

New names and new taxa in the genus *Boronia* (Rutaceae) from Western Australia, with notes on seed characters

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Abstract

Wilson, Paul G. New names and new taxa in the genus *Boronia* (Rutaceae) from Western Australia, with notes on seed characters. *Nuytsia* 12 (1): 119-154 (1998). As a precursor to the treatment for the "Flora of Australia" of Western Australian species of *Boronia* (Rutaceae), the following seven species and eight varieties or subspecies are described as new: *B. acanthoclada*, *B. anceps*, *B. baeckeacea* subsp. *patula*, *B. baeckeacea* subsp. *rosea*, *B. corynophylla*, *B. crenulata* var. *angustifolia*, *B. crenulata* subsp. *obtusa*, *B. exilis*, *B. humifusa*, *B. juncea* subsp. *minima*, *B. purdieana* subsp. *calcicola*, *B. ramosa* subsp. *lesueurana*, *B. scabra* subsp. *attenuata*, *B. scabra* subsp. *condensata*, *B. tetragona*, and *B. westringioides*. The following new subspecific combinations are made: *B. crenulata* subsp. *pubescens* (Benth.) Paul G. Wilson, *B. crenulata* subsp. *viminea* (Lindl.) Paul G. Wilson, *B. fastigiata* subsp. *tenuior* (Benth.) Paul G. Wilson, *B. juncea* subsp. *laniflora* (Bartl.) Paul G. Wilson, *B. juncea* subsp. *micrantha* (Bartl.) Paul G. Wilson. Lectotypes have been designated for a number of species. The seeds typical of each of the sections or series in *Boronia* are described.

Introduction

This paper is a precursor to the treatment of the Western Australian taxa in the genus *Boronia* Sm. (Rutaceae) for the "Flora of Australia". New taxa are described and new lectotypifications are made. Apart from the description of *B. corynophylla*, this paper, and its accompanying flora treatment, exclude those species that are currently placed in sect. *Valvatae* which comprises all tropical members of the genus as well as several temperate species.

The genus *Boronia* was divided by Bentham (1863) into seven series and by Engler (1896) into three sections, one of which was divided into five series. It is here proposed to divide the genus into four sections, none of which corresponds precisely to Bentham's or Engler's groups, and to treat sect. *Valvatae* in the broad sense. This last section is under investigation by Duretto (1997). Marco Duretto is also revising the eastern states' species of the other sections.

Weston *et al.* (1984) prepared a cladistic treatment of the genus to which the taxonomy accepted here largely corresponds, however, their analysis did not include *Boronia cymosa*, which I consider to be the sole representative of the section *Imbricatae* as lectotypified.

The probability of the genus being polyphyletic without the inclusion of *Boronella* from New Caledonia was indicated by Weston *et al.* (1984), and an investigation by me of petal venation and seed morphology, characters which were not included in that study, could strengthen the proposal. However, Hartley (1995) doubts this close relationship and supports the argument for retaining *Boronella* as a distinct genus with details from a study of the articulation in the branchlets and of the shape of the embryonic cotyledons. If the close relationship of *Boronia* to *Boronella* were to be accepted then floral and seed characters suggest that the latter is more closely related to sect. *Boronia* than that section is to any of the other sections in the genus. Logically therefore *Boronella* should either be made a section of *Boronia* or the sections of *Boronia* should be raised to generic level. In spite of these reservations Duretto and I have decided for the "Flora of Australia" to retain the genus with its traditional circumscription, while *Boronella* is assumed to be generically distinct.

As is noted above, the recognition of the infrageneric taxa within *Boronia*, while based largely on floral morphology, is strongly supported by seed morphology. The opportunity is therefore taken to describe the seed types that have been observed in representative taxa of Western Australian species of *Boronia*.

Seed terminology in the Boroniaceae

Sclerotesta. The hard, thick, and brittle portion of the testa. It is always black in colour and is either smooth or variably corrugate.

Outer testa. That portion of the testa outside the sclerotesta. It is membranous, papery, coriaceous, or brittle. It may be smooth, or it may follow corrugations present on the sclerotesta, or it may have corrugations that are independent of the sclerotesta.

Micropyle. This is minute and circular or rarely narrowly elliptic. It is always positioned on the upper adaxial margin of the seed.

Hilum. The scar formed by the dehiscence of the funicle or aril'. It is always in the central adaxial area of the seed and it varies in shape from linear to circular. In *Boronia* sect. *Boronia* it is sunken between lateral lip-like raised portions of the outer integument and is here referred to as labiose.

Raphe. The vascular strand and associated tissue that pass from the base of the hilum to the chalaza. It varies from being shrivelled and insignificant to large and fleshy.

Raphe cover. The tissue that forms a cover to the raphe. It is continuous with and usually has the same texture as the outer testa and therefore varies from being membranous to brittle.

Chalazal aperture. The circular hole in the sclerotesta through which the raphe passes into the chalaza. It is positioned beneath the raphe, either at the base of the seed or at its lower adaxial margin.

Hilar strands. In some genera the seed possesses a cream-coloured ligament-like tissue on its adaxial surface. This tissue has the appearance of a strand; it surrounds the hilum and extends, as a single thread, to the raphe. The strand is here called the hilar strand. It is shed on or shortly after the discharge of the seed. Hilar strands are found in the seeds of *Chorilaena*, *Phebalium* sect. *Goniocladus*, *Rhadinothamnus*,

and *Asterolasia pro parte*. From a study of stages in the development of ovules in these taxa and by comparing them with seeds at various stages of development in other members of the Boronieae, it appears that the hilar strand arises from a narrow portion of the outer testa (formed from the outer integument) that surrounds the hilum. In the early stages of seed development the future strand is intimately fused to the rest of the outer testa. When nearly mature it becomes separated from the testa and eventually falls away from the seed.

In most genera of the Boronieae a pale line around the hilum can be observed in the developing ovule. In *Correa* this area remains pale in the mature seed. In *Boronia* sect. *Boronia* and in *Eriostemon* sect. *Erionema* this area becomes brittle and usually glossy; it eventually becomes raised around an apparently sunken hilum.

In *Philotheca*, in *Eriostemon* sect. *Nigrostipulae*, and in *Geleznovia* the developing ovule has a brown ring around the hilum and raphe that appears to develop into the hard cover to the raphe.

The hilar strand is therefore homologous with the lips that surround the hilum and raphe in *Boronia* sect. *Boronia* and in *Eriostemon* sect. *Erionema*, and it is also homologous with the hard cover to the raphe that is found in seeds of *Drummondita*, *Geleznovia*, and *Eriostemon* sect. *Nigrostipulae*.

Placental endocarp. The endocarp in the mature fruits of the Boronieae consists of two parts: an elastic cartilaginous portion that ultimately ejects the seeds from the fruit, and a membranous or thick and fleshy portion that separates from the elastic endocarp. The placental area of the ovary forms part of this membranous to fleshy portion and for this reason the name "placental endocarp" was used by Wilson (1970) while Kaastra (1982) has preferred the phrase "axial part of the endocarp", Kallunki (1992) the "ventral portion of the endocarp", Corner (1976) the aril, and Gereau (1990) the "arillodio membranaceo". The last two terms are possibly inappropriate since it appears to be true endocarp, and is not formed from the funicle. In some species of the Boronieae (e.g. *Boronia juncea*) a true aril is present that is formed as an extension of the funicle.

New taxa and lectotypifications

***Boronia* Sm.**, Tracts Nat. Hist. 288 (1798).

Type: Boronia pinnata Sm., lectotype here chosen.

Notes. *Boronia pinnata* was one of four *Boronia* species described by J.E. Smith and since it was the only one that had been introduced into cultivation he gave it most prominence.

1. *Boronia* Sm. sect. ***Boronia***

1a. *Boronia* Sm. sect. ***Boronia*** ser. ***Boronia***

Boronia ser. *Heterandrae* Benth., Fl. Austral. 1: 315 (1863). - *Boronia* sect. *Heterandrae* (Benth.) Engler, Nat. Pflanzenfam. 3/4: 136 (1896). *Type: Boronia megastigma* Nees, lectotype here chosen.

Boronia sect. *Octarrhena* F. Muell., Pl. Indig. Col. Victoria 1: 113 (1862). Type: *Boronia pinnata* Sm., lectotype here chosen.

Boronia ser. *Pinnatae* Benth., Fl. Austral. 1: 309, 307 (1863). - *Boronia* sect. *Pinnatae* (Benth.) De Wild., Icon. Select. 2: 67 (1901). Type: *Boronia pinnata* Sm.

Boronia ser. *Terminales* Benth., Fl. Austral. 1: 310, 323 (1863). Type: *B. capitata* Benth., lectotype here chosen.

Boronia ser. *Variabiles* Benth., F. Austral. 1: 309, 320 (1863). Type: *B. crenulata* Sm., lectotype here chosen.

Boronia ser. *Ovatae* Paul G. Wilson, Nuytsia 1: 204 (1971). Type: *B. ovata* Lindl.

Seed morphology. Seed kidney-shaped, adaxial margin flat or convex. *Testa* smooth; outer testa coriaceous, matt, black. *Hilum* sunken, linear to elliptic in centre of adaxial margin, surrounded by glossy labiose (lip-like) raised margin which surrounds raphe. *Raphe* fleshy. *Chalazal opening* basal. *Placental endocarp* membranous, caducous. (Figure 1)

Species examined. Of the 23 Western Australian species recognized in this series the following nine were examined for seed characters: *Boronia clavata*, *B. crenulata*, *B. humifusa*, *B. inornata*, *B. ovata*, *B. purdieana*, *B. scabra*, *B. spatulata*, and *B. tetrandra*.

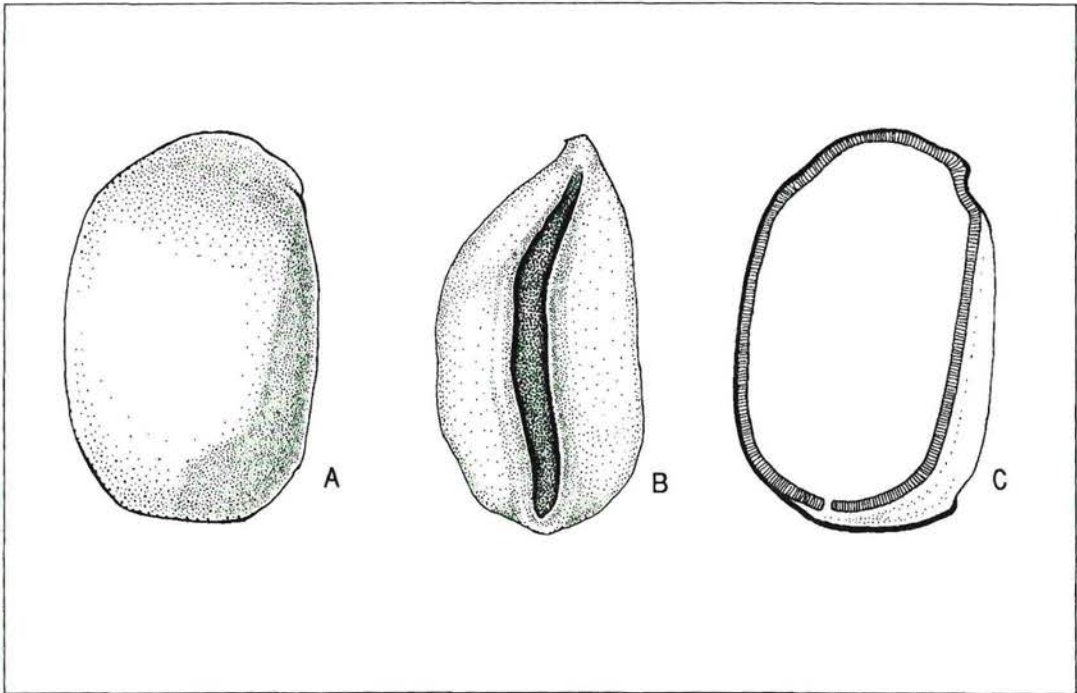


Figure 1. *Boronia crenulata* subsp. *viminea* seed. A - lateral view, B - adaxial surface, C - longitudinal radial section, all x20. Drawn from P. Luff, 3 Oct. 1963.

Notes. The most obvious character that distinguishes the seed of this section from seeds of other taxa in the Boronieae is the presence of the labiose margin to the hilum and its glossy surround. There is some variation to the usual situation. In *B. scabra* the hilum is short, elliptic and not sunken; the raphe passes as a ligament to the glossy chalazal area on the adaxial face. In *B. humifusa* the hilum is again short while the raphe is a broad tissue covered by a glossy cover on the adaxial face. (Figure 2F,G)

Boronia albiflora R. Br. ex Benth., Fl. Austral. 1: 317 (1863). *Type citation:* South coast, R. Brown; King George's Sound, Baxter; Garden Range, hills N of Stirling range, and Cheyne Beach, Maxwell. *Type:* Bay 1 [Lucky Bay], Western Australia, [January 1802], R. Brown (*lecto:* K; *isolecto:* MEL 1058486), lectotype here chosen.

Boronia crassifolia Bartl. in Lehm., Pl. Preiss. 1: 169 (1844). *Type:* Interior of south-west Western Australia, October 1840, L. Preiss 2033 (*lecto:* LD; *isolecto:* MEL 1058498), lectotype here chosen.

Boronia humilis Turcz., Bull. Soc. Imp. Naturalistes Moscou 25/2: 160 (1852). *Type:* Western Australia, J. Drummond 5th coll. no. 199 (*iso:* TCD).

B. multicaulis Turcz., Bull. Soc. Imp. Naturalistes Moscou 25/2: 161 (1852). *Type:* Western Australia, J. Drummond s.n. (*holo:* KW, photo seen).

Boronia crassipes Bartl. in Lehm., Pl. Preiss. 1: 168 (1844). *Type:* Mt Wuljenup [Willyung Hill], Western Australia, 14 October 1840, L. Preiss 2040 (*lecto:* LD; *isolecto:* K photo seen, MEL 1058499, MEL 1058500, MEL 1058501), lectotype here chosen.

Boronia crenulata Sm., Trans. Linn. Soc. London 8: 284 (1807). *Type:* King George Sound, Western Australia, 1803, A. Menzies (*holo:* LINN).

Notes. The sheet with the Menzies collection in herb. LINN bears the date 1803 which is possibly the year in which the material was received by Smith. Menzies visited King George Sound with George Vancouver in 1791.

The leaf shape in each of the different infraspecific taxa is very variable, even on the same plant or in collections from the same area. A further complication is that the subspecies grade into each other, therefore many plants do not fit precisely into the leads provided below.

- 1 Leaves linear to broadly obovate, narrowed at base, eciliate; branchlets glabrous or puberulous
- 2 Petals subapically apiculate, usually prominently so; sepals acuminate or obtuse with apiculum, densely ciliolate subsp. **crenulata**
- 2: Petals either not apiculate or minutely so; sepals obtuse or acute, minutely ciliolate or eciliate
- 3 Sepals broadly ovate, c. 2 mm long, obtuse or rounded at apex, minutely subapically apiculate, ciliolate subsp. **obtusa**
- 3: Sepals ovate to triangular, 1.5-2 mm long, obtuse to acute, not subapically apiculate, eciliate or minutely ciliolate subsp. **viminea**
- 1: Leaves broadly elliptic to obovate, sometimes cordate at base, sparsely long-ciliate; branchlets pilose subsp. **pubescens**

Boronia crenulata Sm. subsp. **crenulata**

Distribution. Occurs in the south-west of Western Australia, towards the south coast from Augusta east to Bremer Bay and north to the Stirling Range and from there to the eastern margin of the Darling Range.

Notes. Two varieties are recognized.

Leaves narrowly to broadly obovate var. **crenulata**

Leaves linear var. **angustifolia**

Boronia crenulata Sm. subsp. **crenulata** var. **crenulata**

B. viminea var. *gracilis* Benth., Fl. Austral. 1: 325 (1863). - *B. crenulata* var. *gracilis* (Benth.) Paul G. Wilson, Nuytsia 1: 204 (1971). *Type:* Western Australia, 1848, *J. Drummond* 92 (*holo:* K; *iso:* TCD).

Leaves narrowly to broadly obovate, 7-12 mm long, rounded to obtuse. *Flowers* predominantly axillary with 1 or 2 pairs of bracteoles. *Sepals* ovate, acuminate, 2-3 mm long. *Petals* glabrous outside, minutely subapically apiculate.

Distribution. Occurs over the entire range of the subspecies.

Notes. The variant from near Albany with broadly obovate leaves corresponds to the type of *B. crenulata* while the variant from near Bremer Bay with narrowly obovate leaves corresponds to the type of *B. viminea* var. *gracilis*.

The variant found north-west of the Stirling Range and towards the Darling Range is sometimes puberulous all over; it has narrow leaves and narrowly triangular to triangular sepals. This variant is somewhat intermediate in morphology between subsp. *crenulata* and subsp. *viminea*.

Over most of its distribution the branches of this variety are puberulous but in the Pemberton-Walpole area they are pilose which suggests intergradation with subsp. *pubescens*.

Boronia crenulata subsp. **crenulata** var. **angustifolia** Paul G. Wilson, *var. nov.*

Folia linearia, 15-30 mm longa, acuta. Flores plerumque ad ramulis brevibus axillaribus terminati. Sepala anguste triangularia, acuminata, c. 3 mm longa. Petala glabra, manifeste subapicaliter apiculata.

Typus: Near junction of Ellen and South Bluff tracks, Stirling Range, Western Australia, 26 September 1975, *R. Voutier* 795 (*holo:* PERTH00962651).

Leaves linear, 15-30 mm long, acute. *Flowers* mostly terminal to short axillary shoots. *Sepals* narrow triangular, acuminate, c. 3 mm long. *Petals* glabrous, prominently subapically apiculate.

Selected specimens examined. WESTERNAUSTRALIA: Ellen Peak, 21 Oct. 1902, *A. Morrison* (PERTH); Ellen track, Stirling Range, 24 Oct. 1973, *R. Voutier* 795 (PERTH).

Distribution. Known only from an area near the type locality in the Stirling Range, south-west Western Australia.

Conservation status. This variety, although restricted in its distribution, is located in a national park where it is not at risk. A Priority Four category is therefore appropriate.

Etymology. The varietal epithet is derived from the Latin words *angustus*, narrow, and *folium*, leaf, referring to the very narrow leaves of this taxon.

Notes. This variety is identical in flower characters to var. *crenulata* which is found elsewhere in the the Stirling Range.

Boronia crenulata* subsp. *obtusa Paul G. Wilson, *subsp. nov.*

Ramuli minute puberuli vel glabri. Folia anguste obovata, 10-15 mm longa, ± integra, ad apicem rotundata vel obtusa, ad basim attenuata, glabra, eciliata. Sepala late ovata, 2 mm longa, crassa, eciliata, glabra, ad apicem obtusa vel rotundata, subapicaliter apiculata. Petala glabra, non-apiculata vel minute subapicaliter apiculata.

Typus: 3 km south-west of gate in Rabbit Proof Fence, east of Lake King, Western Australia, 7 August 1968, R.A. Saffrey 332 (*holo:* PERTH 00946508; *iso:* K).

Branchlets minutely puberulous in strips or glabrous. *Leaves* narrowly obovate, 10-15 mm long, entire or almost so, rounded or obtuse at apex, attenuate at base, glabrous, eciliate. *Pedicels* glabrous or sparsely puberulous, thick; bracteoles sub-basal, c. 1 mm long, obtuse. *Sepals* broadly ovate, c. 2 mm long, thick, ciliolate, glabrous, obtuse or rounded at apex, subapically apiculate. *Petals* glabrous, rounded at apex, either not apiculate or minutely sub-apically apiculate.

Selected specimens examined. WESTERN AUSTRALIA: 17 km E of Grass Patch, *P. vander Moezel* 445 (PERTH); 14 km E of the mouth of the Oldfield River, *A.E. Orchard* 1487 (PERTH); 73 km E of Jerramungup, *G. Perry* 131 (PERTH); 40 km ESE of Lake King township, *P.G. Wilson* 6855 (PERTH).

Distribution. Occurs in south-west Western Australia from Nyabing and Ongerup east to Norseman and from Newdegate south to the coast.

Boronia crenulata* subsp. *pubescens (Benth.) Paul G. Wilson, *comb. et subsp. nov.*

Boronia crenulata var. *pubescens* Benth., Fl. Austral. 1: 323 (1863). - *B. haloragoides* F. Muell., Fragm. 11: 97 (1880). *Type citation:* W. Australia, *Drummond*; Vasse river, *Oldfield*. *Type:* Vasse River, Western Australia, *A. Oldfield* (*lecto:* MEL 1058502), lectotype here chosen.

Distribution. Found in the south-west of Western Australia between Cape Naturaliste and Pemberton.

Boronia crenulata* subsp. *viminea (Lindl.) Paul G. Wilson, *subsp. et comb. nov.*

B. viminea Lindl., Sketch Veg Swan R. 17 (1839). *Type:* Swan River Colony, Western Australia, *J. Drummond s.n.* (*syn:* CGE), *J. Mangles* (*syn:* CGE).

B. viminea var. *latifolia* Benth., Fl. Austral. 1: 325 (1863). *Type*: Canning River, Perth, Western Australia, November 1841, L. Preiss 2022 (*lecto*: LD; *isolecto*: MEL 1058527), lectotype here chosen.

B. tenuifolia Bartl. in Lehm., Pl. Preiss. 1: 168 (1844). *Type*: Canning River, Perth, Western Australia, November 1841, L. Preiss 2022 (*lecto*: LD; *isolecto*: MEL 1058527), lectotype here chosen.

B. machardiana F. Muell., Fragm. 9: 115 (1875). *Type*: Blackwood River, Western Australia, 1874, M. McHard (*iso*: PERTH 00997528, fragment).

Typification. The type of *B. machardiana* is of a variant that is most similar to material found just south of Perth although it is said to have come from the Blackwood River area which is in the far south-west of the State.

Boronia humifusa Paul G. Wilson, *sp. nov.*

Ramuli acute 4-angulati, glabri vel in lineis oppositis scabridi. Folia sessilia, simplicia, oblonga vel oblongo-elliptica, 1-2 cm longa, integra, plana, obtusa, infra glabra, supra scabridula. Flores in cymas apertas; pedunculus gracilis, c. 1 cm longus; pedicellus gracilis, 5-10 mm longus, in medio breviter bibracteolatus. Sepala deltata, c. 1.5 mm longa, glabra. Petala imbricata, elliptica, 6-7 mm longa, extra glabra, intra sparse pilosa, rubra, ad apicem plana, non apiculata; nervatura pinnata, nervo medio unico. Stamina 8, omnino fertilia; filamenta dense ciliata, ad apicem verrucosa. Discus integra, glabra. Ovarium glabrum; stylus stigmaque cylindracea, c. 0.5 mm longa, glabra.

Typus: Capel to Donnybrook road, Western Australia, 16 June 1996, B.J. Lepschi & T.R. Lally 2611 (*holo*: PERTH 04334221; *iso*: CANB, K).

Low-growing wiry *perennial*. Stems and branches sharply 4-angled, glabrous or sometimes scabrid in opposite lines. Leaves sessile, simple, oblong to oblong-elliptic, 1-2 cm long, entire, flat (sometimes recurved when dry), obtuse, glabrous below, scabridulous above. Flowers in open cymes terminal to main and lateral branches; peduncle slender, c. 1 cm long; pedicels slender, 5-10 mm long, medially shortly bibracteolate. Sepals deltate, c. 1.5 mm long, glabrous, glandular-punctate. Petals imbricate, elliptic, 6-7 mm long, wrinkled on margin when dry, pilose within towards base with simple hairs, glabrous outside, red, apex neither inflexed nor apiculate; venation pinnate with a single medial vein. Stamens 8, all similar and fertile; filament compressed-terete, s-curved, densely ciliate, apex globular and verrucose; anther affixed subapically to adaxial margin, thecae c. 1 mm long, white apiculum c. 0.5 mm long. Disc cushion-shaped, entire, glabrous. Ovary glabrous; style and stigma together cylindrical, c. 0.5 mm long, glabrous. Seed semicircular, c. 1 mm long; outer testa smooth, black; adaxial margin with glossy cover to raphe, without a groove. (Figure 2)

Other specimens examined. WESTERN AUSTRALIA: SSE of Capel on Donnybrook road, R. Davies 125 (PERTH); *ibid.*, B.J. Lepschi & T.R. Lally 3121 (PERTH); *ibid.*, D. Papenfuss 300 (PERTH); 10 km W of Donnybrook, P.A. Jurjevich 1831 (PERTH); Tutunup, Sep. 1945, Forester Weston (PERTH).

Distribution. South-west Western Australia, between Capel and Donnybrook.

Habitat. Growing in Jarrah - Marri open forest on lateritic soil.

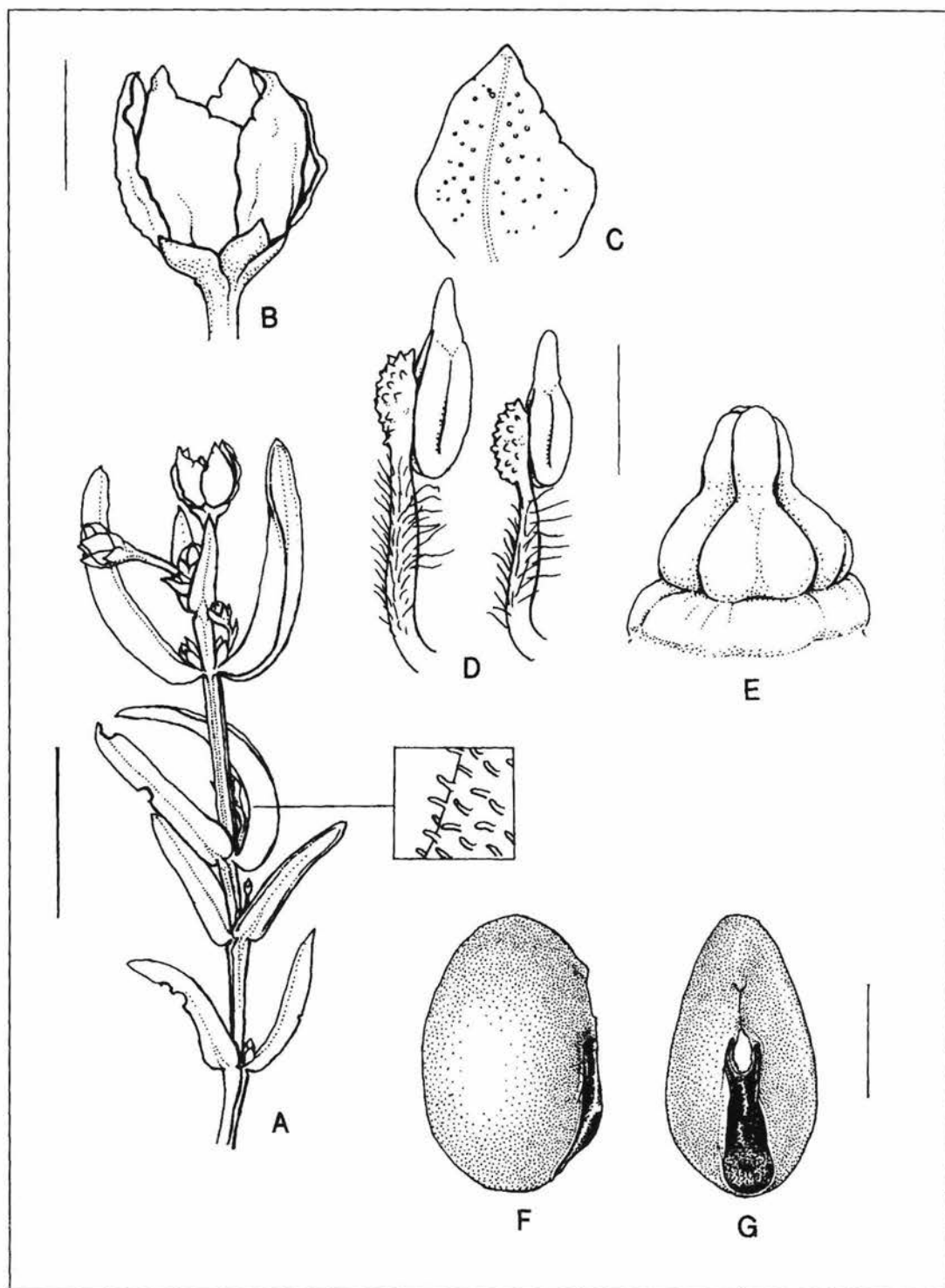


Figure 2. *Boronia humifusa* A - flowering branch, B - flower, C - petal, D - sepaline and petaline stamens, E - disc and pistil, F - lateral view of seed, G - adaxial surface of seed. Scale bars: 2 cm (A), 4 mm (B,C), 1 mm (D,E, F and G). Flowering portions drawn from *B.J. Lepschi & T.R. Lally* 2611; seed drawn from *R.P. Davies* 125.

Conservation status. Known from one small area of forest which is subject to mining and therefore probably places the species under threat. A Priority One classification may be appropriate.

Etymology. The specific epithet, *humifusa*, is a Latin word meaning spread-out over the ground and refers to the low-growing habit of the plant.

Notes. The relationships of this species are uncertain. It does not agree with other members of sect. *Boronia* since the petals lack an apiculum and have only one main vein, while the seed lacks an adaxial groove. In typical members of sect. *Boronia* the petals have several medial nerves and have a subterminal abaxial apiculum while the seed has a linear groove along the hilum. In inflorescence characters it resembles *B. scabra* and *B. ovata* to which species it may possibly be most closely related and for which reason it is here included in the series *Boronia*.

Boronia purdieana Diels, Bot. Jahrb. Syst. 35: 318 f. 38 b, c (1904). *Type:* Near Bullsbrook, Western Australia, July, L. Diels 3564 (*holo:* B n.v., ?destroyed).

Distribution. This species is found near the west coast of Western Australia from Perth north to Shark Bay, with one collection from near Leonora, c. 130 km north of Kalgoorlie.

Notes. *Boronia purdieana* is variable in both vegetative and floral morphology, however, in anther shape and length there are clearly two groups. There is a short-anther plant, which is referred to subsp. *purdieana*, and a long-anther plant, which is referred to subsp. *calcicola*. The plant that is found near Leonora has short anthers but its habitat is very different from that of the type locality of subsp. *purdieana*.

Petaline anthers \pm square, not curved, c. 0.4 mm long subsp. **purdieana**
 Petaline anthers oblong, curved, c. 0.8 mm long subsp. **calcicola**

Boronia purdieana Diels subsp. **purdieana**

Distribution. Found from near Gnangara (c. 20 km north of Perth) north to Coorow with a 1901 collection from near Busselton; recently a sizeable population was discovered near Leonora.

Habitat. Sandy seasonally waterlogged soil in *Banksia* woodland; however, the one collection from near Leonora was found growing on a shale and diorite hillside.

Notes. Diels, in his original description, records that this plant was sold in Perth as an ornamental due to its fragrant flowers.

Boronia purdieana subsp. **calcicola** Paul G. Wilson, *subsp. nov.*

A subsp. *purdieanae* antheris petalinis oblongis, incurvis, ad basim ampliatis, c. 0.8 mm longis recedit.

Typus: Between Pot Alley and Bluff Point, near Kalbarri, Western Australia, 1 August 1972, C. Cockman (*holo:* PERTH 00978752; *iso:* K).

Petaline anthers oblong, curved inward, broadened at the base, c. 0.8 mm long.

Other specimens examined. WESTERN AUSTRALIA: Coast road S of Red Bluff, *A.M. Ashby* 1827 (PERTH); Murchison House Station, *B. & B. Backhouse* WO 174 (PERTH); 16 miles [c. 24 km] SSE of Tamalahomestead, *A.S. George* 9583 (PERTH); Kalbarri, *R.C. Wemm* 1800 (PERTH); 3 km S of Red Bluff, 1 km from coast, *P.G. Wilson* 6707 (PERTH).

Distribution and habitat. Found in Kalbarri National Park north to Shark Bay, Western Australia. Growing in heath and scrub in sand over limestone.

Etymology. The subspecific epithet is derived from the Latin words *calx*, lime, and *-cola*, -inhabitant.

Boronia scabra Lindl., Sketch Veg. Swan R. 17 (1839). *Type:* Swan River Colony, Western Australia, *J. Drummond* s.n. (*holo:* CGE).

Distribution. Found in south-west Western Australia from Geraldton south to Albany and east to Mt Ragged.

Notes. Three subspecies are recognized but their delineation is imprecise.

- 1 Flowers 4-merous; sepals glabrous to hirsute; staminal filaments smooth or tuberculate
- 2 Cymes pedunculate; staminal filaments smooth subsp. **scabra**
- 2: Cymes sessile; staminal filaments tuberculate subsp. **condensata**
- 1: Flowers 4- and 5-merous; sepals strongly hirsute; staminal filaments smooth ... subsp. **attenuata**

Boronia scabra Lindl. subsp. **scabra**

B. thymifolia Turcz., Bull. Soc. Imp. Naturalistes Moscou 25/2: 165 (1852). *Type:* Western Australia, *J. Drummond* ser. 5, 201 (*iso:* K, TCD).

B. fasciculifolia F. Muell., Fragm. 1: 99 (1859). *Type:* Salt River and Fitzgerald River, Western Australia, *G. Maxwell* (*n.v.*).

Distribution. Found in south-west Western Australia from near Geraldton south to Gingin and from Woodanilling south to Stirling Range and east to Mt Ragged.

Boronia scabra subsp. **attenuata** P.G. Wilson, *subsp. nov.*

Folia anguste elliptica vel teretia propter marginibus recurvos vel revolutos. Flores ad apicem ramulorum vel ad apicem pedunculorum gracilium congesti, 4- vel 5-meri. Sepala angusti triangularia, longi attenuata, c. 6 mm longa, valde hirsuta. Petala c. 8 mm longa.

Typus: Mt Le Grand, Western Australia, 3 October 1990, *J. Armstrong* 7051 (*holo:* PERTH 01156675).

Leaves narrowly elliptic to terete due to the recurved to revolute margins. *Flowers* congested at branch apices or on slender peduncles and pedicels, 4- or 5-merous. *Sepals* narrowly triangular, long-attenuate, c. 6 mm long, strongly hirsute. *Petals* c. 8 mm long. *Staminal filaments* smooth except for tuberculate swollen apex.

Selected specimens examined. WESTERN AUSTRALIA: Hellfire Bay, *M. Carter* 225 (PERTH); Cape Le Grand, *J.C. Malone* 5 (PERTH); Sandy Hook Island, Recherche Archipelago, 10 Nov. 1950, *J.C. Willis* (PERTH).

Distribution. Found on the south coast of Western Australia at Cape Le Grand and on the neighbouring islands of the Recherche Archipelago.

Habitat. Growing among granite rocks.

Conservation status. Although this subspecies is found in only a small area it does occur in a national park and therefore is not under threat. A Priority Two classification would be appropriate.

Etymology. The subspecific epithet alludes to the attenuate (Latin *attenuatus*) shape of the sepals.

Notes. At Cape Le Grand and on some of the islands of the Recherche Archipelago is found the variant with congested inflorescences while at Thistle Cove, c. 6 km east of Cape Le Grand, and in Cape Arid National Park is found a variant with slender peduncles and pedicels.

This subspecies is of particular interest because it frequently has alternate leaves and 5-merous flowers; for these reasons it has sometimes been assumed to be a species of *Eriostemon*.

Boronia scabra* subsp. *condensata Paul G. Wilson, *subsp. nov.*

Folia elliptica, plana. Flores in axillis foliorum terminalium aut bracteis foliaceis breviter pedicellata. Sepala anguste elliptica vel anguste triangularia et acuminata, 4-6 mm longa, glabra vel sparse pilosa. Petala c. 8 mm longa. Filamenta staminalia glanduloso tuberculata.

Typus: Dinner Hill, Western Australia, 26 August 1969, *K. Newbey* 2861 (*holo:* PERTH 00986747).

Leaves elliptic, flat. *Flowers* shortly pedicellate in axils of terminal leaves or leaf-like bracts. *Sepals* narrowly elliptic or narrowly triangular and acuminate, 4-6 mm long, often open at base, glabrous or sparsely pilose. *Petals* c. 8 mm long. *Staminal filaments* glandular tuberculate.

Other specimens examined. WESTERN AUSTRALIA: Alexander Morrison National Park, *E.A. Griffin* 4725 (PERTH); Coomallo Creek, *G.J. Keighery* 3199 (PERTH).

Specimens examined of subsp. *condensata* - subsp. *scabra* intermediates. WESTERN AUSTRALIA: 15 miles [24 km] E from Mt Peron, *C.A. Gardner* 9426 (PERTH); 15 miles [24 km] N of Badgingarra, *A.S. George* 8627 (PERTH); Mt Lesueur Reserve, *E.A. Griffin* 4169 (PERTH).

Distribution. Found in the Badgingarra area of south-west Western Australia.

Habitat. Often growing in gravel.

Conservation status. This taxon is known from only a few collections, however, it is found within a national park and therefore does not require protection. A Priority Two classification would be appropriate.

Etymology. The subspecific epithet has reference to the compact (Latin *condensatus*) nature of the inflorescence.

Notes. This taxon is variable in morphology and grades into the typical subspecies. Some intermediate collections are cited above.

1b. *Boronia* sect. *Boronia* ser. *Pedunculatae*

Boronia ser. *Pedunculatae* Benth., Fl. Austral. 1: 326 (1863). Type: *B. spathulata* Lindl., lectotype *vide* P.G. Wilson, Nuytsia 1: 204 (1971).

Seed morphology. Seed kidney-shaped, adaxial margin flat or convex. *Testa* smooth; outer testa coriaceous, glossy, black. *Hilum* linear along adaxial margin. *Raphe* a cream to pale brown pulpy mass at base of seed. *Chalazal opening* basal covered by raphe. *Placental endocarp* membranous, caducous. (Figure 3)

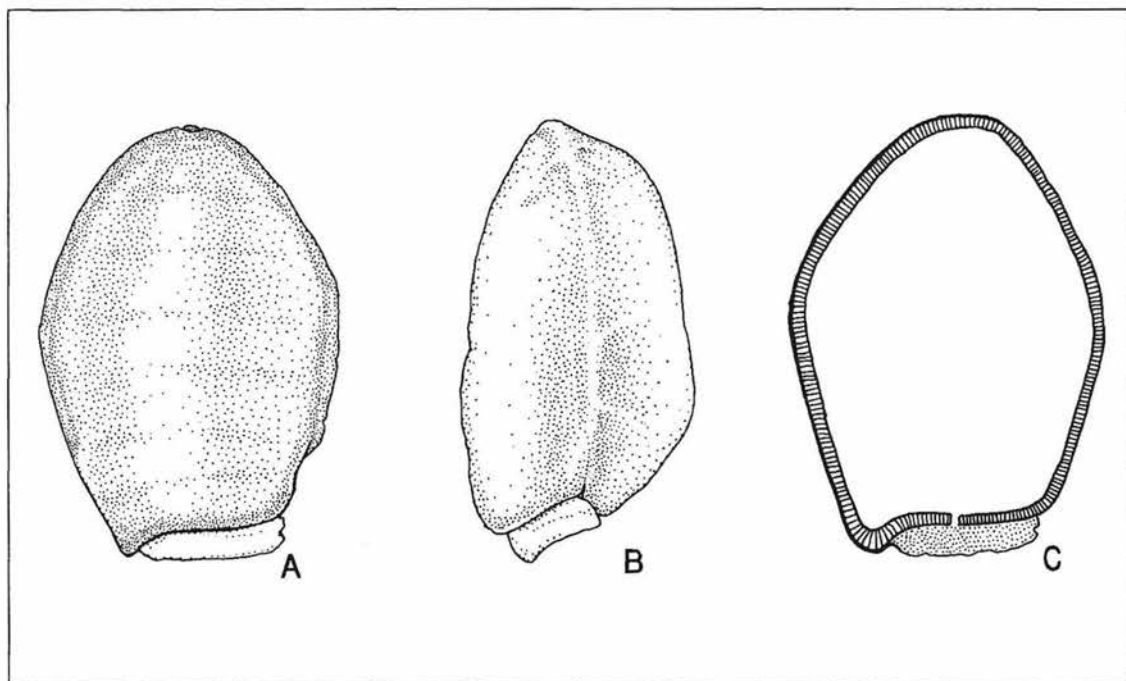


Figure 3. *Boronia dichotoma* seed. A - lateral view, B - adaxial surface, C - longitudinal radial section, all x20. Drawn from Ehrendorfer, Dec. 1966.

Species examined. Of the seven Western Australian species recognized in this series the following six were examined for seed characters: *Boronia anceps*, *B. denticulata*, *B. dichotoma*, *B. fastigiata*, *B. juncea*, and *B. spathulata*.

Notes. The principal character of note is the pulpy raphe at the base of the seed. This formation has not been observed in any other section. The seed morphology otherwise appears to grade into that found in typical members of sect. *Boronia*.

***Boronia anceps* Paul G. Wilson, sp. nov.**

Herba perennis, glabra, ad 60 cm alta. Rami applanati, acute 2-angulati. Folia internodiis breviora, anguste elliptica vel late obovata, 2-4 cm longa, multo reducta superiora, integra, sessilia, ad basin latiora. Flores in cymis longe pedunculati dispositi; pedicelli 5-10 mm longi, graciles, in medio bibracteolati. Sepala ovata, acuta, 3 mm longa, glabra, decidua. Petala late elliptica, c. 10 mm longa, pallidrosea, ciliata; antherae minute apiculatae. Discum integrum, angustum, glabrum. Ovarium lanosum; stylus pyramidalis vel conicus, c. 0.5 mm longus, glaber; stigma minutum.

Typus: 5 km north of Brennans Ford (Scott River crossing), north-east of Augusta, Western Australia, freshwater marsh, 16 November 1982, *A. Strid* 21427 (*holo:* PERTH 00946273).

Perennial herb to 60 cm high, glabrous, not forming a lignotuber. *Stems* flattened and ancipitous when young; internodes c. 6 cm long. *Lower leaves* sessile, obovate, c. 2 cm long; upper leaves narrowly oblong to narrowly ovate; uppermost narrowly oblong to linear, usually very reduced. *Inflorescence* a terminal pedunculate cyme; peduncle slender, to 6 cm long, bracts caducous; pedicels slender and smooth, 5-10 mm long. *Sepals* imbricate, broadly ovate to narrowly triangular, 2-4 mm long, glabrous or woolly ciliate, dark red. *Petals* imbricate, broadly ovate, c. 8 mm long, acuminate, glabrous, pink. *Stamens* all fertile; sepaline filaments very narrowly oblong with a clavate apex, verrucose abaxially, ciliate below; petaline filaments similar but slightly shorter; anthers affixed subapically on a very short stipe to adaxial side of filament, c. 1.8 mm long with a small rounded white apiculum. *Disc.* 1 mm high, equal in width to ovary, glabrous. *Carpels* glabrous or shortly woolly pilose; style and stigma continuous, columnar or conical, 1-1.5 mm long, glabrous or sparsely pilose at base. *Cocci* oblong, c. 3.5 mm long. *Seeds* oblong-ellipsoid, c. 2.5 mm long; outer testa smooth, glossy black. (Figure 4)

Selected specimens examined. WESTERN AUSTRALIA: Boggy Lake, 27 Dec. 1957, *D. Churchill* (PERTH); Scott River road, *S. Paust* 265 (PERTH); Scott National Park, *C.J. Robinson* 505 (PERTH).

Distribution and habitat. Found in the extreme south-west of Western Australia between Scott River and Walpole. Grows in seasonally swampy heaths.

Conservation status. Although this species is known from a relatively small area some of the populations are in a national park. A Priority Three code is therefore probably appropriate.

Etymology. The Latin word *anceps* means two-edged and in this case refers to the shape of the stem.

Notes. *Boronia anceps* is evidently closely related to *B. fastigiata* and to *B. spathulata*; it differs from both in having flattened ancipitous upper internodes and apparently in lacking a lignotuber.

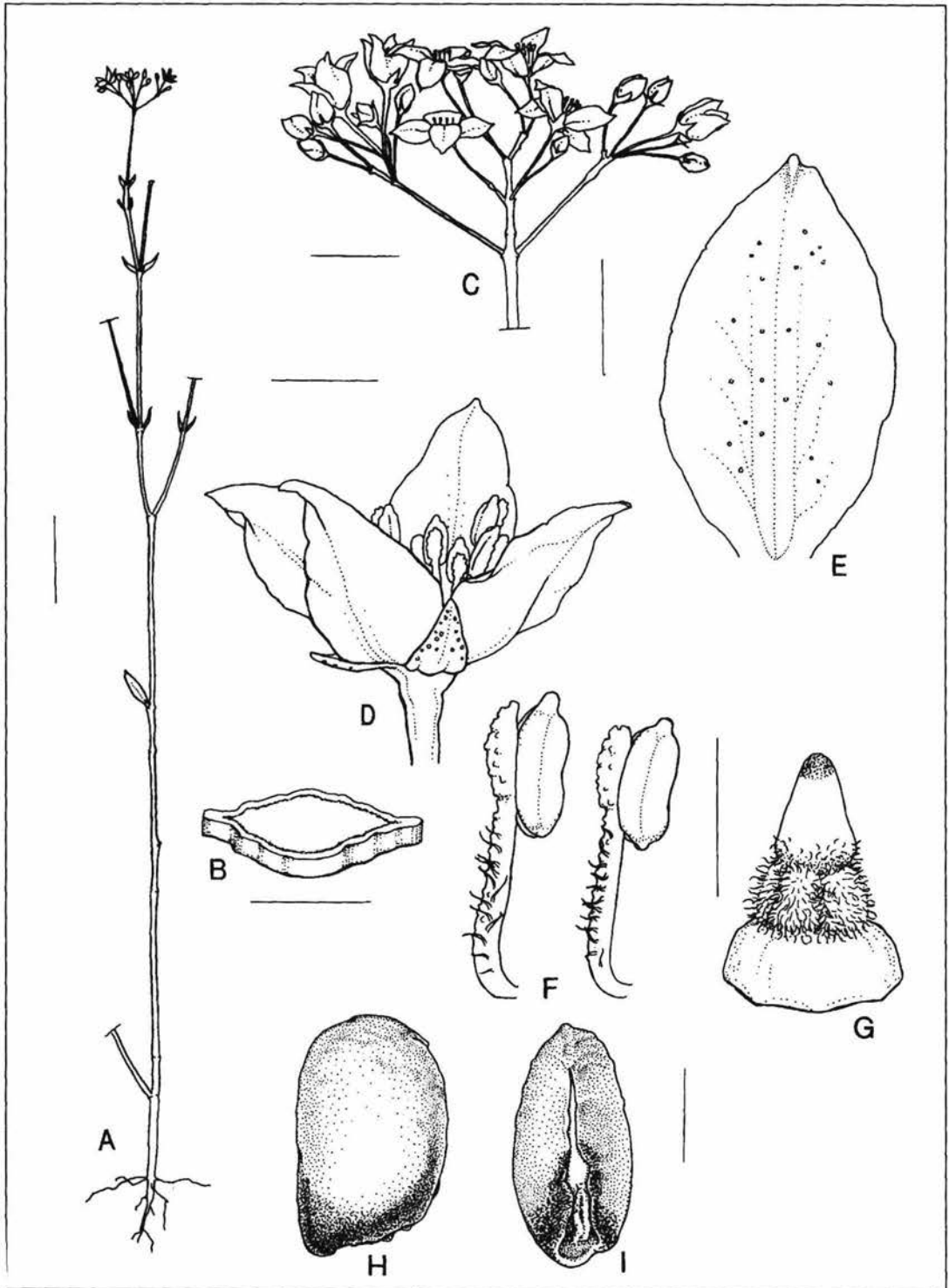


Figure 4. *Boronia anceps* A - whole plant, B - T.S. stem, C - inflorescence, D - flower, E - petal, F - sepaline and petaline stamens, G - disc and pistil, H - lateral view of seed, I - adaxial surface of seed. Scale bars: 5 cm (A), 2 mm (B, E, F and G), 10 mm (C), 3 mm (D), 1 mm (H, I). Flowering illustrations drawn from C.J. Robinson 505, seed from A. Strid 21427.

Boronia denticulata Sm., Trans. Linn. Soc. London 8: 284 (1807). *Type*: King George Sound, Western Australia, 1803, *A. Menzies* (*holo*: LINN, photo seen).

B. chironiifolia Bartl. in Lehm., Pl. Preiss. 1: 167 (1844). *Type*: "In uliginosis sylvae 17 mill. ab urbicula Albany (Plantagenet)" [Albany, Western Australia], 9 November 1840, *L. Preiss* 2027. (*lecto*: LD; *isolecto*: MEL 1058492), lectotype here chosen.

? *B. hypericifolia* Regel, Gartenfl. 6: 152 (1857), *ex desc.*

Note,. Regarding the date of collection of the Menzies specimen cited above see note under *B. crenulata*.

Boronia dichotoma Lindl., Edwards's Bot. Reg. 27: sub tab. 47 (1841). *Type*: Vasse River, Western Australia, *Mr Molloy* (*holo*: CGE, photo seen).

B. spathulata var. *elatior* Benth., Fl. Austral. 1: 327 (1863). *Type citation*: *B. dichotoma*, Lindl. Bot. Reg. 1841, under n. 47. - Vasse river, *Mrs. Molloy*; Swan River, *Drummond*, Coll. 1843, n. 38. *Type*: Vasse River, Western Australia, *Mrs Molloy* (*syn*: K, photo seen); Swan River Colony, Western Australia, *J. Drummond* 38 (*syn*: PERTH).

B. flexuosa Bartl. in Lehm., Pl. Preiss. 1: 166 (1844). *Type*: "In arenosis sylvae ad fluvium Canning (Perth) et in districtu Sussex" [Canning River, Perth, Western Australia], 5 December 1839, *L. Preiss* 2024 (*lecto*: LD; *isolecto*: MEL 1058504, MEL 1058505), lectotype here chosen.

B. integrifolia Domin, Vestn. Kral. Ceske Spolecn. Nauk, Tr. Mat.-Prir. 2: 53 (1923). *Type citation*: W.A.: coll. A.A. Dorrien-Smith (herb. Kew). *Type*: Bridgetown to Kojonup and Slab Hut Gully, Western Australia, 1910, *A.A. Dorrien-Smith* (*lecto*: K) lectotype here chosen.

Notes. *Boronia dichotoma* is readily recognized by the glandular aculeate processes that are found on the pedicels and to a lesser extent the peduncles and terminal portions of the stems. The leaves vary from being obovate (*c.* 2 cm long) towards the base of the stem to slender-terete (*c.* 4 cm long) below the inflorescence. The stems are slender and the internodes very long, the upper ones up to 12 cm long.

The type of *B. integrifolia* differs from material otherwise included in *B. dichotoma* in having relatively small glandular aculeate processes; it also differs in all the leaves being elliptic and 6-12 mm long with the upper internodes only slightly exceeding them. The district in which the type is stated to have been collected is 50-100 km east of any other record for *B. dichotoma*. *Boronia integrifolia* could be recognized as a distinct taxon, but it is possible that the type is a hybrid between *B. dichotoma* and *B. fastigiata* or between *B. dichotoma* and another member of *Boronia* ser. *Pedunculatae*.

Boronia exilis Paul G. Wilson, *sp. nov.*

B. junceae subsp. *laniflorae* (Bartl.) Paul G. Wilson affinis, a qua imprimis differt pedicelli longioribus, staminibus pilis rigidis manifeste ciliatis.

Typus: Scott National Park, Western Australia, 17 September 1990, *C.J. Robinson* 127 (*holo*: PERTI 3054810; *iso*: CANB).

Erect slender-stemmed *perennial* c. 1 m high. *Branches* glabrous; internodes 2-5 cm long. *Lower leaves* caducous, not seen; medial and upper leaves slender, semiterete, channelled above, 1-1.5 cm long, much shorter than internodes, glabrous or sparsely woolly on midrib, caducous. *Flowers* 3-9 in terminal umbelliform cymes; bracts elliptic, c. 5 mm long, woolly ciliate, caducous; pedicels 5-12 mm long, somewhat woolly; bracteoles basal, scarious, caducous. *Sepals* oblong-elliptic, acute, c. 4 mm long, dark red, woolly on both surfaces, densely woolly ciliate, deciduous in fruit. *Petals* broadly obovate with broad claw, c. 7 mm long, rounded at apex, sparsely woolly on midrib and within, pink. *Staminal filaments* terete above, flattened towards base, glandular-verrucose at swollen apex, prominently hirsute ciliate; anthers subapically affixed, c. 1.2 mm long, shortly white-apiculate. *Disc* cushion-shaped, glabrous. *Ovary* glabrous; style terete, glabrous, c. 1.5 mm long; stigma minute. (Figure 5)

Specimens examined. WESTERN AUSTRALIA: 9 miles [14 km] E of Karridale, A.C. Beaglehole 12564 (PERTH); "Port Augusta near Geographe Bay" [Augusta], 1881, Miss Bunbury (MEL); Scott River, E. Mattiske 370 (PERTH); Scott National Park, C.J. Robinson 049 (PERTH).

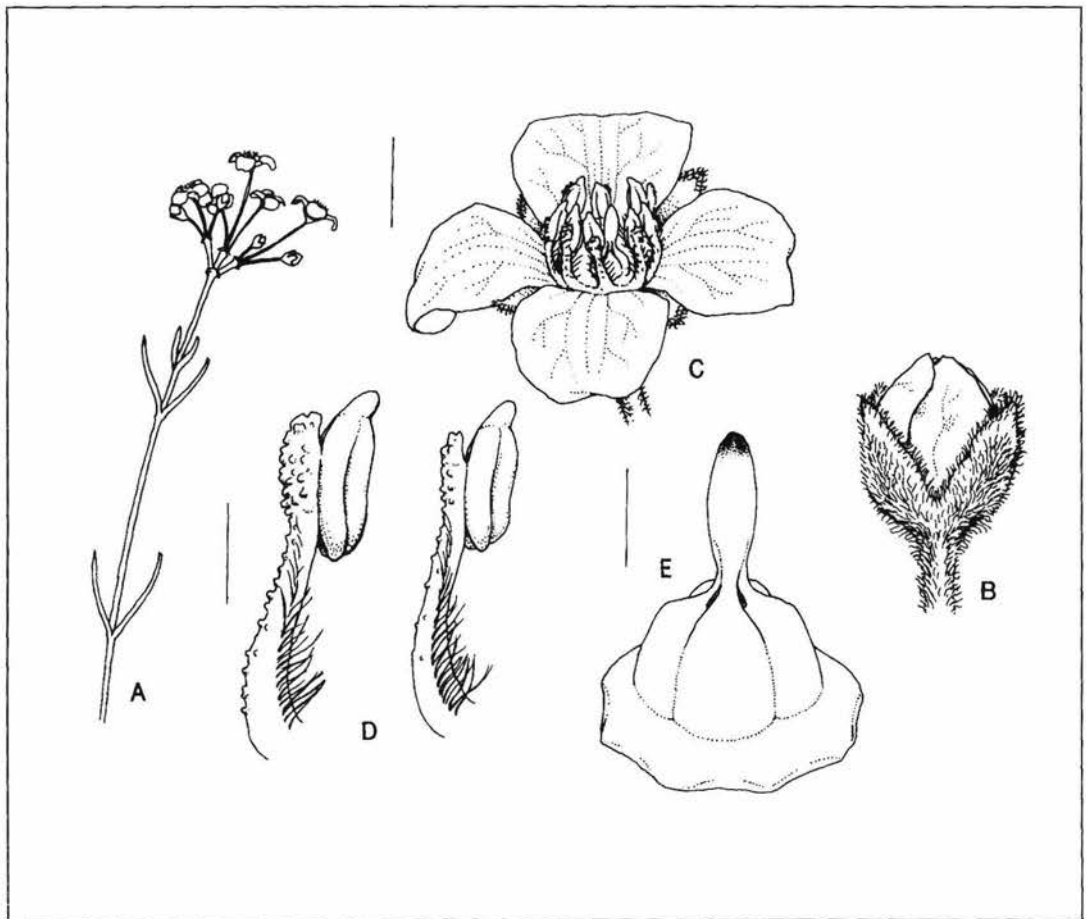


Figure 5. *Boronia exilis* A - flowering stem, B - bud, C - flower, D - sepaline and petaline stamens, E - disc and pistils. Scale bars: 20 mm (A), 3 mm (B,C), 0.5 mm (D), 1 mm (E). Drawn from C.J. Robinson 049.

Distribution. Known only from the Scott River area, extreme south-west of Western Australia.

Habitat. Growing in seasonally wet heath.

Conservation status. Classified as Declared Rare Flora, it is only known from a few sites over a small area.

Etymology. The Latin word *exilis*, meaning slender and weak, refers to the slender stems of this species.

Notes. This species is similar to *Boronia juncea*, particularly to the subsp. *laniflora*; it differs most obviously from that species in having strongly ciliate staminal filaments (in *B. juncea* they are glabrous).

Boronia fastigiata Bartl. in Lehm., Pl. Preiss. 1: 167 (1844). *Type:* "In locis hieme inundatis districtus Plantagenet" [Albany area], Western Australia, November 1840, *L. Preiss* 2028 (*lecto:* LD; *isolecto:* MEL), lectotype here chosen.

Distribution. Found in south-west Western Australia from Perth to the south coast as far east as Albany.

Notes. Two subspecies are recognized.

Branchlets terete subsp. **fastigiata**
 Branchlets with four very narrow glandular undulate wings subsp. **tenuior**

Boronia fastigiata Bartl. subsp. **fastigiata**

Branchlets terete. *Leaves* narrowly to broadly elliptic or obovate, 1-2(3) cm long, entire or almost so. *Cymes* mostly terminal to long branches. *Pedicels* of lateral flowers of cyme with a pair of extremely minutely bracteoles or incipient buds at base.

Distribution. Found in south-west Western Australia from Perth to Collie and from there south-east to Kojonup and Albany.

Habitat. Collectors' notes indicate that it occurs in lateritic gravel.

Notes. This subspecies is similar in its inflorescence and in its floral characters to *B. barkeriana* from New South Wales.

The type of *B. fastigiata* is of a variant with leaves crowded (the internodes *c.* 4 mm long), broadly elliptic, 6-9 mm long, and serrate. It was collected in the Plantagenet county which encompasses the area around Albany, Denmark, and the Stirling Range. The specimen matches material collected between Sla Hut Creek and Cranbrook by Capt. A. Dorrien Smith in 1910 and near Kojonup by W.E. Blackall in 1931. All recent collections of subsp. *fastigiata* have come from between Perth and Collie suggesting that it no longer occurs further south. Some collections from near Albany are intermediate between the subspecies and *B. denticulata*.

Boronia fastigiata* subsp. *tenuior (Benth.) Paul G. Wilson, *stat. nov.*

B. fastigiata var. *tenuior* Benth., Fl. Austral. 1: 327 (1863). *Type citation*: Western Australia, Gilbert, n. 3 and 18. *Type*: Australind, Western Australia, 1842, J. Gilbert 3 (*lecto*: K), lectotype here chosen.

B. tenuior Domin, Vestn. Kral. Ceske Spolecn. Nauk, Tr. Mat.-Prir. 2: 52 (1923). *Type*: Yalingup and Cape Naturaliste, Western Australia, 1910, A.A. Dorrien-Smith (*holo*: K).

Branchlets with four very narrow glandular-undulate wings; *Leaves* narrowly to broadly elliptic, 15-20 mm long, mostly serrate. *Cymes* terminal to main and lateral branchlets. *Pedicels* of lateral flowers of cyme without incipient buds or bracteoles.

Distribution. Found in south-west Western Australia from Busselton south to Augusta and east to Nannup and Walpole. Occurs along streams and in seasonally damp wet areas.

Notes. Near the south coast the leaves are narrowly elliptic whereas further north they are elliptic to broadly elliptic.

The types of both *B. tenuior* and of *B. fastigiata* var. *tenuior* have leaves well-spaced (the internodes 10-20 mm long), narrowly elliptic, 10-15 mm long, and serrate. A variant found in the Harvey River district has slender branches with the internodes 25-45 mm long and obovate entire leaves 15-20 mm long.

Boronia juncea Bartl. in Lehm., Pl. Preiss. 1: 166 (1844). *Type*: Wellington district, Western Australia, 5 December 1839, L. Preiss 2036 (*lecto*: LD), lectotype here chosen.

Distribution. Found in the far south-west of Western Australia.

Notes. Four subspecies are recognized but these evidently grade into each other.

- 1 Pedicels and sepals glabrous subsp. **juncea**
- 1: Pedicels and sepals sparsely to densely woolly
- 2 Sepals 1.5-3 mm long, acute subsp. **minima**
- 2: Sepals 3-5 mm long with acuminate to subulate apex
- 3 Petal apex acuminate subsp. **micrantha**
- 3: Petal apex rounded and apiculate subsp. **laniflora**

Boronia juncea* Bartl. subsp. *juncea

Plant glabrous. *Pedicels* c. 3 mm long, glabrous. *Sepals* narrowly triangular with subulate-acuminate apex, c. 2.5 mm long, glabrous. *Petals* obovate, acuminate, c. 4 mm long, glabrous. (Figure 6A)

Distribution. Found between Bunbury and Mandurah, south-west Western Australia.

Habitat. Growing in low scrub in sand.

Notes. In the strict sense this subspecies is only known from a few collections all from the same locality about 27 km north of Bunbury. Its distribution is therefore evidently quite separate from that of the other subspecies. However, material of *B. juncea* from the Pemberton to Donneybrook area, that is here referred to subsp. *minima*, is somewhat intermediate in morphology between the types of subsp. *juncea* and subsp. *minima*.

Boronia juncea* subsp. *laniflora (Bartl.) Paul G. Wilson, *stat. nov.*

Boronia laniflora Bartl. in Lehm., Pl. Preiss. 1: 165 (1844). *Type:* Between Mt Melville and Mt Elphinstone, 11 October 1840, *L. Preiss* 2030 (*syn:* MEL); Sussex District, Western Australia, December 1839, *L. Preiss* 2037 (*lecto:* LD), lectotype here chosen.

Boronia laniflora var. *macrantha* Bartl. in Lehm., Pl. Preiss. 1: 165 (1844). *Type:* Sussex District, Western Australia, December 1839, *L. Preiss* 2037 (*lecto:* LD), lectotype here chosen.

Branches and leaves glabrous or very sparsely woolly. *Pedicels* woolly, 2-5 mm long. *Sepals* triangular, acuminate, c. 4 mm long, woolly. *Petals* broadly obovate with rounded apiculate apex, c. 7 mm long, very sparsely woolly along midrib outside, sparsely woolly within. *Ovary* glabrous. (Figure 6B)

Distribution. Found near the south coast of Western Australia between Augusta and Walpole and also near Albany.

Habitat. Growing in seasonally swampy soil.

Nomenclatural note. Bartling did not cite collections after his description of *B. laniflora*, but he did after the descriptions of each of his two varieties, *micrantha* and *macrantha*. I have based the name *B. laniflora* on the type of var. *macrantha*.

Boronia juncea* subsp. *micrantha (Bartl.) Paul G. Wilson, *stat. et comb. nov.*

Boronia laniflora var. *micrantha* Bartl. in Lehm., Pl. Preiss. 1: 165 (1844). *Type:* Between Mt Melville and Mt Elphinstone, Western Australia, 11 October 1840, *L. Preiss* 2030 (*iso:* MEL 711185).

Branches and leaves glabrous or very sparsely woolly. *Pedicels* sparsely woolly, 2-5 mm long. *Sepals* narrowly triangular, acuminate, 5-6 mm long, sparsely woolly. *Petals* obovate, acuminate, 5-7(10) mm long, very sparsely woolly along midrib outside, sparsely woolly within. *Ovary* somewhat woolly. (Figure 6C)

Distribution. Found near the south coast of Western Australia between Albany and Walpole.

Habitat. Growing in seasonally swampy situations.

Boronia juncea* subsp. *minima Paul G. Wilson, *subsp. nov.*

Rami et folia glabra. *Pedicelli* sparse lanati, 1-2.5 mm longi. *Sepala* ovata vel triangularia, acuta, 1.5-3 mm, longa, sparse lanata. *Petala* obovata, acuminata vel apiculata, c. 3 mm longa, glabra vel secus costam sparse lanata.

Typus: Scott River, Western Australia, 15 November 1978, *E. Wittwer* 2218 (*holo*: PERTH 00957097).

Branches and leaves glabrous. *Pedicels* sparsely woolly, 1-2.5 mm long. *Sepals* ovate to triangular, acute, 1.5-3 mm long, sparsely woolly. *Petals* obovate, acuminate or apiculate, c. 3 mm long, glabrous or sparsely woolly along midrib. (Figure 6D)

Selected specimens examined. WESTERN AUSTRALIA: 4 miles [c. 6.4 km] S of Northcliffe, *T.E.H. Aplin* 1416 (PERTH); 26 miles [42 km] E of Augusta, *E.M. Bennett* 2834 (PERTH); Chudalup, *W.M. McArthur* 7 (PERTH); Scott National Park, *C.J. Robinson* 005 (PERTH); 3-5 km from Windy Harbour, *A. Strid* 21459 (PERTH); Donneybrook Sunklands, *P.G. Wilson* 11638 (PERTH).

Distribution. Found in south-west Western Australia between Margaret River and Augusta and east to Northcliffe.

Habitat. Growing in seasonally swampy areas.

Conservation status. This subspecies is known from a number of populations some of which are in national parks; it is therefore not at risk.

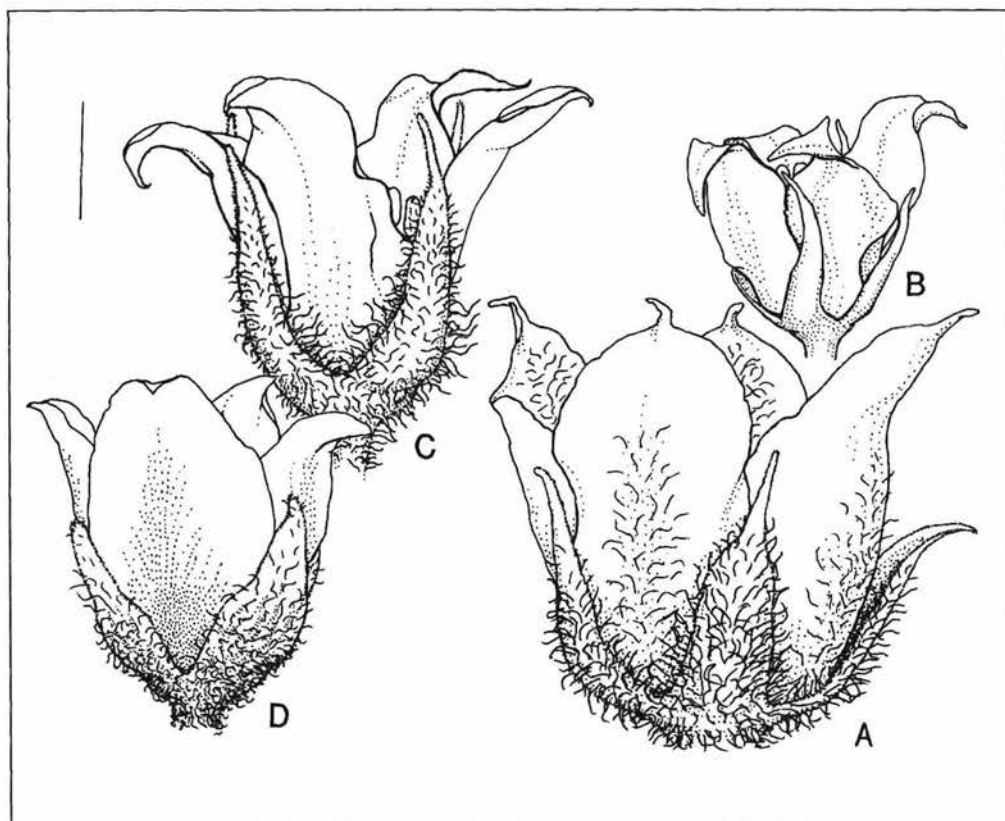


Figure 6. *Boronia juncea* flowers. A - subsp. *laniflora* (*H. Demarz* 6647), B - subsp. *juncea* (*D. Woodman* 184), C - subsp. *micrantha* (*E.J. Croxford* 2920), D - subsp. *minima* (*N. Gibson*). Scale bar = 2 mm.

Etymology. The Latin *minimus* refers to the small flowers of this subspecies.

Boronia molloyae J. Drumm. in Hook., London J. Bot. 2: 169 (1843) as *Molloyi*. *Type:* Between the Vasse River and Augusta, Western Australia, *J. Drummond* (n.v.).

B. elatior Bartl. in Lehm., Pl. Preiss. 1: 170 (1844). *Type:* "In humosa-arenosis humidis inter frutices densos vallis jugi montium Darling's range (Perth)" [Darling Range, Perth, Western Australia], September 1841, *L. Preiss* 2013 (*lecto:* LD; *isolecto:* MEL 725044, 725045), lectotype here chosen.

B. semifertilis F. Muell., Fragm. 2: 98 (1860). *Type:* Franklin River, Western Australia, *G. Maxwell* (n.v.).

Boronia spathulata Lindl., Sketch Veg. Swan R. 17 (1839). *Type:* Swan River Colony, Western Australia, *J. Drummond* (*holo:* CGE photo seen).

B. macra Bartl. in Lehm., Pl. Preiss. 1: 167 (1844). *Type:* Near Mahogany Creek, Darling Range, Western Australia, 13 September 1839, *L. Preiss* 2026 (*lecto:* LD), lectotype here chosen.

B. spathulata var. *ramosa* Benth., Fl. Austral. 1: 327 (1863). *Type:* Swan River Colony, Western Australia, *J. Drummond* s.n. (*syn:* MEL); East Mt Barren, Western Australia, *G. Maxwell* (*syn:* MEL).

Distribution. Found in the south-west of Western Australia from Perth south to Augusta and east to Israelite Bay.

Notes. This species may be readily distinguished from similar species by the open cymose inflorescence, the bracteolate pedicels (of which the upper portion is fleshy and glandular punctate), and the slender sparsely pilose style.

Boronia tetragona Paul G. Wilson, *sp. nov.*

Herba perennis, glabra, ad 70 cm alta. Rami tetragoni, angulis acutis, laevibus. Folia internodiis breviora, sessilia, integra, marginibus dense papillosis, multo reducta superiora, inferiora remota elliptica, superiora ovata, summa triangularia. Flores in umbellis pedunculatis dispositi; pedicelli c. 10 mm longi, graciles, ebracteolati, rubri. Bractee caducae. Sepala ovata, 3 mm longa, glabra, lanato-ciliata, decidua. Petala late elliptica, c. 7 mm longa, pallido rosea, ad apicem rotundata; antherae minutissimae apiculatae. Ovarium glabrum; stylus columnaris vel clavatus, c. 1 mm longus, glaber; stigma hemisphericum, brunneum.

Typus: Western Australia, Ambergate Reserve, south-west of Busselton, 3 November 1993 *G.J. Keighery* 12938 (*holo:* PERTH 04566475).

Perennial herb to 70 cm high, glabrous, not forming a lignotuber. *Stems* tetragonous when young internodes mostly 4–12 cm long. *Leaves* sessile, diminishing in size towards apex, with densely papillate margins; middle and lower leaves elliptic, to 4 cm long; upper leaves ovate; uppermost leaves narrow triangular. *Inflorescence* a terminal pedunculate umbel; peduncle slender, to 2 cm long, bracts caducous pedicels slender and smooth, c. 1 cm long, dark red. *Sepals* open or slightly imbricate, ovate c. 3 mm long slightly woolly ciliate, dark red, deciduous. *Petals* imbricate, broadly elliptic, c. 7 mm long, rounded at apex, glabrous, pink with red medial stripe on abaxial side. *Stamens* all fertile; sepaline filaments ver

narrowly oblong with a clavate apex, verrucose abaxially, sparsely ciliate below; petaline filaments similar but slightly shorter; anthers affixed subapically on a very short stipe to adaxial side of filament, *c.* 1 mm long with a minute rounded white apiculum. *Disc c.* 1 mm high, equal in width to ovary, glabrous, dark red. *Ovary* glabrous; style columnar or clavate, 1 mm long, glabrous; stigma hemispherical, *c.* 0.2 mm long, brown. *Fruit* not seen.

Specimens examined. WESTERN AUSTRALIA: Capel Nature Reserve, 1 km W of Capel, *G.J. Keighery* 13635 (PERTH); Ambergate Regional Park, SW of Busselton, *G.J. Keighery* 14809 (PERTH); 7 km W of Capel, *R. Pullen* 9845 (PERTH); Whicher Range, *P.G. Wilson* 11640 (PERTH).

Distribution. Found in the south-west of Western Australia between Capel and the Whicher Range.

Habitat. Recorded by Keighery as growing in *Melaleuca preissiana* and *Corymbia calophylla* open woodland as well as in *Pericalymma* woodland over sedges, in brown sandy loam in winter-wet flats.

Conservation status. Although this species is known from a relatively small area, two of the populations are in reserves and therefore a Priority Three code is probably appropriate.

Etymology. The Greek words *tetra*, four, and *gon*, angle, refer to the four-angled branchlets.

Notes. *Boronia tetragona* is similar to *B. fastigiata* subsp. *tenuior* from which it differs in having sessile entire leaves, smooth sharply angled branches (the ribs not glandular-undulate), woolly ciliate (not glabrous) sepals, and rounded (not acute) apices to the petals. The leaves of *B. tetragona* are somewhat unusual in that their margins are densely papillate, not smooth as is found in those species that appear to be closely related.

2. *Boronia* sect. *Imbricatae* Engl.

Boronia sect. *Imbricatae* Engl., Nat. Pflanzenfam. 3/4:136 (1896). *Type:* *Boronia cymosa* Endl.; lectotype *vide* P.G. Wilson, Nuytsia 1:204 (1971).

Seed morphology. *Seed* kidney-shaped. *Testa* rugulose; outer testa membranaceous, surface margaritaceous (shiny grey) flecked with black spots on ridges. *Adaxial surface* slightly concave and largely occupied by large ovate, smooth cream aril scar. *Hilum* linear along centre of aril scar. *Raphe* small on lower adaxial margin with reddish brown cover. *Chalazal opening* on lower adaxial margin covered by raphe. *Aril* ovate, firm, cream coloured, attached to seed at aril scar. *Placental endocarp* thin, deciduous. (Figure 7)

Notes. This section is here regarded as being monotypic. It has a seed unlike that found in any other section of the *Boronieae*.

Engler (1896) included five series under the sect. *Imbricatae* into which he placed species from each of the sections here recognized, apart from those in sect. *Valvatae*. It has been lectotypified in a manner that excludes all but one of the taxa included by Engler.

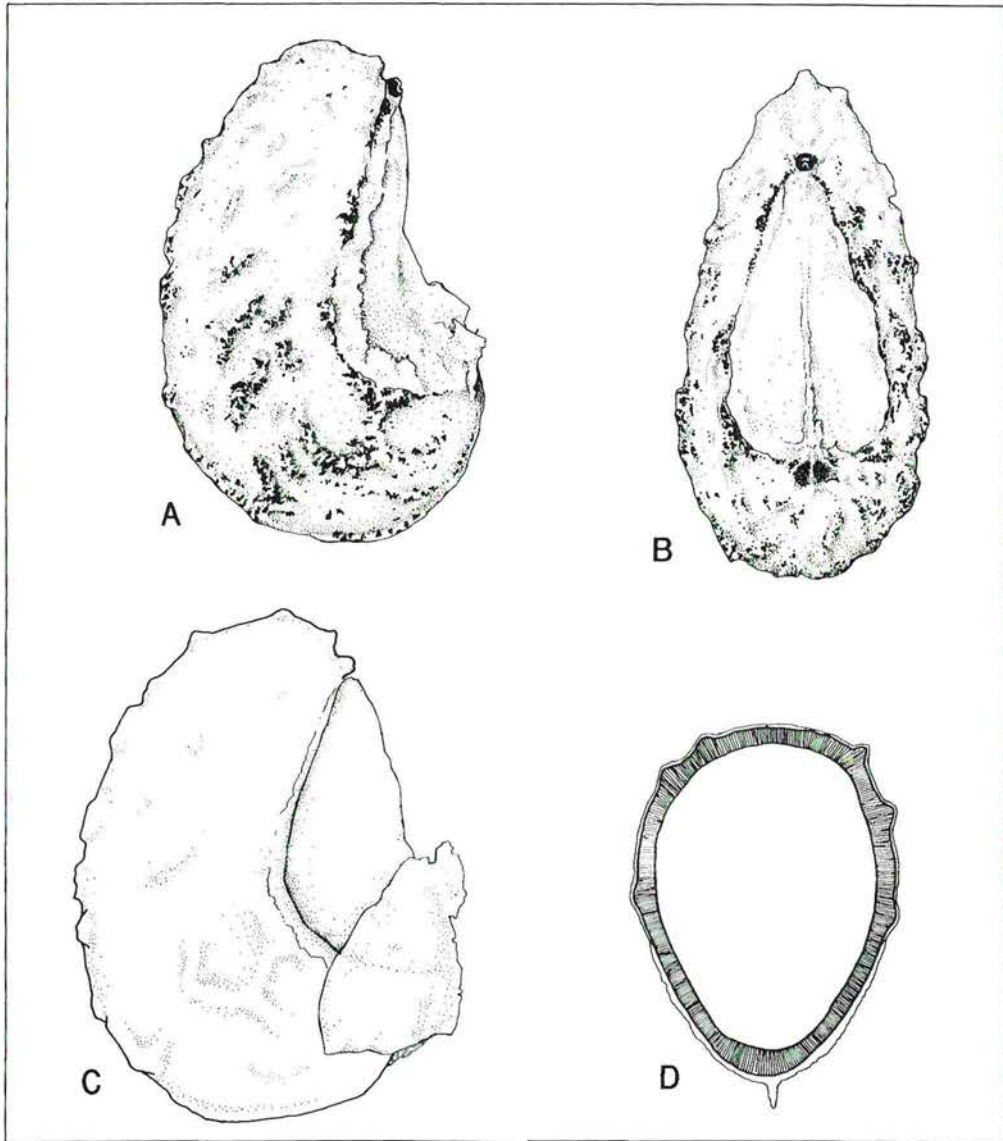


Figure 7. *Boronia cymosa* seed. A - lateral view, B - adaxial surface, C - lateral view with endocarp and aril attached, D - transverse section, all x20. Drawn from E.A. Griffin 1610.

3. *Boronia* sect. *Valvatae* s. lat.

Boronia sect. *Valvatae* (Benth.) Engler, Nat. Pflanzenfam. 3/4: 135 (1896). - *Boronia* ser. *Valvatae* Benth., Fl. Austral. 1: 308, 311 (1863). - *Boronia* sect. *Valvoboronia* Kuntze, nom. illeg. in T. Post & Kuntze, Lex. Gen. Phan. 74 (1903), based on preceding. Type: to be designated.

Boronia subg. *Robonia* Rchb., Iconogr. Bot. Exot. 54 (1824). Type: *B. ledifolia* (Vent.) J. Gay ex DC.

Typification. This section is being revised by Marco Duretto (MEL) who will designate a lectotype.

Seed morphology. Seed kidney-shaped, adaxial margin flat or concave. *Testa* smooth; outer testa matt, minutely papillose, black. *Hilum* linear along adaxial margin, sometimes faint. *Raphe* small on lower adaxial margin and at base of seed, with glossy brittle cover. *Chalazal opening* basal or sub-basal covered by raphe. *Placental endocarp* usually thick and persistent acting as an elaiosome. (Figure 8)

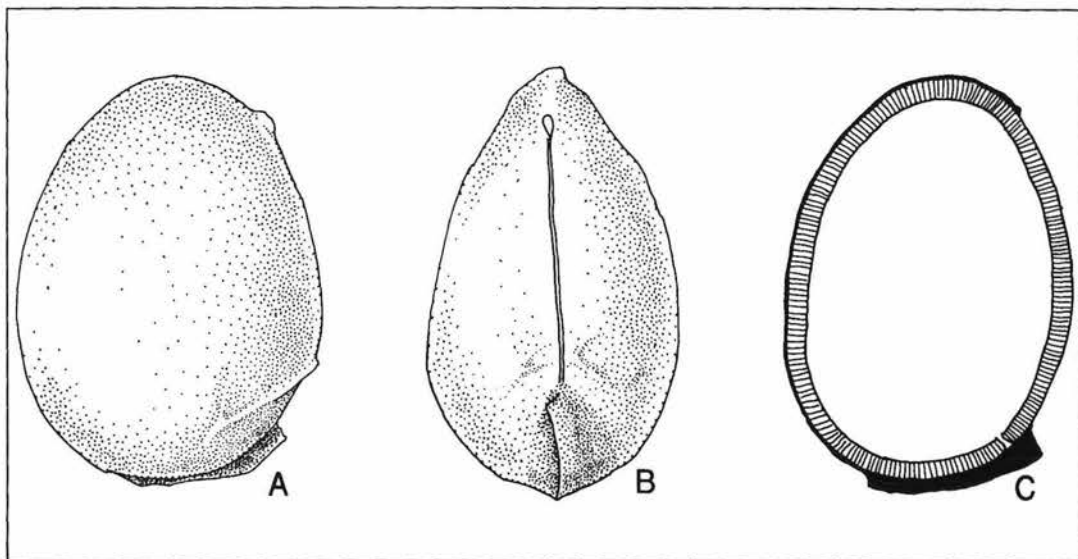


Figure 8. *Boronia alata* seed. A - lateral view, B - adaxial surface, C - longitudinal radial section, all x20.

Species examined. Both the number of species and the circumscription of this section are still to be determined. However, as presently defined, the section includes the following species whose seed morphology was examined: *Boronia alata*, *B. algida*, *B. lanceolata*, and *B. ternata*.

Notes. The seed of this section is characterized by the matt outer testa, the linear hilum, and the frequently thick persistent placental endocarp.

Boronia corynophylla* Paul G. Wilson, *sp. nov.

Ramuli sparse et minute puberuli. Folia anguste teretia vel anguste fusiformia, 7-10 mm longa, modice curvata, minute puberula. Flores 1-3 terminales. Pedicellus crassus, 1-2 mm longus, ad basim bracteolatus. Sepala imbricata, ovata, 2.5-3 mm longa, atro rufescentia. Petala valvata, coriacea, ovata, c. 5 mm longa, acuta, pallido rubra, glabrescentia, apicem non inflexa, non apiculata. Filamenta staminalis: antesepalina clavata, truncata, apicem versus verrucosa, ciliata; antepetalina crassa, oblonga, ad apicem verrucosa, ciliata; antherae minute apiculatae. Discum integrum, glabrum. Ovarium minute puberulum; stylus et stigma continuum, cylindraceum vel clavatum, c. 1 mm longum, obtusum, basin versus pilosum.

Typus: 13 km south-west of 90 Mile Tank, Frank Hann National Park, 27 October 1980, K.R. Newbey 7827 (*holo:* PERTH 01258486).

Spreading, densely branched *shrub* c. 30 cm high. *Branchlets* terete, sparsely and minutely puberulous all over when young with antrorse curved hairs; cuticle soon exfoliating and forming a grey scurfy covering. *Leaves* slender-terete to narrowly fusiform or narrowly clavate, slightly curved,

7-10 mm long, *c.* 1 mm wide, obtuse, slightly flattened above and sometimes sulcate, very minutely puberulous with antrorsely curved hairs. *Flowers* 1-3 terminal to branches. *Pedice*l thick, 1-2 mm long, sparsely and minutely puberulous, with a pair of small (*c.* 1 mm long) ovate bracteoles near the base. *Sepals* imbricate, ovate, 2.5-3 mm long, two narrower and slightly longer, coriaceous, glandular punctate, dark reddish brown, glabrous to very sparsely puberulous, ciliolate. *Petals* valvate, leathery, ovate, *c.* 5 mm long, acute, pale red, glabrous to very sparsely and minutely puberulous outside, puberulous within, prominently glandular-punctate all over; apex neither inflexed nor sub-apically apiculate. *Stamens* all fertile; sepaline filaments clavate, *c.* 2 mm long, obliquely truncate, warty in upper half, ciliate; petaline filaments thick, oblong, *c.* 1.5 mm long, warty at apex, ciliate; anthers cordate, pale yellow, *c.* 0.8 mm long, with broad connective, loculi not reflexed at dehiscence, minutely white-apiculate, affixed by a minute sub-apical stipe to adaxial side of filaments. *Disc* a narrow entire ring, glabrous. Ovary hemispherical, *c.* 1 mm high, minutely puberulous. *Style* and stigma continuous, cylindrical to somewhat clavate, *c.* 1 mm long, obtuse, pilose in lower half. *Fruit* and seed not seen. (Figure 9)

Additional specimen examined. WESTERN AUSTRALIA: 13 km SW of 90 Mile Tank, Frank Hann National Park, 11 Nov. 1979, K. Newbey 6477 (PERTH).

Distribution. This species has only been recorded from Frank Hann National Park, *c.* 90 km north-east of Lake King township, Western Australia.

Habitat. Found in *Eucalyptus salmonophloia* open woodland on well-drained clayey sand.

Conservation status. This species is known from only one locality where, according to the collector (K.R. Newbey), it is very common. An attempt was made in 1996 to re-collect this species but it could not be found, probably due to a fire having passed through the area the previous year. A Priority Two classification with priority for survey would probably be appropriate for this species.

Etymology. The specific epithet is derived from the Greek words *coryne*, a club, and *phyllon*, a leaf, with reference to the shape of the leaves.

Notes. *Boronia corynophylla* is distinctive because of the shape of its leaves and the exfoliating cuticle on its branches which gives the plant a glaucous appearance. The valvate aestivation of the petals is interesting since the sepals are imbricate. This situation is also found in *B. algida*, a species of south-eastern Australia, and with which *B. corynophylla* is probably most closely related (M. Duretto, pers. com.). Seed is required to positively determine its sectional position.

4. *Boronia* sect. *Cyanothamnus*

Boronia sect. *Cyanothamnus* (Lindl.) F. Muell., Fragm. 9: 113 (1875). - *Cyanothamnus* Lindl., Sketch Veg. Swan R. Col. 18 (1839). - *Boronia* ser. *Cyaneae* Benth., Fl. Austral. 1: 309 (1863) based on *Cyanothamnus* Lindl. - *Boronia* sect. *Cyaneae* (Benth.) De Wild. *nom. illeg.*, Icon. Select. 2: 67 (1901). *Type:* *B. ramosa* (Lindl.) Benth., lectotype here chosen.

Typification. The two species of *Cyanothamnus* that were described by Lindley, *C. ramosus* and *C. tenuis*, are currently included in *Boronia* sect. *Cyanothamnus*; the one that is most widespread is selected as lectotype.

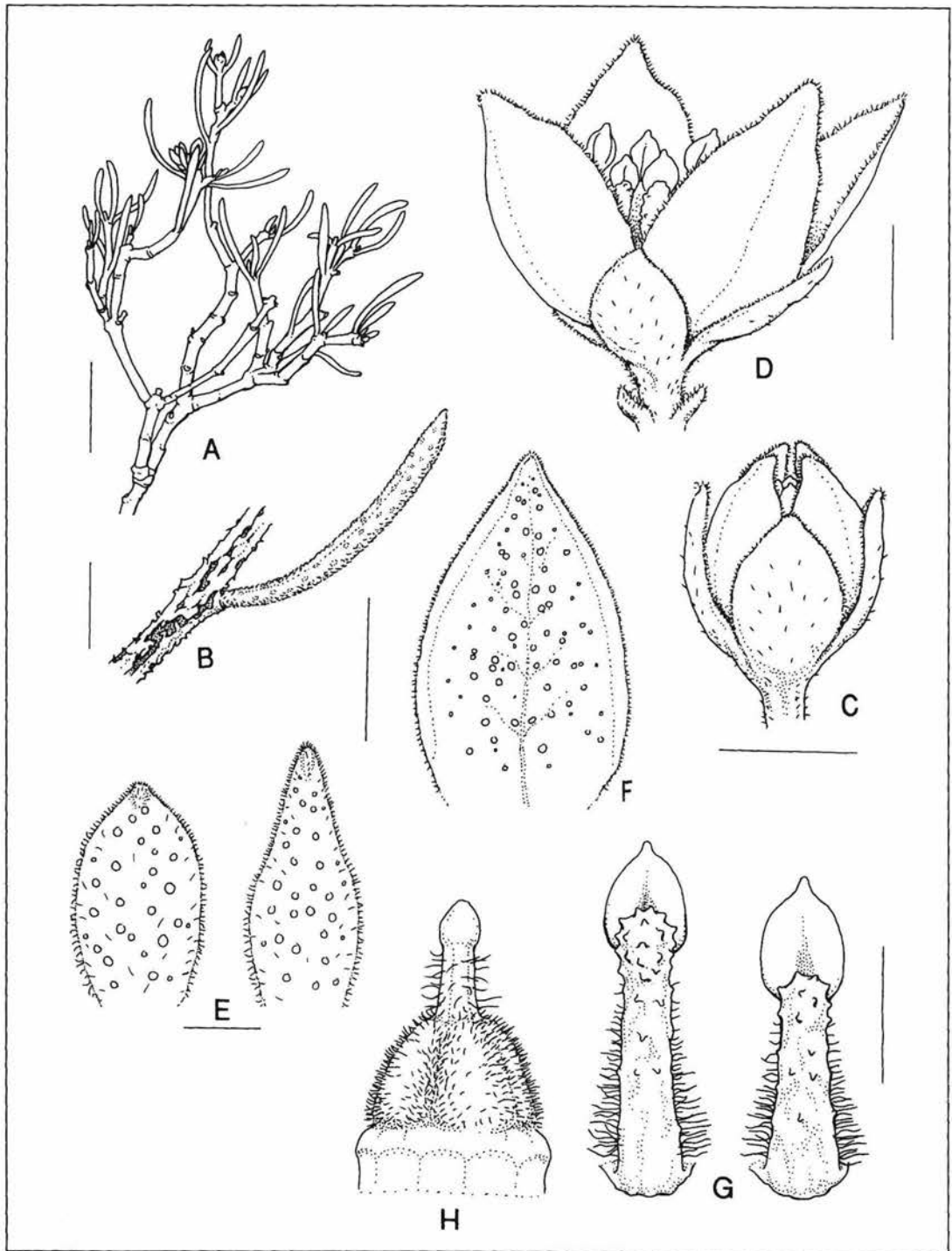


Figure 9. *Boronia corynophylla* A - flowering branch, B - leaf and branchlet, C - flower bud, D - flower, E - sepals, F - petal, G - sepaline and petaline stamens, H - disc and pistil. Scale bars: 10 mm (A), 2.5 mm (B), 2 mm (C, D and F), 1 mm (E, G and H). Drawn from K. Newbey 7827.

Seed morphology. Seed kidney-shaped, adaxial margin flat or convex. *Testa* rugose; outer testa diaphanous, black usually with grey powdery areas between ridges. *Hilum* linear along adaxial margin. *Raphe* minute at base of seed. *Chalazal* opening basal covered by raphe. *Placental endocarp* membranous, caducous. (Figure 10)

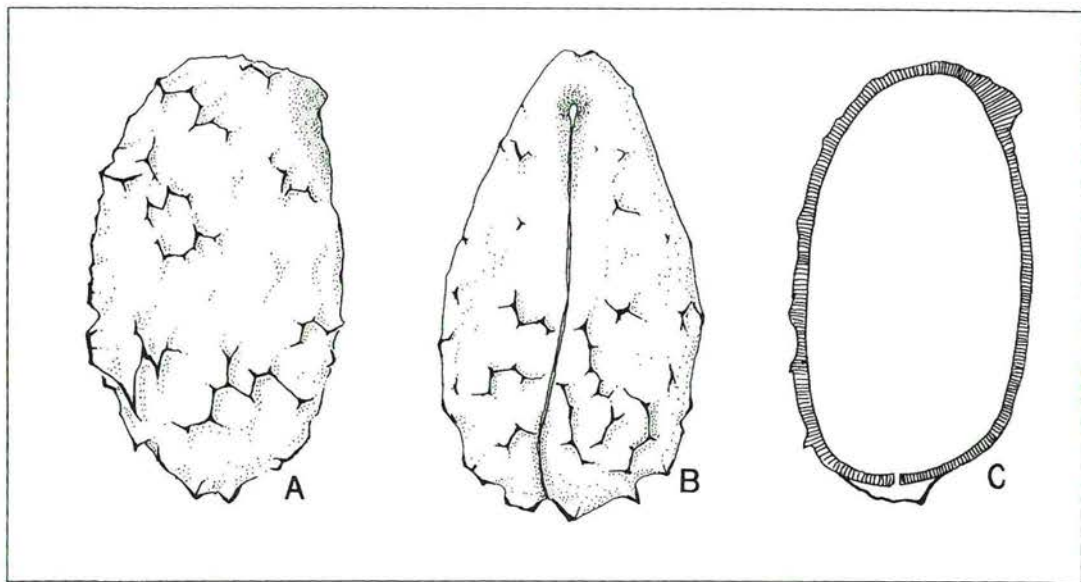


Figure 10. *Boronia coerulescens* seed. A - lateral view, B - adaxial surface, C - longitudinal radial section. all x20. Drawn from P.G. Wilson 270.

Species examined. Of the nine Western Australian species that are recognized in this section the following seven were examined for seed characters: *Boronia baeckeacea*, *B. busselliana*, *B. coerulescens*, *B. fabianooides*, *B. inconspicua*, *B. penicillata*, and *B. ramosa*.

Notes. The seed in this section is fairly uniform, except for variation in size. The rugose testa, black with powdery grey between the ridges, makes the seed unique in the genus and enables the section to be readily recognized.

Boronia acanthoclada* Paul G. Wilson, *sp. nov.

Fruticulus effusus c. 30 cm altus; ramuli divaricati, spinescentes, minutissime puberuli. Folia alterna, saepe in ramis veteribus fasciculata, angustissime obovata, 3-6 mm longa, supra concava, crassa, glabra. Flores solitarii, ad ramulos breves terminales; pedicellus supra bracteolas breves gracilis, 2-3 mm longus. Sepala anguste triangularia, 1.5-2 mm longa, carnosae, glabra. Petala elliptica, c. 4 mm longa, glabra, alba.

Typus: Frank Hann National Park, Western Australia, 29 September 1984, J.M. Brown 4051555 (*holo:* PERTH 01258494).

Spreading *shrub* c. 30 cm high, divaricately branched. *Branchlets* spinescent, extremely minutely puberulous. *Leaves* alternate, often fasciculate on the older wood, very narrowly obovate, rounded below, concave above, 3-6 mm long, thickened, glabrous or almost so. *Flowers* solitary, terminal to short shoots; pedicel (above the small bracteoles) slender, 2-3 mm long. *Sepals* narrowly triangular, 1.5-2 mm

long, fleshy, glabrous. *Petals* elliptic, c. 4 mm long, with a thickened inflexed tip, glabrous, eciliate, glandular-punctate around midnerve, white. *staminal filaments* narrowly oblong, glandular-verrucose in upper half, ciliate; *anthers* c. 0.5 mm long, shortly and bluntly white-apiculate. *Disc* glabrous. *Ovary* glabrous; *style* slender-terete, c. 1.2 mm long, glabrous; *stigma* minute. *Fruit* not seen. (Figure 11)

Specimens examined. Known only from the type collection.

Distribution. Frank Hann National Park, c. 30 km east of Lake King, Western Australia.

Habitat. The collector's notes indicate that the plant was growing in sand over gravel.

Conservation status. Only known from the one collection which was collected in Frank Hann National Park; it has not been relocated although searched for on several occasions. A Priority Two conservation code appears to be appropriate.



Figure 11. *Boronia acanthoclada* A - branch, B - flowering branch, C - adaxial surface of leaf, D - flower, E - petal, F - sepaline and petaline stamens, G - disc and pistil. Scale bars: 10 mm (A), 3 mm (B,D), 2 mm (C,E), 1 mm (F,G). Drawn from holotype.

Etymology. The epithet is derived from the latinized Greek words *acantho-*, spiny, and *cladus*, a branch.

Notes. This species is most closely related to *B. coerulescens*. The presence of alternate leaves, although not unique, is unusual in the genus as are the spinescent branchlets. It is similar in appearance to some variants of *B. coerulescens* subsp. *spinescens* but differs in the shape of the leaves and in their alternate phyllotaxy.

Boronia baeckeacea F. Muell., *Fragm.* 4:28 (1863).

Distribution. Found in southern Western Australia from Pingrup east to Mt Ragged.

Notes. Two subspecies are recognized.

Leaves simple, erect, suborbicular, 2-3 mm long subsp. **baeckeacea**

Leaves simple or trifoliolate, \pm spreading, broadly elliptic to obovate, 4-7 mm long subsp. **patula**

Boronia baeckeacea F. Muell. subsp. **baeckeacea**

Leaves simple, suborbicular, concave, \pm appressed to branch, 2-3 mm long.

Distribution. Found in southern Western Australia from Pingrup east to Mt Ragged.

Habitat. Recorded as growing in a variety of situations, over granite or limestone or in heavy soil.

Boronia baeckeacea subsp. **patula** Paul G. Wilson, *subsp. nov.*

Folia \pm patula, ad apicem recurva, simplicia et integra vel tri-lobata vel trifoliolata; lamina circularis et c. 3.5 mm longa, vel obovata et 5-7 mm longa, supra profunde concava.

Typus: About 45 km north-west of Clyde Hill, Western Australia, 21 May 1993, *G.F. Craig & B. Haberley* 2773 (*holo:* PERTH 3218600).

Leaves \pm spreading, somewhat recurved at apex, sessile, simple and entire or 3-lobed, or trifoliolate; lamina circular and c. 3.5 mm long, to obovate and 5-7 mm long, deeply concave.

Distribution. Found in the vicinity of Mt Ney and Mt Heywood, c. 90 km north-east of Esperance, south-east Western Australia.

Habitat. Growing on clay-loam in mallee.

Selected specimens examined. WESTERN AUSTRALIA: 1 km W of Mt Heywood, *K. Newbey* 8279 (PERTH); SW of Mt Ney, *A.S. George* 15905 (PERTH); 26.5 km NE of Mt Heywood, *W.R. Archer* 1708912 (PERTH).

Conservation status. The collections all come from two relatively small areas and no attempt has been made to determine its degree of security. A Priority One rating would appear to be appropriate.

Etymology. The subspecific epithet is derived from the Latin word *patulus*, spreading, referring to the posture of the leaves.

Notes. This subspecies has circular or obovate leaves to 7 mm long. Occasionally some of these leaves are divided into three sessile leaflets with such a variation being found on the same branch. It grades to the south and west into the typical subspecies.

Boronia coerulescens F. Muell., Trans. Phil. Soc. Victoria 1: 11 (1854). *Type:* Mallee scrub near the entrance of the Murray, South Australia, September 1848, *F. Mueller* (*lecto:* MEL 1058497), lectotype here chosen.

Typification. Mueller gave no collection data under the species name but only under the two varieties, var. *pubescens* and var. *glabrescens*, of which the latter is so lectotypified as to make it homotypic with the typical variety.

Boronia coerulescens F. Muell. subsp. ***coerulescens***

B. coerulescens var. *glabrescens* F. Muell., Trans. Phil. Soc. Victoria 1: 11 (1854). *Type citation:* In barren places from the Mallee scrub on the Murray River to Spencer's Gulf. *Type:* Mallee scrub near the entrance of the Murray, South Australia, September 1848, *F. Mueller* (*lecto:* MEL 1058497), lectotype here chosen.

B. coerulescens var. *pubescens* F. Muell., Trans. Phil. Soc. Victoria 1: 11 (1854). *Type citation:* On rocky hills in the Grampians, and in the desert towards Guichen Bay. *Type:* Morro Morro, The Grampians, Victoria, November 1853, *F. Mueller* (MEL 1058495; *isolecto:* MEL 1058494), lectotype here chosen.

Distribution. This subspecies occurs in extreme south-eastern New South Wales, eastern Victoria through southern South Australia and southern Western Australia.

Boronia coerulescens subsp. ***spicata*** Paul G. Wilson, Nuytsia 1: 200 (1971).

Distribution. Occurs in inland southern Western Australia from Paynes Find south to Muntadgin and east to near Coolgardie.

Boronia coerulescens subsp. ***spinescens*** (Benth.) Paul G. Wilson, Nuytsia 1: 200 (1971).

B. spinescens Benth., Fl. Austral. 1: 319 (1863). *Type:* Swan River Colony, Western Australia, *J. Drummond* 87 (*holo:* K; *iso:* MEL 236848).

Typification. The Drummond collection was incorrectly cited by Bentham, *loc. cit.*, as 78.

Bentham evidently studied two collections of James Drummond's when describing this taxon both of which were in the Herbarium Hookerianum (now herb. K). On the sheets of each collection the epithet *spinescens* is underlined in red ink, which procedure was used by Bentham to indicate that he had studied the specimen when writing the Flora of Australia (Bentham 1863). One of the collections, number 87, is of a plant that is making fresh growth from a burnt stump, it has ascending scarcely spinescent branches. The other, which is not numbered, has spreading prominently spinescent branches. Evidently Bentham derived the specific epithet from the branching pattern of the unnumbered collection but since only collection 87 was cited by him the unnumbered one is not available for lectotypification.

Boronia fabianoides (Diels) Paul G. Wilson, Nuytsia 1: 119 (1970). - *Eriostemon fabianoides* Diels, Bot. Jahrb. Syst. 35: 322, tab. 39 K-L (1904). *Type*: North of Grasspatch, Western Australia, 2 November 1901, L. Diels 5289 (*iso*: PERTH01609726).

Distribution. Found near Cowcowing and from Lake King east to the Fraser Range, southern Western Australia.

Notes. Two subspecies are recognized.

Petals *c.* 3 mm long, white with green midrib subsp. **fabianoides**

Petals 5-7 mm long, white with pink midrib subsp. **rosea**

Boronia fabianoides (Diels) Paul G. Wilson subsp. **fabianoides**

Low spreading *shrub* with divaricate branches, 10-30 cm high. *Sepals* triangular, *c.* 1 mm long. *Petals* broadly elliptic, *c.* 3 mm long, 2 mm wide, glabrous, white with thickened green midrib.

Distribution. Norseman to Esperance area of southern Western Australia.

Habit. In eucalypt woodland on brown loam, sometimes calcareous.

Notes. This subspecies generally has hispidulous branchlets but a glabrous variant is found *c.* 70 km east of Norseman along the Eyre Highway (*G.F. Craig* 3064; *R.J. Cranfield* 9384).

Boronia fabianoides subsp. **rosea** Paul G. Wilson, *subsp. nov.*

Fruticulus erectus ramis ascendentibus, 30-60 cm altus. Sepala triangularia, 2(3) mm longa. Petala late elliptica, 5-7 mm longa, glabra, alba praeter costam crassam pallido rubram.

Typus: Woodline, *c.* 95 km east-north-east of Norseman, Western Australia, 7 August 1980, *G.J. Keighery* 2998 (*holo*: PERTH 942294).

Erect *shrub* with ascending branches, 30-60 cm high. *Sepals* triangular, 2(3) mm long. *Petals* broadly elliptic, 5-7 mm long, 4-6 mm wide, glabrous, white with a thickened narrow pink midrib.

Selected specimens examined. WESTERN AUSTRALIA: 10 km E of Norseman, *D.E. Albrecht* 4035 (PERTH); Cowcowing, September 1904, *M. Koch* 1231 (MEL); 30 km S of Norseman, *K. Newbey* 6869 (PERTH); 2.5 km NW of Lake Cronin, *K. Newbey* 8311 (PERTH).

Distribution. Found between Lake King and the Fraser Range, Western Australia, with a 1904 record from Cowcowing.

Habitat. In clay-loam often over greenstone or granite.

Etymology. The subspecific epithet *rosea*, from the Latin, *roseus*, refers to the colour of the broad midrib of the petals.

Notes. This plant has been described by one collector as being pungently aromatic with a spearmint scent, and by another as having a menthol smell when crushed.

The single collection from the Cowcowing district, made in September 1904 (*M. Koch* 1231), has narrow-oblong sepals *c.* 3 mm long and prominent white anther apicula, but it otherwise agrees with the more easterly collections of subsp. *rosea*.

Boronia penicillata Benth., *Fl. Austral.* 1: 322 (1863). *Type:* Between Swan River and King George Sound, Western Australia, *J. Drummond* 98 (*lecto:* K, photo seen; *isolecto:* MEL 1058515), lectotype here chosen.

Typification. The sheet bearing the lectotype at herb. K is numbered 86 whereas the isolectotype in herb. MEL has an original number tag that is fixed to the sheet so as to give the number 98. Comparison with the writing of the numbers 8, 6, and 9 by Drummond on tags of his other collections suggest that 98 is correct.

Boronia ramosa (Lindl.) Benth., *Fl. Austral.* 1: 320 (1863). - *Cyanothamnus ramosus* Lindl., *Sketch Veg. Swan R.* 18 (1839). *Type:* Swan River Colony, Western Australia, 1839, *J. Drummond* (*syn:* CGE photo seen); *Capt. Mangles* (*syn:* CGE, photo seen).

Notes. Three subspecies are recognized.

- 1 Pedicels 6-15 mm long; stigma fusiform or cylindrical subsp. **ramosa**
- 1: Pedicels 2-3 mm long; stigma capitate
 - 2 Leaflets slender terete, channelled above subsp. **anethifolia**
 - 2: Leaflets linear to narrowly oblong, concave above subsp. **lesueurana**

Boronia ramosa (Lindl.) Benth. subsp. **ramosa**

Distribution. The Darling Range from Perth north to Dandaragan and also near Mt Peron, Western Australia.

Boronia ramosa subsp. **anethifolia** (Bartl.) Paul G. Wilson, *Nuytsia* 1: 320 (1863). - *Cyanothamnus anethifolius* Bartl. in *Lehm., Pl. Preiss.* 1: 170 (1844). - *B. ramosa* var. *anethifolia* (Bartl.) Benth., *Fl. Austral.* 1: 320 (1863). *Type:* Near Spitesbrook on Canning River, 14 July 1841, *L. Preiss* 2035 (*lecto:* LD; *isolecto:* MEL 1058481, MEL 1058482), lectotype here chosen.

Distribution. Murchison River south to the Stirling Range and east to Cape Le Grand, Western Australia.

Boronia ramosa subsp. **lesueurana** Paul G. Wilson, *subsp. nov.*

Folia pinnatim 3-5-foliolata, 15-40 mm longa; petiolus gracilis, 10-15 mm longus, supra sulcatus; foliola linearia vel anguste oblonga, 5-25 mm longa, obtusa, supra concava.

Typus: 3 km south-east of Shaw Rd on south boundary of [Mount Lesueur] reserve, Western Australia, 1 July 1992, *R.J. Cranfield & P. Spencer* 8245 (*holo:* PERTH 02241838).

Compact woody *perennial* to 30 cm high. *Branches* narrowly 4-winged when young due to the decurrent bases of the leaves, becoming tetragonal or terete with age, puberulous between wings otherwise glabrous; internodes 8-15 mm long. *Leaves* pinnately 3-5-foliolate, in all 15-40 mm long; petiole slender, 10-15 mm long, channelled above; leaflets linear to narrowly oblong, 5-25 mm long, 1.3-2 mm broad, obtuse, concave above.

Other specimens examined. WESTERN AUSTRALIA: 10 km N of Jurien Bay turn-off, *R.J. Cranfield* 1467 (PERTH); Mt Lesueur, *C.A. Gardner* 9081 (PERTH); Mt Lesueur, *E.A. Griffin* 1838 (PERTH).

Distribution. Recorded from near Mt Lesueur, c. 200 km north of Perth, south-west Western Australia.

Habitat. Grows in sand or gravel over laterite.

Conservation status. This subspecies is known from four populations of which at least one is in a national park. A Priority Two ranking is recommended.

Etymology. This subspecies is named after the hill where it is to be found.

Notes. *Boronia ramosa* subsp. *lesueurana* appears to grade into *B. ramosa* subsp. *anethifolia* which is found in the heathland surrounding Mt Lesueur; the most obvious difference between the two taxa is to be found in the shape of the leaflets which in subsp. *anethifolia* are slender-terete.

Boronia westringioides* Paul G. Wilson, *sp. nov.

Ramuli stellato pubescentes. Folia conferta, ascendunt, opposita, semiteretia, acuta, 5-10 mm longa. Flores solitarii; pedicellus turbinatus, 1-2 mm longus, dense stellato pubescens; bracteolae foliaceae, c. 1.5 mm longae. Sepala triangularia vel ovata acuminata, 2-3 mm longa, crassa, sparse pubescentia. Petala elliptica, 5-6 mm longa, manifeste rubro glanduloso punctata, tenuia, modice stellato pubescentia.

Typus: 8 km west of Forrestania-Southern Cross road on Hyden-Norseman road, Western Australia, 12 October 1995, *G.F. Craig* 3318 (*holo:* PERTH 04202104; *iso:* CANB, K).

Erect *shrub* to 75 cm high with ascending branches. *Branchlets* stellate pubescent. *Leaves* sometimes congested, ascending, opposite (or ternate, or the leaves sessile and trifoliolate), semiterete or narrowly elliptic, channelled or concave above, acute, 5-10 mm long, smooth, glabrous or stellate puberulous. *Flowers* solitary in uppermost leaf-axils; pedicel turbinate, 1-2 mm long, densely stellate pubescent and with short clavate glandular hairs; bracteoles medially positioned, foliaceous, c. 1.5 mm long. *Sepals* triangular to ovate-acuminate, 2-3 mm long, thick, with prominent red glandular dots when dry, sparsely pubescent. *Petals* elliptic, 5-6 mm long, with prominent red glandular dots all over, thin, moderately stellate pubescent and with clavate glandular hairs, pale pink, midrib not prominent. *Staminal filaments* compressed terete, glandular tuberculate towards apex, ciliate; anthers minutely white-apiculate. *Ovary* glabrous or puberulous; style terete, c. 0.5 mm long, sparsely pilose; stigma subcapitate. *Seed* ellipsoid, c. 3 mm long, rounded at apex and base; testa rugose, black with white deposit. (Figure 12)

Other specimens examined. WESTERN AUSTRALIA: 6 km W of junction of Forrestania Rd and road from Hyden, *B. & B. Backhouse* H/9 (PERTH); far inland from King George Sound, 1882, *A.Y. Hassell* (MEL); 7 km W of Lake Cronin, *K. Newbey* 5199 (CANB, PERTH); c. 65 km E of Hyden, *K. Newbey* 9169 (PERTH).

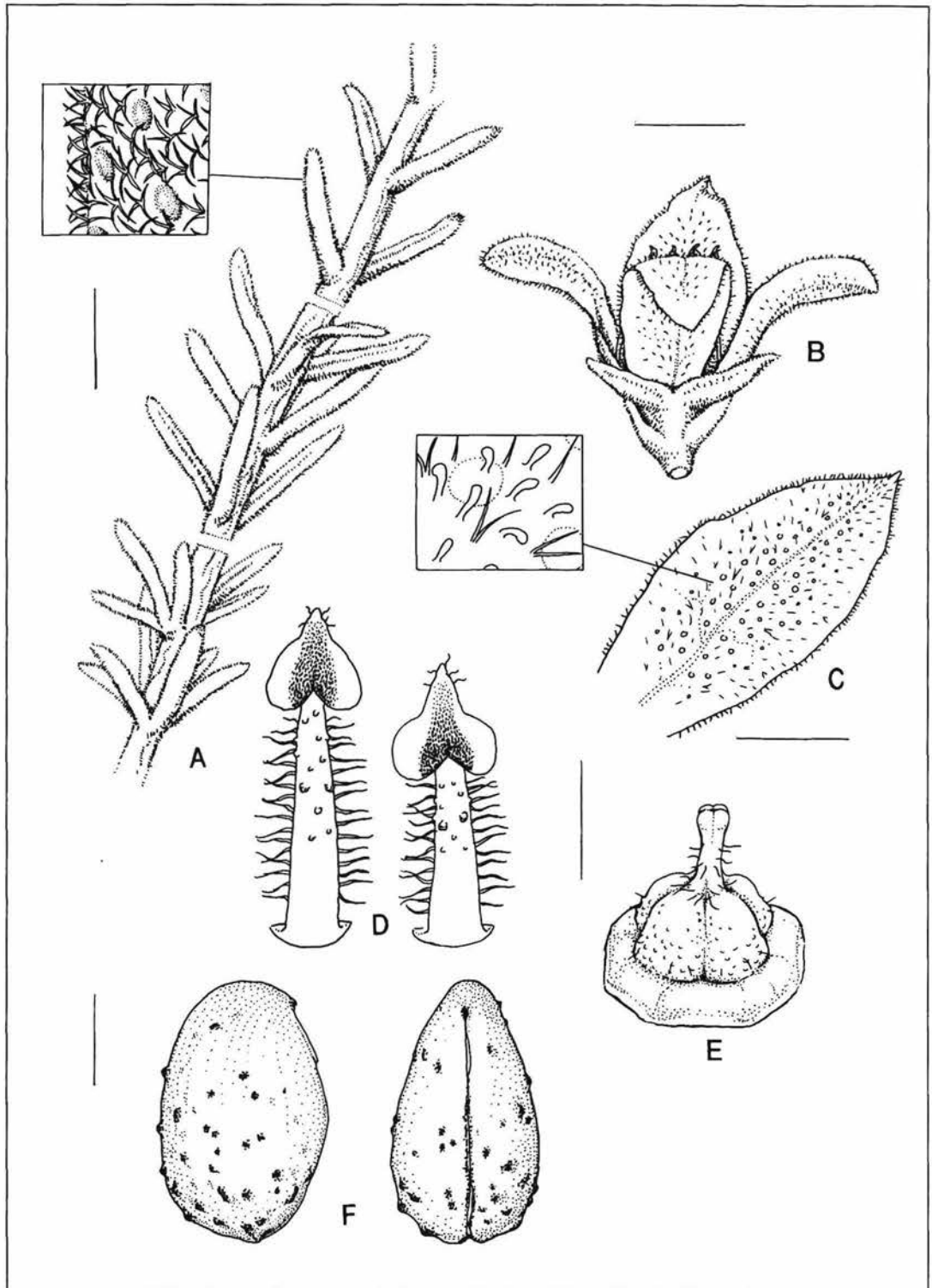


Figure 12. *Boronia westringioides* A - branch, B - flower, C - petal (abaxial surface), D - sepaline and petaline stamens, E - disc and pistil, F - lateral and adaxial surfaces of seed. Scale bars: 5 mm (A), 3 mm (B), 2 mm (C), 1 mm (D,E and F). Drawn from *D. Papenfus* 494.

Distribution. Known from a small area c. 70 km north of Lake King township and c. 65 km east of Hyden, in southern inland Western Australia.

Habitat. Recorded as growing on loamy sand plains.

Notes. There is some variation in the leaves. Whereas in most collections they are simple and decussate in two collections they are ternate with some of the leaves sessile and trifoliate.

Conservation status. This species warrants a Priority Two ranking since it is known from only one area which is not currently under threat.

Etymology. The epithet alludes to the plant's resemblance to members of the genus *Westringia*.

Affinities. This species differs from its closest relative, *B. baeckeacea*, principally in its leaf shape.

Acknowledgements

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