

Taxonomic studies of Australian *Senecio* (Asteraceae): 4. A revision of *Senecio glossanthus* and recognition of an allied species with long ligules

Ian R. Thompson

School of Botany, The University of Melbourne, Victoria 3010, Australia.
Email: I.Thompson@unimelb.edu.au

Abstract

A morphological study of the Australian annual daisy *Senecio glossanthus* (Sond.) Belcher has resulted in the recognition of three new species: *S. halophilus* I.Thomps., *S. serratiformis* I.Thomps., and *S. productus* I.Thomps. Two new subspecies are also described: *S. productus* subsp. *magnus* I.Thomps. and *S. serratiformis* subsp. *stenophyllus* I.Thomps. A further new species, *S. condylus* I.Thomps., described here, has features in common with the *S. glossanthus* group but also has some affinity to the Australian *S. lautus*/*S. pinnatifolius* complex. A key, distribution maps and illustrations of the new taxa are presented.

Introduction

Senecio glossanthus (Sond.) Belcher is a small radiate annual daisy endemic to Australia. It occurs predominantly in low rainfall and/or saline environments across the southern half of the mainland. It is characterised by very small ligules and dimorphic achenes. It was first described as *Erechtites glossantha* Sond. in 1853. Bentham (1867), when transferring this species to *Senecio*, gave it the illegitimate name of *S. brachyglossus* F.Muell. ex Benth. and described two varieties, var. *major* Benth. and var. *elatior* Benth. Belcher made the correct combination of *Senecio glossanthus* in 1956.

The variety *elatior* was prefixed with a '?' by Bentham, presumably to indicate his uncertainty about the nature of the type specimen from the Blue Mountains, New South Wales. Examination of the isotype at MEL has, in fact, shown it to be a hybrid of the disciform species *S. bipinnatisectus* Belcher and the radiate species *S. linearifolius* A.Rich. Hybridisation has been recorded between other radiate and disciform species in Australia. A not infrequent sterile hybrid between *S. lautus* Forst.f. ex Willd. *sensu lato* (alternatively *S. pinnatifolius* A.Rich.) and *S. biserratus* Belcher has been recorded; it was first described as *S. orarius* J.M.Black by Black (1928) and subsequently shown to be a hybrid based on karyotypic studies by Lawrence (1980). A hybrid of *S. linearifolius* A.Rich. var. *linearifolius* and *S. minimus* Poir. has been investigated in Victoria (Thomas, 2004), and herbarium material from HO indicates that these species hybridise in Tasmania. Such hybrids can be distinguished from *S. glossanthus* and related species described in this paper as the ligules of these hybrids are often more than 2.5 mm long and their achenes are homomorphic and sometimes sterile. They are likely to be in close proximity to the parent species.

Examination of the numerous specimens collected and determined as *S. glossanthus* (hereafter the Glossanthus Group) has led to the identification of three new species. Two of the new species have dimorphic achenes like typical *S. glossanthus*, while the other has homomorphic achenes.

Another new species described here, *S. condylus* I.Thomps., is considered to be related to the Glossanthus group, although similarities in capitular morphology and ligule length have in the past caused specimens to be placed with the *S. lautus*/*S. pinnatifolius* complex. The marked achenial dimorphism of *S. condylus* corresponds to the dimorphism seen in three species of the Glossanthus group. It is also similar in habit, and in leaf and

phyllary morphology. Although achenial dimorphism does occur in some members of the *S. lautus* complex, it is less pronounced.

Achenial dimorphism is a complex syndrome and contains the following elements: achenes of female florets up to 20% longer, and slightly broader, than those of bisexual (disc) florets; papillose hairs more robust, whiter, and obscuring the surface of the achenes more fully; carpodium of the female florets forming a larger ring; and thickened and often protruding attachment points developed on the receptacle for the female florets (Figs 1a–c., right; Fig. 9). In addition, the achenes of female florets tend to fall from the receptacle more tardily, and usually the pappus of these achenes is more poorly developed and/or very early caducous.

Materials and Methods

Herbarium specimens from AD, BRI, CANB, DNA, MEL, and PERTH were examined. Field observations and collections in Victoria supplemented the herbarium data. The circumscriptions of, and morphological variation within, previously recognised taxa was critically assessed and new taxonomic concepts developed and tested when the taxonomy was found wanting. Distribution maps were generated using the ArcView computer program.

Glossary of some terms used in keys and descriptions

Bands or lines (of papillose hairs on achenes): The bands or lines run longitudinally following the ribs and grooves, with bands being broader than lines. The hairs themselves are also oriented \pm longitudinally and are appressed to divergent.

Diameter of the involucre: The measurement given is for live specimens measured around the middle of the involucre at or around anthesis. Pressing produces a larger ‘diameter’ (by up to 50%) and will obviously be variable according to the severity of pressing.

Dimorphism associated with achenes: This syndrome is described in the Introduction; see also fig. 1).

Divided leaves: Leaves with major sinuses extending more than 50% towards midline (includes lobate and pinnatisect).

Lageniform (of achenes): Bottle-shaped, i.e. the distal third of the achene more tapered and narrower than the proximal third.

Pappus ring: A slender rim of pale tissue at the summit of the achene to which the pappus bristles attach. The body of the achene narrows shortly below its apex and then dilates as it connects to the pappus ring. The pappus ring is variably obscured and exceeded by hairs arising from the body of the achene.

Unit inflorescence: The cluster of capitula at the end of primary stems and branches where all the supporting branches are leafless. Species commonly develop secondary inflorescences and these are defined by the presence of leaves along the primary axis of these inflorescences.

Key

The following key discriminates the *Glossanthus* group from *S. condylus* and members of the *S. lautus/S. pinnatifolius* complex. A key to all radiate species is presented in Thompson 2004 and a key to a revised *S. lautus/S. pinnatifolius complex* is presented in Thompson (2005b).

- 1 Calycular bracteoles 2–6; involucre with length: diam. ratio 1.5–4; ligule < 2.5 mm long (sometimes vestigial).....**Glossanthus group**
- 1: Calycular bracteoles 5–16; involucre with length: diam. ratio 0.8–1.5; ligule > 4 mm long

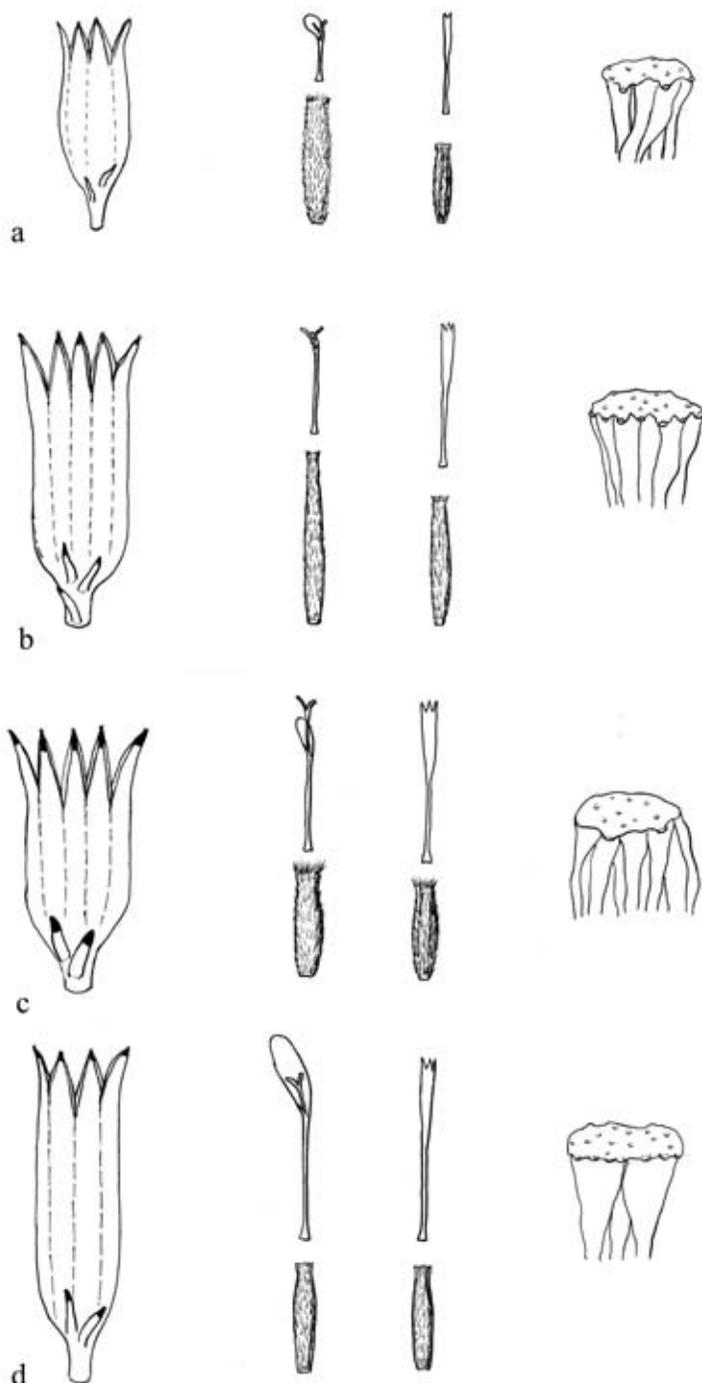


Figure 1. a. *S. glossanthus* (from N.G. Walsh 5820 MEL); b. *S. productus* subsp. *productus* (from A.C. Beauglehole 64354 MEL); c. *S. halophilus* (from I.R. Thompson 674 MEL); d. *S. serratifomis* (from J.Z. Weber 6267 AD; receptacle from E.J. Carroll SA/65 516 AD). From l to r: capitulum (excluding florets); female floret: corolla with exserted style branches and achene; bisexual floret: corolla and achene; mature receptacle. The capitula are shown as they present when lightly pressed (in live material the involucre narrows slightly from base to apex at anthesis). 5 times actual size.

- 2 Achenes dimorphic, with achenes of female florets c. 1 mm longer than those of bisexual florets; bracteoles and phyllaries strongly pigmented in distal 1–1.5 mm**5. *S. condylus***
- 2: Achenes homomorphic, or mildly dimorphic with achenes of female florets hardly longer than those of bisexual florets, or if clearly longer than bracteoles and phyllaries with pigmented zone < 0.5 mm long and often rather faint***S. lautus*/*S. pinnatifolius* complex**

The Glossanthus Group

Erect annuals to c. 0.5 m tall, tap-rooted, nearly glabrous or with scattered coarse multicellular hairs. *Leaves* divided or not; margin usually with some teeth. *Unit inflorescences* of few–25 capitula; mature peduncle mostly 5–25 mm long. *Capitula* radiate, or pseudo-disciform with ligule hardly developed; calycular bracteoles 2–6, narrow-ovate to lanceolate, 0.8–3.0 mm long, 0.3–1.0 mm wide, with margin glabrous or nearly so; involucre 3.0–8.0 mm long, 1–3 mm diam.; phyllaries 7–13, rarely as few as 5 in a minority of capitula, free; stereome ±flat, thin to slightly fleshy, glabrous, with resin ducts fine or prominent, pale or orange; attachment points on mature receptacle for achenes of female florets usually prominent, or not in *S. serratifomis*. *Florets* 8–40; female florets (4–)5–13; ligule to 2.5 mm long, sometimes vestigial, yellow; tube shorter or longer than the mature achene; corolla-limb of bisexual (disc) florets slightly shorter than tube. *Achenes* dimorphic*, or homomorphic in *S. serratifomis*, narrow-obloid, 2.0–5.5 mm long, with ribs ±flat, moderately to densely papillose-hairy, with l:w ratio of hairs 3–8. *Pappus* 2–4 mm long, caducous; bristles nearly smooth or minutely scabridulous.

*syndrome described at end of Introduction

Key to Glossanthus Group

- 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 0.05–0.15 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 0.2–0.3 mm long, clearly exceeding pappus ring...
.....**3. *S. halophilus***

1. *Senecio glossanthus* (Sond.) Belcher, *Ann. Missouri Bot. Gard.* 43: 80 (1956)

Erechtites glossantha Sond., *Linnaea* 25: 524 (1853); *S. brachyglossus* F.Muell. ex Benth., *Fl. Austral.* 3: 670 (1867), *nom. illeg. non Turcz.* (1851). Type: South Australia,

near Adelaide ['Ad agros prope urbem Adelaide'], July 1848, *F. Mueller*; lecto (**here selected**): MEL 2168154.

Herbs to c. 0.3(–0.5) m tall, with scattered hairs usually developed on stems and leaves, glabrescent. *Mid-stem leaves* mostly 1–7 cm long, undivided or lobate to sub-pinnatisect; base attenuate to cuneate or becoming cordate upwards, mildly stem-clasping; margin entire, denticulate or dentate; undivided leaves \pm linear or very narrow-elliptic; divided leaves with 1–3 segments per side. *Upper-stem leaves* often with base cordate, mildly stem-clasping. *Capitula*: calycular bracteoles 0.8–1.5 mm long, 0.2–0.5 mm wide, with brown apical mark to c. 0.3 mm long; involucre 3.5–6 mm long, 1–2(–2.5) mm diam.; phyllaries 7–10, sometimes a minority with 5 or 6 or 11–13, with resin ducts very fine, pale; inner phyllaries with margin 0.2–0.3 mm wide; outer phyllaries with margin hardly developed; receptacle 1–2 mm diam. at maturity, with attachment points for achenes of female florets tubercle-like. *Florets* 8–30; female florets (4–)5–8; corollatube 1.5–2 mm long; ligule 1–2 mm long, usually exceeding phyllaries; corolla of bisexual florets 3–4 mm long. *Achenes* narrow-obloid, dimorphic; achenes of bisexual florets 1.8–3 mm long, with papillose hairs covering c. 50–90% of the otherwise light to dark brown surface, minutely exceeding pappus ring; achenes of female florets 2.3–3.5 mm long, usually completely covered by more robust, papillose hairs; hairs clearly exceeding pappus ring, not or slightly divergent. *Pappus* 3–3.5 mm long, absent from mature achenes of female florets. (Fig. 1a, 3)

Flowers mostly winter and spring.

Distribution and Habitat: Occurs in southern Western Australia, South Australia, western New South Wales, and north-western Victoria (Fig. 2a). Grows in seasonally wet areas, on gilgai plains and clay pans, on clay, clayey sand, or sand over granite, laterite, or limestone, in shrubland and low woodland.

Notes: Sonder cited two syntypes of *Erechtites glossantha*, one from Gulf St. Vincent and the other from near Adelaide. The former contains two plants with flowering capitula but without mature achenes. Although the specimens are imperfect, I consider them most likely to be specimens of *S. halophilus* I.Thomps. The syntype from Adelaide corresponds to the very widespread and common form of *S. glossanthus sensu lato* and is here selected as the lectotype of *E. glossantha*.

Senecio glossanthus is a very widespread species, predominantly of semi-arid areas. Lawrence (1980) identified two chromosome forms, a tetraploid $2n = 40$ and an octoploid $2n = 80$, and indicated that there was a correlation between chromosome number and leaf morphology. This correlation was unable to be confirmed. A possible hybrid, based on the intermediate length of the ligules, of *S. glossanthus* and *S. pinnatifolius s. lat.* has been collected from the Redcliff survey area in South Australia (*R. Chinnock 1582*, AD). *Senecio glossanthus* can be distinguished from perhaps the most similar member of the Glossanthus group, *S. halophilus*, by the generally smaller capitula with fewer phyllaries and florets, smaller mature receptacle, narrower and less pigmented calycular bracteoles, ligules exceeding the phyllaries, achenes of bisexual florets with hairs hardly exceeding the pappus ring, and the more prominent tubercles on the receptacle.

Selected specimens examined: **WESTERN AUSTRALIA**: c. 2.5 km south of Binnu, *P.S. Short 2857*, *M. Amerema*, & *B.A. Fuhrer*, 11.ix.1986 (AD, CANB, MEL, PERTH). **NORTHERN TERRITORY**: New Crown Station, Beddome Range, *P.K. Latz 12512*, 19.viii.1992 (DNA). **SOUTH AUSTRALIA**: Eyre Peninsula District: Corunna Hill South, 4.9 km NW of Iron Knob, *J.D. Briggs 973*, 22.viii.1983 (AD, CBG, MEL). **QUEENSLAND**: Lake Bindegolly National Park, 4 km N on Bulloo Development Road, 200 m E of Lake, *M. Handley 197*, 28.vi.1995 (BRI). **NEW SOUTH WALES**: Vacant lot opposite fuel depot, Bourke, *B. Wiecek 68*, *R. Coveny* & *P. Cuneo*, 19.viii.1987 (AD, BRI, CANB, HO, MEL, NSW). **VICTORIA**: Big Desert ca. 44 km N of Broken Bucket bore & ca 46 km S of Murrayville on road to Nhill, *M.G. Corrick 6353*, 1.x.1979 (MEL).

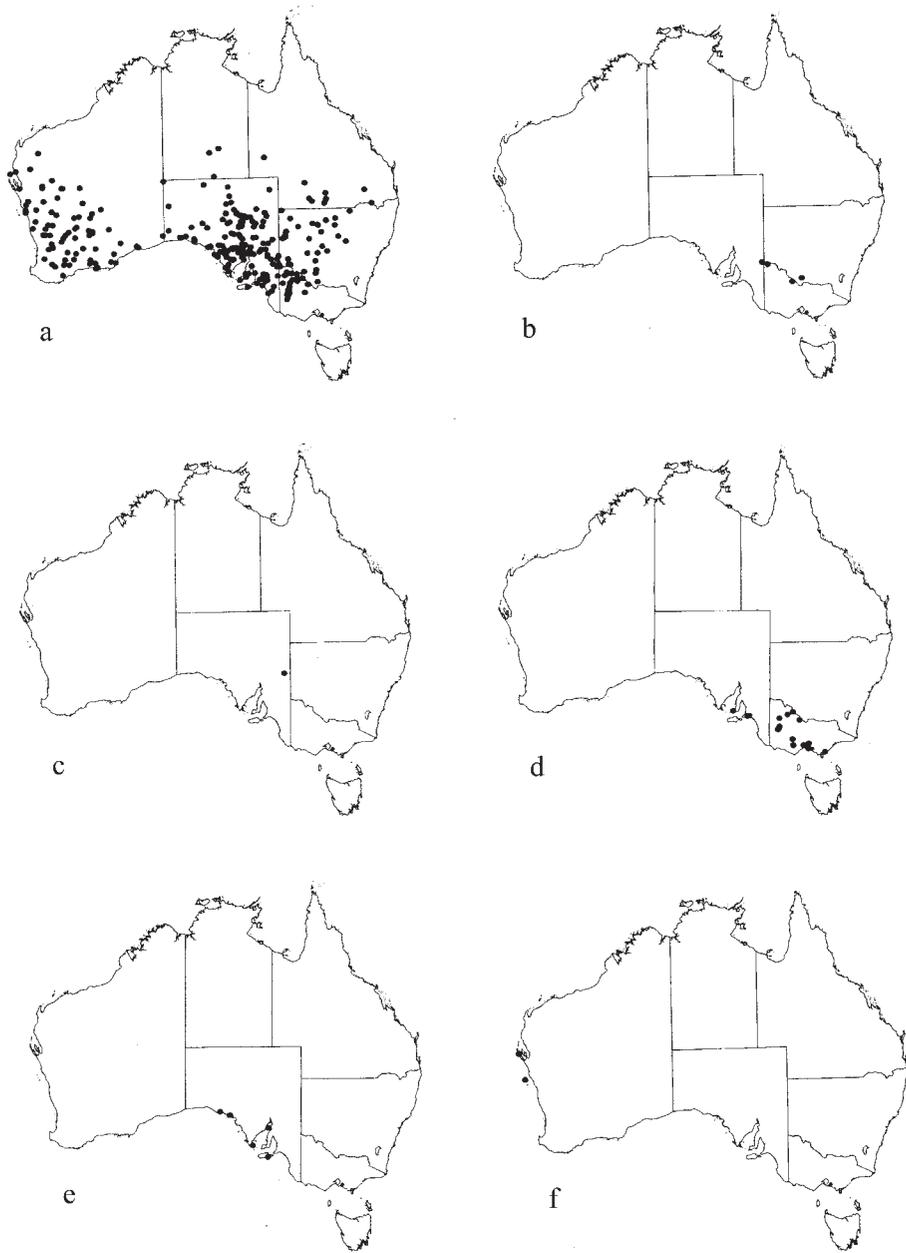


Figure 2. Distribution of a. *S. glossanthus*; b. *S. productus* subsp. *productus*; c. *S. productus* subsp. *magnus*; d. *S. halophilus*; e. *S. serratifomis* subsp. *serratifomis*; f. *S. serratifomis* subsp. *stenophyllus*.

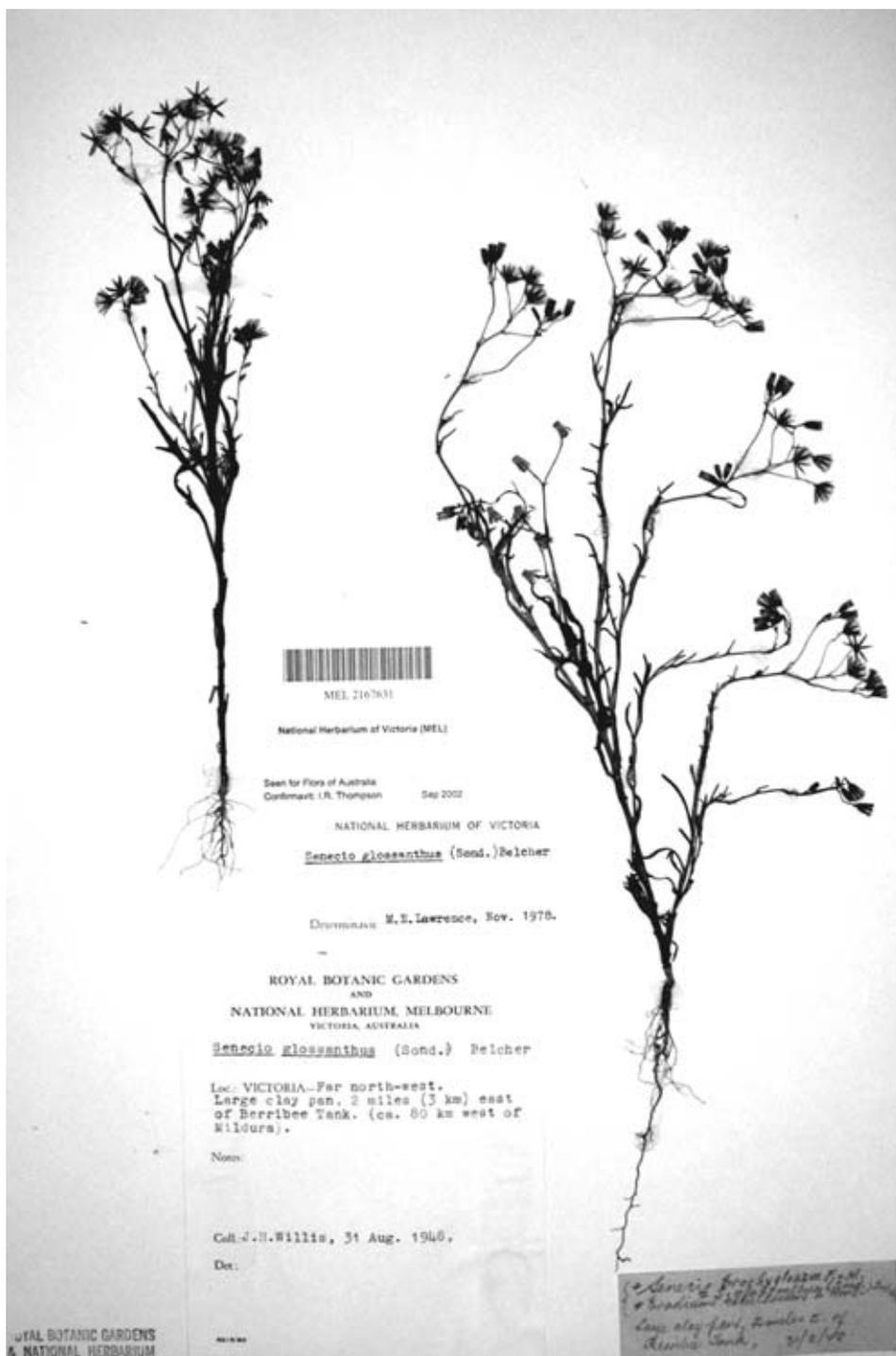


Figure 3. *S. glossanthus* (J.H.Willis 31.viii.1948 MEL)

2. *Senecio productus* I.Thomps., *sp. nov.*

A S. glossantho (Sond.) Belcher flosculis pluribus, capitulis et acheniis longioribus differt.

Type: Victoria, 7.5 km E of Kerang Post Office, *A.C. Beauglehole 64354*, 2 Sept. 1979; holo: MEL.

Herbs to c. 0.3 m tall, glabrous or nearly so. *Mid-stem leaves* mostly 2–7 cm long, undivided or lobate to sub-pinnatisect; base attenuate; margin entire, denticulate or dentate; undivided leaves linear or very narrow-elliptic; divided leaves with up to 3 segments per side. *Upper-stem leaves* with base sometimes shallowly auriculate, hardly stem-clasping. *Capitula:* calycular bracteoles lanceolate, 1.0–2.0 mm long, 0.3–0.6 mm wide, with purple apical mark c. 0.5 mm long purple, or hardly developed; involucre 4.5–7.0 mm long, 1.8–3 mm diam.; phyllaries 12 or 13, or sometimes a minority with 10 or 11, with resin ducts moderately developed, pale to orangish; inner phyllaries with margin 0.2–0.3 mm wide; outer phyllaries with margin to 0.1 mm wide; receptacle 2–3.5 mm diam. at maturity, with attachment points for achenes of female florets tubercle-like. *Florets* 25–45; female florets 8–13; corolla-tube 2–3 mm long; ligule c. 1 mm long or vestigial, exceeding phyllaries or not; corolla of bisexual florets 3–4 mm long. *Achenes* slightly lageniform, dimorphic; achenes of bisexual florets 2.5–4.5 mm long, with papillose hairs covering c. 50–90% of the otherwise light to dark brown surface, shortly exceeding pappus ring; achenes of female florets 3–6 mm long, otherwise similar to achenes of bisexual florets. *Pappus* 3–4 mm long, absent from mature achenes of female florets.

Flowers mostly winter and spring.

Etymology: The epithet alludes to the achenes which are elongated relative to those of *S. glossanthus* (L. *productus*, extended).

There are two subspecies.

Ligule vestigial; achenes of female florets < 4.5 mm long**2a.** subsp. ***productus***
Ligule c. 1 mm long; achenes of female florets > 4.5 mm long**2b.** subsp. ***magnus***

2a. *Senecio productus* I.Thomps. subsp. ***productus***

Phyllaries 5–6 mm long. *Female florets* with ligule vestigial. Achenes of bisexual florets 2.5–3.5 mm long; achenes of female florets 3–4.5 mm long. (Fig. 1b, 4)

Distribution and Habitat: Occurs on plains of the Murray River catchment in far south-central New South Wales, north-central and north-western Victoria and in far south-eastern South Australia (Fig. 2b). Recorded from heavy, grey clay soils, from the edge of a billabong in drying mud, and from chenopod shrubland.

Notes: Similar to *S. glossanthus* but the latter has narrower capitula with fewer phyllaries, fewer but better developed and exerted ligules, and shorter achenes. Because the ligules of this subspecies are vestigial, it could be confused with disciform or discoid species of *Senecio* unless the florets were examined microscopically. Recorded as growing together with *S. glossanthus*.

Selected specimens examined: **SOUTH AUSTRALIA:** Murtho Forest, *R. Bates 18421*, 15.v.1989 (AD). **NEW SOUTH WALES:** 15 miles [24 km] north of Deniliquin, *W.E. Mulham*, 17.ix.1963 (MEL). **VICTORIA:** Neds Corner Station, beside access road, 7.5 km due N from Sturt Hwy at Meringur North, *N.G. Walsh 5778 & I.R.K. Sluiter*, 9.x.2003 (MEL).

2b. *Senecio productus* subsp. ***magnus*** I.Thomps., *subsp. nov.*

A subspecies typica capitulis longioribus, ligulis majoribus, acheniis longioribus differt.

Type: South Australia, 0.5 km NW of Strathearn Homestead near wet clay pan, *L.D. Williams 9968*, 23 Aug. 1978; holo: AD.

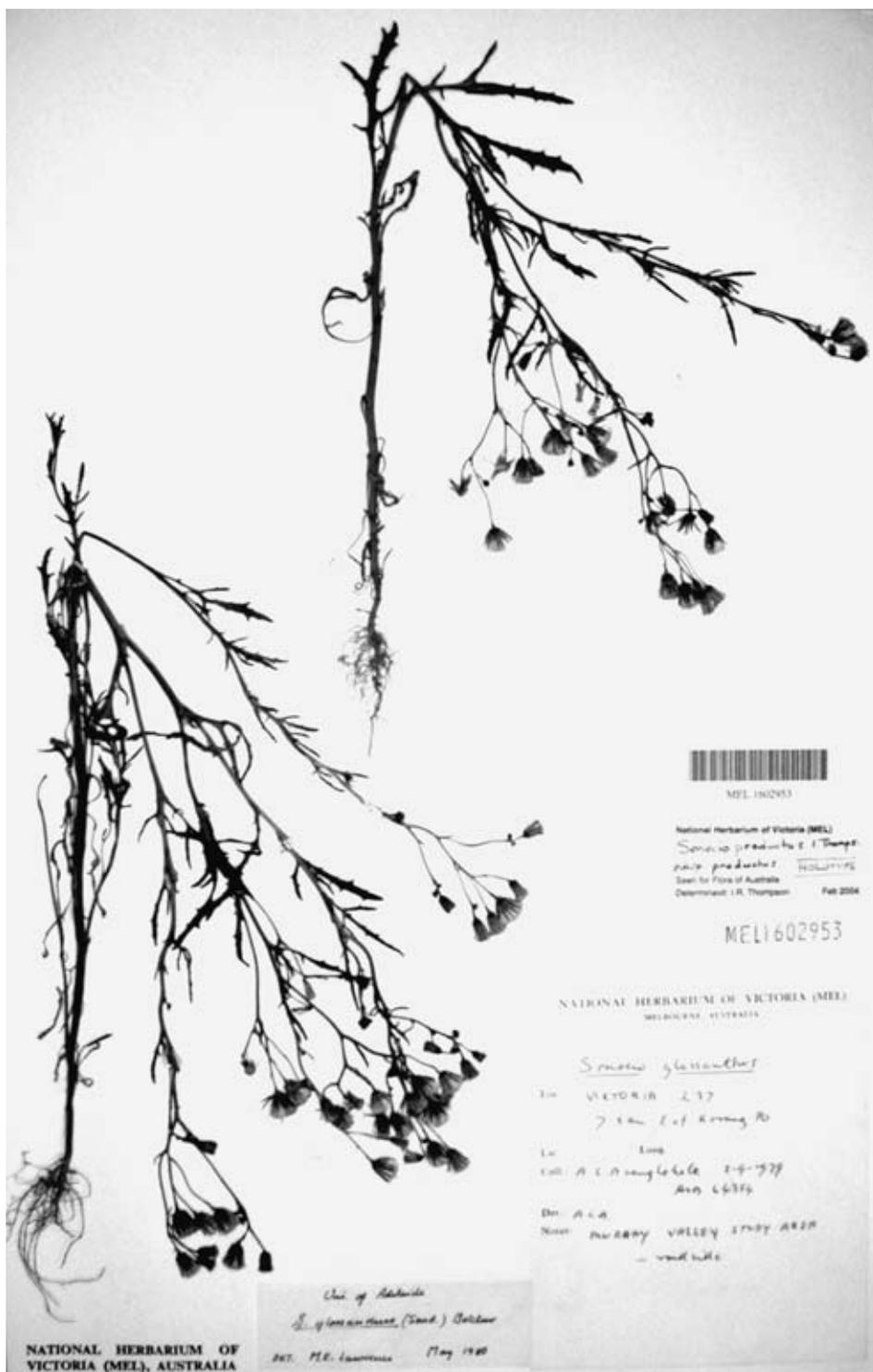


Figure 4. *S. productus* subsp. *productus* (holotype: A.C. Beaglehole 64354 MEL).



Figure 5. *S. productus* subsp. *magnus* (holotype: L.D. Williams 9968 AD).

Phyllaries 5.5–7 mm long. *Female florets* with ligule c. 1 mm long. *Achenes* of bisexual florets 3.5–5 mm long; achenes of female florets 4.5–6 mm long. (Fig. 5)

Etymology: The epithet refers to the larger capitula and achenes in this variety (*L. magnus*, large).

Distribution and Habitat: Known only from the type locality in far eastern South Australia, where it grew adjacent to clay pans (Fig. 2c).

Notes: Known only from the type specimen. Although only apparently differing in the size of reproductive structures, this size difference is substantial. The ligule of the female florets is also larger in this subspecies.

3. *Senecio halophilus* I.Thomps., *sp. nov.*

A *S. glossantho* (Sond.) Belcher *phyllariis* plerumque pluribus, tuberculis receptaculorum minoribus, ligulis *phyllaria* non superantibus, bracteolis latioribus, papillis acheniorum longioribus differt.

Type: Victoria, Northern extremity of Lake Corangamite, south side of Foxhow Road, 2 km west of Foxhow, *I.R. Thompson 676*, 21 Sept. 2001; holo: MEL; iso: AD, CANB, HO.

S. brachyglossus F. Muell. ex Benth. var. *major* Benth., *Fl. Austral.* 3: 670 (1867). *Type*: Point Nepean, *F. Mueller*; lecto (here selected): K (photo seen MEL). [The third syntype cited, from Wilsons Promontory, has not been seen; however, R.O. Belcher (1956) considered that it was not *S. glossanthus* s. lat.]

Herbs to c. 0.4 m tall, with scattered hairs usually developed, glabrescent. *Mid-stem leaves* 2–7 cm long, undivided or lobate to sub-pinnatisect; base becoming slightly cordate upwards, mildly stem-clasping; margin entire, denticulate or dentate; undivided leaves narrow-elliptic to oblanceolate; divided leaves with up to 3 segments per side. *Upper-stem leaves* auriculate, somewhat clasping. *Capitula*: calycular bracteoles narrow-ovate to lanceolate, 1–2 mm long, 0.5–1.0 mm wide, with purple apical mark 0.4–0.8 mm long; involucre 5–7 mm long, 2–3.5 mm diam.; *phyllaries* 8–13, with resin ducts often well-developed, usually pale on drying, inner *phyllaries* with margin c. 0.3 mm wide; outer *phyllaries* with margin c. 0.1 mm wide; receptacle 2–3.5 mm diam. at maturity, with attachment points for achenes of female florets slightly raised or tubercle-like. *Florets* c. 15–30; female florets 5–8; corolla-tube 2–3 mm long; ligule up to 1 mm long or vestigial, not usually exceeding *phyllaries*; corolla of bisexual florets 3–5 mm long. *Achenes* narrow-obloid, dimorphic; achenes of bisexual florets 2–3 mm long, light to dark brown, with papillose hairs robust, obscuring c. 50–100% of surface, clearly exceeding pappus ring and distinctly divergent at summit; achenes of female florets 2.5–3.5 mm long, otherwise similar to achenes of bisexual florets. *Pappus* 3–4 mm long, absent from mature achenes of female florets. (Figs 1c, 6)

Flowers mostly winter and spring.

Distribution and Habitat: Occurs in south-central and south-eastern South Australia and western and south-central Victoria (Fig. 2d). Grows in predominantly saline environments at margins of inland lakes and in coastal areas.

Notes: Similar to *S. glossanthus* but with larger capitula and the achenes of bisexual florets with markedly longer papillose hairs. These hairs are distinctly divergent at the summit of the achene. A specimen from Marion Bay on the Yorke Peninsula has relatively large capitula (involucre 6.5–7 mm long). The syntype of *S. brachyglossus* var. *major* collected from Point Nepean is likely to be this species based on its general appearance and distribution. However, definitive diagnosis requires microscopic examination of capitular characters.

Senecio halophilus is likely to be more common and widespread than is indicated in the distribution map.

Selected specimens examined: **SOUTH AUSTRALIA:** Yorke Peninsula, Marion Bay, *R.J. Bates* 38588, 21.ix.1994 (AD); Hindmarsh Island, *D.E. Murfet* 2508, 24.viii.1996 (AD, MEL). **VICTORIA:** Sandringham, *C. French Jr*, May 1900 (MEL); Mitre Lake Flora and Fauna Reserve, *A.C. Beaglehole* 86508, 11.xi.1986 (MEL); Lake Goldsmith, eastern shore, *N.G. Walsh* 5246 & *A. Brown*, 8.xi.2000 (MEL).

4. *Senecio serratiformis* I.Thomps., *sp. nov.*

A *S. glossantho* (Sond.) Belcher phyllariis longioribus, acheniis homomorphis, achenio quam tubo corollae brevior differt.

Type: South Australia, Eyre Peninsula, Fowlers Bay, just north of jetty, *J.Z. Weber* 6267, 15 Aug. 1980; holotype: AD.

Herbs to c. 0.3 m tall, ±glabrous except for scattered hairs on newer growth. *Mid-stem leaves* mostly 2–6 cm long, undivided or coarse-dentate; base attenuate to cuneate, sometimes becoming cordate upwards; margin with scattered to crowded denticulations or teeth; undivided leaves narrow-elliptic to oblanceolate; coarse-dentate leaves with up to 5 major teeth per side. *Upper-stem leaves* with base often cordate, mildly stem-clasping. *Capitula:* calycular bracteoles lanceolate, 1.0–2.5 mm long, 0.3–0.5 mm wide, with purple apical mark c. 0.5–1 mm long; involucre 5–8 mm long, 2–2.5 mm diam.; phyllaries 8–10, sometimes a minority with 13, with resin ducts fine, pale or reddish on drying; inner phyllaries with margin 0.2–0.3 mm wide; outer phyllaries with margin up to 0.1 mm wide; receptacle 2.5–3 mm diam. at maturity, without enlarged attachment points for achenes of female florets. *Florets* 15–30; female florets 4–6; corolla-tube 3.5–5.0 mm long; ligule 1.5–2.5 mm long, usually exceeding phyllaries; corolla of bisexual florets c. 5 mm long. *Achenes* obloid, homomorphic, 2.0–2.5 mm long, with papillose hairs covering c. 50–100% of the otherwise brown or reddish surface, hardly exceeding pappus ring. *Pappus* c. 5 mm long, equally persistent on all achenes.

Flowers mostly winter and spring.

Notes: *Senecio serratiformis* has longer capitula, and the female florets have longer corollas than in *S. glossanthus*, and the achenes differ in being homomorphic. There are two subspecies.

Mid-stem leaves with l:w ratio < 7; margin with several to many serrations; involucre 7–8 mm long **4a.** subsp. *serratiformis*

Mid-stem leaves with l:w ratio > 7; margin subentire or few-toothed; involucre 6–7 mm long **4b.** subsp. *stenophyllus*

4a. *Senecio serratiformis* I.Thomps. subsp. *serratiformis*

Mid-stem leaves with l:w ratio < 7; margin with several to many serrations. *Involucre* 7–8 mm long. (Figs 1d, 7)

Distribution and Habitat: Occurs in southern South Australia from Fowlers Bay south-east to Kangaroo Island, and in southern Western Australia (Fig. 2e). Grows in sand, on dunes and overlying limestone in coastal vegetation including mallee woodland.

Selected specimens examined: **WESTERN AUSTRALIA:** Bunker Bay, south-west coast, *J. Pulley* 1468, 18.viii.1973 (CBG). **SOUTH AUSTRALIA:** Yorke Peninsula, Point Davenport, *P. Coombe*, Aug. 1978 (AD); West Coast, Fowler's Bay, *R. Tate*, 1877 (AD); North-eastern Eyre Peninsula, Sandhill on Cowell Road, ca. 56 km from Whyalla, *J.B. Cleland*, 10.ix.1965 (AD); Kangaroo Island. Cape Gantheaume Conservation Park, E of Point Tinline, South Coast, *B.M. Overton* 1664, 29.ix.1988 (AD); Memory Cove, Cape Catastrophe, *E.J. Carroll* SA/65 516, 21.ix.1965 (AD, CBG).



Figure 6 *S. halophilus* (holotype: I.R. Thompson 676 MEL).



Figure 7. *S. serratifomis* subsp. *serratifomis* (holotype: J.Z. Weber 6267 AD). Note: The piece in the lower row, second from left is *S. glossanthus*.



Figure 8. *S. serratiformis* subsp. *stenophyllus* (holotype: A.S. George 11435 PERTH).

4b. *Senecio serratiformis* subsp. *stenophyllus* I.Thomps., subsp. nov.

A subspecie typica foliis angustioribus dentibus paucioribus, capitulis minoribus differt.

Type: Western Australia, by airstrip, west of homestead, Dirk Hartog Island, A.S. George 11435, 3 Sept. 1972 (PERTH).

Mid-stem leaves with l:w ratio > 7 ; margin sub-entire or few-toothed. *Involucre* 6–7 mm long. (Fig. 8)

Distribution and Habitat: Occurs on islands off the west coast of Western Australia (Fig. 2f). Ecological preferences not known.

Selected specimens examined: **WESTERN AUSTRALIA:** North Is., Houtman Abrolhos, G.M. Storr, 6.ix.1959 (PERTH); West Wallabi Island, Wallabi Islands, Abrolhos, J.J. Alford 641, 5.x.1987 (CANB, PERTH).

5. *Senecio condylus* I.Thomps., sp. nov.

A *S. glossantho* (Sond.) Belcher capitulis majoribus, ligulis multo longioribus, bracteolis et phyllariis pluribus et pigmentosis magis; a *S. pinnatifolio* A.Rich. pilis persistentioribus, acheniis dimorphis differt.

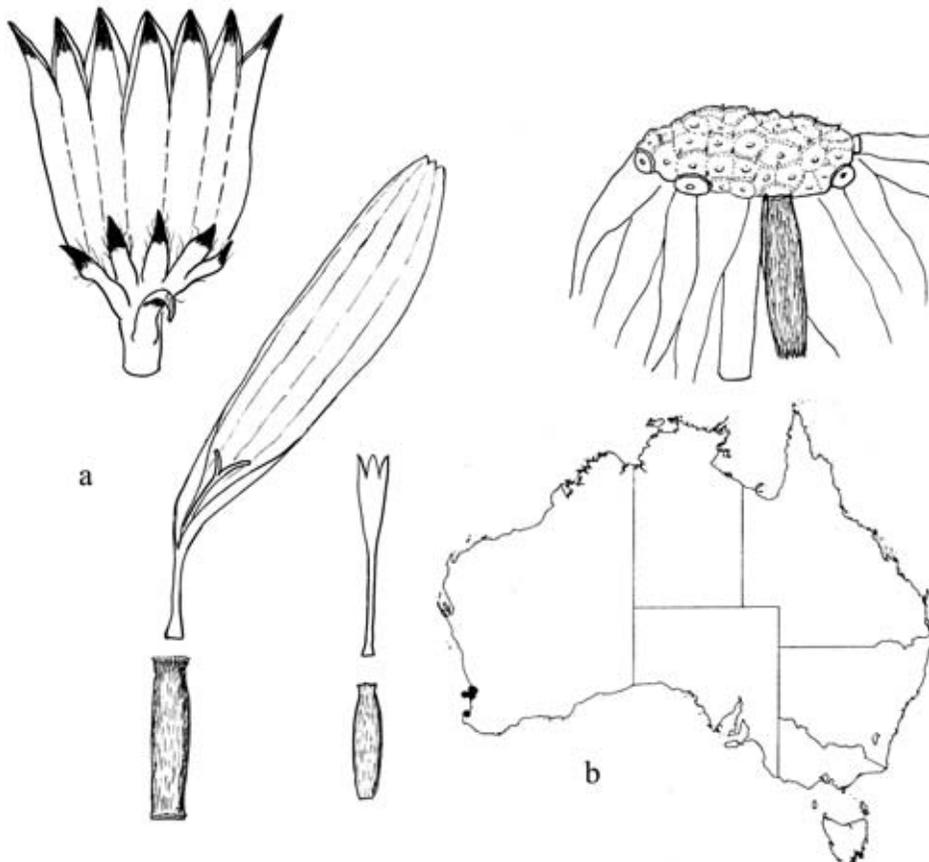


Figure 9. *S. condylus*. a. From l to r: capitulum; female floret: corolla and achene; bisexual floret: corolla and achene; mature receptacle with one achene of female floret attached. 5 times actual size; b. Distribution of *S. condylus*. Note: The record from Coode Is., Melbourne, Victoria is excluded as *S. condylus* is not considered native to Victoria.

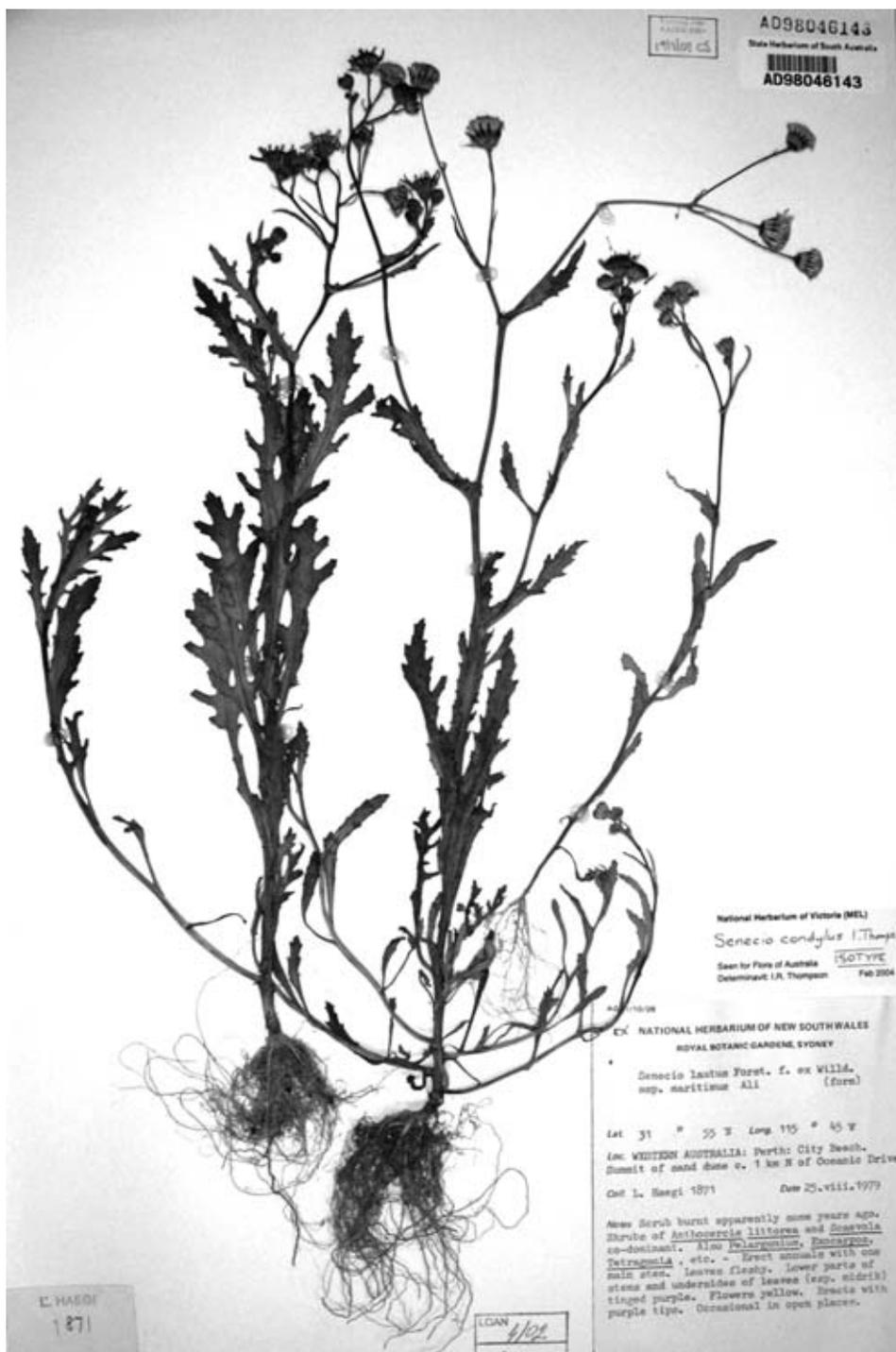


Figure 10. *S. condylus* (isotype: L. Haegi 1871 AD; two plants on sheet).

Type: Western Australia, Perth, City Beach, summit of sand dune c. 1 km north of Oceanic Drive, *L. Haegi* 1871, 25 Aug. 1979; holo: PERTH; iso: AD, NSW.

Annual herbs to c. 0.4 m tall, commonly with scattered hairs, mostly glabrescent, but lower surface of leaves commonly with coarse hairs, or their basal portion, tending to persist. Taproot small; secondary roots numerous. *Mid-stem leaves* mostly 3–8 cm long, undivided or lobate to sub-pinnatisect; base cuneate to cordate; margin with scattered or crowded teeth; undivided leaves very narrow-elliptic, very narrow-oblong or oblanceolate; divided leaves with up to 3 segments per side. *Upper-stem leaves* with base commonly cordate, somewhat stem-clasping. *Inflorescences* of few to c. 20 capitula. *Capitulum:* calycular bracteoles 8–12, narrow-ovate to lanceolate, 2.0–3.0 mm long, 0.6–1.2 mm wide, with margin often hairy, with dark purple apical mark 1–1.5 mm long; involucre 4–6 mm long, 3–4 mm diam.; phyllaries mostly c. 13; stereome often suffused with purple below apex, with resin ducts fine, usually pale on drying; inner phyllaries with margin 0.3–0.6 mm wide; outer phyllaries with margin 0.1–0.2 mm wide; receptacle 3.5–5 mm diam. at maturity, with attachment points for achenes of female florets thickened and usually somewhat protruding. *Florets* 50–60; female florets c. 8; corollatube 2–3 mm long; ligule 6–10 mm long; corolla of bisexual florets 5–6 mm long. *Achenes* obloid, dimorphic; achenes of bisexual florets 2–3 mm long, with papillose hairs covering c. 50–90% of the otherwise brown surface, hardly exceeding pappus ring; achenes of female florets 2.8–3.5 mm long, with more robust papillose hairs ±completely covering surface, clearly exceeding pappus ring; carpopodium much larger than that of achenes of bisexual florets. *Pappus* 4–5 mm long, absent on mature achenes of female florets. (Figs 9a, 10)

Flowers mostly winter and spring.

Etymology: The epithet alludes to the projections on the receptacle to which the enlarged carpopodia of the achenes of female florets are attached (*L. condylus*, projection as in the ball of a ball-and-socket joint).

Distribution and Habitat: Occurs in the Perth and Busselton regions of far south-western Western Australia. (Fig. 9b). It has been collected once from Port Phillip Bay in Melbourne; however, the lack of further collections suggests that the plant was adventive at this location. Grows in sand, often in disturbed sites.

Notes: Consideration was given to the possibility that *S. condylus* was introduced because of its distribution in the city of Perth, but attempts to match it with exotic species were unsuccessful. Furthermore, the dimorphic nature of the achenes and the tuberculate processes on the receptacle margins correspond to the morphology of the indigenous *Glossanthus* group and to some Australian members of the *S. lautus* complex. *Senecio condylus*, although superficially closer to the latter complex because of its larger capitula with large ligules, is closer in other respects to the *S. glossanthus* group.

Selected specimens examined: **WESTERN AUSTRALIA:** Lake Richmond Nature Reserve, S side, A. Bellman 27A, 4.viii.2000 (PERTH); Port Kennedy bushland, 15 km N of Mandurah, G.J. Keighery & N. Gibson 858, 3.ix.1992 (PERTH); Fremantle, N. Ingleton, Oct. 1947 (PERTH); Busselton, M. Koch, Oct. 1909 (PERTH); Fortview Road, Swanbourne, R.J. Cranfield 382, 24.viii.1978 (MEL, PERTH). **VICTORIA:** Coode Island, J.R. Tovey & C. French Jr., 1916 (MEL).

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Index of Scientific Names

Epithets of accepted names are in roman (with bold type for new names) and of synonyms in italics. The numbers (with letters for subspecies) refer to the number of the accepted species as given in the taxonomy section.

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Senecio		
<i>brachyglossus</i> F.Muell. ex Benth.	1	6
<i>brachyglossus</i> var. <i>brachyglossus</i>	1	6
<i>brachyglossus</i> var. <i>elator</i> Benth.	see introduction	3
<i>brachyglossus</i> var. <i>major</i> Benth.	3, 4	13
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<i>glossanthus</i> (Sond.) Belcher	1	6
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productus I.Thomps.	2	10
productus subsp. magnus I.Thomps.	2b	10
productus subsp. productus	2a	10
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