

## **LAXMANNIA COMPACTA (ANTHERICACEAE) A NEW SPECIES FROM EASTERN AUSTRALIA**

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### **Summary**

*Laxmannia compacta* Conran & P. Forster, a new species from eastern Australia is described and figured. This species was previously included within *L. gracilis* R.Br.

*Laxmannia* R.Br. is a small endemic Australian genus Bentham placed in his tribe *Johnsonieae* in Liliaceae (Bentham 1878). More recently it has been included in the Anthericaceae (Dahlgren & Clifford 1982; Dahlgren *et al.* 1985). Bentham recognised eight species, six of which occur in Western Australia, with *L. gracilis* R.Br. and *L. sessiliflora* Decne. occurring in eastern Australia. The latter of these two has been recorded in Victoria and south-eastern New South Wales (Willis 1962) while *L. gracilis* has been considered to be distributed from Victoria to northern Queensland.

Studies of the reproductive biology of the Western Australian species have revealed tendencies towards autogamy and quantum speciation with autopolyploidy indicated (Keighery in Peterson & James 1973, Keighery in James & Hopper 1981).

In the course of field collecting in Mundubbera Shire, south-eastern Queensland, material of a *Laxmannia* not easily referable to *L. gracilis* was found. Examination of this material and herbarium accessions identified as *L. gracilis* at BRI, BRIU, and NSW revealed that there were a number of characters by which these collections could be divided into two groups. These characters are quantifiable and analyses performed suggest that two distinct taxa exist in eastern Australia.

### **Materials, Methods and Results**

Specimens identified as *Laxmannia gracilis* at BRI, BRIU, NSW and MEL were examined, and divided into two groups on the basis of perianth, leaf and internode characteristics. 57 specimens of one type, and 32 of the other at BRI, BRIU and NSW (indicated \* in selected specimens and index to collectors) were measured to determine average ( $n=5$ ) leaf, sepal (outer tepal whorl), petal (inner tepal whorl) and internode lengths, and the data subjected to discriminant function analysis (Fisher 1936; Sokal & Rohlf 1969). The calculations were performed on a PDP-10 computer using the STATPAC program DISCRF. The resulting equation:

$$Di = 7.62116 \times 10^{-2} \times \text{av. leaf length} + 2.89327 \times \text{av. sepal length} + 5.15434 \times \text{av. petal length} \times -1.20239 \times 10^{-1} \times \text{av. internode length}$$

where  $Di$  is the discriminant score for the individual  $i$ , shows that the two major contributing factors to the separation of the group were the average sepal and petal lengths and particularly the petal lengths.

When the  $D$  scores for all the individuals were plotted as a frequency polygon (Fig. 1) the two groups were separated with only a minimal overlap. This statistical separation of the groups, combined with the differences in the degree of anther size and attachment, supports the hypothesis that *L. gracilis* as traditionally circumscribed, consists of two distinct taxa.

### **Taxonomy**

The two taxa here accepted differ in many of the characters considered to be of specific importance in this genus. The perianth characters in particular were used by

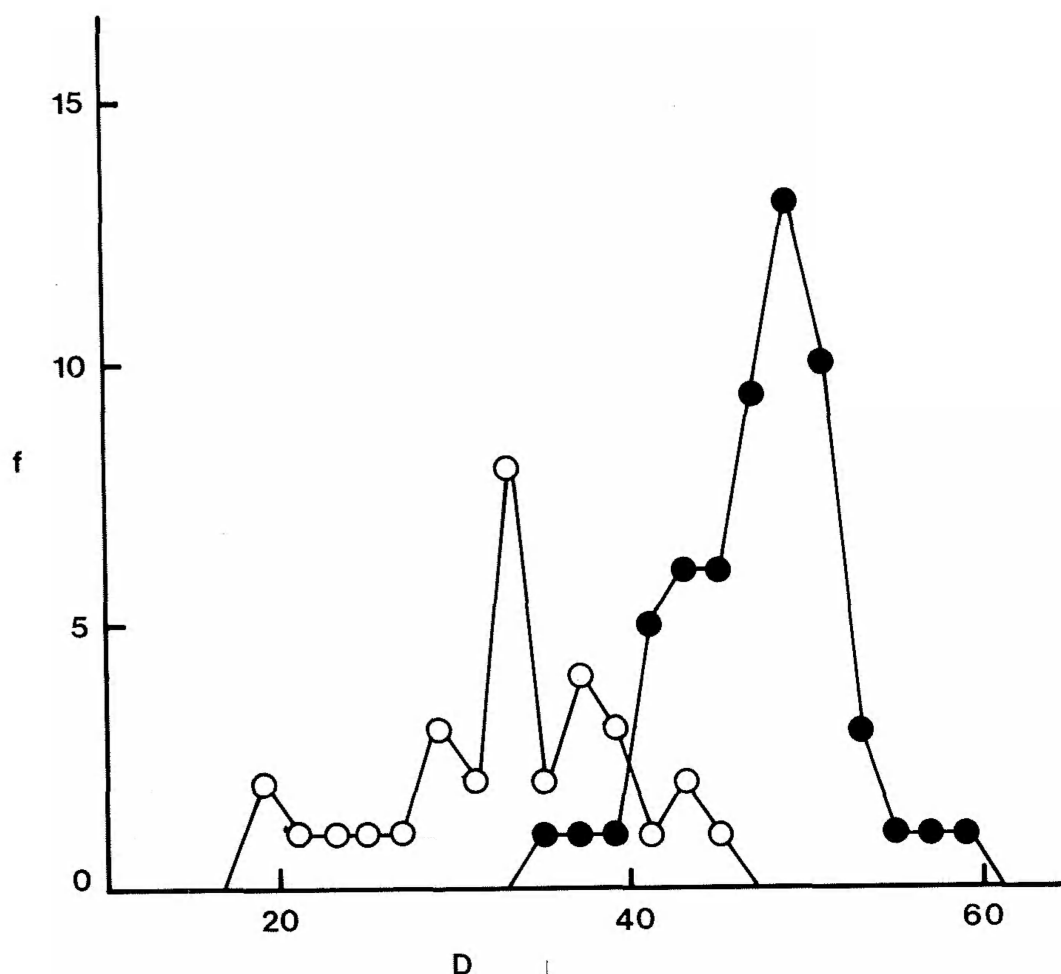


Fig. 1. Frequency polygons of D scores for *Laxmannia compacta* ○ and *L. gracilis* ●

Bentham (1878) to separate species of *Laxmannia*. Accordingly, the two taxa recognised are considered to be of specific rank and are readily distinguishable both in the field and from dried material. Figs 2 & 3.

Throughout much of their known ranges (Fig. 4), these two groups are ecologically and geographically discrete. Material of both species has been collected in close proximity on the Blackdown Tableland, in central Queensland, but there is no evidence of hybridisation. Local allopatry with related species occupying narrow ecologically discrete zones is common in this area.

Isotype material of *L. gracilis* (NSW) examined (and included in the discriminant analysis) had sepals which are much shorter than the petals and this is shown in the Bauer plate of *L. gracilis* published by Endlicher (1838).

*L. illecebrosa* Reichb. is worth considering here. It is stated to differ from *L. gracilis* in the larger scarious sheathing bases of the leaves and by being more woolly hairy. Bentham (1878) referred *L. illecebrosa* to *L. gracilis* as he could find no characters to distinguish the two taxa. Domin (1915) in his account of *Laxmannia*, provided a photograph of presumably type material of *L. illecebrosa* (Brisbane River, Am. Dietrich, Original von. *L. illecebrosa*). This material is referable to *L. gracilis* s. str. and the protologue description (Reichenbach 1871) states that the sepals are manifestly shorter than the petals, a character of *L. gracilis* s. str.

The second taxon accepted is here described as a new species.

*Laxmannia* R.Br., Prodr. 285 (1810) *nom. cons.* **Type:** *L. gracilis* R.Br. (*typ. cons.*)

*Bartlingia* F. Muell., J. & Proc. Roy. Soc. N.S.W. 15: 232 (1882) non Reichb. (1824)

*Laxmannia compacta* Conran & P. Forster, *sp. nov.*

Herba prostrata et ramulosa ad ca 10 cm alta; glaberrima ramosa, stolonifera longa ad ca 10 cm. Folia numerosa, sessilia, arcuata ad linearia, 4–51 mm longa, 1–2 mm lata. Inflorescentia adscendens, pedunculata, axillaris racemosus umbellus. Bractee involucrorum numerosae 2–4 mm longae. Pedunculus ca 2–8 cm longus. Flores numerosi, rosi ad albi, ca 5 mm lati; pedicellares, pedicello 1–3 mm longo. Sepala 2–4 mm longa; filamenta ab sepalis libera, ad petala confluentia; antherae ca 0.25 mm longae, flavae. Ovarium obovatum glabrum, 0.5–1 mm latum; stylus filamentis, capitatus, 0.5–1 mm longa. Fructus 2–3 mm latus, ovatus ad globosus. Semina 2–3 mm longa. **Typus:** Burnett District: Boondooma 9145–340227, 45 km SSE of Mundubbera, “Rocky”, paddock, “Manar” Mundubbera Shire, 22 Nov 1984, *P.I. Forster* 1938 (holotypus BRI; isotypi AD, CANB, CBG, K, L, MEL, MO, NSW, NT, NY, P, PERTH, PRE, QRS, US, W).

A prostrate and branching herb to ca 10 cm high; branches glabrous, stoloniferous with stolons to ca 10 cm long. Leaves numerous and sessile in tufts; arcuate to linear, ca 4–51 mm long, 1–2 mm wide. Inflorescence erect, pedunculate, an axillary umbelliform raceme. Flowers numerous, pink to white, ca 5 mm across, pedicellate, pedicels 1–3 mm long. Sepals 2–4 mm long, 1.5–2.5 mm wide. Petals 2.5–5 mm long, 1–2 mm wide. Stamens 2–3 mm long; antisepalous filaments free from the sepals but antipetalous filaments confluent with the petals for most of their length; anthers ca 0.25 mm long, yellow. Ovary glabrous, obovate, 0.5–1 mm wide; style filamentous, capitate, 0.5–1 mm long. Fruit 2–3 mm wide, ovate to globose. Seeds 2–3 mm long. **Fig. 2.**

**Selected specimens:** Queensland. MORETON DISTRICT: Mt Emu, near Coolumb Beach, E of Yandina, May 1957, *Wilson* 624 (BRI)\*. WIDE BAY DISTRICT: Tin Can Bay, Aug 1943, *White* 12297 (BRI)\*. DARLING DOWNS DISTRICT: Jollys Falls, Portions 15 & 37V, Parish of Stanthorpe, Oct 1956, *Shea* 49 (BRI)\*. BURNETT DISTRICT: Eidsvold, 1913, *Bancroft* [BRI 146163] (BRI)\*. LEICHHARDT DISTRICT: ca 1.2 km NW of Mimosa Ck campsite, Blackdown Tableland, Aug 1971, *Henderson* 969 *et al.* (BRI)\*. New South Wales. NORTH COAST: 55 miles [88 km] NW of Grafton on Gwydir Hwy, Gibraltar Ra., Dec 1966, *Tindale* s.n. (NSW)\*. CENTRAL COAST: Cheltenham, Nov 1954, *Johnson* s.n. (NSW)\*. NORTH WEST SLOPES: 0.5 mile [0.8 km] W of Coonabarabran, Oct 1966, *Briggs* 901 (NSW). NORTHERN TABLELANDS: Yarraford, near Glen Innes, Jan 1911, *Kenny* [BRI 084684]\*. SOUTHERN TABLELANDS: Burrier, Shoalhaven R., Oct 1931, *Rodway* 591 (NSW). SOUTH COAST: Linden, 27 Nov 1965, *Coveny* s.n. (NSW)\*.

**Ecology:** The type was collected at 480 m alt. in open heathland among rock crevices and ledges on a southwestern slope growing among *Schoenus brevifolius* R.Br. Associated vegetation included *Melaleuca sieberi* Schauer, *Pultenaea petiolaris* Cunn. ex Benth., *Trachymene procumbens* (F. Muell.) Benth., *Platysace lanceolata* (Labill.) Druce, *Astrotriche pterocarpa* Benth. and *Oxal stricta* R.Br. The habitat is seasonally waterlogged but becomes desiccated during the dry season in late winter and early spring. Collections from throughout this species' range have been recorded mainly from various heathland communities, with some collections from *Eucalyptus* open forest on sandstone.

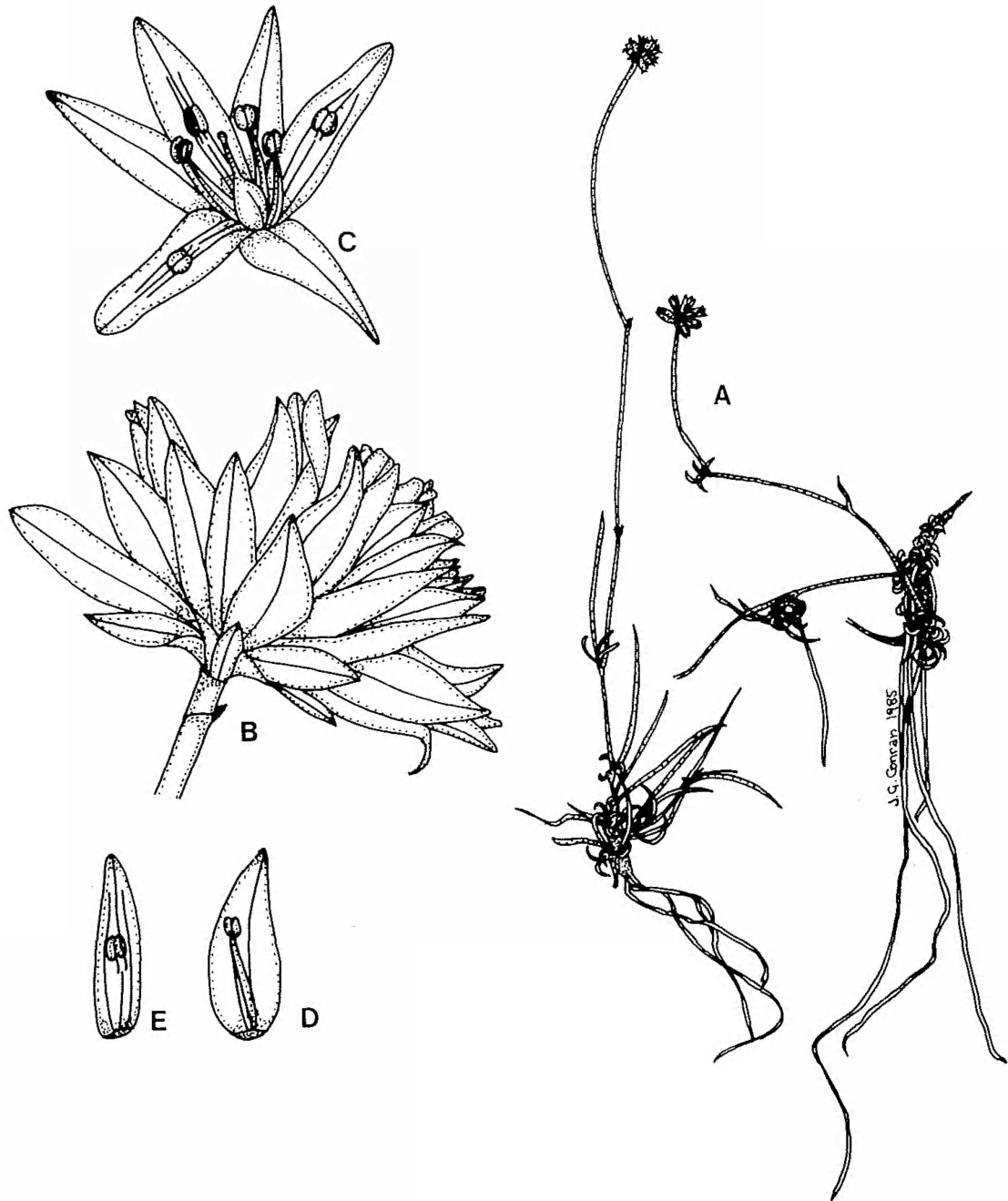
**Etymology:** Named from the compact tufted nature of the leaves.

**Conservation Status:** This species is widespread and represented in a number of Conservation Reserves and is not considered endangered at present.

*Laxmannia gracilis* R.Br., Prodr. 286 (1810); Endl., Iconogr. t. 97 (1838); Schnizlein, Icon. fam. nat. 1: t. 55d, fig. 2-10 (1849); F. Muell., Fragm. 7: 88 (1870); Benth., Fl. Austral. 7: 65 (1878); Engler & Prantl., Natürl. Pflfam. 11 5: fig. 32 D-G (1888); Bailey, Qd Flora 5: 1638-1639 (1902); Domin, Bibl. Bot. 85: 522-523 fig. 110 (1915); Burbidge & Gray, Fl. A.C.T. fig. 95 (1970). *Bartlingia gracilis* (R.Br.) F. Muell., Key Syst. Vict. Plant. 1: 436 (1888). **Type:** Port Jackson, Iter Australiense, R. Brown (isotype: K (photo), NSW, MEL).

*L. illecebrosa* Reichb., Beitr. Syst. Pflanzenk. 72 (1871). **Type:** Brisbane River, A. Dietrich n.v.

An erect, branching herb to 40 cm high; branches glabrous, adventitious roots present but the plants not stoloniferous. Leaves numerous and sessile, scattered or in clusters along the stems; linear, 8–60 mm long, 1–2 mm wide. Inflorescence erect, pedunculate, an axillary umbelliform raceme. Involucral bracts few, 1–3 mm long. Peduncle 2–20 cm long. Flowers few to numerous, white to pink, 6–8 mm wide, pedicellate; pedicels 1–3 mm long. Sepals 4–6 mm long, 2–3 mm wide. Petals 5–8 mm long, 2.5–4 mm wide.



**Fig. 2.** *Laxmannia gracilis*: A. habit  $\times 2/3$ . B. inflorescence  $\times 7$ . C. flowers (opened artificially)  $\times 7$ . D. sepal with anther  $\times 7$ . E. petal with basally epipetalous anther  $\times 7$ . A from Brown s.n., Port Jackson. B-E from Conran s.n., Mt Coot-tha.



Stamens 3–5 mm long; antisepalous filaments free from the sepals but antipetalous filaments fused to the petals at the base only; anthers 0.5–1 mm long, yellow. Ovary glabrous, globose to ovoid, slightly 3-lobed, 1–2 mm wide; style filamentous with stigma capitate, 1.5–3 mm long. Fruit 2–3 mm wide, ovate to globose. Seeds 2–3 mm long. Fig. 3.

A chromosome count of  $2n = 24$  was recorded on the herbarium label for *B. Briggs* s.n. [NSW 89417].

**Selected specimens:** Queensland. MORETON DISTRICT: St Peter's Lutheran College Property, 5 km NE of Crows Nest on Black Creek, Jan 1973, *Sharpe* 296 (BRI)\*. WIDE BAY DISTRICT: 11 km N of Coalstoun Lakes on tableland road, Biggenden Shire, Apr 1983, *Forster* 1558 (BRI, BRIU)\*. BURNETT DISTRICT: 47.2 km from Eidsvold on road to Cracow, Eidsvold Shire, Sep 1983, *Forster* 1641 (BRIU)\*. DARLING DOWNS DISTRICT: Moonie Hwy, 16 km W of Westmar, Oct 1975, *Williams* 75081 (BRI)\*. LEICHHARDT DISTRICT: Near Mimosa Ck campsite, Blackdown Tableland, Apr 1971, *Henderson* 590 *et al.* (BRI)\*. MARANOA DISTRICT: 39 km from Roma on Injune road, May 1975, *Simon* 2858 *et al.* (BRI). MITCHELL DISTRICT: Warlus area C, Site 338, 50 km W of Tambo, Aug 1975, *Beeston* 1332C (BRI). NORTH KENNEDY DISTRICT: Herberton, Feb 1918, *Michael* 374 (BRI)\*. BURKE DISTRICT: Near source of Poison Creek, ca 90 miles [144 km] N of Hughenden, Apr 1935, *Blake* 8467 (BRI). New South Wales. NORTH COAST: Tabulam to Tenterfield Rd, ca 10 miles [16 km] W of Tabulam, Jan 1971, *Salasoo* 4612 (NSW)\*. CENTRAL COAST: 0.5 mile [0.8 km] S of Wiseman's Ferry, Oct 1965, *Briggs* [NSW 89417] (NSW). NORTH WEST SLOPES: Warrambungle Ranges, Jan 1883, *Betche* s.n. (NSW). NORTHERN TABLELANDS: Torrington, Jan 1911, *Boorman* s.n. (NSW). NORTH WEST PLAINS: Narrabri, Feb 1899, *Maiden* s.n. (NSW). SOUTHERN TABLELANDS: Tuross R., 5 miles [8 km] S of Countegany, Dec 1967, *Briggs* 3208 (NSW). SOUTH COAST: Pinnacle Mt, 8 miles [5 km] NNW of Grenfell, Mar 1956, *Constable* [NSW 37906] (NSW)\*. Victoria. East Gippsland, SE side of Glenmaggie view, 8 km NNE of Heyfield, Nov 1973, *Beaughlehole* 43356 *et al.* (NSW, MEL).

**Ecology:** *L. gracilis* occurs in a range of vegetation communities but is commonly found in eucalypt open forest of poor sandy soils or clay loams, often with *Eucalyptus microcarpa* (Maiden) Maiden, *E. crebra* F. Muell. and *Angophora costata* (Gaertner) J. Britten.

**Conservation Status:** *L. gracilis* is widespread and well represented in Conservation Reserves.

Williamson (1928) proposed a varietal epithet *nana* under the name *Bartlingia gracilis* for dwarf specimens from the Mt William area of the Grampians. The type of this varietal name (Summit, Mt William, Nov 1900, H.B. Williamson [MEL 51804]) designated by G. Keighery (but unpublished) appears to be a shortly pedunculate form of *L. sessiliflora* and the description on the herbarium label distinguishes it from *L. gracilis* on the basis of its short peduncles. Willis (1962) considered *B. gracilis* var. *nana* to be based merely on depauperate specimens from high altitudes (ca 1200–1500m). Comparison of the specimens at MEL reveals that the 7–15 mm peduncles of the variety grade into the sessile to 10 mm peduncles of *L. sessiliflora*, and the plants appear to be otherwise identical, especially on perianth lengths and shape. The name *B. gracilis* var. *nana* would therefore be best placed in synonymy with *L. sessiliflora*.

*L. gracilis* and *L. compacta* can be distinguished from each other by the following key:

1. Sepals and petals  $\pm$  equal; inner stamen whorl strongly epipetalous; plants  $\pm$  compact or procumbent . . . . . *L. compacta*
- Petals longer than sepals; inner stamens weakly epipetalous; plants  $\pm$  caulescent and erect . . . . . *L. gracilis*

### Acknowledgements

We would like to thank Mr Nicholas Lander who, while Australian Botanical Liaison Officer at Kew, examined material at K for us, Mr Les Pedley (BRI) for arranging loan of material and the Directors of BRI, BRIU, NSW and MEL for access to material.

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**Fig. 3.** *Laxmannia compacta*: A. habit  $\times 4/5$ . B. inflorescence  $\times 7$ . C. flowers (opened artificially)  $\times 7$ . D. sepal with anther  $\times 7$ . E. petal with epipetalous anther  $\times 7$ . All from Forster 1935.

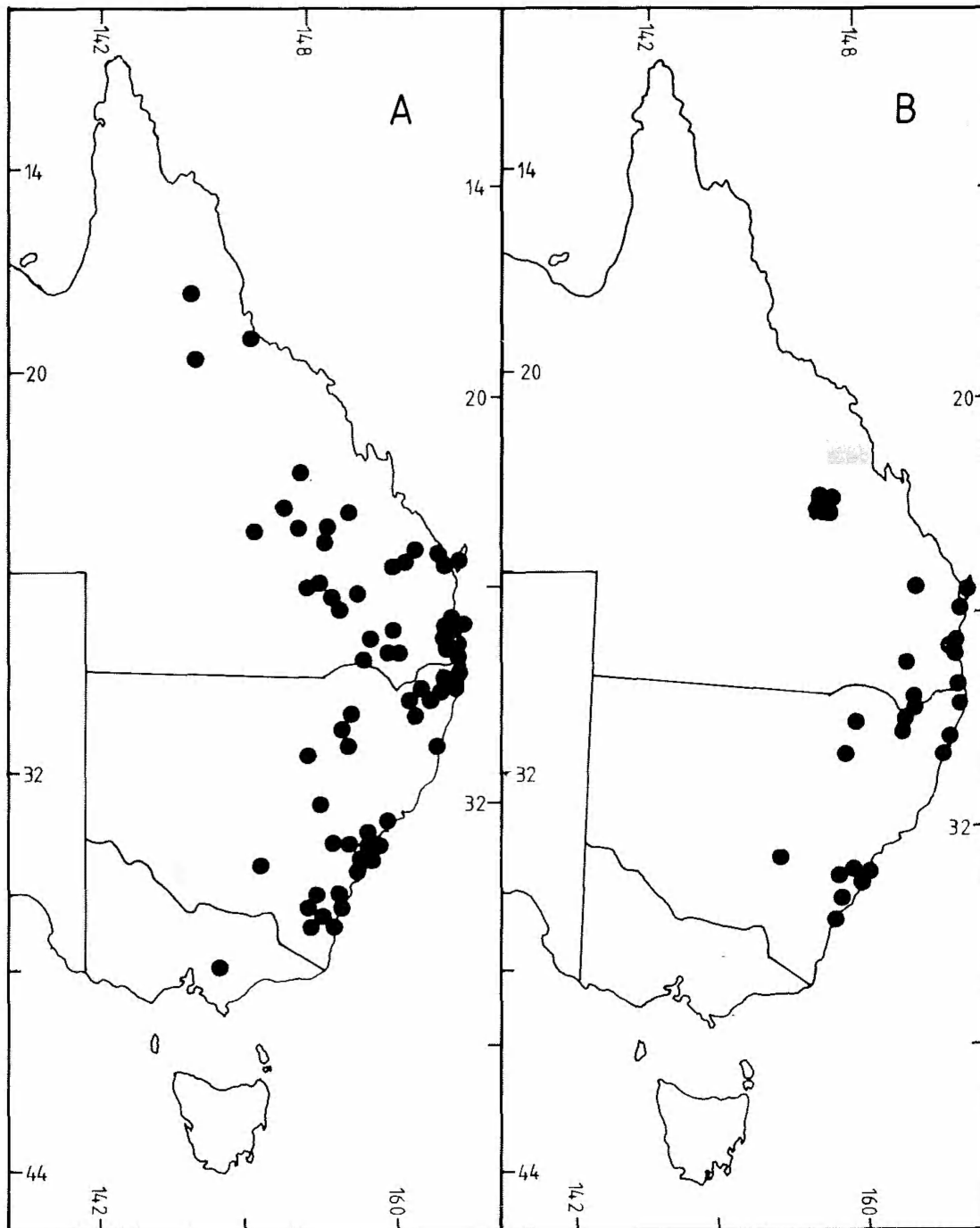


Fig. 4. Distribution of known sites of collection of A. *Laxmannia gracilis* and B. *L. compacta*.

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### Index to Collectors

Collections of *Laxmannia gracilis* and *L. compacta* in the Queensland Herbarium (BRI); Herbarium of the Botany Department, University of Queensland (BRIU); Royal Botanic Gardens and National Herbarium, Sydney (NSW); Royal Botanic Gardens and National Herbarium, Melbourne (MEL).

#### 1. *Laxmannia compacta*

Adams, L.G. 1477 (NSW); Althofer, G.W. 141 (NSW)\*; Bancroft, T.L. (BRI 146163)\*; Bert, W. s.n. (NSW); Betche, E. s.n. (NSW)\*; Blakely, W.F. s.n. (NSW); Boorman, J.L. s.n., Feb 1904 (NSW)\*; Oct 1901 (NSW)\*; Briggs, B.G. 901 (NSW); Burgess, C. s.n. (NSW, CANB 018429); Camfield, J.H. s.n. Oct 1908 (NSW), s.n. Oct 1901 (NSW)\*; Clemens, M.S. (BRI 017562)\*; Coveny, R.G. s.n. (NSW)\*; Coveny, R. & Haegi, L. 9969 (BRI)\*; Dodge, P.H. s.n. (NSW)\*; Floyd, A. s.n. (NSW)\*; Gittins, C.H. 378 (BRI)\*; Hamilton, A.A. s.n. (NSW), s.n. Oct 1901 (NSW); Harrold, A.G. C064 (BRI)\*; Henderson, R. 969 et al. (BRI)\*; Hockings, F.D. (BRI 031501)\*; Hubbard, C.E. 3877 (BRI)\*; Kerridge, P.C. (BRIU 4197); Johnson, L.A.S. s.n., 22 Oct 1953, (NSW)\*; s.n., 25 Nov 1954, (NSW)\*; s.n., 20 Oct 1946 (NSW)\*; s.n., 5 Jan 1951 (NSW)\*, 18961 (NSW); Kenny, F.H. (BRI 084684)\*; Lemberg, R. s.n. (NSW); McComish, J.D. s.n. (NSW); Pearson, S. 26 (BRI)\*; Phillips, M.E. 21502 (BRI)\*; Powell, J.M. & Armstrong, J. 914 (BRI)\*; Rodd, A. 1628 (NSW); Rodway, F.A. 390 (NSW); Rose, A.B. 1 (NSW); Rumsey, H.J. s.n. (NSW)\*; Rupp, H.M.R. (NSW 8107/13)\*; Salasoo, H. 1636 (NSW)\*; Sharpe, P. 1277 (BRI); Shea, K.N. 49 (BRI)\*; Streinham, H. 826 (NSW, CANB); Tindale, M. s.n. (NSW)\*; White, C.T. 12297 (BRI)\*; Williams K.A. 74031 (BRI)\*, 80214 (BRI)\*; Wilson, C.L. 624 (BRI)\*; ex Herb. O.W. Sonder (MEL 51795).

#### 2. *Laxmannia gracilis*

Adams, L.G. (BRI 146168)\*; Bailey, F.M. (BRI 146153)\*; Ballingall, M.E. 1099 (BRI); Bandorlan, W. 55 (MEL); Bates, L.K. 552 (BRI)\*; Beauglehole, A.C. 37710 & Rogers, K.C. (MEL); Beauglehole, A.C. 43356 et al. (NSW, MEL); Beeston, G.R. 1332c (BRI); Bell, C. 531 (BRI); Beuzeville, W.A.W. de (NSW 5615/15)\*; Betche, E. s.n. (NSW)\*; Blake, S.T. (BRI 080922)\*, 4060A (BRI), 2375 (BRI), 8467 (BRI); Blakely, W.F. & Shiress, D.C.W. s.n. (NSW); Boorman, J.L. (BRI 146167)\*, s.n. Oct 1899 (NSW)\*, s.n. Oct 1904 (NSW), s.n. May 1916 (NSW)\*, s.n. Jan 1911 (NSW)\*; Briggs, B.G. s.n., 14 Nov 1965 (NSW)\*, 17 Oct 1965 (NSW 89417)\*, 3208 (NSW)\*; Briggs, B.G.R. 474 (NSW); Camfield, J.H. s.n. (NSW)\*; Cheel, E. s.n. (NSW)\*; Conran, J.G. s.n. (BRIU)\*; Constable, E.F. (NSW 37906)\*, 6480 (NSW)\*; Costin, A.B. s.n. (NSW); Coveny, R. 8553 (NSW), 11824 (NSW)\*; Coveny, R. 7562 et al. (NSW); Cribb, A.B. (BRIU 4199), (BRIU 4201); Durrington, L. 1215 et al. (BRI); Dywer, J.W. s.n. (NSW 8277/15)\*; Everist, S.L. 1030 (BRI)\*; Forster, P.I. 1558 (BRI, BRIU)\*, 1641 (BRIU)\*; Garvey, J. 29 (BRI); Gillieatt, J. 28 (BRI); Hamilton, A.A. s.n. (NSW)\*; Henderson, R. 183 (BRI)\*, 590 (BRI)\*; Howcroft, M. (BRI 026573); Hubbard, C.E. 3587 (BRI); Jackes, B. Y10 (BRI); Johnson, L.A.S. 30380 et al. (BRI)\*; Johnson, R.W. 427 (BRI)\*, 2279 (BRI)\*, 1140 (BRI), 670 (BRI); Keys, J. 80 (BRI)\*; Maiden, J.H. s.n. (NSW)\*; Maiden, J.H. & Boorman, J.L. s.n. (NSW)\*; McAuliffe, D.J. (NSW 10993/16); McBonnon, E.J. 5304 (NSW)\*; McKee, H.S. 7612 (NSW)\*; Michael, N. 1739 (BRI)\*, 374 (BRI)\*, 1945 (NSW)\*; Morain, S.A. 154 (BRI)\*; O'Keefe, B. (BRI 290997); Rodd, A. 1502 (NSW)\*, 2271 (NSW)\*; Rodway, F.A. s.n., 2 Jan 1946 (NSW)\*, s.n., Feb 1917 (NSW)\*, s.n. 3 Aug 1945 (NSW)\*, s.n. Mar 1921 (NSW)\*, 591 (BRI)\*; Rogers, K.C. (MEL 600033), (MEL 600558), (MEL 600503); Salasoo, H. 4612 (NSW)\*, 2368 (NSW)\*; Schneider, H. (BRI 146157)\*; Sharpe, P. 296 (BRI), 668 (BRI)\*, 834 (BRI); Simon, B.K. 2858 et al. (BRI)\*; Smith, D.A. 14 (BRI); Spurgin, M. (BRIU 4200); Thomas, M. (BRI 121412); Thompson, J. 6 et al. (BRI); Tindale, M. (NSW 48852); Tothill, J.C. N34 (BRI); Trapnell 141 et al. (BRI)\*; Wakefield, N.A. 2450 (MEL); Whaite, T. & J. 3447 (NSW)\*; White, C.T. (BRI 146162), (BRI 146165); (BRI 146158)\*, (BRI 146154)\*; Whyte, A. (BRIU 4721); Williams, K.A. 75081 (BRI)\*; Willis, J.H. s.n. (MEL); Collector unknown (MEL 51807).



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