomorphic, narrow-obloid. Pappus caducous.

A genus of c. 100 species in Africa south of the Sahara, Asia and the Pacific Is. The hyaline margin of the phyllaries of species of *Emilia* in Australia are narrow and of similar width on all phyllaries in contrast to most other species in the Senecioneae in Australia which exhibit dimorphism in margin width.

**Key to species**

Developing stems not densely hairy; leaves often with lateral segments; upper-stem leaves strongly cordate or sagittate; corolla with limb 2–3.5 mm long, pale purple, not reaching to apex of phyllaries or exceeding them by up to 2 mm; achenes 2.2–3.8 mm long..... **1. *E. sonchifolia***

Developing stems densely hairy; leaves lacking lateral segments; upper-stem leaves not strongly cordate or sagittate; corolla with limb 4–5 mm long, brick-red, exceeding phyllaries by 2–4 mm; achenes 4.0–5.0 mm long ..... **2. *E. fosbergii***

**1. \**Emilia sonchifolia*** (L.) DC., in R. Wight, *Contr. Bot. India* 24 (1834)

*Cacalia sonchifolia* L., *Sp. Pl.* 2: 835 (1753).

Type: Sri Lanka, Herb. Hermann; BM *n.v.*, *fide* A.J.C. Grierson in M.D. Dassanayake & F.R. Fosberg (eds), *Revis. Handb. Fl. Ceylon* 1: 252 (1980).

Annuals to c. 0.5 m high. Hairs sparse, mainly on stems and leaves, glabrescent. Leaves to c. 8 cm long, with l:w ratio c. 2–4, undivided or sometimes lobate to pinnatisect, sometimes petiole-like with lamina much broader distally; margin dentate; upper-stem leaves becoming lanceolate, auriculate. Inflorescences of 1–several capitula; mature peduncle to c. 80 mm long; ecalyculate; involucre 7–12 mm long, 2–4 mm diam.; phyllaries c. 6–8; stereome flat, with 3–5 resin ducts, with a few coarse hairs or glabrous; receptacular pits not or very slightly raised. Florets c. 30; corolla 6–10 mm long, slightly below, equal to or exceeding involucre by up to 2.5 mm, with base c. 0.3 mm diam., with limb 1/3–2/5 of total length, narrow-obconical, pink; style-branch appendage purple. Achenes narrow-obloid, 2.2–3.8 mm long, with 5 broad ± flat ribs, brown or straw-coloured, with scattered hairs in grooves. Pappus 5–8 mm long; bristles minutely scabrid-barbellate.

*Notes:* Aberrant, probably diseased plants have been collected that develop green inflorescences characterised by several vegetative shoots developing from capitula instead of florets (the so-called ‘hen and chicken’ effect). There are two varieties.

Apex of phyllaries with dark border to c. 1 mm long or absent; corolla 1 mm shorter than or up to 1 mm longer than phyllaries; corolla-lobes < 1 mm long; achenes 2.2–3.2 mm long..... var. ***sonchifolia***

Apex of phyllaries commonly with dark border 2–3 mm long; corolla usually exceeding phyllaries by up to 2.5 mm; corolla-lobes > 1 mm long; achenes 3.0–3.8 mm long..... var. *javanica*

**\**Emilia sonchifolia* (L.) DC. var. *sonchifolia***

[*Emilia purpurea* auct. non Cass. (1825); F.Mueller, *Fragm.* 12: 21 (1882)]

Capitula: length of involucre commonly > 2.5 times diameter mid-involucre; apex of phyllaries without a dark border or border to c. 1 mm long; stereome often with scattered coarse hairs especially distally. Corolla 1 mm shorter than or up to 1 mm longer than phyllaries, with lobes < 1 mm long. Achenes 2.2–3.2 mm long.

*Notes:* Probably native to southern Asia. Occurs in northern Western Australia, northern Northern Territory, and in northern and eastern Queensland, predominantly on or near the coast. A widespread weed of tropical regions. Grows in moist, sandy soils eg. cays, sand dunes, and in grassland. Flowers mostly autumn–winter.

The most reliable character distinguishing this variety from var. *javanica* is the length of the corolla lobes. Subtle differences are also apparent in capitular proportions, and var. *sonchifolia* commonly has scattered hairs on the distal half of phyllaries, whereas var. *javanica* almost always has glabrous phyllaries.

*Representative specimens:* WESTERN AUSTRALIA: Mitchell Plateau mining camp, P.A.Fryxell 4013 & L.A.Craven (MEL). NORTHERN TERRITORY: Little Lagoon, Groote Eylandt, R.L.Specht 419 (CANB); Kakadu National Park, C.R.Dunlop 8562 & P.F.Munns (CANB, DNA, MEL). QUEENSLAND: Red Beach, Weipa area, K.Herrman s.n. (CANB); Beames St, Mareeba, J.R.Clarkson 4594 (DNA, PERTH, QRS).

**\**Emilia sonchifolia* var. *javanica* (Burm.f.) Mattf., *Bot. Jahrb. Syst.* 62: 445 (1929)**

*Hieracium javanicum* Burm.f., *Fl. Indica* 174, t. 57, fig. 1 (1768); *Prenanthes javanica* (Burm.f.) Willd., *Sp. Pl.* 3: 1534 (1803); *Sonchus javanicus* (Burm.f.) Spreng., *Syst. Veg.* 3: 648 (1826); *E. javanica* (Burm.f.) C.B.Rob., *Philipp. J. Sci., C* 3: 217 (1908).

Type: Java, *Garcin s.n.*; holo: G n.v., *fide* D.H.Nicolson, *op. cit.* 399 (1980)

Capitula: length of involucre < 2.5 times the diameter mid-involucre; apex of phyllaries commonly with a dark border 2–3 mm long; stereome usually glabrous; corolla usually exceeding phyllaries, by up to 2.5 mm, with lobes > 1 mm long. Achenes 3.0–3.8 mm long.

*Notes:* Native to eastern Asia and the western Pacific. Occurs in eastern Queensland and north-eastern New South Wales. Grows mostly in sandy soils in coastal dunes, also in woodland and forest. Flowers mostly autumn–winter.

*Representative specimens:* QUEENSLAND: Bruce Hwy, 12 km south of Mackay, A.R.Bean 16271 (BRI); Brisbane, 4 Dec. 1938, H.Tryon (BRI). NEW SOUTH WALES: Kingscliff, North Coast, R.G.Coveny 12437, W.Bishop & L.J.Murray (NSW).

**2. \**Emilia fosbergii* Nicolson, *Phytologia* 32: 33 (1975)**

Type: Bahamas, New Providence, near Nassau, 26 Dec. 1902, Curtiss 6; holo: US n.v., *fide* D.H.Nicolson, *loc. cit.*

Annuals to 0.5 m high. Transiently densely coarse-hairy on new growth. Leaves to c. 8 cm long, with l:w ratio c. 2–4, undivided, margins dentate, base becoming truncate to auriculate upwards. Capitula solitary or few; mature peduncle to c. 80 mm long; involucre 7–12 mm long, 3–7 mm diam.; phyllaries c. 6–8, glabrous; stereome flat, with 3–5 resin ducts; receptacular pits not or slightly raised. Florets c. 30 to numerous; corolla 7–11 mm long, exceeding involucre by 2–4 mm, with base c. 0.4 mm wide, with limb c. 1/2 of total length, very narrow-campanulate, purple-red; style-appendage purple. Achenes obloid, with 5 broad ± flat ribs, 4–5 mm long, ribs brown or stramineous, scattered short papillose hairs in grooves. Pappus 5–8 mm long.

*Notes:* Possibly native to Africa. Occurs in far north-eastern Queensland. Naturalised across the Pacific region. Ecological preferences not known. Flowers mostly autumn–winter.

First recorded for Australia in 1997 when collected from Lockhart River.

*Representative specimens:* QUEENSLAND: Vicinity of Lockhart R. township, *J.F.Grimshaw JFG 697C* (BRI, DNA, MEL).

**14. *Gynura*** Cass., *Dict. Sci. Nat.* 34: 391 (1825), *nom. cons.*

Annual or perennial herbs. Leaves sessile, pinnately veined. Capitula discoid, pedunculate, calyculate; phyllaries free. Florets: corolla-limbs yellow, orange, red, purplish, white or greenish. Anthers ecaudate. Style-branches ± erect, with apex truncate, without crown of papillae, with terminal appendage long, tapering. Achenes homomorphic, narrow-obloid. Pappus persistence not known.

A genus of c. 40 species occurring in Asia and Africa with most species in southeast Asia.

***Gynura drymophila*** (F.Muell.) F.G.Davies, *Kew Bull.* 35(4): 733 (1980)

*Senecio drymophilus* F.Muell., *Trans. & Proc. Philos. Inst. Victoria* 2: 69 (1857).

Type: Brisbane River, Queensland, Oct. 1856, *Hill & F.Mueller* (MEL); lecto: *K n.v.*, *vide* P.I.Forster & A.Thongpukdee, *Austrobaileya* 2(5): 560 (1988); iso: MEL.

Succulent, tuberous rooted herbs to c. 0.5 m high. Coarse-hairy on most parts, or glabrous. Leaves mostly oblanceolate, to 15 cm long, with l:w ratio c. 3–5, entire, denticulate, or lobate; base weakly to strongly auriculate. Capitula few to several; mature peduncle to c. 50 mm long; calycular bracteoles 4–8, linear, 6–10 mm long; involucre 10–15 mm long; phyllaries c. 13; stereome flat, with resin ducts obscure, with coarse hairs or glabrous; receptacular pits slightly raised. Florets numerous; corolla 8–14 mm long, exceeding involucre by c. 3–4 mm, with base c. 0.6 mm wide, with limb c. 1/3 of total length, yellow to orange-red; style-branch appendages yellowish. Achenes narrow oblong-ellipsoid, 5–8 mm long, with c. 10 narrow convex ribs, dark brown, glabrous. Pappus c. 10 mm long; bristles minutely and sparsely scabrid-barbellate.

*Notes:* The broad succulent roots of this species are distinctive. There are two varieties.

Plants with spreading, coarse hairs ..... var. *drymophila*  
Plants glabrous ..... var. *glabrifolia*

***Gynura drymophila*** (F.Muell.) F.G.Davies var. ***drymophila***

*Senecio shirleyanus* Domin, *Biblioth. Bot.* 89: 686 (1929).

Type: Tambourine Mts, Queensland, Mar. 1910, *K.Domin 9143 & 9144*; syn: PR *n.v.*, *vide* R.O.Belcher, *Kew Bull.* 44(3): 533 (1989).

[*Gynura pseudochina auct. non* (L.) DC.; G.Bentham, *Fl. Austral.* 3: 661 (1867)]

Plants with spreading multicellular hairs on stems, leaves, peduncles, bracts, bracteoles and phyllaries.

*Notes:* Occurs in Queensland extending from Lizard Island in the far north of the state south to the MacPherson Ranges; also in far northern New South Wales as far south as Ballina. Grows on sandstone among granite boulders, and in near coastal lowland situations, on cliff tops, and in rocky and sandy sites in woodland, forest, vine thicket, closed heath, vine forests, and hoop pine rainforest. Flowers all year round.

*Representative specimens:* QUEENSLAND: 1 km NW of L. Elphinstone outlet, Carborough Ra., *I.R.Telford 11120 & R.J.Rudd* (BRI, CANB, NSW); Mt Walsh, 6 km south of Biggenden, *M.D.Crisp 2635* (BRI, CANB, NSW). NEW SOUTH WALES: Mt Nullam, Sept. 1896, *W.Bauerlen* (NSW).

***Gynura drymophila*** var. ***glabrifolia*** P.I.Forst. & Thongp., *Austrobaileya* 2(5): 564 (1988)

Type: cultivated specimen ex 2 km SW of Boolbunda Rock, Queensland, 15 May 1986, *P.I.Forster 2425*; holo: BRI.

Plants glabrous.

*Notes:* Occurs in far south-eastern Queensland. Ecological and phenological details as for the type variety. Similar in all details to the typical variety except for the absence of hairs. Recorded as growing side by side with typical variety.

*Representative specimens:* QUEENSLAND: Brigalow research station, 32 km NW of Theodore, *Johnson 2670* (BRI); Mount Moon, 5 km SW of Mt Alford township, *P.I.Forster PIF6621, A.R.Bean & L.H.Bird* (BRI, MEL). NEW SOUTH WALES: Three Tops, Mt Warning National Park, July 1955, *A.Benwell s.n.* (NSW).

**Acknowledgements**

I would like to thank the Royal Botanic Gardens, Melbourne (MEL) for the use of their herbarium and library facilities, and the scientific and technical staff at MEL for their assistance with loans and other matters. I would also like to thank the directors of AD, BRI, CANB, DNA, HO, NE, and PERTH for the loan of specimens. I would like to thank the Royal Botanic Gardens, Sydney for funding my recent visit to NSW. This study was funded by Australian Biological Resources Study (ABRS grant no: 2000/3192).

**References**

Belcher, R.O. (1956). A revision of the genus *Erechtites* (Compositae) with inquiries into *Senecio* and *Arrhenechthites*. *Annals of the Missouri Botanical Garden* 43: 1–85.

- Belcher, R.O. (1994). The '*Senecio* aff. *lautus*' complex (Asteraceae) in Australia. II. Clarification of names given to pseudolautusoid Australian specimens of *Senecio* by Richard and by Candolle. *Australian Systematic Botany* **7**: 71–85.
- Jeffrey, C. (1986). The *Senecioneae* in East Tropical Africa, Notes on Compositae: IV. *Kew Bulletin* **41**: 876.
- Lawrence, M.E. (1980). *Senecio* L. (Asteraceae) in Australia: Chromosome numbers and the occurrence of polyploidy. *Australian Journal of Botany* **28**: 153.
- Nordenstam, R.B. (1977). Senecioneae and Liabeae – systematic review, in V.H.Heywood, J.B.Harborne & B.L.Turner (eds), *The Biology and Chemistry of the Compositae* vol. 2, p. 810.
- Orchard, A.E. (2004). A revision of *Bedfordia* DC. (Asteraceae). *Muelleria* **19**: 81–94.
- Pelser, P.B., Gravendeel, B., & van der Meijden, R. (2002). Tackling speciose genera: species composition and phylogenetic position of *Senecio* Sect. *Jacobaea* (Asteraceae) based on plastid and near DNA sequences. *American Journal of Botany* **89**(6): 929–939.
- Swenson, U. (1995). Systematics of *Abrotanella*, an amphipacific genus of Asteraceae (Senecioneae). *Plant Systematics and Evolution* **197**: 149–193.
- Thompson, I.R. (2004a). Taxonomic studies of Australian *Senecio* (Asteraceae): 1. The disciform species. *Muelleria* **19**: 101–214.
- Thompson, I.R. (2004b). Taxonomic studies of *Senecio* (Asteraceae): 2. The shrubby, discoid species and the allied radiate species *Senecio linearifolius*. *Muelleria* **20**: 67–109.
- Thompson, I.R. (2004c). Taxonomic studies of *Senecio* (Asteraceae): 3. Radiate, arid region species allied to *S. magnificus* and the radiate, alpine species *S. pectinatus*. *Muelleria* **20**: 110–138.
- Thompson, I.R. (2004d). A new name for *Senecio glandulosus*. *Muelleria* **20**: 139–140.
- Thompson, I.R. (2005a). Taxonomic studies of Australian *Senecio* (Asteraceae): 4. A revision of *Senecio glossanthus* and recognition of an allied species with long ligules. *Muelleria* **21**: 3–21.
- Thompson, I.R. (2005b). Taxonomic studies of Australian *Senecio* (Asteraceae): 5. The *S. pinnatifolius*/*S. lautus* complex. *Muelleria* **21**: 23–76.
- Wagstaff, S.J. and Breitwieser, I. (2004). Phylogeny and classification of *Brachyglottis* (Senecioneae, Asteraceae): an example of a rapid species radiation in New Zealand. *Systematic Botany* **29**(4): 1003–1010.
- Walsh, N.G. (1999). *Senecio*, *Flora of Victoria* **4**: 947.

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