JOURNAL of the ADELAIDE BOTANIC GARDENS

AN OPEN ACCESS JOURNAL FOR AUSTRALIAN SYSTEMATIC BOTANY

flora.sa.gov.au/jabg

Published by the
STATE HERBARIUM OF SOUTH AUSTRALIA
on behalf of the
BOARD OF THE BOTANIC GARDENS AND STATE HERBARIUM

State Herbarium of South Australia
PO Box 2732
Kent Town SA 5071
Australia

Government of South Australia
Department of Environment, Water and Natural Resources

Board *of the* Botanic Gardens *and* State Herbarium

J. Adelaide Bot. Gard. 11(2): 179-187 (1989)

PRASOPHYLLUM CALCICOLA, P. MACROSTACHYUM AND *P. RINGENS* (ORCHIDACEAE): THREE SIMILAR SPECIES FROM WESTERN AND SOUTHERN AUSTRALIA

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Abstract

Prasophyllum calcicola R. Bates from South and Western Australia is described as new; *Prasophyllum macrostachyum* R. Br. var. *ringens* (Reichb. f.) A.S. George is raised to species rank as *Prasophyllum ringens* (Reichb. f.) R. Bates; *Prasophyllum macrostachyum* R. Br. is given an expanded description and the relationship of the three species discussed.

Introduction

Prasophyllum macrostachyum R. Br. was described in 1810 from material collected by Robert Brown at King George's Sound, Western Australia in December 1801. In 1840 J. Lindley named *Prasophyllum gracile* based on material inscribed "Swan River" by Drummond. *P. gracile* was recognised by A.S. George (1971) as a synonym of *P. macrostachyum* and is so treated here. H.G. Reichenbach (1871) described *P. gracile* var. *ringens* from plants collected by Preiss near York, Western Australia, and George (1971) made the combination *P. macrostachyum* var. *ringens* for this taxon, which is here raised to species status as *Prasophyllum ringens*. *P. macrostachyum* is basically a swamp plant while *P. ringens* favours dry ground. Both are endemic to Western Australia. Weber & Bates (1986) included South Australian material as *Prasophyllum macrostachyum*, but noted that these plants differed considerably from *P. macrostachyum* sensu stricto. This South Australian form is here described as the new species *Prasophyllum calcicola*, from limestone country on Yorke and Eyre Peninsulas in South Australia and in coastal Western Australia. Thus, there are three species of this natural group occurring in Western Australia with one extending to South Australia.

Each is habitat specific and relatively constant over a wide geographical range. Near Peaceful Bay, Western Australia all three occur within 10 km of each other without intermediate forms.

Key of related *Prasophyllum* species

1. Flowers less than 5 mm in diameter; column appendages absent or vestigial (flowers apomictic) ..... 1. *P. calcicola*
   Flowers greater than 5 mm in diameter; column appendages well formed (flowers not apomictic) 2
2. Flowers and scape wholly green [or rarely uniformly red]; lateral sepals with 3-8 mm long prong-like tips; petals lanceolate ..... 2. *P. ringens*
   Flowers and scape bicoloured, green and red; lateral sepals connate almost to the tips, petals triangular ..... 3. *P. macrostachyum*

1. **Prasophyllum calcicola** R. Bates, sp. nov.

P. macrostachyo affine sed inflorescentia breviori (usque ad 3 cm), folii apice minus rigido, floribus quam 6 mm diametro minoribus, labello viridi et rubro, appendiceque columnae absenti vel vestigiali differt.

Holotype: *R. Bates 2252* (AD), Warrenben Conservation Park (S.Aust.), 23.ix.1982.

Plant 5-15 cm high, slender, rigid, green or red and green; tuberoid sub-globose, 4-9 mm diameter with white, parchment-like outer sheath when dry, formed adjacent to old tuber.

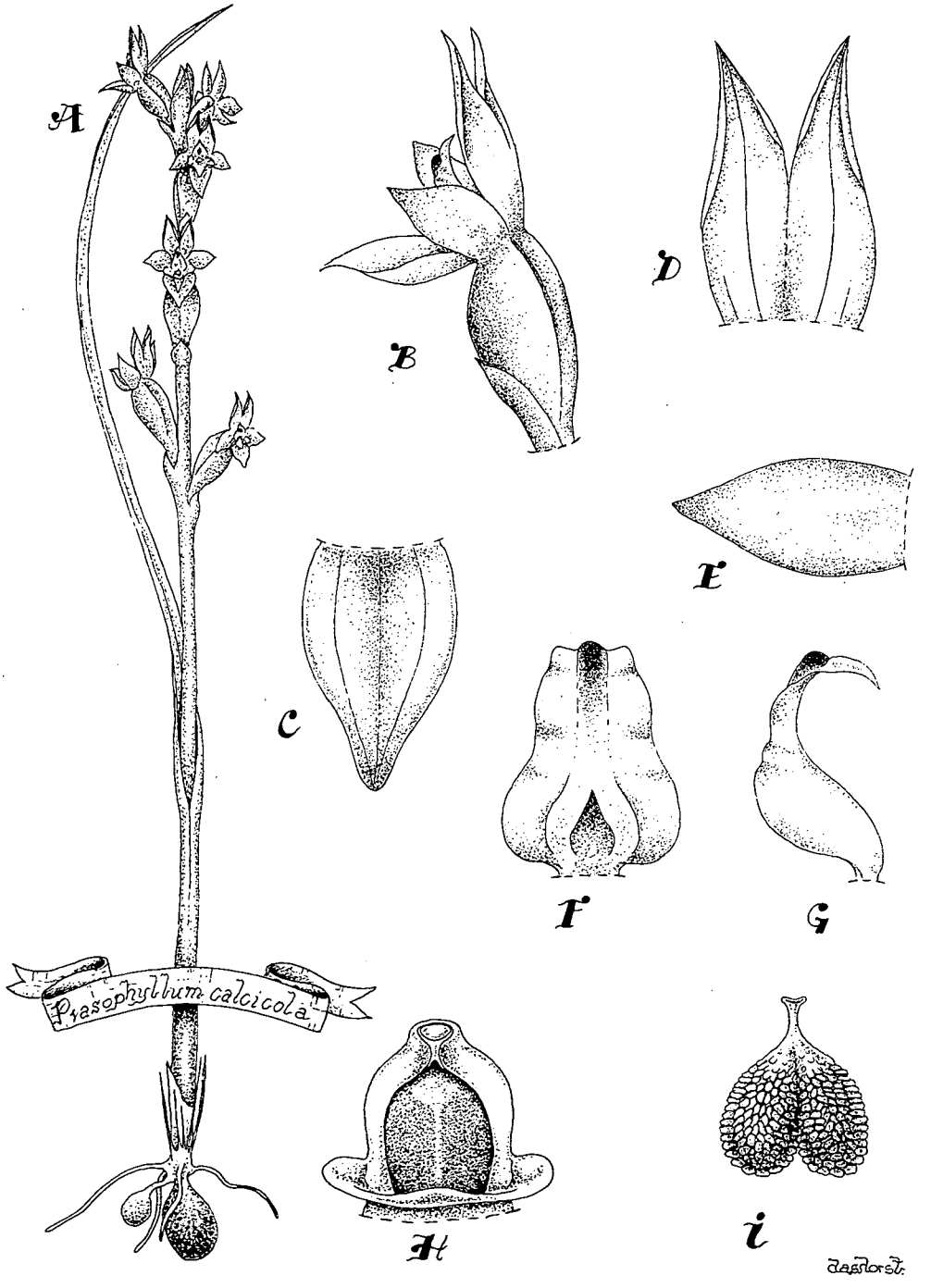


Fig. 1. *Prasophyllum calcicola*. A. Whole plant, x5; B, flower from side, x20; C. dorsal sepal, x30; D. lateral sepals, x30; E. petal, x30; F. labellum front view, x30; G. labellum side view, x30; H. column, x40; I. pollinia, x50. Voucher spec.: *R. Bates 2252, holotype (AD).*

Leaf base red, c. 2 mm diameter, free part becoming almost filiform, erect, 5-15 cm long. *Scape* wiry, green with red tints; base of scape below soil level invested in fibrous tunicate sheaths. *Flowers* 3-12, in loose to moderately crowded spike, to 3 cm long, semi-erect, green with some red tints, not or only slightly fragrant, each subtended by an ovate bract 1.5 x 2 mm; pedicel 0.5-1.5 mm long. *Ovary* ovoid, tumescent, 2-3 x 3-5 mm, large in comparison with flowers. *Dorsal sepal* ovate-lanceolate, 2-2.5 x 2-3 mm, green edged with red, apex straight or incurved; lateral sepals lanceolate, 2.5-3.5 mm long, conjoined for half their length, outer margins inrolled, free part sub-terete, not bidentate; petals triangular 2-2.5 mm long, c. 1.2 mm broad at base, green, edged with red, apex straight or incurved. *Labellum* fleshy, 2.5-3.0 mm long, sub-sessile, oblong-lanceolate, recurved at 90° near middle, green with red tints; basal part oblong, c. 1.2 x 1.5 mm, horizontal, entire, not gibbous, recurved part triangular with entire margins, callus plate triangular, red and green, deeply concave near base, raised and irregularly channelled beyond, extending almost to labellum apex and covering about half its surface. *Column* appendages absent or represented by minute swellings; anther c. 1 x 1 mm, brown, shallow, acute; stigmatic plate c. 1.5 mm high, stigma indistinct; rostellum fleshy, higher than anther; pollinia attached to viscid disk by 0.2 mm long caudicle.

Flowers

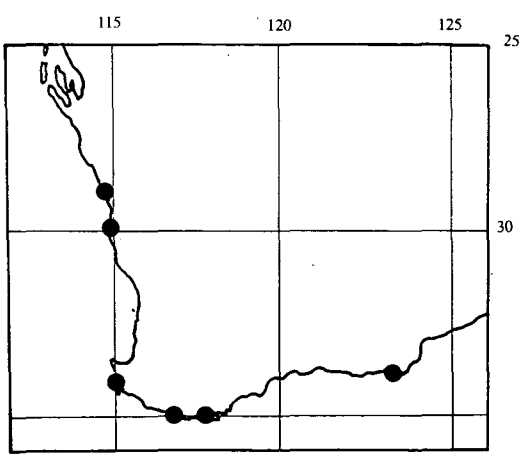
September to early October. Flowering is not dependent on fire or disturbance.

Variation

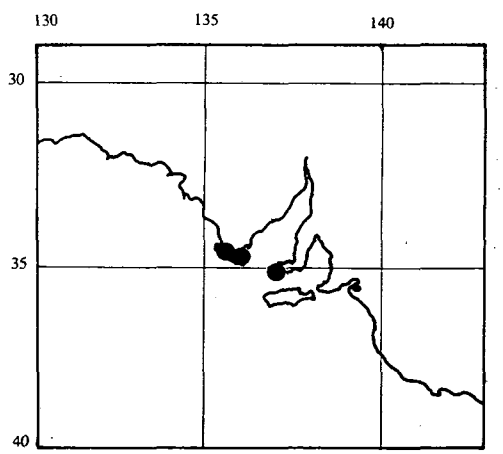
Plants in exposed situations tend to have shorter more crowded inflorescences and are generally more fleshy throughout. Most of the Western Australian plants seen were almost wholly green whereas South Australian plants were more reddish, some specimens having the scape completely deep-red.

Distribution

Not well collected, but certainly widespread along the coast of Western Australia from Kalbarri to Israelite Bay. In South Australia around Port Lincoln and the foot of Yorke Peninsula but possibly also on Kangaroo Island where similar habitats occur. Maps 1 & 2.



Map 1. Distribution of *Prasophyllum calcicola* in Western Australia. Note the very few collections from a wide distribution area.



Map 2. Distribution of *Prasophyllum calcicola* in South Australia with several collections from a limited distribution area.

Habitat

As the name 'calcicola' (growing in calcium rich soils) suggests, plants occur only in calcareous soils, either in leaf litter on travertine limestone, in calcareous sand or in red-brown loam over limestone, usually within a few kilometres of the sea, either in scrubby heath or under mallee, but uncommonly, usually as single plants or small groups widely spread.

Conservation status: 3RC.

Notes

P. calcicola differs from *P. macrostachyum* and *P. ringens* in its smaller apomictic flowers. From *P. macrostachyum* it differs also in its shorter inflorescence, narrow leaf fistula, less rigid leaf apex and green labellum. From *P. ringens* it differs also in having bicoloured flowers with lateral sepals not extended into filiform points. The habitat of *P. calcicola* is also quite different.

In South Australia the species occurs with *Prasophyllum goldsackii* Weber & Bates and at least one other undescribed species. All of these have in common an apparent apomictic habit. This has not been checked in detail, but flowers are short lived, ovaries swell rapidly after anthesis, yet pollinia are rarely removed in nature and do not contact the stigma. Pollinia were removed at anthesis from flowers in cultivation, yet large amounts of apparently viable seed were formed.

It was noted that in some populations of *P. calcicola* flowers did not open, but development of seed capsules progressed as usual. As some flowers have a noticeable fragrance and it is easily demonstrated that pollinia can be removed and transferred to stigmas of other flowers it is likely that some degree of outcrossing may be achieved.

Specimens examined

SOUTH AUSTRALIA: *C.R. Alcock 2765*, 80 km NW Port Lincoln, 17.ix.1969 (AD); *R. Bates 1877*, Warrenben Conservation Park, 23.ix.1980 (AD); *R. Bates 6237*, Lincoln Conservation Park, 10.ix.1985 (AD); *B.J. Blaylock 223a*, Pondalowie Bay, 9.x.1966 (AD); *R.C. Nash s.n.*, 3 miles N Brown's Beach, Yorke Peninsula, 20.ix.1971 (PERTH).

WESTERN AUSTRALIA: *R. Bates 4142*, 20 km N Jurien Bay, 27.viii.1984 (AD, wet coll.); *R. Bates s.n.*, Peaceful Bay, 26.ix.1984 (AD, wet coll.); *R. Bates 4323*, Cape Leeuwin to Gracetown, 30.ix.1984 (AD); *W.E. Cooke AD97715389*, Cape Leeuwin, no date; *N. Sammy 34A*, Abrolhos Is., Island 20, 28.ix.1972 (PERTH).

2. **Prasophyllum ringens** (Reichb. f.) R. Bates, stat. nov.

Basionym: *Prasophyllum gracile* Lindley var. *ringens* Reichb. f., Beitr. Syst. Pfl. 60 (1871).

Type: *Preiss 2198*, York, W. Aust. (lecto.: W; photo.!). Lectotypification by George (1971).

P. macrostachyum R. Br. var. *ringens* (Reichb. f.) A.S. George, Nuytsia 1(2):188 (1971); Pate & Dixon, "Tuberous, cormous and bulbous plants" pl. 183 (1982) as "*Prasophyllum hians*"; Hoffmann & Brown, Orch. S. West. Aust. 265, colour photo. (1984).

P. macrostachyum auct. non R. Br.: R. Erickson, Orch. West. edn 2:59 (1965) partly; W.R. Nicholls, Orch. Aust. 36, pl. 141 (1969); Pocock, Aust. Ground Orch. photo 99 (1972).

Plant (5-) 10-20 (-25) cm tall, slender, wholly greenish or reddish; tuberoid ovoid, 8-14 mm long, together with base of scape partly enclosed in fibrous sheaths. *Leaf* exceeding scape, usually partly senesced at flowering time, apex lax or erect. *Scape* slender, 1-2 mm diam., straight or slightly flexuose; flowers 5-40, uniformly coloured, in moderately dense spike, thin textured, erect. *Ovary* on pedicel 1.5 mm long, obpyriform, shorter than flower, standing out from axis of scape at c. 30°, not tumescent. *Dorsal sepal* ovate-lanceolate, 4-5 mm long, angled downward or with decurved apex; lateral sepals distinctive, 5-9 mm long, falcate-lanceolate, conjoined in their lower two-thirds, with inrolled or incurved margins, apical one-third terete, free, rigidly erect or falcate, like horns or prongs; petals ovate-lanceolate to linear,

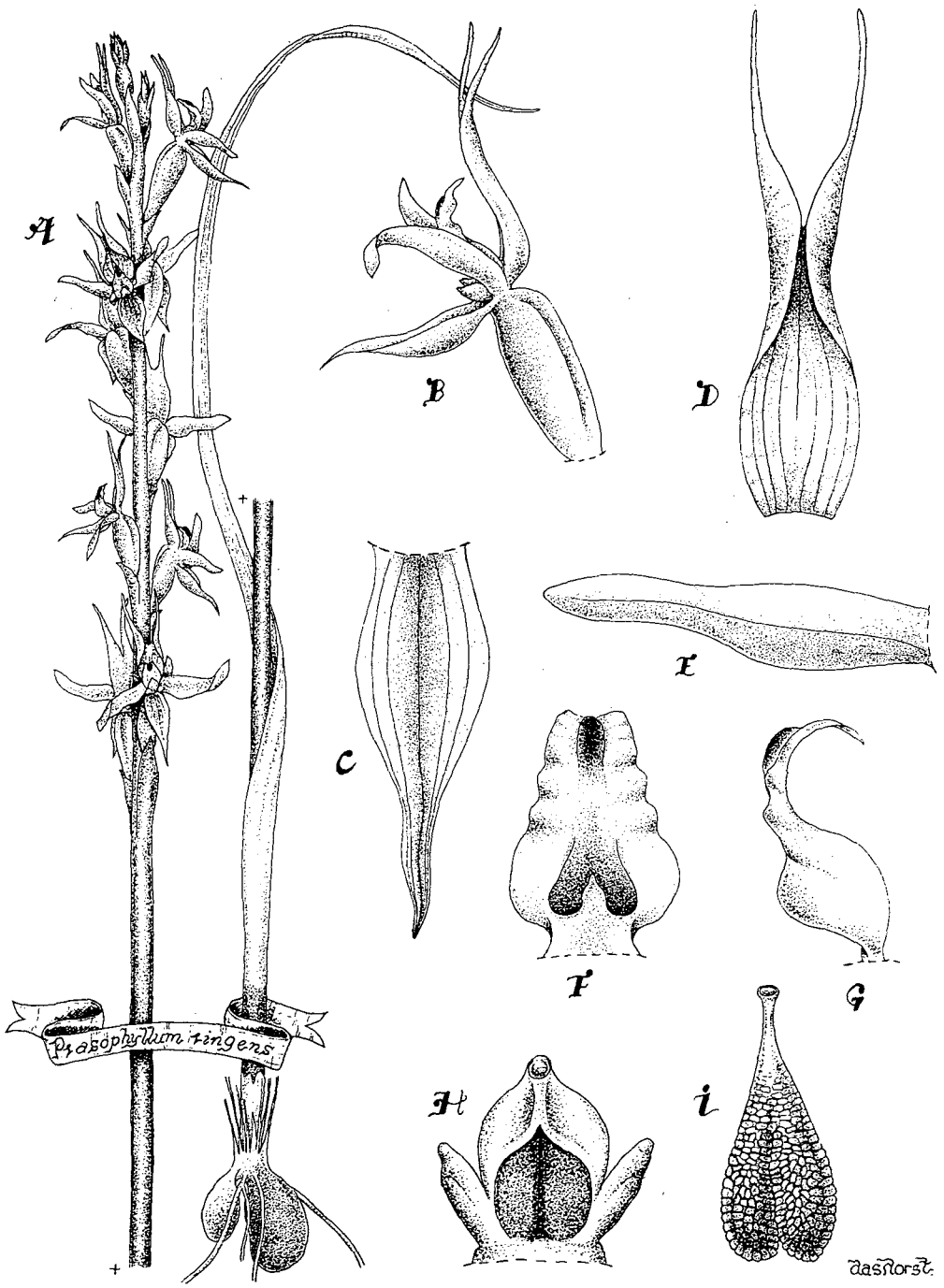


Fig. 2. *Prasophyllum ringens*. A. Whole plant, x4; B. flower from side, x15; C. dorsal sepal, x25; D. lateral sepals, x25; E. petal, x25; F. labellum front view, x25; G. labellum side view, x25; H. column, x30; I. pollinia, x50. Voucher spec.: *R. Bates 2151* (AD).

4-5 mm long, acute. *Labellum* sessile, 4-5 mm long, recurved at 90° near middle, lamina slightly crisped, margins entire, apex acute; callus plate broad at base tapering to an acute apex, not much raised, glabrous and glistening, shallowly channelled before bend. *Column* appendages short (0.5-1 mm high) ovate, obtuse, basal lobe an indistinct bump; anther less than 1 mm high and broad, obtuse; rostellum higher than column appendages, blunt, stigma high up; viscidium orbicular, caudicle c. 0.2 mm long; flowers slightly perfumed.

Flowers

July to October. Flowering freely without fire or disturbance.

Variation

Throughout most of its range *P. ringens* is wholly green or green with light suffusions of brown but on rock outcrops in the central wheat belt north of Hyden a startling wholly red form occurs: scape, rhachis, ovaries and flowers being a deep shining blood-red. On these rock outcrops it occurs sympatrically with the green form or may completely replace it. Specimens seen include — Anderson Rocks, 28.ix.1984, *R. Bates 4525* (AD) and Gorge Rock, 6.ix.1978, *R. Heberle s.n.* (PERTH). One might be tempted to treat them as distinct taxa were it not for the fact that both red and green forms occur in many species of the genus.

On scrub-covered sandhills along the south coast from Albany to Augusta occurs a pallid, few-flowered, very slender race which may prove worthy of subspecific rank but further work is needed. Collections seen include Peaceful Bay, 10.x.1984, *R. Bates 4314* (AD) and William Bay Sandhills, no date, *A. Turner 342* (PERTH).

Distribution

Widespread throughout south-eastern Australia from Shark Bay in the north around the coast to the Great Australian Bight, extending well inland to semi-arid areas.

Habitat

Inland the species is common about granite outcrops; in the wheat-belt it occurs also on fertile flats, especially along drainage lines and on the coast (where it is less frequent) in grassy or rocky places or in coastal sand-hills but not found in poor acid soils.

Conservation status: Common and well conserved.

Notes

Prasophyllum ringens and *P. macrostachyum* both occur together near Busselton and Manjimup without introgression, *P. macrostachyum* in boggy places and flowering more freely after bushfires, *P. ringens* in open grassy dry sites and on rock ledges. Morphological differences include the more rigid leaves of *P. macrostachyum* which are broadest at the fistula and its well-spaced flowers which are distinctly bicoloured with green sepals and purple-red labellum. *P. macrostachyum* also has much longer seed capsules, less acute floral segments, a much shorter and less filiform tip to the lateral sepals, and more distinctly channelled labellum, the whole plant usually drying darker.

This is a strongly outcrossing species. The sweet floral-honey odour of the flowers with their copious nectar seem to assure that a range of small insects visit. The most efficient and frequent pollinators observed have been ichneumon wasps. No evidence of self-pollination or apomixis has been seen.

Specimens examined

WESTERN AUSTRALIA: *R. Bates 2151*, NW Balladonia on rock outcrop, 29.viii.1981 (AD); *R. Bates 4193*, rocks NE Mt Magnet, 2.ix.1984 (AD); *M.G. Corrick 8654*, Cullimbin Reserve E Manmanning, 7.x.1983 (MEL); *D. Cramer sub A. Ashby 2307*, 70 km N Geraldton, 9.ix.1967 (AD); *A.S. George 4193*, Victoria Rocks, 22.ix.1962 (PERTH); *A.S. George 6415*, W Gillingarra, 26.ix.1964 (PERTH), bears label by A.S. George "Agrees well with Lectotype at W. of *Prasophyllum gracile* var. *ringens* . . .".

3. **Prasophyllum macrostachyum** R. Br., Prod. 318 (1810); Spreng., Syst. Veg. 3:712 (1826); Reichb.f., Beitr. Syst. Pfl. 59 (1871), as "*P. macrostachyo*"; Bentham, Fl. Aust. 6:341 (1873); Pelloe, W. Aust. Orchids 26 (1930), partly; Erickson, Orch. West. edn 2:59 (1965), partly; A.S. George, Nuytsia 1(2):187 (1971); Hoffmann & Brown, Orch. S.West Aust. 263, photo (1984); C. & D. Woolcock, Aust. Terrestrial Orchids 88, pl. 43B (1984).

Types: *R. Brown s.n.*, King George Sound, Dec. 1801: (Lecto.: BM!; Syn.: BM, K!). The lectotype designated here is the slenderest plant on a sheet of four specimens and best agrees with the original description. This sheet has in Brown's hand "Oph. parviflorum in paludibus ad portum Regis Georgei . . .". The types are up to 45 cm high and the lower flowers have developed seed capsules to 15 mm long.

P. gracile Lindley, Sketch Veg. Swan Riv. Col. 54 (1840); Lindley, Orch. Pl. 513 (1840).

Types: *Drummond s.n.*, Swan River, 1839 (Lecto.: K-L, photo!). Typification by Clements 1983. George (1971) noted when comparing the types of *P. gracile* with *P. macrostachyum* "The Drummond specimens are much shorter than Brown's but similar morphologically. The type sheet has only two specimens. It bears the annotations "Prasophyllum gracile Lindley, Holotype A.S. George 15.12.1967" and "Prasophyllum gracile Lindley, Lectotype (spec "a") D. Blaxell 1.1.1975). This lectotype (spec "a") is the better of the two specimens.

P. attenuatum auct. non. Fitzg.: Nicholls Orchids Aust. 37, pl. 145 (1969); Pocock, Aust. Ground Orchids 45 (1972).

P. nigricans auct. non. R. Br.: Endl. in Lehm., Pl. Preiss. 2:12 (1846).

Excluded references:

P. macrostachyum sensu Lindley, Orch. pl. 514 (1840) referring to a plant, not determined, collected by R. Brown near Port Jackson.

Plant 10-30 (-45) cm high, slender, green and red; tuberoid ovoid, 5-12 mm long, usually without fibrous sheaths. *Leaf* red at base, shorter than scape, expanded at fistula, apex rigid. *Scape* usually purplish, 1-2 mm diam., often flexuose especially at junction with leaf; flowers 5-30, usually distinctly bicoloured, green and purple-red in attenuated spike to 18 cm long. *Ovary* cylindrical, tumescent, reaching 15 mm long at time of dehiscence; subtending bract reddish, 1-2 mm long, sub-acute. *Dorsal sepal* ovate, 3-4 mm long, green, often with red margins, apex obtuse, not decurved; lateral sepals ovate-lanceolate, 3-4 mm long, green or edged purple-red, ± connate in lower two-thirds, margins much incurved, free apices conical or produced into short prongs. *Petals* very short, 2 x 1 mm, ± triangular, greenish, edged purple, parallel on either side of labellum. *Labellum* on short claw, ovate lanceolate, purplish, 3-4 mm long, recurved at 90° near middle, margins entire, slightly recurved; callus plate broad at base, ill-defined, glabrous, glistening, somewhat triangular in recurved section. *Column* appendages much reduced, 0.4 x 0.4 mm, triangular, obtuse, no basal lobe; anther c. 0.5 mm high, brown, sub-acute; rostellum higher than appendages, c. 1 mm x 0.8 mm; viscidium minute, caudicle only 0.2 mm long.

Flowers

August to December. Flowers with variable sweet fragrance. This species does not need fire to stimulate flowering but fires may increase the proportion of flowering plants.

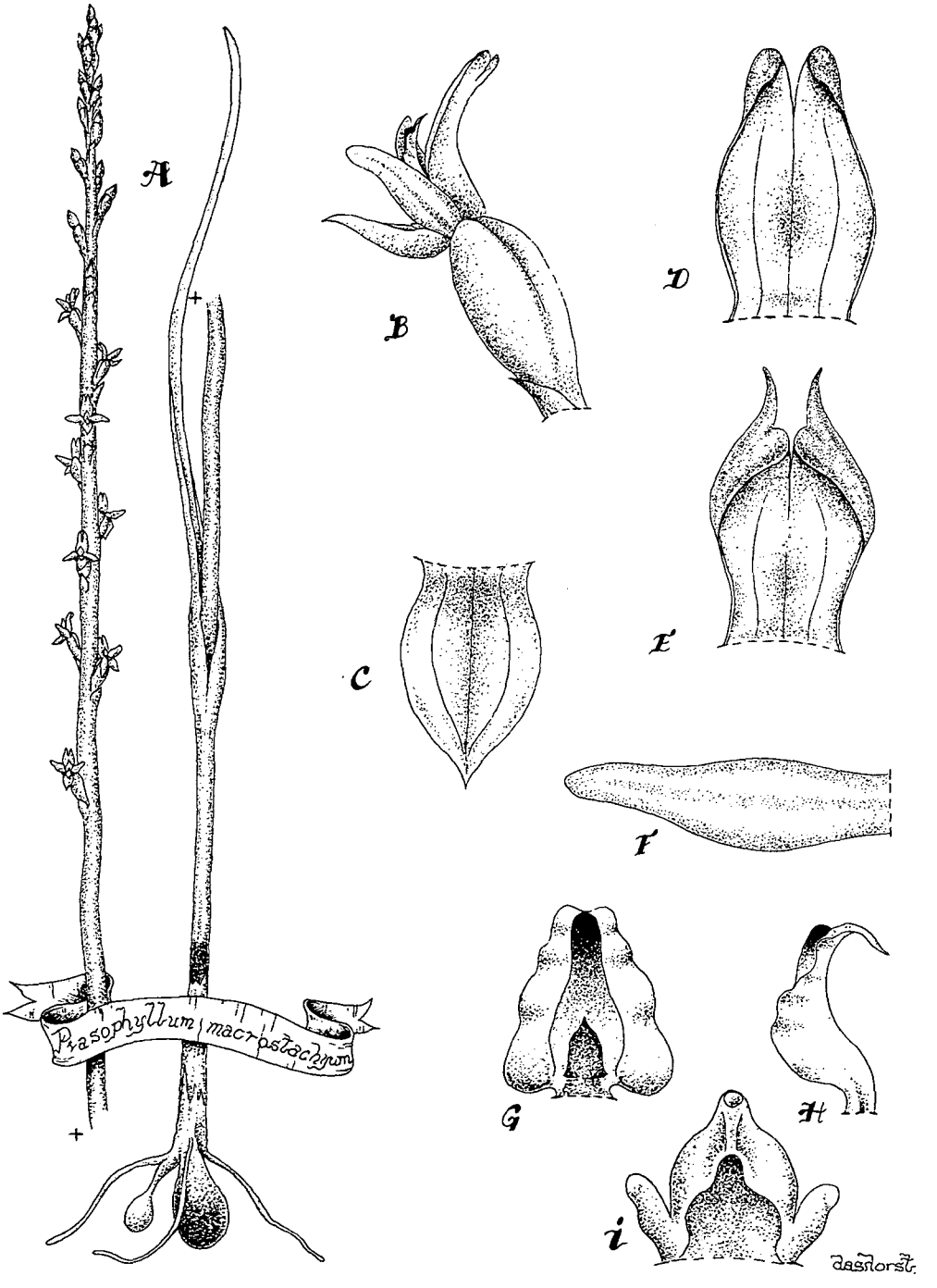


Fig. 3. *Prasophyllum macrostachyum*. A. Whole plant, x2; B. flower from side, x15; C. dorsal sepal, x25; D. & E. lateral sepals, x25; F. petal, x25; G. labellum front view, x25; H. labellum side view, x25; I. column, x30. Voucher spec.: *R. Bates 4560* (AD).

Variation

Two forms have been noted; one (the type form) with short-lived flowers having the ovaries tumescent from bud exhibits some degree of self-pollination; a second form, (*P. gracile* sens. stricto,) has flowers longer lived, the ovaries only swelling after pollination is achieved. The status of these forms requires further investigation. It has also been noted that successively flowering forms may occur in the same area, one group of plants flowering in September, another nearby as late as December. This may be due to environmental differences: flowering may be stimulated by drying out of the soil. Under very wet conditions flowering may be retarded. The author found plants in a waterhole near Northcliffe which were still in bud in December 1987.

Distribution

South-west Western Australia from Dongara to Cape le Grande, usually within 100 km of the coast.

Habitat

Grows in swampy ground, amid low open heathy vegetation, often flowering while standing in water, (however the soil may bake hard in summer).

Conservation status: Common and well conserved.

Selected specimens from 56 examined

WESTERN AUSTRALIA: *R. Bates 4560*, Mount Manypeaks town area, 22.x.1984 (AD); *L. Byrne 3*, Gull Rock E Albany, 10.xi.1968 (PERTH); *A.S. George s.n.*, Foot of Bickley Hill, on clay flat, 4.viii.1961 (PERTH); *A.S. George 15078*, Peaceful Bay, note late flowering, 14.i.1978 (PERTH); *R. Hnatiuk 771395*, 8 km S Enneabba in clay, 27.ix.1977 (PERTH); *T. Wilson s.n.*, Walpole, 1.xi.1975 (PERTH).

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