

# Robert Brown and the naturalised flora of Australia

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Robert Brown noted 29 introduced plant species around Sydney and Parramatta between 1802 and 1804. The list, contained in Brown's miscellaneous papers, was not published by Brown at the time of writing but had to wait for James Britten to publish it in 1906, along with Brown's accompanying notes in Latin. In 1909 Maiden re-published the list for an Australian audience and in 1916 he translated the notes into English and updated the nomenclature of some species.

Brown's list represents the first documentation of Australia's naturalised flora following European settlement of Australia's east coast. Although several of the 29 introduced plant species listed were not considered 'weeds' at the time, most of the 29 have spread subsequently to become common components of the naturalised flora throughout Australia. Nomenclature and current distribution of these 29 species are presented in the context of the approximately 2800 taxa now comprising the *naturalised flora of Australia*.

## Introduction

In the course of his travels in and around Australia between 1801 and 1805, Robert Brown collected many plant species not previously known. The extent of those collections and their subsequent determination and naming were central to establishing the systematic study of the Australian flora as a distinct and fascinating field of scientific endeavour. Two hundred years after his arrival with Flinders, Good and Bauer, the results of Robert Brown's time in Australia are indeed worthwhile celebrating. Whilst Brown's collection of indigenous plants is what is rightly noted, it is little known and even less appreciated that he also observed some European plants while he resided in the Sydney region for several periods between 1802 and 1804. These European species presumably had been introduced to Sydney in the 14 years since 1788 as seed contaminants in soil, stock feed and crop seed supplies from England or, in the case of four crop species, deliberately (Frost 1993). Already by 1804, some of these species had begun to interfere with cropping and gardening in the embryonic settlements of Parramatta and Sydney and many may be considered as Australia's first weeds.

This contribution draws attention to the 29 introduced plant species recorded by Robert Brown and updates their nomenclature and current distributions. Two hundred years later, Brown's group of species comprises some major weeds of agricultural and natural ecosystems, even though it represents only about one hundredth of the total known number of naturalised plant species now present in Australia.

## Robert Brown's list of introduced plants of the Sydney region, 1802–4

During his collecting trips around Sydney, Brown noted some plants familiar to him from his British background. The names of the plants so noted were not published but remained among the '74 folios of Brown's notes (B8.2) at the Natural History Museum ... ' in London (Moore et al. 2001). The list in Latin was published by James Britten about 100 years later (Britten 1906). In this list (Table 1), the identity of two species was queried. There were no specimens from Brown of *Lepidium didymum* (*Senebiera didyma*) in the Herbarium. Britten could find no mention of *Malva capensis* (*Malvastrum capense*) elsewhere as an introduced plant; in addition, there were no specimens from Brown, nor any reference to it in his manuscripts. This particular plant was collected in 'the town of Sydney near D. Chapman's house' (Maiden 1916). The taxonomic identity of these two taxa remains questionable and they are indicated by question marks in the original list (Britten 1906), as well as in Table 1.

**Table 1.** *Plantae introductae vicinitatis Portus Jackson.* Robert Brown's list of introduced plants at Sydney 1802–4 as published by Britten (1906).

*Plantago major.* Ubique ad margines viarum.

*Nicotiana Tabacum.* In ruderalis et ad vias prope Sydney.

*Datura.* In ruderalis ad Sydney et Parramatta.

*Solanum sodomium*

*Physalis pubescens*

*Asclepias fruticosa*

*Daucus Carota*

*Apium graveolens*

*Silene anglica.* Prope Sydney.

*Lythrum hyssopifolium.* Ad vias prope Sydney.

*Euphorbia Peplus.* In hortis ubique.

*Fragaria vesca*

*Stachys arvensis.* Prope Sydney.

*Erodium moschatum.* Ad Parramatta.

? *Lepidium didymum.* Ubique ad vias.

*Vicia sativa*

? *Cotula coronopifolia*

*Malva capensis.* Ad oppidum Sydney prope domum D. Chapman.

*Poa annua*

*Panicum Dactylon*

*Phalaris canariensis*

*Lolium temulentum.* In agris frequens vitium.

*Lolium perenne.* Rarius ad vias.

*Briza virens* [*minor*]. Prope domum Gubernatoris ad Sydney.

*Anagallis caerulea.* Prope domum D. Caley ad Parramatta.

*Scleranthus annuus.* In hortu D. Caley.

*Cerastium vulgatum.* In hortu D. Caley.

*Anagallis arvensis.* In vicinitate Sydney.

*Urtica urens.* In ruderalis, &c., prope Sydney.

Maiden subsequently re-published the list, first in Latin (Maiden 1909) and subsequently in English (Maiden 1916), for a local audience and noted that, 'It is a fragment, with no pretence at completeness, but is a valuable record of weed introduction' (Table 2 from Maiden 1916). Maiden added some extra notes in brackets and suggested (correctly?) that the listing of *Scleranthus annuus* as occurring in Mr Caley's garden at Parramatta was, 'perhaps a mistake, as this species has not been recorded lower down than the Blue Mountains' (Maiden 1916). The present known distribution of *Scleranthus annuus* is confined, however, to the Northern Tablelands and the Northern and Southern Far Western Plains (Harden 1990), so that the real identity of Brown's taxon is now even less clear.

**Table 2.** Introduced plants at Sydney 1802–4. Robert Brown's list as published by Maiden (1916), with Maiden's notes in brackets.

*Plantago major*, everywhere by roadsides (Large-leaved Plantain).  
*Nicotiana Tabacum*, on rubbish-heaps and by roadsides near Sydney (Tobacco).  
*Datura*, on rubbish-heaps between Sydney and Parramatta (*Stramomium*, J.H.M., The Thorn Apple).  
*Solanum sodomium* (The common prickly Apple of Sodom).  
*Physalis pubescens* (*P. peruviana*, the Cape Gooseberry).  
*Asclepias fruticosa* (*Gomphocarpus fruticosus*, the Silk-cotton bush).  
*Daucus Carota* (Wild Carrot)  
*Apium graveolens*  
*Silene anglica*, around Sydney (*S. gallica*, the Catchfly).  
*Lythrum hyssopifolium*, along roads around Sydney.  
*Euphorbia Peplus*, everywhere in gardens.  
*Fragaria vesca* (Wild Strawberry).  
*Stachys arvensis*, near Sydney (Stagger Weed).  
*Erodium moschatum*, at Parramatta (Musky Crowfoot or Cranesbill).  
 ?*Lepidium didymum*, everywhere by roadsides (Pepper Weed).  
*Vicia sativa* (Vetch).  
 ?*Cotula coronopifolia*.  
*Malva capensis*, in the town of Sydney near D. Chapman's house (*Malvastrum capense*. Evidently a mistake).  
*Poa annua*.  
*Panicum Dactylon* (*Cynodon dactylon*, the Couch Grass).  
*Phalaris canariensis* (Canary Grass).  
*Lolium temulentum*, a frequent pest in fields (Darnel).  
*Lolium perenne*, somewhat rare on roads (Rye Grass).  
*Briza virens (minor)*, near Government House, Sydney (Nodding Grass).  
*Anagallis coerulea*, near Mr. Caley's house at Parramatta. (He was Sir Joseph Banks' collector in New South Wales, 1800–10. See the *Gazette* for 1903, p. 988. Blue Pimpernel.)  
*Scleranthus annuus*, in Mr. Caley's garden. (Perhaps a mistake, as this species has not been recorded lower down than the Blue Mountains.)  
*Cerastium vulgatum*, in Mr. Caley's garden (Mouse-ear Chickweed).  
*Anagallis arvensis*, round about Sydney (Scarlet Pimpernel).  
*Urtica urens*, on rubbish heaps, &c., around Sydney (the Small Nettle).

The nomenclature of the species on both Brown's and Maiden's lists has been updated in Table 3, based largely on Harden (1990–1993), although a few queries remain as to the true identity of several taxa. Whatever Brown listed as *Lythrum hyssopifolia* and *Cotula coronopifolia*, each is now considered to be native (Harden 1991), as is some material of *Cynodon dactylon* by certain herbaria (B. Lepschi pers. comm.). The identity of Brown's *Fragaria vesca* as Wild Strawberry remains

somewhat uncertain, and Maiden's query regarding *Scleranthus annuus* in Caley's garden at Parramatta persists. The taxa *Anagallis coerulea* and *Anagallis arvensis* (Blue and Scarlet Pimpernel respectively) are listed separately by Brown but are probably now best considered as infraspecific variants of *Anagallis arvensis* (see note in Harden 1990).

**Table 3.** The list of introduced plants collected by Robert Brown in the Sydney region between 1802 and 1804, with their taxonomy up-dated by Maiden (1916) and as in Harden (1990–1993), together with their present known Australian distributions.

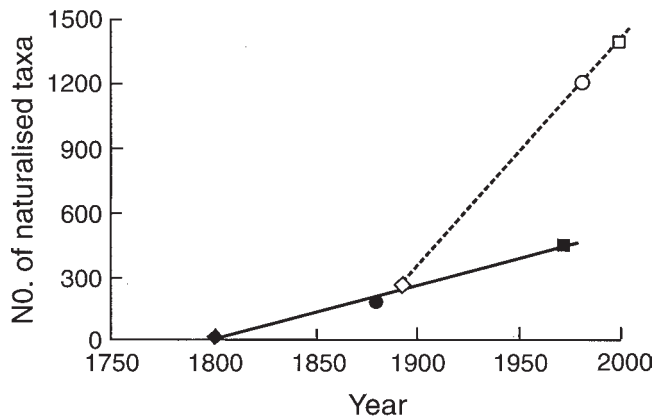
<b>R. Brown (1804)</b>	<b>J. Maiden (1916)</b>	<b>G. Harden (1990–1993)</b>	<b>Present Australian Distribution</b>
<i>Plantago major</i>	<i>P. major</i>	<i>P. major</i>	Qld, NSW, Vic., Tas., S.A., W.A.
<i>Nicotiana Tabacum</i>	<i>N. tabacum</i>	<i>N. tabacum</i>	Qld, NSW, Vic.
<i>Datura</i>	<i>D. stramonium</i>	<i>D. stramonium</i>	all States
<i>Solanum sodomeum</i>	<i>S. sodoneum</i>	<i>S. linnaeanum</i>	Qld, NSW, Vic., S.A., W.A.
<i>Physalis pubescens</i>	<i>P. peruviana</i>	<i>P. peruviana</i>	all States except N.T.
<i>Asclepias fruticosa</i>	<i>Gomphocarpus fruticosus</i>	<i>G. fruticosus</i>	Qld, NSW, Vic., S.A., W.A.
<i>Daucus Carota</i>	<i>D. carota</i>	<i>D. carota</i>	NSW, Vic., Tas., S.A., (W.A.)*
<i>Apium graveolens</i>	<i>A. graveolens</i>	<i>A. graveolens</i>	all States except Qld
<i>Silene anglica</i>	<i>S. gallica</i>	<i>S. gallica</i>	all States except N.T.
<i>Lythrum hyssopifolium</i>	<i>L. hyssopifolium</i>	<i>L. hyssopifolia</i>	all States except N.T.
<i>Euphorbia Peplus</i>	<i>E. peplus</i>	<i>E. peplus</i>	all States except Qld
<i>Fragaria vesca</i>	<i>F. vesca</i>	<i>F. vesca</i>	Qld
<i>Stachys arvensis</i>	<i>S. arvensis</i>	<i>S. arvensis</i>	all States except N.T.
<i>Erodium moschatum</i>	<i>E. moschatum</i>	<i>E. moschatum</i>	NSW, Vic., S.A., (W.A.)*
? <i>Lepidium didymum</i>	<i>L. didymum</i>	<i>Coronopus didymus</i>	all States except N.T.
<i>Vicia sativa</i>	<i>V. sativa</i>	<i>V. sativa</i>	NSW, Vic., Tas., S.A., W.A.
? <i>Cotula coronopifolia</i>	<i>C. coronopifolia</i>	<i>C. coronopifolia</i>	all States except N.T.
<i>Malva capensis</i>	<i>Malvastrum capense</i>	<i>M. americanum</i>	all mainland States
<i>Poa annua</i>	<i>P. annua</i>	<i>P. annua</i>	all States except N.T.
<i>Panicum Dactylon</i>	<i>Cynodon dactylon</i>	<i>C. dactylon</i>	all States
<i>Phalaris canariensis</i>	<i>P. canariensis</i>	<i>P. canariensis</i>	all States except N.T.
<i>Lolium temulentum</i>	<i>L. temulentum</i>	<i>L. temulentum</i>	NSW, Qld, S.A., W.A.
<i>Lolium perenne</i>	<i>L. perenne</i>	<i>L. perenne</i>	all States
<i>Briza virens</i>	<i>B. minor</i>	<i>B. minor</i>	all States except N.T.
<i>Anagallis coerulea</i>	<i>A. coerulea</i>	<i>A. arvensis</i>	all States except N.T.
<i>Scleranthus annuus</i>	? <i>S. annuus</i>	? <i>S. annuus</i>	?NSW, Vic., Tas.
<i>Cerastium vulgatum</i>	<i>C. vulgatum</i>	<i>C. fontanum</i> subsp. <i>vulgare</i>	NSW, Vic., Tas.
<i>Anagallis arvensis</i>	<i>A. arvensis</i>	<i>A. arvensis</i>	all States except N.T.
<i>Urtica urens</i>	<i>U. urens</i>	<i>U. urens</i>	all States

\*see Hussey et al. (1997)

From the present distributions of the 29 weeds that Brown listed, as given in Harden (1990–1993), it is clear that most of them have spread extensively since Brown noted them on his collecting trips around Sydney (Table 3). All taxa still occur in New South Wales and most have spread widely to other Australian states and territories. With the possible exception of what Brown called *Fragaria vesca*, all the other species now occur widely throughout the continent, with only two (the uncertain record of *Scleranthus annuus* and of *Nicotiana tabacum*) being confined to two states other than New South Wales (Table 3). Within New South Wales, most species occupy the coastal, tableland and western slopes regions, with ten species (viz. *Datura stramonium*, *Silene gallica*, *Lythrum hyssopifolia*, *Vicia sativa*, *Cotula coronopifolia*, *Malvastrum americanum*, *Poa annua*, *Cynodon dactylon*, *Anagallis arvensis* and *Scleranthus annuus*) also extending further inland as far as the Far Western Plains (Harden 1990–1993). Of the four cultivated species (*Apium graveolens*, *Daucus carota*, *Fragaria vesca* and *Nicotiana tabacum*) noted by Brown, all are known to have been deliberately imported to the embryonic colony between 1786 and 1798 by Sir Joseph Banks (Frost 1993). *Apium graveolens* is now recorded as naturalised in New South Wales from only two sites (the Picton–Campbelltown area to the southwest of Sydney and from near Lake Cargelligo, Harden 1993) but is recorded currently from all Australian states except Tasmania. Whilst *Daucus carota* is widely distributed throughout southern Australia, *Fragaria vesca* is naturalised only in southeastern Queensland (D. Jones, pers. comm.). *Nicotiana tabacum* is recorded as naturalised in Queensland, New South Wales and Victoria (J. Hosking, pers. comm.).

## Discussion

It is by no means certain that all 29 species recorded by Robert Brown had naturalised by 1804. They do, however, comprise the first records of the introduced flora of New South Wales, and thus of Australia. Specht (1981) showed for four Australian States (South Australia, Victoria, New South Wales and Queensland) that the rate of increase in the number of naturalised plant species was linear with time, with an average rate of almost six species a year. To obtain that rate of increase for the Sydney district (cf. New South Wales), Specht used the numbers of naturalised species recorded by Woolls (1880), by Moore and Betche (1893), and by Beadle et al. (1972). To these may be added the published records of Anderson (1939) and of Jacobs & Pickard (1981) for New South Wales as a whole, although the former specifically excludes grasses. With a yearly increase in the number of naturalised species in New South Wales at about six species per year, Robert Brown's records for the first 16 years of settlement under-estimate the rate over the next 200 years, presumably because they were never meant to be a complete record. Currently, Hosking (pers. comm.) has records, based on vouchered herbarium specimens, for 1564 taxa as naturalised in New South Wales. We conclude that the number of naturalised species for both the Sydney region and for New South Wales has increased considerably since the first records of Robert Brown 200 years ago (Figure 1).



**Fig. 1.** Increases in the number of naturalised plant species in the Sydney region (solid line) and in New South Wales (dashed line), in relation to the 29 collected by Robert Brown between 1802 and 1804.

Many of the species listed by Robert Brown were also present in South Australia prior to 1855 (Kloot 1985) and at least 10 of the 29 were in Tasmania prior to 1878 (Rozeffelds et al. 1999). Whether these subsequent records were as a result of relatively rapid spread from introductions to Sydney or were separate introductions is not known. What is known, however, is that all the species listed by Robert Brown are now widespread in Australia (Table 1), with the possible exception of *Fragaria vesca*. They constitute a significant 1% of the 2795 naturalised taxa that currently have vouchered specimens in Australian herbaria (J. Hosking, pers. comm.).

Some of the plants recorded by Brown as native to the Sydney region, and considered thus by Bentham (1863–1878) in his *Flora Australiensis*, may now best be regarded as introduced. Some of Brown's species are now known to have cosmopolitan distributions, e.g. *Cotula coronopifolia*, *Sonchus oleraceus* and *Ludwigia peploides*, and possibly also *Pavonia hastata*. One species noted by Brown as introduced to Sydney is now considered to have both indigenous and introduced populations in the Sydney region, viz. *Cynodon dactylon* (Harden 1993). The modern methods of conservation genetics and systematics may help resolve the status of some of the species recorded by Brown, either in his list (Table 1), Prodrumus (Brown 1810), Appendix III in Flinders (1814), or in his diary (Moore et al. 2001).

The list of the introduced plants compiled by Robert Brown as occurring in the region of Sydney and Parramatta during his several stays in the area between 1802 and 1804 thus constitutes a valuable resource. The number of naturalised plant species in the Sydney region, as well as in New South Wales, has increased steadily since 1802 (Figure 1). Their geographic origin has changed from solely Britain to include species from many other regions and floras. The origins of the humans who have settled in the Sydney region have diversified greatly in recent years; in the same way so have the geographic origins of the weeds that interfere in some way with the activities of those many more humans living in Sydney than in the first years of settlement.

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