KANUNNAH

The Research Journal of the
Tasmanian Museum and Art Gallery

VOLUME 3

Ka-nunnah – 'Thylacine'

The oldest fossils of thylacines are Late Oligocene to Middle Miocene in age (20–25 My B.P.) and are from the Riversleigh deposits in north-western Queensland (Vickers-Rich *et al*. 1991). It is speculated that competition with introduced dingoes in mainland Australia may have caused their extinction in mainland Australia during the last 5000 years. The most recent remains of thylacines in mainland Australia were dated at just over 3000 years old (Archer 1974).

The thylacine *(Thylacinus cynocephalus)* in Tasmania coexisted with Aboriginal people for millennia. The arrival of Europeans in Tasmania resulted, in just over a hundred years, in the extinction of thylacines from their last refuge. The demise of the thylacine resulted in the extinction of an entire lineage of marsupials from the planet.

To the Aboriginal people of Tasmania the thylacine was called many things due to its wide spread distribution in the State. Tribes from the areas of Mount Royal, Bruny Island, Recherche Bay, and the south of Tasmania referred to the Tiger as 'Ka-nunnah' or 'Laoonana', while tribes from Oyster Bay to Pittwater called it 'Langunta' and the North-west and Western Tribes called it 'Loarinnah' (Milligan 1859). Famous Tasmanian Aboriginal chief Mannalargenna from the East Coast of Tasmania called the thylacine 'Cab-berr-one-nen-er', while Truganinni and Worrady, (Bruny Island) called it 'Can-nen-ner'.

The thylacine is the state logo for Tasmania. The title of the journal 'Kanunnah' commemorates the Tasmanian Aboriginal word used by tribes from southern Tasmania for the thylacine.

Archer M (1974) New information about the Quaternary distribution of the thylacine (Marsupialia: Thylacinidae) in Australia. *Journal and Proceedings of the Royal Society of Western Australia* **57**: 43–50.

Milligan J (1859) Vocabulary of dialects of Aboriginal Tribes of Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* **3(2)**: 239–282.

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Tasmanian Museum and Art Gallery

The Tasmanian Museum and Art Gallery is a combined museum, art gallery and state herbarium. It has the broadest collection range of any single institution in Australia and these collections span the arts, sciences, history and technology. The Tasmanian Museum and Art Gallery's role is to collect, conserve and interpret material evidence on the State's natural history and cultural heritage.

Kanunnah is a peer-reviewed journal published by the Tasmanian Museum and Art Gallery in Hobart, Tasmania. Its aim is to disseminate research in all areas of study undertaken by the Tasmanian Museum and Art Gallery. These areas include the life sciences, culture, history and the arts. Papers on any of these research areas will be considered, but papers dealing with Tasmanian, southern Australian and sub-Antarctic issues will be particularly welcome.

Short communications and reviews are also welcome. Researchers based outside the institution are encouraged to submit manuscripts for publication to the journal, although they must be relevant to the Museum's primary areas of study.

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IN BLACK AND WHITE: W.C. PIGUENIT'S MONOCHROME PAINTINGS AND THE IMAGING OF THE TASMANIAN WILDERNESS IN THE *PICTURESQUE ATLAS OF AUSTRALASIA*

Jonathan Holmes

Holmes, Jonathan 2008. In black and white: W.C. Piguenit's monochrome paintings and the imaging of the Tasmanian wilderness in the *Picturesque Atlas of Australasia*. *Kanunnah* 3: 1–12. ISSN1832-536X. William Charles Piguenit (1836–1914) created a number of monochrome paintings of the wilderness areas in Tasmania during the late 1880s. They are an isolated group of paintings in this medium in Piguenit's oeuvre and this paper argues that many were commissioned for engravings reproduced in the *Picturesque Atlas of Australasia* (1886–1888). It is suggested that the paintings were produced in black and white for transfer to photo-sensitised woodblocks. It is further argued that this approach enabled engravers to more faithfully represent the tonal values of the originals. Until now these paintings were thought to have been created in 1891, but it seems likely that most of the monochrome paintings by Piguenit in the Tasmanian Museum and Art Gallery were painted sometime in 1887.

Jonathan Holmes, Tasmanian School of Art, University of Tasmania,
Private Bag 57, Hobart, Tasmania, 7001, Australia.
Email: Jon.Holmes@utas.edu.au

KEY WORDS: Piguenit, nineteenth century Australian painting, landscape painting, Tasmanian art, Tasmanian Museum and Art Gallery, nineteenth century illustration, *Picturesque Atlas of Australasia*, Royal Society of Tasmania.

The Tasmanian-born landscape painter and illustrator, William Charles Piguenit (1836–1914), was commissioned to produce a number of illustrations for the *Picturesque Atlas of Australasia*, which was published in monthly instalments between 1886 and 1888.[1] This publication was a lavishly illustrated historical and descriptive account of the Australian colonies and of New Zealand, and was intended to represent Australia as a vibrant and forward-thinking country. It was sold by subscription and each issue cost five shillings.[2]

Piguenit created images of wilderness areas in Tasmania for the *Atlas* and this paper contends that the engravings that were included in the *Atlas* were based upon monochrome oil paintings, which he produced from sketches made on several

Fig. 1. W.C. Piguenit *The Frenchman's Cap from the western flank of Mount Arrowsmith* 1887. Monochrome oil on cardboard, 33.1 x 45.5 cm, Royal Society of Tasmania TMAG: AG 1822

arduous field trips into the south-west and highlands of Tasmania during the 1870s and 1880s. It has long been the view that a number of these monochrome paintings in the Tasmanian Museum and Art Gallery's collection were produced to coincide with the lecture, 'Among the western highlands of Tasmania', which Piguenit gave in January, 1892 in the Royal Society of Tasmania rooms in Hobart at the fourth meeting of the Australasian and New Zealand Association for the Advancement of Science. Accordingly, these paintings have been dated as being produced during the previous year.

This paper presents a case, however, that the paintings should be dated to 1887 since it is argued that their creation was timed to fit into the publication schedule of the *Picturesque Atlas of Australasia*. It is also suggested that they may have been painted in monochrome because they were intended to be photographed. Once this had occurred, it was possible for the photographic images to be transferred to the photo-sensitised wood blocks upon which they were to be engraved. As Tony Hughes-d'Aeth states in *Paper Nation: The Story of the Picturesque Atlas of Australasia, 1886–1888*, photographs were used in a variety of ways by the artist-illustrators and engravers working on the *Atlas*.[3] This will be discussed later in this paper.

Several other monochrome paintings by Piguenit have been positively identified as works produced in 1887 and this further

Fig. 2. W.C. Piguenit *Mount King William, Western Tasmania* 1887.
Monochrome oil on cardboard, 46.7 x 64.2 cm, Royal Society of Tasmania. TMAG: AG 1821

supports the case for the dating of the works to that year.

Monochrome paintings by Piguenit in the Tasmanian Museum and Art Gallery collection

There are seventeen monochrome paintings by Piguenit in the Tasmanian Museum and Art Gallery [TMAG] collection. One of the reasons for TMAG's dating of the majority of the works to 1891 is that nine of the undated paintings were a gift from the Tasmanian Government in 1892 and were bought from Piguenit immediately after his lecture in January 1892. A ten-page pamphlet with eight photolithographs of the monochromes was subsequently published by the Tasmanian Government Printer, Hobart.[4]

Five more of the monochrome landscapes were acquired by the Royal Society of Tasmania, two of which have the date inscribed – 1887: *The Frenchman's Cap from the western flank of Mount Arrowsmith* (Fig. 1) and *Mount King William, Western Tasmania* (Fig. 2). There is also a later monochrome, *Mount Wellington from Shag Bay, River Derwent*, which was painted in 1893. The Royal Society of Tasmania had two other monochromes, one simply described as a *Landscape* and the other, *On the Huon, Tasmania* (Fig. 3). The latter work is similar to the watercolour *A Northern River, N S Wales*, and the title *On the Huon, Tasmania* is incorrect (A Rozefelds

Fig. 3. W.C. Piguenit *On the Huon, Tasmania*, late 1880s.
Monochrome oil on cardboard, 37.2 x 52.4 cm, Royal Society of Tasmania. TMAG: AG 1820

pers. comm. 2008). In the TMAG database these two paintings are noted as being created in the late 1880s.

A further two paintings came to the Tasmanian Museum and Art Gallery's collection as a gift from R.M. Johnston (1844–1918): *Ben Lomond from the Marshes*, dated in the mid-1880s, and *Camp, Lake Pedder* also dated in the 1880s. The seventeenth monochrome, *Ben Lomond from the Break O'Day Plains*, was presented to TMAG in 1946 as part of the R.W. Legge Bequest. This is undated but, again, appears to have been painted at the same time as the others. The painting was initially acquired by Colonel W.V. Legge (1841–1918), a close friend of Piguenit, who owned 'Cullenswood' near the railhead at St Marys in the Fingal Valley. Together with Piguenit, Johnston, J.B. Walker (1841–1899) and Colonel Legge, a noted ornithologist, were expeditioners on the C.P. Sprent expedition that ventured into the King River in February 1887.[5] Several of Piguenit's sketches from this expedition found their way into illustrated publications about this time, including the *Picturesque Atlas of Australasia*.

The *Picturesque Atlas of Australasia*

Piguenit was one of a number of significant artists to be employed on the *Picturesque Atlas of Australasia*; among the other artists already living in Australia were J.R. Ashton (1851–1942), A.H. Fullwood

(1863–1930), and Frank Mahony (1862–1917). The team was led by three American artists, F.B. Schell (d. 1905), W.T. Smedley (1858–1920) and W.C. Fitler (1857–1915), all of whom had played prominent roles in other *Atlas* publications in North America and Europe earlier in the decade. The work as a painter-illustrator was extremely lucrative. Ashton recounted in his autobiography, *Now Came Still Evening On*, that his employment on the *Australasian Sketcher* in 1880 earned him the princely sum of £1200 per annum. A large number of artists working in Australia during the 1880s and 1890s gained a considerable income from the illustrated press.

The American-born chief illustrator of the *Atlas*, F.B. Schell, appears to have covered all of the states (although most of the illustrations for Western Australia appear to have been derived from photographs); Ashton, together with Fullwood, covered the eastern seaboard. In 1887 Piguenit returned to Tasmania from Sydney (where he had settled in 1880) and there is strong evidence to suggest that some illustrations in the *Atlas* were created from sketches made at the time, although others were created from sketches made during previous excursions into the south-west and central highlands and to the north-east of Tasmania. It seems that only Schell and Piguenit came to Tasmania; there are several illustrations by Fullwood but these appear to have been created from photographic sources.

Piguenit's wilderness expeditions in Tasmania

Piguenit made four arduous journeys into the south-west and central highlands of Tasmania. His first trip was with J.R. Scott (1839–1877) when they walked into Port Davey in February 1871 along the Huon River track. In 1892, in his illustrated lecture for the Australasian Association for the Advancement of Science in Hobart, Piguenit recounted some of his experiences of this first journey. Commenting on the rather uninteresting landscape for the first forty miles or so, he remarked that 'ample compensation is made to the traveller by the magnificent view that suddenly bursts upon the eye when the summit of the last hill, overlooking the Arthur Plains, is reached'.[6] The moment was recorded in a beautiful pencil and watercolour work. *Pass in the Arthur Range, Tasmania* created in either 1871 or 1874, when he returned with Johnston along the same track to Lake Pedder. The work is held in the collection of the Ballarat Fine Art Gallery, Victoria. The painting depicts two of the expeditioners surveying the plain. This painting was subsequently worked up as one of the monochrome paintings purchased in 1892 by the Tasmanian Government. Entitled *The Arthur Range, Tasmania*, Piguenit had removed the two figures in the earlier painting and the Frankland Range has been depicted as slightly closer to the vantage point chosen by the artist.

The 1871 expedition continued to Port Davey and five days were spent exploring the waterways by boat; Piguenit also took the opportunity to sketch, among other sites, Hells Gates on the Davey River and observed that, in the midst of several days of foul weather, 'I had much difficulty in making the sketch from which the accompanying illustration has been taken, owing to the furious westerly wind that was blowing through the "Gates", accompanied with driving showers of sleet'.[7] (Figs 4, 5).

Fig. 4. W.C. Piguenit *'Hell's Gates', Davey River, Tasmania*, c. 1891.
Monochrome on cardboard, 55.3 x 78 cm, presented by the Tasmanian Government. TMAG: AG 1385

Christa Johannes and Anthony Brown date Piguenit's monochrome painting *Hell's Gates* to c. 1891; the reasoning being that this painting was one of the works used in the January 1892 lecture.[8] It is my view, however, that it was painted during 1887, either during Piguenit's visit to Tasmania from New South Wales in February and March 1887, or later that year in Sydney. Support for this interpretation is that a group of 'very fine pictures in black and white by Mr Piguenit', was reported as being exhibited in Sydney by the *Sydney Morning Herald* in August 1887,[9] and, according to Johannes and Brown, monochrome paintings entitled *Peak of King William from the Terrace, King William Range, Mount Gell, King William from Lake George* and *The Frenchman's Cap* were shown at Callan & Sons, Sydney in August; two further unidentified monochromes were shown in the Art Society of New South Wales Exhibition in Pitt Street, Sydney, a month earlier.[10] One can surmise, too, that the two Tasmanian chapters of the *Atlas* were published sometime during the middle of the year since the *Atlas* had been released in monthly instalments during the preceding months. I believe that one of the reasons this set of works were created was for the *Picturesque Atlas of Australasia*.

All of the works described in *The Sydney Morning Herald* were probably derived from sketches created on the Charles Sprent

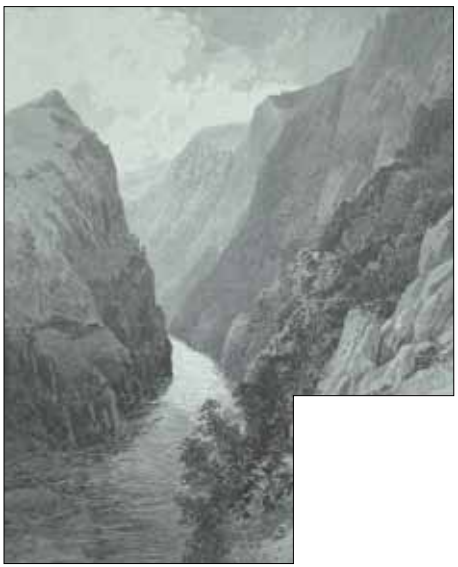

Fig. 5. W.C. Piguenit *'Hell's Gates' Davey River, Tasmania*, 1887.

Engraved by H. Miller from an original painting by Piguenit, engraving, B. & W., 22.0 x 17.8 mm, vol. 2, p. 496 in *Picturesque Atlas of Australasia*, Sydney: Picturesque Atlas Publishing Company, 1886–1888

expedition into the western highlands in February 1887. As previously noted, Piguenit was accompanied by Walker, Colonel Legge and Johnston and the party, as Johannes and Brown write, followed the route taken in 1873 as far as Lake St Clair. As they go on to say:

> From there the men veered west south-west across the Navarre Plain, past Mt King William and the King William Range, past Mt Arrowsmith, Mt Rufus, Mt Gell and the Frenchman's Cap. The track was incredibly rough. The two horse-drawn carts which carried equipment had to be sent back at Mt King William, and the men had to shoulder their heavy knapsacks and proceed with only packhorses. On 20th February the party camped on the Cardigan River.[11]

On the way to the river and on his return to Lake St Clair, Piguenit sketched extensively. The watercolour, *Mount Gell, Western Highlands, Tasmania* was painted on that trip; and three (or perhaps four) of the extant monochromes were created after the February expedition – *The King William Range, Tasmania*; *Mt Gell, Tasmania*; *King William from Lake George, Tasmania*; and possibly *Mt Olympus, Lake St Clair*. There was probably a sixth monochrome of Frenchman's Cap together with one held by the TMAG, as illustrations of Mount King William and a slightly different view of the Cap found their way into the *Atlas*, as well as an illustration of the Eldon Bluff, probably sketched during the 1873 Scott expedition (Fig 6).

Given the subjects sketched during this expedition, it seems reasonable to assume that the five monochromes exhibited at Callan & Sons had been worked up from sketches made earlier in 1887.

James Backhouse Walker, later to be Vice-Chancellor of the University of Tasmania (1898–1899), recorded his experience of the expedition in the manuscript of 1887, 'Walk to the West', writing:

> On descending … down a white gravel path through myrtle scrub, great knobs and bosses of quartzite cropped out of the steep green hill to our left, the red crags of Mount Gell towering a thousand feet above us to the right, its lower slopes clothed in dense dark myrtle forest running sharply down a thousand feet below us into the deep gorge of the Franklin River. Turning the corner of the descending zigzag the enormous range

Fig. 6. W.C. Piguenit *Frenchman's Cap, Tasmania*, 1887.

Engraved by A. Hayman from an original painting by Piguenit, engraving, B. & W., 25.8 x 17.6 mm, vol. 2, p. 519, in *Picturesque Atlas of Australasia*, Sydney: Picturesque Atlas Publishing Company, 1886–1888

> of the Frenchman's Cap, near 5000 feet high, suddenly burst upon us in all its glory, its fantastic peaks crowned with cliffs of glistening quartzite.[12]

Although this was to be Piguenit's last expedition into these rugged wilderness areas of Tasmania, the Sprent journey was a particularly productive one for him. It seems likely that one of the reasons he was persuaded to undertake the trip was because of his *Atlas* commitments.

A further reason for dating this body of work as early as 1887 lies in the fact

Fig. 7. W.C. Piguenit *Lake Pedder, Tasmania*, c. 1891.

Monochrome oil on cardboard, 46.7 x 86.3 cm, Tasmanian Museum and Art Gallery. TMAG: AG 1389

that Johnston spent 1887 writing up his *Systematic Account of the Geology of Tasmania* which was published in 1888.[13] Included in the publication were several illustrations by his friend, Piguenit, including works that appear to have been derived from three of the monochromes in the TMAG collection.

The Arthur Range was developed from either the 1871 Port Davey expedition or the 1874 Lake Pedder journey; *Lake Pedder* was developed from *Camp, Lake Pedder* (Fig. 7) and *Ben Lomond, from the Marshes* appears to have been painted from the monochrome of the same title. Both these latter works were in the collection of R.M. Johnston and were bequeathed to the TMAG in 1918 shortly after his death. The latter work is intriguing, insofar as it was not only engraved by the renowned engraver, G.A. Collingridge (1847–1931), for the Johnston publication but it, or a similar work, was also engraved for the *Atlas* by Horace Baker (1833–1918), the highly skilled American engraver brought to Australia by Schell to lead the team of engravers of the *Picturesque Atlas of Australasia* (Figs 8, 9).

Fig. 8. W.C. Piguenit *Ben Lomond from the Marshes*

Engraved by George Collingridge from an original sketch by Piguenit, engraving, B. & W.; 15.0 X 22.2 cm, R.M. Johnston's *Systematic account of the geology of Tasmania*. Hobart: J. Walch and Sons, William Thomas Strutt, Govt Printer, 1888, pl. 4, facing p. 162

Fig. 9. W.C. Piguenit *Butts of Ben Lomond*.

Engraved by Horace Baker from an original painting by Piguenit, engraving, B. & W.; 14.9 x 22.5 mm, vol. 2, p. 523 in *Picturesque Atlas of Australasia*, Sydney: Picturesque Atlas Publishing Company, 1886–1888

Also included in Johnston's publication was a delightful illustration of the 1874 Pedder expeditioners negotiating a tricky crossing of the Picton River using a fallen tree as their bridge. The site was probably just above the junction between the Huon and Picton Rivers in southern Tasmania.

Piguenit's monochromes and the *Picturesque Atlas of Australasia*

The monochrome paintings in the TMAG were all created during a relatively short time and there is no evidence to suggest that other than in the late 1880s and early 1890s, was Piguenit attracted to this medium. They were painted on cardboard, not well-prepared canvas, and this suggests that they may have been created for a relatively ephemeral purpose – as a vehicle to pass on an image to the engraver. There appears to be a logical nexus, then, between the monochrome paintings and the subsequent illustrations and there is a link in the very process of printing these images in publications like the *Atlas*.

Tony Hughes-d'Aeth in *Paper Nation* provides a rigorous account of the role of wood block engraving in the *Atlas* and the commitment of the publishers to produce a publication of the highest standards.[14] He discusses the problems associated with trying to bring together type and print on the same page and he points out that the *Atlas* was printed on especially developed, although much more costly, paper and that this assisted the publishers in achieving the qualities that are apparent in the *Atlas*.[15] It also helped, of course, that the publishers had a group of highly skilled engravers and printers.

The process of wood engraving is a centuries-old one and by the nineteenth century it was being used for relatively large-scale production. The *Picturesque Atlas of Australasia*, for instance, was published in an edition of 50,000 – quite an extraordinary undertaking given that the population of Australia and New Zealand, at that time, was fewer than five million. The engravings were made on blocks

consisting of very smooth end-grain boxwood – some squares, some rectangles and some oval and circular vignettes. Larger woodblocks were often made of boxwood sections collared together. Engravings, unlike etchings, are printed type-high so this means that ink will sit on the surface while the engraved parts remain white; cross-hatching, stippling and fine-line engraving allow the engraver to produce extremely subtle gradations of tone. It is a highly skilled if laborious craft. If the paintings were being passed directly to the engraver for copying, it would thus make sense to limit the palette in the monochrome paintings in order to allow tonal values to be brought to the fore once translated to the white surface of the woodblock.

There is, however, a second possible reason that these works were painted in monochrome: this relates to advances in photography that were being made in the 1880s. In *Paper Nation*, Hughes-d'Aeth discusses the role of photography in some detail regarding the production of the *Atlas*.[16] Large numbers of the illustrations in the *Atlas* represent architectural subject matter – significant public buildings, city thoroughfares, parks and monuments – and Hughes-d'Aeth argues that artists would often use photographs and, where necessary, embellish them with additional details. The reasoning: the longer exposure times needed meant that if one were focussing on, say, a streetscape, the architecture would be sharp and well defined but moving traffic (human beings, horses, carriages, etc.) would be a blur, as well the skies were flattened out to an even consistency. These embellished photographic illustrations were then provided to the engraver.

The most compelling argument, however, in establishing a nexus between the monochrome paintings and their engravings in the *Atlas* comes from a discovery that Hughe-d'Aeth had made. He found a reference in the *Illustrated Australian News* in 1887 to the use of photography in the actual preparation of the woodblock prints.

He cited the following report from the *News* on how the publishers at the *Atlas* were intending to proceed with the printing process:

> The engraving upon wood will be performed by working on the photographed block, reduced from the size of the artist's larger and bolder drawing, and with all of the coarseness and breadth of the latter toned down and softened in the smaller photographic duplicate on the wood block.[17]

The majority of the monochromes are about 50 x 70 cm – large enough to carry the 'painterly' ambitions of the artist and yet small enough to easily photograph. That they were painted in monochrome relates to the fact that they were to be photographed in black and white and subsequently printed in black and white. My view is that Piguenit believed that he would be better able to convey the tonal qualities he was seeking to achieve in these works by limiting the colour and focussing on the tonal gradations in his compositions. Indeed, if he had presented the works to the *Atlas* in colour, there would have been a tendency for the photographs of the paintings or watercolours to be flattened out, less tonal and less intense.

Assuming that the photographic image was printed onto the photo-sensitised woodblock, this also provided the oppor-

Fig. 10. W.C. Piguenit *Mount King William, Western Tasmania*, 1887.
Monochrome oil on cardboard, 46.7 x 64.2 cm, Royal Society of Tasmania. TMAG: AG 1821

Fig. 11. W.C. Piguenit *Mount King William, Tasmania*, 1887.
Engraved by W. Mollier from an original painting by Piguenit, engraving, B. & W.; 17.0 x 23.0 cm, vol. 2, p. 496 in *Picturesque Atlas of Australasia*, Sydney: Picturesque Atlas Publishing Company, 1886–1888

tunity for a considerable amount of fine-tuning to be carried out before the engraving was begun. In the final *Atlas* image *Butts of Ben Lomond* (Fig. 9), for instance, virtually all of the compositional elements are present that can be seen in the monochrome – fallen trees in the right foreground, a line of dead trees creating a receding orthogonal line on the left hand side of the image, the central vanishing point that is used to allow the eye to slowly travel up the picture plane to the imposing cliff face and peak, the bucolic scene of cattle and pasture set against the backdrop of the mountain and its awesome sense of impenetrability. However, the engraving is slightly wider than the monochrome and the foreground space has been opened out much more dramatically with the cattle slightly diminished and the signs of habitation – the cottage and smoking chimney removed. The broader, 'painterly' brushstrokes have been replaced by a much softer and gradual tonal variation.

In the case of the *Hell's Gates* illustration (Fig. 4), the landscape format of the monochrome has been replaced by the vertical portrait format of the engraving. Whereas in the monochrome much more of the cliff face is exposed on the right hand side, in the illustration the image is cropped at the side and, because more of the sky is exposed, the line of cliff face is extended to the top right hand side of the picture, making the cliff appear much more precipitous. In many ways, the *Atlas* illustration is more dramatic than the monochrome, despite the fact that the bottom right hand side has been cropped by text.

There are two monochromes entitled *Mount King William* in the TMAG collection and the one of the mountain viewed from across Lake George had been selected for the engraving in the *Picturesque Atlas of Australasia*. It was reproduced relatively faithfully although two black swan have been included for incidental effect (Figs 10, 11).

Conclusion

This paper argues that the vast majority of the monochrome paintings by Piguenit in the TMAG were painted sometime in 1887, probably after he returned to Sydney at the end of March. They were painted in black and white; there was no need to paint them in colour as they were to be photographed in black and white and then the photographic images were to be transferred onto photo-sensitised boxwood block. Depending on the format of the intended illustration, a large number of adjustments would have had to have been made before the engraver finally embarked on the laborious, month-long process of preparing the engraving. The illustrations were cropped or extended, depending upon the layout for that particular page; further fine-tuning occurred as the image made the transition from oil painting to finely toned engraving. Whether the illustration was still in the control of the artist or in the hands of the art director and engraver is unclear but what is certain is that the image continued to be further refined over the following weeks as the engraver completed the print.

The monochromes that came to the TMAG in the Johnston Bequest are considerably smaller than the others. Johnston commissioned Piguenit to prepare illustrations for his 1888 book *Systematic Account of the Geology of Tasmania*. One might speculate that the reason is that Piguenit's colleague, Collingridge, who engraved the plates, asked for a different format.

Endnotes

1 Andrew Garran (ed.) *Picturesque Atlas of Australasia* (illustrated under the supervision of Frederic B. Schell), Sydney, Picturesque Atlas Publishing Co., 1886–1888, 800 pp.: ill., col. maps, portraits.

2 See Tony Hughes-d'Aeth, *Paper Nation: The Story of the Picturesque Atlas of Australasia, 1886–1888*, Melbourne: Melbourne University Press, 2001, 22, for a discussion of the setting up of the *Picturesque Atlas of Australasia*.

3 See Hughes-d'Aeth, ch. 6. This chapter (pp. 168–195) discusses the various ways in which photography was employed in the production of illustrated newspapers and books.

4 WC Piguenit, *Among the Western Highlands of Tasmania*, Hobart: William Grahame Jnr, Acting Government Printer, 1892, 10 pp. with 8 photolithographs.

5 WV Legge, 'The Highlands of Lake St Clair', *Royal Society of Tasmania Papers*, Hobart: Royal Society, 1887; see also WV Legge, *WC Piguenit: an appreciation of a Tasmanian artist*, Launceston: AJ Pasmore, 1914, 8 pp.

6 WC Piguenit, 'Among the Western Highlands of Tasmania,' *Report of the Fourth Meeting of the Australasian and New Zealand Association for the Advancement of Science*, Hobart, January, 1892; reprinted in B Smith (ed.) *Documents in Art and Taste in Australia*, Melbourne: OUP, 1975, p. 173.

7 Piguenit: pp. 174–175.

8 Christa Johannes, A Brown, *W.C. Piguenit, 1836–1914: Retrospective*, Hobart, Tasmanian Museum and Art Gallery, 1992.

9 *The Sydney Morning Herald*, 23 August 1887, p. 7.

10 Johannes, Brown, p. 60.

11 *Ibid*., p. 25.

12 James Backhouse Walker, 'Walk to the West 1887' in Michael D Stoddart, *Walk to the West*, Hobart: The Royal Society of Tasmania, 1993.

13 RM Johnston, *Systematic Account of the Geology of Tasmania*, Hobart: J Walch and Sons, William Thomas Strutt, Govt Printer, 1888, xxii, 408 pp., 84 plates (some folded): ill. (some col.), maps, plans, ports.

14 Hughes-d'Aeth, ch. 7. See particularly pp. 198–201.

15 Hughes-d'Aeth, p. 201.

16 Hughes-d'Aeth, ch. 6. On the part played by photography in architectural illustrations, see pp. 68–69.

17 Report in *Illustrated Australian News*, 2 April 1887, p. 55 and cited in Hughes-d'Aeth, p. 202.

A NEW MUSEOLOGICAL APPROACH TO THE INTERPRETATION OF HIGHFIELD HISTORIC SITE AT STANLEY, TASMANIA

Jane Deeth

Deeth, Jane 2008. A new museological approach to the interpretation of Highfield Historic Site at Stanley, Tasmania. *Kanunnah* 3: 13–26. ISSN 1832-536X. The rationale for the new interpretation of the Highfield Historic Site is detailed. The principles that govern this new interpretation approach are multi-vocality; acknowledgement of absent voices; interactive dialogue between the place, its history and the visitor; minimal impact on the fabric of the site; and involvement of the community.

Jane Deeth, 52 Dry Street, Invermay, Tasmania, 7248, Australia.
Email: jadeeth@bigpond.com

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Highfield is an elegant Regency house on a headland overlooking Bass Strait and The Nut[1] at Stanley on Tasmania's north-west coast and was purchased by the Tasmanian Government in 1982 and placed on the National Estate. At first glance, the house epitomises the Romantic vision of man's relationship to the sublime landscape (Figs 1, 2). However, beneath the fine tracery of its design, layers of history co-exist uncomfortably. The stories of European invasion, exploration and economic development intersect. Significant life and death issues relating to individuals, communities and animal species were determined here. At the same time, Highfield is a very pretty house and it is this delicacy that makes its place in the history of Tasmania even more poignant.

In September 2007, the new interpretation at Highfield Historic Site was launched by Paula Wriedt, MHA, Tasmania's then Minister for Tourism, Arts and the Environment. This article outlines the rationale behind the new interpretation, developed during a two-year period by the Sentience Group,[2] a Tasmanian-based interpretation consultancy.

In line with the new museology that has been filtering into the museum sector since the late 1980s, the interpretation accepts that history can no longer be presented as a singular narrative (Vergo 1989). Who has written the history and who is retelling it, determine what stories are preserved and selected and what points of view will dominate. Traditionally, history is the preserve of

Fig. 1. Highfield Historic Site looking towards The Nut at Stanley.
Photograph: Lindsay Kelly, Jaffa Design

the rich and powerful, which means that in general terms, it is told from a white, European, male, ruling-class perspective. Contemporary museological interpretation seeks to counter this in order to reveal alternative and often-contested histories.

The Highfield interpretation believes that is through the visitors' subjective encounters with a range of perspectives that a greater opportunity for empathy and learning is made possible. As a consequence, different 'voices' are placed in juxtaposition, inviting visitors to think about where the information comes from and what a writer might have had to gain from recording the truth, fabricating a lie, or perhaps embellishing or diluting what they knew to be the case. The approach taken involves a number of contemporary museological principles: multi-vocality, acknowledgement of absent voices, and interactive dialogue between the place, its history and the visitor. The task was inflected by the fact that Highfield does not conform to the usual vision of stately homes that conjure the past through painstaking restoration. Due to the exposed geographical location and the depredation of time, the fabric of the house is extremely fragile and it contains little authentic furnishing. Rather than seek to remedy this, the patina of time has been accepted as the site's reality. In order not to exacerbate any structural concerns, minimising the impact of the physical aspects of interpretation on the fabric of the site was observed. A goal of the interpretation plan was also to involve the community in the process of telling their stories about what is, to all intents and purposes, their 'backyard'.

History of the Highfield site and the Van Diemen's Land Company

Highfield was the headquarters of the Van Diemen's Land[3] Company,[4] established in England in the early 1820s as a large-scale financial venture into fine wool production. The enterprise began operations with the landing of the first vessel, *Tranmere*, at Circular Head[5] towards the end of 1826. On board were the vast supplies necessary for establishing an isolated settlement. These included materials to enable the immediate building of a four-roomed timber cottage for the company administrator. This simple dwelling sufficed as the company headquarters for the first five years, but in 1832 Edward Curr (1798–1850), the fastidious young man

Fig. 2. Highfield House.
Photograph: Lindsay Kelly, Jaffa Design

charged with the task of realising the potential of the enterprise was granted permission by the company directors in London for the building of a new house.

> The wooden house I live in will not stand 15 years; the stone one which I am building will stand a century.
>
> *Edward Curr, 1832*

Interestingly, the decision to build this new house was made at a time when it was becoming increasingly apparent that the company's wool venture was heading for failure. Much of the land that Curr had been able to obtain from a somewhat resistant George Arthur (1784–1854), the Lieutenant Governor of Van Diemen's Land, was of poor quality. This, together with the inhospitable weather, resulted in the death of thousands of sheep. Nevertheless, despite the company's tenuous financial situation, the Board of Directors agreed to Curr's request for a new stone house and also gave him a large £800 bonus. Thus, from the outset, the house was more than a building. It encapsulated the company's ambitions, be they unrealistic at times.

Highfield was designed by the company surveyor and architect Henry Hellyer (1790–1832). He was a remarkable man who, over a short six-year period, surveyed much of the north-west of the island, naming its features as he went, as well as designing its roads and bridges. The house Hellyer designed was not large but its elegant proportions and simple geometry reveal a sensitivity and sophisticated taste well versed in the latest Regency style. This stylish confidence seems appropriate as it was from this site that the opening up of Tasmania's north-west region was orchestrated.

Fig. 3. Previous interpretation panels with text by Kerry Pink.
Photograph courtesy of the Highfield Heritage Site

The significance of the Van Diemen's Land Company should not be underestimated. Its power and influence are evident in that the Hobart-based government feared the company would become 'a colony within a colony' ruled by Curr who was described in the *Hobart Town Courier* on 16 January 1835 as 'the potentate of the North'. Curr referred to himself as 'master and magistrate, party and judge' (Curr, Despatch to Directors, 22 March 1833, in McFarlane, 2002, p. 247). Such power had its dark side, with the company under Curr's leadership, participating, through action or inaction, in the swift decline of the local Tasmanian Aboriginal population. It also contributed to the extinction of both the Tasmanian emu[6] and thylacine.[7] Thus, Highfield encapsulates the complexity of Tasmania's history in the early 1800s including the hegemony of the colonial mindset and its energetic pioneering spirit. The scope and implications of this progressive vision, with each of these aspects being both positive and negative, were challenges for the interpretation.

History, in many respects, is a product of what is written down, preserved and then rediscovered. Highfield's story is no exception. During Edward Curr's time at Highfield almost nothing happened without it being documented, in order to keep the

Fig. 4. Previous interpretation panels with text by Kerry Pink.
Photograph courtesy of the Highfield Heritage Site

Court of Directors in London informed. Curr also corresponded constantly with the authorities in Hobart Town as well as with other agents of the company. Currently the Archives Office of Tasmania holds a large quantity of documents on behalf of the company. Some cataloguing has taken place with the company's permission but it is a gargantuan task that would take years to complete. Researchers and historians have examined some of the documents seeking to illuminate the company's story, although the results are inevitably incomplete.

A number of histories have been written including *Around Circular Head* (Buckby 1984), articles by Geoff Lennox (1986) and *Beyond the Ramparts: A Bicentennial History of Circular Head, Tasmania* (Pink and Ebdon 1992). These publications constitute the dominant perspectives regarding the region's early history. The previous interpretation panels at Highfield were prepared by the late Kerry Pink. She was a member of the advisory committee overseeing the site. Pink's summation of the history of Highfield was presented on a number of substantial free-standing blackwood screens, each considering a particular topic (Figs 3, 4). The panels were placed in the rooms throughout the house as a series of discrete and complementary narratives.

Contested histories

The interpretation brief allowed neither the time nor budget to engage in primary research. Instead, the approach taken was to re-present the available material, recognising that some of the history is contested and that people with different perspectives and ideologies can reach conflicting conclusions. Rather than prescribe one particular path, the new interpretation presents a range of voices through a mosaic of extracts. As a consequence, what is presented is not the definitive history of Highfield and the Van Diemen's Land Company. Instead, in line with the principle of multi-vocality, it can be understood, both by necessity and design, as an open and multi-layered work-in-progress.

One significant difference between the previous interpretative style and the latest intervention is the place given to the overwhelming absences and silences. The five tonnes of archived despatches and material in the Van Diemen's Land Company archives represent a huge resource; however, what is missing from these papers also 'speaks' volumes. Women's voices at Highfield tend to appear in between the lines or in unofficial writing such as personal letters and diaries. Mrs Rosalie Hare's diary is a case in point. Mrs Hare (c. 1809–?) was a young, newly married woman and wife of the captain of a trading vessel, *Caroline*, which sailed to Van Diemen's Land from England on its way to Java. During the voyage Mrs Hare wrote her diary, which included observations made during a three-week sojourn at Circular Head while her husband, accompanied by Edward Curr, sailed to Launceston to unload the cargo. Mrs Hare's writing has become a significant resource in the interpretation of the early history of the north-west. Her short but damning diary entries counter the official documentation that emanated from Curr, specifically in relation to the treatment of the Aboriginal people by the company's men.

> We have to lament that our own countrymen consider the massacre of these people an honour. While we remained at Circular Head there were several accounts of considerable numbers of natives having been shot by them [the company's men], they wishing to extirpate them entirely, if possible.
>
> *Rosalie Hare's Diary, January 1828*

Curr's official protestations against such behaviour on the part of his men and the absence of any prosecutions have been used in other histories to downplay, if not exonerate, the company's conduct with regard to the treatment of Aboriginal people. However, it is precisely because there is little that Mrs Hare had to gain from 'massaging' the truth that her simple writing can act as a counterfoil to Curr's more copious and public texts.

Similarly, a letter written in 1827 by Mrs Mary Adey (1796?–1869), the wife of company agent Stephan Adey (1781?–1860), provides a raw insight into the society in the new colony. This letter was originally intended only for the eyes of a relative but was published, firstly in London and later in Hobart. Mrs Adey writes:

> In the first place, you could hardly imagine that a country like England could produce such an illiterate cub as this Colony. Who would not have expected to find by this

> time a Library at least. They had one at South Carolina before it was established twelve months. Saturn is not more remote from the Sun, than Hobart Town from all Science and Literature.

Had Mrs Adey meant the text to be published, her choice of words may well have been more circumspect, given she had to continue living amongst the society of which she had been so critical.

The other primary female character in the story is Edward Curr's wife, Elizabeth (1798–1866). There are few records in which Elizabeth exists as an independent entity and these are mainly references at the end of letters to her husband wishing her good health. As an individual she is silent. We know that she had fifteen children, a number of whom were either left behind or returned to England for schooling. One child, Juliana, died tragically at Highfield. In her silence, Elizabeth stands for the many other women who worked, lived, grieved and died virtually unacknowledged.

The Aboriginal voice is also absent. For tens of thousands of years this previously wooded terrain, with its abundant supplies of food, had been home to the people of the eight north-west Aboriginal clans. In the ten years before Highfield was built, few Europeans had set foot on this land. In the 1820s the far north-west became a haven for the Aboriginal peoples who had been pushed out of the 'settled' areas. However, between 1824 and 1831, the Aboriginal population was all but destroyed in what has become known as the 'Black Wars'. These were the same years during which the Van Diemen's Land Company was staking its claim in the north-west (McFarlane 2008).

The Aboriginal voice is encountered not from first-hand documentation but through secondary sources such as letters and journals, as well as through amateur and academic analysis and speculation applied to the available material. What is selected for consideration and the conclusions made vary, depending on the viewpoint of the writer. With regard to the demise of the Aboriginal people, some say they died mostly from disease, others believe they were often murdered (Rosalie Hare's Diary, January 1828); some believe they were victims of genocide. There is a strong argument that Curr and the men under him played a significant role in this destruction (McFarlane 2008).

Ian McFarlane was interested in finding the Aboriginal voice in the absence of direct primary information (MacFarlane 2008). Aborigines could not write down their own version of events but they did talk to those who did. McFarlane has scanned these accounts for hidden agenda, constructing a picture as logic allows. Through his analysis of documents, McFarlane discerns the selective use of language that enabled Curr to retain a public perception of propriety while denying the violence that was actually occurring.

Similarly, Plomley (1966), in his examination of George Augustus Robinson's journals, was able to deconstruct particular moments in Robinson's recording of events to reveal something of 'the conciliator's' more sinister and self-serving motivations in his rounding up of the Aboriginal people in the early 1830s. Historians such as McFarlane and Plomley take the publicly recorded information and test it against material from a range of diverse sources, casting light on what has been

distorted and concealed. In the Highfield interpretation these contested histories sit side by side and layer upon layer.

A new interpretation

The aim of the new interpretation is to engage visitors in the stories of the past by connecting them to the present. The notion that history is only about the past limits the possibility for it to affect the visitor directly. The adage 'history repeats itself' can be countered by bringing the lessons of the past into life as it is lived. The new Highfield interpretation seeks to maximise visitor interaction and thereby encourage visitors to take responsibility for interpreting the stories. To this end Andrea Witcomb's evaluation of the notion of interactivity in her text *Re-Imagining the Museum: Beyond the Mausoleum* (2003) has proven useful.

Witcomb's research identifies three kinds of interactivity – technological, spatial and dialogical. Her notion of dialogical interactivity is 'an imaginative and conceptual activity' rather than a physical one. Her criticism of technologically based interactivity is from the perspective that: '[a]dding multimedia stations to an exhibit will not … necessarily challenge a one-way flow of communications which the exhibition as a whole may be premised upon' (Witcomb 2003, p. 130). She states that, 'designing an interactive exhibit requires an ability to integrate communication goals (what you want the visitor to learn) with behavioural goals (what you want the visitor to do), and even emotional goals (what you want the visitor to feel)' (Witcomb 2003, 133). She suggests instead that to achieve this, the exhibition space can be reconceptualised as interactive in itself. This requires museums moving away from a didactic and hierarchical model of communication towards constructing a dialogical environment. However, Witcomb is not arguing for a relativist 'anything goes' approach to interpretation. Instead, '[t]he difficulty for those museums that wish to be less didactic and more interactive is to achieve a balance between multiple points of view while maintaining an editorial line which is not reductive' (Witcomb 2003, p. 156). In other words, the complexity between the alternative perspectives remains sufficiently open for visitors to construct their own version of the story but is, at the same time, sufficiently focused so as not to lose the visitor in an infinity of unmediated relativism.

Thus textual information in the new interpretation at Highfield is presented as inconclusive snippets within a focused framework. Visitors can choose how much they want to dwell on the texts. Each text becomes a moment within a mosaic of ideas, some of which work together and some of which are in opposition. The thematic intention is made apparent in conjunction with the texts, implying that there is work to be done and particular issues for visitors to consider.

A guiding principle in the new interpretation was to minimise impact on the site. The built fabric of Highfield is extremely fragile. Even at the time of building in 1832 there were concerns about the quality of the workmanship. Damp has been and remains a constant problem. Ensuring the preservation of the fabric was therefore essential. It was decided that installation of the interpretation would be undertaken without the use of nails,

Fig. 5. 'The Room of Conversation' dining room interpretation.
PHOTOGRAPH: LESA SCOTT, HIGHFIELD HISTORIC SITE

screws or any other attachment device. This meant presenting stories in ways that had an extremely low physical impact.

The simplest solution was to rest glass text panels over existing horizontal surfaces such as on mantelpieces and furniture (Fig. 5). Another method has been applying 'wallpaper' texts to vertical surfaces. The use of wallpaper resonates with the history of the building. As found in many houses of this age, layer upon layer of different wallpapers marking changes in fashion and fortune can be found beneath the paint; the new interpretation simply adds another layer. A further approach involved creating surfaces to carry the interpretation. This meant constructing free-standing forms that refer to, without replicating, furniture of the 1800s (Fig. 6). These structures relate to the rooms in which they are placed and focus attention on the task the visitor is invited to undertake. They include a 'dressing table' to sit and reflect at, a 'drawing desk' on which to examine plans and drawings, a 'chopping block' with a 'cookery book' that refers to what was available to eat. The use of contemporary abstracted forms in the design of these structures aimed to reinforce the notion that interpretation is made in the present.

This approach also assists by allowing the architecture to play a role in comprehension by focusing attention on the original purpose of the rooms. Each room has been given a title that indicates its purpose within the original layout

Fig. 6. 'Meet the People', gallery interpretation.
PHOTOGRAPH: LINDSAY KELLY, JAFFA DESIGN

of the house and its place within the interpretation, as well as acting as cues as to modes of address the visitors might employ. Thus, the drawing room is 'The Room of First Impressions' presenting snippets from diaries and journals about the impact the place made on early visitors to the site. The study is 'The Room of Despatches', giving an overview of official decisions made in the development of the company and the historical timeline of three historical threads – the company, the Aboriginal people and the world situation. The dining room is 'The Room of Conversation' with extracts of possible dinner table chatter about people and events connected to the early years of the company. The cellar is 'The Room of Provisions', presenting the vast list of the practical requisites brought to the settlement. The kitchen is 'The Room of Abundance', describing what produce was available and provides recipes from both Tasmanian Aboriginal and European diets. The original nursery, which has seen many permutations over the years, becomes 'The Room of Changes', presenting the designs and plans of the buildings and gardens. The children's room is 'The Room of Games' designed especially for younger visitors with an interactive game to play based on the stories of Highfield. The guest bedroom is 'The Room with the View' and tells the

visitors about the geology and naming of the land as they gaze through the window towards The Nut and the safe harbour that this feature protects. The master bedroom is 'The Room of Reflection', providing some highly emotional stories and offering the visitor a moment of quiet repose. Only one of the outbuildings has been included in this phase of the interpretation. The chapel becomes 'The Room of Preaching and Piety' in which a 'sermon' written by Danish adventurer and convict Jorgen Jorgenson (1780–1841)[8] about the morality of relations between the European population and the Aboriginal people is presented.

In this way, the various stories that converge at Highfield are presented in parallel rather than as isolated topics. Through this less linear approach it is intended that the contest between versions of events will become more apparent and that visitors will take responsibility for making meaning.

Community engagement

A guiding principle in the new interpretation was to involve the community. There is a high degree of personal connection and ownership of Highfield within Circular Head. For example, the current manager is related to a family integral to the Highfield story[9] and the wife of the advisory committee's chairman is related to John Cross, one of the original builders of Highfield. Although there is considerable local support, building an even stronger and more pragmatic connection is important not only in order to create a sense of ownership but also because the survival of the project, in the longer term, requires that the community takes a key role in Highfield's promotion.

Community connections have been made in a number of ways. For example, it would appear from the history books that Highfield was very much a man's place, with even the choir comprising eight convict baritones. Therefore the decision to reinstate the chapel choir provided the opportunity to include women's voices. 'Fully Dilated and Pushing' is an a cappella group of women from the Circular Head district. They meet regularly for the joy of singing together and to perform at festivals and particular events. In the soundscape that accompanies the 'sermon' on European-Aboriginal relations, the choir sings Catholic and Anglican hymns as well as a colonial, working-class ballad.

Another community project evolved from the difficulty in finding appropriate images of key Highfield characters. Not only were few available, those that were found often showed people in their latter years. It was felt that using such images would lead to misinterpretation. For example, one of the factors affecting the way Curr was perceived was his youth. He was 27 years old when he became the company's chief agent; the existing image of Curr shows a man probably in his late sixties. The solution was to locate appropriate portraits from the period and to build composite images using local people as models. The State Library of Tasmania's Heritage Collections were extremely supportive in providing original portraits. A call to the community, combined with a 'talent scouting' campaign, generated the faces. Edward Curr is 'Kurt', a local student and part-time worker in a coffee shop, with the body of an *Unknown Gentleman: Man with reddish side-whiskers* (n.d.) attributed to Thomas Bock (1793–1855). Jorgen

Fig. 7. Jorgen Jorgenson.
Composite image – contemporary portrait with base image from the Heritage Collections of State Library of Tasmania

Fig. 8. Mrs Rosalie Hare.
Composite image – contemporary portrait with base image from the Heritage Collections of State Library of Tasmania

Jorgenson combines *A young gentle man in black coat* (1800s) by Nathaniel Rogers (1788–1844) with the features of 'Clint', the proprietor of one of Stanley's successful accommodation enterprises (Fig. 7). Rosalie Hare is *Portrait of a woman, standing* (n.d.), also attributed to Bock with the face of 'Ellie' who is currently pursuing her interest in education in developing countries (Fig. 8). The resulting 'portraits', it could be argued, are both more and less accurate. Their slightly surreal quality reinforces a more indeterminate, and perhaps more 'real' understanding of what history might be.

A further project was undertaken for the soundscape in the 'Room of Despatches'. Members of the local community were asked to consider what Highfield and Edward Curr meant to them. Their responses, recorded on audio tape, include effusive praise for Curr and amazement at what he managed to achieve so far from home, expressions of loss and shame for the suffering and treatment of the original people, and personal thoughts, memories and reflections.

The following is a sample of the responses: 'Curr was an astute and hard businessman; – he also had a kind and generous side; – a hard man in a hard, difficult situation; – the puppet and servant of his colonial masters who were greatly misguided in what they were achieving; – he has got a lot of questions to answer; – they finished knocking them [the Aborigines] off around 1832.' In many ways this soundscape epitomises the intervention.

Throughout the development of the interpretation, the advisory committee's role has been crucial. To their immense

credit, each member has been able to set aside personal perspectives and preferences in order to focus on the principle of multi-vocality and ensure that the interpretation remains as open as possible. This approach has generated high-quality discussion while also allowing for diversity and difference.

Results of the new interpretation of Highfield

Since the installation of the new interpretation, it has been noted that the time that visitors spend at the site has more than doubled. According to the manager, before the new interpretation entries in the comments book tended to be along the lines of 'nice house, nice view'. Subsequent to the changes visitors are much more likely to engage staff in conversations which are often about the different points of view, their appreciation of the stories behind the house and being able to step into others' shoes. Although systematic research is yet to be undertaken, from the anecdotal evidence it is believed that the new interpretation at Highfield provides a framework in which visitors can engage in a self-reflexive and meaningful way with the past, informing both an understanding of history and our subjective place within it.

Endnotes

1 The Nut is a basalt outcrop, 147 metres high and 32 hectares in area, which juts out into Bass Strait, making it one of the most prominent and dramatic features along the northern coastline of Tasmania. Colonial explorer, Matthew Flinders (1771–1803), described the promontory as: 'a cliffy, round lump, in form much resembling a Christmas cake; and is joined to the main by a low, sandy isthmus. The land at the back is formed into very gentle slopes' (Flinders, journal written from the *Norfolk* in December 1798).

The origin of the local name, The Nut, is uncertain. One theory is that the failure to blast rock from the cliff face for the construction of breakwater for the port in 1892, despite having been set with a 500-pound charge, earned it a nickname referring to 'a hard nut to crack'. An early account has it that the crew of a ship calling in at Stanley in 1851 referred to the outcrop at The Nut, possibly as in the slang for head. Then again its name might simply refer to its shape.

2 The writer is a member of The Sentience Group, which is a collaborative association of like-minded businesses that come together to work on interpretation projects concerned with strategic planning, interpretative design, architectural design and business modelling.

3 Van Diemen's Land is the name given to what is now Tasmania by the Dutch navigator Abel Janszoon Tasman in 1642. Tasman discovered and named the island after Anthony van Diemen, governor general of the Dutch East Indies at the time. The island was renamed Tasmania after Tasman in 1855.

4 The Van Diemen's Land Company is Australia's third-oldest company and the world's only surviving Royal Charter company still owning its property at Woolnorth in the far north-west. The Company's major shareholder is now a New Zealand public company based in Dunedin.

5 Circular Head is another name for The Nut. However, in recent years, Circular Head has come to refer to the entire municipality.

6 Tasmanian emus (*Dromaius novaehollandiae diemenensis*) were sufficiently prevalent in the region for the bay on which Burnie now stands to be named Emu Bay. These flightless birds provided an easily hunted food source for the fledgling colony.

7 The thylacine or Tasmanian tiger (*Thylacinus cynocephalus*) was a marsupial carnivore that roamed throughout Tasmania before European settlement in 1803. It was hunted to extinction because it was seen as a threat to livestock. In 1830 the Van Diemen's Land Company introduced a thylacine bounty. The last captive thylacine died in the Beaumaris Zoo (Hobart) in 1936.

8 Jorgen Jorgenson wrote this text in one of the journals he wrote in response to his experiences in the north-west (Jürgensen [sic] and Plomley (ed.), 1991, pp. 34–35).

9 Lesa Scott is the current manager of Highfield Historic Site. Her great-great-great-great-grandfather, Henry Anthony, worked at Highfield after he received his ticket of leave (conditional pardon) in about the 1850s. Her great-grandfather, Edward Anthony, purchased Highfield in 1930 from the Ford family, subdividing and selling it a year later. Her grandparents, Stan and Gladys Anthony, lived in the overseer's cottage (L Scott, pers. comm., 30 October 2007).

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A REVIEW OF THE EARLY TRIASSIC FISH REMAINS FROM TASMANIA

Patrick Bender

Bender, Patrick 2008. A review of the Early Triassic fish remains from Tasmania. *Kanunnah* 3: 27–40. ISSN 1832-536X. Osteichthyan (bony fish) remains from the fresh-water sediments of the Early Triassic Knocklofty Formation of Tasmania have been recognised for more than 100 years; however, little recent research has been conducted on this fauna. In this article elements of the Knocklofty Formation fish fauna are reviewed and new data presented. Although the focus of this article is on the bony fishes, a number of specimens of uncertain affinity are also illustrated and described because of their potential palaeontological importance. These include fin spines not previously recorded from this Formation, and coprolites (fossilised faeces) that may preserve important morphological and environmental information.

Patrick Bender, Tasmanian Museum and Art Gallery,
GPO Box 1164, Hobart, Tasmania, 7001, Australia.
Email: patrick.bender@education.tas.gov.au

KEY WORDS: Actinopterygii, Dipnoi, fish spines, coprolites, Triassic, Knocklofty Formation, Tasmania.

The aim of this article is to update information on the taxonomy of the Early Triassic fish of Tasmania, and illustrate and describe some significant new specimens (Table 1). The focus of this article is on the osteichthyans (bony fishes) and, in particular, the actinopterygians (the ray-finned fishes) and the dipnoans (lungfish).

The new figured material includes a specimen of *Saurichthys* and a faintly preserved actinopterygian specimen. The latter specimen is of significance because it appears to represent a new record from the Triassic of Tasmania and it occurs with plant remains. Plant and animal fossil remains are rarely found together in the earliest Triassic (Gastaldo *et al.* 2005). A number of other potentially significant specimens include fin-spines, which are possibly chondrichthyan in origin. The range of variation in coprolites (fossilised faeces), which were regarded by Banks *et al.* (1978) as being very common in the Early Triassic of southern Tasmania, is also illustrated and described.

TAXA	REFERENCES
DIPNOI	
Ptychoceratodus philippsi	Dziewa 1980; Kemp 1991, 1996; this paper
COELACANTHIDAE	
Coelacanthidae gen.et sp. indet.	Dziewa 1980
ACTINOPTERYGII	
Saurichthys sp.	Dziewa 1980; this paper
Acrolepis tasmanicus	Dziewa 1980; this paper
Acrolepis? hamiltoni	Johnston and Morton 1890; this paper
Acrolepis? sp.	Dziewa 1980
Cleithrolepis granulata	Dziewa 1980
Undetermined actinopterygian	This paper
CHONDRICHTHYES?	
Fin spines	This paper
Coprolites	Banks *et al.* 1978; Northwood 2005; this paper

Table 1. Tasmanian Early Triassic fish material.

PREVIOUS RESEARCH

Osteichthyan remains from the freshwater sediments of the Early Triassic Knocklofty Formation of south-eastern Tasmania have been recognised since the late-nineteenth century. Johnston and Morton (1890, 1891) described two species of early actinopterygian fish, *Acrolepis? hamiltoni* Johnston and Morton, 1890 and *A. tasmanicus* Johnston and Morton, 1891 from Tasmania. Dziewa (1980) documented additional osteichthyan specimens that he assigned to the cosmopolitan Triassic dipnoan genus *Ceratodus* Agassiz, 1838, as well as fragmentary remains assignable to the chondrostean genera *Saurichthys* Agassiz, 1834 and *Cleithrolepis* Egerton, 1864, and indeterminate remains that are tentatively referred to the family Coelacanthidae (Table 1).

Owing to the relatively extended geological time range of the fish taxa, Dziewa (1980) concluded that osteichthyan taxa were of limited stratigraphic use, with the amphibians more useful for correlative purposes (see also Banks *et al.* 1978). The presence of lydekkerinid amphibians in the Arcadia and Knocklofty Formations, in particular, provides a strong basis for correlation between the Australian assemblages and similar-aged fossiliferous outcrops in South Africa (Neveling 2004). Long (1993), however, has shown that fossil fishes are good indicators of palaeoenvironments and have also been useful for global biostratigraphic and correlative purposes (Long 1993); thus more detailed study of the Tasmanian fossil fish material could prove worthwhile.

Early Triassic fishes are rare in most Australian deposits with the exception of the Terrigal Formation (Gosford Subgroup, Narrabeen Group) that has yielded abundant fish, including actinopterygians,

dipnoans and pleuracanth chondrichthyan remains from two main localities near Gosford in the Sydney Basin (Kemp 1991; Ritchie 1981; Wade 1935; Woodward 1890, 1908). The Arcadia Formation, Queensland, has yielded actinoperygian and dipnoan taxa (Northwood 1999). In addition to those from the Arcadia and Terrigal Formations, fish have also been described from the Knocklofty Formation in Tasmania (Banks *et al.* 1978; Dziewa 1980; Johnston and Morton 1890, 1891), and the Blina Shale, in Western Australia (Kemp 1991; Turner 1982). Cosgriff (1974) and Northwood (1997) reported the remains of *Ceratodus*, *Saurichthys* and coelacanths from the Blina Shale, and fish scales from the Kockatea Shale in Western Australia, although neither the fish nor the scales has been described. The Blina Shale from Western Australia is regarded as younger than both the Arcadia and Knocklofty Formations (Damiani 1999; Northwood 1999).

The Tasmanian Knocklofty Formation appears to be contemporaneous with the Arcadia Formation from Queensland (Northwood 1999), which is possibly the Griesbachian Regional Stage (251–250 +/-0.4 m.y. B.P.) (Damiani 1999; Northwood 1999). The Griesbachian Regional Stage (Neveling 2004) is the earliest Triassic Stage and occurred immediately after the largest extinction of the Phanerozoic Era.

The Triassic Period, and in particular the Early Triassic Epoch, was an interesting time in terms of the earth's vertebrate history, with the changeover from the archaic faunas of the Permian to those more typically associated with the Triassic and the later Mesozoic (Borsuk-Bialynicka *et al.* 1999). Early Triassic faunal assemblages are known from several regions, including a range of northern regions. Southern faunal assemblages occur in continental sedimentary basins in Antarctica, Australia, India and South Africa, and from coastal deposits in Madagascar and north-west Australia (Borsuk-Bialynicka *et al.* 1999). The Early Triassic terrestrial and freshwater assemblages of Australia are notable for their abundance of amphibians and rarity of therapsids (Thulborn 1986, 1990). A diverse amphibian-dominated vertebrate fauna has been described from the Knocklofty Formation and its stratigraphic equivalents in southern Tasmania (Cosgriff 1974).

The end-Permian mass extinction that occurred at approximately 251 million years ago (Bowring *et al.* 1998) is generally regarded as the most catastrophic of the five major Phanerozoic mass extinctions (Smith and Botha 2005). The estimates of biodiversity loss, as a consequence of this extinction event, are thought to be as high as 75% to 90% of known organisms in the marine fossil record, with recent proposals suggesting that the decimation in the oceans was accompanied by a synchronous collapse in the terrestrial realm (Erwin 1993; Twitchett 2001). The early Triassic faunas therefore provide an important insight into how life recovered after a major extinction event.

DESCRIPTION AND DISCUSSION OF SELECTED MATERIAL

This review of certain Tasmanian Early Triassic fishes is based upon updated taxonomic work and will provide a basis for a more complete understanding of the Tasmanian Triassic ichthyofauna. The specimens referred to in this article are held

Fig. 1. *Ptychoceratodus phillipsi* toothplate in dorsal view, from the Early Triassic Knocklofty Formation, Tasmania.

at the Department of Geology (UTAS), University of Tasmania and at the Tasmanian Museum and Art Gallery (TMAG).

Class **Osteichthyes**
Order **Dipnoi** Müller, 1845
Family **Ptychoceratodontidae**
Martin, 1982
Ptychoceratodus Jaekel, 1926
Phytoceratodus phillipsi
(Agassiz 1838)

A lungfish toothplate (UTGD 87871) collected from Midway Point is similar to toothplates described from Old Beach and Coningham by Dziewa (1980) (Fig. 1). UTGD 87871 is a nearly complete left pterygoidal toothplate only lacking the distal portion of the first ridge, with a maximum width of 9 mm. The dental plate is 14 mm in length.

This species was described by Dziewa (1980) as *Ceratodus gypsatus*, but has been transferred to *Ptychoceratodus* by Kemp (1996) on the basis of its narrower ridged and higher crowned tooth plates (see Kemp 1997a; Schultze 1992). *Ptychoceratodus phillipsi* exhibits five ridges on the upper and four on the lower toothplates, with the clefts between the toothplate ridges relatively wide and curved, and the ridge crests straight and radiating.

Lungfish toothplates are reliable for defining taxa (Kemp 1997a,b), especially in the Mesozoic and Cenozoic where skull material is scarce, and many species are represented only by tooth plates (Schultze 1981; Martin 1981). Most Triassic adult lungfish have six toothplates, comprising a pair of large upper and lower occluding toothplates that are carried on the pterygopalatine and prearticular bones respectively, and a pair of much smaller vomerine toothplates (Campbell and Barwick 1987; White 1966).

Kemp (1996) referred all previous records of Triassic lungfish from Tasmania, i.e. *Ceratodus gypsatus* Quenstedt, 1885 (Dziewa 1980) and *Ceratodus* sp. *C. phillipsi* (Agassiz 1838) (Kemp 1991) to *Ptychoceratodus phillipsi*. *Ptychoceratodus phillipsi* has been recorded from the Arcadia Formation in Queensland, Blina Shale in Western Australia and the Knocklofty Formation. It was apparently a small- to moderate-sized lungfish (Australian tooth plates never exceed 18 mm in length, but material from Africa is as long as 25 mm). *Ptychoceratodus* has a wide geographic distribution, especially in the Middle Triassic, with species recorded in Africa, Australia, China, Europe, Madagascar, North America and Russia; and a long time range from the Early Triassic (where it is currently only known from Gondwana) through to the Tertiary (Schultze 1981).

The Australian Triassic lungfish record comprises at least six different species recorded from the Gosford, Narrabeen and Hawkesbury Formations (Sydney Basin), the Blina Shales, Western Australia, Arcadia Formation, Queensland and the Knocklofty Formation, Tasmania (Kemp 1991). Only a single species, *Ptychoceratodus phillipsi* is currently recorded from Tasmania.

Sub Class **Actinopterygii** Woodward 1891
Order **Saurichthyiformes**
Family **Saurichthyidae** Goodrich, 1909

The Saurichthyidae are characteristic Mesozoic actinopterygians with a slender elongate body and fin arrangement reminiscent of the extant *Esox*, and the jaws are drawn out to a long-pointed rostrum. Two long-pointed rostral fragments of fish are known from Tasmania: a specimen referred to *Saurichthys* by Dziewa (1980) and the new specimen described in this article. Dziewa (1980) referred the skull specimen to *Saurichthys* because of the elongate shape of the skull, together with the ornamentation on the skull and mandible.

The following features can be regarded as distinguishing characters of *Saurichthys* species (Griffith 1978): skull proportions, the shape of the parasphenoid bone, the dermal bone ornament, the number of parietals, the location of the teeth on the bones bearing them, the size of the tip of the tooth, the ratio between the maximum depth of the lower jaw and of the palatoquadrate-maxillary apparatus. Until further preparation of the material is undertaken, and all of the Triassic species are studied, this new specimen, and that described by Dziewa (1980), cannot be confidently referred to a particular species. None the less, according to Gardiner (1967), all Triassic saurichthyids belong to the genus *Saurichthys*.

In terms of its phylogenetic position, a recent study indicates that *Saurichthys* is a relatively primitive actinoterygian closely linked to the extant Acipensiformes, a group which includes the sturgeon and

Fig. 2. *Saurichthys* skull in dorsal view, from the Early Triassic, Knocklofty Formation, Tasmania.

the paddlefish, and that are basal to the neopterygians and all teleosts (Gardiner *et al.* 2005).

Saurichthys Agassiz, 1834

A previously undescribed nearly complete elongate skull specimen (UTGD 95496), from Old Beach, is 4.2 cm long and 1.8 cm wide at its broadest point near the back of the skull (Fig. 2). It is 2.8 cm at its deepest point also near the back of the skull with closely spaced fine striae orientated obliquely on the lateral surface of the lower jaw, forming a pattern of concentric semi-circles. This specimen preserves the dorso-ventrally compressed posterior portion of a skull with no teeth visible since the lower jaw and maxilla are compressed under the bones of the palate and skull roof.

The specimen of *Saurichthys* from Conningham in Tasmania comprised a posterior portion of the right side of the head, dermal elements of both upper and lower jaws, and an anterior portion of the opercular apparatus (Dziewa 1980). According to Dziewa the Tasmanian form cannot be distinguished from the following species: *Saurichthys ornatus* Stensio 1925 (Lower Triassic Spitsbergen), *Saurichthys gigas* or *Saurichthys gracilis* (Woodward 1890) from the Lower Triassic Gosford Formation, Gosford, New South Wales (NSW), *Saurichthys parvidens* Wade, 1935 from the Middle Triassic Hawkesbury Sandstone at Brookvale, NSW, or from *Saurichthys striolatus* (Bronn 1858) Upper Triassic of Raibl, Austria. *Saurichthys* is also reported from the Blina Shale, Western Australia, and from the Arcadia Formation at Rewan Crater, south-eastern Queensland (see Northwood 1999).

Outside Australia, *Saurichthys* is a widely occurring Triassic genus, found in the Early Triassic of Alberta, British Columbia, China, Ellesmere Island, France, Greenland, South Africa, Spitsbergen, Madagascar, Nepal, Russia (Bender and Hancox 2003, 2004; Rieppel 1992). The genus is also found abundantly in the Middle Triassic of Italy and Switzerland (Rieppel 1992). It

Fig. 3. *Acrolepis tasmanicus*, paratype, in lateral view, from the Early Triassic Knocklofty Formation, Tasmania.

is restricted to mainly marine sediments at its first appearance in the Early Triassic, later invading freshwater or brackish habitats (Rieppel 1992), and thus appears to have become adapted to both marine and fresh waters (Beltan and Tintori 1981). It potentially serves as a link between the marine and non-marine realms in the Early Triassic.

Order **Palaeonisciformes** Hay, 1902
Family **Acrolepididae** Aldinger, 1937

Gardiner and Schaeffer (1989) in their comprehensive taxonomic revision of primitive actinopterygian fishes, based on endoskeletal and dermal skeletal characters, refer to the palaeoniscoids as a group of fossil lower actinopterygian genera. Furthermore, they locate the acrolepids near the base of the lower actinopterygians and thus basal to most of the Permo-Triassic lower actinopterygian taxa.

Acrolepis Agassiz, 1833
Acrolepis tasmanicus
Johnston and Morton, 1891

Dziewa (1980) considered *A. tasmanicus* (Fig. 3) an acrolepid. A recent taxonomic revision by Gardiner and Schaeffer (1989) confirms that it is referable to the genus and is part of the *Pteronisculus* Group on the basis of the presence of an intertemporal bone in contact with the nasal bone.

Acrolepis? hamiltoni
Johnston and Morton, 1890

A single, poorly preserved specimen was tentatively assigned to *Acrolepis? hamiltoni* by Johnston and Morton 1890 (TMAG Z1377) (Fig. 4). Johnston and Morton (1890) suggested that this species was closely allied to *A. tasmanicus*, but noted a number of differences, including the greater development of the vertical fins and a greater number of scale rows.

Fig. 4. *Acrolepis? hamiltoni* in lateral view, from the Early Triassic, Knocklofty Formation, Tasmania.

Dziewa (1980) also referred to *A? hamiltoni*, noting that only the left lateral impression was available (this was also the only one found by the current author). After re-examination of the left lateral impression and the fragmentary skull, it is concluded that Johnston and Morton's (1891) generic designation of *A.? hamiltoni* cannot currently be improved upon, and it is therefore suggested here that the original tentative generic identification be retained.

Actinopterygian of uncertain affinity

A faintly and poorly preserved posterior portion of an actinopterygian fish (TMAG Z1771) was collected at a quarry on 10 Mile Hill, Austins Ferry, Hobart district, apparently in the Tiers Formation equivalent (Steve Forsyth pers. comm. 1990) (Fig. 5). The specimen measures approximately 120 mm in total length from the dorsal fin region to the end of the caudal fin, and 60 mm in body width posterior to the dorsal fin. Impressions of the dorsal, tail and anal fins are incompletely visible, with the anal fin apparently triangular in shape. The scale rows appear to be numerous, with at least 25 posterior to the dorsal fin to the insertion of the caudal fin. The scales are relatively small and numerous, with scales in the region of the dorsal fin about 1 mm x 1 mm. Evidence of scale ornamentation is faintly visible as horizontal ridge impressions on the scale surface. The specimen is preserved in a mudstone which includes fossil plant material.

Fig. 5. Unidentified actinopterygian specimen together with plant fragments, in lateral view, from the Early Triassic Knocklofty Formation, Tasmania.

SPECIMENS OF UNCERTAIN AFFINITY

Fin spines

A number of fin spine specimens were noted in the UTAS geology collection from Old Beach, and are of interest since fine spines have not been recorded previously from the Knocklofty Formation. In particular, specimen UTGD 95501, is 4.8 cm long and 0.5 cm wide tapering to a point, with short spines as long as to 2.5 mm present over most of the external surface (Fig. 6).

Fin spines are found in a number of different fish groups, including actinopterygians and chondrichthyans, but stout spines with nodose ornamentation in the Mesozoic are commonly seen on chondrichthyans (Duffin 1985). Triassic sharks include the ancestors of modern sharks, skates and rays (neoselachians), as well as three extinct groups: the hybodontids, xenacanths and ctenacanths (Compagno 1973; Long 1995; Zangerl 1973, 1981). In the latter two groups the fin spines are cylindrical and ornamented with rows of small thorn-like denticles (Martin 2003), whereas in the hybodontids the fin spines are made up of enamelled ridges (Duffin 1985). The fin spines from Tasmania do not appear to have the typical shape and ornamentation of the hybodontids, so possibly belong to either the ctenacanth or xenacanth shark groups.

Fig. 6. Fin-spine in lateral view, from the Early Triassic Knocklofty Formation, Tasmania.

Fossil sharks and rays have long been known from the Mesozoic of Australia (Long 1991), with sites near Sydney and Gosford (Sydney Basin Triassic) being of particular importance as they have yielded articulated pleuracanth shark material. Australia's most complete chondrichthyan fossils are large pleuracanth sharks from the Early Triassic St Peters Fauna near Sydney (Woodward 1908).

Coprolites

Three coprolite specimens (all with the same specimen number UTGD 95754), from Old Beach, are illustrated here, but numerous additional specimens were noted in the UTAS collection. The specimens are 28 mm x 12 mm, 22 mm x 8 mm, and 20 mm x 18 mm in terms of height and diameter respectively (Fig. 7).

Coprolites have been studied as curiosities since the early 1800s (see Northwood 2005; Banks *et al.* 1978), but there have been few detailed studies regarding their palaeoecological significance. Coprolites from the Arcadia Formation have been successfully used for palaeoecological research and provide evidence of cyanobacteria, insects and other arthropods, and insights into the diversity of fish in the fauna (Northwood 2005). In addition, coprolites have been used as molecular markers to infer components of diet, and have also been used to biostratigraphically correlate exposures within a single Group (Northwood 2005).

A variety of coprolite features including shape, surface marks, size and inclusions have been used to assign coprolites to specific producers (Northwood 2005). The right-figured coprolite (Fig. 7) shows a longitudinal striated surface pattern, possibly produced by a fish, with the left-figured coprolite exhibiting spiral surface patterning attributable to fish with a spiral valve (e.g. lungfish or chondrichthyes, J. Long pers. comm. 2006). The middle specimen with no evidence of striations or spiralling is possibly amphibian in origin (Northwood 2005).

Fig. 7. Coprolites from the Early Triassic Knocklofty Formation, Tasmania.

SUMMARY

Osteichthyan remains from the fresh-water sediments of the Early Triassic Knocklofty Formation of south-eastern Tasmania have been recognised since Johnston and Morton (1890, 1891) described actinopterygian remains from the Tinderbox area. Since then Dziewa (1980) described a more diverse osteichthyan assemblage, based on material collected in the early- to mid-1970s, including a dipnoan, a coelacanthid, and a number of lower actinopterygians. The tentative generic status of *Acrolepis? hamiltoni* is retained in this paper and the original placement proposed by Johnston and Morton (1890) is supported.

New material is illustrated and described in this paper including a previously undescribed elongate skull (Fig. 2), with typical saurichthyid outer bone ornamentation, which is placed in the genus *Saurichthys*. Fin spines, possibly belonging to the chondrichthyes, are figured and described for the first time from the Knocklofty Formation.

Coprolites have been previously recorded from the Knocklofty Formation (Banks *et al.* 1978). In this paper the range of variation in coprolites from the Knocklofty Formation is illustrated, with coprolites displaying longitudinal or spiral surface markings thought to have been produced by fish.

Dedication and acknowledgments

Heartfelt thanks to all my family and friends including Tasmanian Museum and Art Gallery (TMAG) friends and colleagues who have supported and helped me in so many ways during the last few months with the passing of my father. I wish to dedicate this article to the memory of Colin Bender who was the first person to show me a Tasmanian fossil, and whose inspiration led to my interest in the strange and wonderful world of fossils.

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A NEW SPECIES OF *EUCALYPTUS*, SERIES *RADIATAE*, SUBGENUS *MONOCALYPTUS*, (MYRTACEAE) FROM NORTH-WESTERN TASMANIA

A.M. Gray

Gray, A.M. 2008. A new species of *Eucalyptus*, series *Radiatae*, subgenus *Monocalyptus* (Myrtaceae) from north-western Tasmania. *Kanunnah* 3: 41–48. ISSN 1832-536X. A new species *Eucalyptus nebulosa* A.M.Gray is described from Serpentine Ridge west of the Huskisson River in north-western Tasmania. Notes on its distribution, affinities and ecology are also included.

A.M. Gray, Tasmanian Herbarium,
Private Bag 4, Hobart, Tasmania, 7001, Australia.

KEY WORDS: *Eucalyptus*, *Monocalyptus*, Myrtaceae, Tasmania, Australia, Serpentine endemic.

The large genus *Eucalyptus* is represented in Tasmania by 30 species, of which seventeen are endemic. In addition three subspecies are also endemic to Tasmania. The series *Radiatae* (Chippendale 1998) of subgenus *Monocalyptus* is represented in Tasmania by eight species, including the species described in this paper; of these, seven are endemic in the state. Another species has been ascribed in the past to *Eucalyptus radiata* Sieber ex DC. subsp. *robertsonii* (Blakely) L.A.S. Johnson and Blaxell, but its current taxonomic status is in some doubt and there is some question as to whether the species is conspecific with the Australian mainland tree or whether it is an, as yet, undescribed taxon (Williams and Potts 1996).

Six of the seven previously recognised species demonstrate interesting distribution patterns within the state, tending to show habitat preferences for soils that are derived from particular geological substrates.

Eucalyptus amygdalina Labill. is the most widespread species, inhabiting the drier areas of the south-east, southern Midlands, east coast, north-east and northern Tasmania. In the south-east, the species is generally associated with Triassic sedimentary formations, with isolated occurrences on Jurassic substrates (dolerite). Elsewhere within its range it is equally widespread on sedimentary and Jurassic dolerite substrates.

Eucalyptus pulchella Desf. is a species largely restricted to the south-east of the state, with isolated outliers in the southern Midlands and the central east coast. It is almost always associated with Jurassic dolerite, from sea-level to c. 650 m.

Eucalyptus risdonii Hook.f. is a species of very restricted range in the south-east of the state, on the eastern shores of the River Derwent, opposite the city of Hobart. Here it is almost confined to the Permian formations of the low, dry hills of the Meehan Range.

A species closely related to the former, but far more widely distributed, is *Eucalyptus tenuiramis* Miq. This species is also usually associated with impoverished soils on Permian sedimentary substrates in the south-east, and southern Midlands, although a few populations occur on Triassic sediments in wetter localities. However, there are some interesting disjunct populations of this species occurring on the central, southern coastal areas of the Eastern Tiers and on the Freycinet Peninsula. The populations of the Tiers are associated with Jurassic dolerite while those of the Peninsula are on sands and gravels derived from Devonian granites.

Eucalyptus nitida Hook.f. occurs on very poor soils mainly derived from Cambrian and Precambrian formations. The species is widespread in the south-west, west and far north-west of the state, from sea-level to c. 750 m. *Eucalyptus nitida* is the only species of the series to occur extra-mainland Tasmania. Populations of trees and mallees, of nearest affinity to *E. nitida sens. lat.*, are widespread on some islands of the Furneaux Group, in Bass Strait.

Eucalyptus coccifera Hook.f. is a species of sub-alpine distribution on many of the dolerite (Jurassic) mountains and plateaus of the state, with the exception of the far west and the plateaus of the north-east. The two latter species are discussed in further detail, later in this work.

In south-western and far north-western Tasmania, where rainfall is highest, extremely impoverished, leached, skeletal soils are derived from quartzites, schists and conglomerates of chiefly Cambrian and Precambrian age. Serpentinites also occur here and occupy a fairly extensive area between the Huskisson and Wilson Rivers, major tributaries of the Pieman River, in north-western Tasmania. Here, the diversity of the vegetation is indicative of the relative fertility and better drainage characteristics of the soils derived from this rock type and a new species of *Eucalyptus*, the major tree species occupying this ecological niche, has been recognised.

TAXONOMY

Eucalyptus nebulosa
A.M.Gray *sp. nov.*

E. nitidae et E. cocciferae affinis sed differt ab illa foliis adultis plerumque latioribus non nitidis glaucis, foliis juvenibus minoribus late ellipticis et cortice trunci ramorumque laevi decorticato pulveraceo-niveo vel pallide griseo, ab hac alabastris multum parvioribus, capsulis non glaucis, disco angustiore convexo, et foliis adultis subfalcatis tenuioribus longioribus angustioribusque.

Type

Serpentine Ridge, just north of the Pieman Road, c. 7 km west of the Huskisson River, 41° 42' S, 145° 24' E, *A.M.Gray* 1368, 6 May 2004 (holotype HO 527538; isotypes AD, CANB, MEL, NSW).

A small *tree*, 3.5–5(–7) m tall; trunk usually unbranched for approximately the lower two thirds, then sparsely and evenly branched, the branches angled at

Fig. 1. Holotype of *Eucalyptus nebulosa* (HO 527538).

Fig. 2. Distal portion of 'wild' seedling of *E. nebulosa* (HO 527211).

c. 30°–60° to the axis; ultimate branchlets glaucous; young stems of seedlings and coppice shoots prominently warty-tuberculate and deep reddish in colour. *Bark* smooth throughout, decorticating in small, elongated strips or short ribbons; freshly exposed bark dull cream-white and chalky-dusty, occasionally yellowish or pale greenish-bronze and ageing to dull grey or grey-green, branch bark similar, with some compression wrinkles evident at major angles; canopy umbrageous, open and with an overall bluish-grey hue. *Juvenile leaves* opposite, sessile to very shortly petiolate, petioles up to c. 2 mm long; lamina elliptic, 25–45 mm long, (10)–15–25 mm wide, grey-blue when fresh, concolorous, thickly coriaceous, oil glands obscure; lateral veins from 30°–50° to the midrib, distinct; intramarginal vein 1.0–1.5 mm from margins; apex acute to apiculate; base rounded. *Adult leaves* alternate, long-petiolate; petioles 10–15(–20) mm long; lamina narrow elliptic, sub-falcate, 50–80(–110) mm long, 8–12(–15) mm wide, pale blue-grey, glaucous, dull never glossy (either fresh or dry when young) though older leaves may become sub-glossy after abrasion of cuticle wax, concolorous, weakly coriaceous; oil glands numerous, large; lateral veins 10°–20°(–30°) to the midrib, distinct; intramarginal vein 0.5–1.0 mm from margins, obscure; apex long-acuminate, uncinate; base attenuated. *Inflorescence* 7–11(–15) flowered or fewer by abortion; peduncle (3)–5–10 mm long, terete, angular to biconvex, wrinkled, expanded toward the distal portion. *Buds* clavate, glandular, sub-glaucous, sessile or with pedicels 2–3 mm long; operculum hemispherical, distinctly umbonate, 1.0–1.5 mm long and wide, < 1/3 the length of the hypanthium; hypanthium narrowly obconical, 2–3 mm long; flowers at anthesis 5–8 mm in diameter, (including stamens), stamens pale creamy-white. *Mature fruit* hemispherical or sub-turbinate, minutely verrucose, sub-glaucous, 3–5 mm long, 3–5 mm wide, on short, compressed pedicels to 2(–3) mm long; disc narrow, level or convex; valves 3–5, erect to enclosed, with the tips membranous. *Seeds* cuneiform, angular, dull reddish to dark brown in colour. Flowering period: December through to March.

Additional specimens examined
Tasmania (all HO)

Pieman Rd, Serpentine Ridge, 41°43' S, 145°24' E, *A.M.Gray s.n.*, 2 April 1990; Pieman Rd, c. 2 km east of the Wilson River, 41°42' S, 145°23' E, *A.M.Gray 1367*, 6 May 2004; Pieman Rd, 3 km east of the Wilson River, 41°42' S, 145°23' E, *A.M.Gray 1370*, 6 May 2004; Pieman Rd, 5 km east of the Wilson River 41°43' S, 145°25' E, *A.M.Gray 1373*, 6 May 2004.

NOTES

Distribution and ecology

Eucalyptus nebulosa forms an extensive and discrete population between the Wilson and Huskisson Rivers, tributaries of the Pieman River, in the northern part of the west coastal region of Tasmania. It is the dominant tree species on Cambrian serpentine rock formations featuring low hills and ridges, at altitudes between c. 200 and 300 metres. Understorey taxa associated with *E. nebulosa* include *Acacia mucronata* Willd. ex Wendl.f. subsp. *mucronata*, *Banksia marginata* Cav.,

Fig. 3. Habitat photograph of *E. nebulosa*, Serpentine Ridge, Tasmania.

Hakea epiglottis Labill. subsp. *epiglottis*, *Cenarrhenes nitida* Labill., *Bauera rubioides* Andr., *Spyridium gunnii* (Hook.f.) Benth. and *Micrantheum serpentinum* Orchard, a Tasmanian serpentine endemic. The entire population appears to be remarkably homogenous with no other *Eucalyptus* species evident; the limits of the population also appear to be defined by the serpentine formation. Surrounding the population, and associated with a different geology, are other species of *Eucalyptus,* including *E. nitida* Hook.f., *E. obliqua* L'Hér. and, rarely, a form of *E. ovata* Labill. Although detailed investigations have yet to be undertaken, there appears to be little evidence of introgression between *E. nebulosa* and the sympatric *E. nitida*, a closely related species, at shared boundaries of populations. The closest population of *E. coccifera* (from Tasmanian Herbarium records) is at Black Bluff, a dolerite range, c. 40 km to the north-east, at an altitude of c. 850 metres.

DISCUSSION

Although *Eucalyptus nebulosa*, *E. coccifera* and *E. nitida* are closely related within series *Radiatae*, *E. nebulosa* forms a large, discrete population of trees of distinctive and homogenous character confined, as far as has been observed, to the serpentine geology in a small and uninhabited area of the state. *Eucalyptus nebulosa* differs from *E. nitida* in the mostly broader, distinctive grey-blue glaucous, non-glossy new adult

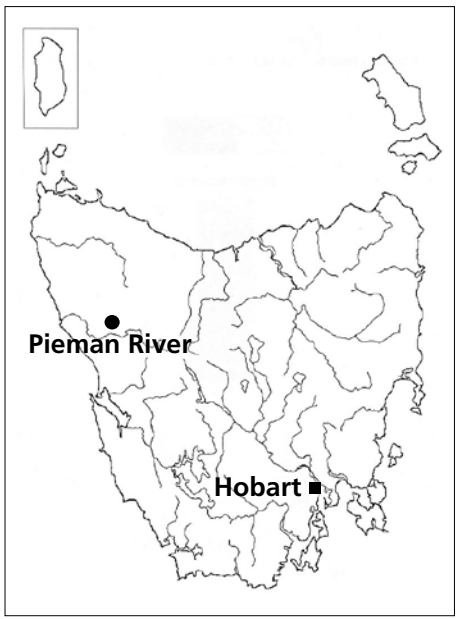

Fig. 4. Distribution of *E. nebulosa* population.

leaves and in the smaller, broadly elliptical juvenile leaves, and the smooth, powdery-white to pale-grey bark of the trunk and larger branches. It differs from *E. coccifera* in the much smaller mature buds and non-glaucous fruits, with a narrower, convex disc, and thinner, longer, narrower, sub-falcate adult leaves.

Eucalyptus nitida and *E. coccifera* occupy different ecological ranges. However, it has been demonstrated that *E. nitida* may show a clinal variation to forms very close to *E. coccifera* (Shaw *et al.* 1984). Of the Tasmanian representatives of series *Radiatae*, *E. nitida* is, perhaps, the most variable. Generally *E. nitida* occurs from sea-level to c. 750 metres and is usually associated with quartzites, schists and other rocks of Precambrian or Cambrian age with skeletal, siliceous, nutrient-poor soils. It is commonly a small, multi-stemmed shrub (mallee) with smooth, yellow-greenish bark, decorticating from the base to the crown in long, narrow ribbons; this form is widespread on the buttongrass sedgelands throughout much of western and south-western Tasmania. On the deeper, more fertile soils of river valleys in the far south, very tall, sometimes even massive trees are not uncommon, with smooth, yellow bark decorticating in elongated patches and ribbons throughout or fibrous and persistent to the major branches. *Eucalyptus coccifera* is almost exclusively a sub-alpine species, occurring at altitudes of above c. 650 metres thence to the tree-line which, in Tasmania, is at c. 1000 metres; it is widespread between these altitudes on the Central Plateau, north-west and the south-east, and nearly always associated with Jurassic dolerite. The species has not been recorded from the higher dolerite mountains of the north-east of the state.

Conservation status

As far as is known, *E. nebulosa* occupies an extensive, remote area of more than 15 km^2 and constitutes the major component of the woody vegetation of this tract of land. It is locally abundant and, apart from the remote possibility of extensive fire or mining operations, not considered to be at risk.

Etymology

The specific name *nebulosa* (Latin, *nebulosus*: misty, cloudy) refers to the smoky/hazy aspect of the bluish-grey leafy crowns of the population as viewed from a distance. A common name, 'serpentine peppermint', is proposed.

KEY

(separating *E. nebulosa* from *E. coccifera* and *E. nitida*)

1 Adult leaves usually glossy-green, falcate; juvenile leaves green to sub-glaucous, ovate-elliptic, 45–65 mm long, 25–35 mm broad; bark sub-fibrous throughout or for varying distances on the lower trunk, or decorticating from the trunk and branches in long ribbons with exposed surfaces yellow-cream to grey-green — ***E. nitida***

1 Adult leaves glaucous, bluish-grey, dull at first but sometimes sub-glossy with age, narrow elliptic, sub-falcate; juvenile leaves glaucous, elliptic, 25–45 mm long, 15–25 mm broad; bark smooth throughout, decorticating in short strips or ribbons, with exposed surfaces cream-white to grey-green, often 'chalky-dusty' — 2

2 Adult leaves thick, coriaceous, elliptic-lanceolate, rarely subfalcate; mature capsules 7–11 mm long, 10–13 mm wide; bark seldom chalky. Subalpine tree, widespread on dolerite mountains and plateaus at > 650 m altitude — ***E. coccifera***

2 Adult leaves relatively thin, scarcely coriaceous, falcate-lanceolate; mature capsules 3–5 mm long, 3–5 mm wide; bark usually chalky. Small, lowland trees confined to serpentine geology at < 350 m altitude — ***E. nebulosa***

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

Mark Wapstra, Ian Thompson and Alex Buchanan

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

Mark Wapstra, Environmental Consulting Options Tasmania
28 Suncrest Avenue, Lenah Valley, Tasmania, 7008, Australia.
Email: mark@ecotas.com.au

Ian Thompson, School of Botany, The University of Melbourne
Parkville, Victoria, 3010, Australia.
Email: i.thompson@unimelb.edu.au

Alex Buchanan, Tasmanian Herbarium
GPO Box 252-04, Hobart, Tasmania, 7001, Australia.
Email: alex.buchanan@tmag.tas.gov.au

KEY WORDS: *Senecio,* groundsel, fireweed, Asteraceae, key, Tasmania.

Senecio is a large cosmopolitan genus comprising about 1250 species (Bremer 1994). Australia has 87 native species (Thompson 2006) and ten naturalised species, the latter mostly from South Africa and some from Europe. Curtis (1963) in Part 2 of the *Student's Flora of Tasmania* recognised 22 species in *Senecio*, four being naturalised and eighteen native. Two have since been transferred to other genera, these being the introduced *S. mikanioides* Otto ex Harv., now known as *Delairea odorata* Lem., and *S. centropappus* F.Muell. for which the name *Brachyglottis brunonis* (Hook.f.) B.Nord. is current. Curtis (1963) did not recognise any varieties or subspecies in *Senecio*.

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

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

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

Some notes on using the key

As with most keys, it is difficult to avoid the use of technical terms, especially in the case of a genus like *Senecio*, in which the identification of species, subspecies or varieties often requires microscopic examination of capitula, stems or leaves. However, an annotated and illustrated glossary is provided following the key to explain technical terms. Each species has some accompanying notes on its recognition (in particular, confusing species or characters), distribution and habitat (also following the key).

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

What material needs to be collected

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

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

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

Species nomenclature

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

A note on hybrids

Species of *Senecio* readily hybridise, both within and between the two morphologically distinct groups (i.e. the radiate and disciform species). Hybrids are not included in the present key but are discussed in the notes below each species in the key that may be possible parent species. Hybrids between disciform and radiate species are usually identifiable by the presence of ligules that are shorter (mostly 0.5–4 mm long), and narrower than those seen in radiate species, and, in the field, by the identification of populations of parent species in the vicinity.

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

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

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

Distribution maps

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

All records for Tasmanian *Senecio* are shown in Fig. 1. This map clearly demonstrates that several parts of the state are represented by very few or no collections: in particular, several parts of the south-west (generally difficult to access), many parts of the central, eastern and northern Midlands (mainly private property), parts of the north-east and several areas in the north-west (notably much of the private property areas and two offshore islands). This map also shows that many areas of the state are represented by numerous collections. Of note are the coastal areas, many of the Bass Strait islands, parts of the Central Highlands and around the major population centres in the Tamar (Launceston) and Derwent (Hobart) river systems. Macquarie Island, a sub-antarctic island administered by Tasmania, is not included on the distribution maps because no species of *Senecio* are known from there (Buchanan 2005).

Conservation status

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

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

1a Plants glabrous, scrambling, twining or climbing; leaves distinctly petiolate and with a lobate lamina 1–2 times as long as broad — 2

1b Plants glabrous or hairy, not growing as above; leaves various, not entirely as above — 3

2a Capitula radiate; leaves dark green, with lamina generally longer than broad and with base truncate to cuneate; petiole 1–4 cm long; stipules absent — ***S. angulatus****

2b Capitula discoid; leaves pale green, lamina about as broad as long and with base strongly cordate (heart-shaped); petiole 4–7 cm long; kidney-shaped stipules present — ***Delairea odorata****

3a Capitula radiate — 4

3b Capitula not radiate — 23

4a Woody shrubs or trees, 2–4 m high; leaves linear, with margins entire, viscid (Mts Wellington and Dromedary) — ***Brachyglottis brunonis***

4b Herbaceous plants (sometimes woody basally), to 2 m high; leaves various, not viscid (distribution various) — 5

5a Ligules of ray florets crimson to purple, or rarely white (and if white, then inflorescences of several capitula) — ***S. elegans****

5b Ligules of ray florets yellow, or if ever cream or whitish then inflorescences of a single capitulum — 6

6a Involucre < 5.5 mm long, < 2 mm diameter; disc florets < 30; ray florets 4–8; leaves never lobate or pinnatisect — 7 (***S. linearifolius***)

6b Involucre 4–15 mm long, > 2 mm diameter; disc florets > 30; ray florets c. 13, or more; leaves sometimes lobate or pinnatisect — 10

7a All leaves appearing entire — ***S. linearifolius*** var. ***linearifolius***

7b At least the stem leaves callus-denticulate, denticulate or dentate — 8

8a New axillary growth densely cobwebby to woolly; involucre mostly > 4.0 mm long — ***S. linearifolius*** var. ***arachnoideus***

8b New axillary growth glabrous or only sparsely cobwebby; involucre 2.5–4.0 mm long — 9

9a Mid- to upper-stem leaves less than 25 mm wide and with length:width ratio > 4; leaf-base attenuate to cuneate — ***S. linearifolius*** var. ***denticulatus***

9b Mid- to upper-stem leaves more than 25 mm wide, or if narrower then length:width ratio < 4 and/or with leaf-base broad-cuneate, truncate or cordate (heart-shaped) — ***S. linearifolius*** var. ***latifolius***

10a Leaves bi- or tri-pinnatisect, with ultimate segments variable in width; calycular bracteoles narrow-lanceolate, to c. 0.5 mm wide; achenes of ray florets glabrous but those of disc florets hairy — ***S. jacobaea****

10b Leaves not bi- or tri-pinnatisect, or if so with all ultimate segments of leaves similarly narrow and with calycular bracteoles ovate to lanceolate, 0.7–1.6 mm wide; achenes either all hairy or all glabrous — 11

11a Plants rosette-forming; leaves/bracts above mid-stem much smaller than basal leaves; calycular bracteoles narrow-oblong, > 4 mm long (mostly montane to alpine) — 12

11b Plants not rosette-forming, or if so then calycular bracteoles ovate, ≤ 3 mm long; largest leaves occurring along stems (mostly lowland) — 16

12a Leaves distinctly hairy; stem leaves/bracts up to 5 (excluding distal-most 1 cm of stem) — 13

12b Leaves glabrous or nearly so; stem leaves/bracts 5–15 (excluding distal-most 1 cm of stem) — 14

13a Basal leaves not spathulate (demarcation between petiole and blade more or less abrupt), usually at least some > 15 mm wide; upper surface lacking broad-based coarse hairs; inflorescences of 1–4 capitula — ***S. primulifolius***

13b Basal leaves spathulate, < 15 mm wide; upper surface with broad-based coarse septate hairs to c. 1.5 mm long (or their stout residual bases); inflorescences of a single capitulum — ***S. papillosus***

14a Leaves deeply lobate to pinnatisect, with 3–6 more or less oblong segments per side, concolorous or nearly so; inflorescences of 1 capitulum (rarely 2); ligules yellow — ***S. pectinatus*** var. ***pectinatus***

14b Leaves less dissected than above, with 1–several serrations or somewhat triangular lobes per side, markedly discolorous; inflorescences of 1 or more capitula; ligules yellow, white, or cream — 15

15a Leaves 4–10 mm wide, with teeth or lobes 3 or more per side; inflorescences mostly of 3 or more capitula; ligules yellow — ***S. leptocarpus***

15b Leaves 1–4 mm wide, with teeth 1 or 2 per side; inflorescences of a single capitulum; ligules white or cream — ***S. albogilvus***

16a Leaves entire or denticulate to dentate, strongly amplexicaul; calycular bracteoles up to 4; plants often glaucous — ***S. velleioides***

16b Leaves variously dissected, not or hardly amplexicaul; calycular bracteoles 6 or more; plants not glaucous — 17

17a Calycular bracteoles 5–10 mm long; phyllaries with conspicuous dark hairs; ligules 7- or 8-veined — ***S. vagus*** subsp. ***vagus***

17b Calycular bracteoles 1–3 mm long; phyllaries glabrous; ligules mostly 4-veined — 18

18a Leaves bi- or tri-pinnatisect; stems succulent; capitula and leaves rather crowded (Bass Strait islands) — ***S. pinnatifolius*** var. ***capillifolius***

18b Leaves not bi-pinnatisect, or if so then stems not or hardly succulent; capitula and leaves crowded or lax (widespread) — 19

19a Stereome of inner phyllaries more than twice as broad as stereome of outer phyllaries measured c. 1 mm below apex, and usually bordered by a purple chevron; margins of outer phyllaries c. as broad as the stereome 1 mm below apex — ***S. pinnatifolius*** var. ***lanceolatus***

19b Stereome of inner phyllaries less than twice as broad as that of outer phyllaries measured c. 1 mm below apex, usually not bordered by a purple chevron but

sometimes weakly so; margin of outer phyllaries narrower than stereome 1 mm below apex — 20

20a Leaves halfway to 2/3 along stems/major branches broadest beyond midleaf and/or with marginal points or segments clearly more numerous in distal half of leaf; peduncles commonly hairy at flowering (montane to alpine) — ***S. pinnatifolius*** var. ***alpinus***

20b Leaves halfway to 2/3 along stems/major branches not broadest beyond midleaf and with marginal points or segments not more numerous in distal half; peduncles commonly glabrous at flowering (generally lower than montane) — 21

21a Leaves generally only slightly fleshy (although succulent on coast); base of upper-branch leaves (excluding any lobes or segments) generally not broader than the branch (east coast and inland) — ***S. pinnatifolius*** var. ***pinnatifolius***

21b Leaves fleshy; base of upper-branch leaves commonly broader than branch (west coast) — 22

22a Achenes 3.0–5.5 mm long; pappus persistent; broadest stereomes of phyllaries well over 1 mm wide (sandy sites only) — ***S. spathulatus*** var. ***spathulatus***

22b Achenes < 3.0 mm long; pappus not persistent; broadest stereomes of phyllaries to c. 1 mm wide (rocky sites as well as on sand) — ***S. pinnatifolius*** var. ***maritimus***

23a Involucres all or mostly of 7–10 phyllaries — 24

23b Involucres all or mostly of more than 11 phyllaries (mostly c. 13, but sometimes more) — 30

24a Capitula discoid, with florets 10–16; corolla of all florets 5-lobed and markedly dilated distally; plant aromatic, usually quite glaucous — ***S. odoratus***

24b Capitula disciform with florets mostly more than 16; corolla of outer florets hardly dilated distally and less than 5-lobed; plants not usually aromatic, not glaucous — 25

25a Plants greyish in appearance with a cottony to woolly indumentum of fine hairs at least on stems and lower surface of leaves; coarse hairs absent — ***S. quadridentatus***

25b Plants not greyish in appearance with fine hairs rather sparse except on newest growth; if ever somewhat greyish overall then the indumentum of coarse hairs — 26

26a Achenes lageniform, > 2.8 mm long, with hairs rather sparse in lines; secondary roots slightly tuberiform; — ***S. prenanthoides***

26b Achenes not lageniform and/or < 2.8 mm long, with hairs variously dense; secondary roots not tuberiform — 27

27a At least lower- to mid-stem leaves lobed; marginal teeth scattered (< 3 per cm) — 28

27b Stem leaves not lobed; margins often crowded-toothed (c. 5 per cm) — 29

28a Lobation of leaves markedly angled forwards, with acute teeth on the lobes also angled forwards; upper surface of upper-stem leaves nearly glabrous; achenes (2.0–)2.5–3.2 mm long — ***S. biserratus***

28b Lobation of leaves nearly at right-angles to midrib, with subacute teeth on the lobes hardly angled forwards; upper surface of all leaves with scattered coarse hairs; achenes 1.5–2.2 mm long; achenes red-brown — ***S. hispidulus***

29a Leaf margins smooth or with scattered points; inflorescences of few to c. 30 capitula — ***S. microbasis***

29b Leaf margins with numerous crowded denticulations; inflorescences of 100s of capitula — ***S. minimus***

30a Capitula discoid; calycular bracteoles conspicuously jet black in distal 0.5–1 mm; near glabrous annuals to 0.5 m high — ***S. vulgaris****

30b Capitula disciform, or if discoid then plants densely hairy; calycular bracteoles with black pigmentation absent or inconspicuous and confined to very tip; short-lived perennials of various height, hairy or not — 31

31a At least lower-stem region developing coarse hairs (these sometimes partly obscured by overlying wispy extensions), these hairs sometimes becoming lost with age — 32

31b Stems glabrous or with all hairs very fine (appressed-cottony or woolly), nowhere developing any coarse hairs — 38

32a Involucre < 2.0 mm diameter (see glossary), 3.0–6.0 mm long or to 9 mm long but then achenes markedly lageniform (neck 0.3–1.0 mm long); achene hairs forming lines or bands narrower than ribs — 33

32b Involucre mostly > 2.0 mm in diameter, (5.0–)6.0–12.0 mm long; achenes not or only slightly lageniform (neck c. 0.2 mm long); achene hairs forming bands c. as wide as ribs — 36

33a Involucre 6.0–9.0 mm long; achenes lageniform, 2.8–4.5 mm long; secondary roots slightly tuberiform — ***S. prenanthoides***

33b Involucre 3.0–6.0 mm long; achenes obloid, 1.0–2.2 mm long; secondary roots not tuberiform — 34

34a Peduncle and capitulum glabrous at flowering; calycular bracteoles 4–8 — ***S. hispidulus***

34b Peduncle and capitulum (in region of bracteoles) cobwebby to woolly at flowering; calycular bracteoles 6–12 — 35 ***S. glomeratus***

35a Achenes < 1/3 of phyllary length (phyllaries 4.0–6.0 mm long; achenes 1.0–1.7 mm long); peduncles and lower parts of capitulum moderately cobwebby to woolly; pappus usually > 5 mm long — ***S. glomeratus*** subsp. ***glomeratus***

35b Achenes > 1/3 of phyllary length (phyllaries 3.0–5.0 mm long; achenes 1.3–2.2 mm long); peduncles and lower parts of capitulum sparsely to moderately cobwebby; pappus usually < 5 mm long — ***S. glomeratus*** subsp. ***longifructus***

36a Upper-stem leaves not or hardly auriculate; apex of phyllaries black-tipped but without a zone of purple below this; achenes commonly slightly lageniform — ***S. longipilus***

36b Upper-stem leaves usually auriculate; apex of phyllaries black-tipped or not, commonly with a zone of purple immediately below; achenes narrow-obloid — 37

37a Coarse hairs on stems persisting throughout; achenes light to mid brown; phyllaries c. 13 — ***S. hispidissimus***

37b Coarse hairs on stems giving way to cottony hairs above mid-stem; achenes sometimes dark-brown to blackish; phyllaries c. 13, or often 16–20 — ***S. squarrosus***

38a Capitula discoid — ***S. georgianus***

38b Capitula disciform — 39

39a Achenes lageniform, 2.0–7.0 mm long — 40

39b Achenes obloid to ellipsoid, 1.5–3.0 mm long — 43

40a Involucre > 3.0 mm diameter; calycular bracteoles > 3.0 mm long; achenes with hairs in bands c. as broad as ribs — ***S. macrocarpus***

40b Involucre < 3.0 mm diameter; calycular bracteoles < 3.0 mm long, appressed; achenes with hairs in lines or bands much narrower than ribs 41

41a Leaves in lower third of stems with scattered coarse hairs; achenes 5–7 mm long, markedly lageniform with a very long slender neck (> 1 mm long) — ***S. tasmanicus***

41b Leaves in lower third of stems lacking coarse hairs; achenes 2.0–4.5 mm long, with neck shorter (< 1 mm long) — 42

42a Plants with a grey appearance; taproot stout; at start of flowering lower-stem region densely cottony to woolly and capitula and peduncles either glabrous or cobwebby; outer achenes usually red — ***S. quadridentatus***

42b Plants with a greenish appearance; taproot inconspicuous; at start of flowering lower-stem region glabrous or sparsely cottony and capitula and peduncles cobwebby; outer achenes dark brown — ***S. campylocarpus***

43a Calycular bracteoles 1.0–2.0 mm long, 3–5 per capitulum; capitulum glabrous at flowering — 44

43b Calycular bracteoles 2.0–5.0 mm long, more than 5 per capitulum or if 3–5 then capitula (in region of bracteoles) cobwebby at flowering — 45

44a Involucre 1.0–1.5 mm diameter; florets up to 25; mature receptacle 1.0–2.0 mm diameter — ***S. microbasis***

44b Involucre 1.5–2.0 mm diameter; florets more than 25; mature receptacle 2.5–3.0 mm diameter — ***S. phelleus***

45a Peduncles and capitula glabrous at flowering (swamp plants) — ***S. psilocarpus***

45b Peduncles and capitula (in region of bracteoles) cobwebby at flowering (not swamp plants) — 46

46a Achenes with dense hair-bands c. as broad as ribs, mid-brown or blackish between bands; involucre 2.0–4.0 mm diameter (lowland) — ***S. squarrosus***

46b Achenes glabrous or hairs in lines much narrower than ribs, olive-brown or red-brown; involucre 1.7–2.0 mm diameter (montane or higher altitudes) — 47

47a Achenes 2.5–4.0 mm long, olive-brown; calycular bracteoles extending up to c. one-quarter of way along involucre; upper-stem leaves entire or denticulate — ***S. gunnii***

47b Achenes 2.0–2.2 mm long, red-brown; calycular bracteoles extending c. one third to halfway along involucre; upper-stem leaves lobate — ***S. extensus***

NOTES ON TASMANIAN SPECIES OF *SENECIO*

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

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

This species is distinct from *S. pectinatus* on the basis of leaf morphology, and is perhaps more similar to *S. leptocarpus* (both have similarly toothed or lobed, discolorous leaves but those of *S. albogilvus* are considerable smaller). The white-cream colour of the ligules is perhaps the most distinctive feature and makes confusion with other species unlikely. Belcher (1996) notes that the recognition of this species in dried material is easy because of the distinctive leaves and bracts, even though the rays usually undergo discoloration during drying and are not then reliably different in colour from dried material of *S. pectinatus*.

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

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

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

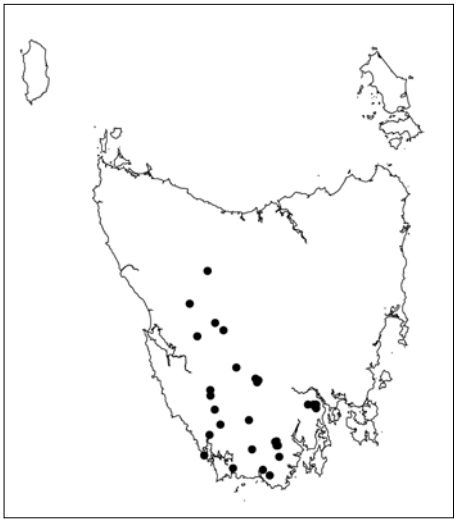

Fig. 2. Distribution of *Senecio albogilvus*.

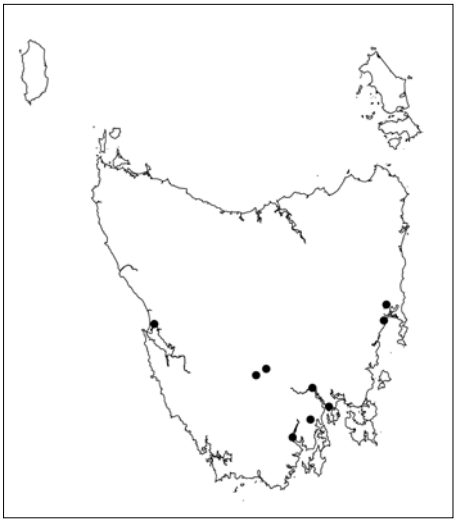

Fig. 3. Distribution of *Senecio angulatus*.

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

Senecio biserratus Belcher, *Ann. Miss. Bot. Gard.* 43: 43 (1956)
'jagged fireweed'
(Fig. 4)

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

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

Senecio campylocarpus I.Thomps., *Muelleria* 20: 139 (2004)
'bulging fireweed'
(Fig. 5)

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

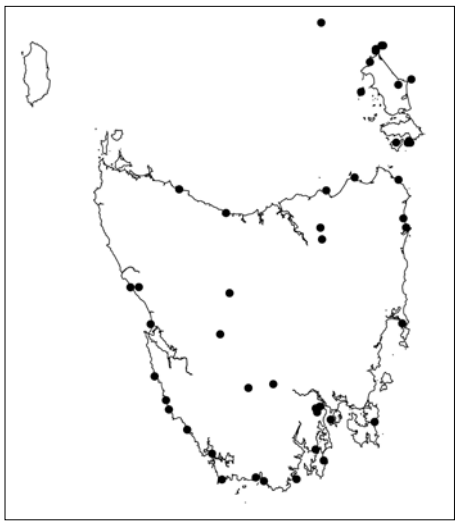

Fig. 4. Distribution of *Senecio biserratus*.

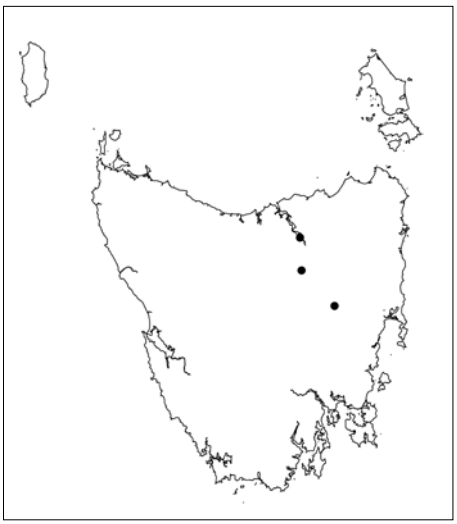

Fig. 5. Distribution of *Senecio campylocarpus*.

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

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

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

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

(Fig. 6)

In Tasmania the species is most widespread on the east and north coasts (including Bass Strait islands) but is apparently absent from the west and south coasts. This is an almost wholly coastal species (usually on dune sand) and has distinctive crimson to purple (or occasionally white) ligules. Even when not in flower, the broad cup-shaped involucral buds with prominently black-tipped bracts combined with the thick and more or less hollow branches and the fleshy deeply divided leaves make it easily recognised. It is a native of South Africa. Walsh (1999) reports apparent hybrids between *S. elegans* and *S. pinnatifolius* from near Portland and Wilsons Promontory in Victoria, which have more narrowly lobed or subentire leaves and pale mauve to whitish ligules (rather than the usual rich purple). Such hybrids have not been reported from Tasmania.

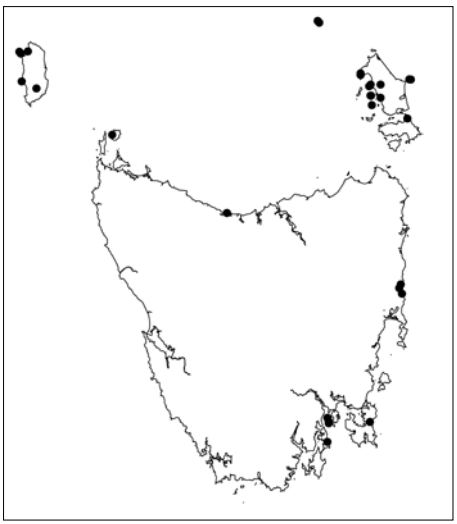

Fig. 6. Distribution of *Senecio elegans*.

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

(Fig. 7)

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

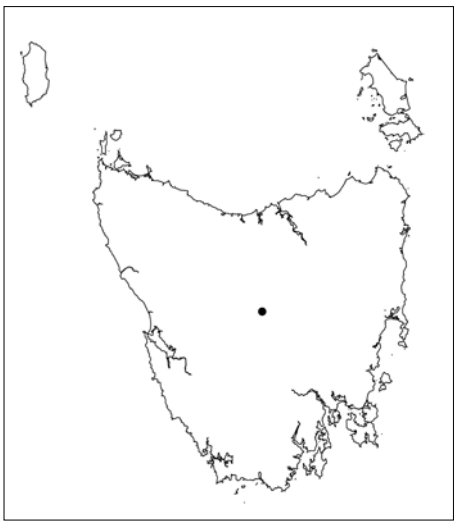

Fig. 7. Distribution of *Senecio extensus*.

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

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

This species has been recorded only once for Tasmania and, like all mainland records of this species, this was in the 1800s. The single Tasmanian collection is apparently that of Gunn, held at Kew, and is simply labelled 'Van Diemen's Land'. Later in his career Gunn forwarded mainland collections of other collectors to Hooker. J.D. Hooker described *Erechtites candicans* from this Gunn material, later recognised as synonymous with *S. georgianus*. As such, it is possible that *S. georgianus* is not present in Tasmania, but has been included in the key because of the Gunn collection. Although discoid, in other aspects of its morphology it conforms to the disciform group of Australian *Senecio*. It resembles *S. gunnii* vegetatively. Herbarium labels (from mainland specimens) suggest that it occurs at moderate altitudes and may be an autumn flowering species.

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

(Fig. 8)

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

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

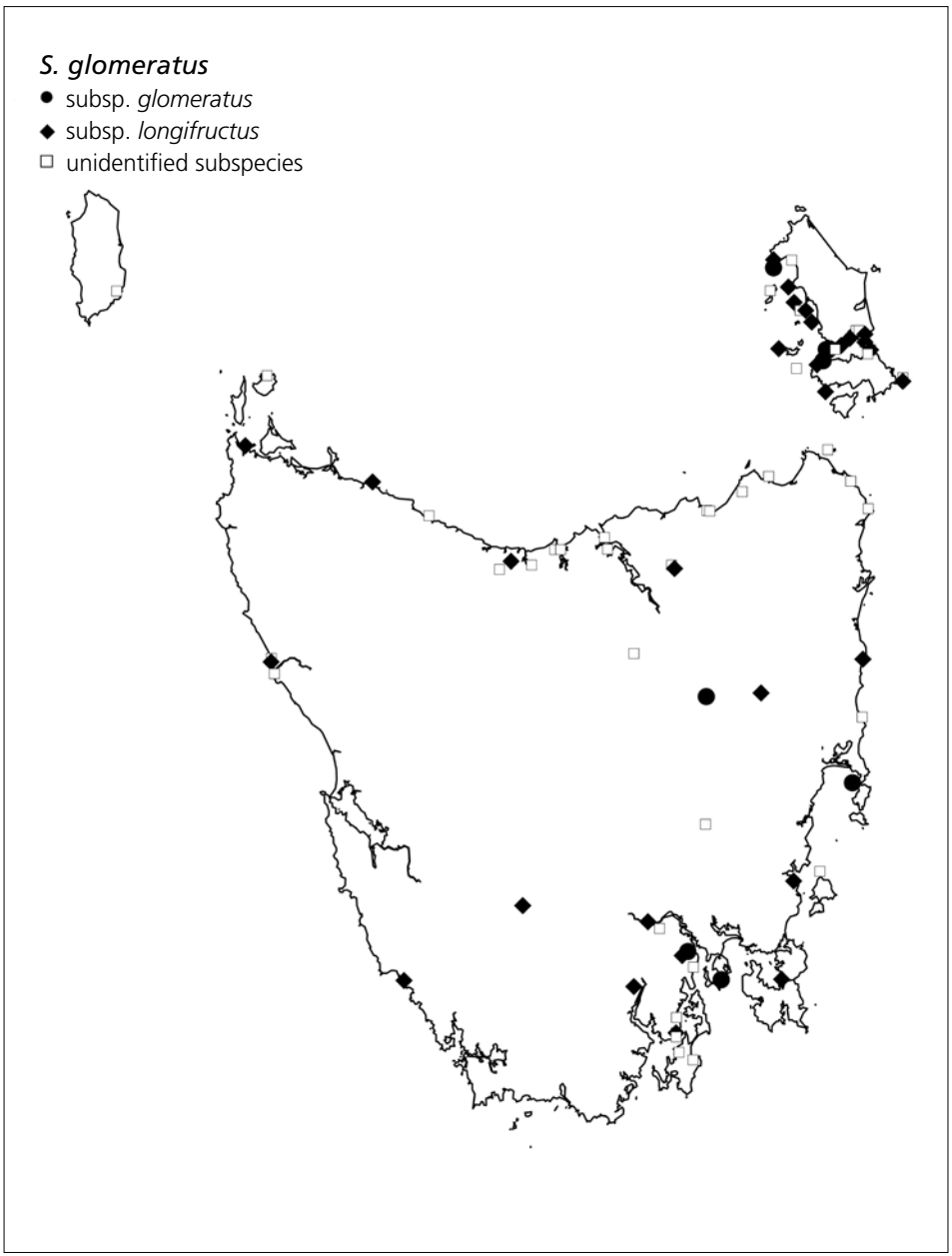

Fig. 8. Distribution of *Senecio glomeratus*.

Senecio glomeratus subsp. ***glomeratus***
'shortfruit purple fireweed'

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

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

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

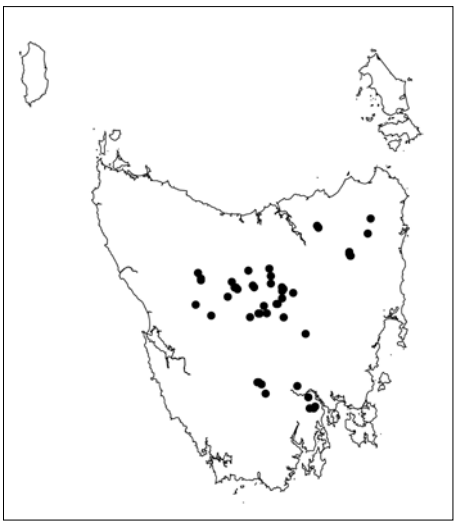

Fig. 9. Distribution of *Senecio gunnii*.

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

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

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

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

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

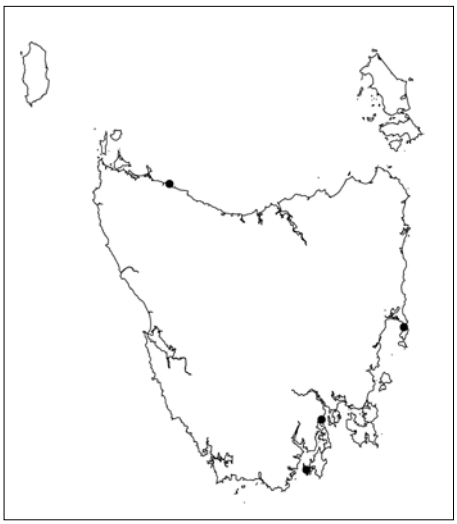

Fig. 10. Distribution of *Senecio hispidissimus*.

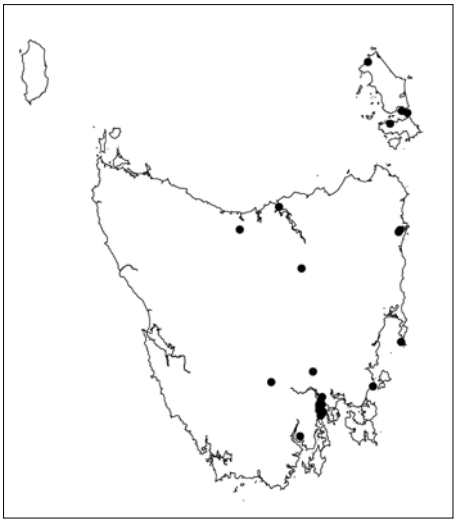

Fig. 11. Distribution of *Senecio hispidulus*.

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

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

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

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

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

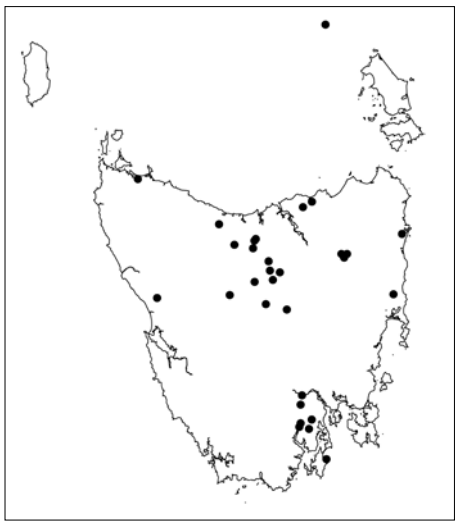

Fig. 12. Distribution of *Senecio jacobaea*.

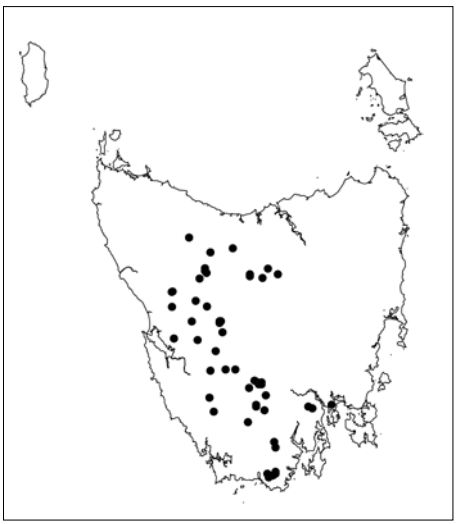

Fig. 13. Distribution of *Senecio leptocarpus*.

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

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

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

(Fig. 13)

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

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

(Fig. 14)

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

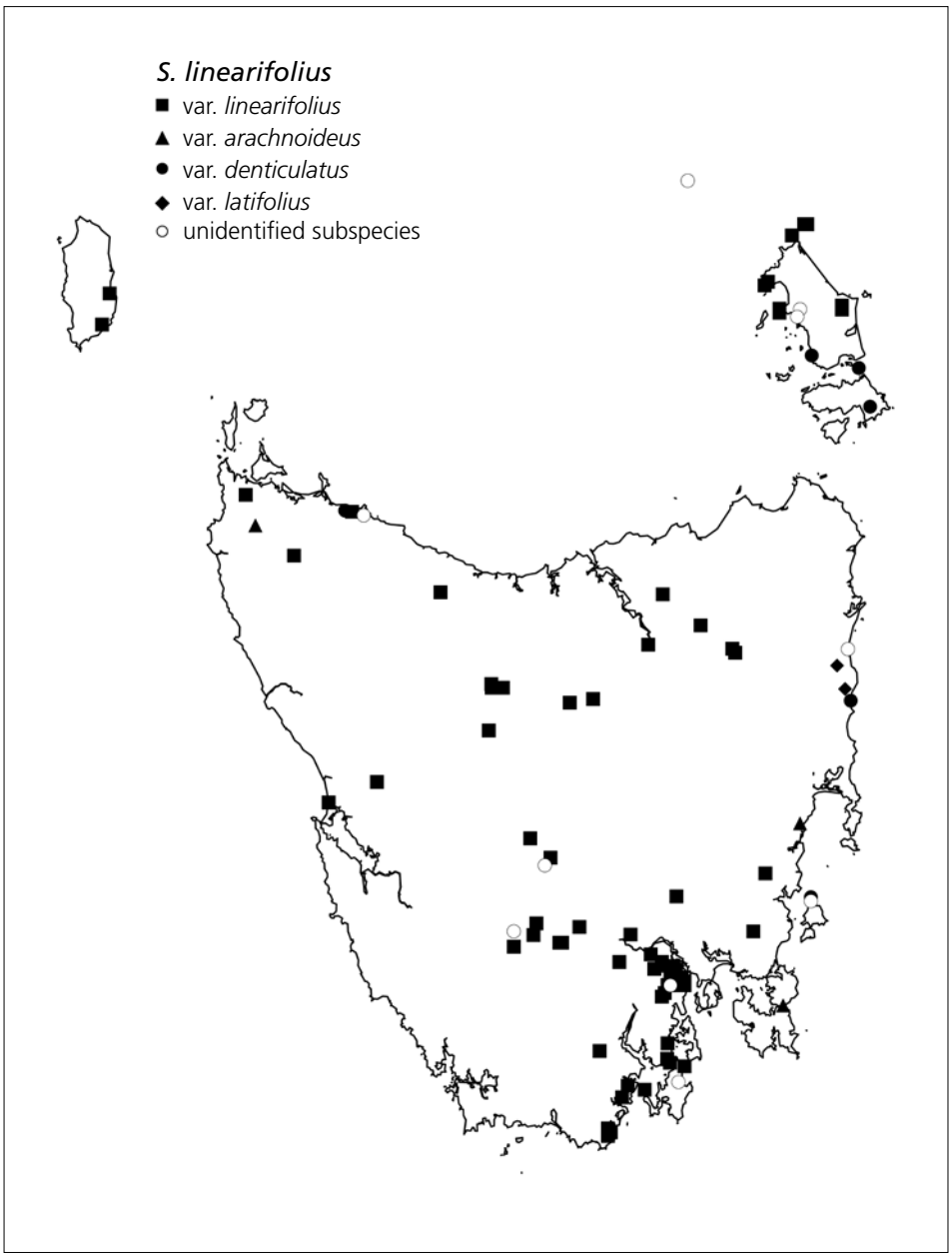

Fig. 14. Distribution of *Senecio linearifolius*.

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

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

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

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

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

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

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

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

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

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

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

This taxon is localised in north-eastern Tasmania based on three collections from the Lower Marsh Creek-Elephant Pass-St Marys Pass area. On the mainland it occurs at moderate to high altitudes and the Tasmanian collections are from steep slopes in eucalypt forest at lower elevations.

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

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

(Fig. 15)

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

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

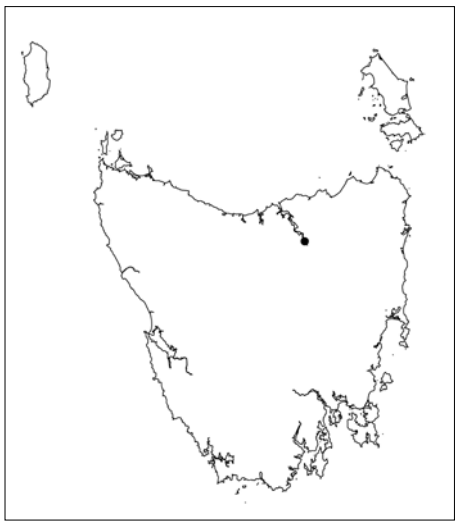

Fig. 15. Distribution of *Senecio longipilus*.

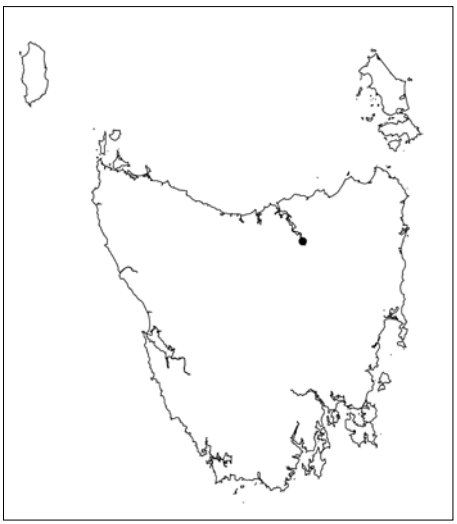

Fig. 16. Distribution of *Senecio macrocarpus*.

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

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

(Fig. 16)

Senecio macrocarpus grows to 0.6 m. It is listed as extinct on the Tasmanian *Threatened Species Protection Act 1995* and as vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is represented by a single old record from northern Tasmania (South Esk River area close to Launceston/Perth). On the mainland it typically grows in low-lying areas, and has been recorded from basalt-derived clay or clay-loam soils in grassland, sedgeland and woodland. This species is readily recognisable by its narrow-linear branch-leaves, small number of very large capitula, and long, densely papillose-hairy, lageniform achenes.

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

(Fig. 17)

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

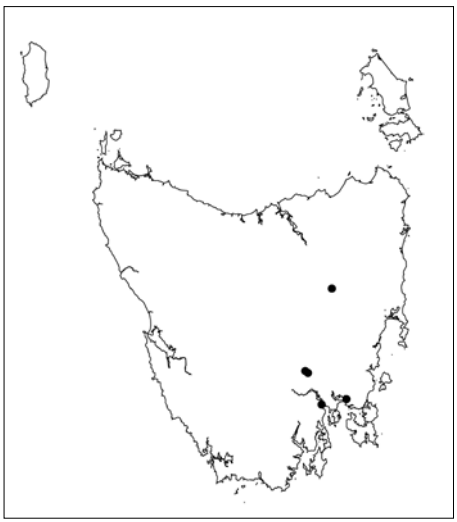

Fig. 17. Distribution of *Senecio microbasis*.

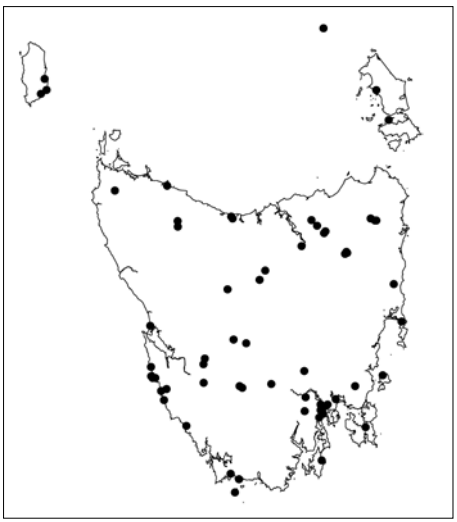

Fig. 18. Distribution of *Senecio minimus*.

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

Senecio minimus Poir., *Encycl. Suppl.* 5: 130 (1817)
'shrubby fireweed'
(Fig. 18)

Senecio minimus grows to 2 m. It is readily identified by inflorescence with numerous, small, slender capitula, and large leaves with more or less regular, crowded denticulations and distinct reticulate venation. It is most common on fertile sites, e.g. rich soils in moister sites such as beside swamps and streams, and occurs throughout Tasmania at most elevations. In Tasmania, prior to the major review of *Senecio*, many specimens (of several species) are likely to have been erroneously attributed to this species. This species often forms dense shrubby stands on disturbed sites such as roadsides and clear-felled coupes.

Senecio odoratus Hornem., *Hort. Bot. Hafn.* 2: 809 (1815)
'scented groundsel'
(Fig. 19)

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

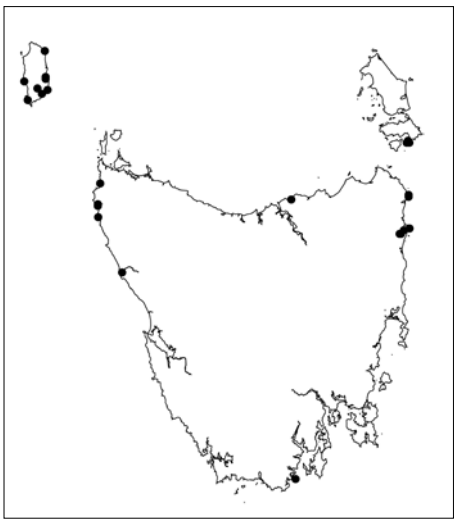

Fig. 19. Distribution of *Senecio odoratus*.

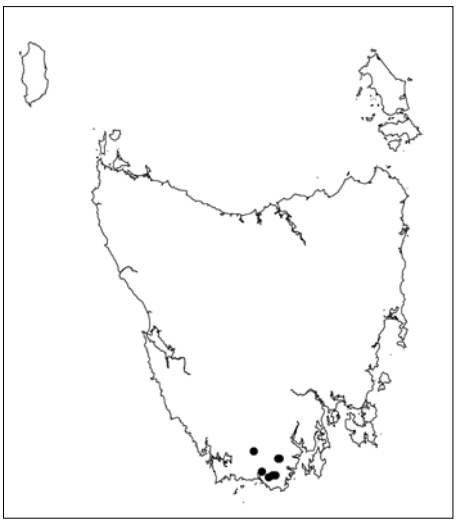

Fig. 20. Distribution of *Senecio papillosus*.

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

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

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

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

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

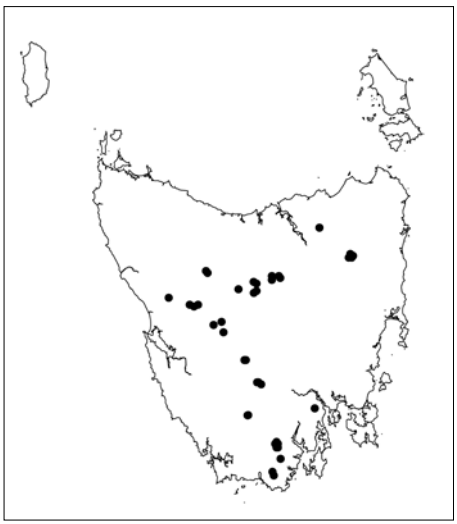

Fig. 21. Distribution of *Senecio pectinatus*.

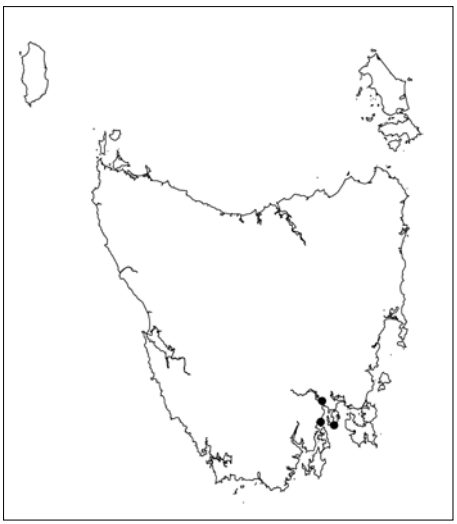

Fig. 22. Distribution of *Senecio phelleus*.

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

(Fig. 22)

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

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

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

(Fig. 23)

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

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

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

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

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

This variety grows to 0.8 m, and is erect or sprawling. It is currently only known from the Bass Strait islands including some small and close to shore islands off the north-east coast. This variety is distinctive because of its much-dissected leaves, succulent branches (generally quite flattened after pressing), and congested corymbiform inflorescences that are held only a short distance above the often congested upper-branch leaves. Ligules are relatively short, not or hardly longer than the involucre in pressed specimens, and achenes are relatively short compared to those of var. *pinnatifolius* and var. *alpinus*. Although always finely dissected, there is variation from long filiform primary and secondary segments to those with smaller intricately divided often tri-pinnatisect leaves with segments rather crowded. Forms of var. lanceolatus with bi-pinnatisect leaves, some of which occur on the Bass Strait islands, resemble var. *capillifolius* but these forms have different phyllary morphology, their upper-stem region and inflorescences are less congested, and the ligules are longer than the involucre.

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

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

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

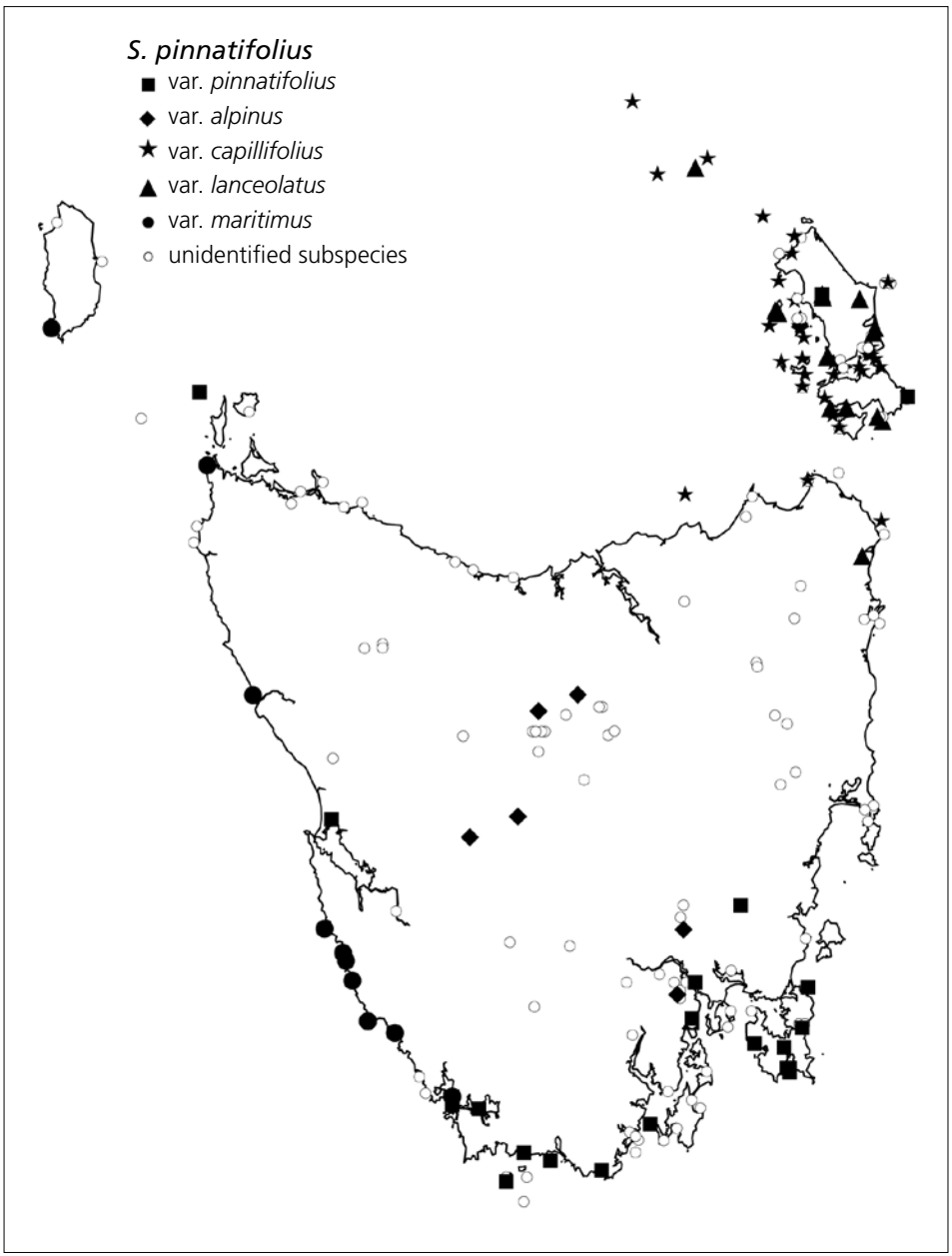

Fig. 23. Distribution of *Senecio pinnatifolius*.

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

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

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

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

This variety grows to 0.4 m and is sprawling to prostrate. It is restricted to the west coast and King Island. *Senecio pinnatifolius* var. *maritimus* can be difficult to distinguish from var. *lanceolatus* and var. *pinnatifolius*. Compared to the mainland form of var. *maritimus*, the Tasmanian form has uppermost leaves more dilated basally, smaller calycular bracteoles and differently coloured achenes (olive-brown and golden rather than reddish and brown). The var. *maritimus* can be difficult to distinguish from *S. spathulatus* var. *spathulatus*, which occupies similar coastal habitats (see also comments under *S. spathulatus*, 19a). *Senecio pinnatifolius* var. *maritimus* differs from coastal forms of var. *pinnatifolius* that are widespread along the east coast of Australia including Tasmania, by having fleshier leaves, generally fewer leaf segments (if present) and with a lower length:width ratio, shorter achenes relative to the length of the phyllaries, and of upper-branch leaves (excluding any segments) broader near the base and never developing strap-like basal segments.

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

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

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

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

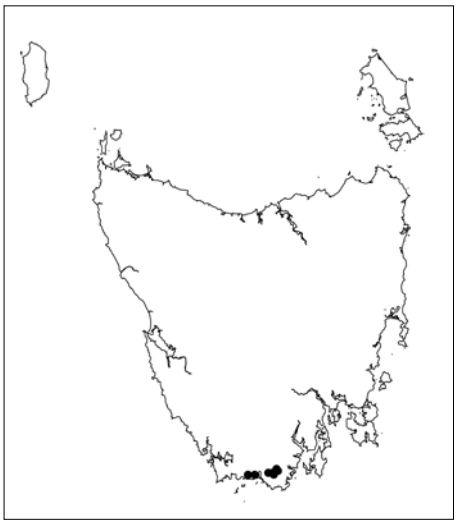

Fig. 24. Distribution of *Senecio primulifolius*.

Senecio primulifolius F.Muell., *Trans. Philos. Inst. Vict.* 2: 69 (1857)
'showy alpine groundsel'
(Fig. 24)

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

Senecio psilocarpus Belcher & Albr., *Muelleria* 8: 113 (1994)
'swamp fireweed' (Fig. 25)

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

Senecio psilocarpus most closely resembles *S. squarrosus* but has a sparser indumentum, shorter capitula and glabrous achenes. The two species have a similar distribution but *S. psilocarpus* has a stronger preference for aquatic habitats. It has been recorded from herb-rich wetlands. Associated with its aquatic nature, *S. psilocarpus* can develop long underground 'rhizomes' or decumbent stems that root at the nodes with stems arising from these horizontal structures to emerge above the surface of the water. This extensive growth habit has not been observed in *S. squarrosus* (Belcher and Albrecht 1994). Belcher and Albrecht (1994) also suggested that the smell

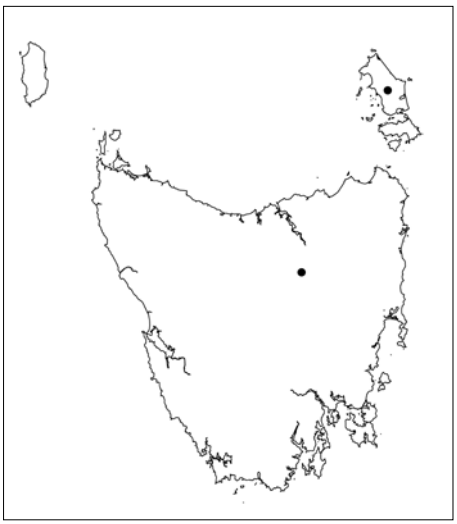

Fig. 25. Distribution of *Senecio psilocarpus*.

emanating from bruised leaves (carrot-like in *S. psilocarpus*; tomato-like in *S. squarrosus*) may distinguish the species, but this has not been assessed by the authors.

Senecio prenanthoides A.Rich., *Voy. Astrolabe* 2: 96 (1834) 'common fireweed' (Fig. 26)

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

This is one of several species forming a rosette of leaves until the phase of rapid elongation leading up to flowering. As flowering commences, leaves tend to be relatively crowded and are significantly broader in the lower half of the plant. In this respect, as well as in the type of leaf indumentum and capitular dimensions, *S. prenanthoides* is similar to *S. phelleus* but differs from that species by having slightly tuberiform roots, basal regions of stems with coarse hairs, auricles when present not sagittate or amplexicaul, phyllaries sometimes fewer and usually finally reflexed, and achenes longer and lageniform. The leaf shape in *S. prenanthoides* is diverse but most characters are very consistent.

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

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

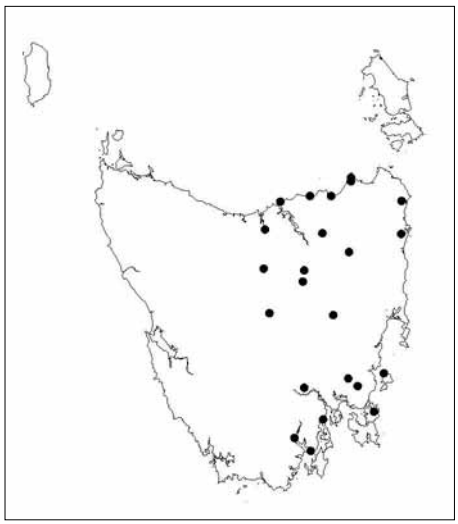

Fig. 26. Distribution of *Senecio prenanthoides*.

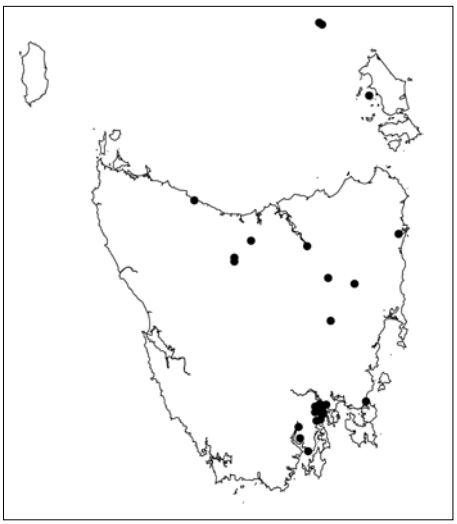

Fig. 27. Distribution of *Senecio quadridentatus*.

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

Senecio squarrosus A.Rich., *Voy. Astrolabe* 2: 107 t.35 (1834) 'leafy fireweed' (Fig. 28)

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

Senecio spathulatus A.Rich., *Voy. Astrolabe* 2: 125 (1834) var. ***spathulatus*** 'dune groundsel' (Fig. 29)

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

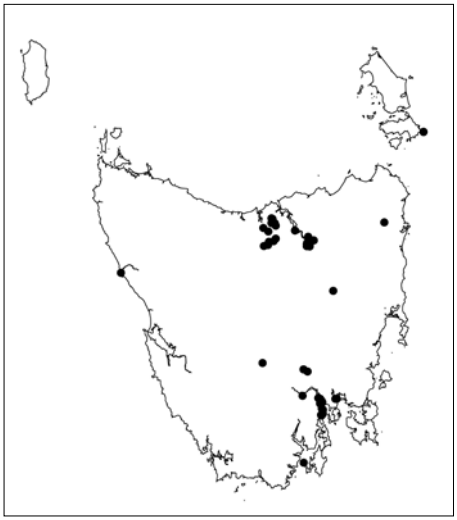

Fig. 28. Distribution of *Senecio squarrosus*.

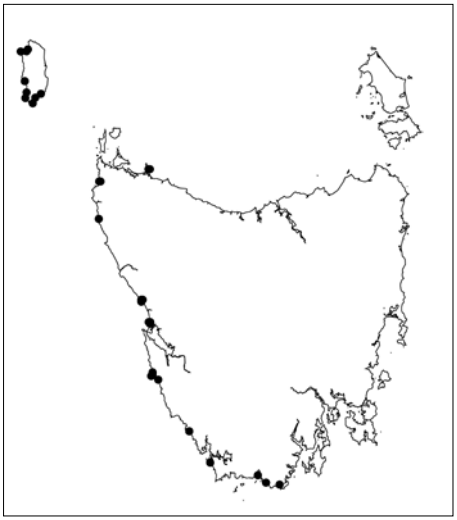

Fig. 29. Distribution of *Senecio spathulatus*.

hybridises with *S. pinnatifolius* var. *maritimus*, but appears restricted to frontal dunes and shifting sands, unlike the latter.

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

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

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

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

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

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

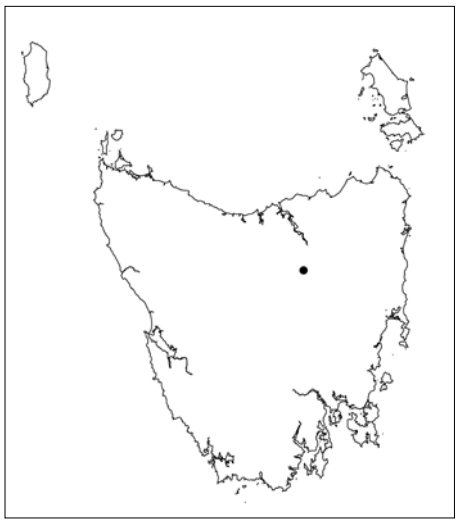

Fig. 30. Distribution of *Senecio tasmanicus*.

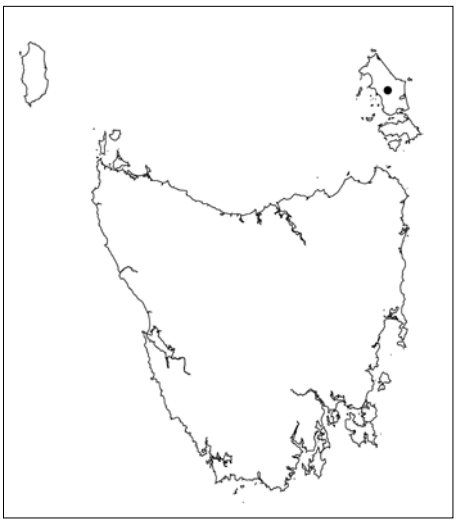

Fig. 31. Distribution of *Senecio vagus*.

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

Senecio velleioides A.Cunn. ex DC., *Prodr.* 6: 374 (1838) 'forest groundsel' (Fig. 32)

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

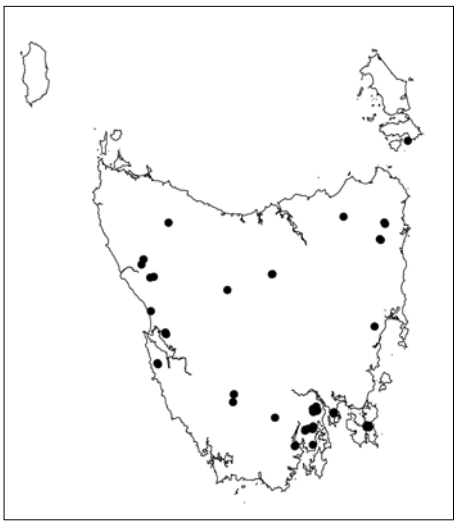

Fig. 32. Distribution of *Senecio velleioides*.

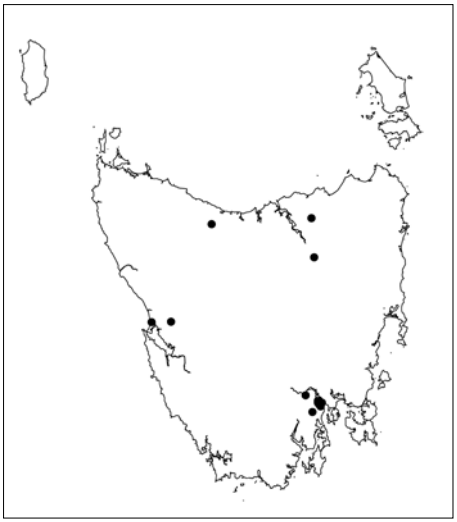

Fig. 33. Distribution of *Senecio vulgaris*.

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

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

DEFINITION AND ILLUSTRATION OF TERMS

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

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

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

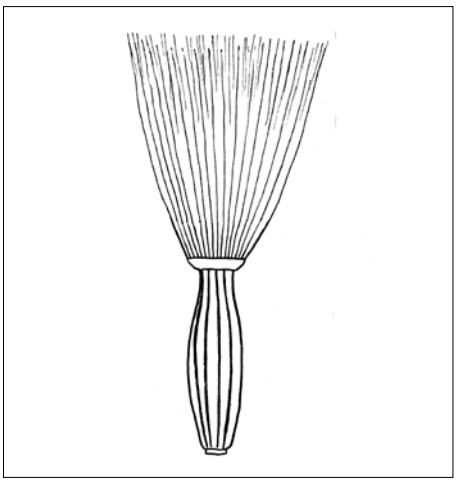

Fig. 34. General achene morphology showing (from bottom to top) carpopodium, body with longitudinal ribs, pappus ring and pappus.

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

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

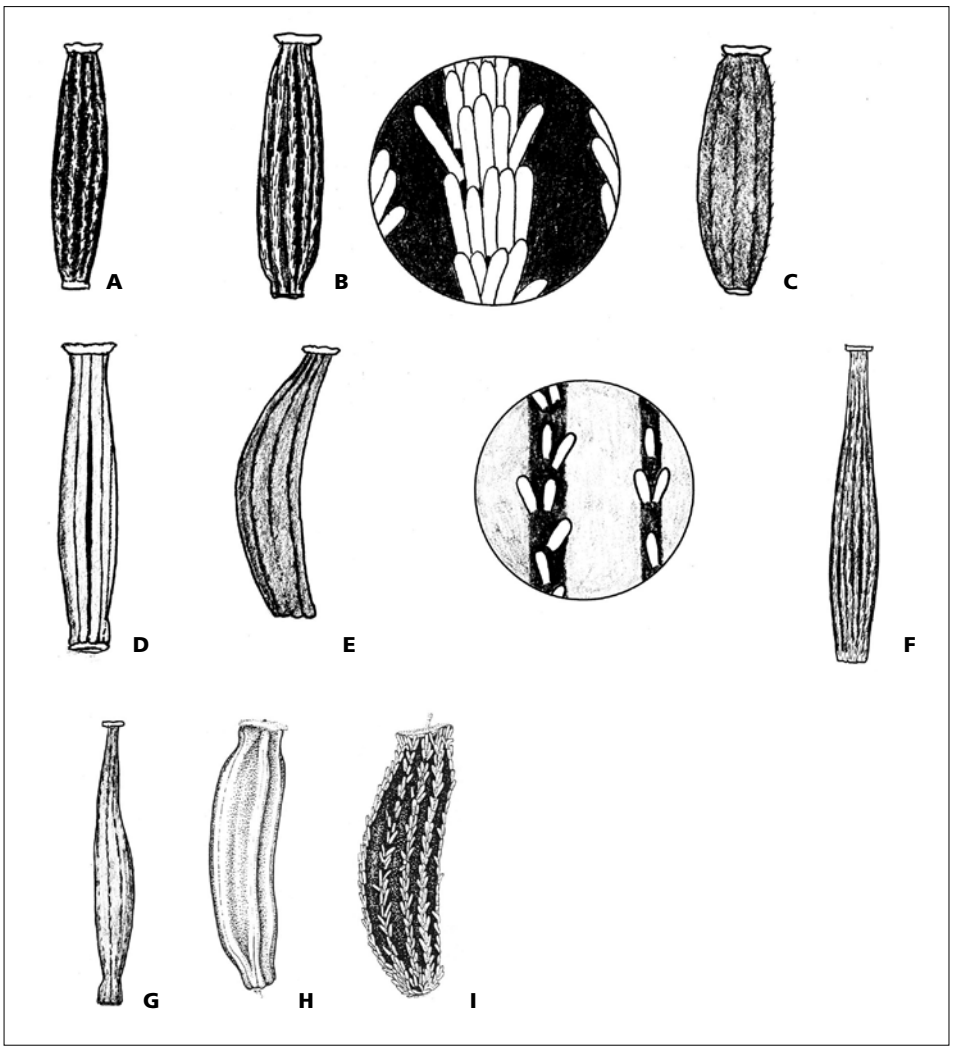

Fig. 35. Detailed achene morphology (**A–H** adapted from Thompson 2004a; **I** from Belcher and Albrecht 1994). **A.** Narrow oblong-ellipsoid with papillose hairs in dense bands (*S. biserratus*). **B.** Narrow-obloid to narrow oblong-ellipsoid, hairs scattered or in dense bands (*S. phelleus*). **C.** Narrow-obloid to narrow-ellipsoid with relatively fine papillose hairs in lines or somewhat scattered (*S. hispidulus*). **D.** Narrow oblong-ellipsoid, glabrous (*S. gunnii*). **E.** Lageniform, the most curved achene of the disciform species, close-up of lines of short papillose hairs (*S. campylocarpus*). **F.** Lageniform with papillose hairs in dense bands (*S. macrocarpus*). **G.** Lageniform, extremely attenuate apically (*S. tasmanicus*; note that *S. prenanthoides* and *S. quadridentatus* have the same lageniform shape but with a shorter neck). **H.** Narrow-obloid, glabrous (*S. psilocarpus*). **I.** Narrow-obloid with papillose hairs in dense bands (*S. squarrosus*).
Not to scale

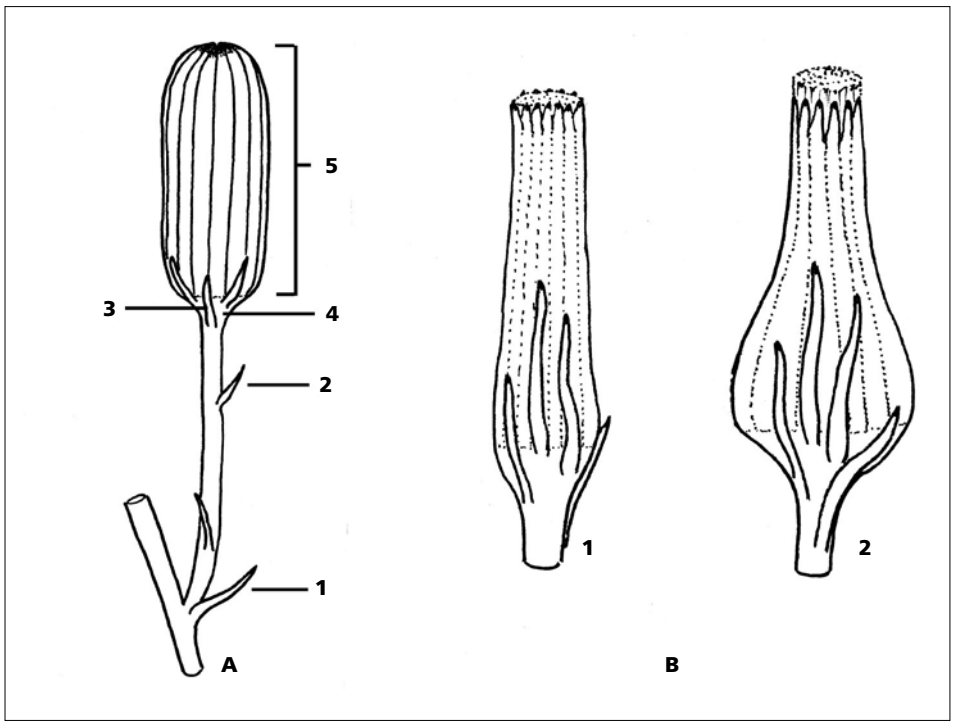

Fig. 36. A. Capitulum and peduncle: **1.** peduncular bract; **2.** peduncular bracteole; **3.** calycular bracteole; **4.** receptacle; **5.** involucre. **B.** Capitulum shape change through time: **1.** just prior to anthesis (flowering); **2.** bulging basally towards fruit maturity.

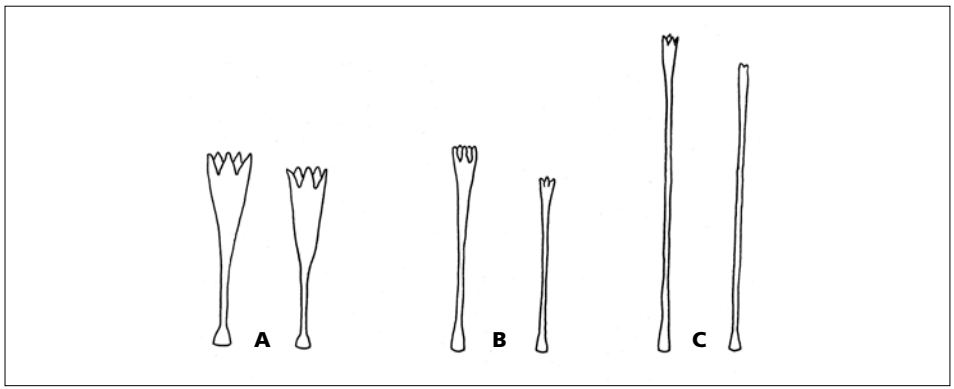

Fig. 37. Tubular florets: corollas of central (left) and outer (right) florets: **A.** A discoid species (*S. odoratus*). **B–C.** Two disciform species, *S. hispidulus* (**B**) and *S. dolichocephalus* (**C**). Note: corollas of *S. quadridentatus* are similar but slightly shorter than those of *S.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

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

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

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

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

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

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

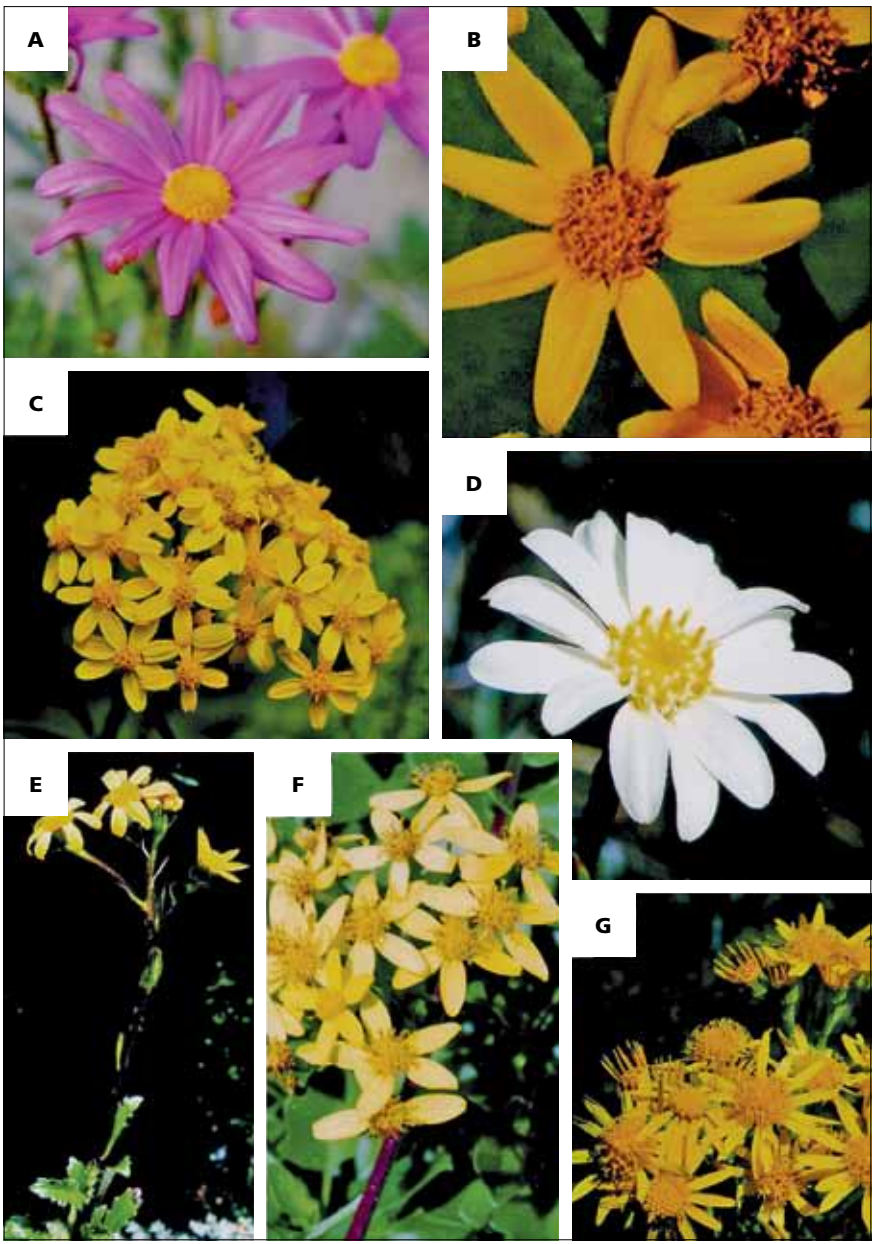

Fig. 38. Capitula of various species of *Senecio*. Radiate capitula: **A.** *S. elegans*. **B.** *S. velleioides*. **C.** *S. linearifolius* var. *linearifolius*. **D.** *S. albogilvus*. **E.** *S. leptocarpus*. **F.** *S. angulatus*. **G.** *S. jacobaea*. NOT TO SCALE

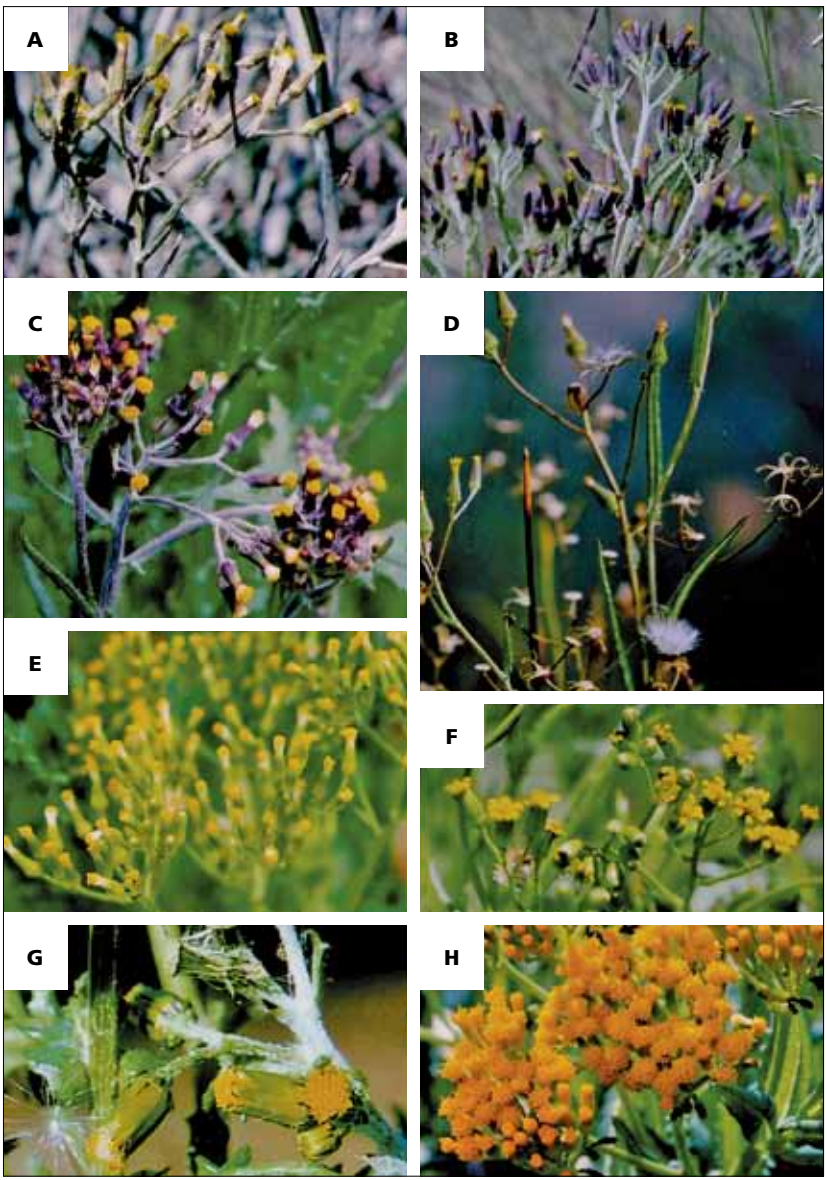

Fig. 39. Capitula of various species of *Senecio*. Disciform capitula. **A.** *S. quadridentatus*. **B.** *S. gunnii*. **C.** *S. glomeratus* subsp. *glomeratus*. **D.** *S. campylocarpus*. **E.** *S. biserratus*. **F.** Hybrid between radiate and disciform species (possibly *S. biserratus* or *S. minimus*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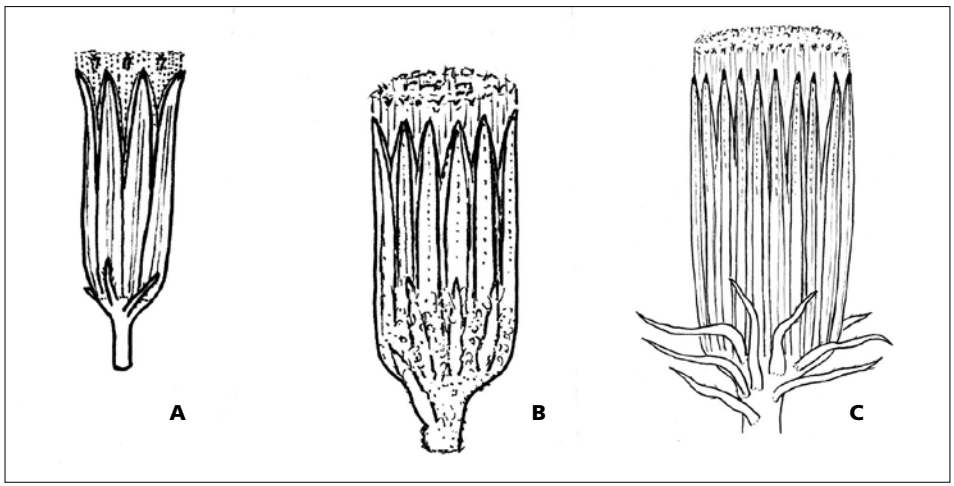

Fig. 40. Disciform capitula (examples drawn from pressed material). **A.** Involucre of c. 8 phyllaries (*S. minimus*). **B.** Involucre of c. 13 phyllaries (*S. glomeratus* subsp. *glomeratus*: note basal woolliness). **C.** Involucres of c. 20 phyllaries (*S. macrocarpus*: note spreading calycular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

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

Inflorescence: Although technically a *capitulum* is an inflorescence (a group or clustered arrangement of flowers), in the daisy family the term inflorescence usually refers to the arrangement of groups of capitula. A unit inflorescence is a cluster of capitula at the end of an axis where all associated branch structures are leafless (Fig. 42). A primary inflorescence is a unit inflorescence terminating a stem (in some rosette-leaved species, a single unbranched stem with one or more capitula form the unit inflorescence). Secondary inflorescences commonly develop on leafy branches that arise immediately below the base of the primary inflorescence. Overtopping is used to describe inflorescences where lateral capitula or clusters extend above the central capitulum or cluster. This architecture is common among the *disciform* species and is variable in extent depending on the species.

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

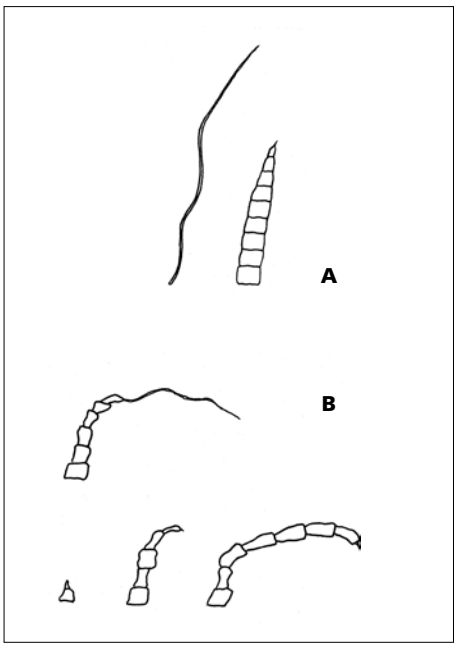

Fig. 41. Indumentum. **A.** Fine hair (left) and coarse, septate hair (right). **B.** Coarse hairs showing variation in length and degree of wispy extension (hairs desiccated and variously collapsed and crumpled as seen in herbarium specimens). (x 30).

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

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

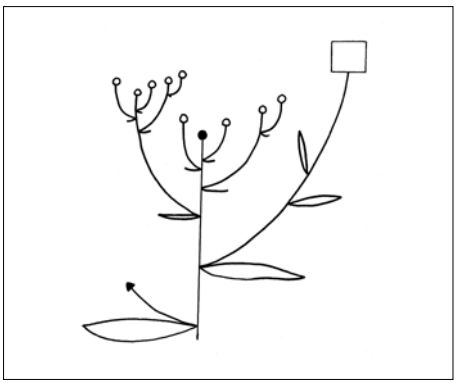

Fig. 42. Inflorescence architecture. The primary unit inflorescence with capitula represented by circles and the initial capitulum shown as a closed circle. A secondary inflorescence, defined by presence of leaves, is also shown (cluster of capitula represented by a square). Moderate overtopping is demonstrated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

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

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

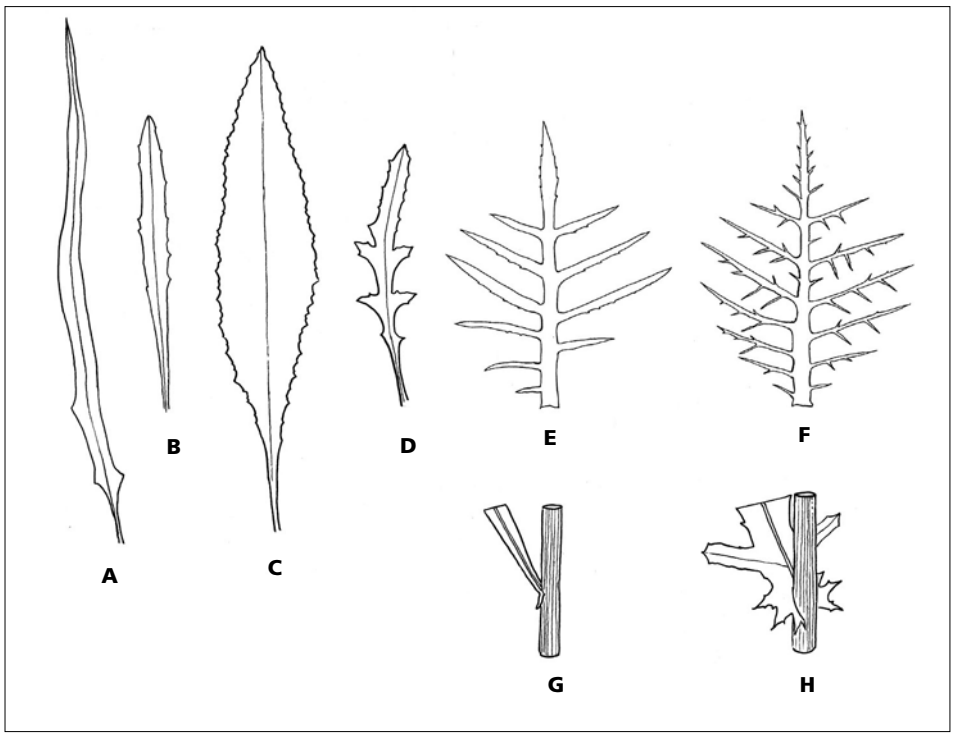

Fig. 43. Leaf outlines (leaves from midstem region x 0.5; basal auricles not included except as indicated (**G–H**). **A.** Undivided except for a few proximal lobes, margins entire (*S. phelleus*). **B.** Undissected, margin scattered-denticulate (*S. prenanthoides*). **C.** Undissected, margin crowded-denticulate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

oval like a flattened circle), ovate (egg-shaped, broadest in the proximal half), lanceolate (three or more times as long as broad, broadest in the proximal half), linear (very narrow in relation to length, with the sides mostly parallel), oblanceolate (reverse lanceolate, attached by the narrower end), and spathulate (spoon-shaped, broad at the tip and narrowed towards the base). The terms narrow and broad are often used to further qualify leaf shape. The term length:width ratio (l:w ratio) refers to the ratio between the length of the leaf measured from apex to base of petiole and width measured at right angles to the axis at the widest points (several leaves should be measured to obtain an average l:w ratio).

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

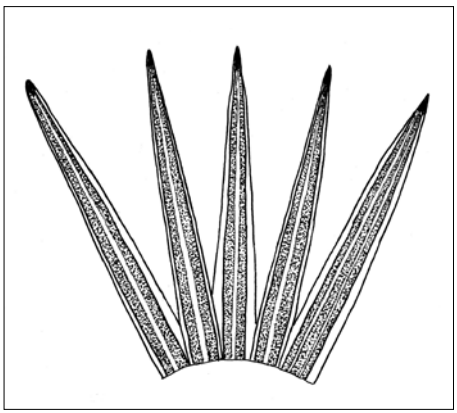

Fig. 44. Phyllary morphology: five consecutive phyllaries of an involucre demonstrating the three major types of phyllary. From right to left: inner (margin broad, stereome with two resin ducts); outer (margin narrow, stereome with one resin duct); inner (stereome with only one resin duct); outer and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

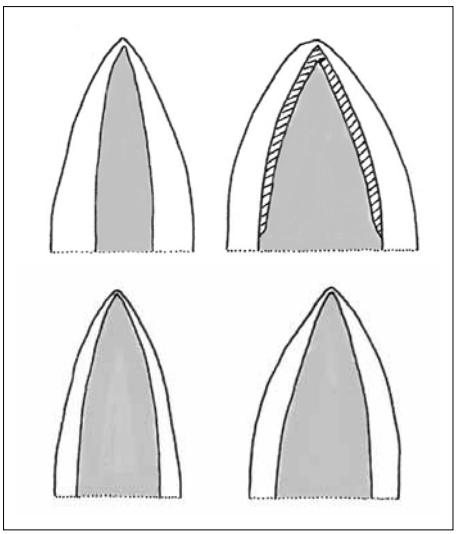

Fig. 45. Distal portion (c. 1 mm) of outer (left hand side in each pair) and inner (right hand side in each pair) phyllaries of *S. pinnatifolius* var. *lanceolatus* (above) and var. *pinnatifolius* (below).

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

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

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

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

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

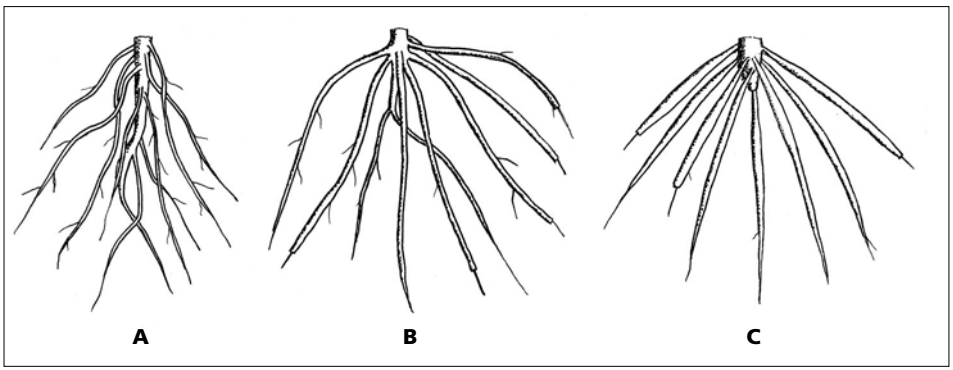

Fig. 46. Root systems. **A.** Taproot well-developed, stouter than secondary roots (*S. hispidulus*). **B.** Taproot slender, not stouter than fleshy secondary roots (*S. phelleus*); **C.** Taproot slender or lost, secondary roots very fleshy and slightly tuberiform (*S. prenanthoides*). (x 0.5).

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

Phyllaries (Fig. 44)**:** The specialised bracts surrounding the florets of a *capitulum*. Collectively they form the *involucre*. Phyllaries consist of an herbaceous lamina (the stereome) which is tinged green or purple and a hyaline (thin, translucent, colourless) margin. One or two longitudinal resin ducts are usually evident in stereomes. Phyllaries overlap along these margins and so can be categorised as inner phyllaries or outer phyllaries. As well, intermediate phyllaries occur in many involucres; they are half and half with the margin on one side overlapping and on the other being overlapped. In *S. pinnatifolius* in particular it is important to recognise these distinctions. Notably, in *S. pinnatifolius* var. *lanceolatus*, there is an inverted V-shaped pigmentation mark delineating the distal portion of the stereome of the inner phyllaries. This mark is termed a chevron herein (Fig. 45).

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

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

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

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

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

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

Acknowledgments

Hans and Annie Wapstra made useful comments on earlier versions of the manuscript, collected fresh specimens to test the key, and kindly allowed use of their excellent colour photographs. All line drawings, except as indicated in captions, are by Ian Thompson and have appeared in his previous manuscripts as cited in the references. Kim Hill extracted data records from the Tasmanian Herbarium. The anonymous referees commented on an earlier version of the manuscript.

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SHORT COMMUNICATION

THE SIGNIFICANCE OF 'H' IN WILLIAM H ARCHER IN AUSTRALIAN HERBARIUM COLLECTIONS

Anita Hansen

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Anita Hansen, School of Art, University of Tasmania,
Private Bag 57, Hobart, Tasmania, 7001, Australia

Recent research by the author (Hansen 2007) into the botanical legacy of William Archer indicates that confusion exists regarding the correct citation of his specimens held at the Tasmanian Herbarium (HO) and the National Herbarium of New South Wales (NSW). The confusion relates to the addition of a middle initial 'H' to collections made by William Archer.

William Archer (1820–1874) was born in Launceston, Tasmania, and is acknowledged as the first Australian-born botanist and botanical illustrator.

In the late 1850s William Archer travelled to England to work with Sir Joseph Dalton Hooker on *Flora Tasmaniae* (1860), to which he contributed extensively both as a botanist and as an illustrator. When Archer travelled to England he took with him a substantial herbarium of Tasmanian plants and it was this herbarium, as well as the herbarium at the Royal Botanic Gardens, Kew, that Hooker referred to when compiling *Flora Tasmaniae*. While working with Hooker, Archer added to his herbarium from the collection at Kew. He took this expanded herbarium back to Tasmania on his return in 1860.

On Archer's death in 1874 his main herbarium was sold as part of his estate. Although efforts were made to have the Government of Tasmania buy the collection – Hooker (Royal Society Archives [RSA]/E/12), William Spicer (RSA/H/12) and the Council of the Royal Society of Tasmania corresponded with the Government attesting to the importance of this herbarium to the state – it was considered to be too expensive at the time. Hooker eventually purchased Archer's herbarium and it became a part of the Kew Herbarium collection (Brummitt *et al.* 2004).

A significant number of William Archer's specimens, probably duplicates, remained in Tasmania. These specimens, as well as collections by Gunn and others, were sent to NSW in Sydney, possibly by the Royal Society of Tasmania, in the early 1900s. There is no record in the *Papers and Proceedings of the Royal Society of Tasmania* (for the years 1902–1912) that provides a date for the transfer of the specimens. Karen Wilson (NSW) wrote on 4 August 2006:

> … I have not been able to find any information about exactly when the W.H. Archer specimens came to us in

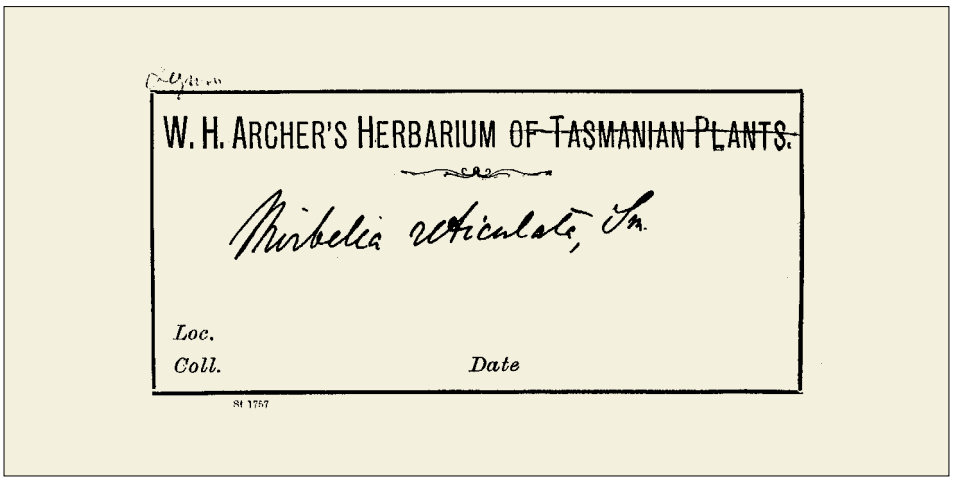

Fig. 1. Example of Tasmanian Herbarium label 'W.H. Archer's Herbarium of Tasmanian Plants'.

any of the publications in our library. The annual reports during the period that J.H. Maiden was director are very detailed as to receipt of specimens but I couldn't find an entry for Archer (nor for Gunn or Milligan) – there are several for Leonard Rodway[1] having sent usually smallish numbers of specimens variously as gifts or exchange … Our specimen database shows that there are 950 specimens databased as coming from William or William H. Archer … The Archer specimens that I have seen have printed labels (Fig. 1).

Following their arrival in Sydney, new labels were printed for the specimens and were headed 'William H. Archer', and all subsequent citations followed this form, with the 'H' included. A number of specimens were later returned to Tasmania bearing the printed NSW labels and these form the Archer collection at HO. The remainder are still housed at NSW.

An examination of the handwriting[2] on the labels of the specimens in HO and NSW clearly shows the specimens are those of William Archer. This labelling error has caused confusion in the past, and has resulted in William Archer being incorrectly cited as W. H. Archer in both Jones *et al.* (1999) *The Orchids of Tasmania* and the Australian National Botanical Gardens website.

There are three other William Archers who were active at about the same time as William Archer (1820–1874). It seems likely that one of these naturalists and/or botanists may have inadvertently been confused with William Archer (1820–1974).[3]

Stafleu and Cowan (1976) and Brummit and Powell (1992) cite a William Archer (1830–1897) from Dublin, Ireland, who was a botanist, librarian and microscopist but he is not known to have collected in Australia and is therefore not relevant to this study.

Two other William Archers, both with a middle initial 'H', were naturalists in Australia. William Henry Archer (1825–1909) was born in England and arrived in Victoria at the end of 1852 and was a corresponding member (whose address was given as Melbourne) of the Royal Society of Tasmania for many years (*Papers and Proceedings of the Royal Society of Tasmania* 1867–1869).

William Henry Davies Archer (1836–1928) was born in Longford, Tasmania, the son of William Archer of Brickendon; William Archer's uncle (1820–1874). W.H.D. Archer was a member of the Tasmanian Parliament, as was William Archer (1820–1874). W.H.D. Archer was also a member of the Royal Society of Tasmania (in the early 1900s), about the time the herbarium specimens were sent to NSW (*Papers and Proceedings of the Royal Society of Tasmania* 1902–1912).

There is nothing known about the contribution of either W.H. Archer or W.H.D. Archer as either botanists or botanical collectors and it seems that they were minor contributors, if at all, to herbaria in Australia. Maiden (1910) does not mention either W.H. Archer or W.H.D. Archer in his paper on Tasmanian botanists and Brummitt and Powell (1992) do not refer to either of them, which suggests they did not name any new taxa, nor were taxa named after them.

It seems likely, therefore, that probably all of the collections that have been labelled as William H. Archer at both NSW and HO were collected by the William 'without the H' Archer – the first Australian-born botanist and botanical illustrator (1820–1874). The use of the middle initial for the William Archer specimens in HO and NSW is therefore incorrect. It is hoped this note will resolve the confusion surrounding the appropriate citation for William Archer. It should also help clarify Archer's contributions to the study of the Tasmanian flora.

Endnotes

1 Leonard R Rodway (1853–1936). Honorary Government Botanist 1896–1932. Honorary Curator of the Tasmanian Museum Herbarium 1928–1932.

2 Examples of Archer's handwriting from his diaries held at the Royal Society of Tasmania (Archer, W *Diaries 1847–74*, 61–1,) and notes on his orchid illustrations held at the Tasmanian Museum and Art Gallery were compared.

3 Stafleu and Mennega (1992) cause further confusion by indicating that *Archeria* was named after Thomas Croxen Archer (1817–1885). This genus was named after William Archer (1820–1874), as correctly indicated in Stafleu and Cowan (1976).

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