Studies on the Australasian Asclepiadaceae. I. *Brachystelma* Sims in Australia

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Abstract

Forster, P.I. Studies on the Australasian Asclepiadaceae. I. *Brachystelma* Sims in Australia. Nuytsia 6(3): 285-294 (1988). A taxonomic account of Australian *Brachystelma* Sims is given, with a single species, *B. microstemma* Schltr. recognised for which a lectotype is selected *Microstemma tuberosum* R.Br., *Brachystelma glabriflorum* F. Muell, and *B. papuanum* Schltr. are included in synonymy. Notes on variation, habitat and conservation status of *B. microstemma* are given.

Introduction

The last taxonomic treatment of the Australian Asclepiadaceae as a whole, was that of Bentham (1869) who recognised 53 native species in 14 genera. Little revisionary work has been undertaken since, and the generic and specific delimitation of Australasian material is in need of critical study. This initial contribution concentrates on specific taxa referred to the genera *Microstemma* R. Br. and *Brachystelma* Sims.

On examination of herbarium material at the Queensland Herbarium (BRI), it was evident that collections of *Microstemma tuberosum* R. Br. were congeneric with species of *Brachystelma* Sims, as recognised by Schlechter (1914). Due to the earlier publication of *Microstemma*, it was considered appropriate to propose conservation of *Brachystelma*, to avoid the approximately 100 new combinations necessary if the two genera were combined. The authorship of *Brachystelma* and its typification are discussed in Forster (1985, 1986).

Taxonomic History

The genus *Microstemma* R. Br. was first validly published in Brown (1810a). The entry in Farr et al. (1979) incorrectly cites Brown (1810b), issued as a preprint of Brown (1811), which although previously thought to be issued simultaneously with Brown (1810a), in fact postdated it by some 7 days (Mabberley 1985).

Brown's material originated from the voyage with Matthew Flinders in H.M.S. Investigator. This material was from Turtle Island in the Gulf of Carpentaria and is probably that drawn by the voyage's artist, Ferdinand Bauer, published by Endlicher (1838).

A second species, *M. glabriflorum* F. Muell., was described in 1858, based on a single collection from the Sea View Range, collected by Ferdinand von Mueller. Only two small specimens were found with few flowers. Mueller (1858) distinguished this species from *M. tuberosum* primarily by its glabrous corolla and the more prominent corona. Bentham (1869) noted, in addition, that the flowers were smaller and commented that *M. glabriflorum* may be only a variety of M. *tuberosum*.

Schlechter (1914), although recognising the prior publication of *Microstemma*, preferred to recombine *M. glabriflorum* into *Brachystelma* and provided a new name, *B. microstemma* Schltr. for *M. tuberosum* R. Br. to avoid creating a later homonym for *B. tuberosum* (Meerburg) R. Br. ex Sims (Forster 1985).

Materials & Methods

A request for material of *Microstemma* provided a number of specimens of *M. tuberosum* (hereinafter referred to as *Brachystelma microstemma*) which have been cultivated for several years. Herbarium material at BRI, CANB, DNA, MEL, NSW and PERTH, and selected material from BM, K and L was examined. The description of *B. microstemma* is based mainly on the live collections studied.

Taxonomic Treatment

Brachystelma Sims, Bot. Mag. 49: t. 2343 (1822); Endl., Gen. Pl. 8: 597 (1838); Decne. in DC., Prodr. 8: 646-647 (1844); Harv., Gen. S. Afr. Pl. edn 2. 242 (1868); Benth. in Benth. & Hook., Gen. Pl. 2: 781 (1876); Schltr., Bot. Jahrb. Syst. 20, Beibl. 51: 52-54 (1895); J. Bot. 35: 292 (1897); Bot. Jahrb. Syst. 50: 160-162 (1914); Bot. Jahrb. Syst. 52: 144-145 (1914); K. Schum., Nat. Pflanzenfam. 4, 2: 268 (1897); N.E. Br., Fl. Trop. Afr. 4,1: 471 (1903); Fl. Cap. 4,1: 833 (1908); Phill., Gen. S. Afr. Fl. Pl. edn 2: 607 (1951); Huber, Prodr. Fl. S. W. Afr. 114: 10 (1967); R. A. Dyer, Bothalia 10: 373 (1971); Gen. S. Afr. Fl. Pl. 487 (1975); Fl. S. Afr. 27, 4: 1-41 (1981); *Ceropegia, Brachystelma* and *Riocreuxia* in Southern Africa (1983); Walker, Asklepios 25: 92-106 (1982); Bruyns, Dinteria 17: 3-80 (1984). *Type*: *B. tuberosum* (Meerburg) R. Br. ex Sims.

Microstemma R. Br., Prodr. 459 (1810); On Asclepiad. 14 (1810); Trans. Wern. Soc. Nat. Hist. 1: 25-26 (1811); Endl., Gen. Pl. 8: 597 (1838); F. Muell. Fragm. Phyt. Austral. 1:58 (1858); Decne. in DC., Prodr. 17: 294-295 (1873); Benth. in Benth. & Hook., Gen. Pl. 2: 778-779 (1876); K. Schum., Nat. Pflanzenfam. 4, 2: 266 (1897). *Type*: *M. tuberosum* R. Br.

Decaceras Harv., Thes. Cap. 2: 9, t. 114 (1863); Gen. S. Afr. Pl. edn 2. 242 (1868); Schltr., J. Bot. 35: 291-292 (1897); K. Schum., Nat. Pflanzenfam. 4, 2: 266 (1897). *Type*: *D. huttonii* Harv.

Dichaelia Harv., Gen. S. Afr. Pl. edn 2. 241 (1868); Benth. in Benth. & Hook., Gen. Pl. 2: 780 (1876); Schltr., Bot. Jahrb. Syst. 18, Beibl. 45: 35-37 (1894); Bot. Jahrb. Syst. 20, Beibl. 51: 49-50 (1895); J. Bot. 35: 293 (1897); Bot. Jahrb. Syst. 52: 145 (1914); K. Schum., Nat. Pflanzenfam. 4, 2: 269 (1897); Bullock, Kew Bull. 1953: 358 (1953); Huber, Prodr. Fl. S. W. Afr. 114: 28 (1967). *Type*: *D. gerrardii* Harv.

Micraster Harv., Gen. S. Afr. Pl. edn 2. 242 (1868). *Type*: *M. pulchellus* Harv.

Lasiostelma Benth. in Benth. & Hook., Gen. Pl. 2: 776 (1876); Oliver, Hooker's Icon. Pl. 15, t. 1449 (1883); Schltr., J. Bot. 37: 61-62 (1899). *Type*: *L. sandersonii* Oliver.

Tapeinostelma Schltr., Verh. Bot. Vereins. Prov. Brandenburg. 35: 53 (1893); K. Schum., Nat. Pflanzenfam. 4, 2: 267-268 (1897). *Type*: *T. caffrum* Schltr.

Craterostemma K. Schum., Bot. Jahrb. Syst. 17: 154 (1893); Nat. Pflanzenfam. 4, 2: 266 (1897). *Type: C. schinzii* K. Schum.

Brachystelmaria Schltr., Bot. Jahrb. Syst. 20, Beibl. 51: 50-52 (1895); J. Bot. 35: 293 (1897); K. Schum., Nat. Pflanzenfam. 4, 2: 268: (1897). *Type*: not designated.

Aulostephanus Schltr., Bull. Herb. Boissier 4: 451 (1896). *Type*: *A. natalensis* Schltr.

Blepharanthera Schltr., Bot. Jahrb. Syst. 52: 146-148 (1914). *Type*: not designated.

Siphonostelma Schltr., Bot. Jahrb. Syst. 52: 148-149 (1914); Huber, Prodr. Fl. S. W. Afr. 114: 53 (1967). *Type*: *S. stenophyllum* Schltr.

Geophytic perennial herbs with a single tuber or cluster of fleshy, fusiform roots. Stems prostrate to erect, single or variously branched. Leaves opposite, sessile or with short petiole, pubescent or glabrous, generally without glands at lamina base. Flowers 1

to several in subsessile cymes or terminal, pedicellate, rarely pedunculate. Calyx without basal glands, 5 parted, generally ovate-lanceolate to linear-lanceolate, glabrous or pubescent. Corolla tube rarely longer than lobes, tubular, campanulate to flat; lobes 5, free or connate at tips, flat or replicate, broadest at base; glabrous or pubescent. Staminal corona 1-2 seriate, longer or shorter than staminal column; outer corona variously shaped; inner lobes usually incumbent on backs of anthers, rarely reduced to small swellings at base of anthers. Staminal column arising from base of corolla, anther connectives incurved or incumbent on column or suberect, oblong or subquadrate, without terminal appendage. Pollinia horizontal or erect, solitary in each anther cell, pellucid on inner margin. Caudicles linear-oblong, attached to base or midway along translators. Stigma usually conical-convex, not exceeding anthers. Follicles fusiform to linear-fusiform, glabrous, green or mottled. Seeds convex on one side, concave on other, with coma of numerous hairs at one end.

Distribution. About 100 species, occurring mainly in Africa, but also in India and South-east Asia, with one species in Australia.

Brachystelma microstemma Schltr., Bot. Jahrb. Syst. 50: 160 (1914); *Microstemma tuberosum* R. Br., Prodr. 459 (1810); Endl., Icon. Gen. Pl. t. 60 (1838); F. Muell., Fragm. Phyt. Austral. 1: 58 (1858); Benth., Fl. Austral. 4: 345 (1869); Bailey, Queensland Fl. 3: 1014-1015 (1900); Bailey, Compr. Cat. Queensland. Pl. 335, t. 312 (1913); Back. & van der Brink Bakhuizen, Fl. Java 2: 257 (1965). *Lectotype* (here designated): Australia, Carpentaria, Turtle Island, Dec. 1802, *R. Brown* s.n. sub. *J.J. Bennett* 2880 (lecto: BM; isolecto: K).

Microstemma glabriflorum F. Muell., Fragm. Phyt. Austral. 1:58 (1858); Benth., Fl. Austral. 4: 345 (1869); *Brachystelma glabriflorum* (F.Muell.) Schltr., Bot. Jahrb. Syst. 50: 161 (1914). *Type*: Seaview Range, s. dat., *F. Mueller* s.n. (holo: K).

Brachystelma papuanum Schltr., Bot. Jahrb. Syst. 50: 161 (1914). *Type*: Nordostl. Neu-Guinea: auf grasigen Hugeln am Fuβe des Bismarck-Gebirges, *R. Schlechter* 18470 (holo: B, non vidi).

Tuber ovate to discoid or irregularly shaped, 1-8 cm diameter. *Stems* 20-85 cm long, 2-3 mm thick, upright, rarely branched, up to 9 nodes; internode length variable to 6 cm. *Leaves* often vestigial and scale-like, or well developed, narrowly linear-lanceolate, acuminate; firmly coriaceous, glabrous; 5-100 mm long, 2-10 mm wide. *Flowers* borne on top 1-5 nodes; borne between petioles of leaf pair, or terminal; in subsessile cymes, 1-few flowered; often next to scale-like leaves. *Flower pedicels* 7-20 mm long, filiform, greenish-yellow with faint purple spots, with short, greenish-yellow cilia; pendulous during anthesis. *Fruiting pedicels* erect 10-25 mm long. *Calyx segments* narrowly triangular, acute, 1 mm long, greenish yellow, with greenish-yellow cilia. *Corolla* deeply 5-parted; segments valvate in bud, afterwards widely patent and longitudinally conduplicate, ovate-oblong, 7-9(14) mm long, 2-2.5 mm wide at base, greenish outside, glabrous; tube greenish to cream inside, segments with copious dark purple or brown dots or entirely purple, glabrous or with copious dark purple hairs. *Corona* inserted c. 1 mm above base of staminal column, gamophyllous, widely cupular-truncate, 0.75 mm high, 2.5 mm wide, yellowish with dark-purple upper margin; divided into compartments by 5 epistaminal septa; upper margin of corona between septa with horizontally patent to slightly oblique short white cilia. *Staminal tube* short, connectives incurved, apex truncate, yellow-cream. *Pollinia* erect, ovoid, slightly compressed, pellucid margined on top inside edge, c. 0.27 mm long, 0.16 mm wide. *Caudicles* yellowish 0.09 mm long. *Translators* brown, 0.16 mm long. *Stigma* conical-convex, yellowish. *Follicles* fusiform, erect, narrowly linear-lanceolate, acute, terete, smooth, glabrous, 6-12 cm long, 2-3 mm wide. *Seeds* brown, to 8 mm long, coma 2-2.5 cm long. Figures 1-3.

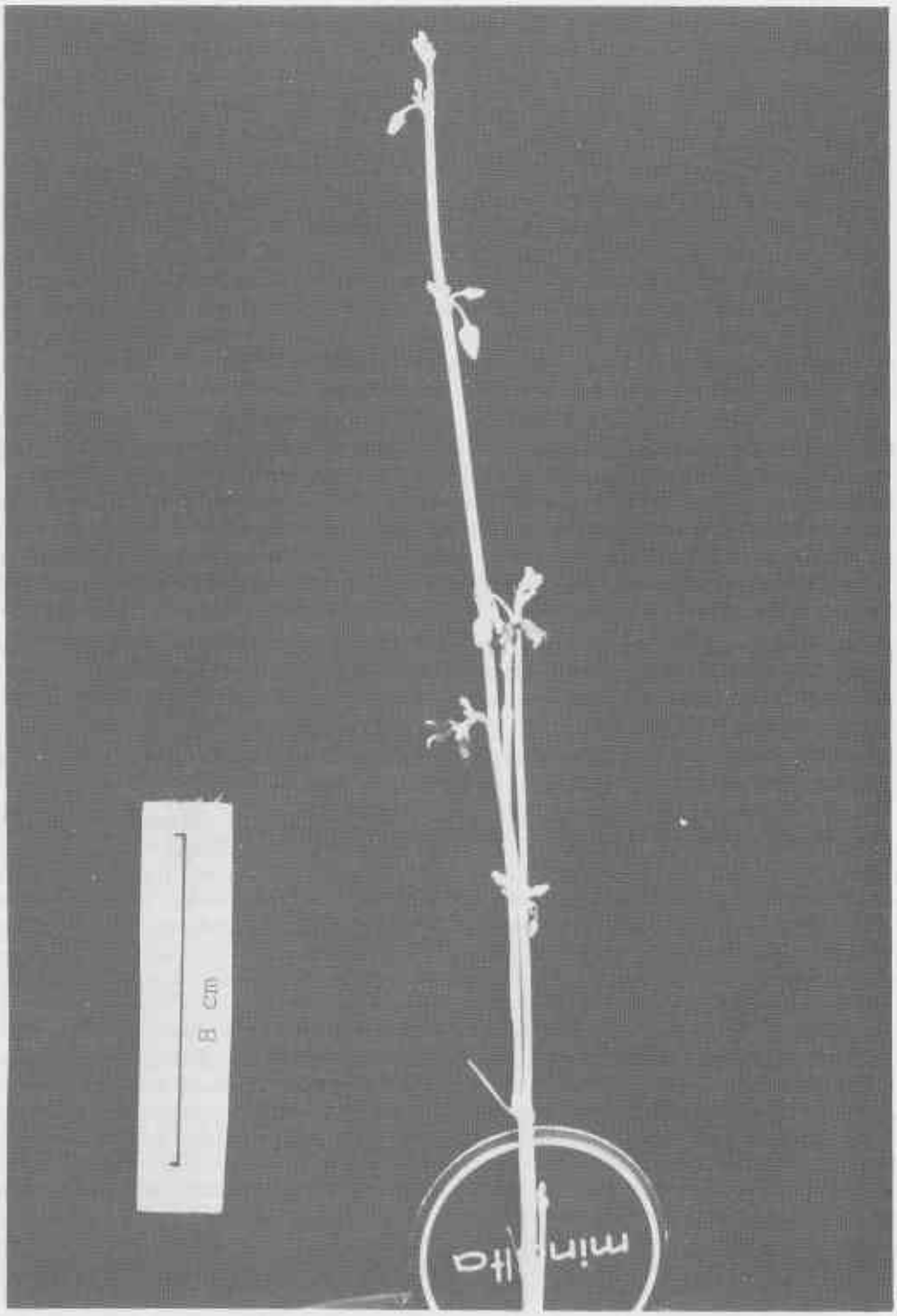


Figure 1. Flowering plant of *B. microstemma* (*M. Lockyer* sub *P.I. Forster* 1570), showing pendulous flowers and linear, vestigial leaves.

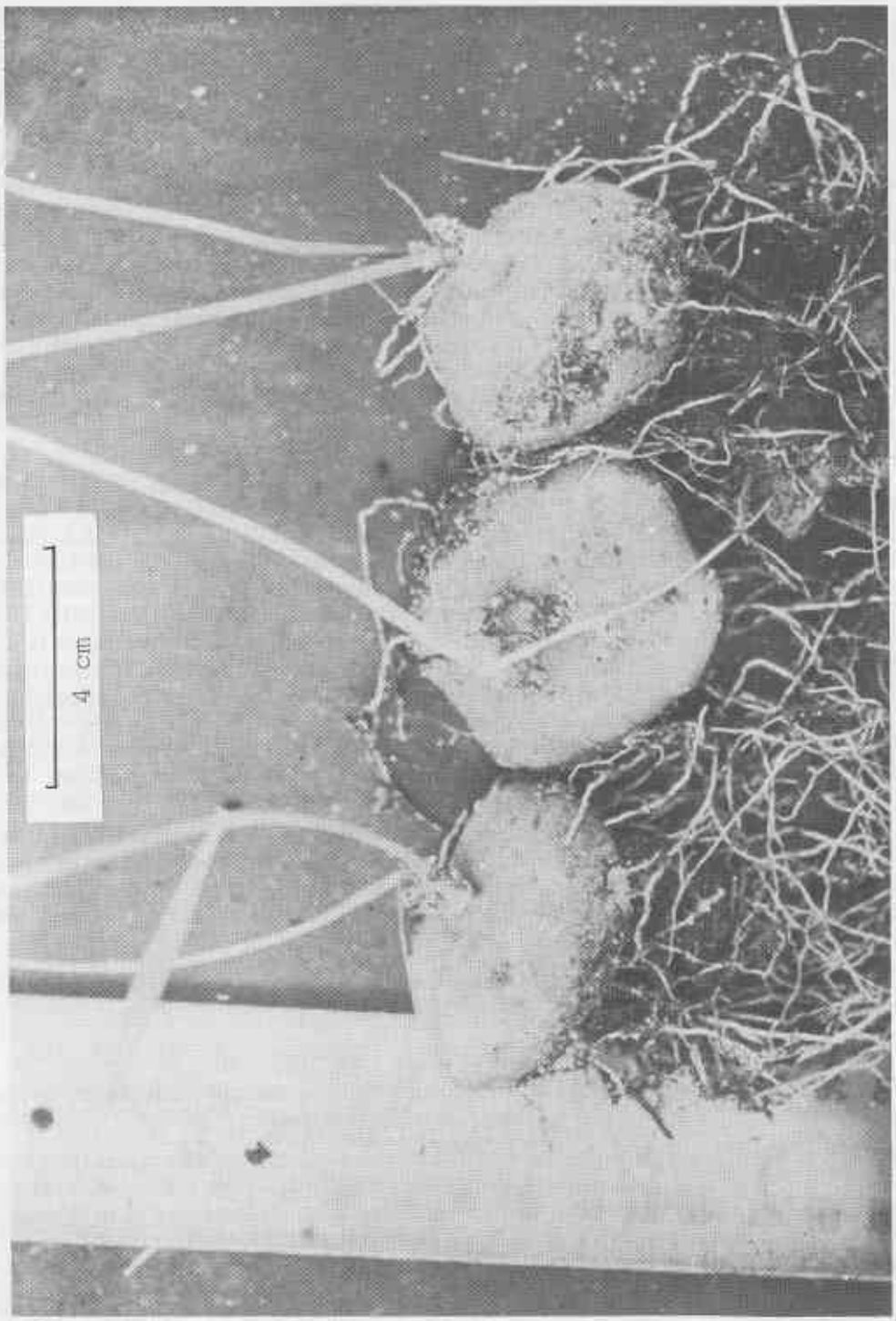


Figure 2. Tubers and linear-lanceolate leaves (arrowed) of *B. microstemma (R. Lockyer* sub *P.I. Forster* 1768). Scale = 20 mm.

Other specimens examined. PAPUA NEW GUINEA: Penzara, between Morehead & Wassi Kussa Rivers, *L.J. Brass* 8466 (BRI,L); vicinity of Kajabit Mission, *M.S. Clemens* 10735 (BRI).

INDONESIA: K1, Soenda Eil Flores, Matawae-Mburak, Paku, *E. Schmutz* 1870 (L).

AUSTRALIA, NORTHERN TERRITORY: Darwin & Gulf District: "North Australia", 1886, *J.E. Tenison-Woods & M. Holtze* s.n. [MEL1537655] (MEL); Port Darwin, Jan. 1883, *M. Holtze* s.n. [MEL1537647] (MEL); Port Darwin, 1882, *P. Foelsche* s.n. [MEL1537650] (MEL); Port Darwin, *Schulze* s.n. [sub. 6/1870 *Schomburgh*] (K); Port Darwin, *Schulze* s.n. [sub. 3/1870 *Schomburgh*] (K); Port Essington, *M. Holtze* 472 (MEL); Albridge River, 1886, *A. Cooke* s.n. [MEL1537648] (MEL); Port Keats, Sept. 1972, *C.S. Robinson* s.n. [DNA5128] (DNA); D. & G. Peron Island, *T.S. Henshall* 863 (DNA); Fenton Airstrip, *J. Must* 1283 (DNA); 14 miles (22.5 km) from Darwin on Stuart Hwy, *D.J. Morgan* 14 (DNA); Yirrkala—Nhulunbuy road, *N. Scarlett* NSY-254-74 (BRI); Arnhem Bay, central NE Arnhem Land, Dec. 1967, *N. Peterson* s.n. [NSW168641] (NSW); Nangalaa near the Raminginin turnoff, *H. Reeve* 410 (CANB); cultivated plant ex N.T., Feb. 1908, *A.E. Martin & R.S. Rogers* s.n. [NSW168640] (NSW).

QUEENSLAND: Cook District: Trinity Bay, 1893, *J.M. Birch* s.n. [MEL1537649] (MEL); Gilbert River, s. dat., *Anonymous* [MEL1537652] (MEL); Silver Plains—Goanna Creek road, *L.J. Webb* 3115 (BRI); 23.5 km ENE of Weipa Mission, *R.L. Specht & R.B. Salt* W204 (BRI); Princess Charlotte Bay, s. dat., *R.E. Roth* s.n. (BRI); Walsh, 1891, *J. Barclay-Millar* s.n. (BRI); Weipa, Fauna Survey Site 17, *A. Morton* 1599 (BRI); Beagle Airstrip, Aurukun Associates Lease, N of Aurukun, *A. Morton* 1588 (BRI); Badu Island, *J.R. Clarkson* 4011 (BRI, QRS, K, PERTH); Burke District: Mornington Island, Dec. 1979, *A. Moon* s.n. [BRI251693] (BRI). North Kennedy District: Herbert River, 1893, *J.M. Birch* s.n. [MEL1537649] (MEL); Herbert River, 1893, *Anonymous* [MEL1537653] (MEL); Near Mt Woodhouse, SW of Ayr, *S.T. Blake* 18658 (BRI); Scrubby Creek, c. 65 km WSW of Townsville, *M. Lockyer* sub *P.I. Forster* 1570 (BRI); 1 km N of the Kennedy Highway before crossing over Wild River, 22km W of Ravenshoe, *R. Lockyer* sub *P.I. Forster* 1768 (BRI).

WESTERN AUSTRALIA: Gardner District: NE of Kalumburu Mission, *H.F. Broadbent* 494 (PERTH); Swimming Hole, Camp Creek, 2 km S of mining campsite, Mitchell Plateau, N Kimberley, *K.F. Kenneally* 8690 (PERTH); Trial Mining site, 21 km N of Mining Campsite, Mitchell Plateau, N Kimberley, *K.F. Kenneally* 8660 (PERTH); s. loc., s. dat., *Anonymous* [MEL537654] (MEL).

Distribution. Widely distributed in north tropical Australia, with potentially a wide range in Papua New Guinea and Indonesia (Map).

Flowering period. Sporadic throughout year.

Habitat. The recurring habitat type recorded is in seasonally waterlogged ground amongst grass, often near creeks, under eucalypt woodland.

Affinities. B. microstemma appears to be a distinct, somewhat variable species and is unlikely to be confused with other members of the genus. There are some superficial similarities in the flower appearance with southern African species such as *B. tuberosum* (Meerb.) R. Br. ex Sims and *B. decipiens* N.E. Br. (Dyer 1980, 1983; Forster 1986). The greatly reduced corona in *B. microstemma* is distinctive, but similar coronas occur in *B. oianthum* Schltr., *B. decipiens* and *B. caffrum* (Schltr.) N.E. Br. (cf. Dyer 1980, 1983).

The distinctive vestigial scale leaves of *B. microstemma* do not apparently have counterparts among other species of the genus, but linear-lanceolate leaves are quite common (Figures 1 & 2).

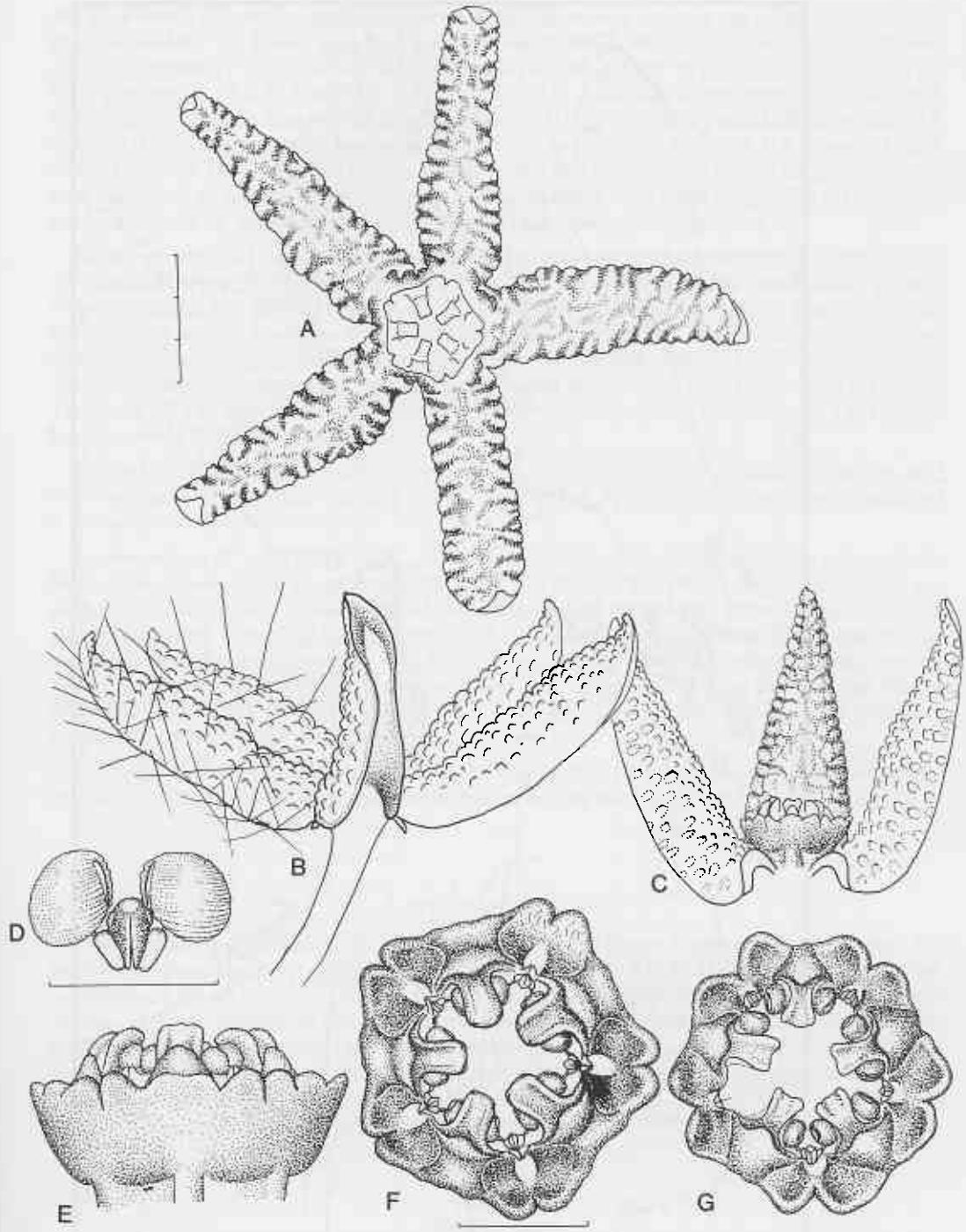
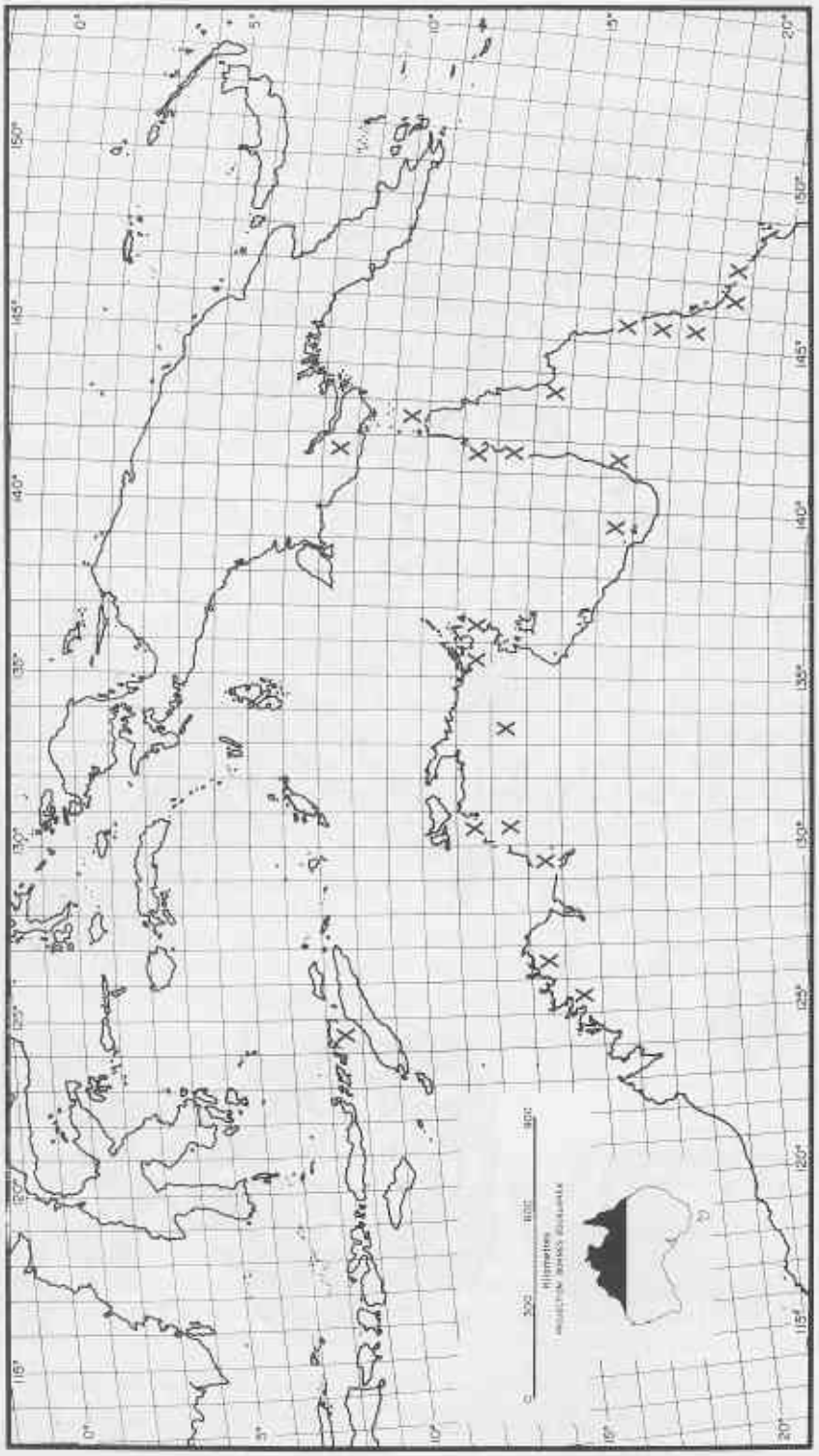


Figure 3. A—flower, apical view (hairs on corolla not shown). B—flower, side view (with hairs on corolla shown). C—transverse section of flower showing staminal column (A-C, scale = 3 mm). D—pollinarium (scale = 0.5 mm). E—side view of staminal column. F-G—apical view of staminal columns. Arrow indicates hairs on inner face of outer corona which are present on all lobes. (E-G, scale = 1 mm). A-F from *M. Lockyer* sub *P.I. Forster* 1570, G from *R. Lockyer* sub *P.I. Forster* 1768.
Drawings by P.V. Bruyns.



Map 1. Distribution map of *Brachystelma microstemma* in Australia and New Guinea.

Notes. Flower coloration and the presence or absence of hairs is variable, with the former dependent on flower age and the light of viewing. Herbarium records list flower colour as brown (*T.S. Henshall* 863) or purple (*A. Moon* s.n.). While most flowers are pilose, the corolla of *R.L. Specht & R.B. Salt* W204 is glabrous. In live material examined, the inner corolla was cream with purple spots with long purple hairs (*M. Lockyer* sub *P.I. Forster* 1570) or cream with brown spots and glabrous (*R. Lockyer* sub *P.I. Forster* 1768). Material from Java referred to this species (Backer & van der Brink Bakhuizen 1965) was described as having a greenish corolla deeply beset with dark purple dots. Hence the recognition of *M. glabriflorum* by Mueller (1858) is unwarranted.

B. papuanum was considered closest to *B. microstemma* and less so to *B. glabriflorum* (Schlechter 1914). It was distinguished from *B. microstemma* by the much taller growth (50-80 cm) and the much longer pedicel (17-20 mm). The flower colour was dark violet with golden yellow anthers. From Schlechter's illustration I can distinguish no floral characters significantly different to those from Australian material of *B. microstemma*. The maximum stem length observed in cultivated material of *R. Lockyer* in *P.I. Forster* 1768 was 85 cm and from wild collected material, 77 cm for *D.J. Morgan* 14. Pedicel length varies from 7-14 mm.

Pedicel length by itself is too minor a character on which to maintain a species, and in the absence of any other distinguishing characters, *B. papuanum* must be considered a synonym of *B. microstemma*.

In describing *B. merrillii* Schltr., Schlechter (1915) stated "This species is nearly allied to the Papuan *B. papuanum* Schltr. and the Australian *B. microstemma* Schltr. especially to the former, from which it is distinguished by shorter growth and the quite glabrous corona as well as by the form of the pollinarium. In all these three species the corolla is dark brownish-purple in colour." Enquiries to the Philippines Herbarium revealed that the material of this species there was destroyed during the Second World War and that it has not been recollected. From the original description it is probably conspecific with *B. microstemma*.

Conservation Status. The species cannot be considered endangered or threatened in any way at this stage. Ethnobotanical use in Australia has been outlined by Forster (1987).

Acknowledgements

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