



## Notes on *Pimelea curviflora* and *P. micrantha* (Thymelaeaceae, Sect. Epallage) and recognition of two new subspecies of *P. curviflora*

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### Introduction

The circumscription of *Pimelea curviflora* R.Br. is problematic. In the most recent comprehensive account of the genus, Rye (1990) recognised six varieties of *P. curviflora* and commented, 'A highly variable species in need of further study. The status of the 6 varieties recognised here needs to be re-examined, and at least 1 new variant needs to be named'. Under the account of *P. curviflora* var. *subglabrata* Threlfall, Rye noted 'an unnamed variant from S.A. and Vic. keys to var. *subglabrata*'. The significant feature of this variant, linking it to var. *subglabrata*, is its short sepal length of 0.6–1 mm, compared to the other five named varieties of *P. curviflora* with sepals 1.2–3 mm long.

Two of the named varieties of *P. curviflora*, var. *gracilis* (R.Br.) Threlfall and var. *sericea* Benth., occur in Victoria along with the unnamed *subglabrata*-like variant, as well as the apparently closely related *P. micrantha* F.Muell. ex Meisn. with sepals ca. 0.5 mm long. In a treatment of the genus in *Flora of Victoria*, Entwisle (1996) recognised both *P. curviflora* and *P. micrantha*, but did not formally distinguish the varieties *gracilis* and *sericea*, although their different morphologies and geographic ranges were discussed. The unnamed variant was discussed too, as was a dubious record of

### Abstract

The complex comprising *Pimelea curviflora* R.Br. and *P. micrantha* F.Muell. ex Meisn. is reassessed and two new south-eastern Australian subspecies of *P. curviflora*, namely subsp. *fusiformis* N.G.Walsh & E.M.Schulz and subsp. *planiticola* N.G.Walsh & E.M.Schulz, are described, illustrated and mapped. Seeds have been identified as particularly useful in discriminating between members of the group and are illustrated for this purpose. Taxa previously treated as varieties of *P. curviflora* are elevated to subspecies, lectotypes are nominated as required, and notes on typification in the group are provided.

*P. curviflora* var. *divergens* Threlfall, also mentioned by Rye (1990).

This unsatisfactory situation has led to considerable confusion in the application of names in Victoria. Specimens of *P. curviflora* and *P. micrantha* were reassessed at MEL in an attempt to clarify taxon boundaries and produce a workable treatment. No genuine specimens of *P. curviflora* var. *subglabrata* were available at MEL, but specimens of this and other members of the group were borrowed from NSW and included in the study. Other members of the complex not known to occur in Victoria (i.e. varieties *curviflora*, *divergens* Threlfall and *acuta* Threlfall) were examined to confirm their distinctness and to preclude the possibility of any of these names being applicable to unplaced Victorian samples. Inspection of representatives of these varieties suggests that they are reasonably well circumscribed both morphologically and geographically.

Those characters used in Rye's 1990 treatment were closely examined, as was an earlier treatment of the genus in Australia by Threlfall (1983). While both treatments employed seed characters to some extent, these were found to be particularly useful and so aspects of seed morphology not discussed in either of these studies were considered.

Two distinct unnamed entities were recognised amongst specimens of *P. curviflora* and *P. micrantha* at MEL and those borrowed from NSW. One shared some features with *P. curviflora* var. *subglabrata*, i.e. short sepals, leaves mostly glabrous or nearly so on the adaxial surface and straight, rather than curved fruit (a characteristic of var. *curviflora*), but the seed shape and growth habit were distinctive for both these unnamed entities. The second unnamed entity appeared somewhat intermediate vegetatively between *P. curviflora* var. *gracilis* and *P. micrantha*, but differed from both in the seed, which had a slight constriction toward the apex (reminiscent of the 'skittle-shaped' or 'peanut-shaped' seed of *P. micrantha*), but was distinctive in its acute, shortly uncinat apex. From *P. curviflora* var. *gracilis* it differed further in having distinctly shorter sepals. While some specimens of the latter type had been determined as 'var. aff. *subglabrata*' at MEL, most specimens of the latter were found within folders of *P. micrantha* or *P. sericea* var. *gracilis*.

Rank is problematic in the *P. curviflora*-*micrantha*

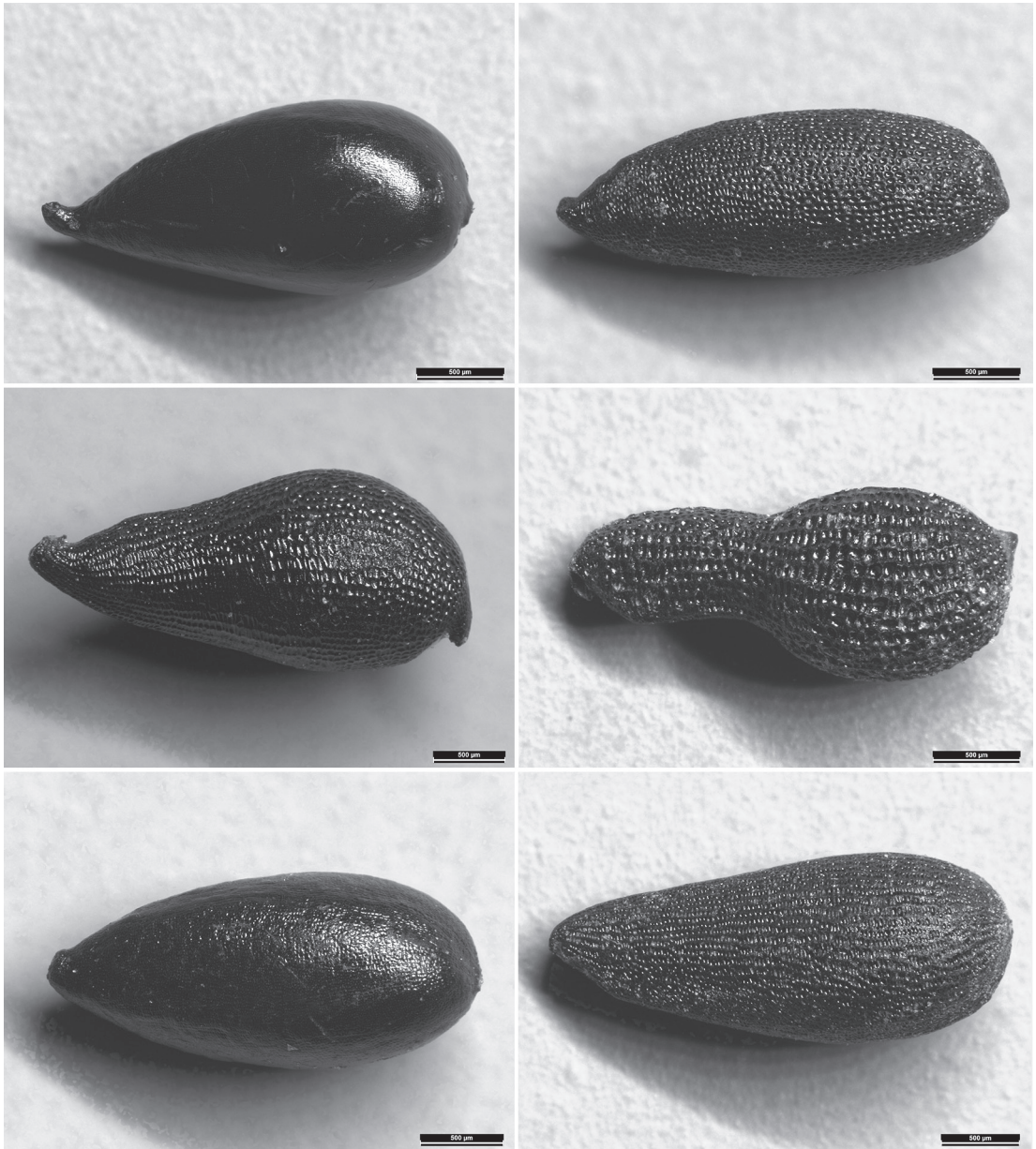
complex. For example, Threlfall (1983) recognised *P. micrantha*, *P. curviflora* var. *curviflora* and *P. curviflora* var. *gracilis* (as recognised by Rye) all as subspecies of *P. curviflora*, while the other taxa were treated as varieties of *P. curviflora* subsp. *gracilis* (R.Br.) Threlfall. Rye (1990) treated *P. micrantha* as a distinct species and others at a single infraspecific (varietal) rank while noting var. *acuta* to be 'the most distinctive of the varieties recognised and [that it] possibly should be regarded as a subspecies or even as a separate species'. A case exists to return *P. micrantha* to subspecific rank under *P. curviflora* (the earlier name) to underline their morphological proximity, but we consider the combined features of the corolla (very short 'style portion' *sensu* Rye (1988), and fruit to warrant maintenance at species rank. At least some of the members of *P. curviflora* could probably be recognised as good species (as suggested by Rye for var. *acuta*) but the intent of the current study is to clarify the taxonomy of the group in Victoria. We consider that, in addition to morphological features, there are geographic and ecological signals that help to separate the taxa, criteria that support recognition at subspecific rank at least. Looking beyond the Victorian taxa, other members of the *P. curviflora*-*P. gracilis* complex are similarly well defined morphologically and geographically, so, to maintain taxonomic consistency in the group, the other varieties are here elevated to subspecies rank. A more detailed study of the complex, perhaps incorporating molecular data, is warranted to establish a reliable hierarchy of its components.

## Materials and methods

Descriptions are based on field-collected plants and herbarium specimens at MEL and limited numbers of specimens at AD and NSW and type specimens that were accessed online through Global Plants (<http://plants.jstor.org/>, accessed 31 May 2019) and by correspondence with herbaria not represented on the Global Plants websites. Floral measurements were made primarily from herbarium specimens. Flowers of *Pimelea* are considered to be derived from fused elements of the calyx and corolla and the perianth is described as being composed of the ovary portion (from the base to the point that the floral tube abscises during fruit development), and the 'style portion' (that part above the abscission point) following Rye (1988).

Irrespective of the true origin of the floral parts, the lobes of the perianth are here referred to as sepals. Lengths of elements of the perianth are measured at the time of abscission of the style portion. The fruit, at time of shedding, includes the remnant of the ovary portion closely enclosing the achene, which consists of a thin membranous epicarp loosely overlaying the

seed itself. The patterning of the seed coat is apparent through the fine, closely-enveloping mesocarp but is clearer if a portion of this layer is carefully scraped away. The photographs (Figs 1, 2), taken on a Leica M205C stereomicroscope processed via Leica application suite Version 4.9, are of seeds from which the mesocarp has been removed.



**Figure 1.** *Pimelea* seed. a. *P. curviflora* subsp. *subglabrata* (NSW 273649); b. *P. curviflora* subsp. *fusiformis* (MEL1559898); c. *P. curviflora* subsp. *planiticola* (MEL 2134990); d. *P. micrantha* (MEL50719); e. *P. curviflora* subsp. *sericea* (MEL 50768); f. *P. curviflora* subsp. *gracilis* (MEL 222164). Scale bars 0.5 mm.





Figure 2. Holotype of *Pimelea curviflora* subsp. *fusiformis* (MEL2418230).

## Taxonomy

### *Pimelea curviflora* subsp. *fusiformis* N.G. Walsh & E.M. Schulz subsp. nov.

**Type:** AUSTRALIA. Victoria. Bunyip State Park, Towt Rd (=Back Creek Rd), just S of its junction with Watsons Track, 9.8 km direct NNW from Tonimbuk Hall, *N.G. Walsh 8753* & *A. Messina*, 9.xi.2017 (holo: MEL 2418230 !; iso: CANB !).

Amongst the other subspecies of *Pimelea curviflora*, subsp. *fusiformis* most closely resembles subsp. *subglabrata*, but is generally of a more spreading habit and has narrower, more or less fusiform (rather than ovoid) seeds that are generally distinctly textured (rather than smooth). It resembles subsp. *curviflora* in general habit but has shorter sepals, a less densely indumented perianth and uncurved seeds.

Weak, twiggy subshrub to ca. 30 cm high and often as wide; hairs on young stems lightly to moderately appressed or semi-appressed hairy to ca. 1 mm long, older stems glabrescent. Leaves alternate, sessile or with petiole to ca. 0.5 mm long; lamina elliptic to obovate, 5–9 mm long, 1.5–2.5 mm wide, slightly paler beneath, sparsely appressed hairy on lower surface, glabrous or with a very few hairs on upper surface, hairs to 1 mm long. Inflorescence axillary (mostly) and sometimes terminal, of compact, 2–5-flowered clusters; involucre bracts absent or not differentiated from leaves. Flowers bisexual, yellow, often reddish toward the tip; pedicel densely sericeous, ca. 0.5 mm long; perianth 5–8 mm long at maturity (fruit developed but before abscission of style portion), ovary portion persisting and falling with fruit, 3–4 mm long, style-portion 2–3 mm long; sepals not or hardly spreading, ca. 0.6–1.1 mm long, shorter than tube of style portion; stamens inserted just below sepals, sessile or subsessile; anthers ca. 0.5 mm long; style not exerted. Seed fusiform, 2.8–3.2 mm long, acute or subacute, ±equally pointed at either end and widest at the centre; seed coat finely alveolate with alveolae more or less isodiametric, in indistinct ranks (Figs 1a, 2).

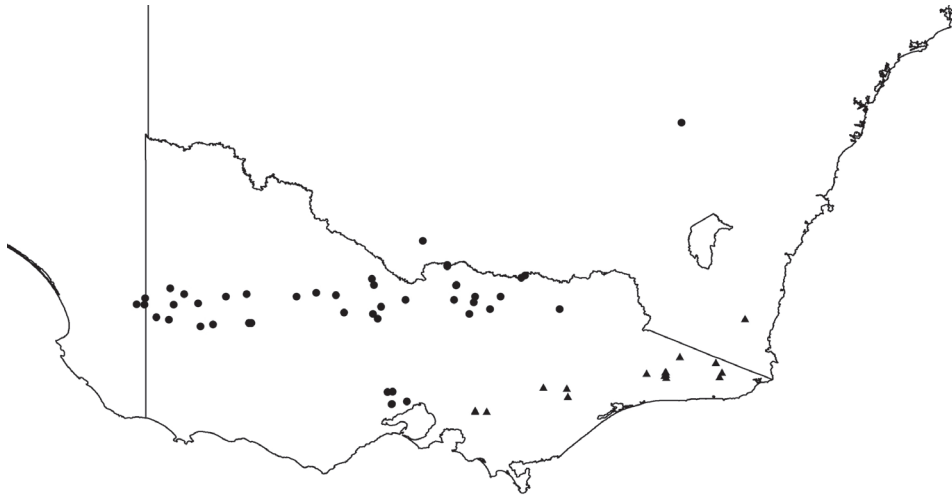
**Selected specimens:** NEW SOUTH WALES. Near Bemboka Walls, Bemboka State Forest, *D.L. Binns 23*, 19.x.1986 (MEL, NSW). VICTORIA. Bunyip State Park, *A.C. Beauglehole 72080*, 20.xi.1982 (MEL); Valencia Ck Rd, between Little Scott Ck & Esteppey Yards, 13 miles SE of Mt Wellington, *A.C. Beauglehole 43448*, 31.x.1973 (MEL); 4 miles E of Licola, *A.C. Beauglehole*

*43386*, *J.H. Willis & E.A. Chesterfield*, 21.x.1973 (MEL); Mt Dawson, *E.A. Chesterfield 140*, 22.iii.1984 (MEL); Yalmy Forest Management Block, *E.A. Chesterfield 9*, 9.xi.1983 (MEL); Reedy Ck, 6 km NE of Cann River, *J. Piggin s.n.*, 5.v.1976 (MEL); Warbisco Tk, ca. 1.7 km NNW of Trapyard Hill, *D.E. Albrecht 3205 & D.G. Cameron*, 12.i.1987 (MEL); Pinnak Rd, 300 m N of Mine Tk, 10.8 km N of junction with Yalmy Rd, *N.G. Walsh 8613*, *A.J. Brown & A. Messina*, 8.ii.2017 (MEL, CANB); Yalmy Rd, 24 km WSW direct from Goongerah, *N.G. Walsh 8611*, *A.J. Brown & A. Messina*, 8.ii.2017 (MEL); Mt Kaye, *N.A. Wakefield 3284*, 20.xi.1947 (MEL); Mt Elizabeth Rd ca. 4.4 km N of Junction of Tambo and Timbarra Rivers *A. Messina 1527*, 10.x.2019 (MEL).

**Distribution and habitat:** Known from south-eastern New South Wales (1 record) and scattered localities through Gippsland, Victoria, from near the NSW border to ca. 70 km ESE of Melbourne (Figure 3).

Our field observations and notes on herbarium specimens suggest the typical habitat of *P. curviflora* subsp. *fusiformis* is dry open forest with a rather sparse shrub layer. Soil is typically rather shallow and outcropping rocks are common. The aspect is commonly northerly or north-westerly and sometimes rather steep. The recorded elevation range is 145–700 m above sea-level. Associated species in the New South Wales and eastern Victorian sites include *Eucalyptus agglomerata* Maiden, *E. macrorhyncha* F.Muell. ex Benth., *E. polyanthemos* subsp. *vestita* L.A.S. Johnson & K.D. Hill, *E. sieberi* L.A.S. Johnson, *Acacia boormanii* Maiden subsp. *boormanii*, *A. falciformis* DC., *A. gunnii* Benth., *Bossiaea obcordata* (Vent.) Druce, *Comesperma ericinum* DC., *Daviesia latifolia* R.Br., *Dillwynia phyllicoides* A.Cunn., *Hibbertia obtusifolia* DC., *Monotoca scoparia* (Sm.) R.Br., *Platysace lanceolata* (Labill.) Druce, *Pomax umbellata* (Gaertn.) Sol. ex A. Rich., *Rhytidosporum procumbens* (Hook.) F.Muell., *Gonocarpus tetragynus* Labill., *Gahnia sieberiana* Kunth., *Stypanandra glauca* R.Br. and *Rytidosperma pallidum* (R.Br.) A.M. Humphreys & H.P. Linder. At the one Bunyip State Park site (the westernmost known locality known to date), the vegetation is heathier and more moist, with associated spp. *Eucalyptus cephalocarpa* Blakely, *E. dives* Schauer, *Leptospermum myrsinoides* Schtdl., *Pimelea phyllicoides* Meisn., *Dampiera stricta* (Sm.) R.Br., *Bauera rubioides* Andrews, *Xanthosia tridentata* DC., *Gahnia radula* (R.Br.) Benth., *Lomandra filiformis* subsp. *coriacea* A.T. Lee and *Laxmannia orientalis* Keighery.

**Etymology:** The subspecific epithet, *fusiformis*, is



**Figure 3.** Distribution of *Pimelea curviflora* subsp. *fusiformis* (triangles) and subsp. *planiticola* (circles) based on herbarium collections at MEL and selected specimens from CANB and NSW.

from the Latin for spindle-shaped, a reference to the distinctive shape of the seed.

**Conservation status:** *Pimelea curviflora* subsp. *fusiformis* seems to be uncommon at the sites from which it has been collected (specimen notes and pers. observ.), but occurs in sites that are mostly unlikely to be exploited for timber harvesting or agriculture. It is rather rarely collected, but perhaps overlooked due to its rather cryptic habit and flowers. There is no clear case for it to warrant recognition as a threatened taxon under IUCN (2001) criteria, but it is probably fairly described as rare. The Bunyip population was destroyed by fire in March, 2019 and its response has not yet been noted, but from observations at sites further east where fires have occurred in the last decade, it is expected to recover via seed recruitment.

**Notes:** The new subspecies differs from others within *P. curviflora* in the almost symmetrical, ellipsoid to fusiform seeds (ovoid in the other subspecies) (Figure 1). The near-symmetry of the seeds is apparent when they are still enclosed within the hypanthium remnant. They are distinctly more slender (relative to their length) than other members of the group in Victoria. The seed of subsp. *curviflora* (not illustrated) is of similar overall proportions to that of subsp. *fusiformis*, but it is distinctly curved (banana-shaped). In the short sepals, subsp. *fusiformis* most closely resembles subsp. *subglabrata* and *planiticola*. It further resembles subsp. *subglabrata*

in the diffuse, widely branched habit, while the habitat (from notes on herbarium specimens) appears to be broadly similar to, but drier than that of, subsp. *subglabrata*.

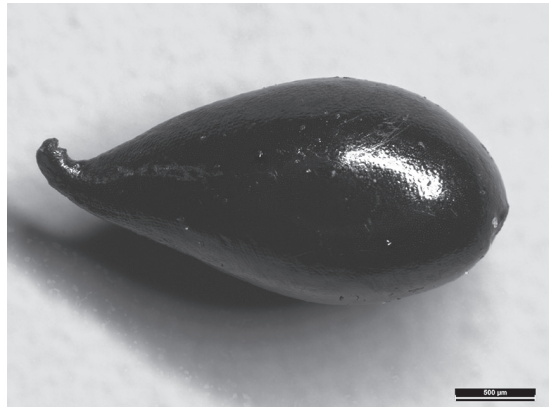
***Pimelea curviflora* subsp. *planiticola*  
N.G.Walsh & E.M.Schulz subsp. nov.**

**Type:** AUSTRALIA. Victoria, Bacchus Marsh, between Fisken & Vallance Sts, *V. Stajsic* 2679, 25.xi.2001 (holo: MEL 2134990; iso AD 136393, CANB 554567, NSW 677436, PERTH 6311660)

Resembles subsp. *subglabrata* and subsp. *fusiformis* in the short sepals, but differs from both in having the seed slightly constricted towards the minutely but distinctly uncinat apex. Both the other subspecies have ovoid, non-uncinate seeds. Seeds of subsp. *planiticola* are more strongly uncinat than all other subspecies of *P. curviflora*. It resembles *P. micrantha* somewhat in having a slightly constricted seed, but not as strongly constricted as in that species, which has blunt, 'skittle-shaped' or 'peanut-shaped' seeds (Figure 1d). The texture of the seed coat is much finer than that of *P. micrantha*, with smaller, shallower alveolae, the tubular part of the style portion of the perianth is relatively longer (longer than the sepals; shorter than the sepals in *P. micrantha*), and the growth habit is typically taller and more slender than that of the three taxa noted above.

Erect subshrub or shrub to 50 cm high; young stems densely appressed-hairy with hairs ca. 1 mm long, older stems usually glabrescent. Leaves alternate, sessile or with petiole to ca. 0.5 mm long; lamina ovate to elliptic, narrowly elliptic, oblong or narrowly obovate, 6–13 mm long, 2–4 mm wide, concolorous or slightly paler beneath, sparsely to moderately hairy on both surfaces (usually sparser adaxially) with appressed hairs to 1 mm long, older leaves sometimes glabrescent. Inflorescence terminal and/or axillary, of compact 4–12-flowered clusters; involucre bracts absent or not differentiated from leaves. Flowers bisexual or female, yellow, yellow-green, or sometimes reddish toward the tip; pedicel densely sericeous, ca. 0.5 mm long; perianth 5–7 mm long at maturity (fruit developing but before abscission of style portion), rather densely covered with appressed hairs 0.2–0.6 mm long, denser toward the base; ovary portion 3–3.7 mm long, deciduous style-portion 1.6–2.5 mm long; sepals not or only moderately spreading, 0.6–1.1 mm long, 1–2 times as long as the tubular part of the style portion; stamens inserted just below sepals, almost sessile; anthers ca. 0.5 mm long; style not exerted. Seed ovoid, ca. 2.5 mm long, acute, distinctly broader proximally than distally, with slight constriction just above midway, and minutely uncinuate at apex; seed coat finely textured with alveolae distinctly wider than long, in indistinct ranks, rarely quite smooth (Figs 1b, 4, 5).

**Selected specimens examined:** **SOUTH AUSTRALIA.** Section 43, Hundred of Tatiara, 6 km NE of Wolseley, *T. Croft* 125, 20.x.1993 (AD); ca. 0.5 km NE of Pooginagoric on road to Wolseley in road reserve on SE side, *P.J. Lang* 2356, 24.xi.1993 (AD); 4.6 km direct NNW of Serviceton (Heritage Agreement 1000), *P.J. Lang* B584-974, 13.ii.1995 (AD); 50 m NE along Stotts Road from the junction of Bordertown-Frances Rd, Watsons Rd and Pooginagoric-Custon Rd, *T.S. Te* 815, 8.x.2009 (AD). **NEW SOUTH WALES.** River flat near Deniliquin, *W.E. Mulham s.n.*, xi.1979 (MEL, NSW); Cowra township, *E.J. McBarron* 9154 bis, 26.viii.1964 (MEL, NSW); 1 km SE of Munyabba, *B.G. Briggs* 4394, 18.x.1971 (MEL, NSW). **VICTORIA.** Little Desert, 12 km NNW of Minimay, *A.C. Beaglehole* 66842, 28.xi.1979 (MEL); Broughton Roadside Reserve, *A.C. Beaglehole* 84071, 10.ix.1986 (MEL); Natimuk Lake Reserve, *A.C. Beaglehole* 86272, 10.xi.1986 (MEL); Barrabool Flora and Fauna Reserve, *A.C. Beaglehole* 85725 (MEL), 17.x.1986; Bacchus Marsh (Maddingley area), *N.G. Walsh* 8819 & *V. Stajsic*, 23.viii.2018 (AD, MEL); 14 km NNE of Wedderburn, *A.C. Beaglehole* 50161, 12.viii.1975 (MEL); About 1 mile [1.6 km] S of Wunghnu, *T.B. Muir* 6889, 6.xi.1981 (MEL); Barmah National Park, Maconochies Crossing, *V. Stajsic* 6946,



**Figure 4.** Unusual, smooth-seeded form of *Pimelea curviflora* subsp. *planiticola* (MEL616755). Scale bar = 0.5 mm.

13.iii.2011 (MEL); Bushland Reserve, Webb Rd, Goomalibee, NW of Benalla, *R. Thomas* 349, 10.x.1991 (MEL); Hunter railway siding, NW of Elmore, *P. Foreman* 87, 16.i.1993 (MEL); Terrick Terrick National Park, *W.A. Gebert* 350, 11.ix.2013 (MEL, PAL, RSA); Shepparton State Forest, 1.5 km SW of Shepparton, *G.K. Patterson* 558, 10.x.1980 (MEL); Rabbiters Swamp, E of Balliang, *D. Frood* 035/90, 19.vi.1990 (MEL).

**Distribution and habitat:** Recorded from south-eastern South Australia (near Bordertown), central and north-western Victoria, south-west plains and south- and central western slopes of New South Wales to as far north at least as Cowra (Figure 3).

Known from grasslands and grassy woodlands on predominantly marine, fluvial and aeolian sediments (Muller 2002), mainly on plains and occasionally in ephemeral swamps, but also on river terraces and gently undulating country. The average annual rainfall is mostly 300–500 mm. Soils are mostly clay loams or clays, sometimes slightly saline. From herbarium sheets, commonly associated species include *Eucalyptus albens* Benth., *E. camaldulensis* Dehnh., *E. largiflorens* F.Muell., *E. melliodora* A.Cunn. ex Schauer, *E. microcarpa* (Maiden) Maiden, *Allocasuarina luehmannii* (R.T.Baker) L.A.S.Johnson, *Acacia* spp., *Duma florulenta* (Meisn.) T.M.Schust., *Haloragis aspera* Lindl., *Anthosachne scabra* (R.Br.) Nevski, *Poa labillardierei* Steud., *Rytidosperma duttonianum* (Cashmore) Connor & Edgar, *Marsilea drummondii* A.Braun.

**Etymology:** The subspecific epithet, *planiticola*, is from the Latin *planities*, a plain, and *-cola*, dwelling, a reference to the habitat of the taxon.





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cm  
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NATIONAL HERBARIUM OF VICTORIA (MEL)  
HOLOTYPE  
*P. curviflora* subsp. *planiticola* N.G. Walsh & E.M. Schulz  
Determinavit: N.G. Walsh 7.VIII.2019

**TYPE**

NATIONAL HERBARIUM OF VICTORIA (MEL), AUSTRALIA

NATIONAL HERBARIUM OF VICTORIA (MEL)  
MELBOURNE, AUSTRALIA

MEL 2134990



192 THYMELAEACEAE  
*Pimelea curviflora* R.Br.  
var. aff. *subglabrata* Threlfall

Coll.: Stajic, V. 2679 Date: 25 Nov 2001  
AUSTRALIA : VICTORIA  
Region/District: Midlands/Vic. Volcanic Plain  
Locality: Bacchus Marsh, on S side of Ballarat railway line, between Fiskens and Vallance Streets. Ref: AMG 55 274500 5825500.  
Lat.: 37°41'24"S Long.: 144°26'33"E  
Vic. Grid Ref.: N 39:

Notes: Growing on embankment above railwayline, below powerlines, on High level river terrace geology, on reddish coloured soil with pebbles and quartz. Associated with: \**Arctotheca calendula*, \**Avena barbata*, *Austrostipa bigeniculata*, *A. scabra*, *A. setacea*, *Chloris truncata*, *Einadia nutans*, *Enchylaena tomentosa*, *Enneapogon nigricans*, \**Erodium cicutarium*, *Euphorbia drummondii*, \**Lycium ferocissimum*, *Faspidium constrictum*, \**Pentstemonis airoides*, *Wahlenbergia luteola* and *Cassinia arcuata*.  
Small branched shrubs to 30-40 cm high. About 150 plants of various age classes. Very rare in the region.  
Dups: AD, CANB, MEL (Vic.Ref.Set), NSW, PERTH

Figure 5. Holotype of *Pimelea curviflora* subsp. *planiticola* (MEL2134990).



**Conservation status:** As its habitat is largely relatively fertile plains country, the abundance of subsp. *planiticola* has undoubtedly diminished substantially since settlement and in many districts is now largely confined to remnant roadside vegetation (e.g. through the Victorian Wimmera). Nonetheless, it is known from numerous conservation reserves and has a wide distributional range. Specimen notes also often record it as occurring in small populations, so it is probably correctly regarded as regionally rare at least, but it is considered unlikely to qualify for listing under IUCN (2001) criteria.

**Notes:** While the slightly constricted seed of subsp. *planiticola* suggests a relationship with *P. micrantha*, it is still considered nearer to the range of seed shapes and textures in *P. curviflora* than to the very distinctive shape and surface texture (strongly alveolate with alveolae in more or less distinct rows) of *P. micrantha* (see Figure 1). One specimen of subsp. *planiticola* (G.K. Patterson 558, Shepparton area, Victoria, MEL616755) was found with virtually smooth seeds (Figure 4), but this is not the normal state within the taxon. The short perianth also suggests a relationship with *P. micrantha*, but the sepals are up to twice as long as the tubular part of the style portion, slightly longer than those of *P. micrantha* which are shorter than or equal to the tubular part of the style portion.

The mostly semi-arid habitat of subsp. *planiticola* distinguishes it from other subspecies of *P. curviflora* in Victoria. In overall appearance (habit, indumentum) it is most likely to be confused with subsp. *gracilis* (a species from relatively high-rainfall areas in Victoria) or with *P. micrantha* with which it may be sympatric (e.g. Bacchus Marsh and Wimmera areas of Victoria).

## New Combinations

### *Pimelea curviflora* subsp. *acuta* (Threlfall) N.G.Walsh comb. nov.

*P. curviflora* var. *acuta* Threlfall, *Brunonia* 5:190 (1983)

**Type:** AUSTRALIA. N.S.W. Two Sticks Rd, ca. 1.6 km N of Picadilly Circus, 15 Nov. 1961, *P.J. Darbyshire* 525 (holo: NSW 651525 photo seen; iso: A 443770 photo seen, CANB 86039 *n.v.*, MEL 50775 !).

### *Pimelea curviflora* subsp. *divergens* (Threlfall) N.G.Walsh comb. nov.

*P. curviflora* var. *divergens* Threlfall, *Brunonia* 5:189 (1983)

**Type:** AUSTRALIA. N.S.W. Currabubula district, 31 May 1940, *per Glenfield Veterinary Research Stn 40/812* (holo: NSW 178603 photo seen; iso: SYD *n.v.*, NSW 653308 photo seen).

### *Pimelea curviflora* subsp. *sericea* (Benth.) N.G.Walsh comb. nov.

*P. curviflora* var. *sericea* Benth., *Fl. Austral.* 6:31 (1873)

**Type:** AUSTRALIA. N.S.W. North Bathurst, *A. Cunningham* Nov. 183/1822 (lecto: K 00900018 photo seen, *fide* S. Threlfall, *Brunonia* 5: 187 (1983); isolecto: K 00900019 photo seen).

### *Pimelea curviflora* subsp. *subglabrata* (Threlfall) N.G.Walsh comb. nov.

*P. curviflora* var. *subglabrata* Threlfall, *Brunonia* 5:189 (1983)

**Type:** AUSTRALIA. N.S.W. 5 miles [8 km] S of Wollar, 1 Oct. 1952, *H.S. McKee* 315 (holo: NSW 127778 !; iso: SYD *n.v.*).

## Typification

Typification of some taxa in the *Pimelea curviflora* - *P. micrantha* complex was deficient in the accounts by Threlfall (1983) and Rye (1988, 1990), undoubtedly partly due to the greater difficulty during that period in locating types. With the advent of online delivery of Type images, e.g. through the JSTOR Global Plants imaging project (<http://plants.jstor.org/>, accessed 31 May 2019), the opportunity is taken here to clarify the typification of *P. curviflora* (and its synonyms *P. muelleri* Meisn. and *P. thymifolia* C.Presl), two of its subspecies, and *P. micrantha*.

### *Pimelea curviflora* R.Br., *Prodr.* 362 (1810)

**Type:** AUSTRALIA. N.S.W. Port Jackson area, 1802, R.Br. s.n. (Lecto: here chosen BM 000895082 photo seen; isolecto: K 900020, K 900021, MEL 50703 !, MEL 51300 !, S 09-18564 photo seen).

**Notes:** Threlfall (1983) cited the BM specimen as the holotype, pointing out that the date on Brown's label (June 1802) was not in agreement with his notes (17.v.1802). Although a number of apparent duplicates of Brown's type have been brought to light via JSTOR ([http://plants.jstor.org](http://plants.jstor.org/), accessed 31 May 2019), none has a date of May 17, supporting Threlfall's assertion that the BM specimen is the most appropriate type; however we consider it better treated as a lectotype than a holotype

in accordance with Articles 9.4 and 9.19 of the Code (Turland *et al.* 2018). Threlfall (*loc. cit.*) transcribed Brown's label in Latin: 'in pratis (unreadable word) prope Sydney, (unreadable word) prope Parramatta, June 1802 ...' Having inspected the image on JSTOR, the unreadable words were found to be 'rarius' and 'crebrius', rendering Brown's note (translated to English) as 'In meadows, rare near Sydney, frequent near Paramatta.'

In addition to the types noted above, there is an

unnumbered specimen in LINN ex herb Banks from Port Jackson but without collector, and 2 sheets at BRI (both numbered AQ023515) labelled '*Pimelea curviflora*, Port Jackson' (undated) in Brown's hand. These are likely to isolectotypes.

***Pimelea curviflora* var. *sericea* Benth., Fl. Austral. 6:31 (1873)**

Bentham (1873) synonymised *Pimelea propinqua*

#### Key to *P. micrantha* and *P. curviflora* subspecies

- 1 Sepals <1 mm long ... 2
- 1 Sepals >1 mm long ... 5
- 2 Seed skittle-shaped with a distinct constriction at, or shortly above, midpoint, apex obtuse; style portion of tube no longer than sepals; leaves (at least those subtending inflorescences) and perianth densely sericeous (semi-arid areas of WA, SA, NSW, Vic.)... *P. micrantha*
- 2 Seed more or less ovoid, apex acute; style portion of tube slightly longer than sepals; leaves glabrescent to moderately appressed-hairy ... 3
- 3 Fruit and seed slightly constricted below the minutely but conspicuously uncinatate apex (south-east SA, south-western plains NSW, western and northern plains Vic)... subsp. ***planiticola***
- 3 Fruit and seed not constricted below the apex, not uncinatate ... 4
- 4 Fruit and seed more or less symmetric, almost fusiform; sepals up to twice as long as the tubular part of the style portion of corolla; leaves with appressed hairs on abaxial (and usually adaxial) surface; (far south-east NSW, south-eastern VIC)... subsp. ***fusiformis***
- 4 Fruit and seed distinctly asymmetric, ovoid; sepals at least 2.5 times as long as the tubular part of the style portion of corolla; leaves lacking hairs, or a few only on abaxial surface (Wollongong-Newcastle area NSW) ... subsp. ***subglabrata***
- 5 Fruit and seed curved, not or barely wider in basal half and more or less evenly and equally tapered at base and apex; (Sydney area NSW)... subsp. ***curviflora***
- 5 Fruit and seed usually asymmetric but not curved, distinctly wider in basal half ... 6
- 6 Leaves no more than 3 times longer than wide, margins distinctly and narrowly recurved; hairs of younger stems 2–3 mm long; perianth mostly 10–13 mm long at maturity; (Southern Highlands, NSW) ... subsp. ***acuta***
- 6 Leaves usually >3 times longer than wide (sometimes less in subsp. *gracilis*), margins flat or rather indistinctly incurved or recurved; hairs of younger stems to 2.5 mm long; perianth mostly <10 mm long (but to 12 mm long in subsp. *divergens*) ... 7
- 7 Leaves usually distinctly discolorous, usually obtuse; plants typically erect, slender, single-stemmed from base; inflorescences mostly 3–7-flowered; mostly forest areas (?SA, Qld, NSW, Vic, Tas) ... subsp. ***gracilis*\***
- 7 Leaves usually concolorous, usually acute; plants commonly several-stemmed from base with a persistent woody taproot; inflorescences mostly 5–15-flowered; mostly grasslands ... 8
- 8 Longest hairs 1.2–2.5 mm long; fruit gibbous at base, at least half as wide as long, pericarp with an erect, rather dense terminal tuft of hairs; perianth to 12 mm long (south-eastern Qld, north-eastern NSW) ... subsp. ***divergens*\*\***
- 8 Longest hairs to 1.5 mm long; fruit not gibbous, *ca.* 3 times as long as wide, pericarp lacking a terminal tuft of hairs, or rarely with a few weak hairs at apex; perianth to *ca.* 8 mm long (SA, NSW, VIC, TAS) ... subsp. ***sericea*\*\*\***

\* Subsp. (as var.) *gracilis* was cited by Rye as occurring in SA, with a specimen cited from 'W end of Torrens Gorge' (A. Spooner 1135). We have not seen this specimen, but others labelled as var. *gracilis* at MEL have been redetermined to be either subsp. *sericea* or subsp. *planiticola*.

\*\*A specimen of subsp. (as var.) *divergens* from Wickliffe Victoria (s. coll., 9.xi.1903, MEL2180317) was reported by both Rye and Threlfall, but this specimen appears to be quite typical of subsp. *sericea* and has been redetermined.

\*\*\*Threlfall and Rye both give the distribution of subsp. (as var.) *sericea* as including Queensland. Bean (2017) notes that all Queensland specimens of this variety seen by him belong with the superficially very similar subsp. (as var.) *divergens*. No Queensland specimens of subsp. *sericea* were seen at MEL. Some Tasmanian specimens of subsp. *sericea* that had been treated as an undescribed taxon, *P. sp.* 'Tunbridge' were considered a threatened taxon (e.g. <https://www.threatenedspecieslink.tas.gov.au/Pages/Pimelea-sp-Tunbridge.aspx>, accessed 31 May 2019), but these are typical subsp. *sericea* in both habit and grassland habitat. Some confusion appears to have arisen about the circumscription of subsp. *sericea* in Tasmania from Rye's citation of its occurrence on Flinders Island. All Flinders Island material of *P. curviflora* at HO and MEL is subsp. *gracilis*.

Meisn. under *P. curviflora* var. *sericea*. No particular type was noted, but Threlfall's (1983) lectotypification of Meisner's name, based on a Cunningham specimen at K ('North Bathurst, Nov. 183/1822') is appropriate. This is K00900018, but another element is mounted on the same sheet 'slender shrub in fertile plain, N of Bath' [Bathurst], as K00900019. It also apparently a Cunningham collection (signified by a pencilled 'C') and is likely part of the same collection, resembling closely K00900018. It is treated here as an isolectotype. A Cunningham collection at NY (386352) 'Valleys near Bathurst, N.S.Wales, 1822' is almost certainly another isolectotype and would have been used by Meisner in naming *P. propinqua* (he may or may not have seen the Kew specimens).

Rye (1990) notes a possible isotype at G-DC, but the Cunningham specimen therein, inspected from microfiche, has no locality and appears to be dated 1836, so is not an isolectotype.

The K sheet with the two pieces (00900018 and 00900019) has been labelled by Cunningham as '*Pimelea congesta* A.Cunn.'. This name was never validly published, although cited by Bentham as a synonym under *P. curviflora* var. *sericea*. Threlfall (1983) included it as a *nomen nudum* under *P. hirsuta* Meisn. (although attributed the name to Richard Cunningham (R.Cunn.) rather than his brother Alan (A.Cunn.)). Bentham (1873) had made the note under *P. hirsuta*, '*P. hirsuta* R.Cunn. in several herb., not of A.Cunn.'. It is not clear which herbaria Bentham was referring to here, there being no collections identified as *P. congesta* R.Cunn. encountered in the present study.

### ***Pimelea muelleri* Meisn., *Linnaea* 25:351 (1854).**

Bentham included *Pimelea muelleri* in *P. curviflora* var. *curviflora* rather than var. *sericea*, but his concept of var. *curviflora* was very broad. Threlfall (1983) synonymised *P. muelleri* under *P. curviflora* var. *sericea* which is the best fit of currently named taxa. She nominated a G-DC specimen collected by Mueller at Holdfast Bay in South Australia as the lectotype and other specimens at MEL as possible syntypes. There are at MEL five Mueller collections of this from Holdfast Bay (MEL 51201, MEL 51299B, MEL 51321, MEL 59270, MEL 59272) and one at NY (1104574), all of similar appearance and presumably

duplicates. These specimens are either dated 1847 or undated – a January 1851 collection is in late fruit and is clearly not of the same gathering. The 1847 collections are reasonably treated as isolectotypes. Specimens at FR (036146, photo seen), G (190897, photo seen) and MEL (59271!), labelled simply 'Nov. Holland. Meridional.' (i.e. South Australia), are of similar appearance to the isolectotypes noted above and may also be isolectotypes.

Collections by Behr 'inter Gawlertown et Lyndoch Vale' were listed by Meisner along with Mueller's Holdfast Bay collections, and two specimens of this gathering are at MEL (51203 and 51299A) forming the residual syntypes of *P. muelleri*. It is likely that other examples of the Behr collections exist, most likely at G and/or NY.

### ***Pimelea thymifolia* C.Presl, *Botanische Bemerkungen*: 107 (1845)**

**Type: AUSTRALIA.** Novae Hollandiae [Sydney region, N.S.W.], 1823, *Sieber* 205 (lecto: (here chosen): PRC 456580 photo seen; isolecto: H 1385484 photo seen, H 1568440 photo seen, MEL 51251 p.p.!, MEL 61290 p.p.!, MO 3498383 photo seen, PRC 456577 photo seen, PRC 456578 photo seen, PRC 456579 photo seen, PR 615838 photo seen, S 09-20908 photo seen, W 0045017 photo seen, W 0045018 photo seen, W 0045019 photo seen, W 0045239 photo seen),

*Pimelea thymifolia* was treated by Threlfall (1983) and subsequently others (e.g. Rye 1990; Australian Plant Census: <http://www.chah.gov.au/apc/index.html>; accessed 4 Jan 2019) as a synonym of *P. curviflora*. Threlfall cited only one specimen (MEL) and treated it as an isotype. Subsequently, many further specimens of *Sieber* 205 have been located. The specimen from the herbarium at Charles University, Prague (PRC), noted as the principal 'home' of Presl's collections (Stafleu & Cowan 1976–1988), has been chosen as the lectotype (Figure 6), but numerous isolectotypes exist, a testament to the zealous collecting habits of Sieber (see Ducker, 1990). Presumably further examples of *Sieber* 205 exist but are yet to be revealed.

Presl noted his *Pimelea thymifolia* (based on *Sieber* 205) differed from *P. curviflora* in the leaves and the perigonium tube (i.e. the hypanthium: 'perigonii ... tubo recto'). There are no substantial differences at all in the leaves of *Sieber* 205 and the type of *P. curviflora* at MEL. Specimens of *Sieber* 205 at MEL showed the



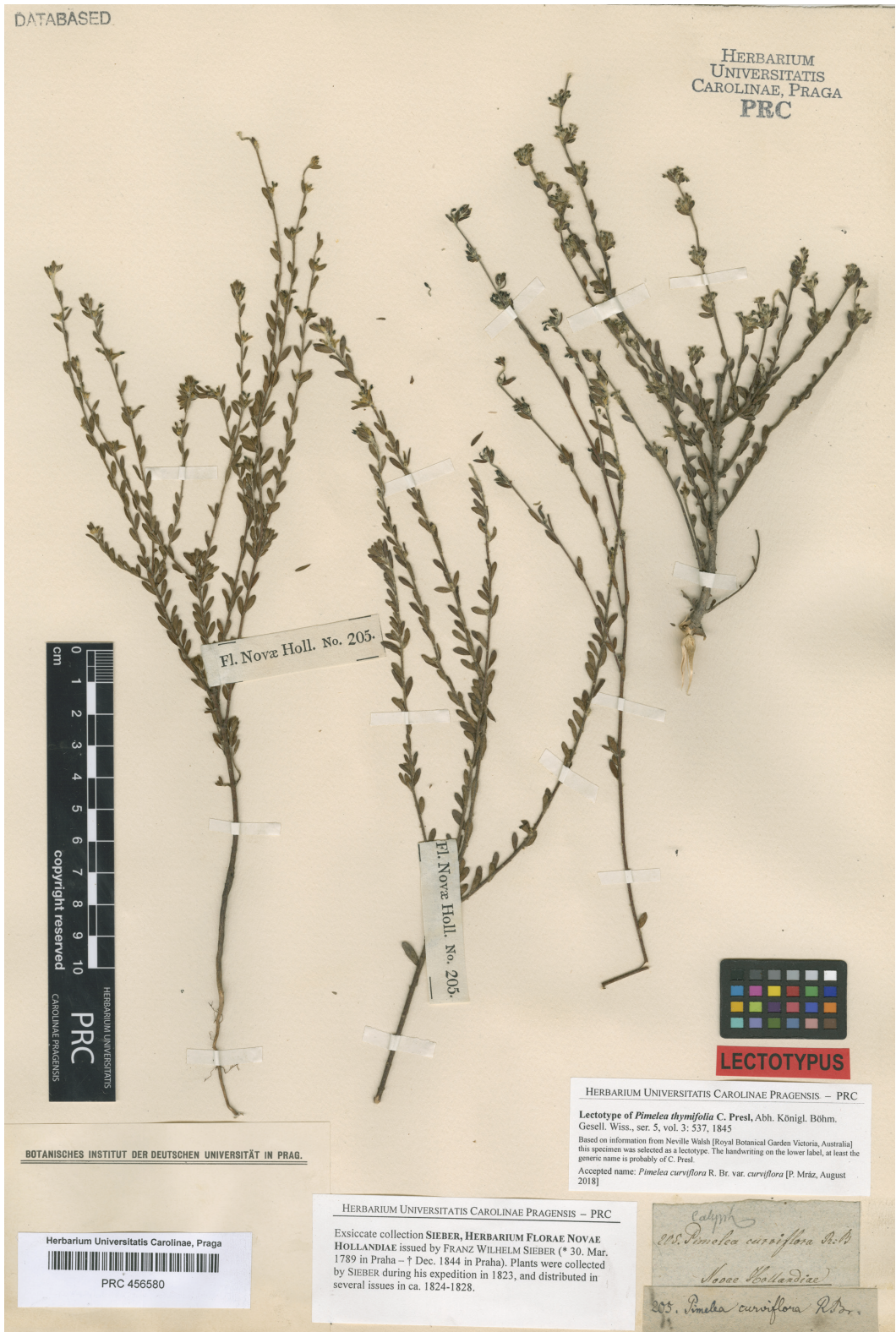


Figure 6. Lectotype of *Pimelea thymifolia* (PRC 456580).

typical flower and fruit of *P. curviflora*. Some of the Sieber specimens were in early flower when collected, and it is possible that those available to Presl were at this stage (although photographs of specimens at PRC appear to show curved flowers and fruits and at least two of these specimens had been seen by Presl.). The characteristic curvature of the flowers of *P. curviflora* becomes particularly apparent at maturity or even after the 'style portion' abscises to leave the developing falcate fruit.

***Pimelea micrantha* F.Muell. ex Meisn., *Linnaea* 26: 351 (1854).**

**Type: AUSTRALIA.** "Ultra Saltcreek, Nov. (Dr.Behr). Circa Enfield, Austral. aur. Janr. (Dr. F. Müller)" (lecto here designated: Enfield N. Holl. Austr., Jan 1852, *F. Mueller s.n.* (NY photo seen; isolecto: MEL 52308 p.p. !; probable isolecto: HBG photo seen; residual syntype: Ultra Saltcreek, Nov., *Dr.Behr s.n.*, MEL 51308 p.p. !

Threlfall cited the Enfield specimen at NY as holotype. This is incorrect as two collections were referenced by Meisner in the protologue. Meisner's herbarium is at NY (Stafleu and Cowan 1976–1988) and the specimen there is here nominated as the lectotype. A mixed sheet at MEL (MEL51308) has labels for both the localities (Salt Creek and Enfield) cited in the protologue. Of the elements on the sheet, one resembles that at NY, while one is of a smaller-leaved plant – presumably the Salt Creek component. The elements matching the lectotype have been indicated and are treated as isolectotypes and the 'mismatching' element is treated as the residual Salt Creek syntype.

Putative types have been imaged on JSTOR (<http://plants.jstor.org/>, accessed 31 May 2019) from K and HBG, but the Kew sheet is labelled 'Murray River, J.D.' (undated). The collector is almost certainly John Dallachy, who collected for Mueller in north-west Victoria. This specimen has no type status. The HBG sheet has a 'Plantae Mullerianae' label, so is probably a Mueller collection, and the locality is given as simply 'Nov. Holland. meridional' (i.e. South Australia). The specimen is a fair match for the Enfield gatherings at NY and MEL and is therefore treated here as a likely isolectotype.

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