



Lobelia pachytricha (Campanulaceae; Lobelioideae), a new species from South Australia and Victoria

D.E. Albrecht¹ & N.G. Walsh²

¹ Australian National Herbarium, Centre for Australian National Biodiversity Research (a joint venture between Parks Australia and CSIRO), Canberra, ACT 2601, Australia; email: dave.albrecht@csiro.au

² Royal Botanic Gardens Victoria, Birdwood Avenue, Melbourne, Victoria 3004, Australia

Introduction

Lobelia pedunculata R.Br. is a widespread member of the 'creeping' lobelias, most of which were previously treated in Australia as *Pratia* (e.g. Toelken 1986, Ross 1996). As currently understood, it occurs from north-eastern New South Wales to south-eastern South Australia and is widespread in Tasmania. It occurs from near sea level to alpine areas of 1800 m elevation or more. Across its range there is considerable morphological variation, and some forms have been selected as ground-covers for the horticultural industry. Its cultivated range beyond Australia includes New Zealand, where it has become naturalised (Ogle *et al.* 2020), parts of Europe, North America and southern Africa. The morphological variation is complicated by dioecy within the species, with male plants generally having larger and sometimes more colourful flowers. A distinctive entity, usually included within the variation of *L. pedunculata*, occurs in the south-western part of the species' distribution and is characterised by generally brighter blue, and more strongly zygomorphic, fan-shaped corollas. It is further distinguished by the presence of short, thick hairs on the dorsal part of the anther tube. Although sometimes treated as distinct (e.g. Toelken 1986, Ross 1996), it has never been provided with a valid name, and is here formally recognised as a new species.

Abstract

Lobelia pachytricha is described and illustrated, and major differences between it and closely related species discussed. Typification of *Lobelia pedunculata* is discussed.

Keywords: Campanulaceae, Lobelioideae, Almanda Blue, wetlands, taxonomy

Methods

The descriptions presented herein are based on both fresh material and herbarium specimens. Hypanthium features were assessed at flowering stage. Corolla tube length was measured from the corolla base (where it becomes distinct from the hypanthium) to the sinuses between the three lobes of the lower lip, and thus includes the proximal part of the lower lip where the three lobes are fused. The length of the upper two corolla lobes was measured as the distance between the tip of the lobe and sinus between the upper (2-lobed) and lower (3-lobed) lips. The length of the lateral lobes of the lower lip was measured from the tip of the lobe to the sinus between the lateral and central lobes of the lower lip. The length of staminal filaments was measured from their junction with the hypanthium to the base of the anther tube.

Taxonomy

Lobelia pachytricha Albr. & N.G.Walsh sp. nov.

Pratia pedunculata sens. H.R.Toelken in J.P. Jessop & H.R. Toelken (eds), *Fl. South Australia* 3:1374 (1986), non R.Br.

Pratia sp. aff. *pedunculata* (South-west Victoria), J.H. Ross, *Census Pl. Victoria* edn 5: 58, 202 (1996)

Lobelia sp. South-western Victoria (A.C.Beauglehole 30495) [Census of South Australian Plants Algae and Fungi <http://flora.sa.gov.au/census.shtml> accessed Aug. 6 2021]

Type: AUSTRALIA. Victoria, Cordover (Red-gum) Swamp, Lower Glenelg National Park. 4 km south east of Drik Drik, 11.xii.2021, *D.S. Pitts DSP202101* (holo MEL 2518115; iso: AD, CANB)

Dioecious, mat-forming perennial herb. Stems prostrate to decumbent, glabrous, rooting at nodes, weakly ridged from decurrent leaf bases shortly below nodes. Leaves more or less distichous, alternate; lamina ovate, broadly elliptic, orbicular or rarely obovate, 2–13 mm long 1.5–10 mm wide, glabrous or rarely with occasional hairs to ca. 0.1 mm long; margins with 1–5 teeth on either side, each tooth with a minute translucent region at apex; apex obtuse to acute, base contracting gradually or abruptly to a petiole to 2.5 mm long, or petiole virtually absent. Flowers axillary, solitary, borne at irregular intervals along stem. Male and female flowers

superficially similar but females usually slightly smaller. Pedicels 3–100 mm long, glabrous, often recurved in fruit, a pair of rudimentary bracteoles to ca. 0.2 mm long sometimes present at base of pedicel. Hypanthium obconic to ellipsoid in female flowers (2.4–3.5 mm long, 1–2 mm diam.), obconical in male flowers (1–2 mm long, 1–1.5 mm diam.), glabrous, rarely scabridulous. Calyx lobes erect or spreading, triangular, 0.8–3 mm long, entire or with a rudimentary tooth on each side toward the base, glabrous. Corolla fan-shaped, 4–9 mm long (females 4–7.5 mm; males 5–9 mm), glabrous externally; lobes spreading or the tips slightly reflexed, elliptic to oblanceolate-obovate, overall blue to blue-mauve (sometimes very pale) on both surfaces, usually with a darker midvein, those of female flowers 2.0–4.5 mm long, upper lobes 1–2 mm wide, lower lobes 1–2.5 mm wide; those of male flowers 3–6 mm long, upper lobes 1–2.2 mm wide, lower lobes 1.3–2.8 mm wide, width subequal or the upper 2 lobes to ca. 2/3 width of lower lobes; sinus between upper and lower lobes often deeper than between each of the 3 lower lobes; lobe apices acute to abruptly tapered and very shortly acuminate or cuspidate; lower 3 lobes becoming paler or whitish toward base, with 2 yellowish-green bands (sometimes partially connected) at base, extending into throat of tube; tube 2–4 mm long, split dorsally to 0.1–0.7 mm from base, white to light green externally with two longitudinal channels extending from the sinuses between the lower 3 lobes towards the hypanthium, with fine retrorse hairs (rarely glabrous) internally towards base. Filaments 1.7–2.7 mm long, glabrous or puberulous, adnate to the corolla tube near its junction with the hypanthium for up to 0.8 mm, distally connate for 0.2–1 mm below the anther tube, rarely quite free to base of anther tube, very gradually widening towards connate part, white to green or tinged blue. Anther tube white and sterile in female flowers, dark or denim-blue in male flowers, 0.7–1.1 mm long (females), 1–1.3 mm long (males), with thick, sub-acute to obtuse hairs ca. 0.1 mm long in rows dorsally (less conspicuous or sometimes absent in female flowers), the apex of the 2 lower anthers each with a seta 0.3–0.5 mm long and a cluster of short hairs 0.05–0.1 mm long; upper 3 anthers glabrous at apex. Stigma protruding from apex of the anther tube in female flowers, 2-lobed, densely papillose, surrounded by a ring of hairs. Style glabrous. Disc surrounding ovary

summit yellowish-green, puberulous. *Fruit* (from few examples available) ellipsoid to obovoid, sometimes asymmetric, slightly compressed, 4–6 mm long, ca. 3 mm wide, glabrous, indehiscent. *Seeds* light brown, broadly ellipsoid, compressed, 0.5–0.6 mm long, 0.4–0.5 mm wide, testa surface with a network of microscopic ridges forming irregular but more or less isodiametric alveolae ca. 20–30 µm diam. Figures 1, 2a & b.

Representative specimens: (ca. 50 specimens examined) SOUTH AUSTRALIA. South East, Glencoe District. Between Marshes Swamp and Mt Burr, *K. Alcock s.n.*, 2.ii.1992 (AD, MEL!); Clarendon, *Anon. s.n.*, xii.1881 (AD!); 1 km SW of Lake Edward, *R.J. Bates 9855*, i.1987 (AD); Scott Creek Conservation Park. 100 m down from Almanda Mine, *R.J. Bates 21921*, 5.i.1990 (AD!); 5 km S of Mylor, *R.J. Bates 43252*, 4.v.1996 (AD!); Behind Woods & Forests Headquarters, Compton, *B. Copley 3389*, 18.i.1971 (AD); Mt Bold Reservoir adjacent Onkaparinga River ca. 800 m upstream from [Moullgraves] Crossing, *D.J. Duval 1504 & T.S. Te*, 24.ii.2009 (AD); East of Penola, *D. Hunt 363*, 12.xi.1964 (AD); Naracoorte Caves, *D. Hunt 2258*, 29.xi.1964 (AD!); 4 km [2.5 ml] SW of Glencoe, *D.N. Kraehenbuehl 1*, 1.vii.1965 (MEL!); Telford Scrub Con[servation] P[ar]k, ca. 15 km N of Mt Gambier, *D.N. Kraehenbuehl 5353*, 28.xi.1990 (AD!); Section 142 (Lot 5), Hundred of Encounter Bay. 'Mt Alma' Swamp, *P.J. Lang, D8575*, 6.xii.1988 (AD!); Onkaparinga River, *F. Mueller s.n.*, 1851 (MEL!); Near Miss Ashby's Flora Res[erve] [Nangawooka], *D.E. Murfet 641*, 10.i.1988 (AD!); Mt McIntyre Swamp, Mt Burr Forest Reserve, *D.E. Murfet 2679*, *K.M. Alcock, R.L. Taplin*, 20.iii.1997 (AD); The Marshes Native Forest Reserve, *D.E. Murfet 4275*, 24.xii.2002 (AD); Onkaparinga, *J.G.O. Tepper 374*, xii.1881 (MEL!); 1.5 miles [2.4 km] N of Wandilo Railway Station, *I.B. Wilson 634*, 5.xi.1966 (AD); 3 km SSW of Tarpeena, *P.G. Wilson 1245*, 15.xi.1959; N part of Honans Scrub Reserve, *A.A. Munir 5386*, 2.xi.1981 (AD). **VICTORIA.** Mill Swamp, ca. 2 km N of Wilkin, *D.E. Albrecht 5168*, 3.xii.1992 (MEL!); Lower Glenelg River area, Red Gum Swamp, S of Greenwald, *A.C. Beauglehole 6521*, 17.i.1965 (MEL!); Gora West, ca. 16 km [10 ml] NW of Portland, *A.C. Beauglehole 6530*, 21.i.1965 (MEL!); Grampians. Wannon River. East of Mirranatwa Gap, *A.C. Beauglehole 16361*, 9.xii.1967 (MEL!); Lower Glenelg River, W side of river. Keegans Bend, *A.C. Beauglehole 19089*, 24.i.1965 (MEL!); Grampians, Fyans Creek, *A.C. Beauglehole 24947*,

8.iii.1968 (MEL!); Grampians, E of Mt Zero, Goltons Ck, *A.C. Beauglehole 30092*, 18.xii.1968 (MEL!); Between Red Hill Road and Victoria Valley Road, Victoria Range, Grampians, *A.C. Beauglehole 30249*, 2.i.1969 (CANB!, MEL!); Grampians, Henham Tk, 5 km [3.1 ml] SE of Junction with Victoria Valley Rd, *A.C. Beauglehole 30392*, 29.i.1969 (CANB!); Grampians. South end of Serra Range, Wannon River Bridge, North of Dunkeld, *A.C. Beauglehole 30495*, 11.ii.1969 (MEL!); Glenelg Shire, 8.8 km [5.5 ml] N of Dartmoor, *A.C. Beauglehole 38121*, 31.xii.1971 (MEL!); 6 km north of Portland, *A.C. Beauglehole 93524*, 19.v.1991 (MEL!); 6 km N of Portland, Bolwarra Bushland Reserve, *A.C. Beauglehole 93527*, 11.viii.1991 (MEL!); Warrawong Farm, between Hamilton and Branxholme, *M.G. Corrick s.n.*, 6.xi.1966 (MEL!); Grampians. Lake Wartook, S end, *M.G. Corrick 757*, 6.iv.1968 (MEL!); 21 km NE of Portland, lower Fitzroy River, 0.8 km S of 'Avonlea', *M.D. Crisp 6874*, 17.xi.1980 (CANB!); Otway Region, Chapple Vale, *G.E. Earl 22*, 13.iii.1984 (MEL!); Lower Glenelg River, *J.P. Eckert 52*, 1891 (MEL!); Grampians, 6.4 km [4 ml] north of Zumsteins, *S.T.W. Parfett 3*, 3.v.1982 (MEL!); Banks of Wimmera River, *F.M. Reader s.n.*, 26.xii.1897 (MEL!); Lower Plenty. Yarra Valley Parklands. Yaruk Tamboore Wetlands, *V. Stajsic 7274*, *S. Hodge, S. Liu*, 17.xii.2014 (MEL!); Cassidy Gap, Serra Range, *H. Streimann 2733*, 12.xii.1975 (CANB!); Mt William, *D. Sullivan 13*, xii.1880 (MEL!); Hall's Gap, Grampians Mts, *J.E. Tilden 825*, *s.d.* (MEL!); Near Cape Otway, *C. Walter s.n.*, iii.1874 (MEL!); Hawkesdale near Hopkins River, *H.B. Williamson 22*, 1893 (MEL!); Curdies River, *H.B. Williamson 34*, 1894 (MEL!); Lower Glenelg River, near Eaglehawk Bend, *J.H. Willis s.n.*, 31.x.1948 (MEL!).

Illustrations: H. R. Toelken in J.P. Jessop & H.R. Toelken (eds), *Fl. South Australia* 3:1375 (1986) as *Pratia pedunculata*; N. Romanowski, *Australian Plants* 17(136), p. 164 (1993), as *Isotoma fluviatilis*; D.E. Albrecht in N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria*, 4:569 (1999) as *L. pedunculata* 'south-western Victorian variant' (anther tube only); Mayfield, E. (2013). *Flora of the Otway Plain and Ranges*. 2, p. 133 (2013) as *L. pedunculata*.

Distribution: Occurs from SE South Australia near Scott Creek, ca. 20 km SW of Adelaide, to SW Victoria (including the Grampians where rather common), as far east as Chapple Vale in the Otway Ranges. Figure 3.



Figure 1. *Lobelia pachytricha*. **a:** female flowers (from near Drumborg, Victoria) <https://www.inaturalist.org/observations/38650001>; **b:** male flowers and **c:** closeup showing corolla coloration and short thick hairs on the dorsal surface of male anther tube (from near Mooralla, Victoria) <https://www.inaturalist.org/observations/28831419>; **d:** male plant (from near Hotspur, Victoria) <https://www.inaturalist.org/observations/20976451>. (All images: Reiner Richter)

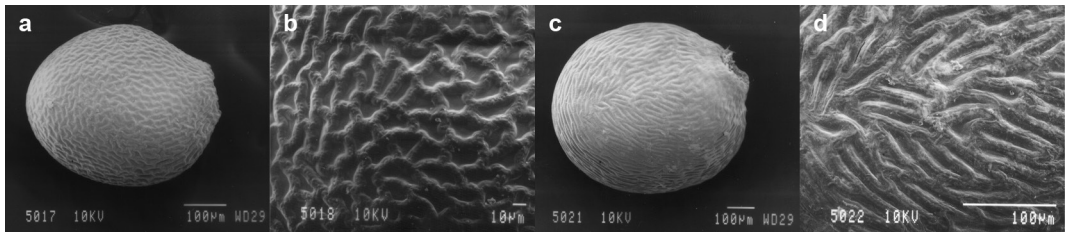


Figure 2. Seeds and seed surface ornamentation. **a & b:** *Lobelia pachytricha* (from same location as A.C. Beaglehole 93524); **c & d:** *Lobelia pedunculata* (from L. Rodway 235).

Habitat: *Lobelia pachytricha* typically occurs along margins of watercourses, in peaty swamps and low-lying woodlands with commonly associated species including *Eucalyptus ovata*, *E. camaldulensis*, *Callistemon sieberi*, *Leptospermum lanigerum*, *Melaleuca squarrosa*, *Gahnia* spp. and other semi-aquatic herbs (e.g. *Juncus* spp., *Carex fascicularis*, *Centella cordifolius*, *Goodenia* spp., *Hydrocotyle* spp., *Mazus pumilio*, *Montia australasica*, *Myriophyllum* spp., *Ranunculus* spp.). Occasionally in drier woodlands of e.g. *Eucalyptus leucoxylon*, *E. obliqua*, but in areas with impeded drainage.

Conservation Status: *Lobelia pachytricha* does not appear to qualify as threatened (VU, E, CR) applying IUCN (2012) criteria, but can be reasonably considered rare. It is protected in several large conservation reserves in both South Australia and Victoria. However, effects of

climate change could result in drying of swamps and small streams, conceivably rendering the species as threatened in the foreseeable future (if not within the next decade). Many of the areas represented by older South Australian records are now forestry or pasture. Many of the Scott Creek CP populations were burnt in recent severe fires (J. Conran, Univ. of Adelaide, pers. comm. 2022), so its security there is dependent on its ability to regenerate post-fire. It is likely threatened (*sensu* IUCN 2012) in South Australia.

Notes: Vegetatively, *Lobelia pachytricha* is very similar to *L. pedunculata*, but is more commonly glabrous, whereas leaves and stems of *L. pedunculata* are usually somewhat to distinctly hispid and uncommonly glabrous. The leaf blades of *L. pachytricha* are mostly gradually tapered towards the base and only sometimes

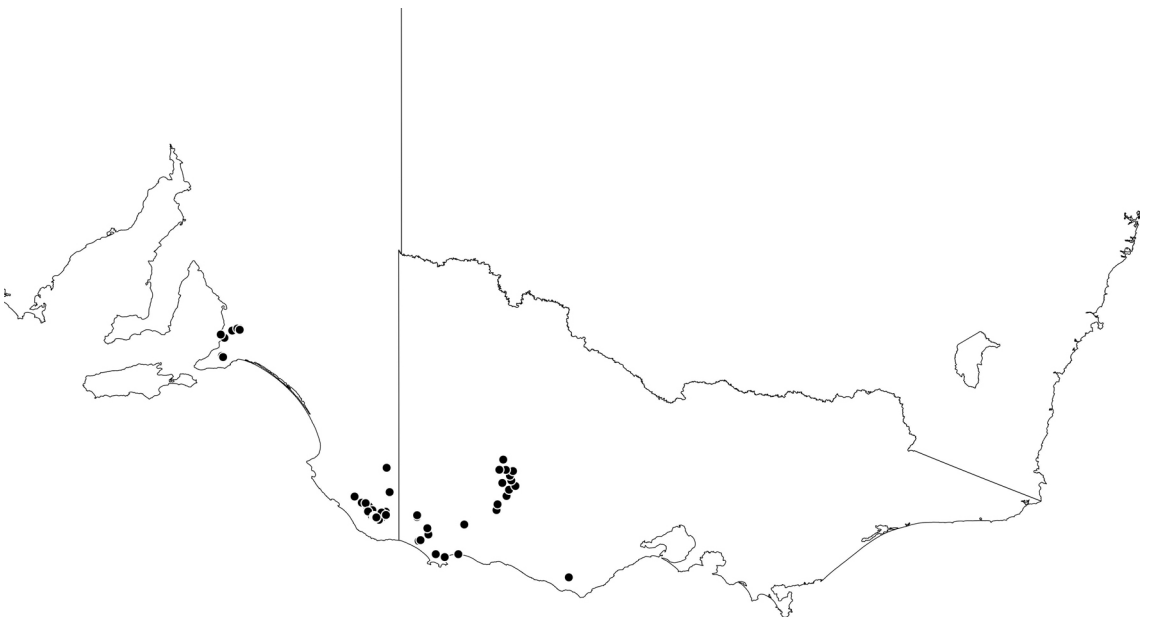


Figure 3. Distribution of *Lobelia pachytricha* based on herbarium collections at AD, CANB and MEL (excluding collections considered to be non-indigenous occurrences).

abruptly tapered, while in *L. pedunculata* the leaf blades are more consistently abruptly tapered (i.e., very obtuse to truncate or shallowly cordate). The corollas of *L. pachytricha* differ considerably from those of *L. pedunculata* in being almost fan-shaped with the two dorsal lobes subequal to, or distinctly narrower than, the lower three. In *L. pedunculata* the corolla lobes are similar in width and more evenly radially oriented. Male flowers of *L. pachytricha* are distinctive in the dorsal side of the anther tube having rows of moderately dense, sub-acute to obtuse hairs c. 0.1 mm long. These hairs are less conspicuous or occasionally absent in female flowers. In *L. pedunculata*, the anther tube is glabrous dorsally, or if hairs are present (observed only in very few specimens from Tasmania) they are sparse, narrow and acute. Based on SEM images of a few representatives of either species, there is an apparent difference in seed surface patterning between them. In *L. pachytricha* the alveolae formed by the network of surface ridges are almost isodiametric, not elongated and narrow as in *L. pedunculata* (Figure 2). Despite considerable variation in the corolla coloration in *L. pedunculata*, none of the variants quite match *L. pachytricha*. In *L. pachytricha* the corolla lobes are largely pale to rich blue or blue-mauve and usually have a darker midvein at least in part. The three lower lobes have a distinctly paler (or white) zone toward the base above the yellow-green zone, the latter made up of two bands, sometimes partially connected, running into the corolla tube. In *L. pedunculata* the corolla lobes are either wholly white or pale blue to mauve and either lack a darker midvein, or if present, it is usually accompanied by dark short lateral veins. When the corolla lobes are pale blue to mauve, a distinctly paler (or white) zone may be present toward the base of the lower three lobes, but it is very narrow. The yellow-green zone on the ventral side of the throat appears as a more solid block of pigment than in *L. pachytricha*.

Bentham (1868) may have been the first to have recognised the species described herein, referring it to a 'small form' of *Lobelia purpurascens* R.Br., a species of east-coast Australia. He most likely associated it with *L. purpurascens* on the basis of its distinctly zygomorphic flowers with the upper two corolla lobes distinctly narrower than the lower three. Wimmer (1953, p. 110), under *Pratia pedunculata*, cited a specimen from Halls Gap, Grampians Mtns Victoria (*J.T. Tilden n. 825*), with

the note '*specimen fem. glabrum*' [specimen female, glabrous] – presumably emphasising the aberrant glabrous state with respect to typical *Lobelia (Pratia) pedunculata*. This specimen is at MEL (no 1592628). It is *L. pachytricha*. Wimmer has annotated the specimen 'var. *tildenae*', but the name was never formalised. He annotated the label '*foli basi plerumque angustata*' (leaves at the base mostly narrowed) indicating that he had noted the tendency for the leaf bases to be tapered in contrast to the \pm truncate leaf-bases of *L. pedunculata* as noted above. Toelken (1986) recognised two species in the *L. pedunculata* group, but erroneously treated the 'fan-flowered' entity (i.e., *L. pachytricha*) as *Pratia pedunculata* and the 'typical' form of *Lobelia pedunculata* as *P. puberula*. The correct application of the name *P. puberula* has caused confusion as the three collections cited by Bentham in the protologue comprise three elements: a high-elevation form of *L. pedunculata*, *L. leucotos* Albr. and *L. purpurascens*. Albrecht (2000) lectotypified *P. puberula* on the high-elevation form of *P. pedunculata* from the Cobberas Mountains, Victoria which differs somewhat from lowland forms in having corolla lobes commonly white with purplish venation.

Lobelia pachytricha is sometimes cultivated as a garden ornamental. A selection 'Almanda Blue' from a population in Scott Creek Conservation Park south-east of Adelaide has been registered under Australian Plant Breeders Rights and a US patent has been applied for it (United States Patent Application 20180084703) (FPO 2018). The Scott Creek population (c. 20 km SSE of Adelaide) and several nearby are remote from other known populations – the nearest being in the far south-east of South Australia, some 400 km away. Two 19th century collections from 'Onkaparinga' near Scott Creek (*Mueller*, 1851 (MEL 1596757), *Tepper*, 1881, (MEL 15981290)) appear to dispel any notion that the species may have been introduced there. Scott Creek is a tributary of the Onkaparinga River from the margins of which Mueller's collection was made. A recent collection from the Yarra Valley, ca. 15 km NE from Melbourne CBD (*Stajsic 7274 et al.* (MEL 2384747, 2384782)), is likely to represent an introduction rather than a natural occurrence, there being no collections of this distinctive and attractive species prior to 2014 and the collection site being one at which there has been considerable rehabilitation work. Plants of *L. pachytricha* are

propagated and currently offered for sale in at least one 'native' plant nursery (La Trobe University Indigenous Nursery) and either through direct 'revegetation' planting or spread by seed or plant fragments by e.g. waterbirds, further occurrences in the lower Yarra Valley could be anticipated.

Herbarium specimens bearing our early determinations using the manuscript names *Lobelia* (or *Pratia*) *pedunculata* subsp. *pachytricha* Albr. can be taken to be *L. pachytricha*. Despite its obvious similarity to *L. pedunculata*, we have now chosen to recognise *L. pachytricha* at species rank, based on the weight of its combined morphological distinctions, and also the partly sympatric distribution with no evidence of morphologically intermediate plants that might otherwise suggest clinal variation or hybridisation between the two entities.

Lobelia pedunculata, even with the excision of *L. pachytricha*, remains a variable taxon, and continuing studies may support the recognition of further taxa, e.g. the high-elevation plants matching the lectotype of *Pratia puberula* as noted above.

Etymology: The epithet, from the Greek *pachys* = thick + *thrix/trichos* = hair, refers to the short, thick hairs on the dorsal surface of the anther-tube.

Generic placement: Molecular analyses by Knox (unpubl. data; pers. comm.) and Kagame et al. (2021), and morphology-based reviews by others (e.g. Lammers 2011) show relationships between the genera in Campanulaceae subfamily Lobelioideae to be complex and do not support recognition of many genera as monophyletic. Lammers (2011) attempted to resolve this complexity by recognising a very large *Lobelia* with 18 sections. In this arrangement, *L. pachytricha* and *L. pedunculata* belong to sect. *Hypsela*, which in Australia includes *Hypsela*, *Pratia*, *Isotoma* (but not its type species, *I. hypocrateriformis* (R.Br.) Druce) and some species traditionally placed in *Lobelia*, none of which resolve at the molecular level to monophyletic groups. Work is ongoing, but until a satisfactory arrangement is achieved, the least contentious position is to treat the new species, and its close relatives, in *Lobelia*.

Lectotypification of *Lobelia pedunculata*

Brown (1810) referred to the type of *L. pedunculata* as

'J (v.v.)', indicating that the plant was collected from between Port Jackson and Newcastle area, New South Wales, and seen live by him. Brown's herbarium at BM includes two specimens identified as types of *L. pedunculata*, both collected from 'Hunters River' on October 30 1801 and numbered 2620. One sheet is fragmentary (BM000907575), the other (BM000907574) includes copious material in good flowering condition. Mabberley & Moore (2022) indicated that the fragmentary specimen derived from Dryander's herbarium was not available to Brown in preparing the *Prodromus*. Consequently, the specimen from Brown's own herbarium (BM000907574) should be treated as a holotype, and BM000907575 from Dryander's herbarium as the isotype. Walsh (*in sched* 3.xi.2008) had annotated BM000907574 and BM000907575 as lectotype and isolectotype respectively, but Mabberley's justification for holotype is reasonable and should be followed. The holotype is mounted on the same sheet as Tasmanian material of *L. pedunculata* collected by Ronald Gunn which is separately numbered BM000957992.

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