It's complicated:

A brief overview of the taxonomy of the New Zealand *Brachyglottis rotundifolia* species complex (Senecioneae)

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ABSTRACT

Brachyglottis J.R.Forst. & G.Forst. (Senecioneae Cass.; Asteraceae) is a mostly woody genus of *ca.* 24 species. It is endemic to New Zealand in classifications where *B. brunonis* (Hook.f.) B.Nord. from Tasmania is segregated as *Centropappus brunonis* Hook.f. As part of his undergraduate research project at University of Canterbury, Eastman-Densem performed an unpublished pilot study into patterns of morphological variation in a group of four discoid *Brachyglottis* species with unclear taxonomic boundaries (i.e., the *B. rotundifolia* species complex): *B. buchananii* (J.B.Armstr.) B.Nord., *B. cockaynei* (G.Simpson & J.S.Thomson) B.Nord., *B. elaeagnifolia* (Hook.f.) B.Nord., and *B. rotundifolia* J.R.Forst. & G.Forst. With the aim of supporting future studies focused on resolving this species complex, we here provide a brief overview of its current taxonomic treatment and synonymy (summarized in Table 1), with notes about its complicated taxonomic history. We conclude that although *Senecio bennettii* G.Simpson & J.S.Thomson is listed as a synonym of *B. buchananii* in recent publications and other works and treatments, this name should instead be considered as a synonym of *B. rotundifolia* if the current taxonomic delimitation of the complex is followed.

Keywords: Asteraceae, Compositae, nomenclature, *Senecio bennettii*, species delimitation

INTRODUCTION

The Brachyglottidinae (Senecioneae) are a mostly Australasian subtribe in which currently between seven and nine genera are recognised. Its center of diversity is in New Zealand, where all but three of its genera are found. *Brachyglottis* J.R.Forst. & G.Forst. is the largest of these.The relatively recent diversification of this genus, coupled with the varied topography and climate of New Zealand has contributed to impressive morphological diversity within *Brachyglottis* (Wagstaff & Breitwieser, 2004), as well as groups of species within which species boundaries are difficult to determine (i.e., Mennes et al., 2012; Millar et al., 2018). This is certainly the case for a group of four discoid *Brachyglottis* species (i.e., the *B. rotundifolia* J.R.Forst. & G.Forst. species complex; Figure 1). An overview of its taxonomic history of this *Brachyglottis* complex was prepared as part of a preliminary study aimed at resolving its species delimitation.

TAXONOMIC OVERVIEW

Brachyglottis rotundifolia J.R.Forst. & G.Forst., Char. Gen. Pl., ed. 2: 92 (1776) ≡ *Cineraria rotundifolia* (J.R.Forst. & G.Forst.) G.Forst., Fl. Ins. Austr. Prodr.: 56 (1786) ≡ *Senecio reinoldii* Endl., Ann. Wiener Mus. Naturgesch. 1: 169 (1836), nom. nov., non *Senecio rotundifolius* Stokes (1812), nec Lapeyr. (1813) ≡ *Senecio rotundifolius* (J.R.Forst. & G.Forst.) Hook.f., Bot. Antarct. Voy. II. (Fl. Nov.-Zel.). 1: 149 (1852), nom. illeg., auct non Stokes (1812), nec Lapeyr. (1813) ≡ *Senecio puffini* Allan ex Rehder, J. Arnold Arbor. 27: 174 (1946), nom. superfl. **Type:** Forster (K00844033*), Dusky Bay.

Senecio bennettii G.Simpson & J.S.Thomson, Trans. & Proc. Roy. Soc. N. Z. 72: 39 (1942). **Type:** G. Simpson (CHR29513!, syn), J.S. Thomson & G. Simpson (AK35247*, syn), Mt. Cargill, near Dunedin, upper forest margins, 600m.

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Complex past

The *Brachyglottis rotundifolia* complex has a dynamic history of changes in its species delimitation. Close-up of the capitulescence, showing its flower heads.

Stewart Island, New Zealand
Photo by Ilse Breitwieser

This taxon was first described as *Brachyglottis rotundifolia* (Forster & Forster, 1776), and then transferred to *Cineraria* L. (i.e., *Cineraria rotundifolia (*J.R.Forst. & G.Forst.) G.Forst.; Forster, 1786). Endlicher (1836) subsequently moved it to *Senecio* L., creating the nomen novum *S. reinoldii* Endl., because the name *S. rotundifolius* was occupied by a northern hemisphere species (i.e., *S. rotundifolius* Stokes). Hooker (1852) seems to have overlooked this and made the illegitimate combination *S. rotundifolius* (J.R.Forst. & G.Forst.) Hook.f. Unfortunately, this combination continued to persist, appearing for example in Kirk (1899) and Cheeseman (1906a, 1925). Rehder (1946) finally recognised that this combination could not be used and, following correspondence with Allan, created the replacement name *S. puffıni* Allan ex Rehder. However, this is a superfluous name, because *S. reinoldii* was already validly published before this new name was created. Allan (1961), apparently realized this, and used *S. reinoldii* in his Flora of New Zealand. This name was also used by Drury (1973). The original name, *Brachyglottis rotundifolia,* became the preferred name when Nordenstam (1978) transferred the species back to *Brachyglottis,* and it is used until this day.

In 1942, Simpson & Thomson described *Senecio bennettii* G.Simpson & J.S.Thomson for South Island and Stewart Island plants that were before that time considered *S. elaeagnifolius* Hook.f., but that the authors considered taxonomically distinct (Simpson & Thomson, 1942). In their publication they noted that they had not seen *S. elaeagnifolius* in the South Island and wrote that "...*S. bennettii* is in need of further study and must meanwhile be regarded as a composite of two or more closely-related forms." (Simpson & Thomson, 1942, p. 39). Allan (1961) accepted this somewhat tenuous species, giving a distribution from 40° 30' southwards (i.e., South Island and Stewart Island). Drury (1973) did not recognize *S. bennettii*. He included plants from the northern part of the distribution of *S. bennettii* in *S. elaeagnifolius* and those with a southern distribution in *S. reinoldii* (Drury, 1973; Haase 1986). Nordenstam (1978) listed *S. bennettii* as a synonym of *Brachyglottis buchananii* (J.B.Armstr.) B.Nord. and noted "As typified by Drury (1973 b p. 746) *S. buchananii* is synonymous to *S. bennettii* and takes priority" (Nordenstam, 1978, p. 29), but this seems incorrect, because Drury (1973) considered the type of *S. bennettii* to belong to *S. reinoldii* (*B. rotundifolia*) instead of *S. elaeagnifolius* var. *buchananii.* This is clear from the text in Drury's section about *S. reinoldii*: "Until the limits of the discoid species are resolved, it seems best to include here the southern portion of *S. bennettii* Simp. & Thoms. (the type specimen from Mt. Cargill, Dunedin, has 13 involucral bracts)" (Drury 1973, p. 752). The added note about the number of involucral bracts of the type of *S. bennettii* is important, because Drury's identification key indicates that he considered specimens with about 13 involucral bracts to belong to *S. reinoldii*, whereas those with 7–9 involucral bracts key to *S. elaeagnifolius.* Therefore, *S. bennettii* should be regarded a synonym of *B. rotundifolia* instead of *B. buchananii* in Nordenstam's (1978) classification.

Brachyglottis rotundifolia var. **ambigua** (Cheeseman) B.Nord., Opera Bot. 44: 29 (1978) ≡ *Senecio rotundifolius* var. *ambiguus* Cheeseman, Man. N. Zeal. Fl., ed. 2: 1026 (1925) ≡ *Senecio reinoldii* var. *ambiguus* (Cheeseman) Allan, Fl. New Zealand 1: 754 (1961). **Type:** H.J. Matthews (not found, syn), B.C. Aston (not found, syn), North-west Nelson – West Wanganui; W. Townson (AK10757*, syn), Cape Foulwind, near Westport; W. Townson (CHR331498!, syn), Cape Foulwind, Nelson; D. Petrie (AK10758*, AK10759*, syn), Cape Foulwind, near Westport, Feb-1913.

This taxon was first noted by Petrie (1913) as plants from Cape Foulwind (South Island) that were initially identified as *Senecio rotundifolius*. He suggested that they instead belong to *S. elaeagnifolius*. Cheeseman (1925), however, considered them taxonomically distinct and described the new variety *S. rotundifolius* var. *ambiguus,* acknowledging similarities between this taxon and *S. elaeagnifolius* in leaf shape. Allan (1961) transferred the variety to *S. reinoldii.* In the section of his publication about *S. reinoldii*, Drury wrote that *S. reinoldii* var. *ambiguus* "is sometimes placed under *S. reinoldii* and at other times under *S. elaeagnifolius*" (Drury, 1973, p.752), and refrained from giving it formal taxonomic recognition in either species. Nordenstam (1978) subsequently placed it in *Brachyglottis rotundifolia*.

Brachyglottis elaeagnifolia (Hook.f.) B.Nord., Opera Bot. 44: 29 (1978) ≡ *Senecio elaeagnifolius* Hook.f., Bot. Antarct. Voy. II. (Fl. Nov.-Zel.). 1: 150 (1852). **Type:** Colenso 39 (K000844032*, ?WELT SP024196/A (not seen), ?WELT SP024196/B (not seen), syn), Ruahine mountains, 1847.

This species was first described as *Senecio elaeagnifolius* by Hooker (1852) based on plants from the Ruahine Range (North Island), although he later regarded this taxon "probably only a form of *S. rotundifolius"* (Hooker, 1867, p. 734). Kirk (1899), however, accepted *S. elaeagnifolius* (incl. *Senecio elaeagnifolius* var. *buchananii* (J.B.Armstr.) Kirk, see below) as a distinct species with a distribution from the eastern part

Figure 1. Diversity within *Brachyglottis rotundifolia* species complex. **A.** Coastal specimen, Stewart Island. **B.** Plant in exposed open habitat, Mt. Aspiring National Park, South Island. **C.** Capitulum, Stewart Island. **D.** Inflorescence, Otira Valley, South Island. **E.** Abaxial view of leaf of plant in forest habitat, Mount Aspiring National Park, South Island. **F.** Abaxial view of leaf in exposed open habitat, Mount Aspiring National Park, South Island. Photos: A, C, M. Ford; B, D, F, G, P.B. Pelser; E, D. Lyttle.

Table 1. Key taxonomic treatments of the *Brachyglottis rotundifolia* species complex. For each treatment, the table shows the accepted name used for each basionym (and its homotypic synonyms). Most authors did not explicitly list autonyms at the level of variety and these were therefore inferred from information presented in the literature cited.

Basionym & *homotypic synonyms*	**Current classification**	**Nordenstam 1978**	**Drury 1973**	**Allan 1961**	**Simpson & Thomson 1942**	**Cheeseman 1925**	**Kirk 1899**
Senecio rotundifolius var. ***ambiguus*** Cheeseman. *Senecio reinoldii* var. *ambiguus* (Cheeseman) Allan, *Brachyglottis rotundifolia* var. *ambigua* (Cheeseman) B.Nord.	***B. rotundifolia*** var. ***ambigua***	*B. rotundifolia* var. *ambigua*	*S. elaeagnifolius* or *S. reinoldii*? (see text)	*S. reinoldii* var. *ambiguus*	*S. rotundifolius* var. *ambiguus*	*S. rotundifolius* var. *ambiguus*	
Brachyglottis rotundifolia J.R.Forst. & G.Forst. *Cineraria rotundifolia* (J.R.Forst. & G.Forst.) G.Forst. *Senecio reinoldii* Endl. *Senecio rotundifolius* (J.R.Forst. & G.Forst.) Hook.f. *Senecio puffini* Allan ex Rehder	***B. rotundifolia*** var. ***rotundifolia***	*B. rotundifolia* var. *rotundifolia*	*S. reinoldii*	*S. reinoldii* var. *reinoldii*	*S. rotundifolius* var. *rotundifolius*	*S. rotundifolius* var. *rotundifolius*	*S. rotundifolius*
Senecio bennettii G.Simpson & J.S.Thomson	***B. rotundifolia*** var. ***rotundifolia***	*B. buchananii*	*S. reinoldii*	*S. bennettii*	*S. bennettii*		
Senecio buchananii J.B.Armstr. *Senecio elaeagnifolius* var. *buchananii* (J.B.Armstr.) Kirk *B. buchananii* (J.B.Armstr.) B.Nord.	***B. buchananii***	*B. buchananii*	S. elaeagnifolius or S. reinoldii? (see text)	*S. bennettii*	*S. bennettii*	*S. elaeagnifolius* var. *buchananii*	*S. elaeagnifolius* var. *buchananii*
Senecio elaeagnifolius Hook.f. *Brachyglottis elaeagnifolia* (Hook.f.) B.Nord.	***B. elaeagnifolia***	*B. elaeagnifolia*	*S. elaeagnifolius*	*S. elaeagnifolius*	*S. elaeagnifolius*	*S. elaeagnifolius* var. *elaeagnifolius*	*S. elaeagnifolius* var. *elaeagnifolius*
Senecio cockaynei G.Simpson & J.S.Thomson *Brachyglottis cockaynei* (G.Simpson & J.S.Thomson) B.Nord.	***B. cockaynei***	*B. cockaynei*	*S. elaeagnifolius*	*S. cockaynei*	*S. cockaynei*		

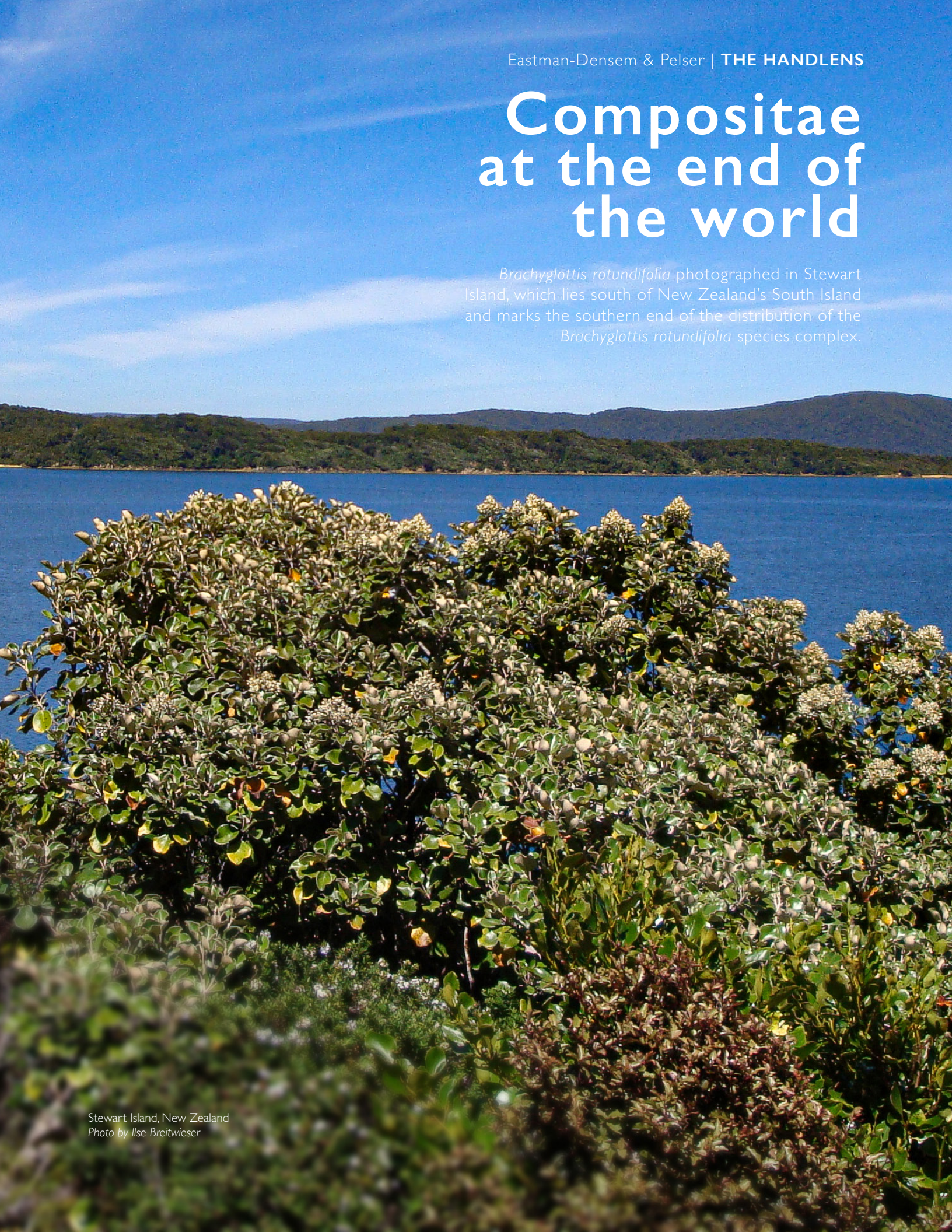
of the North Island (i.e., East Cape) south through the South Island and Stewart Island. Simpson & Thomson (1942) and Allan (1961) considered South Island and Stewart Island plants of Kirk's *S. elaeagnifolius* as better accommodated in *S. benettii* G.Simpson & J.S.Thomson or *S. cockaynei* G.Simpson & J.S.Thomson, reducing *S. elaeagnifolius* to a species endemic to the North Island. The delimitation of *S. elaeagnifolius* was again revised by Drury (1973), who suggested the inclusion of *S. cockaynei* and plants from the northern part of the distribution of *S. bennettii* (excl. the type, see previous discussion). Nordenstam (1978) made a new combination for *S. elaeagnifolius* in *Brachyglottis*, but recognized *S. cockaynei* (as *B. cockaynei* (G.Simpson & J.S.Thomson) B.Nord.) and *S. elaeagnifolius* var. *buchananii* (as *B. buchananii* and including *S. bennettii* as a synonym) as distinct at the species level.

Brachyglottis buchananii (J.B.Armstr.) B.Nord., Opera Bot. 44: 29 (1978) ≡ *Senecio buchananii* J.B.Armstr., New Zealand Country J. 3: 56 (1879) ≡ *Senecio elaeagnifolius* var. *buchananii* (J.B.Armstr.) Kirk, Stud. Fl. New Zealand: 349 (1899). **Type:** "Found on Arthur's Pass, and Mount Egmont. J.B. Armstrong and others". (See comments on the type material below)

Armstrong (1879) described this species from plants from Mt. Egmont (North Island) and Arthur's Pass (South Island), but he also mentioned Kaikoura and Otago (South Island) as part of its distribution in a later publication (Armstrong, 1881). Kirk (1899) reduced this taxon to a variety of *Senecio elaeagnifolius* and this classification was followed by Cheeseman (1906a, 1925). Interestingly, Allan (1961) did not mention the names *S. buchananii* and *S. elaeagnifolius* var. *buchananii* in his Flora of New Zealand. Drury (1973), however, mentioned that the only specimen in the Armstrong herbarium (CHR635537!) from one of the localities of the original material used for describing *S. buchananii* (i.e., Arthur's Pass) would be considered *S. bennettii* in the delimitation of that taxon used by Allan (1961). Although Drury (1973) concluded that this is the only material available for the lectotypification of the name *S. buchananii*, he did not lectotypify the name, nor did he detail whether he considered Armstrong's specimen to belong to *S. reinoldii* (*Brachyglottis rotundifolia*) or *S. elaeagnifolius* (*B. elaeagnifolia*). Drury (1973) did not explicitly recognise *S. elaeagnifolius* var. *buchananii* as a distinct taxon and stated that the Mt. Egmont plants that Armstrong (1879, 1881) placed in his *S. buchananii* "are properly treated with *S. elaeagnifolius*

Compositae at the end of the world

Brachyglottis rotundifolia photographed in Stewart Island, which lies south of New Zealand's South Island and marks the southern end of the distribution of the *Brachyglottis rotundifolia* species complex.



Stewart Island, New Zealand
Photo by Ilse Breitwieser

(cf. Kirk 1899, Cheeseman 1906a, 1925, and Allan 1961)." (Drury, 1973, p.747). In 1978, Nordenstam transferred *S. buchananii* to *Brachyglottis*. Until the name *S. buchananii* is lectotypified, it will remain unclear for what plants (if any) the name *B. buchananii* should be used.

Brachyglottis cockaynei (G.Simpson & J.S.Thomson) B.Nord., Opera Bot. 44: 29 (1978). ≡ *Senecio cockaynei* G.Simpson & J.S.Thomson, Trans. & Proc. Roy. Soc. N. Z. 72: 38 (1942). **Type:** G. Simpson (CHR29505!, holo), cultivated, Dunedin ex Westhaven, West Wanganui Inlet, Nelson.

Cheeseman (1906b) first noted the occurrence of plants that he identified as *Senecio rotundifolius* in the West Wanganui Inlet (northern South Island), mentioning that this find extended the known distribution range of this species. Cockayne (1918) commented that he received a specimen of this population and that he could not determine if it belonged to *S. elaeagnifolius* or *S. rotundifolius*, pointing out morphological differences with both taxa. Simpson & Thomson (1942) considered these differences significant enough to describe this taxon as *S. cockaynei,* and this view was adopted by Allan (1961). Drury (1973) recommended including *S. cockaynei* in *S. elaeagnifolius,* awaiting further studies into the delimitation of the species complex. Nordenstam (1978) transferred the name to *Brachyglottis*.

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