

**A reassessment of *Prasophyllum gracile* and *P. macrostachyum*
(Orchidaceae), with the description of *P. paulinae*, a new species from
south-west Western Australia**

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Abstract

Jones, D.L. and Clements, M.A. A reassessment of *Prasophyllum gracile* and *P. macrostachyum* (Orchidaceae), with the description of *P. paulinae*, a new species from south-west Western Australia. *Nuytsia* 10 (3): 409-418 (1996). The taxonomic status of the Australian orchid *Prasophyllum gracile* Lindl. is clarified after a critical examination of the holotype. A rare new species, *Prasophyllum paulinae*, closely related to *P. macrostachyum* R. Br., is described from a restricted area in the south-west of Western Australia.

Introduction

The genus *Prasophyllum* R. Br. is taxonomically one of the most difficult of Australian orchid genera. Considerable problems with identification of taxa have been experienced by taxonomists and field workers because of the apparent overall similarity of floral morphology between taxa and the difficulty of identifying dried herbarium specimens. As part of an overall study of the genus, various complexes are being examined by the senior author, with the first of these studies on the *P. alpinum* complex now completed (Jones in press).

Particularly troublesome has been the *Prasophyllum macrostachyum* R. Br. alliance of species which occurs in Western Australia (W.A.) and South Australia (S.A.). Members of this alliance are recognizable by a very slender habit and relatively small, narrow flowers. Currently there are considered to be three species in this alliance (Bates 1989), viz. *P. macrostachyum*, *P. ringens* (Rchb.) R.J. Bates and *P. calcicola* R.J. Bates. During field work in 1989 another species in this alliance was brought to the attention of the authors by Ron and Pauline Heberle. Upon rechecking photographs of the types of all taxa in the group to authenticate the new discovery, it became apparent that the types of *P. ringens* and *P. gracile* Lindl. (treated by recent authors as a synonym of *P. macrostachyum*) were very similar. The type specimens were again subsequently checked by one of us (MAC) and following these findings, the nomenclature and taxonomy of all members of the alliance were examined in detail.

Methods

This study is based on field observations and herbarium collections (spirit and dried) from the following Australian herbaria (AD, CANB, MEL and PERTH). Type specimens of all previously described taxa have been examined including those in overseas herbaria (BM, K, K-L, W). Measurements given in descriptions are from living plants or spirit-preserved specimens. Notes on distribution, habitat (particularly soil and plant association) and conservation status were derived from our own field studies and consultations with A.P. Brown and R. Heberle.

Taxonomic history

Prasophyllum macrostachyum was described by Brown in 1810 based on collections he made in swamps near Albany, W.A. In 1840 Lindley described *P. gracile* based on material collected by James Drummond, probably from near Perth. Six years later Endlicher (1846), determined two Preiss collections from Western Australia as representative of *P. nigricans* R. Br and *P. gracile*, even though both collections are in fact the same species. Reichenbach (1871), after studying the same two collections, determined that the specimen attributed by Endlicher to *P. nigricans* was in fact *P. gracile* Lindley and the second specimen, determined by Endlicher as *P. gracile*, was a new taxon which he described as *P. gracile* var. *ringens*. George (1971), after a study of the types, made the new combination of *P. macrostachyum* var. *ringens* and reduced *P. gracile* to a synonym of *P. macrostachyum* var. *macrostachyum*. In a revision of the alliance, Bates (1989) described a third species, *P. calcicola*, from material collected on Yorke Peninsula, S.A. but which also occurs in W.A. In the same paper he elevated *P. macrostachyum* var. *ringens* to specific status. Clements and Jones (in Clements 1989) independently reached a similar conclusion about the status of this taxon and renamed it as *P. antennatum*.

A subsequent re-assessment of the type collection of *Prasophyllum gracile* by one of us (MAC), housed in the Lindley Herbarium, Kew, showed that the specimens have lateral sepals with long, acicular terete apices and this species is conspecific with *P. ringens*, and not *P. macrostachyum* as previously interpreted by George (1971) and Clements (1989). According to article 11 of the 1994 International Code of Botanical Nomenclature, *Prasophyllum gracile* Lindley has priority over *P. ringens* (H.G. Reichb.) R.J. Bates. Studies of the types of other species in the complex have confirmed that their taxonomic status agrees with that accorded to them by Clements (1989), and show that the taxon recently discovered by Ron and Pauline Heberle is new. Subsequent field studies by the senior author have allowed the comparison of fresh material of *P. macrostachyum*, *P. gracile* and the new taxon. These studies have supported the recognition of the three taxa detailed in this paper and have revealed further distinguishing characters that are not readily evident in herbarium specimens. The taxonomy and morphology of the three taxa is presented here. *Prasophyllum calcicola* was the subject of a recent study (Bates 1989) and is not described here but is included in the key.

Taxonomic treatment

Key to species

1. Flowers 6-10 mm long, column wings well-developed 2
- Flowers c. 5 mm long, column wings vestigial ***P. calcicola***

2. Lateral sepals with acicular terete apices 1.5-2.5 mm long 1. **P. gracile**
 Lateral sepals with acicular terete apices c. 1 mm long 3
3. Flowers c. 9 mm long, widely separated in a linear spike;
 labellum ovate; callus thin-textured 2. **P. macrostachyum**
 Flowers c. 6 mm long, crowded in a subpyramidal spike;
 labellum broadly elliptic obovate; callus thick-textured 3. **P. paulinae**

1. *Prasophyllum gracile* Lindl. in Edward's, Bot. Reg. 1-23: Swan Riv. Append. liv (1840). *Type*: 'Swan River', *J. Drummond s.n. (holo: K-L!)*.

Syn: *Prasophyllum gracile* Endl. in Lehm., Pl. Preiss. 2: 12 (1846), non R.S. Rogers (1909); *P. gracile* var. *ringens* Rchb., Beitr. Syst. Pflanzenk. 60 (1871); *P. macrostachyum* var. *ringens* (Rchb.) George, Nuytsia 1: 188 (1971); *P. ringens* (Rchb.) R.J. Bates, J. Adelaide Bot. Gard. 11(2): 182(1989); *P. antennatum* M.A. Clem. & D.L. Jones, Aust. Orch. Res. 1: 110 (1989). *Type*: 'In solo limoso prope oppidulum York', 4 Sept. 1840, *Preiss* 2198 (*holo: W!*).

Illustrations. Plate 141 (Nicholls 1969) - as *P. macrostachyum*; Fig. 2. (Bates 1989) - as *P. ringens*; plate on page 295 (Hoffman & Brown 1992) - as *P. ringens*.

Slender, terrestrial, *tuberous herb* 10-30 cm tall, growing in loose groups. *Tubers* ovoid-oblong, 8-14 mm long, 5-8 mm wide. *Leaf* linear-terete, 10-30 cm long, dark green, base 1-2 mm across, whitish, rarely red, free lamina 6-15 cm long, erect, very slender, often partly withered at anthesis. *Inflorescence* a narrow, sparse to moderately dense, linear spike 8-25 cm long, consisting of 5 - c. 30 flowers. *Floral bracts* transversely ovate, c. 1.3 mm long, 1.3 mm wide, apiculate. *Ovary* obovoid, c. 3.5 mm long, 1.5 mm wide, shiny green, set at about 50 degrees to the rhachis. *Flowers* 7-10 mm long, c. 5 mm across, usually pale green to yellowish green, rarely wholly brown or red, opening widely, sessile. *Dorsal sepal* narrowly ovate-lanceolate, 4.5-5.5 mm long, 1.4-1.7 mm wide, concave, obliquely deflexed, subacute to apiculate. *Lateral sepals* narrowly oblong-lanceolate, 5.5-6.5 mm long, 1.0-1.2 mm wide, connate for proximal half then free, distal margins involute, with acicular, terete apices 1.5-2.5 mm long. *Petals* narrowly lanceolate, c. 4 mm long, 1 mm wide, porrect, incurved, subacute. *Labellum* ovate-lanceolate in outline when flattened, 3-3.3 mm long, 1.8-2 mm wide, narrowed to a short, ligulate basal claw, proximal half porrect, not gibbous when viewed from the side, with entire margins, distal half recurved at right angles, with shallowly crenulate margins, usually recurved near the apex and just touching the lateral sepals, narrowly obtuse; callus ovate-elliptic near the base, then narrowed to a linear-oblong section, 1.6-1.8 mm long, c. 1.2 mm wide, raised, fleshy, light green, channelled centrally, margins entire, narrowed beyond the bend and extending two-thirds of the distance to the labellum apex. *Column* porrect from the end of the ovary, c. 1.6 mm long, 1.8 mm wide, not hidden by the dorsal sepal and petals; appendages narrowly oblong-lanceolate, c. 1 mm long, 0.4 mm wide, pale green, obtuse. *Anther* ovate, c. 1 mm long, 1.2 mm wide, dark brown. *Pollinarium* c. 1.2 mm long; viscidium elliptic, c. 0.1 mm long, white; hamulus c. 0.15 mm long, ligulate; pollinia linear-clavoid, c. 1 mm long, yellow, sectile. *Stigma* transversely reniform, c. 1.2 mm long, 0.6 mm wide, the rostellum much higher than the appendages. *Capsule* obovoid, 6-7 mm long, 3-3.5 mm wide, shiny green. (Figure 1)

Selected specimens (49 examined). WESTERN AUSTRALIA: rocks NNW of Mt Magnet, 2-9-1984, *Bates* 4193 (AD, CANB); Mt Latham, 7 km west of Wagin, 27-9-1980, *Clements* 2173 (CBG); Victoria Rocks, 22-9-1962, *George* 4193 (PERTH); Dundas Rocks, 11-10-1988, *Jones* 2977 &

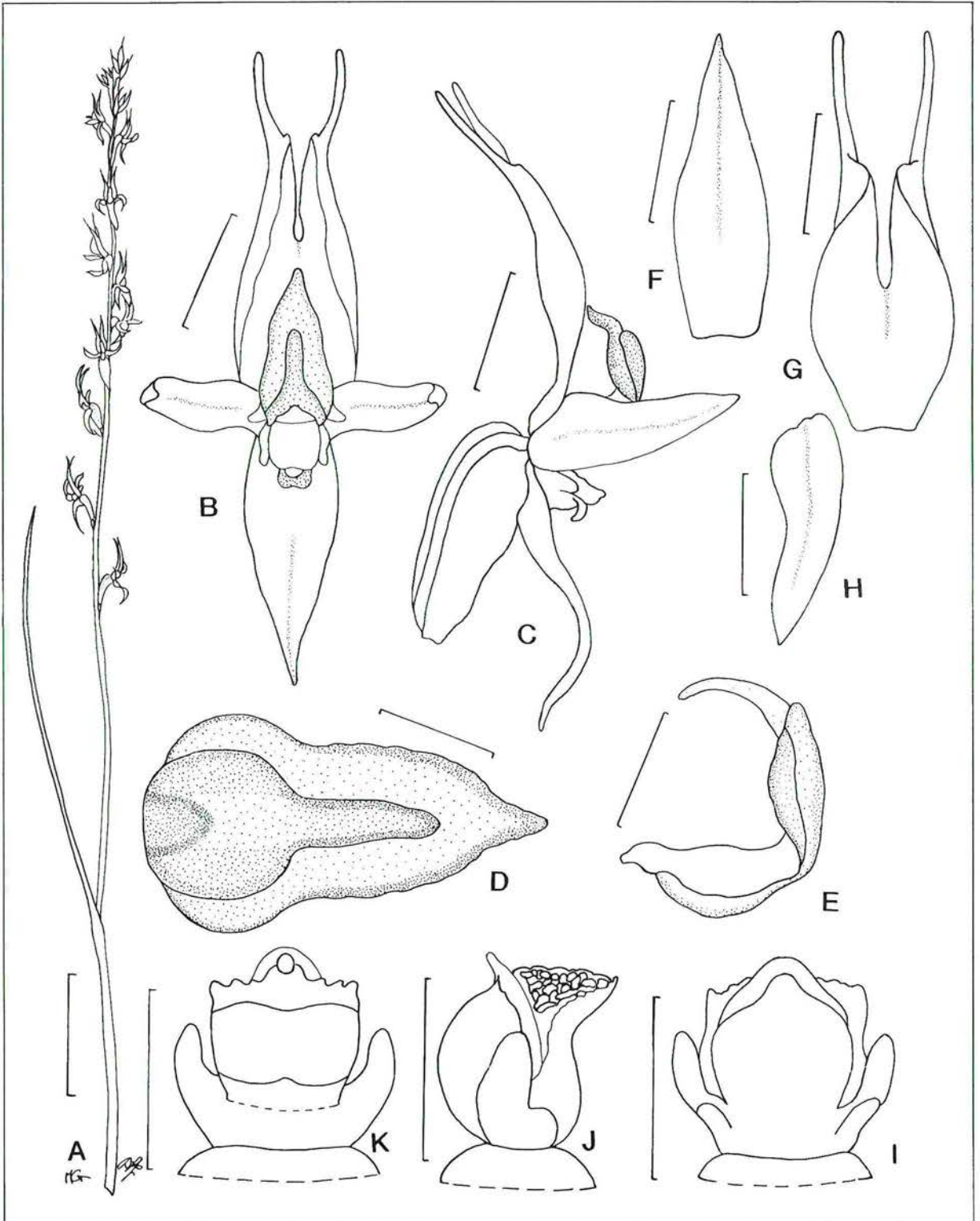


Figure 1. *Prasophyllum gracile* Lindl. A - plant habit, B - flower from front, C - flower from side, D - labellum from above, flattened out, E - labellum from side, F - dorsal sepal flattened out, G - conjoined lateral sepals, H - petal, I - column from rear, J - column from side, K - column from front. Scale bars: A = 2 cm; B,C,F,G,H = 2 mm; D,E,I,J,K = 1 mm. Drawn from K. Smith (D.L. Jones 12585 - CBG).

Clements (CBG); salt lake, c. 4 km west of Moora, 5-10-1991, Jones 8148 & Clements (CBG); Highbury, 8-10-1991, Jones 8210 & Clements (CBG); Mt Tampia, Arrowsmith, Sept. 1946, Nicholls (MEL); east of Paynes Find, 2-9-1986, Smith 721 (MEL, PERTH); 16 km west of Merredin, 18-9-1963, Willis (MEL).

Distribution and habitat. Endemic to south-western Western Australia where widely distributed between Shark Bay and Israelite Bay, extending from the coast to inland districts. The species is commonest on granite outcrops and winter-wet areas but also occurs on laterite, sand and loam, growing in open forest, woodland, shrubland and grassy areas.

Flowering period. July-November.

Conservation status. *Prasophyllum gracile* is widespread, common and well conserved in national parks and other reserves.

Notes. *Prasophyllum gracile* is a very widely distributed species with an exceptionally long flowering period, due mainly to its range (northern populations flower earlier) but also with race variation occurring in some localities. Apart from some rather striking variation in flower colour and to a lesser degree flower size, investigations by us have shown limited variation in floral morphology, the most noticeable feature being the length of the terete apices on the lateral sepals. Further investigation may warrant infraspecific recognition of this variation, particularly if it can be linked with flowering time and habitat. *Prasophyllum gracile* and *P. macrostachyum* grow in close proximity in some localities in the south-west of Western Australia but hybrids are unknown.

2. *Prasophyllum macrostachyum* R. Br., Prodr. 318 (1810). *Type:* 'In paludibus ad portum Regis Georgii 111', December 1801, *R. Brown s.n. (lecto: BM!)*.

Illustrations. Plate 145 (Nicholls 1969) - as *P. attenuatum*; Fig. 3. (Bates 1989); plate on page 296, (Hoffman & Brown 1992).

Slender, terrestrial, *tuberous herb* 15-45 cm tall, growing in loose groups. *Tubers* ovoid-oblong, 8-12 mm long, 6-8 mm wide. *Leaf* linear-terete, 10-18 cm long, dark green, base 2-3 mm across, reddish to purplish, free lamina 7-12 cm long, erect, often partly withered at anthesis. *Inflorescence* a narrow, sparse, linear spike 8-18 cm long, consisting of 15 - c. 30 flowers. *Floral bracts* transversely ovate, c. 1.2 mm long, 1.2 mm wide, apiculate. *Ovary* obovoid, c. 4 mm long, c. 1.5 mm wide, shiny green, set at about 50 degrees to the rhachis. *Flowers* c. 9 mm long, c. 4 mm across, pale green with purplish-green to reddish purple markings and suffusions in the petals and labellum, opening widely, sessile. *Dorsal sepal* narrowly ovate-lanceolate, 4.5-5 mm long, 1.8-2.2 mm wide, green, usually with reddish edges, concave, obliquely deflexed, apex cymbiform to apiculate. *Lateral sepals* oblong-lanceolate, 5.5-6 mm long, 1.2-1.3 mm wide, green with red margins, connate for proximal two-thirds then free, distal margins involute, with acicular, terete apices 0.5-1 mm long. *Petals* narrowly ovate-lanceolate, c. 3.5 mm long, 1.3 mm wide, green with reddish to purplish markings and suffusions, porrect, incurved, obtuse. *Labellum* broadly elliptic-ovate in outline when flattened, 3.2-3.5 mm long, 2-2.2 mm wide, green with reddish or purplish margins, narrowed to a ligulate basal claw c. 1 mm long, proximal half porrect, not gibbous when viewed from the side, with slightly irregular margins, distal half recurved at right angles, with slightly irregular margins, the apex erect or recurved and just touching the lateral sepals, narrowly obtuse; callus ovate-elliptic near the base then narrowed

and linear, 2.2-2.5 mm long, *c.* 1.1 mm wide, raised, fleshy, light green, channelled centrally, margins nearly entire, narrowed beyond the bend and extending two-thirds of the distance to the labellum apex. *Column* porrect from the end of the ovary, *c.* 1.7 mm long, 1.6 mm wide, mostly hidden by the dorsal sepal and petals; appendages narrowly oblong-ovate, *c.* 1 mm long, 0.5 mm wide, pale green, subobtusate. *Anther* ovate, *c.* 1 mm long, 1 mm wide, dark brown. *Pollinarium* *c.* 1.4 mm long; viscidium elliptical, *c.* 0.15 mm long, white; hamulus *c.* 0.2 mm long, ligulate; pollinia linear-clavoid, *c.* 1.1 mm long, yellow, sectile. *Stigma* transversely reniform, *c.* 1 mm long, 0.7 mm wide, the rostellum much higher than the appendages. *Capsule* obovoid, 6-9 mm long, 3-4.5 mm wide, shiny green. (Figure 2)

Selected specimens (30 examined). WESTERN AUSTRALIA: Palgarup, near Manjimup, 23-10-1975, *Clements* 157 (CBG); foot of Bickley Hill on clay flat, 4-8-1961, *George* (PERTH); east of Oyster Harbour, Albany, 11-10-1969, *George* 9688 (PERTH, MEL); 1.5 km east of Elleker towards Grasmere, 2-10-1971, *George* 11103 (PERTH, CANB); 8 km south of Enneabba in clay, 27-9-1977, *Hnatiuk* 771395 (PERTH); Manypeaks, 20-10-1988, *Jones* 3361 & *Clements* (CBG); swamp *c.* 22 km south of Bridgetown, 19-10-1991, *Jones* 8285 & *Clements* (CBG); 90.1 km west of Mt Barker, 12-10-1991, *Jones* 8363 & *Clements* (CBG); Upper King River, Oct. 1946, *Nicholls* (MEL).

Distribution and habitat. Endemic to south-western Western Australia where distributed in a narrow coastal and near-coastal band from near Eneabba to east of Esperance. The species grows in winter-wet swamps and clay pans, commonly flowering while partly submerged.

Flowering period. September to January.

Conservation status. Common and well conserved in national parks and other reserves.

Notes. *Prasophyllum macrostachyum* has similarities with *P. gracile* but can be readily distinguished by its widely spaced flowers imparting a sparse appearance to the inflorescence, broader dorsal sepal, much shorter points on the lateral sepals and a broader, oblong-obovate labellum. It is closest to *P. paulinae* but is less robust than that species and has slender stems and leaves, widely spaced flowers in a linear spike, shorter ovaries, longer, narrower lateral sepals and a much thinner-textured lamina callus.

3. *Prasophyllum paulinae* D.L. Jones & M.A. Clem., sp. nov.

Affinis *P. macrostachyo* R. Br. a qua in habitu robustiore caulibus crassioribus, foliis crassioribus, floribus numerosioribus confertis in spicis subpyramidalibus, ovarii longioribus, sepalis lateralibus brevioribus latioribus, petalis brevioribus obtusis, et labello late elliptici-obovato obtuso et callo crasso differt.

Typus: Cuthbert, near Albany [precise locality withheld], Western Australia, 20 October 1993, *Jones* 12425 (*holo:* CBG 9318004; *iso:* AD, BRI, CBG, MEL, NSW, PERTH).

Slender, terrestrial, *tuberous herb* 15-40 cm tall, growing in loose groups. *Tubers* ovoid-oblong, 8-13 mm long, 5-8 mm wide. *Leaf* linear-terete, 10-18 cm long, dark green, base 4-5 mm across, whitish, free lamina 6-10 cm long, erect, often partly withered at anthesis. *Inflorescence* a narrow, dense, subpyramidal spike 8-25 cm long, consisting of 25 - *c.* 70 flowers. *Floral bracts* transversely

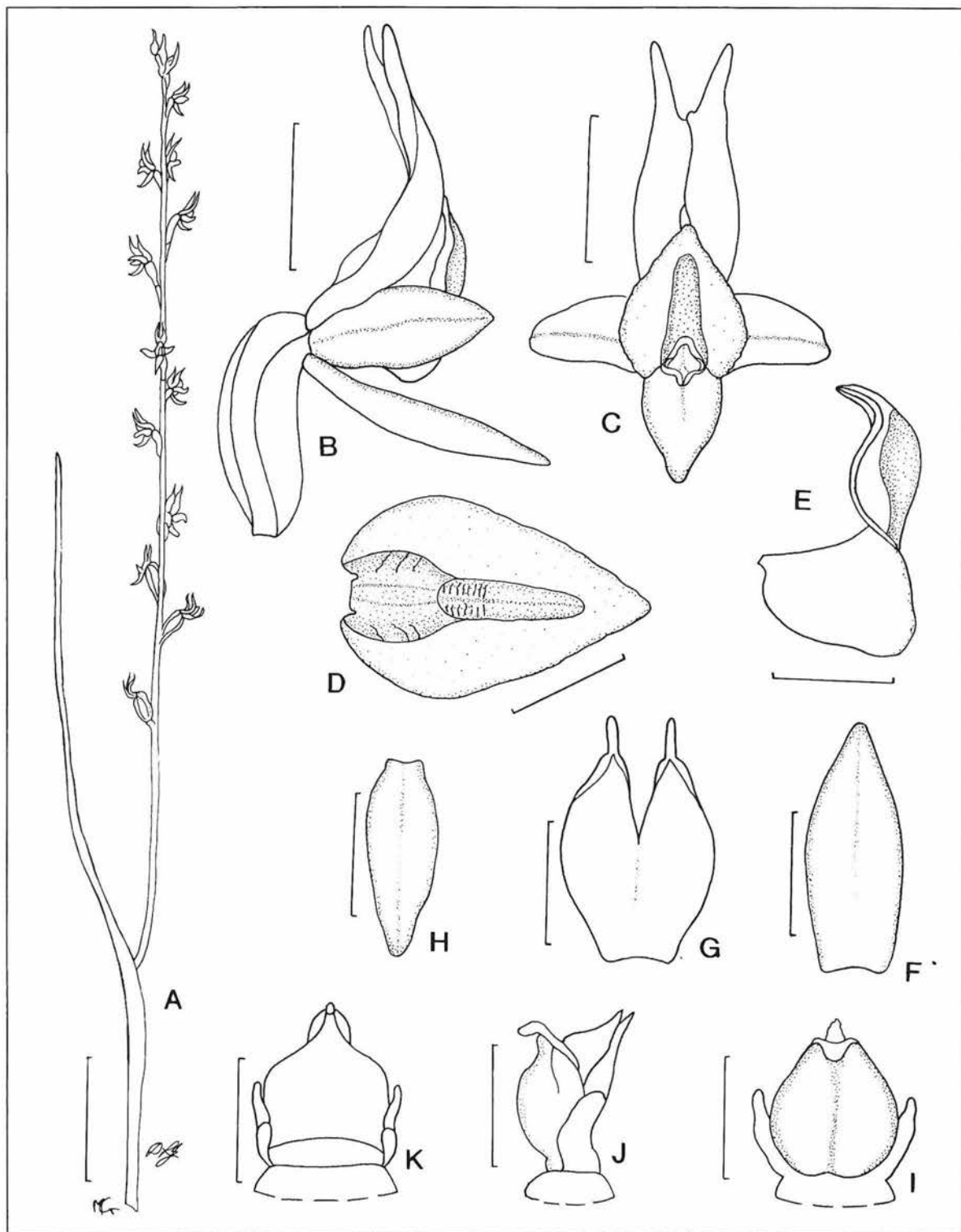


Figure 2. *Prasophyllum macrostachyum* R. Br. A - plant habit, B - flower from front, C - flower from side, D - labellum from above, flattened out, E - labellum from side, F - dorsal sepal flattened out, G - conjoined lateral sepals, H - petal, I - column from rear, J - column from side, K - column from front. Scale bars: A = 2 cm; B, C, F, G, H = 2 mm; D, E, I, J, K = 1 mm. Drawn from D.L. Jones 3260 (CBG).

ovate, *c.* 1.5 mm long, 1.5 mm wide, apiculate. *Ovary* obovoid, *c.* 4 mm long, 2.5 mm wide, shiny green, set at about 45 degrees to the rhachis. *Flowers* *c.* 6 mm long, pale green with purplish-green to reddish purple markings and suffusions in the petals and labellum, opening widely, sessile. *Dorsal sepal* narrowly elliptic, 3.5-4 mm long, 1.8-2 mm wide, green, sometimes with reddish margins, concave, obliquely deflexed, subacute. *Lateral sepals* oblong-lanceolate, 3.5-4 mm long, 1.2-1.4 mm wide, green, connate for proximal two-thirds then free, distal margins involute, with acicular, terete apices *c.* 0.5 mm long. *Petals* narrowly elliptical, *c.* 3 mm long, 1.2 mm wide, green with reddish to purplish markings and suffusions, porrect, incurved, obtuse. *Labellum* broadly elliptic-obovate in outline when flattened, 5-5.5 mm long, 3.5-4 mm wide, green with reddish or purplish margins, narrowed to a short, ligulate basal claw, proximal half porrect, not gibbous when viewed from the side, with shallowly crenulate margins, distal half recurved at right angles, with shallowly crenulate margins, the apex just touching the lateral sepals, obtuse; callus very narrowly ovate-lanceolate, 4.5-5 mm long, *c.* 1.8 mm wide, raised, fleshy, light green, channelled centrally, margins entire, narrowed beyond the bend and extending nearly to the labellum apex. *Column* porrect from the end of the ovary, *c.* 1.2 mm long, 1.2 mm wide, hidden by the dorsal sepal and petals; appendages linear-oblong, *c.* 1 mm long, 0.3 mm wide, pale green, subobtuse. *Anther* ovate, *c.* 1 mm long, 0.8 mm wide, dark brown. *Pollinarium* *c.* 1.2 mm long; viscidium elliptic, *c.* 0.1 mm long, white; hamulus *c.* 0.1 mm long, ligulate; pollinia linear-clavoid, *c.* 1 mm long, yellow, sectile. *Stigma* transversely reniform, *c.* 1 mm long, 0.6 mm wide, the rostellum higher than the appendages. *Capsule* obovoid, 6-7 mm long, 3-3.5 mm wide, shiny green. (Figure 3)

Specimens examined. WESTERN AUSTRALIA: *Cuthbert* 18-10-1988, *Jones* 3257 & *Clements* (CBG).

Distribution and habitat. Endemic to south-western Western Australia where known only from a degraded area in a complex of cleared swamps to the west of Albany. The species grows among grasses and herbs in black, peaty, alkaline soil.

Flowering period. September to November.

Conservation status. Rare, not conserved and endangered by drainage of swamps, land clearing and weed invasion. Recommended as a Priority 1 category on the Priority Flora List of the Department of Conservation and Land Management .

Notes. *Prasophyllum paulinae* is similar to *P. macrostachyum* but is much more robust with stouter stems and leaves, more numerous, crowded flowers in a subpyramidal spike, longer ovaries, shorter, broader lateral sepals and a broadly elliptic-obovate, obtuse labellum with a much thicker-textured callus (prominent when viewed from the side). By contrast with *P. paulinae*, *P. macrostachyum* is a very slender species with fewer, widely separated flowers in a linear spike and an ovate labellum with a thinner-textured callus. Both taxa grow in swampy environments but *P. macrostachyum* occurs in wetter conditions than *P. paulinae*, often growing with the base of the plants submerged.

Etymology. Named in honour of Pauline Heberle who has assisted with specimens, provided hospitality and has been supportive of our research over many years.

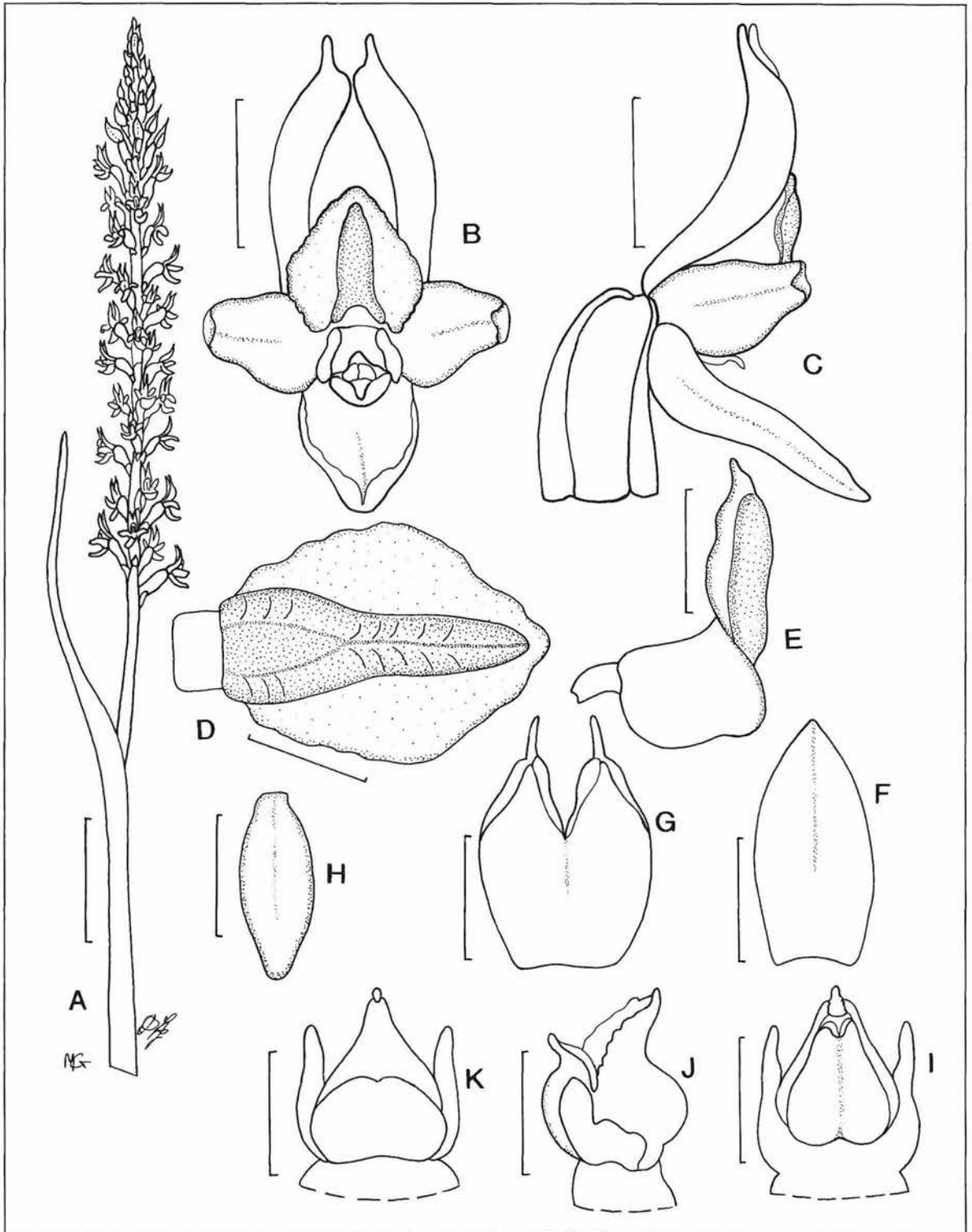


Figure 3. *Prasophyllum paulinae* D.L. Jones & M.A. Clem. A - plant habit, B - flower from front, C - flower from side, D - labellum from above, flattened out, E - labellum from side, F - dorsal sepal flattened out, G - conjoined lateral sepals, H - petal, I - column from rear, J - column from side, K - column from front. Scale bars: A = 2 cm; B, C, F, G, H = 2 mm; D, E, I, J, K = 1 mm. Drawn from D.L. Jones 3257 (CBG).

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