

Australian Orchid Research

Volume 5, 2006

New Taxa of Australian Orchidaceae

David L Jones & Mark A Clements



The Australian Orchid Foundation

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by

David L. Jones & Mark A. Clements

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FRONT COVER PHOTO: *Tropilis eungellensis* from Eungella, Queensland.

(© David P. Banks)

BACK COVER PHOTO: *Arachnorchis branwhitei* [*Caladenia branwhiei*] from Bethungra, New South Wales.

(© Dean Rouse)

David L. Jones

David Lloyd Jones was born at Mont Albert in Victoria in 1944. Early days at Balwyn were spent in nearby Beckett Park and exploring the wonderful collection of native plants in the iconic Maranoa Gardens. School holidays were enjoyed with an elderly garden-loving aunt at The Basin in the Dandenong Ranges where first involvements with native orchids and bushfires were experienced. Knowledge gained at Burnley Horticultural College, where David met Barbara, the sunny lady who was to share his passion for plants and life, was expanded and diversified by a degree in agricultural science at the University of Melbourne which was supported by a cadetship gained from the Department of Agriculture.

After graduating from university in 1968, his research work at the Scoresby Horticultural Research Station in Victoria involved the introduction of fruit cultivars from overseas, introduction and establishment of miscellaneous fruit crops, including blueberries, Chinese gooseberries and feijoas, grafting and nutrition of ornamental plants and the identification and testing of alternative materials for nursery potting mixes with the late David Nicholls. In 1978 the family moved to Queensland opening Eugenia Park Nursery in the Currumbin Valley, growing hardy coastal plants and bringing many rainforest species into cultivation. This was followed by a stint as a horticultural research officer at the Australian National Botanic Gardens in Canberra and then as research scientist in the Orchid Research Group at the Centre for Plant Biodiversity Research established within CSIRO.



A challenge in his teens by a nurseryman that “native orchids are impossible to grow” stimulated him to pioneer cultivation techniques for native terrestrial orchids that are the basis of those in use today. A plentiful supply of displaced plants from Melbourne’s encroaching urban sprawl fuelled the early growing experiments and stimulated his natural botanical curiosity. Corresponding with like-minded enthusiasts in other areas revealed different morphological interpretations between species in different parts of the country. This led to a very successful research program involving a network of licensed collaborators forwarding fresh specimens and for the first time allowing direct comparison between taxa from different areas and habitats. A rewarding simple process that revealed large gaps in our knowledge of native orchids and also resulted in the recognition of numerous new species. Following his first new species, *Pterostylis aestivalis* in 1972, David has described more than 370 species of native orchids that have come to his attention from his network of contacts or travels in the bush. He also prepares detailed botanical drawings of native orchids and writes prolifically, sharing his knowledge of plants through books and other publications.

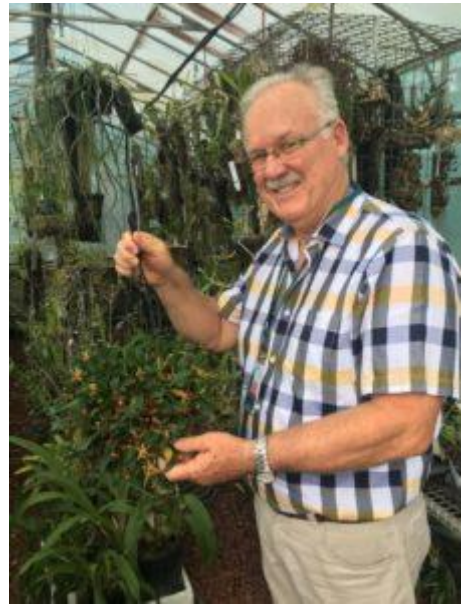
In 1991, David was awarded the Victorian College of Agriculture & Horticulture medal in recognition of his outstanding contribution to the Australian ornamental horticultural industry. In 2001 he was presented with the Australian Orchid Foundation’s prestigious ‘Award of Honour’ in recognition of his enormous contribution to the study of orchids in Australia and internationally. David served as a member of The Australian Orchid Foundation, Research Committee from its inception in 1977 to 2009; and as its Chairman from 1981 to 2002. In 2004 his contribution to orchid taxonomic research, while at the Centre for Plant Biodiversity Research was recognised when he was a finalist in the Australian Museum’s esteemed Eureka Prize for Biodiversity Research.

Dr Mark A. Clements

Mark Clements is an Australian botanist born in 1949. His career spans four decades and in that time, he has discovered about 250 new species of Australian orchids and curated tens of thousands of specimens representing more than 1600 species of Australian native orchids. These specimens are housed in the Australian National Herbarium.

Mark grew up in Largs Bay in South Australia, on the Le Fevre Peninsula about 16 km northwest of Adelaide city centre. Mark's father was an analytical chemist who had extensive general knowledge, particularly in natural history. He was also a keen grower of native orchids. With this background, Mark developed his own interest in natural history, and orchids in particular, from 10 years old. Mark attended Urrbrae Agricultural High School in Adelaide.

During his high school years, he completed a preliminary course in Wool Classing at the Adelaide Institute of Technology. On leaving school he undertook and completed the course and was awarded a Certificate in Wool Classing.



Between 1968 and 1974, Mark continued his training and development as a professional wool classer. Over this period, he worked with various shearing contractors, totalling 84 shearing sheds throughout South Australia, western New South Wales, Victoria and at the edge of the Nullarbor in Western Australia. On weekends, on mainly mostly remote sheep stations and properties, Mark spent much of his spare time studying birds, plants, the geology and searching for indigenous Australian artifacts. These interests led him to volunteer to undertake work at the South Australian Museum, Anthropology Department during the periods when wool classing work was not available. During this time he helped curate some of their natural history collections.

It was in this Museum environment that Mark's desire to expand his interest in natural history studies, and orchids in particular, became clear. His interest in orchids had also grown significantly during this period, firstly through association with a group of field naturalists and orchid growers with like interests, in particular Ray Nash, and secondarily through study of W.H. Nichols' book on Australian Native Orchids, co-incidentally co-edited by David Jones (see below). To pursue his interest in orchids and natural history, Mark decided to move to Canberra. Following a meeting with John Wrigley, who was the curator of the Australian National Botanic Gardens (ANBG), Mark was offered a job as a gardener. By this time, Mark had developed an interest in the symbiotic relationship between mycorrhiza and the germination of orchids, having observed the development of orchid protocorms following germination from seed in pots of terrestrial orchids he was growing at home.

After a couple of years working as a gardener, an opportunity to work with the research team at the Gardens became available. He also commenced study for a science degree at Canberra University. Mark took up the position in the research laboratory at the ANBG and immediately commenced work on trying to isolate mycorrhizal fungi from wild orchids, and then germinating seeds of those species *in vitro*. Fortuitously the first trials worked and in 1977 he achieved the successful germination of the threatened terrestrial orchid *Diuris fragrantissima* (or *D. punctata* var. *albo-violacea* as it was then called). Many other native orchids were successfully germinated during this

early phase. Soon after, wanting to learn more about the nature of the relationship between orchids and their mycorrhizal partners, at the invitation of Professor Denis Carr at the Australian National University, Mark started a collaboration looking at this aspect of orchid biology. He found that some cells harboured fungal growth while others didn't. Mark also found that most species studied had a preferred fungal partner.

In 1981, Mark attended the 10th World Orchid Conference in Durban, South Africa. He gave a presentation on his work entitled "Propagation and re-introduction of endangered orchids of Australia". While at the conference, Mark met Dr Phillip Cribb, Curator of Orchids at the Royal Botanic Gardens, Kew, England. Dr Cribb thought that Mark's methods might be able to solve some of the problems that scientists were facing with threatened orchids in the United Kingdom. Mark was invited (seconded) to the Royal Botanic Gardens, Kew as the Sainsbury Orchid Fellow to work on the propagation and re-introduction of five endangered United Kingdom orchids. After first completing an honours degree at the Australian National University, Mark started work at RBG, Kew in 1983. One of the first things he realised was that the laboratory protocols being used for the germination and propagation of orchids were not adequate. He changed the protocols and turned his attention to England's infamous lady slipper orchid *Cypridpedium calceolus*.

Cypridpedium calceolus had been harvested from the wild for flower markets since Victorian times until only a single plant remained in Yorkshire. Possibly hundreds of years old, this plant had held the title of last survivor for at least 30 years and was protected by security guards during its growing and flowering season. Despite concerted efforts, no-one had been able to propagate it. Mark used his knowledge of orchid biology and, in 1984, was able to finally initiate germination of the lady slipper beginning the process that would save the species from possible extinction. Mark also successfully germinated other European orchid species such as *Orchis militaris*, *Anacamptis morio* and *A. laxiflora* and instituted the protocols for their establishment and maintenance in cultivation with the aim of re-establishment in the wild.

During this visit to Kew, at the request of Dr. Cribb, Mark studied most of the original collections of Australian orchid species, and historical sketches of 'Lindley's herbarium collection', and visited the British Museum of Natural History which contained original specimens collected by Robert Brown and drawings by Ferdinand Bauer during Matthew Flinders circumnavigation expedition of Australia. Using this data, Mark was able to solve many taxonomic issues with Australian orchids.

Throughout his career, Mark contributed to many revisions of the classification of Australian orchids. He wrote the Checklist of Australian Orchids and then re-wrote another volume called the Catalogue of Australian Orchidaceae. On the basis of his studies at the RBG, Kew, he commenced research on *Dendrobium*. As a significant part of this research, he visited herbaria and museums in Europe to locate, study and photograph many of the type collections of Australian orchids and many *Dendrobium* species. It was during this period that his collaborative research partnership on Australian orchids with David Jones commenced. Together David and Mark have authored numerous papers, CDs, and reformed the interpretation of the biodiversity and extent of Australian orchids – and identified many new orchid species.

After returning to Australia, Mark began his PhD studies on the embryology of orchids. His thesis was entitled 'Reproductive Biology in relation to phylogeny of the Orchidaceae, especially the tribe Diurideae.' Mark was also a pioneer of molecular systematics of Australian orchids. He not only prepared classic samples for the Australian National Herbarium collection but had the foresight to store orchid specimens in silica gel, making them suitable for molecular analysis.

Aside from undertaking field work in Europe whilst at the RBG, Kew, to study European orchids, on returning to Australia, Mark participated in a series of expeditions to study species related to Australian orchids, in particular *Dendrobium* and *Pterostylis*, in Borneo, New Guinea, New Caledonia, Vanuatu and New Zealand. One of Mark's many career highlights was undertaking research on the translocation of three threatened species, including the Eastern Australian Underground orchid, *Rhizanthella slateri*, for the New South Wales government Bulahdelah Bypass, Pacific Highway project. This was one of a string of projects in which Mark's expertise on Australian orchids was sought on the conservation of threatened orchid species.

Mark has worked collaboratively with many scientists throughout his career, both overseas and in Australia. Since 2010, Mark worked in a strong partnership with Dr Katharina Nargar, at the Australian Tropical Herbarium in Cairns, as well as others in her team including Dr Lars Nauheimer and Dr Lalita Simpson. Together they have collaborated on major projects on the phylogenetics and systematics of Australian orchids, and others at a broader world-wide scale, specifically those in tribes Diurideae and Pterostylidinae and Dendrobieae (*Dendrobium* and *Bulbophyllum*).

In 2016, in recognition of his lifetime of achievements and enormous contributions to the Orchidaceae family, Mark was awarded the prestigious Westonbirt Orchid Medal from the Royal Horticulture Society in the United Kingdom. The Westonbirt Orchid Medal is awarded annually to individuals for "scientific, literary or any other outstanding personal achievement in connection with orchids".

Throughout his career, Mark has authored many scientific publications, and written and contributed to several books. He is a member the IUCN Orchids Specialist Group and served as a member of The Australian Orchid Foundation, Research Committee for over 30 years (1985 – 2020). He has helped to develop a collection of hardy orchids for the horticultural industry, and has been successful in his work to re-introduce endangered orchids into areas of Australia and the UK. He has also been a lifelong mentor, inspiring many early career scientists, sharing his interest and passion with citizen scientists and demonstrating the value of herbarium collections.

Mark has progressed our understanding and knowledge of the Orchidaceae immeasurably, not just in Australia but in many countries in the world, including the UK. In early 2021, Mark retired from his position as Research Scientist at the Australian National Herbarium but continues his involvement in orchid research as an CSIRO Honorary Scientist.



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Fourteen New Taxa of Orchidaceae from Northern and Eastern Australia and Two New Combinations from New Guinea

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ABSTRACT

Fourteen new taxa of Orchidaceae in eight genera are described from northern and eastern Australia. These are *Acriopsis emarginata*, *Cadetia clausa*, *Calanthe australasica*, *Crepidium fontinale*, *Oberonia crateriformis*, *O. flavescens*, *O. rimachila*, *Oxysepala schilleriana* subsp. *maritima*, *Rhinerrhizopsis matutina*, *Tropilis angusta*, *T. crassa*, *T. eburnea*, *T. eungellensis* and *T. radiata*. New combinations in *Rhinerrhizopsis* from New Guinea are also made for *Thrixspermum beccarii* Rehb.f. and *Renanthera ramuana* Kraenzl.

INTRODUCTION

Studies in some groups of Orchidaceae from northern and eastern areas of Australia have revealed a range of nomenclatural issues that are dealt with here, these issues sometimes resulting in the recognition of new taxa. In these studies we continue to challenge the concept of the existence of widely distributed orchid species that are reputedly represented in many countries and supposedly have the same genotype throughout their range (see for example the new segregate taxa *Eucosia umbrosa*, *Flickingeria clementsii*, *Tropidia territorialis* and *Vrydagzynea grayi* in Jones & Clements 2004). This concept, as exemplified by the elongated synonym lists of many European publications, is untenable to us because it results in "convenience taxonomy" that ignores or submerges important biodiversity. Convenience taxonomy can also have a significant consequence, namely that of masking unique biodiversity which might require the application of a conservation program for its survival.

It is obvious from a general scan of botanical literature that the submergence of a taxon is a very simple process, whereas we are of the view that the synonymisation of a taxon should require the presentation of evidence in a similar manner to that required for the erection of a new genus or description of a new taxon. It is also apparent that many botanical treatments, both revisionary and *ad hoc* herbarium decisions, are based on the study of dried specimens. We all know the limitation of reliance on herbarium specimens, but in the Orchidaceae, the interpretation of dried specimens can be particularly difficult. This is especially true when the worker is not familiar with the unique floral features of the group in question, because so many significant morphological characters are lost or masked in the drying process. Careful examination of a dried specimen can yield important data, but in so many studies the approach seems to be based on the supposition "if taxa look alike then they are probably the same".

The importance of morphological studies using fresh material, supplemented by high quality colour images and spirit-preserved material cannot be overemphasised. Even with this data, floral similarities in Orchidaceae must still be interpreted with care because of the high degree of evolutionary convergence in the family. Conservative or generalised approaches greatly undervalue the high degree of evolution and specialisation that has occurred in the Orchidaceae, achieving a level that is not paralleled in any other monocotyledonous group and in the dicotyledons possibly matched only by the Asteraceae.

MATERIALS AND METHODS

This study is based on the morphological examination of living plants and fresh flowers, examination of dissected flowers mounted on cards, dried and spirit-preserved herbarium specimens and images of living flowers. Herbarium collections (spirit and dried) were examined from the following herbaria: AD, BRI, CANB, CBG, HO, MEL and NSW. Type specimens and protologues of all species having similarities or possible relationships to new taxa have been examined. Measurements given in the descriptions are from living plants or dissected flowers on cards. Notes on distribution, habitat and ecology, were derived from our own observations or from herbarium labels. Notes on conservation status were derived from our own field work or in consultation with the relevant authorities.

TAXONOMIC TREATMENT

Acriopsis Reinw. ex Blume

The Australian species of *Acriopsis* has historically been treated as *A. javanica* Reinw. ex Blume (eg Dockrill 1992), or *A. javanica* var. *nelsoniana* (Bailey) J.J.Smith. In the most recent taxonomic treatment of the genus, de Vogel (1986) lectotypified *A. javanica* by a collection from Mt Salak in Java and then treated it as a very widespread taxon (South-east Asia to Australia),

with three named varieties. More recently, in a classical case of conservative botany based entirely on the interpretation of a detailed botanical description and in the absence of a supporting botanical specimen, *A. javanica* has been reduced to a synonym of *A. liliifolia* (Ormerod in Seidenfaden 1995a), the type of which has not been found, but was possibly collected from Phuket or Malacca (Seidenfaden 1995b). The identification to species rank by Ormerod of an *Acriopsis* of uncertain provenance and based on a Latin description together with "primitive sketches of the column" (Seidenfaden 1995a), seems hazardous at best in a specialised genus and certainly does not provide a basis to confidently relegate another taxon (*A. javanica*) to synonymy.

We regard *Acriopsis* as being a highly evolved and diverse genus, this conclusion being based on biology and comparisons of the floral morphology of fresh flowers produced on cultivated plants in the collection at the Australian National Botanic Gardens from populations in Australia, New Guinea, Indonesia, the Philippines and Malaysia. Examination of the pollination systems of these orchids shows the flowers are well adapted to insect pollination. Specialisations include nectar produced in a basal saccate nectary, projecting labellum with associated callus, column arms to guide vectors and specialised pollinarium with a long stipe, narrow pollinia and a terminal viscidium. Species specificity is supported by the observation that cultivated plants of the Australian species of *Acriopsis*, growing beside plants from New Guinea at Shiptons Flat south of Cooktown, regularly set seed capsules whereas the New Guinea plants remain infertile, confirming pollinator specialisation (Lewis Roberts pers. comm.).

Examination of spirit-preserved flowers of *Acriopsis* in the collection of CANB, from localities in Queensland, New Guinea, the Philippines and Malaysia, shows significant disparity in flower size, column and labellum features. De Vogel (1986) also noted similar variation but could not link it with distribution and chose to treat the taxa very conservatively. Photographs of flowers from various countries also show significant variation in floral colours and patterns of colour on the segments and labellum. Consideration of the highly evolved pollination system, significant morphological divergence in the labellum and column and diverse floral colouration and colour patterns leads us to the conclusion that species of *Acriopsis* have adapted to local environments and the biodiversity within the genus cannot be adequately recognised by previous conservative taxonomic treatments. As the Australian species

does not adequately fit in with other named taxa it is here described as new.

Taxonomy

1. *Acriopsis emarginata* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *A. javanicae* Reinw. ex Blume, sed plantis fortioribus; pseudobulbis majoribus; foliis majoribus; paniculis ramis crebrioribus; floribus cremeis, labello albo; callo emarginato, differt.

Type: Queensland. Cook District, Daintree River Valley, 13 Oct. 2004, *R.Savage & B.Gray* (ORG 4566) (holo CANB 667075; iso BRI, NSW).

Description: *Epiphyte* forming dense clumps with the pseudobulbs surrounded by a mass of thin, white, much-branched aerial roots which arise from normal spreading roots. *Pseudobulbs* crowded, ovoid, 3-7 cm long, 3-4 cm wide, pale green, shiny, when young covered by white scarious sheaths. *Leaves* erect, from apical nodes, 2-4, narrowly ovate to narrowly elliptical, 15-20 cm long, 2-2.5 cm wide, dark green, firm textured and coriaceous. *Inflorescence* arcuate, 20-60 cm long, usually branched, many-flowered. *Flowers* porrect, 4-5 mm diam., cream with a white labellum, on filiform pedicels 4-5 mm long. *Perianth segments* narrow, widely spreading. *Dorsal sepal* erect and incurved, linear-oblong, 4-5 mm long, c. 1 mm wide, distal margins incurved. *Lateral sepals* fused to form a boat-shaped synsepalum beneath the labellum, 4-5 mm long, c. 1.5 mm wide. *Petals* spreading, linear-obovate, 4-5 mm long, c. 1 mm wide, obtuse. *Labellum* porrect to obliquely deflexed, 4-5 mm long, c. 4 mm wide, 3-lobed; lateral lobes spreading, broadly deltate, acute to blunt; midlobe short, with 2 prominent calli, the main central callus notched. *Column* porrect, 3.5-4 mm long, c. 0.8 mm wide. *Column wings* extending as a prominent cucullate mitra over the anther; lateral arms projecting forwards, narrowly cylindrical, c. 1.5 mm long, apices yellow. *Anther* erect. *Pollinia* linear, on a long filiform stipe. *Stigma* ovate. *Capsules* ovoid to ellipsoid, 6-8 mm long, 4-5 mm wide, the walls splitting and spreading at dehiscence. **Fig. 1.1.**

Distribution and ecology: Endemic in north-eastern Qld where ranging from Cape York to the Daintree River. This species is often locally common in hot humid lowland conditions, growing on trees, palms and *Pandanus* in swamps, rainforest, and on rainforest margins. The orchid plants frequent the upper part of the tree trunk near the crown and the upper branches. On palms the species is often found in the leaf bases of the upper trunk with its roots spreading through the fibrous leaf sheaths. Alt. 0-300 m. Flowering: Mainly June to November.

Recognition: The Australian species can be readily distinguished from *A. javanica* (fig. 1.2) by its more robust plants which have larger pseudobulbs and larger leaves, panicles with more numerous branches, cream flowers with a white

labellum and the labellum callus emarginate. The species is also distinct from all CANB collections originating in various parts of New Guinea (see fig. 1.3), many of which have flowers heavily marked with purple blotches and streaks. *Acriopsis nelsoniana* F.M.Bailey, described from material collected on the Gira River in New Guinea, has greenish yellow flowers with a white labellum and an erect callus with a rounded apex (Bailey 1898).

Notes: The wiry inflorescence of these orchids remains green for many months after flowering has finished. The capsules of *Acriopsis* species open in manner unusual in the Orchidaceae; after dehiscence the three carpels separate at the apex and spread like the petals of a flower.

Conservation status: Relatively widespread, locally common and well conserved.

Etymology: The Latin *emarginatus* – notched, in reference to the notched labellum callus.

Cadetia Gaud.

A new species of *Cadetia* has been recognised among collections made on Moa Island in Torres Strait.

Taxonomy

2. *Cadetia clausa* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *C. maidenianae* (Schltr.) Schltr., sed floribus cleistogamis; lobis lateralibus labelli vestigialibus, medilobo trilobato, marginibus denticulatis patentissimis; capsulis minoribus (5×4 mm), differt.

Type: Queensland. Moa Peak, N end of Moa Island, 11 Feb. 1989, *D.L.Jones* 3589 (holo CANB).

Description: *Epiphyte* forming small open to moderately crowded clumps. *Stems* spreading to erect, slender, 40–70 mm long, 1–1.5 mm wide, gradually widening from base to apex, flattened; proximal half covered by a loose bract. *Leaf* ovate, oblong or elliptic, 30–70 mm long, 10–15 mm wide, dark green, thin-textured; apex unequally emarginate. *Flowers* produced at sporadic intervals, usually single, cleistogamous, c. 3 mm across, globose, white. *Pedicel* c. 1 mm long, enclosed by a brownish scarious bract. *Ovary* obovoid, c. 3 mm long, the apex covered with fleshy hair-like tubercles 1–1.5 mm long. Perianth segments remaining incurved. *Dorsal sepal* oblong-elliptic when flattened, c. 1.5 mm long, c. 1 mm wide. *Lateral sepals* asymmetrically ovate when flattened, c. 1.7 mm long, c. 1.3 mm wide. *Petals* narrowly linear-lanceolate when flattened, c. 1.5 mm long, c. 0.3 mm wide. *Labellum* narrowly cuneate when flattened, c. 3.5 mm long, c. 2.5 mm wide, white, ventral surface pubescent, 3-lobed; lateral lobes vestigial; midlobe trilobate, c. 1.5 mm long, c. 2.5 mm wide, the margins broadly flared and denticulate, longer than the central part when flattened;

spur about 1 mm long, saccate. *Column* c. 2 mm long, c. 1.5 mm wide; foot c. 1.5 mm long, pubescent; column wings present as 2 short apical teeth. *Anther* cap c. 1 mm long, c. 1 mm wide, with a short denticulate rostrum. *Pollinia* difficult to extract, elliptic, c. 0.5 mm long. *Stigma* c. circular, c. 1 mm across, concave. *Capsule* obovoid, c. 5 mm long, c. 4 mm wide, with coarse soft hair-like tubercles 1–1.3 mm long. **Fig. 1.4.**

Distribution and ecology: Occurs on Moa Island in Torres Strait growing on rough-barked trees in the rainforest that covers the slopes of low hills. Alt: 200–300 m. Flowering: January to July.

Recognition: This species is generally similar to *C. maideniana* (fig. 1.5) and the two species have undoubtedly been confused. Both species have similar growth habit, stems and leaves and the presence of short fleshy tubercles on the ovary adds to the confusion. The flowers of *C. clausa* are short-lived and self-pollinate, often without opening, whereas those of *C. maideniana* generally open freely. The most obvious differences between the two species occur in the labellum and capsules. In *C. clausa* the labellum lateral lobes are vestigial and the midlobe itself is trilobate with broadly flared denticulate margins. In *C. maideniana* the labellum lateral lobes project as short teeth and the midlobe is narrow, transversely oblong, undivided and with an incurved or inrolled apical margin. The capsules of *C. clausa* are significantly smaller (5×4 mm) than those of *C. maideniana* (8×7 mm) and have less hair-like tubercles.

Similar species: The new species also has general similarities with *C. echinocarpa* Schltr. from New Guinea the type of which has been examined by Mark Clements. This species also has hair-like tubercles on the ovary but its flowers, which are larger and open freely, have a longer retrorse mentum, very thick, recurved, hispid margins on the labellum midlobe and bifid column wings.

Conservation status: Poorly known and probably confused with *C. maideniana* because of the similar appearance of the plants of both species; suggest 2K by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *clausa*, shut, closed, in reference to the cleistogamous flowers.

Calanthe R.Br.

We have been concerned about the placement of the Australian species of *Calanthe*, which has generally been included in *C. triplicata* (Willemet) Ames for many years. In an attempt to get a better match for the Australian species, we

have examined numerous specimens of *Calanthe* from various herbaria, including the collections at BOG, BRI, BM, HBG, K, LAE, L, LINN, MEL, P, W and Z, as well as living plants from floras directly related to Australia. During these studies it has become apparent that an ultraconservative taxonomic approach has been taken by listing authorities when dealing with the evergreen white-flowered species of *Calanthe*. Such "convenience taxonomy" has resulted in megaspecies (such as *C. triplicata sens. lat.*), that are supposedly widely distributed in many countries. From our studies of the taxa submerged in some of these treatments, it seems that anything with a similar general appearance has a good chance of being treated as a synonym, without its scientific worth as a distinct taxon being tested. As a consequence the blind acceptance of synonym lists can be very misleading, and this in turn can have significant potential impacts on the conservation of genetic diversity in various countries.

For this study, we examined the protologues and type specimens of *Calanthe triplicata* and the 26 taxonomic synonyms as listed in the World Checklist of Monocotyledons as presented by Kew. Intraspecific taxa have not been included and the listed synonyms of *C. triplicata* are dealt with in chronological order. The results clearly show that many distinct taxa worthy of recognition in their own right have been wrongly submerged in *C. triplicata*. Illustrations accompanying the type descriptions of some species are reproduced in figs. 1.6 and 1.7.

Calanthe triplicata (Willemet) Ames, *Philipp. J. Sci.* 2: 326 (1907); *Orchis triplicata* Willemet, *Ann. Bot. (Usteri)* 18: 52 (1796).

Notes: *Orchis triplicata* was described by Willemet in 1796 as part of an account of the flora in "*Herbarium Mauritianum*". The description is so brief (7 words) that, in isolation it is not diagnostic. However, Willemet in the description also cites the following:-

- (i) reference to "*Flos triplicatus*. Rumph. t. 6. p. 115, T. 52, f. 2." which is an illegitimate name and consequently has no standing in modern botany because it pre-dates the official starting date of botanical nomenclature, 1 May 1753,
- (ii) a specimen from Mauritius.

These are both effectively syntypes for *Orchis triplicata*.

Further assessment reveals that:-

- (1) the description and illustration of "*Flos triplicatus*" is not in conflict with the protologue for *Orchis triplicata*,

- (2) the Rumphius publication was obviously the source of the specific name "*triplicata*" as used in *Orchis triplicata*,
- (3) despite the fact that the Rumphius' description is based on material collected in Ambon in eastern Indonesia, the presence of the name "*Flos triplicatus*" historically has influenced the interpretation and application of the name *Calanthe triplicata*.

In the absence of an actual specimen from Mauritius, the interpretation of the name *Orchis triplicata* has now been fixed by lectotypification based on the Rumphius plate (Kores 1989). As pointed out by Garay *et. al* (1996), the plant illustrated by Rumphius cannot be applied taxonomically to the species to which it has typically been assigned and specifically to that which occurs in Australia. The lectotype of *C. triplicata* has distinctly ovate-elliptic lateral lobes compared with the linear-oblong labellum lateral lobes of the Australian material and the Australian specimens have a much longer spur.

Limodorum veratrifolium Willd., *Sp. Pl.* 4: 122 (1805), *nom. illeg.*

Note: This name is illegitimate because it cites *Orchis triplicata* in synonymy (Art 52.1, 52.2, ICBN).

Calanthe veratrifolia Ker-Gawl. in Edwards's, *Bot. Reg.* 9: t. 720 (1823), *nom. illeg.*; *Amblyglottis veratrifolia* (Willd.) Blume, *Bijdr.* 370 (1825); *Alismorchis veratrifolia* (Willd.) Kuntze, *Revis. gen. pl.* 2: 650 (1891).

Note: These names are nomenclatural synonyms of *Limodorum veratrifolium* and are all illegitimate because that name is illegitimate (Art. 52.1, 52.2, ICBN).

Limodorum ventricosum Steud., *Nomencl. ed.* 1: 481 (1821), *nom. illeg.*

Note: An illegitimate substitute name for *Orchis triplicata*.

Calanthe furcata Batem. ex Lindl. in Edwards', *Bot. Reg.* 24: Misc. 28 (1838); *Alismorchis furcata* (Batem. ex Lindl.) Kuntze, *Revis. gen. pl.* 2: 650 (1891). Type: [Philippines] "A white-flowered species, with a scape about a foot high, received by Mr Bateman from Luzon islands, where it was collected by Mr. Cuming" (holo K-LINDL!).

Examination of the type, which includes an illustration of the flower, reveals a labellum with obovate lateral lobes, bifid midlobe with erose apical margins and a recurved, narrow, minutely pubescent spur with a bifid apex. These characters distinguish the species from Australian material.

Notes: Garay (1996) was of the opinion that this name should be applied to the species commonly interpreted as *C. triplicata* because, contrary to an earlier statement (Garay and Sweet 1974), he considered *C. triplicata* to be based on a Mauritian plant. Despite this notion and the fact that Kores (1989) has fixed the name to a plant from Ambon, the type specimen of *C. furcata* has a number of characters that clearly differentiate it from that described and illustrated as *Orchis triplicata*. A plant matching the type of *C. furcata* is illustrated as *C. triplicata* by Valmayor (*Orchidiana Philippiana* 1984; 42, t. 34). This species appears to be of restricted distribution in the Philippines (Jim Cootes, pers. comm.).

Calanthe perrottetii A.Rich., *Ann. Sci. Nat., Bot.*, II, 15: 68 (1841). Type: [Sri Lanka] Nil-Gherries: Crescit in sylvis humidis circa Avalanchy, *M. Perrottet s.n.* (holo P).

Notes: There is a specimen and illustration of a plant labelled with this name in the Lindley herbarium. The protologue states that the flowers are pale lilac and a drawing by Lindley shows lateral lobes spreading at right angles to the midlobe, and the midlobe with a shallowly notched apex. These characters distinguish the species from *C. triplicata*, *C. furcata* and the Australian material. This is the earliest name available for a *Calanthe* from this region.

Calanthe comosa Rchb.f., *Linnaea* 19(3): 374 (1846). Type: [Sri Lanka] 'Nilgherries: Kotigherry', 1838, herb *Delessert s.n.* (holo W!).

Notes: Reichenbach based the description of this species on two incomplete inflorescences in the Delessert herbarium. He described the labellum as trilobed, the lateral lobes obovate-retuse, the medium lobe cuneate with an emarginate apex, spur filiform and incurved, the apex truncate and bearing short yellowish hairs. He also noted the similarity of the spur of *C. comosa* with that of *Calanthe discolor* and *C. furcata*. The illustration accompanying the type shows widely spreading sepals and petals; labellum with spreading narrow, nearly rectangular lateral lobes, marginally bifid (emarginate) midlobe and a long narrow spur. Most of these characters serve to distinguish the species from *C. triplicata*, *C. furcata* and the Australian material, especially the emarginate labellum midlobe and hairy spur. The main features of this species suggest affinities with *Calanthe discolor*, but not the Australian species, and it also appears to be distinct from *C. perrottetii*.

Calanthe gracillima Lindl., *Fol. Orchid.* 6: 8 (1855). Type: Wild in the Society Islands, *Beechey* (r.s.sp. in hb. Hooker) (holo K!).

Notes: Collected from "Wild in the Society Islands" and was by Lindley considered to be "abundantly distinguished from *C. veratrifolia*"

in both floral and plant habit. He clearly differentiated it from *C. veratrifolia* on the same page of this publication and there is no reason to dispute this given the material Lindley examined. It is readily distinguished from the Australian species by its very slender habit, and the dense crescent-shaped cluster of calli at the labellum base. This species, which is distinct from *C. triplicata*, appears to be confined to islands of the eastern Pacific (Tahiti and Samoa).

Calanthe catilligera Rchb.f., *Bonplandia* 5: 37 (1857). Type: 'Java', *Zollinger s.n.* (holo W!).

Notes: The type of this species is in very poor condition but there is an illustration of a flattened labellum on the sheet. The labellum is trilobed with rectangular lateral lobes spreading at an oblique angle and about half the total length of the labellum; the midlobe is shortly bifid (emarginate) with the apices of the lobes narrowly obtuse; a small callus occurs at the base. It is distinguished from the Australian species by its incurved lateral lobes held close to the midlobe and an emarginate midlobe with short forward pointing lobes. These features also distinguish it from the species typically interpreted as *C. triplicata*.

Calanthe angraeciflora Rchb.f., *Linnaea* 41: 75 (1876). Type: New Caledonia, Kanala, *Deplanche 114* (holo P, iso W).

Notes: This species has very large flowers with acuminate to aristate tips on the sepals, very broad lateral lobes with the anterior margin broadly curved and irregular, deeply notched midlobe with obovate labellum lateral lobes and a very long spur. It is very different to the Australian material and is not very similar to the species typically interpreted as *C. triplicata*.

Calanthe bracteosa Rchb.f., *Flora* 65: 533 (1882). Type: Samoa, *Linden* (? holo W).

Notes: This poorly known species, which is from Samoa, is illustrated by a drawing in the Reichenbach herbarium in Vienna. It is readily distinguished from the Australian species by its suberect, oblong labellum lateral lobes, deeply divided midlobe with widely spreading lobes and a clavate spur.

Calanthe proboscidea Rchb.f., *Gard. Chron.*, n.s., 1884: 476 (1884). Type: Imported from the Sunda Islands, *Messrs. J. Veitch & Sons* (holo W).

Notes: This species, which is from the Sunda Islands, is distinguished from the Australian species by its hairy ovary, hairy spur and the labellum with a cluster of red calli breaking up distally into papillae and surrounded by a red horseshoe-shaped mark.

Calanthe diploxiphion Hook.f., *Fl. Brit. Ind.* 5: 849 (1890); *Alismorchis diploxiphion* (Hook.f.) Kuntze., *Revis. gen. pl.* 2: 650 (1891). Type: 'Barat: Perak [Malaya], at Goping in shady places', *King's Collector s.n.* (holo K!).

Notes: The detailed illustration accompanying the description of this species, which is from Malaya, shows that it is readily distinguished from the Australian species by smaller flowers, narrowly ovate-lanceolate dorsal sepal, narrowly oblanceolate lateral sepals, linear oblanceolate petals and curved, forward-pointing spur. Hooker in describing and illustrating this species noted: "I have seen only the one specimen here figured" and "except in the much smaller flowers and very short raceme and larger bracts, it resembles *C. veratrifolia*". The minute cluster of basal calli on the labellum, the oblanceolate acute sepals, labellum with narrowly oblong sidelobes and widely spreading obliquely obovate lobes of the midlobe further differentiate it from that species. The status of this taxon needs further investigation.

Calanthe celebica Rolfe, *Bull. Misc. Inform. Kew* 1899: 129-130 (1899). Type: North-east Celebes, summit of Mt Masarang, *Minahassa Korders* 29520 (holo K!).

Notes: This species, which is from Sulawesi and surrounding islands such as Ambon, is readily distinguished from the Australian material by its hairy leaves and small colourful flowers. Schlechter in his 1911 account of the orchids of the Celebes records it as widely distributed in the forests of the ranges in the Minahassa district and that it is distinguished by the "lustrous violet-red flowers, the labellum having a white front lobe." These characters also distinguish it from *C. triplicata*. This species is clearly a distinct taxon worthy of recognition in its own right.

Calanthe matsamurana Schltr., *Repert. Spec. Nov. Regni Veg.* 2: 168 (1906). Type: 'Liutkiu-Inseln: Yakunosima', *Matsumura s.n.* (holo B†).

Notes: This species, from Taiwan and Japan, is distinguished from the Australian species by its smaller flowers, falcate lateral lobes and very short (14 mm long) incurved spur. This is the Japanese species that is commonly misinterpreted as *C. triplicata*.

Calanthe nephroglossa Schltr., *Repert. Spec. Nov. Regni Veg.* 9: 99 (1911). Type: Savaii: Südlich von Matoana, c. 1000 m, 17 May 1906, *Vaupel* 413 (holo B†).

Notes: This species, which is from Samoa, is clearly misplaced if treated as a synonym of *C. triplicata* and is quite dissimilar to the Australian species. Schlechter describes the species as having a reniform midlobe. Examination of

isotypes at AMES shows the unusual midlobe clearly, as well as a short thick curved spur. These features align it with another group within the genus containing species such as *C. chrysantha*, and quite distinct from the group which includes the Australian species.

Calanthe brevicolumna Hayata, *J. Coll. Sci. Imp. Univ. Tokyo* 30(1): 328 (1911). Type: Formosa: Taitó: Bataian, Apr. 1907, *T. Kawakami s.n.* (holo ?).

Notes: This species, which is from Taiwan, is distinguished from the Australian species by smaller flowers with narrow (c. 3 mm wide) sepals and petals, very short labellum spur (c. 6 mm long), very short (3 mm long) obliquely elliptical lateral lobes and a long neck between the base of the lateral lobes and the midlobe. The labellum also has a very dense cluster of calli. Most of these characters also distinguish it from *C. triplicata*.

Calanthe orthocentron Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 1: 380 (1912). Type: [New Guinea] Kaiser-Wilhelms-Land: In humus in the forests near Toliba, alt. c. 300 m, Dec. 1908 R.Schlechter 18968 (holo B†).

Notes: This species, which is from New Guinea, is readily distinguished from the Australian species by its ovate sepals with acute to acuminate tips, narrow acuminate petals, falcate forward pointing lateral lobes and midlobe with narrowly linear lobes.

Calanthe pubescens Ridl., *Bull. Misc. Inform. Kew* 1923: 117 (1923). Type: 'Malay Peninsula, Jalor Besar in sylvis', 1899, *Gwynn-Vaughn* 261 (holo K!).

Notes: This species, from the Malay Peninsula, is clearly distinguished from Australian material by the densely hairy petioles, hairy leaf undersurface, densely hairy scape and very short (c. 1 cm long) filiform spur. These characters also distinguish it from *C. triplicata*.

Calanthe millotae Ursch & Genoud ex Bosser, *Adansonia* (n.s.), 6: 399 (1966). Type: Madagascar: Massif du Marojeje, *H. Humbert* (*Jard. Bot. Tan.* 944) (holo P?).

Notes: This species, which is from Madagascar, is readily distinguished from the Australian species by its red labellum calli, short broadly obovate lateral lobes and broadly cuneate lobes on the midlobe. These characters also distinguish it from *C. triplicata*. It may have been treated as a synonym of *C. triplicata* because of the early misconception that *C. triplicata* was based on material from Mauritius.

Calanthe rubicallosa Masam., *J. Geobot.* 23(2): t. 7 (1975), *nom. inval.*

Notes: This species, which is from Taiwan, is readily distinguished from the Australian species by its hairy ovary, hairy spur, incurved lateral lobes, obovate lobes on the midlobe and red labellum calli. These characters also distinguish it from *C. triplicata*.

Taxonomy

As a result of these studies the Australian species cannot be satisfactorily placed with a named taxon at species rank and it is here described as new.

3. *Calanthe australasica* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *C. triplicata* (Willemet) Ames, sed lobis lateralibus labelli lineari-oblongis; callo minor compacto flavo; calcaribus multo longiore, differt.

Type: Australia. Queensland. Kroombit Tops, 2 Jan. 1997, *R. Crane 1773* (holo CANB).

Calanthe veratrifolia (Willd.) R.Br. var. *australasica* Lindl. et Paxton in Paxton's, *Fl. Gard.* 2: 132 (1851-53). Type: cult. Kew ex 'New Holland, Illawarra', Aug. 1822, *A. Cunningham s.n.* (holo K-LINDL!).

Calanthe veratrifolia (Willd.) R.Br. var. *kennyi* F.M.Bailey, *Queensland Agric. J.* 28: 276 (1912). Type: 'Lake Eacham', *F. Hamilton-Kenny s.n.* (holo BRI!).

Illustration: Page 277, Dockrill (1992), as *C. triplicata*.

Description: *Pseudobulbs* crowded, ovoid, 4-8 cm long, 2-4 cm wide. *Leaves* erect, 4-9 per pseudobulb, lasting many seasons, glabrous throughout, petiolate; petioles 8-20 cm long, fleshy, channelled; lamina broadly elliptical to obovate, 20-60 cm long, 10-18 cm wide, dark green, plicate. *Inflorescence* from a basal axil, erect, 0.5-1.5 m tall, multiflowered. *Peduncle* longer than the rhachis, fleshy, glabrous. *Flowers* crowded in a condensed terminal raceme, 25-40 mm across, white, readily bruising purplish. *Dorsal sepal* erect, ovate to ovate-elliptic, 10-18 mm long, 6-10 mm wide, acute to acuminate. *Lateral sepals* widely spreading, broadly ovate to obovate, 11-20 mm long, 7-10 mm wide, acuminate to aristate. *Petals* obliquely erect, narrowly to broadly obovate, 10-17 mm long, 3-10 mm wide. *Labellum* porrect to decurved, 12-20 mm long, deeply 3-lobed (appearing 4-lobed); lateral lobes widely divergent, linear-oblong, 8-12 mm long, 3-5 mm wide, straight, obtuse; midlobe c. 8-12 mm long, 10-22 mm across, deeply bilobed, the lobes widely divergent, oblong, falcate, 7-10 mm long, 3-7 mm across, widest distally, the apex obliquely truncate. *Labellum base* with two groups of three, entire or lobed, yellow calli situated on either side of the entrance to the spur. *Spur* curved, more or less parallel with the ovary, glabrous, cylindrical, 16-27 mm long, c. 1-1.3 mm wide, curved,

not dilated distally. *Column* porrect from the end of the ovary, 5-7 mm long, 4-5 mm wide, the proximal margins adnate to the proximal labellum margins. *Anther* ovate, c. 3 mm long, with an oblong rostrum. *Pollinarium* c. 2 mm long, consisting of 8 narrowly obovate pollinia attached directly to an ovate viscidium. *Stigma* in 2 parts. *Capsules* pendulous, obovoid, 3-4 cm long, 1-1.4 cm wide, green, shiny.

Distribution and ecology: Widely distributed in Queensland and New South Wales more or less between the Iron Range on Cape York Peninsula and Termeil in south-eastern New South Wales. It possibly also extends to New Guinea but we consider this doubtful. It is a widespread common species that grows in humus-rich soils and sites of litter accumulation in shady locations in forest, particularly rainforest, but also near streams and on sheltered slopes in more open habitats. Plants often grow on rotting logs, stumps and in accumulations of litter on boulders. Alt. 0-1200 m. Flowering: October to February.

Recognition: Characterised by the acuminate to aristate tips on the sepals, deeply 3-lobed labellum, labellum basal margin with two groups of three entire or lobed yellow calli, oblong straight lateral lobes 8-12 mm long, 3-5 mm wide and, deeply bilobed midlobe with widely divergent, oblong, falcate lobes, 7-10 mm long, 3-7 mm across, widest distally, the apex obliquely truncate.

Similar species: Erroneously linked with *C. triplicata*, which has distinctly ovate-elliptic labellum lateral lobes and a shorter spur. Also with *C. furcata* which has obovate lateral lobes, a shortly bifid midlobe with toothed apical margins and a pubescent spur with a bifid apex.

Conservation status: Widely distributed, common and well conserved.

Etymology: The Latin *australasicus*, from Australia.

Crepidium Blume

The species, recorded from Australia as *Malaxis acuminata* D.Don (Hill & Blaxell 1985), has been found to be distinct and is described here as new.

Taxonomy

4. *Crepidium fontinale* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *C. acuminato* (D.Don) D.L.Szlachetko, sed floribus viridis ad galbinos; labello late elliptico, calcaribus brevibus, latis, deltatis, longitudine latitudinem circa aequante; lacuna calli depressissimo, longitudine latitudinem circa aequante; apice labelli furcato, lobis acuminatis, differt.

Type: Northern Territory. Black Jungle, 25 Feb. 1982, *G. Wightman 339* & *C. Dunlop* (holo DNA 21778; iso BRI, NSW).

Description: Terrestrial *herb* forming small clumps. *Stems* erect, ovate-ellipsoid, 40–60 mm long, 8–10 mm wide, fleshy. *Leaves* 4–6, suberect to porrect; petiole 8–15 mm long, channelled; lamina broadly ovate, dark green, 100–150 mm long, 30–50 mm wide, with 5–7 prominent veins; margins undulate. *Raceme* 100–300 mm tall, multiflowered; peduncle green, brittle, winged. *Flowers* crowded, porrect to semi-nodding, 8–10 mm long, 9–11 mm wide, opening green, ageing to greenish-yellow. *Dorsal sepal* deflexed or recurved, oblong, 5–6 mm long, c. 2 mm wide. *Lateral sepals* divergent, ovate, 4–5 mm long, 2.5–3 mm wide, obtuse. *Petals* spreading to recurved, linear, 5–6 mm long, 1–1.3 mm wide; margins recurved. *Labellum* porrect, broadly elliptical to cordate, 6–7.5 mm long, 6–8 mm wide, 3-lobed; lateral lobes c. 3 mm long, auriculate, deltate, extending behind the column; midlobe deltate; margins entire or irregular; apex bifid, sometimes retrorsely folded. *Callus* pit deeply sunken, c. 1.5 mm long, surrounded by a thickened papillate ridge. *Column* straight, c. 1.5 mm long, c. 1.5 mm wide. *Column wings* broad, obtuse, extending above the anther. *Capsules* winged. **Fig. 1.8.**

Distribution and ecology: Restricted to northern parts of the Northern Territory, including Bathurst Island. It grows in wet black loam, peat or sandy soil in seepage areas and springs that arise in dense patches of monsoonal rainforest. Occasionally it grows in patches of leaf litter that accumulate in low-lying sites in woodland. Alt. 20–100 m. Flowering: January and February.

Recognition: This species has been recorded from Australia as *Malaxis acuminata* D. Don (Hill & Blaxell 1985) (recently as *Crepidium acuminatum* (D. Don) D. L. Szelachetko), the type of which is from Nepal. Material of *M. acuminata sens. strict.*, obtained for us from northern India by Ish Sharma, was shown by him to be genetically distinct from Australian material when examined by molecular sequence data using the internal transcribed spacer (ITS) region of the 18–26S nuclear ribosomal DNA. Morphologically the Australian species differs from *M. acuminata* by its consistently greenish-yellow flowers (opening green) with a broadly elliptic to cordate labellum which has short, broad deltate labellum spurs which are about as long as wide, a deeply sunken callus pit about as long as wide and surrounded by a papillate ridge and, acuminate lobes subtending the notched labellum apex. Seidenfaden (1978) discusses in detail the synonyms associated with *M. acuminata* complete with floral illustrations from five types. According to him *M. acuminata* is a widespread species distributed from Nepal to the Philippines, with 16 nomenclatural synonyms. We find Seidenfaden's taxonomic opinion on this species

difficult to reconcile with results of field studies in Australia, New Guinea and New Caledonia, which show that these orchids are far more highly evolved than we are lead to believe by Seidenfaden. Such a generalised approach is more a matter of convenience and does not take into account the true biodiversity involved within *M. acuminata sens. lat.*, provides no phylogenetic information on the group and has significant conservation implications for the various taxa that are synonymised by such a conservative treatment. For example, specimens from Java attributed to *M. acuminata* (as illustrated by Comber 1990) are very distinctive and readily distinguished by a narrowly elliptical labellum with amplexicaul labellum spurs.

Conservation status: Relatively widespread and conserved in National Parks and other reserves.

Etymology: The Latin *fontinalis*, spring, in reference to the preferred habitat of this species.

Other specimens: NORTHERN TERRITORY: Black Jungle, 4 Dec. 1980, *C. Dunlop 5626* (DNA); Apsley Strait, Bathurst Island, 9 Nov. 1983, *G. Wightman 934* & *C. Dunlop* (DNA); Black Jungle Swamp, 4 Feb. 1984, *D. L. Jones 1333* (BRI, CANB, DNA); Black Jungle, 10 May 1984, *G. Wightman 1157* (BRI, CANB, DNA, MEL, QRS); cultivated ex Black Jungle, 22 Jan. 1985, *D. L. Jones 1770* & *C. Dunlop* (DNA); Black Jungle, 4 Nov. 1985, *Clark 63* (DNA); Mistake Creek, Wildman River Station, 13 May 1987, *J. Russell-Smith 2293* & *Lucas* (DNA); Jabiru Jungle, Leichhardt Creek, Wildman River, 15 May 1987, *J. Russell-Smith 2346* & *Lucas* (DNA); source of Hayward Creek, 23 Feb. 1989, *J. Russell-Smith 7239* (DNA); Bloomfield area, K3FS site 19, 20 April 1990, *K. Brennan 21* & *Orr* (DNA); c. 4.6 km S of Bloomfield Springs, 26 April 1990, *A. Snee* & *K. Brennan 2922* (CANB); Port Stuart, 15 June 1991, *Brock 792* (DNA); plot 80, 19 Feb. 1995, *J. Russell-Smith 9554* (DNA); Nitmiluk National Park, Douglas Springs area, 22 May 2001, *I. Cowie* & *Dixon 9230* (DNA).

Oberonia Lindley

Electron microscopy examination of *Oberonia* flowers from various localities in eastern Australia have identified the presence of 3 new species that are described here.

Taxonomy

5. *Oberonia crateriformis* D. L. Jones & M. A. Clem., *sp. nov.*; affinis *O. palmicolae* F. Muell., sed petalis ovovato-ellipticis; lobis lateralibus oblongo-cuneato; lobis inter laterales et medilobem late hianti; medilobo obtusato; callo depresso profunde et crateriformi, differt.

Type: Cultivated at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 20 April 1994, *D. L. Jones 19353* (holo

CANB). Provenance: plant originally collected from Crediton State Forest, Eungella, Queensland, 14 June 1993, *D.L.Jones 11560*, *C.H.Broers & S.Pearson*.

Description: Erect to porrect, clumping *epiphyte*. *Leaves* 4-6 per stem, ensiform, 3-6 cm long, 5-8 mm wide, acute, bright green. *Racemes* 6-15 cm long, arcuate to pendulous. *Peduncle* 2-5 cm long. *Rachis* longitudinally ridged. *Fertile bracts* spreading, narrowly subulate, c. 1.5 mm long, c. 0.5 mm wide, long-acuminate. *Pedicel* and *ovary* c. 1.5 mm long. *Flowers* c. 1.7 mm long, c. 1.5 mm wide, in verticels of 8-10 flowers, c. 1-2 mm apart, wholly pale red to brownish-red. *Dorsal sepal* antrorse, elliptical-obovate, c. 0.7 mm long, c. 0.5 mm wide, entire, obtuse. *Lateral sepals* strongly reflexed against the ovary, ovate, c. 0.7 mm long, c. 0.6 mm wide, entire, flat or concave, subobtusely. *Petals* antrorse, appressed to the dorsal sepal, obovate to elliptic, c. 0.7 mm long, c. 0.5 mm wide, flat, margins irregular. *Labellum* retrorse, broadly ovate in outline, 3-lobed, c. 0.8 mm long, c. 0.9 mm wide at the lateral lobes, a wide gap between the lateral lobes and the midlobe; lateral lobes cuneate, c. 0.4 mm long, c. 0.4 mm wide, held flat, margins irregularly lobed; midlobe obcuneate, c. 0.5 mm long, c. 0.6 mm wide, margins entire or slightly irregular. *Callus* a broad, sunken, elliptical crater. *Column* porrect from the end of the ovary, cylindrical-globose, c. 0.4 mm long, c. 0.4 mm wide; column wings broad, extending above the rostellum. *Stigma* orbicular, saccate. *Rostellum* retuse. *Pollinia* oblate. **Figs 1.9, 1.10.**

Distribution and ecology: Occurs in north-eastern Queensland but exact range uncertain due to confusion with *O. rimachila*. It appears to be widely distributed and is known to occur from various localities between Mt Misery and Eungella. It grows on trees and rocks in rainforest. Alt. 200-1000 m. Flowering: February to June.

Recognition: This species can be recognised by its obovate-elliptic petals, oblong-cuneate lateral lobes, broadly obcuneate midlobe and the labellum callus consisting of a broad, deeply sunken crater-like structure. See also notes under *O. rimachila*.

Conservation status: Widespread, locally common and well conserved.

Etymology: The Latin *crateriformis*, bowl-shaped, in reference to the shape of the callus pit.

Specimens Examined: QUEENSLAND: Massey Ck, Evelyn Tableland, 6 Jan. 1989, *L.Lawler 38* (BRI!, CBG!); the species is also known from Shiptons Flat, Mt Misery, Herberton Range and Eungella.

6. *Oberonia flavescens* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *O. complanata* (A.Cunn.) M.A.Clem. & D.L.Jones, sed floribus flavicantibus; labello triangularibus et latiore quam longo; lobis lateralibus extantioribus; lobulis marginalis labelli paucioribus (8-12) et majoribus, differt.

Type: Cultivated at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 26 Aug. 2005, *D.L.Jones 19354* (holo CANB). Provenance: plant originally collected from Pandanus Creek, McIlwraith Range, Queensland, 23 May 2003, *B.Gray 8640* & *D.L.Jones*.

Description: Erect to porrect *epiphyte* forming large clumps. *Leaves* 4-6 per stem, broadly ensiform, 7-15 cm long, 1.5-2 cm wide, falcate, bright green, acute. *Racemes* 10-20 cm long, arcuate, densely flowered. *Peduncle* 4-6 cm long, 3-3.5 mm wide, ellipsoid in cross-section. *Rachis* 3-4 mm wide, fleshy, ridged, the ridges formed from the decurrent bases of the pedicels. *Fertile bracts* spreading, ovate, 2-2.5 mm long, c. 1.3 mm wide, margins erose. *Pedicel* and *ovary* merging, c. 2.5 mm long. *Flowers* c. 2.3 mm long, c. 1.5 mm wide, in verticels of 6-8 flowers, 2-3 mm apart; sepals and petals whitish, labellum yellowish. *Dorsal sepal* antrorse or reflexed against the ovary, ovate-deltate, c. 1.2 mm long, c. 1 mm wide, entire, obtuse. *Lateral sepals* strongly reflexed against the ovary, ovate, c. 1.2 mm long, c. 0.8 mm wide, asymmetric, entire, flat, apiculate. *Petals* antrorse or reflexed against the ovary, ovate-lanceolate, c. 1.2 mm long, c. 0.5 mm wide, flat, margins erose. *Labellum* retrorse, broadly deltate in outline, obscurely 3-lobed, 1.2-1.4 mm long, 1.4-1.6 mm wide across the lateral lobes, shallowly concave; margins deeply erose-fimbriate, with 8-12 echinate spreading lobules to 0.3 mm long; apex bilobed. *Callus* a broad, sunken pit. *Column* porrect from the end of the ovary, cylindrical-globose, c. 0.7 mm long, c. 0.6 mm wide; column wings broad, extending above the rostellum. *Stigma* orbicular, saccate. *Rostellum* retuse. *Pollinia* oblate. *Capsules* projecting, obovoid, 3-4 mm long, 1.6-1.8 mm wide. **Fig. 1.12.**

Distribution and ecology: Occurs in north-eastern and central-eastern Qld, more or less between the Iron Range and Clarke Range near Eungella. This species grows on trees in rainforest, rock outcrops and gorges in open forest, coastal scrub and mangroves. Alt. 0-1000 m. Flowering: February to July.

Recognition: *Oberonia flavescens* is similar to *O. complanata* (fig. 1.11) but can be distinguished by its uniform yellowish-green flowers, a triangular labellum that is wider than long and which has more pronounced lateral lobes and fewer (8-12) but larger and distinctly echinate marginal lobules.

Conservation status: Widely distributed, locally common and conserved in National Parks and reserves.

Etymology: The Latin *flavescens*, yellowish, pale yellow, in reference to the flower colour.

Specimens Examined: Tozer Range, 4 July 1994, *P.I. Forster 15469* (BRI!).

7. *Oberonia rimachila* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *O. palmicola* F.Muell., sed floribus majoribus; lobis lateralibus late ovato-cuneato; medilobo transverse elliptico; callo rima transversa, differt.

Type: Queensland. Cook District: Tozer Range, ½ mile east of Mt Tozer, 1 July 1948, *Brass 19394* (holo CANB 186351; iso BRI 80746).

Description: Erect to porrect, clumping epiphyte. *Leaves* 5-7 per stem, ensiform, 3-7 cm long, 5-8 mm wide, acute, green to reddish green. *Racemes* 14 cm long, arcuate to pendulous. *Peduncle* 2.5-5 cm long. *Rachis* longitudinally ridged. *Fertile bracts* spreading, narrowly subulate, c. 1.6 mm long, c. 0.5 mm wide, long-acuminate. *Pedice*l and *ovary* merging, c. 1.5 mm long. *Flowers* c. 1.6 mm long, c. 1.4 mm wide, in verticels of 8-10 flowers, 2-3 mm apart; sepals and petals transparent, pinkish, labellum red. *Dorsal sepal* antrorse, elliptical-ovate c. 0.8 mm long, c. 0.6 mm wide, entire, obtuse. *Lateral sepals* strongly reflexed against the ovary, ovate, c. 0.8 mm long, c. 0.75 mm wide, entire, flat, apiculate. *Petals* appressed to the dorsal sepal, antrorse, elliptical-obovate, c. 0.8 mm long, c. 0.5 mm wide, flat to slightly concave, margins irregular. *Labellum* retrorse, broadly ovate in outline, 3-lobed, a narrow gap between the lateral lobes and the midlobe, c. 1 mm long, c. 1 mm wide at the lateral lobes; lateral lobes ovate-cuneate, c. 0.3 mm long, c. 0.4 mm wide, held flat, margins slightly irregular; midlobe broadly ovate to transversely ovate or transversely elliptical, c. 0.5 mm long, c. 0.7 mm wide, flat, margins entire or slightly irregular. *Callus* a very narrow slit. *Column* porrect from the end of the ovary, cylindrical-globose, c. 0.5 mm long, c. 0.5 mm wide; column wings broad, extending above the rostellum. *Stigma* orbicular, saccate. *Rostellum* retuse. *Pollinia* oblate. **Figs 1.13, 1.14.**

Distribution and ecology: Occurs in north-eastern Queensland, but the exact range uncertain as the general plant habit and floral characteristics are similar to *O. crateriformis*. Its distribution is more or less between the Tozer Range and Palmerston. It grows on trees and rocks in rainforest. Alt. 100 - 500 m. Flowering: February to June.

Recognition: This species can be recognised by its broadly ovate-cuneate lateral lobes, broadly to transversely ovate or transversely elliptical

midlobe and the labellum callus consisting of a narrow transverse slit.

Similar species: Plants of *O. rimachila*, *O. crateriformis* and *O. palmicola* have a similar general appearance and are difficult to tell apart. *Oberonia palmicola* has smaller flowers than the others and *O. crateriformis* and *O. rimachila* are most reliably separated by the shape of the callus pit which is not always easy to see.

Conservation status: Widespread, locally common and well conserved.

Etymology: Derived from *rima*, slit and *cheilos*, lip, in reference to the shape of the callus pit.

Other specimens: QUEENSLAND. this species is also known from Herberton Range, Wild River Dam, Palmerston, Russell River and Kirrima Range.

Oxysepala Wight

A new taxon from coastal habitats in north-eastern Queensland is described here at subspecies rank.

Taxonomy

8. *Oxysepala schilleriana* subsp. *maritima* D.L.Jones & M.A.Clem., *subsp. nov.*; affinis *O. schillerianae* (Reichb.f.) D.L.Jones & M.A.Clem. subsp. *schillerianae*, sed foliis minoribus et textura tenuioribus; floribus minoribus; labello minus hirsuto, differt.

Type: Queensland. Cook District: Russell River road, E of Bellenden Ker community, 21 May 1989, *D.L.Jones 4180* & *M.A.Clements* (holo CANB).

Description: *Stems* creeping or somewhat pendulous, c. 3 mm thick, covered with brown scarious bracts. *Pseudobulbs* crowded in the basal parts of the stems, 3-5 mm apart on the distal parts, ellipsoid, 4-6 mm long, 3-4 mm wide, partially covered with brown bracts. *Leaf* terminal on a pseudobulb, 25-50 mm long, 14-19 mm wide, dark green, somewhat fleshy, shallowly grooved, subacute to acute. *Flowers* arising singly from stem internodes; pedicel plus ovary c. 2-3 mm long; flowers c. 3.5 mm long, c. 3 mm wide, cream with reddish tips. *Sepals* c. 3.5 mm long, 0.7 mm wide, fused proximally. *Petals* ovate, c. 1 mm long, c. 0.7 mm wide, distal margins irregular. *Labellum* ovate-lanceolate, c. 1.8 mm long, c. 1 mm wide, brown, fleshy; margins with numerous hairs to 0.3 mm long; apex broadly obtuse. *Column* c. 1 mm long, 0.6 mm wide. **Fig. 1.15.**

Distribution and ecology: Restricted to coastal districts of north-eastern Queensland more or less between Cairns and Hinchinbrook Island. This subspecies, which can be locally common, grows

on trees in dense swamp forest, on trees lining small coastal streams and on mangroves. Alt. 0-20 m. Flowering: April to August.

Recognition: This taxon has obvious affinities with *O. schilleriana* but the plants are generally smaller and tend to branch more freely than in *O. schilleriana* subsp. *schilleriana* and additionally have thinner-textured leaves, smaller flowers (3.5 x 3 mm versus 6.5 x 6 mm), smaller and a more distinctly ovate-lanceolate labellum (1.8 x 1 mm versus 3 x 1.3 mm) and more hairs on the labellum margins.

Notes: This taxon has been linked with *Bulbophyllum intermedium* F.M.Bailey which was grown at Bowen Park in Brisbane and reputed to be collected from Hinchinbrook Island in north-eastern Queensland. Examination of the meagre type specimen of *B. intermedium* shows that it is undoubtedly identical with *Oxysepala shepherdii* (F.Muell.) D.L.Jones & M.A.Clem. (*Bulbophyllum shepherdii* (F.Muell.) F.Muell.) and as with some other Bowen Park specimens cited by Bailey, the locality given as the place of collection (Hinchinbrook Island) is most likely incorrect.

Conservation status: Relatively widespread, locally common and conserved in National Parks.

Etymology: The Latin *maritimus*, growing by the sea.

Rhinerrhizopsis Ormerod

Ormerod (2001) when erecting *Rhinerrhizopsis*, treated the genus conservatively making a new combination for the type, *R. moorei*, while noting that at least one other taxon ("*beccarii*") might also be worthy of recognition. Reichenbach's drawing of *Thrixspermum moorei* is clear with its major diagnostic feature, the narrow scimitar-like labellum lateral lobes, clearly delineated. Collections of *Rhinerrhizopsis* at CANB, including spirit-preserved flowers, show that the genus consists of at least 4 taxa. New combinations are made for two New Guinea species and the Australian species is described as new.

Taxonomy

9. *Rhinerrhizopsis moorei* (Rchb.f.) Ormerod, *Oasis* 1: 3 (2001).

Basionym: *Thrixspermum moorei* Rchb.f., *Gard. Chron.* (n.s.), 13: 104 (1880); *Sarcophilus moorei* (Rchb.f.) Constantin, *Orch. Cult.* 40 (1911); Rchb.f., *Gard. Chron.* n.s. 13: 104 (1880), *pro. syn.*; Schltr., *Repert. Spec. Nov. Regni. Veg., Beih.* 1: 967 (1913); *Pteroceras moorei* (Rchb.f.) Bakh.f., *Blumea* 12: 69 (1963); *Rhinerrhiza moorei* (Rchb.f.) M.A.Clem., B.J.Wallace & D.L.Jones, *Austral. Orch. Res.* 1: 128-129 (1989).

Type: cult. London ex 'New Briton', *C.Moore s.n.* (holo W!).

Distribution: Described from material collected in New Britain, apparently on the Gazelle Peninsula on the northeastern side (Ormerod 2001) and also occurring on New Hanover.

Recognition: This species is characterised by large flowers (20-23 x 23-27 mm), elliptic to narrowly elliptic lateral sepals (11-13 x 4-5 mm) and petals (9-10 x 3-3.5 mm) with a long basal claw, labellum c. 5 x 2 mm with strongly curved, scimitar-like, acute to acuminate lateral lobes 3-3.5 x 0.8 mm and a vestigial midlobe.

10. *Rhinerrhizopsis beccarii* (Rchb.f.) D.L.Jones & M.A.Clem., *comb. nov.*

Basionym: *Thrixspermum beccarii* Rchb.f., *Bot. Centralbl.* 28: 343 (1886); *Sarcophilus beccarii* (Rchb.f.) F.Muell., *Descr. Notes Papuan Pl.* 2, 9: 66 (1890). Type: Aru Islands, May 1872, *Beccari s.n.* (holo FI!).

Sarcophilus englerianus Krzl., in Schum. & Laut., *Fl. Deutsch. Schutzgeb. Suds.* 252 (1901). Types: E New Guinea, Bismark Range, *Lauterbach* 2477 (syn B†, isosyn WRS!); Bismark Plateau, *Lauterbach* 3355 (syn B†).

Sarcophilus solomonensis Rolfe, *Bull. Misc. Inf. Kew* 72 (1908). Type: Solomon Islands, Tulagi, 17 June 1907, *Woodford* 6 (holo K!).

Distribution: Described from the Aru Islands but widespread in New Guinea, New Ireland, Manus Island and also in the Solomon Islands.

Recognition: This species is characterised by relatively large flowers (16-20 x 15-19 mm), elliptic to obovate lateral sepals (9-11 x 4-5 mm) and petals (7-9 x 3-4 mm) with a very short basal claw, labellum c. 6.5 x 2.5 mm with strongly curved, broadly oblong-quadrate obtuse lateral lobes 3.5-4 x 2-2.5 mm and a vestigial midlobe.

11. *Rhinerrhizopsis ramuana* (Krzl.) D.L.Jones & M.A.Clem., *comb. nov.*

Basionym: *Renanthera ramuana* Krzl., in K.Schum. & Laut., *Fl. Schutzgeb. Sudsee, Nachtr.* 252 (1901); *Sarcophilus ramuanus* (Krzl.) Schltr., in K.Schum. & Laut., *Nachtr. Fl. Schutzgeb. Sudsee*, 232 (1905). Type: New Guinea, Ramu River, *Tappenbeck* 139 (holo B†).

Illustration: As *Sarcophilus ramuanus* in *Nova Guinea* viii (part 1): 120, t.xli, 135 (1909).

Distribution: Described from the Ramu River valley south-west of Madang, New Guinea and relatively common in the Madang Province.

Recognition: This species is characterised by relatively small flowers (12-18 x 12-19 mm), obovate/spathulate lateral sepals (5-10 x 3.5-4.5

mm) and petals (5-8 x 2.5-3.5 mm) with a short basal claw, labellum c. 5.5 x 2 mm with shallowly curved, broadly oblong-quadrate irregularly denticulate lateral lobes 3-3.5 x 2-2.3 mm and a short projecting midlobe.

12. *Rhinerrhizopsis matutina* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *R. moorei* (Rchb.f.) Ormerod, sed floribus minoribus (14-17 mm latis); sepalis et petalis breviter unguiculatis, ovato-orbicularibus; lobis lateralibus labelli late oblongis, apice denticulato et medilobo procurenti, differt.

Type: Flowered in cultivation at Australian National Botanic Gardens, Canberra, Australian Capital Territory, 5 Sept. 1989, *D.L.Jones 4964* (holo CBG 8913496). Provenance: plant originally collected from 2 km S of Capsize Creek crossing on road running S from Iron Range Airfield, Queensland, 18 Sept. 1976, *J.W.Wrigley 428*.

Description: *Epiphytic herb* usually consisting of a single semi-pendulous main growth. *Roots* spreading, thin, smooth. *Stems* 5-12 cm long, fibrous. *Leaves* 3-8, porrect to semi-drooping, oblong, 15-30 cm x 5-6 cm, thin-textured, coriaceous, usually heavily suffused with pink to mauve, apex unequally emarginate. *Racemes* pendulous, 30-45 cm long. Peduncle much shorter than the rhachis. *Flowers* opening in spasms, 10-50, cupulate, 12-15 mm x 12-15 mm, short-lived, tawny yellow heavily spotted and blotched with brown. *Sepals* and *petals* broadly obovate-spathulate, base shortly clawed. *Dorsal sepal* 8-11 mm x 4-5 mm. *Lateral sepals* 8-11 mm x 4-5 mm. *Petals* 6-7 mm x 3-4 mm. *Labellum* white or yellowish, fleshy, 4.5-5.5 mm x 4-5 mm; lateral lobes oblong, about 3.5 mm x 1.5 mm, incurved, with a basal swelling, apex irregularly denticulate; midlobe projecting, very short, obtuse, minutely papillate; spur saccate, c. 1.5 mm long. *Column* porrect from the end of the ovary, c. 2 x 1.4 mm. *Column foot* at right angles to the column, c. 2.5 mm x 0.5 mm, nearly straight. *Anther* ovate, c. 1.3 mm x 0.8 mm. *Stigma* concave, ovate-elliptic, c. 1 mm x 1 mm. *Capsules* not seen.

Distribution and ecology: Occurs in north-eastern Queensland between the Iron Range and the McIlwraith Range. This species, which can be prominent on the trunks and lower branches of trees along rainforest margins, also occurs in streamside vegetation and on trees in isolated patches of rainforest. Alt. 200-600 m. Flowering: July to September.

Recognition: This species, which has been generally included with *R. moorei*, can be readily distinguished from that species by its smaller flowers, broadly obovate sepals and petals with a short basal claw, oblong lateral lobes with an irregularly denticulate apex and short projecting midlobe. The Australian species is probably most

similar to *R. ramuana* which has broader lateral lobes and a longer spur with a narrow apex (compared with the saccate spur with a broadly rounded apex in the native species).

Notes: The flowers of *R. matutina* last less than a day. They open very early in the morning and are often finished by midday. Sections of flowers on the raceme open simultaneously in spasms and generally all plants in an area respond to a specific stimulus together and flower synchronously.

Conservation status: Locally common and well conserved in National Parks.

Etymology: The Latin *matutinus*, finishing before noon, in reference to the short-lived flowers.

Taxon inserta cedis: *Sarcochilus papuanus* Krzl., in K.Schum. & Laut., *Flora of Kaiser-Wilhelm Land* 34 (1889). Type: Pataikai Island near Hatzfeldhafen, Nov. 1886, *Hollrung 416* (holo B†).

Note: The generic placement and status of this species requires further clarification. It is unusual for its erect, few-flowered (12-15 flowers) inflorescence of similar length to the leaves and long-clawed lateral sepals that have an acute apex.

The *Tropilis aemula* Group

Tropilis aemula (R.Br.) Rafin. has been generally treated as a species widely distributed in eastern Australia ranging from the Atherton Tableland in north-eastern Queensland to near Bega in south-eastern New South Wales. Several variants have been recognised within the taxon, generally being distinguished by vegetative features rather than floral morphology, and usually treated as informal variants (see for example Dockrill 1969, 1992). We regard these taxa as distinct and five species related to *T. aemula* are described here as new.

Taxonomy

13. *Tropilis aemula* (R.Br.) Rafin.

Characterised by crowded small to large clumps; pseudobulbs mainly projecting from the host, dumpy or squat, oblong to ellipsoid, 5-18 cm long, 7-12 mm wide; leaves 2-4, thick, leathery, 20-50 mm long, 20-30 mm wide; racemes 30-60 mm long, 2-7-flowered; flowers 17-20 mm long, 20-25 mm wide, crystalline white, rarely pinkish; labellum 6-7 mm long, 5-6 mm wide, white with purplish markings; lateral lobes erect, purple, acute; midlobe ovate when flattened, decurved, cream to white, acute; callus with a prominent convolute yellow ridge.

Distribution and ecology: Widespread and common between the Calliope Range west of Bundaberg, Queensland, to Moruya in south-eastern New South Wales; 10-600 m alt. Flowering: August and September. It grows on the large older plants of ironbarked species of *Eucalyptus*, particularly *E. crebra* and *E. paniculata*, in open forest from the coast to the ranges. The plants generally grow in bright situations where they are exposed to sun for part of the day.

Notes: This species can be recognised by its short, thick, dumpy, pseudobulbs, 2-4 thick leaves per pseudobulb and crystalline white flowers with a pointed labellum apex.

14. *Tropilis angusta* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. aemulae* (R.Br.) Rafin., sed pseudobulbis tenuioribus (3-5 mm diam.), cylindraceutis; foliis per pseudobulbum 1-2, textura tenuioribus; laminis anguste ovato-lanceolatis ad anguste ellipticos, relative angustis (15-22 mm latis); racemis 5-10-floris, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 12 Sept. 2005, *D.L.Jones 19355* (holo CANB 670974). Provenance: plant originally collected from the Blackbutt Plateau, near Huonbrook, Upper Wilsons Creek, New South Wales, May 2005, *B. Dalyell (ORG 4855)*.

Description: *Epiphyte* forming relatively large clumps. *Pseudobulbs* mainly projecting from the host, 4-18 cm long, 3-5 mm wide, consisting of 3-5 nodes, mainly dark reddish brown, ribbed, new growths covered with prominent white sheaths; base swollen then with a narrow "neck" 3-5 mm long, 2-2.5 mm wide, expanding into the main part of the pseudobulb which is narrowly cylindrical, apex often thickened, appearing truncate on leafless pseudobulbs, with a thick dense tuft of bracts. *Leaves* terminal, 1-2 per pseudobulb, narrowly ovate-lanceolate to narrowly elliptic, 40-60 mm long, 15-22 mm wide, dark green adaxially, green abaxially, thin-textured; apex acute to unequally emarginate. *Racemes* 40-80 mm long, 5-10-flowered. *Sterile bracts* 3-4, tubular, imbricate, restricted to the base, lowest bract ribbed. *Fertile bracts* subulate, 3-4 mm long, appressed to the base of the pedicel. *Flowers* when flattened, 32-45 mm long, 25-38 mm across, white, fragrant. *Perianth segments* spreading, thin-textured. *Dorsal sepal* erect, narrowly oblong-tapered, 19-30 mm long, 2.5-3.5 mm wide, subacute. *Lateral sepals* divergent, narrowly oblong-tapered, 20-25 mm long, 2.5-3 mm wide, broadest at the base (4-5 mm wide), subacute. *Petals* porrect to divergent, narrowly linear, 20-30 mm long, 1-1.5 mm wide, acute to acuminate. *Labellum* curved in a semicircle, when flattened 5-6 mm long, 7-7.5 mm wide, ventral surface densely covered with short thickish papillae, 3-lobed; lateral lobes erect and incurved close to the column, purple, c. 3 mm wide,

outer margins curved; midlobe recurved, broadly ovate-oblong when flattened, acute. *Callus* consisting of 3 yellowish-green ridges extending onto the base of the midlobe, the central ridge strongly convolute and extending nearly to the labellum apex. *Column* porrect from the end of the ovary, mostly reddish, c. 2 mm long, c. 1.3 mm wide, with short apical wings. *Column* foot c. 3 mm long, curved. *Anther* c. 1 mm long, c. 0.8 mm wide. *Stigma* c. 0.6 mm across. *Pollinarium* c. 0.8 mm long, c. 0.6 mm wide, orange.

Distribution and ecology: Occurs in south-eastern Queensland and north-eastern New South Wales more or less between the Lamington Plateau and the Whian Whian Range. It grows nearly exclusively on large old trees of *Allocasuarina torulosa* in moist forests, occasionally on *Callicoma serratifolia*. Altitude: 600-900 m alt. Flowering: September and October.

Recognition: Similar to *T. aemula* but with relatively long (to 18 cm), thinner (3-5 mm wide), cylindrical pseudobulbs, 1-2 relatively narrow (15-22 mm wide), narrowly ovate-lanceolate to narrowly elliptic, thin-textured leaves per pseudobulb and 5-10-flowered racemes.

Notes: *Tropilis crassa* and *T. angusta* both grow as epiphytes on *Allocasuarina torulosa* but the two species are separated by a geographical distance of about 1200 km and they can be readily distinguished from each other by the thickness and shape of the pseudobulbs.

Conservation status: Restricted but locally common and conserved in National Parks.

Etymology: The Latin *angustus* narrow, applied in reference to the thinner pseudobulbs relative to those of *T. crassa*, the other species which grows on *Allocasuarina torulosa*.

15. *Tropilis crassa* D.L.Jones, B.Gray & M.A.Clem., *sp. nov.*; affinis *T. aemulae* (R.Br.) Rafin., sed pseudobulbis cylindraceutis; foliis per pseudobulbum 1-3, textura tenuioribus, saepe signis rubris; racemis usque ad 10 flores, differt.

Type: Queensland. Cook District: SFR 194, Western, Herberton Range, 30 July 2003, *B.Gray 8677* & *D.L.Jones* (holo QRS; iso CANB).

Description: *Epiphyte* forming dense clumps. *Pseudobulbs* mainly projecting from the host, 30-120 mm long, 5-8 mm wide, cylindrical throughout, straight, dark reddish brown. *Leaves* 1-3 per pseudobulb, spreading widely, oblong to ovate, 30-60 mm long, 15-30 mm wide, moderately thick, leathery, dark green, often with red margins, often purplish beneath. *Racemes* 30-65 mm long, 3-10-flowered.

Flowers 22-32 mm long, 20-30 mm wide, white. *Sepals and petals* narrow, widely spreading. *Dorsal sepal* 16-22 mm long, 2.5-3 mm wide. *Lateral sepals* 15-20 mm long, 2.5-3 mm wide. *Petals* 15-22 mm long, 1-1.5 mm wide. *Labellum* curved, 6-7 mm long, 5.5-6 mm wide, white with purplish markings; lateral lobes erect, pointed; midlobe decurved, pointed. *Callus* with a prominent yellow convolute ridge. *Column* correct from the end of the ovary, mostly reddish, c. 2 mm long, c. 1.3 mm wide, with short apical wings. *Column foot* c. 3 mm long, curved. *Anther* c. 1 mm long, c. 0.8 mm wide. *Stigma* c. 0.6 mm across. *Pollinarium* c. 0.8 mm long, c. 0.6 mm wide, orange.

Distribution and ecology: Apparently restricted to the Atherton Tableland in north-eastern Queensland where it grows on large old trees of Forest Oak (*Allocasuarina torulosa*) in moist open forest; 900-1200 m alt. The plants grow on the upper trunks and larger branches of trees in shady situations. Flowering: July to September.

Recognition: Similar to *T. aemula* but distinguished by its longer cylindrical pseudobulbs, 1-3, slightly thinner leaves on each pseudobulb and racemes with up to 10 flowers. Its leaves often have red margins and can be purplish beneath.

Conservation status: Of restricted distribution and apparently not conserved; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *crassus* thick, applied in reference to the thick pseudobulbs relative to those of *T. angusta*, the other species which grows on *Allocasuarina torulosa*.

16. *Tropilis eburnea* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. aemulae* (R.Br.) Raf., sed pseudobulbis cylindricis anguste; foliis 1-2 per pseudobulbum, textu tenuiore; floribus pallido viridulo-cremo, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 23 Aug. 2005, *D.L.Jones 19356* (holo CANB 670975; iso BRI, NSW). Provenance: plants originally collected from Bugong National Park, Bugong Creek crossing on Bugong Road, New South Wales, 26 May 2005, *D.L.Jones 19229* & *M.A.Clements*.

Description: *Epiphyte* forming small clumps. *Pseudobulbs* mainly appressed to the host, 30-120 mm long, 4-6 mm wide, cylindrical, straight, dark reddish green. *Leaves* 1-2 per pseudobulb, 30-60 mm long, 15-30 mm wide, moderately thick, leathery, dark green. *Racemes* 30-50 mm long, 2-7-flowered. *Flowers* 17-22 mm long, 16-22 mm wide, pale greenish cream. *Sepals and petals* narrow, widely spreading. *Dorsal sepal* 15-20 mm long, 2.5-3 mm wide. *Lateral sepals* 14-18 mm

long, 2.5-3 mm wide. *Petals* 14-17 mm long, 1-1.3 mm wide. *Labellum* 6-7 mm long, 6.5-7 mm wide, cream with purplish markings; lateral lobes erect, pointed; midlobe decurved, pointed. *Callus* with a prominent yellow convolute ridge. *Column* correct from the end of the ovary, mostly reddish, c. 1.8 mm long, c. 1.3 mm wide, with short apical wings. *Column foot* c. 2.7 mm long, curved. *Anther* c. 1 mm long, c. 0.8 mm wide. *Stigma* c. 0.6 mm across. *Pollinarium* c. 0.8 mm long, c. 0.6 mm wide, orange.

Distribution and ecology: Widespread but disjunct extending from Fraser Island in south-eastern Queensland to near Bega in south-eastern New South Wales; 10-800 m alt. This species, which is sometimes locally common, grows on trees and rocks in moist to wet forests and sheltered gullies; it grows on a range trees in rainforest well in from the forest margins, often in very shady conditions. Flowering: August to October.

Recognition: Similar to *T. aemula* but distinguished by its narrow, cylindrical pseudobulbs each with 1-2 relatively thin-textured leaves and pale greenish cream flowers.

Notes: This species is known by orchid growers as the "rainforest form" of *T. aemula*.

Conservation status: Widespread and well conserved.

Etymology: The Latin *eburneus*, ivory-coloured, white with a yellow tinge, in reference to the flower colour.

17. *Tropilis eungellensis* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. aemulae* (R.Br.) Raf., sed fasciculis relative parvis; pseudobulbis angustioribus; foliis 1-2 per pseudobulbum; floribus majoribus et medilobo labelli oblongo-ovato, apice late obtuso ad truncatum, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 18 Aug. 1993, *D.L.Jones 19357* (holo CANB 67096). Provenance: originally collected from Cockies Creek State Forest, SW of Eungella, Queensland, 18 June 1993, *D.L.Jones 11648*, *C.H.Broers* & *S. Pearson*.

Description: *Epiphyte* forming small clumps. *Pseudobulbs* mainly projecting from the host, 3-10 cm long, 4-8 mm wide, consisting of 3-4 nodes, mainly dark greenish brown, ribbed, new growths covered with prominent white sheaths; base swollen then with a narrow "neck" 5-7 mm long, 2-2.5 mm wide, expanding into the main part of the pseudobulb which is cylindrical, apex not narrowed, appearing truncate on leafless pseudobulbs. *Leaves* terminal, 1-3 per

pseudobulb, at about 45° to the pseudobulb, curved, ovate to elliptic, 30-50 mm long, 15-25 mm wide, shallowly concave, dark green adaxially, green abaxially, thick-textured; apex obtuse, apiculate. *Racemes* 30-50 mm long, 3-8-flowered. *Sterile bracts* 3-4, tubular, imbricate, restricted to the base, lowest bract ribbed. *Fertile bracts* subulate, 3-4 mm long, appressed to the base of the pedicel. *Flowers* 30-45 mm long, 20-30 mm wide, white, fragrant. *Perianth segments* spreading, thin textured. *Dorsal sepal* erect, narrowly oblong-tapered, 15-22 mm long, 2.5-3 mm wide, subacute. *Lateral sepals* divergent, narrowly oblong-tapered, 15-20 mm long, 2.5-3 mm wide, broadest at the base (4-5 mm wide), subacute. *Petals* porrect to divergent, linear, 17-25 mm long, 1-1.5 mm wide, acute. *Labellum* curved in a semicircle, 5-6 mm long, 6-7 mm wide, ventral surface densely covered with short thickish papillae, 3-lobed; lateral lobes erect and incurved close to the column, c. 3 mm wide, outer margins curved, mostly purplish; midlobe ovate-oblong when flattened, recurved, broadly obtuse to truncate. *Callus* consisting of 3 yellowish-green ridges extending onto the base of the midlobe, the central ridge strongly convolute and extending nearly to the labellum apex. *Column* porrect from the end of the ovary, mostly reddish, c. 2.2 mm long, c. 1.5 mm wide, with short apical wings. *Column foot* c. 3 mm long, curved. *Anther* c. 1 mm long, c. 0.8 mm wide. *Stigma* c. 0.6 mm across. *Pollinarium* c. 0.8 mm long, c. 0.6 mm wide, orange.

Distribution and ecology: This species appears to be restricted to the Clarke Range and Connors Range to the west of Mackay in north-eastern Queensland. It can be locally common and grows on a range of trees, particularly *Eucalyptus drepanophylla*, on slopes and gullies in open forest and along rainforest margins. Alt. 600-900 m. Flowering: August-September.

Recognition: Similar to *T. aemula* but characterised by relatively small clumps, narrow pseudobulbs to 10 cm long, large flowers and an oblong-ovate labellum midlobe with a broadly obtuse to truncate apex.

Conservation status: Relatively restricted, locally common and conserved in Eungella National Park.

Etymology: From Eungella, its main area of distribution.

18. *Tropilis radiata* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. aemulae* (R.Br.) Rafin., sed pseudobulbis cylindraceis, longioribus et angustioribus (20–50× 0.5–0.8 cm), in orbe radiato; foliis per pseudobulbum 1–3, textura moderate condensae; racemis longioribus (ad 10 cm) usque ad 11 flores, differt.

Type: Queensland. Moreton District: Advancetown, near Nerang, 26 Aug. 1991, J.

Roberts (D.L.Jones 7676) (holo CBG 9109886; iso BRI, NSW).

Description: *Epiphyte* forming large clumps. *Pseudobulbs* mainly appressed to the host, 50-200 mm long, 4-8 mm wide, cylindrical, straight, dark reddish green, radiating in a circle like the spokes of a wheel. *Leaves* 1-3 per pseudobulb, widely spreading, 20-50 mm long, 10-25 mm wide, moderately thick, leathery, dark green. *Racemes* 30-100 mm long, 5-11-flowered. *Flowers* 27-42 mm long, 25-40 mm wide, white. *Sepals and petals* narrow, widely spreading. *Dorsal sepal* 20-33 mm long, 2.5-3 mm wide. *Lateral sepals* 17-30 mm long, 2.5-3 mm wide. *Petals* 17-33 mm long, 1-2 mm wide. *Labellum* 6-7 mm long, 6-7 mm wide, cream to white with purplish markings; lateral lobes erect, pointed; midlobe decurved, apex truncate. *Callus* with a prominent yellow convolute ridge. *Column* porrect from the end of the ovary, mostly reddish, c. 1.8 mm long, c. 1.1 mm wide, with short apical wings. *Column foot* c. 2.8 mm long, curved. *Anther* c. 1 mm long, c. 0.8 mm wide. *Stigma* c. 0.6 mm across. *Pollinarium* c. 0.8 mm long, c. 0.6 mm wide, orange.

Distribution and ecology: Widespread and distributed from near Eungella in Queensland to near Wauchope in New South Wales; 100-1000 m alt. This species grows only on the scaly basal bark of Brush Box trees (*Lophostemon confertus*) in moist to wet forest, especially on the ranges. Flowering: August to October.

Recognition: Similar to *T. aemula* but distinguished by its much longer, narrow, cylindrical pseudobulbs that radiate in a circle like the spokes of a wheel, each pseudobulb with 1-3 moderately thick leaves and racemes to 100 mm long with white flowers, the labellum apex truncate.

Notes: This species is known by orchid growers as the "brushbox form" of *T. aemula*. Numerous large plants and the readily recognisable seedlings of this species have been observed growing on the trunks of *Lophostemon confertus* beside mature plants and seedlings of *T. aemula* on large *Eucalyptus crebra* in the Numinbah Valley of south-eastern Queensland, with no host overlap by either species (D.L.Jones pers. obs.).

Conservation status: Widespread, common and well conserved.

Etymology: The Latin *radiatus*, radiating, spreading like spokes from a common centre, in reference to the arrangement of the pseudobulbs.

ACKNOWLEDGEMENTS

We thank Laurie Adams for the Latin diagnoses, Catherine Jordan for chasing up obscure references and Karina Richards, Tara Hopley, Marion Garratt and Emma Clifton for technical assistance. Many people contributed specimens including David Banks, Jim Cootes, Clyde Dunlop, Bruce Gray, Mike Harrison, Len Lawler, Eric Leijalkis, Steve Pearson, John Riley, Lewis Roberts, Ron Savage, Ron Tunstall, Ben Wallace and Gerry Walsh.

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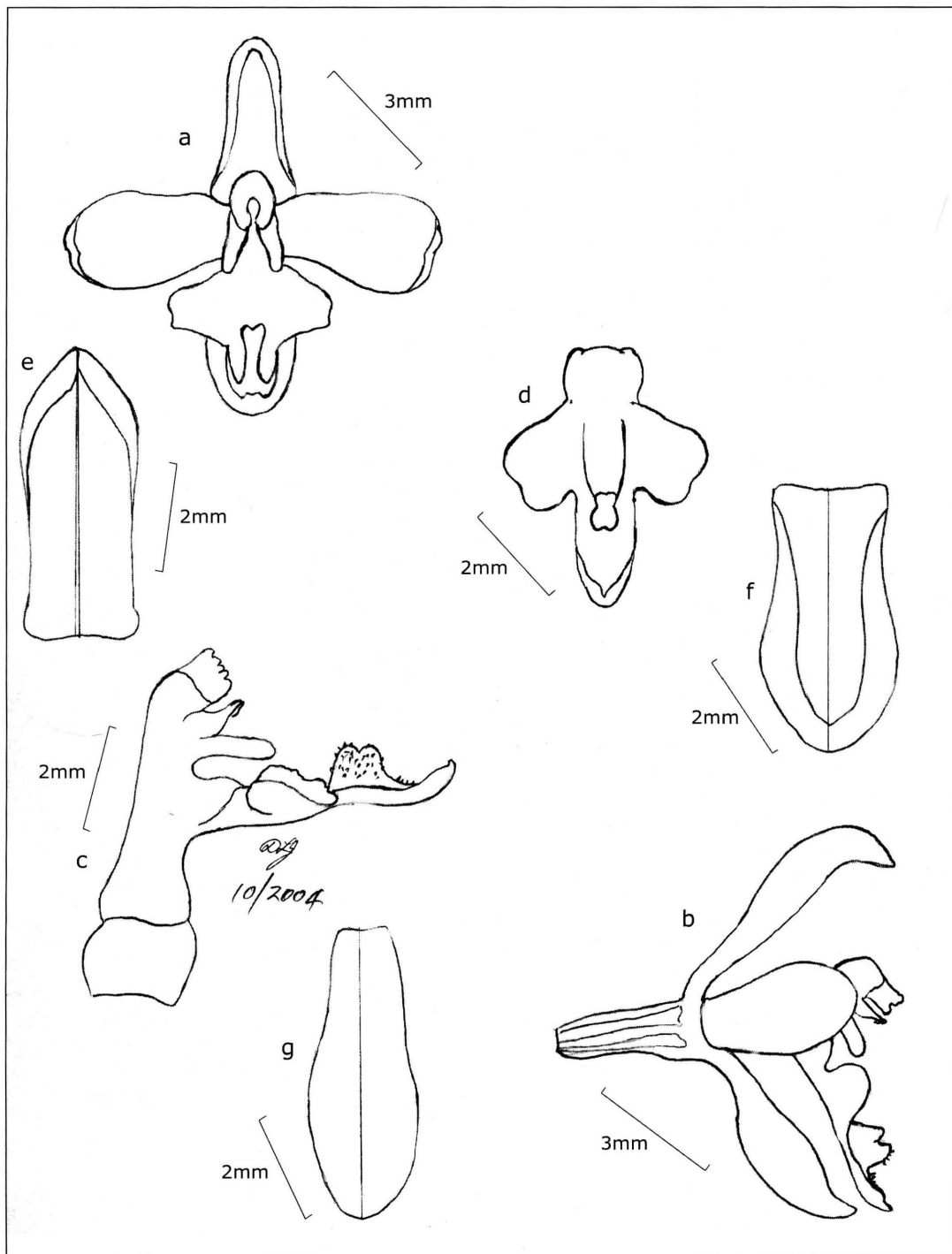


Figure 1.1. *Acriopsis emarginata*, Lower Daintree Valley, Queensland, B.Gray & R.Savage.
a. flower from front; b. flower from side; c. column and labellum from side; d. labellum from above,
flattened; e. dorsal sepal; f. synsepalum; g. petal. **Drawing 10/2004 by D.L.Jones.©**

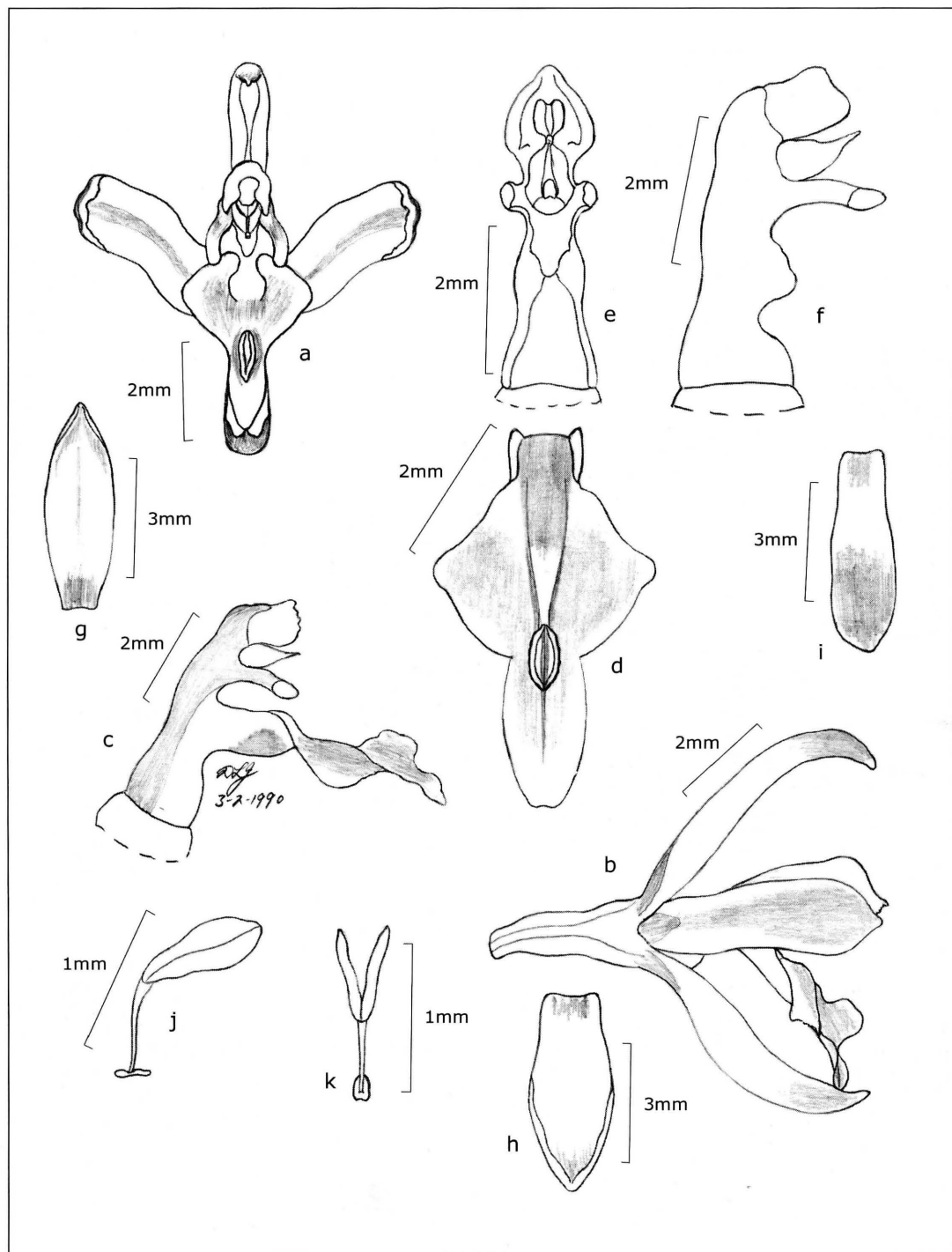


Figure 1.2. *Acriopsis javanica*, Penang Hill, Malaysia, P. Vaughan.

a. flower from front; b. flower from side; c. column and labellum from side; d. labellum from above, flattened; e. column from front; f. column from side; g. dorsal sepal; h. synsepalum; i. petal; j. pollinarium, side view; k. pollinarium, front view. **Drawing 3/2/1990 by D.L.Jones.©**

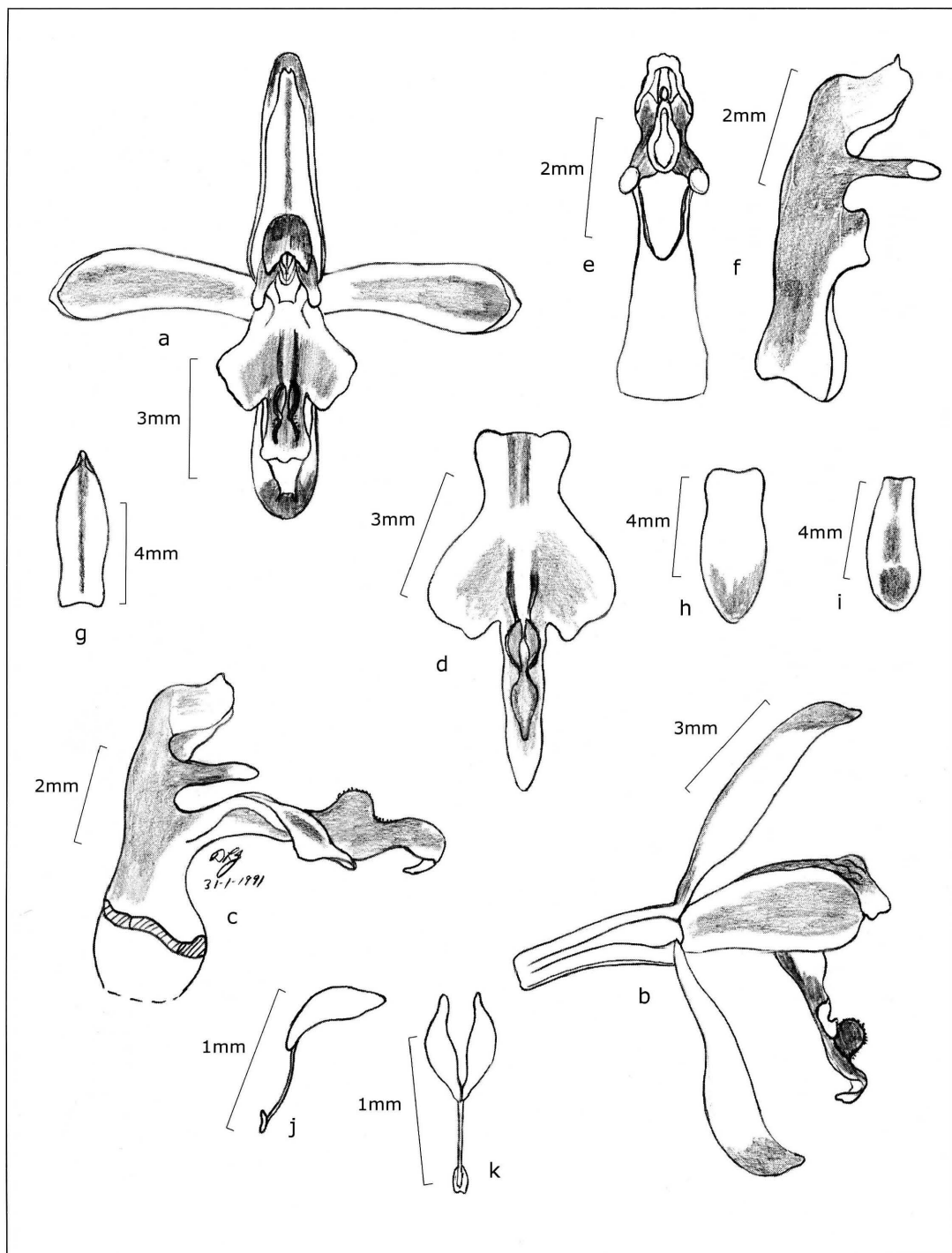


Figure 1.3. *Acriopsis papuana*, Garassa, Papua New Guinea, M.A.Clements.

a. flower from front; b. flower from side; c. column and labellum from side; d. labellum from above, flattened; e. column from front; f. column from side; g. dorsal sepal; h. synsepalum; i. petal; j. pollinarium, side view; k. pollinarium, front view. **Drawing 31/1/1991 by D.L.Jones.©**

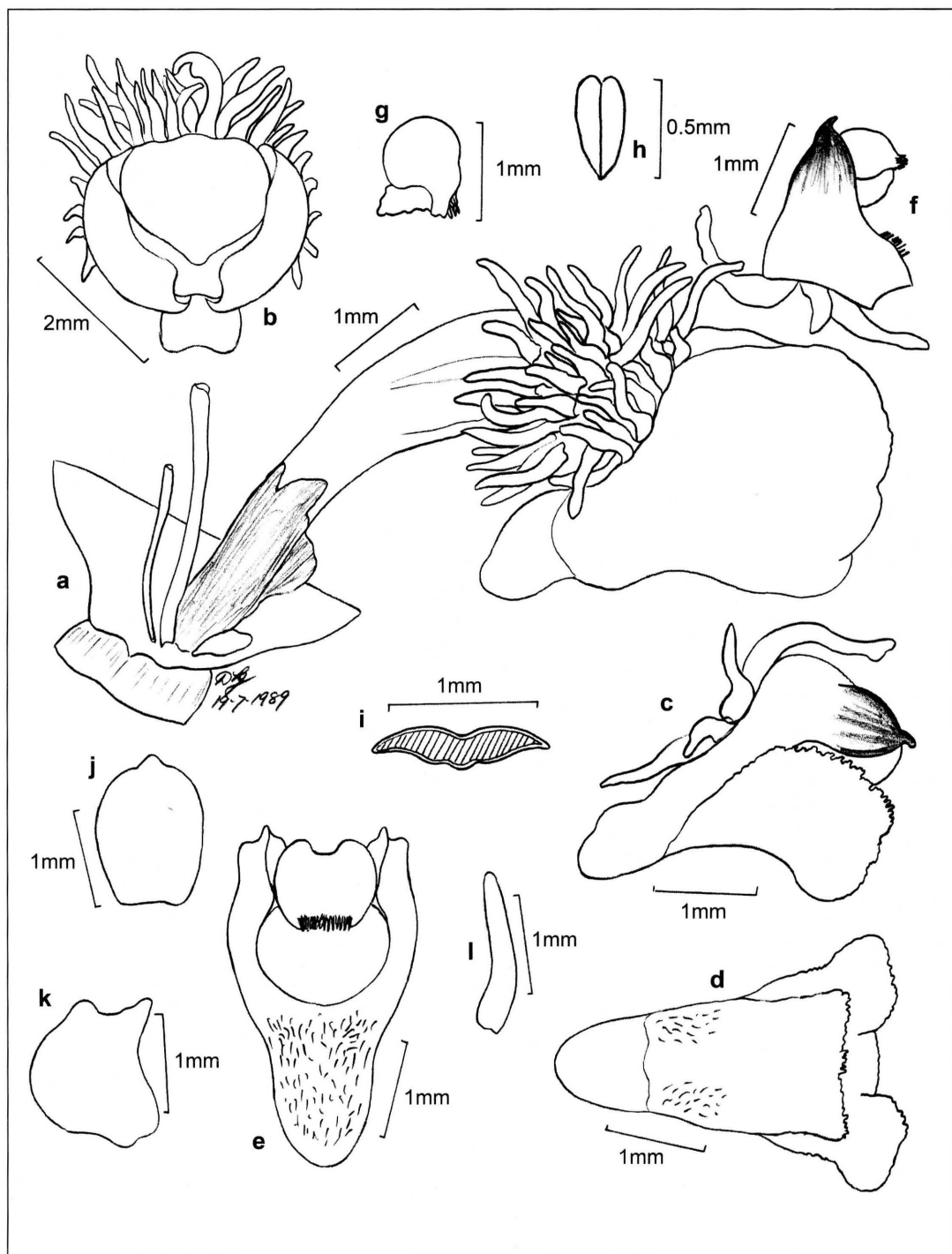


Figure 1.4. *Cadetia clausa*, Moa Island, Queensland, D.L.Jones 3589; from the type collection.
 a. leaf base and flower from side; b. flower from front; c. flower from side; d. labellum from above, flattened;
 e. column from front; f. column from side; g. anther cap; h. pollinia; i. cross-section of leaf; j. dorsal sepal; k.
 lateral sepal; l. petal. **Drawing 19/7/1989 by D.L.Jones.©**

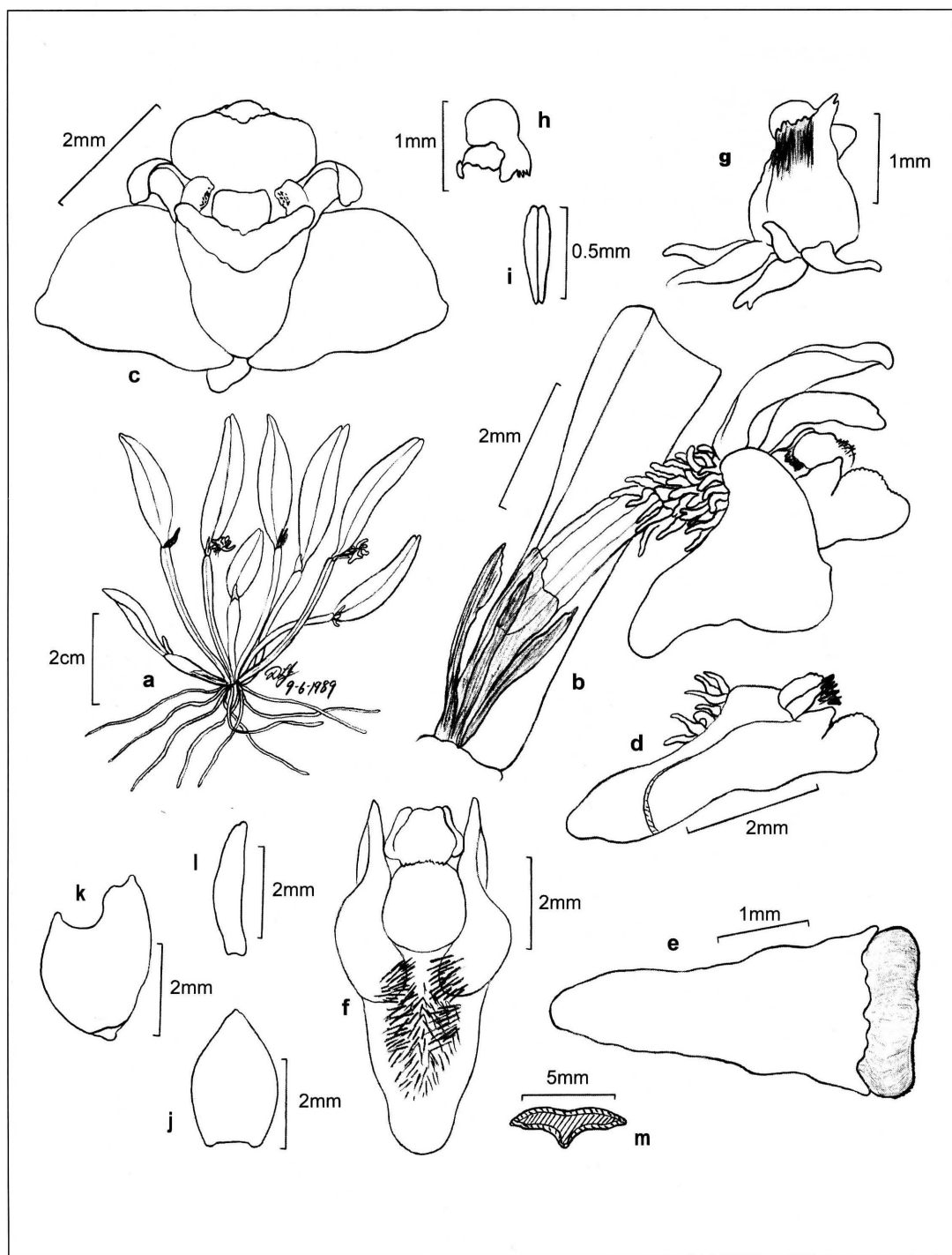


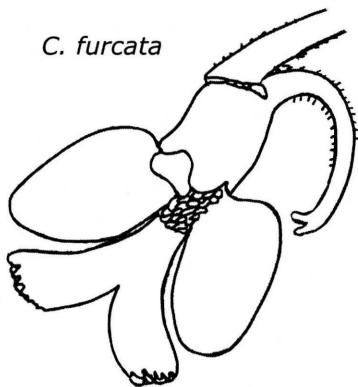
Figure 1.5. *Cadetia maideniana*, Tully, Queensland, R. Tunstall.

a. plant; b. leaf base and flower from side; c. flower from front; d. column and labellum from side; e. labellum from above, flattened; f. column from front; g. column from side; h. anther cap; i. pollinia; j. dorsal sepal; k. lateral sepal; l. petal; m. cross-section of leaf. **Drawing 9/6/1989 by D.L. Jones.©**

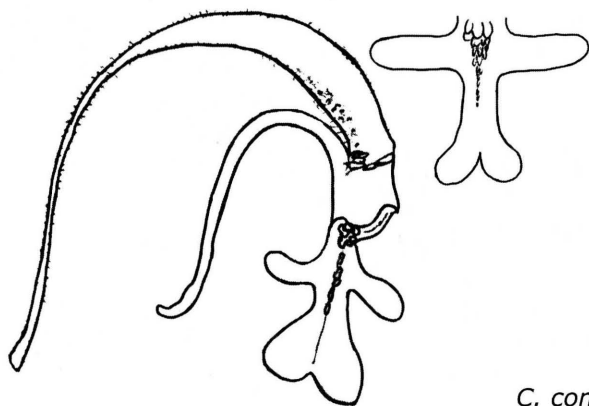
C. triplicata



C. furcata



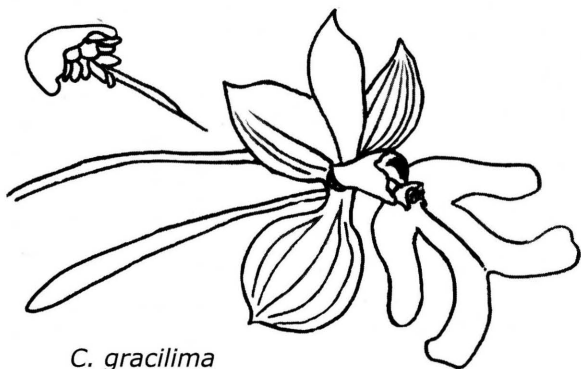
C. perrottetii



C. comosa



C. gracilima



C. catilligera

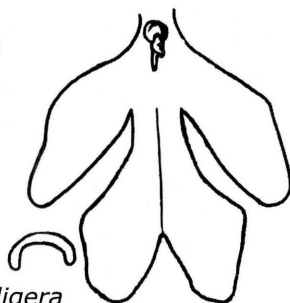


Figure 1.6. Reproduction of illustrations of *Calanthe* types.

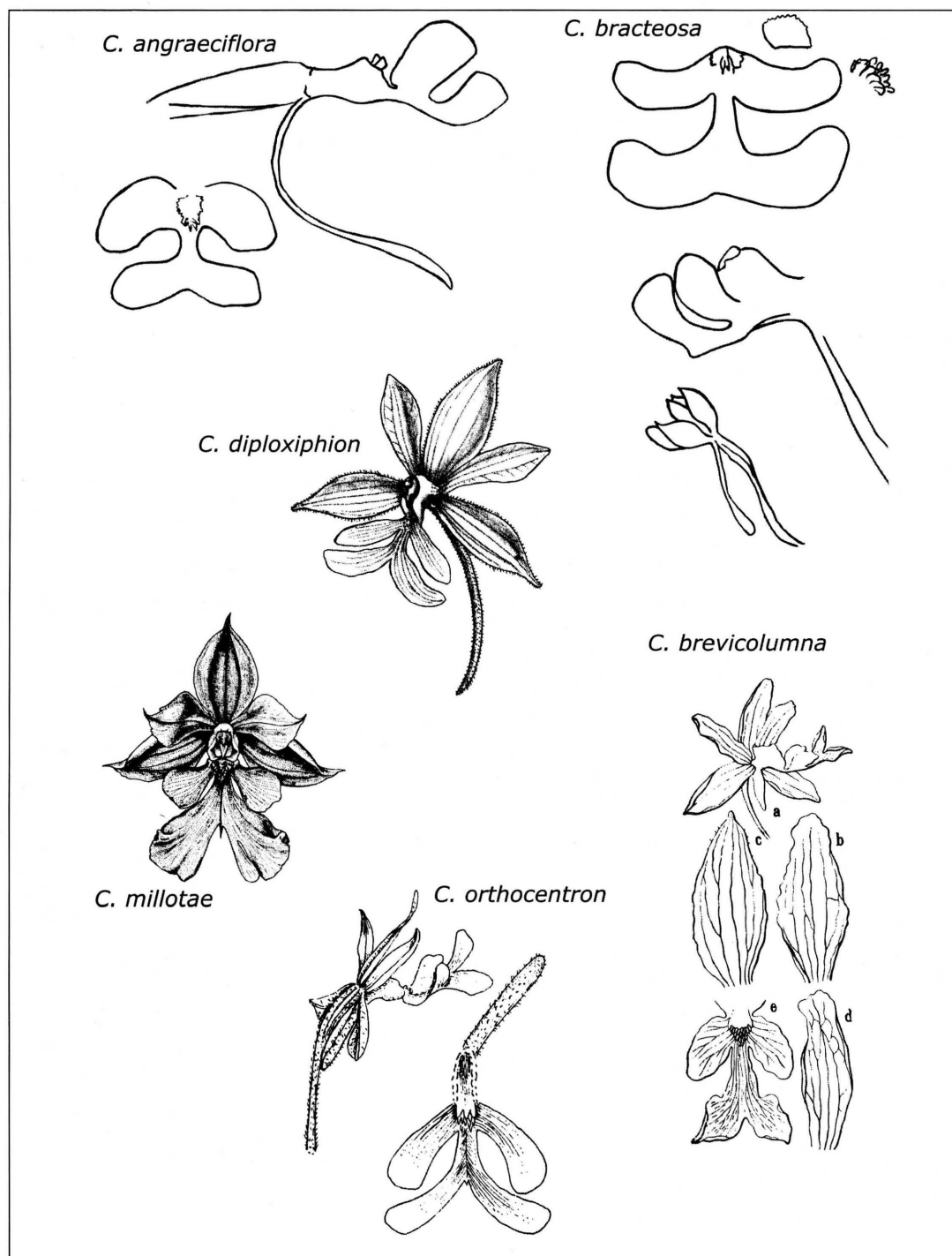


Figure 1.7. Reproduction of illustrations of *Calanthe* types.

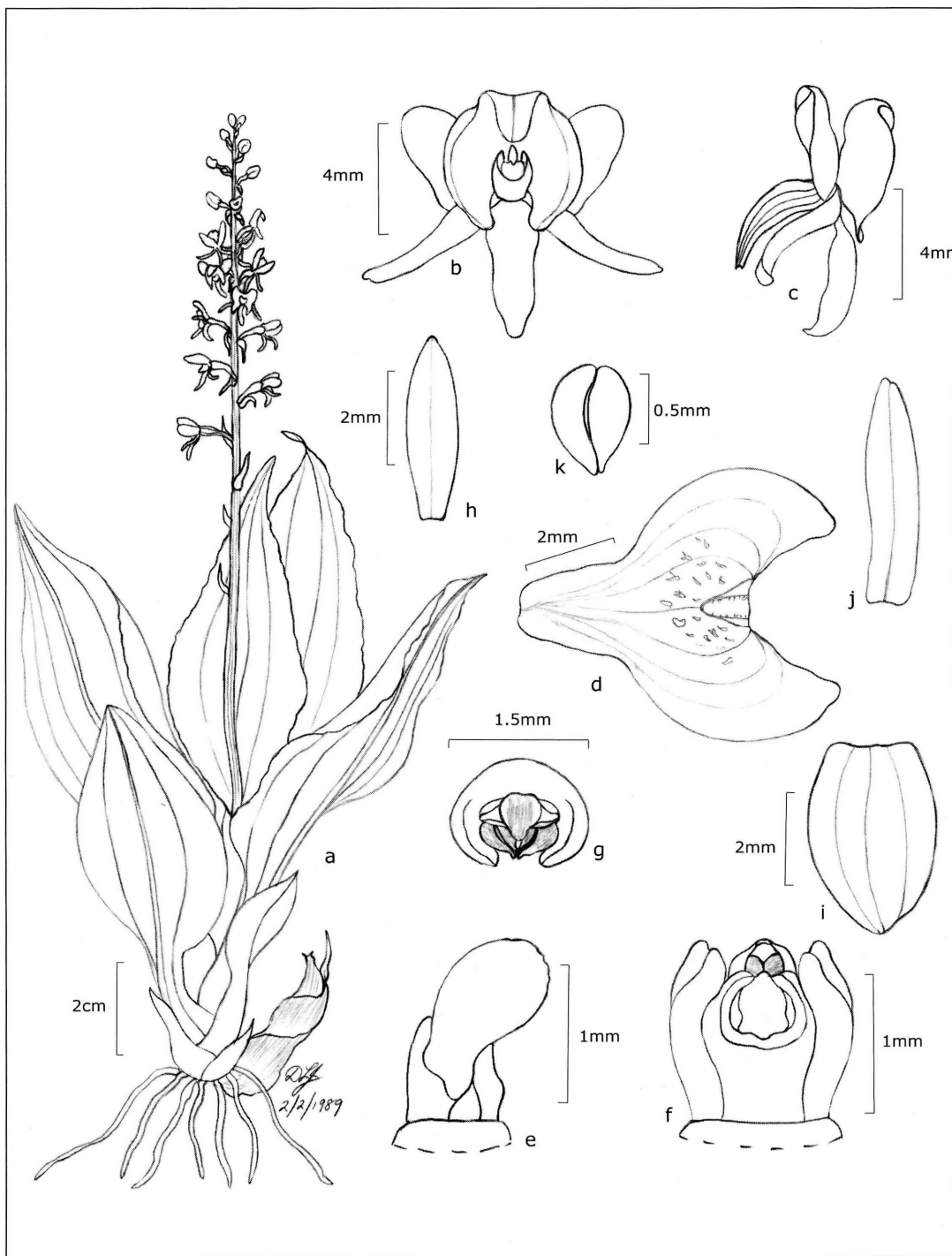


Figure 1.8. *Crepidium fontinale*, Black Jungle, Northern Territory, Ian Morris.
a. plant; b. flower from front; c. flower from side; d. labellum from above, flattened; e. column from side; f. column from front; g. column from above; h. dorsal sepal; i. lateral sepal; j. petal; k. pollinia.
Drawing 9/6/1989 by D.L.Jones.©

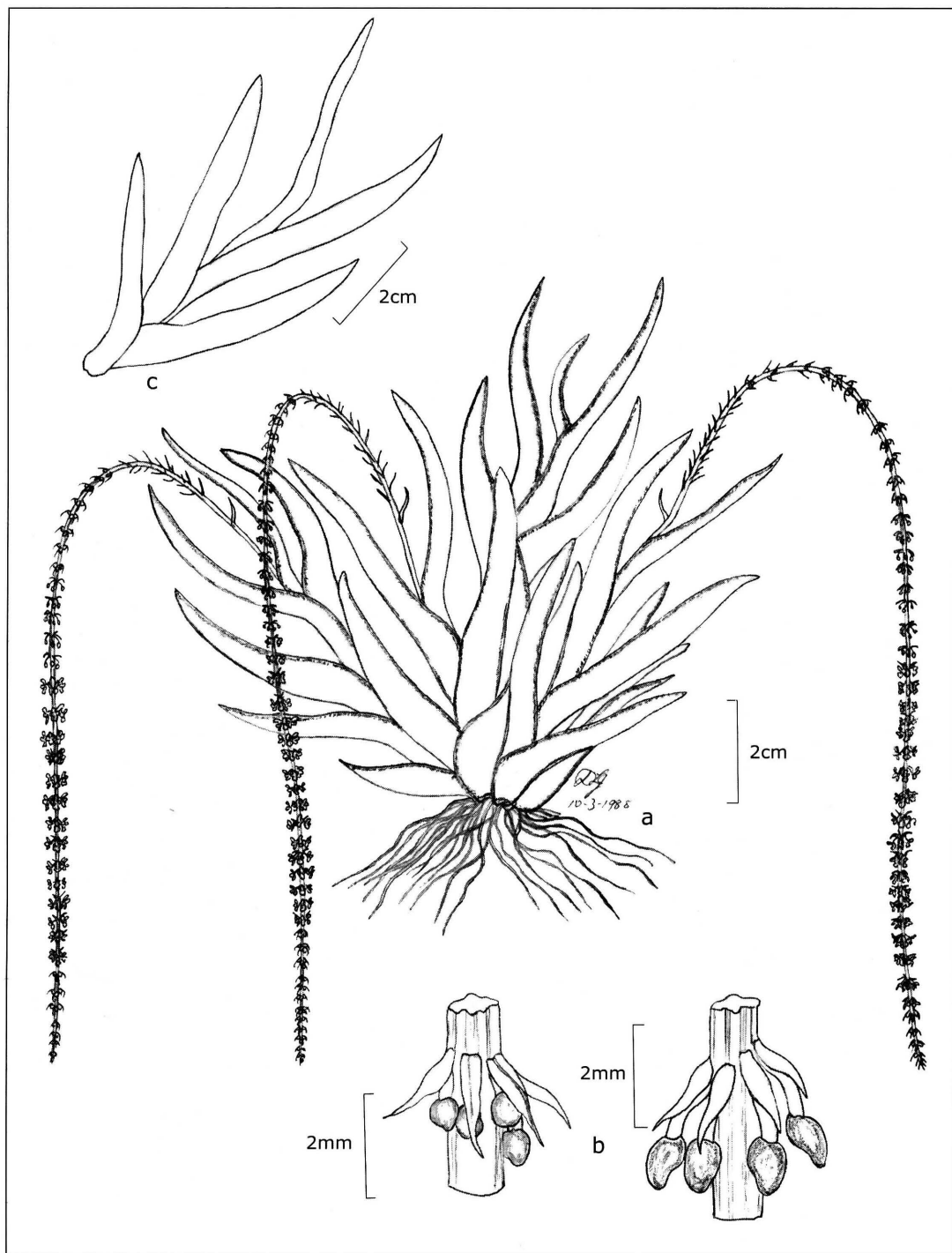


Figure 1.9. *Oberonia crateriformis*, Evelyn Tableland, Queensland, L. Lawler 38.
a. plant; b. sections of raceme and arrangement of buds; c. single growth.
Drawing 10/3/1988 by D.L.Jones.©

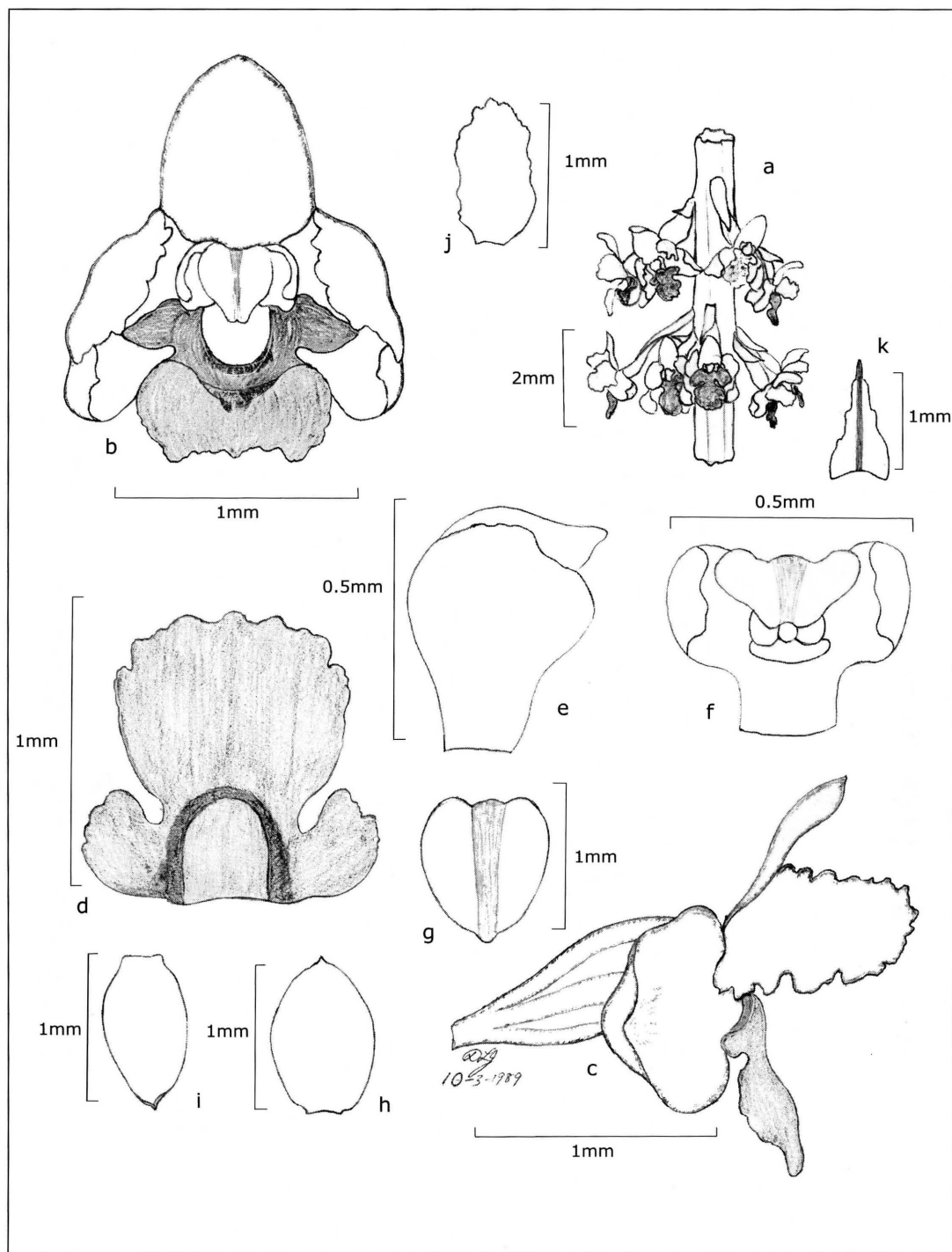


Figure 1.10. *Oberonia crateriformis*, Evelyn Tableland, Queensland, L. Lawler 38.
a. section of raceme and arrangement of flowers; b. flower from front; c. flower from side; d. labellum from above, flattened; e. column from side; f. column from front; g. pollinium; h. dorsal sepal; i. lateral sepal; j. petal; k. fertile bract. **Drawing 10/3/1988 by D.L.Jones.©**

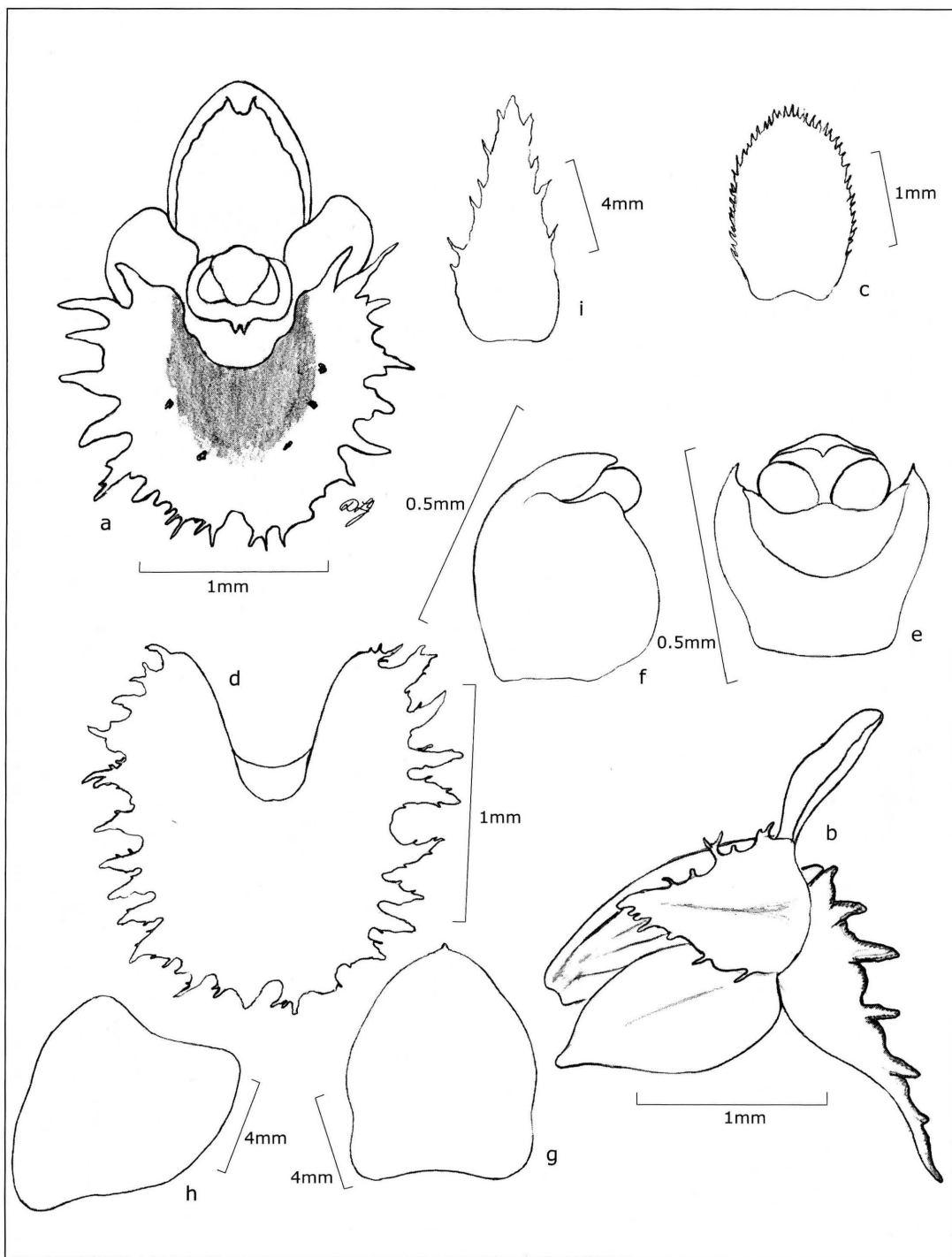


Figure 1.11. *Oberonia complanata*, Nerang, Queensland, R.Crane 332.

a. flower from front; b. flower from side; c. labellum from above, flattened; d. column from side; e. column from front; f. dorsal sepal; g. lateral sepal; h. petal; i. fertile bract. **Drawing 19/2/1992 by D.L.Jones.©**

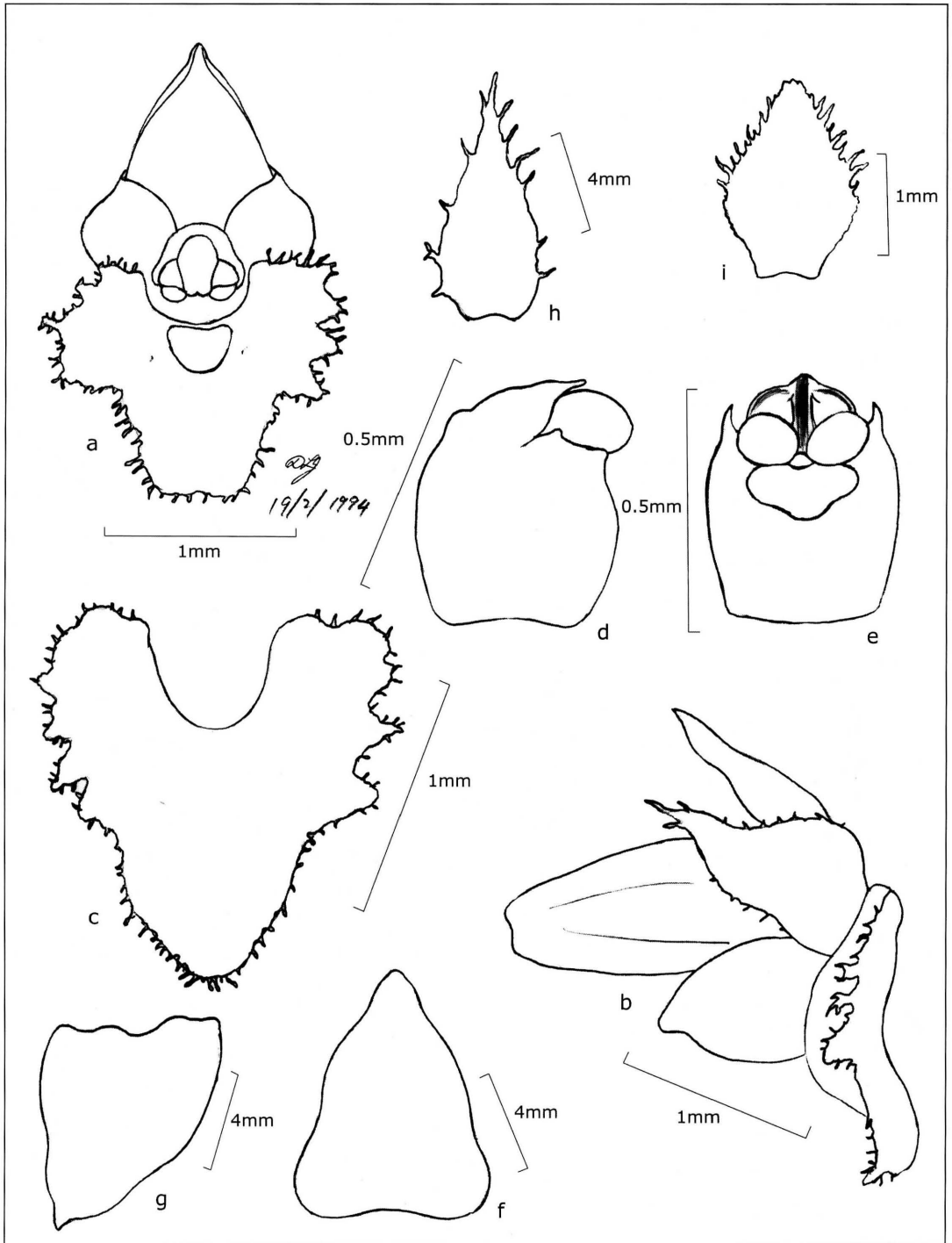


Figure 1.12. *Oberonia flavescens*, Millaa Millaa, Queensland, D.L.Jones 4322.

a. flower from front; b. flower from side; c. labellum from above, flattened; d. column from side; e. column from front; f. dorsal sepal; g. lateral sepal; h. petal; i. fertile bract. **Drawing 12/2/1994 by D.L.Jones.©**

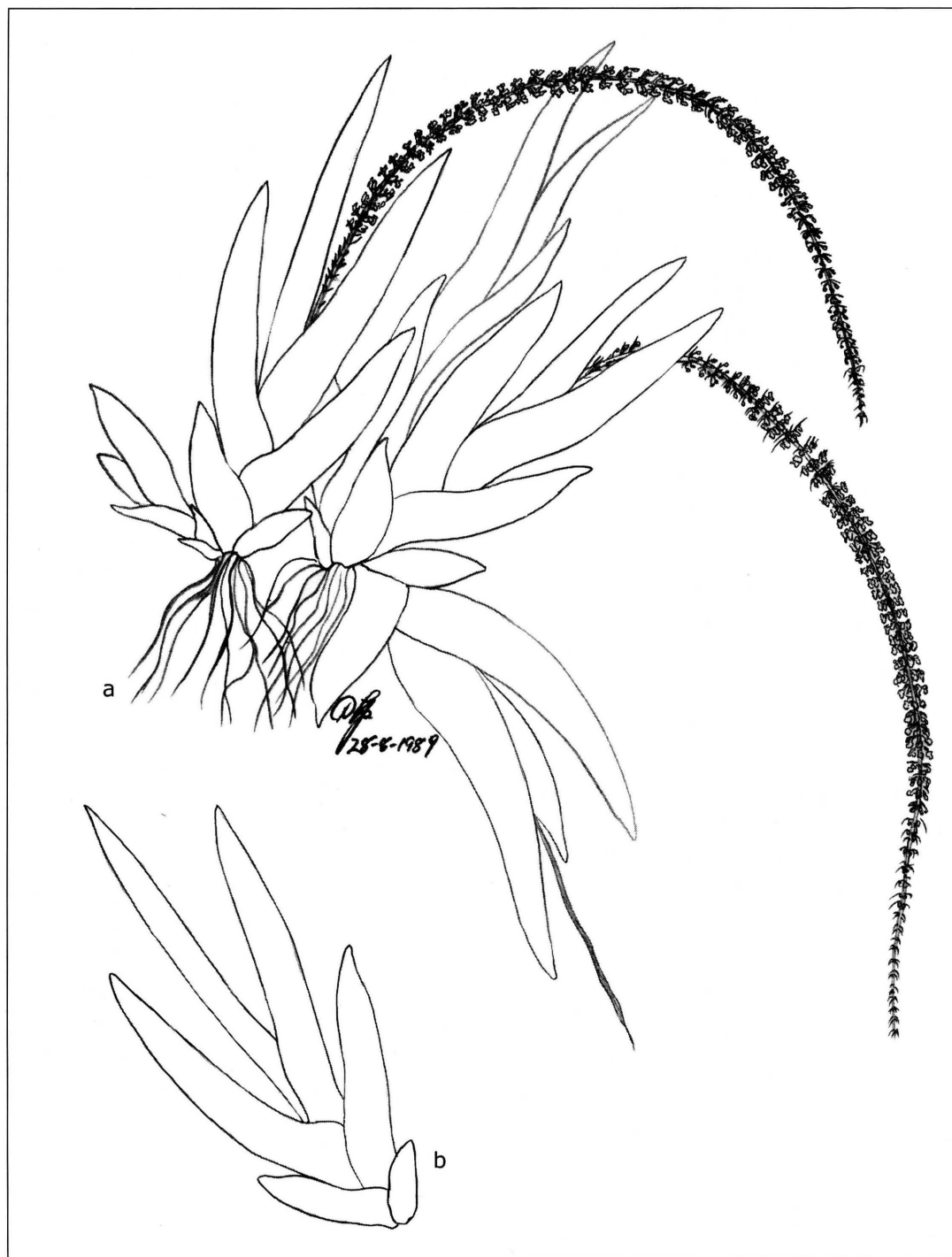


Figure 1.13. *Oberonia rimachila*, Russell River Heads, Queensland, D.L.Jones 4187.
a. plant; b. single growth. Drawing 28/8/1989 by D.L.Jones.©

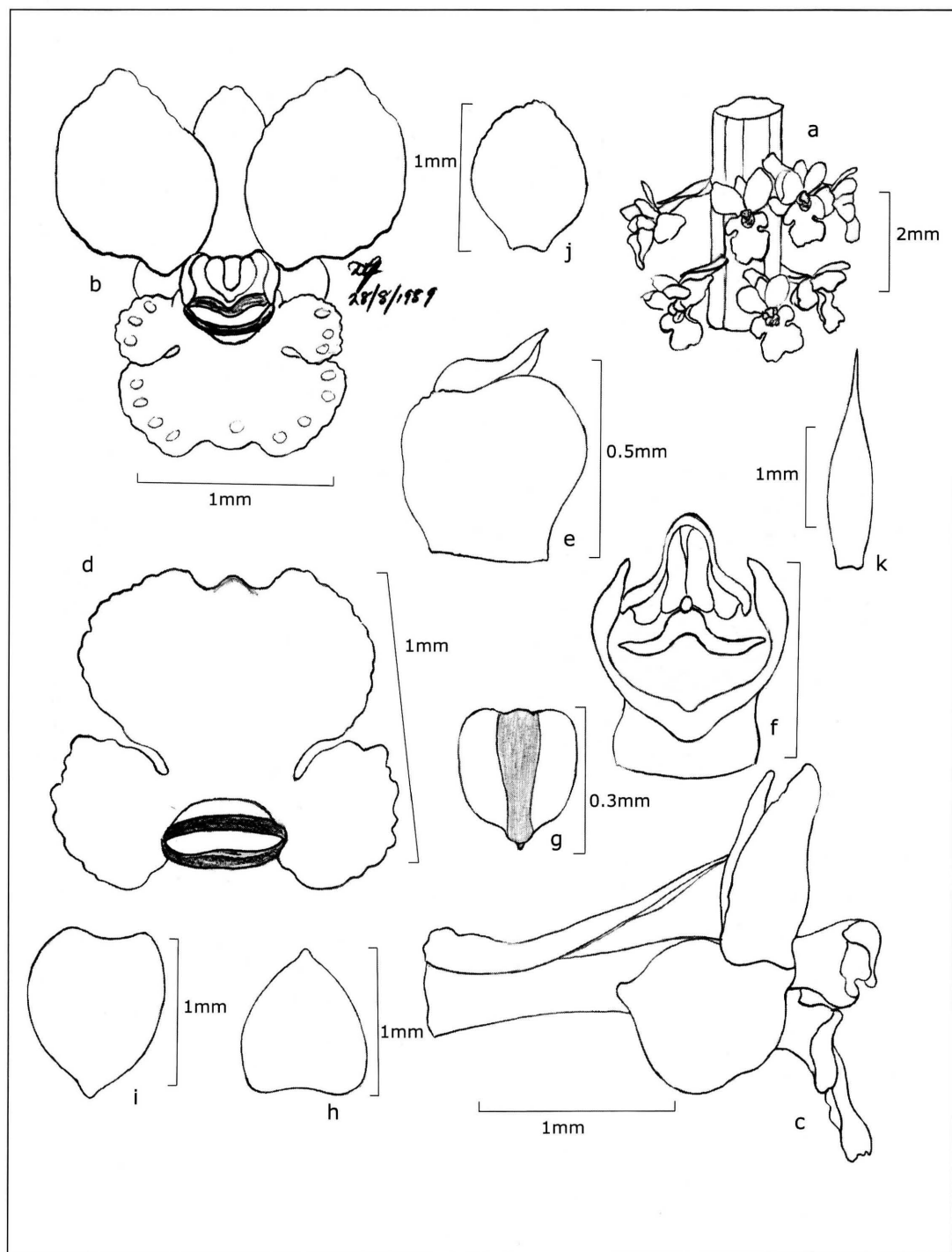


Figure 1.14. *Oberonia rimachila*, Russell River Heads, Queensland, D.L.Jones 4187.
a. section of raceme and arrangement of flowers; b. flower from front; c. flower from side; d. labellum from above, flattened; e. column from side; f. column from front; g. pollinium; h. dorsal sepal; i. lateral sepal; j. petal; k. fertile bract. Drawing 28/8/1989 by D.L.Jones.©

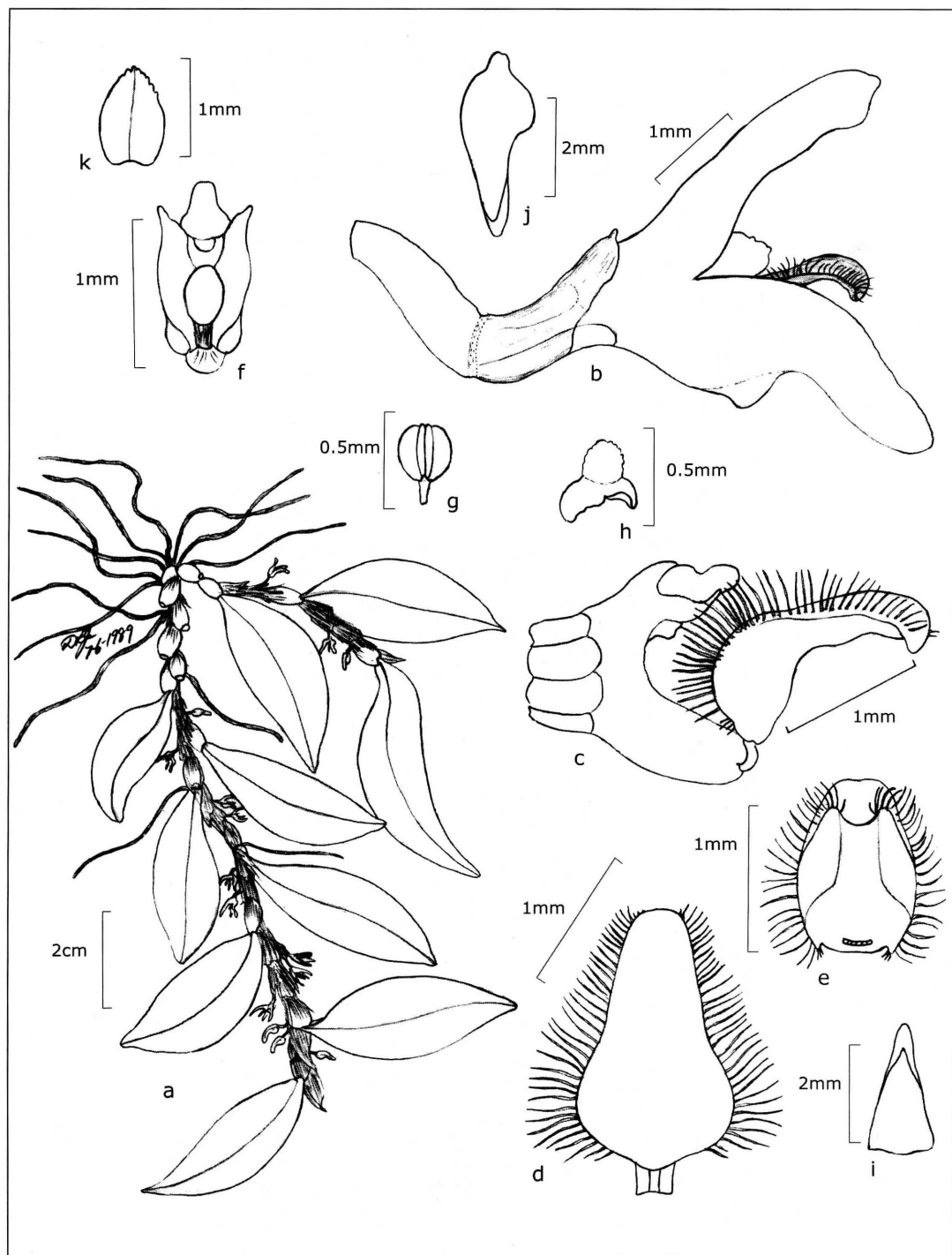


Figure 1.15. *Oxysepala schilleriana* subsp. *maritima*, Russell River Heads, Queensland, D.L.Jones 4180.

a. plant; b. flower from side; c. column and labellum from side; d. labellum from above, flattened; e. labellum, front view; f. column from front; g. pollinium; h. anther cap; i. dorsal sepal; j. lateral sepal; k. petal.
Drawing 7/6/1989 by D.L.Jones.©

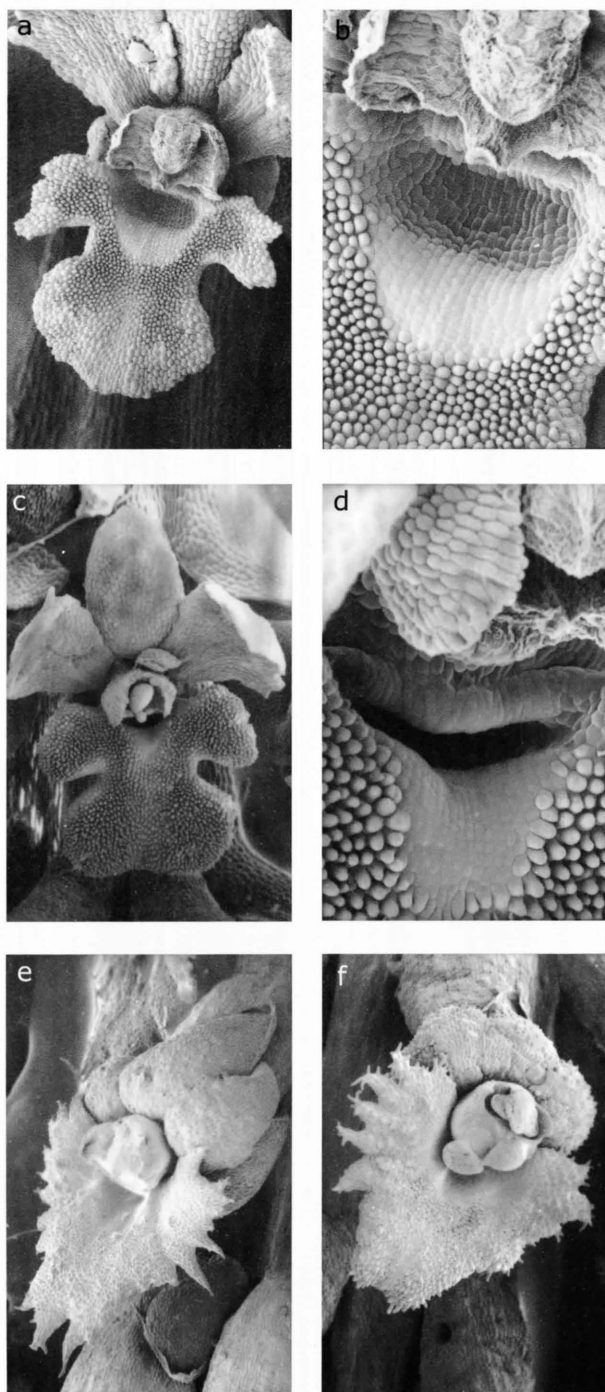


Plate 1. Electron micrographs of *Oberonia* spp. a.,b. *Oberonia crateriformis*, Herberton Range, Queensland; c.,d. *O. rimachila*, Palmerston, Queensland; e. *O. complanata*, Nerang, Queensland; f. *O. flavescens*, Eungella, Queensland.

Towards a Revision of the *Thelychiton speciosus* Group

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ABSTRACT

Morphological and field studies in conjunction with preliminary molecular systematic research, using DNA sequences of the internal transcribed spacer (ITS) region of the 18–26S nuclear ribosomal repeat unit, were conducted on the *Thelychiton speciosus* group (Grastidiinae: Dendrobieae). The results provide support for the recognition of 11 species in the group, six of which are already described (*T. capricornicus*, *T. curvicaulis*, *T. pedunculatus*, *T. rex*, *T. speciosus* and *T. tarberi*) and five which are described here as new: *T. biconvexus*, *T. coriaceus*, *T. epiphyticus*, *T. rupicola* and *T. spectabilis*. Information on distribution, ecology and diagnostic features of each species is provided as also is a comparative table and key to the species.

INTRODUCTION

We have been researching the *Thelychiton speciosus* (formerly *Dendrobium speciosum*) complex for nearly two decades based on field studies and the extensive collection of living plants of known provenance held at the Australian National Botanic Gardens. The “*speciosus*” group, which contains some popular orchidaceous horticultural subjects, is widely distributed in eastern Australia, extending from near Cooktown in north-eastern Queensland to eastern Victoria. It occupies a wide range of habitats and exhibits significant variation in vegetative and floral features. Six taxa have been described within the group to date, these have been variously treated at species, subspecies or varietal rank by different authors (for various treatments of the group, taxonomic changes and comments see Gregory 1980, Clemesha 1981a, 1981b, 1982, 1986, Gregory 1988, Clements 1989, Banks & Clemesha 1990, Adams 1991, Clements & Jones 2002).

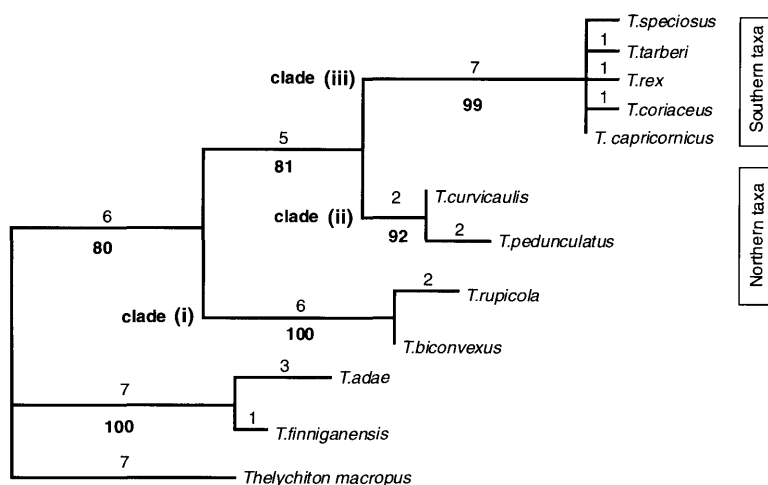
Our initial research was based on morphology and clearly showed the presence of useful diagnostic characters in both vegetative

and floral features for separating taxa, including the size and shape of the pseudobulbs, length of the peduncle, its thickness and surface ornamentation. These studies convinced us that significant segregation had occurred within the complex and we have chosen to recognise the taxa at species rank. Recently molecular studies have supported much of the unpublished morphological findings and have provided important phylogenetic insights into the group.

MATERIALS AND METHODS

DNA analysis: Fresh leaf material of nine members of the *Thelychiton speciosus* group of known provenance plus *Thelychiton macropus*, the type of the genus, *T. adae* and *T. finniganensis* as the outgroup, were used in molecular studies. Leaves were dried either over silica gel or by pressing. Genomic DNA was extracted from 10–100mg of leaf tissue using a modified CTAB method, and PCR and sequencing was undertaken using as previously described (Clements *et al.* 2002). The complete sequence of the ITS1–5.8S–ITS2 region for each sample was edited and assembled using Sequencer 3.0 software (Gene Codes Corporation).

Figure 1. A phylogram of one of the two most parsimonious trees from the ITS analysis of 9 collections of the *Thelychiton speciosus* complex and outgroup taxa: $L = 52$, $CI = 0.9231$, $RI = 0.9412$, showing the relationships between the species. The three main clades (i, ii & iii) and southern and northern taxa are identified. Bootstrap percentages (50% or more) for the taxa are below branches in bold.



Sequence alignment and phylogenetic analysis.

Sequences were imported into BioEdit version 4.7.8. and initially aligned using the EclustalW program. Sequences were secondarily manually aligned in BioEdit and the aligned files converted to a PAUP/NEXUS file. The aligned file was then exported through MacClade (Maddison and Maddison, 1992) for analysis using PAUP version 4.0b4a (Swofford, 1998). The most parsimonious trees were determined using a heuristic search algorithm with 100 replicates of random taxon entry, TBR branch swapping and the ‘Multrees’ option generating a consensus tree. Bootstrap analyses were undertaken using unweighted trees to determine the relative support for the resultant clades (Felsenstein 1985), and all minimal length trees saved. Voucher specimens for all collections used in this research are lodged in the Australian National Herbarium, Canberra (CANB).

Floral measurements in the descriptions are taken from flattened flowers. For convenience the species are treated in alphabetical order. In a systematic arrangement they would appear in the following order - *T. speciosus*, *T. epiphyticus*; *T. tarberi*, *T. rex*, *T. capricornicus*, *T. spectabilis*; *T. curvicaulis*; *T. pedunculatus*, *T. rupicola*, *T. coriaceus*, *T. biconvexus*.

RESULTS

An assessment of the *Thelychiton speciosus* complex using 9 representative species produced an alignment that contains 837 nucleotide sites of which 29 were potentially parsimony informative. Analysis of this computer-generated alignment produced two equally, near identical parsimonious trees; tree length (L) = 52, consistency index (CI) = 0.9231, retention index (RI) = 0.9412, and rescaled consistency index (RC) = 0.8688. One of these trees is shown in Figure 1. The molecular studies show that the “*speciosus*” complex is comprised of three distinct phylogenetic lineages (Fig. 1), rather than a

single entity as has been previously thought (see Adams 1991). Within the group the basal position is a well supported (100% bootstrap values); clade (i) containing *T. biconvexus* and *T. rupicola*; sister to these are the remaining taxa which in turn divide into two well supported separate branches, clade (ii), containing *T. curvicaulis* and *T. pedunculatus* (92% bootstrap support values) and clade (iii), containing *T. capricornicus*, *T. rex*, *T. tarberi*, *T. coriaceus* and *T. speciosus* (99% bootstrap support values).

DISCUSSION

Whilst it is recognised that not all taxa are present in this analysis and that only a single sample of each species was used, these results clearly show the presence of a phylogenetic pattern within the group. Additionally there is molecular differentiation between all the representative taxa. The results also show that the northern tropical areas represent the greatest area of diversity and probably the origin of the group, with two distinct lineages, whilst the southern taxa represent the least diverse and possibly the most recently diverged members of the group. The ITS results reveal there is greater genetic divergence between apparent morphologically similar species such as *T. pedunculatus* and *T. rupicola* than there is between any of the morphologically distinct southern taxa. In fact, there is similar or greater genetic differentiation between many of the species in this group than there is between other readily recognised and accepted *Thelychiton* species such as *T. finniganensis* and *T. adae*.

Overall, these results although only preliminary and of a restricted nature, clearly provide independent support for the recognition of all taxa within the *T. speciosus* complex. Five new taxa within the complex are described here at species rank.

Key to Species of the *Thelychiton speciosus* group

- 1 Pseudobulbs fusiform (spindle-shaped), strongly ellipsoid in cross-section with the edges sharply pointed (biconvex) **1. *T. biconvexus***
- 1: Pseudobulbs cylindrical or broadest at the base and tapered upwards, ellipsoid or round in cross-section, the edges round to bluntly pointed **2**
- 2 Pseudobulbs broadest at the base and tapered towards the apex **3**
- 2: Pseudobulbs cylindrical, more or less of uniform width throughout **6**
- 3 Leaves 1-3 per pseudobulb, erect, pseudobulbs less than 25 cm long, peduncle long and well-developed, smooth, 3-5 mm diam. **4**
- 3: Leaves 2-5 per pseudobulb, spreading, pseudobulbs to 40 cm long, peduncle very short or absent, ribbed, 7-10 mm diam. **9. *T. speciosus***
- 4 Pseudobulbs 5-15 cm long, peduncle ½-¾ the length of the raceme **6. *T. pedunculatus***
- 4: Pseudobulbs more than 15 cm long, peduncle ½-½ the length of the raceme **5**
- 5 Flowers white to cream **8. *T. rupicola***
- 5: Flowers yellow **3. *T. coriaceus***

6	Two types of root growth present (erect and litter-trapping and spreading)	7
6:	Roots spreading only (erect and litter-trapping roots absent).....	8
7	Flowers yellow, 45-70 x 55-80 mm.....	7. <i>T. rex</i>
7:	Flowers white to cream, 35-50 x 30-50 mm.....	11. <i>T. tarberi</i>
8	Leaves 1-3 per pseudobulb, erect, peduncle long and well-developed, 2-3 mm diam., smooth	9
8:	Leaves 2-5 per pseudobulb, spreading, peduncle very short or absent, 7-10 mm diam., ribbed.....	10
9	Pseudobulbs to 15 x 3 cm, flowers 30-45 x 35-45 mm.....	2. <i>T. capricornicus</i>
9:	Pseudobulbs to 70 x 2 cm, flowers 20-30 x 20-30 mm.....	4. <i>T. curvicaulis</i>
10	Flowers 20-50 per raceme, 40-50 x 30-40 mm, cream to pale yellow.....	5. <i>T. epiphyticus</i>
10:	Flowers 150-250 per raceme, 55-75 x 60-75 mm, pale yellow.....	10. <i>T. spectabilis</i>

Taxonomy

1. *Thelychiton biconvexus* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. curvicaulis* (F.M.Bailey) M.A.Clem. & D.L.Jones, sed pseudobulbis majoribus (20-40 cm long), fusiformibus, biconvexis transversim; foliis majoribus (20-30 x 6-9 cm); pedunculo $\frac{1}{3}$ - $\frac{1}{2}$ longitudine racemi; racemis longioribus (25-75 cm); floriis crebrioribus (40-75) et majoribus (4.5-5.5 x 3.5-4 cm), differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 22 Nov. 1993, D.L.Jones 19359 (holo CANB; iso AD, BRI, MEL, NSW). Provenance: originally collected from Mt Windsor Tableland, Queensland, 27 May 1989, D.L.Jones 4358 & M.A.Clements (CBG8913162).

Description: *Lithophyte* forming large erect clumps. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* erect, 20-40 cm long, 3.5-5 cm wide, consisting of 8-10 nodes, green, shallowly ribbed/furrowed, new growths covered with white sheaths; base swollen then narrowed before expanding into the main part of the pseudobulb which is fusiform, strongly ellipsoid in cross-section with the edges sharply pointed (biconvex), tapered to the apex. *Leaves* terminal, suberect to spreading, 2-4 per pseudobulb, elliptic to obovate, 20-30 cm long, 6-9 cm wide, dark green adaxially, lighter green abaxially, thick-textured, leathery; apex unequally emarginate. *Racemes* 25-75 cm long, 40-75-flowered. *Peduncle* 13-25 cm long, 7-8 mm wide, dark green, smooth. *Sterile bracts* 4-5, basal bracts imbricate, rest well spaced. *Fertile bracts* subulate, 4-5 mm long. *Pedicels* 3-3.5 cm long. *Ovary* at an angle to the pedicel. *Flowers* crowded, 45-55 mm long, 35-40 mm across, cream to whitish, fragrant. *Perianth segments* widely spreading, thin textured. *Dorsal sepal* erect, oblong, 25-30 mm long, 4.5-5.5 mm wide, subacute. *Lateral sepals* divergent, strongly falcate, oblong-tapered, 23-35 mm long, 5-6 mm wide, broadest at the base (6-7 mm wide), obtuse. *Petals* correct to spreading, linear-oblong, 20-25 mm long, 2-2.5 mm wide, falcate, subacute. *Labellum* shallowly curved, 13-15 mm long, 10-12 mm wide, cream with purple flecks and lines, especially towards the base, 3-

lobed, a very wide wedge-shaped gap between the lateral lobes and the midlobe; lateral lobes erect and incurved, c. 5 mm wide, outer margins sharply curved; midlobe recurved, transversely elliptic when flattened, apex subacute. *Callus* consisting of a single yellow ridge c. 5 mm long, extending as a thin line to the labellum apex. *Column* porrect from the end of the ovary, mostly reddish, c. 6 mm long, c. 2.5 mm wide, with short apical wings; foot 6-7 mm long. *Anther* c. 1.6 mm long, c. 2 mm wide. *Stigma* c. 1.5 mm across. *Pollinia* orange.

Distribution and ecology: Restricted to higher peaks in north-eastern Queensland where currently known with certainty from Mt Amos, Mt Windsor Tableland and Mt Finnigan, but probably on other mountains in the region. It grows on rocks, boulders and cliffs within rainforest or on moist sheltered slopes in open forest close to rainforest. Alt. 700-1000 m. Flowering: July-September.

Recognition: Recognised by the following combination of characters: roots spreading only; pseudobulbs fusiform, ellipsoid and biconvex in cross-section, with sharp edges (noticeable on young growths); leaves 2-4, suberect to spreading, 20-30 x 6-9 cm; racemes 40-75-flowered; peduncle $\frac{1}{3}$ - $\frac{1}{2}$ the length of the raceme, 7-8 mm wide, smooth; flowers 45-55 x 35-40 mm, white or cream; labellum apex broad, with a short mucro; gap between the labellum lateral lobes and the midlobe deep and wide.

Notes: This species has a disjunct distribution but can be locally common. Plants usually occur in relatively sheltered situations, but are sometimes found on exposed sites where there are breaks in the forest canopy.

Conservation status: Disjunct, locally common and conserved in National Parks.

Etymology: The Latin *biconvexus*, two surfaces curved outwards, in reference to the pseudobulbs.

2. *Thelychiton capricornicus* (Clemesha) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 491 (2002); *Dendrobium speciosum* Sm. var. *capricornicum* Clemesha, *Orchadian* 7(5): 103-6, f. 2, 3, 4 & 6 (1982).

Type: Cultivated Coffs Harbour, May 1978, *S.C.Clemesha* ex 'near a disused quarry on an old volcanic plug about 8 km inland from Yeppoon, Queensland', 24 July 1981, *S.C.Clemesha* s.n. (holo NSW!).

Description: *Lithophyte* forming small clumps. *Roots* spreading from the base, not erect. *Pseudobulbs* appressed to erect, cylindrical, 7-15 cm long, 2-3 cm wide, straight, ellipsoid in cross-section, smooth, tough and fibrous, green or yellowish, when young covered with white to purplish, papery bracts. *Leaves* apical, erect to spreading, 2-4, elliptical to ovate, 7-12 cm long, 2.5-4 cm wide, thick and leathery, stiff, dark green or purplish. *Racemes* 25-40 cm long, erect, arching or pendulous, 30-50-flowered; peduncle $\frac{1}{3}$ - $\frac{1}{2}$ the length of the raceme. *Flowers* 30-45 mm long, 35-45 mm wide, white, not crowded, fragrant. *Perianth segments* narrow, widely spreading, thick and fleshy. *Dorsal sepal* obliquely erect, oblong, 20-25 mm long, 5-6 mm wide. *Lateral sepals* divergent, 15-20 mm long, 5-8 mm wide, strongly falcate. *Petals* erect or incurved, linear-oblong, 15-20 mm long, 1.5-2 mm wide. *Labellum* projected forwards, 8-10 mm long, 8-10 mm wide, curved, streaked with reddish purple, 3-lobed; gap between lateral lobes and midlobe deep and wide; lateral lobes erect, column-embracing, blunt; midlobe narrower than the lateral lobes; apex truncate to apiculate. *Callus* of 3 central yellow ridges. *Column* porrect from the end of the ovary, c. 4 mm long, c. 2 mm wide, with short apical wings; foot c. 4 mm long, curved. *Anther* 1.3 mm long, c. 1.8 mm wide. *Stigma* c. 1 mm across. *Pollinia* orange.

Distribution and ecology: Restricted to central-eastern Qld between the Byfield Range and Yeppoon and in the vicinity of Rockhampton. A short-growing species that occurs in exposed situations on the basalt faces of old volcanic plugs. Alt. 150-500 m. Flowering: June to August.

Recognition: Recognised by the following combination of characters; roots spreading only; pseudobulbs cylindrical, 7-15 x 2-3 cm, ellipsoid in cross-section; leaves 2-4, erect to spreading, 7-12 x 2.5-4 cm; racemes 25-40 cm long, erect, arching or drooping; peduncle $\frac{1}{3}$ - $\frac{1}{2}$ the length of the raceme, 2-3 mm wide, smooth; flowers 30-50, not crowded, 30-45 x 30-45 mm, white; labellum 8-10 x 8-10 mm, apex truncate to apiculate; gap between lateral lobes and midlobe deep and wide. Its early flowering habit is also noteworthy.

Notes: The racemes are distinctive, generally erect, but also arching to drooping and with a long peduncle. Each pseudobulb usually produces 1-2 inflorescences from the apex.

Conservation status: Of restricted distribution but conserved; suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: *capricornicus* – Tropic of Capricorn (centre of distribution).

3. *Thelychiton coriaceus* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. capricorno* (Clemesha) M.A.Clem. & D.L.Jones, sed floribus constipatis, flavidis ad laetiflavos; segmentis perianthii condensatis, succulentis; labello medilobo et lobis lateralibus late et profunde dissitis, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australia, 6 Sept. 2002, *D.L.Jones 19360* (holo CANB; iso BRI, NSW). Provenance: originally collected from Carnarvon Gorge, Queensland, 23 Aug. 1996, *R.Crane*, s.n..

Description: *Lithophyte* forming relatively small compact clumps. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* appressed to erect, broad at base then tapered, 15-22 cm long, 2-3 cm wide, consisting of 3-6 nodes, straight, green to reddish, round in cross-section. *Leaves* terminal, erect, 1-3 per pseudobulb, elliptic to oblong-elliptic, 8-16 cm long, 3-6 cm wide, thick, stiff, leathery, dark green, sometimes with reddish or purplish suffusions; apex unequally emarginate. *Racemes* 25-55 cm long, 20-40-flowered, arcuate. *Peduncle* $\frac{1}{4}$ - $\frac{1}{3}$ the length of the peduncle, 8-16 cm long, 3-4 mm wide, dark green or reddish, smooth. *Flowers* crowded, thick and fleshy, 35-55 mm long, 35-50 mm across, creamy yellow to yellow, fragrant, sometimes not opening widely. *Dorsal sepal* erect, oblong, 22-30 mm long, 4-5 mm wide, subacute. *Lateral sepals* divergent, strongly falcate, 16-25 mm long, 4-6 mm wide, broadest at the base (7-9 mm wide), subacute. *Petals* porrect to spreading, linear-oblong, shallowly falcate, 20-28 mm long, 2.5-3.5 mm wide, subacute. *Labellum* shallowly curved, 9-13 mm long, 9-12 mm wide, cream with purple flecks and lines, densest towards the base, 3-lobed, a short narrow gap between the lateral lobes and midlobe short and narrow; lateral lobes erect, incurved, c. 4 mm wide, outer margins curved; midlobe recurved, transversely ovate when flattened, apex truncate to apiculate. *Callus* consisting of a single yellow ridge c. 4 mm long, extending as a thin line to the labellum apex. *Column* porrect from the end of the ovary, c. 4 mm long, c. 2.5 mm wide, with short apical wings; foot 5-6 mm long. *Anther* c. 1.5 mm long, c. 2 mm wide. *Stigma* c. 1.5 mm across. *Pollinia* orange.

Distribution and ecology: Occurs in central Queensland on the Blackdown Tableland and in the Carnarvon Gorge, Expedition Range and Mt Moffat region. It grows on cliff faces and escarpments of sandstone origin, usually in relatively sheltered sites, sometimes exposed. Alt. 500-800 m. Flowering: August to October.

Recognition: Recognised by the following combination of characters: roots spreading only; pseudobulbs tapered, 15-22 x 2-3 cm, round in cross-section; leaves 1-3, erect, 8-16 x 3-6 cm;

racemes 25-55 cm long, arching; peduncle $\frac{1}{4}$ - $\frac{1}{2}$ the length of the raceme, 3-4 mm wide, smooth; flowers 20-40, crowded, 35-55 x 30-50 mm, thick and fleshy, creamy yellow to yellow; labellum 9-13 x 9-12 mm, apex truncate to apiculate; gap between the labellum lateral lobes and the midlobe short and narrow.

Notes: In this species the new growth and young leaves often have dark purple colouration.

Conservation status: Of sporadic and disjunct distribution but locally common and well conserved in National Parks.

Etymology: The Latin *coriaceus*, thick and leathery, in reference to the leathery pseudobulbs, leaves and fleshy flowers.

4. *Thelychiton curvicaulis* (F.M.Bailey) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 491 (2002); *Dendrobium speciosum* Sm. var. *curvicaule* F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 14: 12 (1896); *Dendrobium curvicaule* (F.M.Bailey) M.A.Clem. & D.L.Jones, *Austral. Orch. Res.* 1: 51 (1989).

Type: Cultivated Bowen Park, Brisbane ex 'Lady Elliot's Island', Sep., [*F.M.Bailey?*] (holo BRI!).

Dendrobium speciosum [var. *fragrans* R.Br.] *sensu* R.Br., *Prod.* 332 (1810), *pro parte*. Type: '(J.T.) v.v.' [Tropical Australia, Port II (Port Clinton, Queensland), *R.Brown s.n.*] (lectotype BM!), *fide* Clements (1989).

Description: *Epiphyte* forming small to moderate sized sprawling to erect clumps. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* mainly erect, cylindrical, fusiform or slightly tapered, 10-70 cm long, 1-2 cm wide, straight or more often curved, especially the smaller older pseudobulbs, consisting of 5-6 nodes, ellipsoid to nearly oblong in cross-section with the edges bluntly pointed, green to reddish, shallowly to deeply ribbed/furrowed, new growths covered with white sheaths. *Leaves* terminal, erect to spreading, 1-3 per pseudobulb, narrowly elliptic, 8-15 cm long, 3-4.5 cm wide, dark green adaxially, lighter green abaxially, moderately thick-textured, leathery; apex unequally emarginate. *Racemes* 25-45 cm long, 25-45-flowered. *Peduncle* 10-16 cm long, 2-3 mm wide, dark green, smooth. *Sterile bracts* 4-5, basal bracts imbricate, rest well spaced, all tubular except for the uppermost bract which is sometimes partially free. *Fertile bracts* subulate, 2-3 mm long. *Pedicels* c. 2 cm long. *Ovary* at an angle to the pedicel. *Flowers* not crowded, 20-30 mm long, 20-30 mm across, white or cream, fragrant. *Perianth segments* widely spreading, thick textured. *Dorsal sepal* erect, oblong or tapered, 18-27 mm long, 3-4 mm wide, obtuse. *Lateral sepals* divergent, falcate, oblong-tapered, 15-22 mm long, 4-5 mm wide, broadest at the base (6-8 mm wide), obtuse. *Petals* porrect to spreading, linear-oblong, 15-20 mm long, 2-3 mm wide, falcate, subacute. *Labellum* shallowly curved, 11-13 mm long, 9-11 mm wide, white or cream with reddish-purple

flecks and lines, especially towards the base, 3-lobed, a very wide wedge-shaped gap between the lateral lobes and the midlobe; lateral lobes erect and incurved, c. 4 mm wide, outer margins truncate; midlobe recurved, transversely elliptic to transversely ovate when flattened; apex acute to apiculate. *Callus* consisting of a single yellow ridge c. 5 mm long, tallest near the middle, extending as 2 thin lines to the labellum apex. *Column* porrect from the end of the ovary, mostly reddish, c. 4 mm long, c. 2 mm wide, with short apical wings; foot 4-5 mm long. *Anther* c. 1.5 mm long, c. 1.6 mm wide. *Stigma* c. 1.4 mm across. *Pollinia* orange.

Distribution and ecology: Widely distributed in north-eastern Queensland more or less between Mossman and Paluma. The species grows on trees or rocks in or close to rainforest and extends from the coastal lowlands to relatively high altitudes in the ranges and tablelands. In the lowlands the species generally grows in gallery forest close to streams. Alt. 20-1200 m. Flowering: August and September.

Recognition: Recognised by the following combination of characters: roots spreading only; pseudobulbs cylindrical, fusiform or slightly tapered, 10-30 x 1-2 cm, ellipsoid to oblong in cross-section; leaves 1-3, erect to spreading, 8-15 x 3-4.5 cm; racemes 25-45 cm long; peduncle $\frac{1}{2}$ - $\frac{1}{2}$ the length of the raceme, 2-3 mm wide, smooth; flowers 20-30 x 20-30 mm, not crowded, white or cream; labellum 11-13 x 9-11 mm, apex pointed; gap between lateral lobes and midlobe deep and wide.

Notes: This species, which generally forms relatively small clumps, has a confused history and remains poorly known, although it is relatively widespread and can sometimes be locally common. It has been commonly, but wrongly, linked by orchid growers with *T. spectabilis* which has much larger pseudobulbs and crowded racemes of large light yellow flowers. Much of the confusion over the identification of this species has arisen from the type citation which was given by Bailey as "cultivated at Bowen Park, Brisbane, ex Lady Elliotts Island". This is a mistake as there are no members of the *T. speciosus* group to be found on this island.

Conservation status: Relatively widespread, common and conserved in several National Parks.

Etymology: The Latin *curvicaulis*, curved stems, a reference to curved pseudobulbs; the pseudobulb on the type specimen is curved but this is not a reliable character for identification of the species.

Footnote: The selection of a neotype of *Dendrobium speciosum* var. *curvicaule* by Adams et al. [Adams, P.B., Bourke, J.M. and Lawson, S.D. (2006b). *Dendrobium speciosum* (Dendrocoryne:

Orchidaceae) complex in north Queensland, *Austral. Syst. Bot.* 19: 259-271.] was superfluous since an extant type exists [specimen AQ 23080 at BRI]. We have examined this specimen and although it is in poor condition and is from an erroneous locality, we concur with Clemesha (1981a) about its identity. Interestingly Adams in 1991 also agreed with Clemesha's interpretation of the type as evidenced by his own photo on page 125 of Adams (1991).

5. *Thelychiton epiphyticus* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. specioso* (Sm.) M.A.Clem. & D.L.Jones, sed habitu epiphytico praecipue; pseudobulbis longis (50-80 cm), cylindricatis; foliis longioribus (20-40 cm); pedunculo c. $\frac{1}{3}$ longitudine racemi, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 25 Nov. 2004, *D.L.Jones 19361* (holo CANB; iso MEL, NSW). Provenance: originally collected at Cambewarra Mountain, New South Wales, 30 Aug. 2001, *T.Golson 65*.

Description: *Epiphyte* forming large erect clumps, occasionally a lithophyte. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* erect, usually cylindrical, sometimes tapered (lithophytes) 50-80 cm long, 2.5-5 cm wide, consisting of 7-9 nodes, straight or curved, round in cross-section, green, deeply ribbed/furrowed, new growths covered with white sheaths. *Leaves* terminal, spreading, 2-5 per pseudobulb, narrowly elliptical to obovate, 20-40 cm long, 6-8 cm wide, dark green adaxially, lighter green abaxially, thick-textured, leathery, often curved or partly twisted; apex unequally emarginate. *Racemes* arcuate, 25-45 cm long, 25-50-flowered. *Peduncle* c. $\frac{1}{3}$ the length of the raceme, 9-14 cm long, 4-6 mm wide, dark green, usually shallowly furrowed (sometimes obscure). *Sterile bracts* 3-5; basal bracts imbricate and tubular, distal bracts free. *Fertile bracts* ovate, 4-5 mm long. *Pedicels* 2.5-3 cm long. *Ovary* at an angle to the pedicel. *Flowers* moderately crowded, 40-50 mm long, 30-40 mm across, cream to pale yellow, strongly fragrant. *Perianth segments* widely spreading, thick textured. *Dorsal sepal* erect, oblong, 25-35 mm long, 4-5 mm wide, obtuse. *Lateral sepals* divergent, falcate, oblong-tapered, 20-25 mm long, 4.5-5.5 mm wide, broadest at the base (6-8 mm wide), subacute. *Petals* spreading, linear-oblong, 22-30 mm long, 3-4 mm wide, falcate, subacute. *Labellum* porrect, shallowly curved, 11-15 mm long, 11-13 mm wide, cream with reddish-purple flecks and lines, especially towards the base, 3-lobed, a narrow shallow gap between the lateral lobes and the midlobe; lateral lobes erect and incurved, c. 5 mm wide, outer margins shallowly curved, sometimes nearly square; midlobe recurved, ovate when flattened, apex mucronate to acute. *Callus* consisting of a single yellow ridge 5-6 mm long, tallest near the middle, extending as a thin line to the labellum apex. *Column* porrect from the end of the ovary, cream with purplish flecks, c. 5 mm long, c. 3.5 mm wide, with short apical wings; foot c. 5 mm long. *Anther* c. 1.6 mm long, c. 2 mm wide. *Stigma* c. 2 mm across. *Pollinia* orange.

Distribution and ecology: Restricted to some high peaks and the vicinity of waterfalls on parts of the escarpment in the Illawarra Region of south-eastern New South Wales. The species usually grows on trees in tall moist to wet forest, including rainforest, but also occurs on cliff faces close to waterfalls. Alt. 400-700 m. Flowering: September-November.

Recognition: Recognised by the following combination of characters: roots spreading only; pseudobulbs usually cylindrical, sometimes tapered (lithophytes), 50-80 x 2.5-5 cm, deeply furrowed, round in cross-section; leaves 2-5, spreading, 20-40 x 6-8 cm; racemes 25-45 cm long, arching; peduncle about $\frac{1}{3}$ the length of the raceme, 4-6 mm wide, usually furrowed; flowers 20-50, crowded, 40-50 x 30-40 mm, cream to pale yellow; labellum 11-15 x 11-13 mm, apex rounded; gap between the labellum lateral lobes and the midlobe short and narrow.

Notes: This species has been generally included with *T. speciosus* which is almost exclusively lithophytic with broad strongly tapered pseudobulbs 10-40 cm long and the racemes lacking an obvious peduncle or with a very short peduncle.

Conservation status: Restricted, sometimes locally common and conserved in National Parks.

Etymology: The Latin *epiphyticus*, growing on other plants.

6. *Thelychiton pedunculatus* (Clemesha) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 491 (2002); *Dendrobium speciosum* Sm. var. *pedunculatum* Clemesha, *Orchadian* 6(11): 261 (1981); *Dendrobium pedunculatum* (Clemesha) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 1: 58 (1989).

Type: Cultivated Coffs Harbour, 26 Aug. 1980, *S.C.Clemesha* ex 'Bones Knob via Atherton', *B.Gray s.n.* (holo NSW!; iso BRI!).

Description: *Lithophyte* forming small clumps. *Roots* spreading from the base, not erect. *Pseudobulbs* swollen at the base and tapered upwards, 5-15 cm long, 2.5-4 cm wide, straight or curved, round in cross-section, tough and fibrous, green or yellowish with purple suffusions, when young covered with white to purple papery bracts. *Leaves* apical, erect to spreading, 2-3, elliptical to ovate, 5-15 cm long, 2.5-5 cm wide, thick and leathery, dark green, reddish or purplish. *Racemes* usually erect, 25-50 cm long, 10-30-flowered. *Peduncle* $\frac{1}{2}$ - $\frac{2}{3}$ the length of the raceme, 2-3 mm wide, smooth, purplish. *Flowers* 30-45 mm long, 25-40 mm across, white, cream, crowded, fragrant. *Perianth segments* narrow, widely spreading, thick and fleshy. *Dorsal sepal* obliquely erect, oblong, 15-25 mm long, 4-5 mm wide. *Lateral sepals* divergent, 13-18 mm long, 5-8 mm wide, strongly falcate. *Petals* erect or incurved, linear-oblong, 15-20 mm long, 1.5-2 mm wide. *Labellum* porrect, 8-10 mm long, 7-8 mm wide,

curved, streaked with reddish purple, 3-lobed; gap between lateral lobes and midlobe deep and narrow; lateral lobes erect, column-embracing, blunt; midlobe narrower than the lateral lobes; apex strongly apiculate. *Callus* a single central yellow ridge. *Column* porrect from the end of the ovary, c. 4 mm long, c. 2 mm wide, with short apical wings; foot 3.5-4 mm long, curved. *Anther* 1 mm long, c. 1.8 mm wide. *Stigma* c. 1 mm across. *Pollinia* orange.

Distribution and ecology: Restricted to north-eastern Qld where occurring on the western slopes between Mount Windsor Tableland and the Evelyn Tableland. It grows on rocks and rock faces in exposed situations in open forest. Alt. 850-1200 m. Flowering: July to August.

Recognition: Recognised by the following combination of characters; plants dwarfed; roots spreading only; pseudobulbs broad at the base then tapered, 5-15 x 2.5-4 cm, round in cross-section; leaves 2-3, erect to spreading, 5-15 x 2.5-5 cm; racemes 25-50 cm long, erect; peduncle $\frac{1}{2}$ - $\frac{2}{3}$ the length of the raceme, 2-3 mm wide, smooth, purplish; flowers 10-30, crowded, 30-45 x 25-40 mm, white or cream; labellum 8-10 x 7-8 mm, apex strongly apiculate; gap between lateral lobes and midlobe deep and narrow; callus ridge single.

Notes: Plants of this species have stiffly erect leaves and the racemes are usually erect with a distinctive long peduncle. Each pseudobulb usually produces only a single inflorescence from the apex (rarely 2 on robust plants). New growths are often stained with purple or dark red tones and the capsules are also purplish.

Conservation status: Although relatively widespread this species is disjunct and consists mainly of small localised colonies that are vulnerable to overcollection; suggest 2VR by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *pedunculatus*, stalk or peduncle, in reference to the particularly long peduncle in this species.

7. *Thelychiton rex* (M.A.Clem. & D.L.Jones) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 492 (2002); *Dendrobium rex* M.A.Clem. & D.L.Jones, *Austral. Orch. Res.* 1: 58 (1989); *Dendrobium speciosum* Sm. var. *grandiflorum* F.M.Bailey, *Bot. Bull. Dept. Agric. Queensland* 14: 12 (1896); *Dendrobium speciosum* Sm. var. *hillii* F.M.Bailey forma *grandiflorum* (F.M.Bailey) F.M.Bailey, *Queensl. fl.* 5: 1526 (1902).

Type: Cultivated Bowen Park, Brisbane, Sep. 1896, *F.M.Bailey* ex 'Eumundi', Sep. 1894, [*Anon s.n.*] (holo BRI!).

Description: *Epiphyte* or *lithophyte* forming medium to large coarse clumps. *Roots* both erect and spreading from the base. *Pseudobulbs* evenly cylindrical,

sometimes tapered (lithophytes), 50-180 cm long, 2.5-4 cm wide, usually straight, round in cross-section, tough and fibrous, green or yellowish, when young covered with white papery bracts. *Leaves* apical, spreading, 2-5, elliptical to obovate, 10-25 cm long, 5-8 cm wide, thick and leathery, dark green. *Racemes* arching, 40-80 cm long, 50-150-flowered. *Peduncle* absent. *Flowers* 45-70 mm long, 55-80 mm across, light yellow to golden, crowded, fragrant. Perianth segments narrow, widely spreading, thin but fleshy. *Dorsal sepal* obliquely erect, oblong, 30-45 mm long, 4-6 mm wide. *Lateral sepals* divergent, 25-30 mm long, 7-9 mm wide, strongly falcate. *Petals* erect or incurved, linear-oblong, 25-35 mm long, 3-3.5 mm wide. *Labellum* porrect, 10-13 mm long, 10-12 mm wide, curved, spotted or streaked with reddish purple, 3-lobed; gap between lateral lobes and midlobe short and broad; lateral lobes erect, column-embracing, blunt; midlobe slightly narrower than the lateral lobes; apex truncate. *Callus* of 3 central yellow ridges. *Column* porrect from the end of the ovary, c. 5.5 mm long, c. 2.5 mm wide, with short apical wings; foot c. 4-4.5 mm long, curved. *Anther* 1.7 mm long, c. 2 mm wide. *Stigma* c. 2 mm across. *Pollinia* orange.

Distribution and ecology: Distributed in central-eastern and south-eastern Qld more or less between Mt Larcom and the Calliope Range east of Biloela to the Bunya Mountains and Conondale. This species, which forms large bulky clumps with an upright growth habit, grows on trees, boulders and cliffs on ridges and slopes in rainforest and in streamside vegetation. Alt. 100-600 m alt. Flowering: August to October.

Recognition: Recognised by the following combination of characters; roots both erect and spreading; pseudobulbs cylindrical (tapered in lithophytes), 50-180 x 25-40 cm, round in cross-section; leaves 2-5, spreading, 10-25 x 5-8 cm; racemes 40-80 cm long, arching; peduncle absent; flowers 50-150, crowded, 45-70 x 55-80 mm, light yellow to golden; labellum 10-13 x 10-12 mm, apex truncate; gap between lateral lobes and midlobe short and broad.

Conservation status: Widespread, locally common and conserved in National Parks.

Etymology: The Latin *rex*, monarch, king.

8. *Thelychiton rupicola* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. pedunculato* (Clemesha) M.A.Clem. & D.L.Jones, sed pseudobulbis longioribus (15-24 cm long); pedunculo tumidiore (3-5 mm lato), longitudinem rachidis circa aequanti; floriis non stipitatis, crebrioribus (30-50), differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 15 Oct. 1998, *D.L.Jones 19362* (holo CANB; iso AD, BRI, MEL, NSW). Provenance: originally collected from Blencoe Falls, Kirrima Range, Queensland, 19 May 1989, *D.L.Jones 4129 & M.A.Clements*.

Description: *Lithophyte* forming small to moderate sized erect clumps. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* erect, broad at the base then tapered, 15-24 cm long, 3-4 cm wide, consisting of 4-6 nodes, usually straight, ellipsoid in cross-section with blunt edges, green to reddish or purplish, shallowly ribbed/furrowed; new growths covered with white sheaths. *Leaves* terminal, 1-3 per pseudobulb, narrowly elliptic, 10-18 cm long, 4-8 cm wide, dark green and slightly pruinose adaxially, lighter green or purplish abaxially, thick-textured, leathery; apex unequally emarginate. *Racemes* erect to arcuate, 30-55 cm long, 30-50-flowered. *Peduncle* $\frac{1}{3}$ - $\frac{1}{2}$ the length of the raceme, 15-25 cm long, 3-5 mm wide, light green, smooth. *Sterile bracts* 4-5; basal 2-3 bracts imbricate and tubular, rest well spaced and free. *Fertile bracts* ovate, c. 1 mm long. *Pedicels* 2-2.5 cm long. *Ovary* at a shallow angle to the pedicel. *Flowers* irregularly arranged, not crowded, 30-35 mm long, 20-25 mm across, white, fragrant. *Perianth segments* widely spreading, moderately thick textured. *Dorsal sepal* erect, oblong, 18-24 mm long, 4-5 mm wide, obtuse. *Lateral sepals* divergent, falcate, oblong-tapered, 16-20 mm long, 4-5 mm wide, broadest at the base (6-8 mm wide), obtuse. *Petals* porrect to spreading, linear-oblong, 18-23 mm long, 2.5-3.5 mm wide, falcate, subacute. *Labellum* porrect, shallowly curved, 9-11 mm long, 9-10 mm wide, white or cream with purple flecks and lines, especially towards the base, 3-lobed, a deep narrow gap between the lateral lobes and the midlobe; lateral lobes erect and incurved, c. 4 mm wide, outer margins curved; midlobe recurved, transversely elliptic when flattened, apex truncate, apiculate. *Callus* consisting of a single yellow ridge c. 5 mm long, tallest towards the apex, extending as a thin line to the labellum apex. *Column* porrect from the end of the ovary, mostly reddish, c. 4 mm long, c. 4 mm wide, with short apical wings; foot 4-5 mm long. *Anther* c. 1.8 mm long, c. 2 mm wide. *Stigma* c. 1.6 mm across. *Pollinia* orange.

Distribution and ecology: Widely but disjunctly distributed in north-eastern Queensland between the Mt Windsor Tableland and Mt Elliot near Townsville, possibly extending south to near Sarina. This species grows in the ranges and tablelands on boulders, cliffs and escarpments in situations ranging from relatively sheltered to fully exposed. Alt. 400-800 m. Flowering: August to October.

Recognition: Recognised by the following combination of characters: roots spreading; pseudobulbs broad at the base then tapered, 15-24 x 3-4 cm, ellipsoid in cross-section; leaves 1-3, erect, 10-18 x 4-8 cm; racemes 30-55 cm long, erect to arching; peduncle $\frac{1}{3}$ - $\frac{1}{2}$ the length of the raceme, 3-5 mm wide, smooth; flowers 30-50, not crowded, 30-35 x 20-25 mm, white; labellum 9-11 x 9-10 mm, apex truncate; gap between the labellum lateral lobes and the midlobe short and narrow.

Notes: This species, which grows on boulders and rock outcrops, is of sporadic distribution. It is most similar to *T. pedunculatus* which has very small (5-15 cm long), tapered pseudobulbs and a

thinner (2-3 mm wide) often purplish peduncle that can be up to $\frac{2}{3}$ the length of the raceme and bearing 10-30 crowded flowers. Plants of *T. rupicola* from some areas, such as higher parts of the Atherton Tableland, often have reddish new growth and young leaves.

Conservation status: Relatively widespread, locally common and conserved in National Parks.

Etymology: Derived from the Latin *rupes*, rock and *-cola*, dwelling, in reference to its lithophytic growth habit.

9. *Thelychiton speciosus* (Sm.) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 492 (2002); *Dendrobium speciosum* Sm., *Exotic Bot.* 1: 17, t. 10 (1804); *Callista speciosa* (Sm.) Kuntze, *Revis. gen. pl.* 2: 655 (1891); *Dendrocoryne speciosum* (Sm.) Brieger, Schlechter *Die Orchideen* 3(1): 724 (1981); *Tropilis speciosa* (Sm.) Butzin, *Willdenowia* 12(2): 250 (1982); *Tropilis speciosa* (Sm.) Rauschert, *Feddes Repert.* 94(7-8): 471 (1983), *nom. illeg.*

Type: Port Jackson, New South Wales, *J.White in herb. J.E.Smith 1404.6 and 7* (holo LINN!).

Description: *Lithophyte*, rarely an *epiphyte*, forming medium to large, coarse clumps. *Roots* usually spreading from the base, rarely erect. *Pseudobulbs* swollen at the base and tapered upwards, 10-40 cm long, 3-6 cm across, straight or curved, round in cross-section, tough and fibrous, green or yellowish, when young covered with white papery bracts. *Leaves* apical, spreading, 2-5, elliptical to obovate, 10-25 cm long, 4-8 cm wide, thick and leathery, dark green. *Racemes* arching, 20-60 cm long, 30-100-flowered. *Peduncle* very short or absent. *Flowers* 45-65 mm long, 40-52 mm across, usually dull yellow, sometimes white or cream, crowded, fragrant. *Perianth segments* narrow, widely spreading, thick and fleshy. *Dorsal sepal* obliquely erect, oblong, 25-33 mm long, 4-6 mm wide. *Lateral sepals* divergent, 20-25 mm long, 7-9 mm wide, strongly falcate. *Petals* erect or incurved, linear-oblong, 20-30 mm long, 1.5-3 mm wide. *Labellum* porrect, 10-15 mm long, 10-13 mm wide, curved, spotted or streaked with reddish purple, 3-lobed; gap between lateral lobes and midlobe short and narrow; lateral lobes erect, column-embracing, blunt; midlobe narrower than the lateral lobes; apex broadly rounded to truncate. *Callus* of 3 central yellow ridges. *Column* porrect from the end of the ovary, 4-5 mm long, c. 2.5 mm wide, with short apical wings; foot 4-4.5 mm long, curved. *Anther* 1.5 mm long, c. 2 mm wide. *Stigma* c. 1.3 mm across. *Pollinia* orange.

Distribution and ecology: Distributed from Bulahdelah in central-eastern NSW to Cann River in eastern Vic, mainly in coastal and near-coastal localities but in NSW extending inland to near Mudgee. This species grows almost exclusively on rocks, boulders, gorges, escarpments and cliff faces, especially sandstone formations. Plants are often found in very

exposed situations but also occur in the shade. Alt. 0-800 m. Flowering: August to October.

Recognition: Recognised by the following combination of characters; roots spreading; pseudobulbs broad at the base and tapered upwards, 10-40 x 3-6 cm, round in cross-section; leaves 2-5, spreading, 10-25 x 4-8 cm; racemes 20-60 cm long; peduncle very short or absent; flowers 30-100, crowded, 45-65 x 40-52 mm, dull yellow, white or cream; labellum 10-15 x 10-13 mm, apex broadly rounded to truncate; gap between lateral lobes and midlobe short and narrow.

Conservation status: Widespread, common and conserved in National Parks and other reserves.

Etymology: The Latin *speciosus*, showy, in reference to the impressive floral displays.

10. *Thelychiton spectabilis* D.L.Jones & M.A.Clem., *sp. nov.*; affinis *T. rex* (M.A.Clem. & D.L.Jones) M.A.Clem. & D.L.Jones, sed radicibus spargentibus; racemis pedunculo profunde sulcato, brevibus (7-9 cm), crasso (0.8-1 cm); floriis cremeis ad flaveolis, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 19 Aug. 2005, *D.L.Jones 19363* (holo CANB; iso BRI, MEL, NSW). Provenance: originally collected from Cockies Creek State Forest, south-west of Eungella, Queensland, 17 June 1993, *D.L.Jones 11645*, *C.H.Broers & S.Pearson*.

Description: *Epiphyte* or *lithophyte* forming large erect clumps. *Roots* spreading, not erect and litter-collecting. *Pseudobulbs* erect, usually cylindrical to slightly fusiform, sometimes tapered (lithophytes), 20-55 cm long, 2-4 cm wide, consisting of 6-8 nodes, usually straight, ellipsoid in cross-section, yellowish green, deeply ribbed/furrowed; new growths covered with white sheaths. *Leaves* terminal, 1-3 per pseudobulb, oblong to elliptic, 16-40 cm long, 5-9 cm wide, dark green and somewhat pruinose adaxially, bright green beneath, thick-textured, leathery; apex unequally emarginate. *Racemes* 25-55 cm long, arcuate, 150-250-flowered. *Peduncle* 7-9 cm long, 0.8-1 cm wide, bright green, deeply ribbed/furrowed. *Sterile bracts* 3-4, restricted to the base, tubular, imbricate. *Fertile bracts* subulate, 4-5 mm long. *Pedicels* 3.5-4 cm long. *Ovary* at right angles to the pedicel. *Flowers* densely crowded, 55-75 mm long, 60-75 mm across, creamy yellow to pale yellow, fragrant. *Perianth segments* widely spreading, thin textured. *Dorsal sepal* erect, oblong-tapered, 30-50 mm long, 4-7 mm wide, obtuse. *Lateral sepals* divergent at the base then incurved and often crossed, oblong-tapered, 23-35 mm long, 5-6 mm wide, broadest at the base (7-9 mm wide), obtuse. *Petals* spreading, linear-oblong, 25-40 mm long, 3-4 mm wide, subacute. *Labellum* shallowly curved, 10-12 mm long, 10-12 mm wide, cream with purple flecks, 3-lobed, a broad gap between the lateral lobes and the midlobe; lateral lobes erect and incurved,

c. 5.5 mm wide, outer margins curved; midlobe recurved, transversely oblong when flattened, apex truncate. *Callus* a single yellow ridge 6-7 mm long, tallest near the middle, extending as a thin line to the labellum apex. *Column* porrect from the end of the ovary, cream with purplish flecks, c. 5.5 mm long, c. 4 mm wide, with short blunt wings; foot c. 5 mm long, curved, similar colouration to the column, with a yellow apical area. *Anther* c. 1.8 mm long, c. 2 mm wide. *Stigma* c. 2 mm across. *Pollinia* orange.

Distribution and ecology: Restricted to the peaks and ranges around Eungella, west of Mackay. This species, which is locally common, grows high on trees in rainforest and on tall she-oaks on sheltered slopes and near streams in tall open forest. It also colonises cliffs and boulders. Alt. 700-1250 m. Flowering: August to October.

Recognition: Recognised by the following combination of characters: roots spreading; pseudobulbs usually cylindrical to slightly fusiform, sometimes tapered (lithophytes), 20-60 x 2-4 cm, deeply furrowed, ellipsoid in cross-section; leaves 1-3, spreading, 16-40 x 5-9 cm; racemes 25-55 cm long, arching; peduncle less than ¼ the length of the raceme, 8-10 mm wide, deeply furrowed; flowers 150-250, densely crowded, 55-75 x 60-75 mm, creamy yellow to pale yellow; labellum 10-12 x 10-12 mm, apex truncate; gap between the labellum lateral lobes and the midlobe short and broad.

Notes: *Thelychiton spectabilis* is most similar to *T. rex* which has erect litter-trapping roots, racemes without an obvious peduncle and large (4.5-7 x 5.5-8 cm) creamy yellow to bright yellow flowers. Because of its spectacular floral displays this species is popular with orchid growers who have mostly wrongly identified it as *T. curvicaulis*. The latter species, which is nowhere near as showy in flower, has a long, thin smooth peduncle and small cream or white flowers. It is restricted to rainforests between Mossman and Paluma in north-eastern Queensland. Plants from some coastal areas near Mackay have much shorter pseudobulbs than those from the mountains but share the thick ribbed peduncle and showy displays of large crowded creamy yellow to pale yellow flowers. These may be best treated at infraspecific rank.

Conservation status: Localised but common and conserved in Eungella National Park.

Etymology: The Latin *spectabilis*, notable, showy, in reference to the floral displays of this species.

11. *Thelychiton tarberi* (M.A.Clem. & D.L.Jones) M.A.Clem. & D.L.Jones, *Orchadian* 13(11): 492 (2002); *Dendrobium tarberi* M.A.Clem. & D.L.Jones, *Austral. Orch. Res.* 1:

62 (1989); *Dendrobium hillii* Hook.f., *Bot. Mag.* 87: t. 5261 (1861), *nom. illeg., non* F.Muell. (1859); *Dendrobium speciosum* Sm. var. *hillii* Anon, *Gard. Chron.* (new ser.), 7: 112, f. 18 (1877); *Dendrobium speciosum* Sm. forma *hillii* Domin, *Beitr. Fl. Pflanzenk.* 539 (1915); *Dendrocoryne speciosa* (Sm.) Brieger var. *hillii* (Hook.f.) Brieger, Schlechter *Die Orchideen* 3(1): 725-6 (1981), *nom. invalid.*

Type: Cult. Royal Botanic Gardens, Kew ex 'Moreton Bay', *W.Hill s.n.* (holo K!).

Description: *Epiphyte* or *lithophyte* forming medium to large coarse clumps with an erect habit. Roots both erect and spreading from the base. *Pseudobulbs* cylindrical, rarely tapered (lithophytes), 40-90 cm long, 2-4 cm wide, straight, round in cross-section, tough and fibrous, green or yellowish, when young covered with white papery bracts. *Leaves* apical, spreading, 2-5, elliptical to obovate, 10-25 cm long, 4-7 cm wide, thick and leathery, dark green. *Racemes* arching, 20-60 mm long, 70-200-flowered. Peduncle absent. *Flowers* 35-50 mm long, 30-50 mm across, white or cream, crowded, strongly fragrant. *Perianth segments* narrow, widely spreading, thin but fleshy. *Dorsal sepal* obliquely erect, oblong, 15-30 mm long, 3-4 mm wide. *Lateral sepals* divergent, 12-25 mm long, 4-7 mm wide, falcate. *Petals* erect or incurved, linear-oblong, 15-27 mm long, 1.5-2.5 mm wide. *Labellum* porrect, 6-10 mm long, 7-9 mm wide, curved, spotted or streaked with reddish purple, 3-lobed; gap between lateral lobes and midlobe short and broad; lateral lobes erect, column-embracing, blunt; midlobe narrower than the lateral lobes; apex broadly rounded to truncate. *Callus* consisting of 3 central yellow ridges. *Column* porrect from the end of the ovary, c. 5 mm long, c. 2.3 mm wide, with short apical wings; foot c. 4 mm long, curved. *Anther* 1.5 mm long, c. 1.8 mm wide. *Stigma* c. 1 mm across. *Pollinia* orange.

Distribution and ecology: Distributed more or less from near Maleny in south-eastern Qld to Mangrove Mountain in central NSW and extending inland to the Darling Downs. A very common species that grows on trees, boulders and cliffs in moist open forest and rainforest, sometimes forming huge clumps metres across. Alt. 50-1200 m. Flowering: August to October.

Recognition: Recognised by the following combination of characters; roots both erect and spreading; pseudobulbs mostly cylindrical, 40-90 x 2-4 cm, round in cross-section; leaves 2-5, spreading, 10-25 x 4-7 cm; racemes 20-60 cm long, arching; peduncle absent; flowers 70-200, crowded, 35-50 x 30-50 mm, white or cream; labellum 6-10 x 7-9 mm, apex broadly rounded to truncate; gap between lateral lobes and midlobe short and broad.

Notes: Plants growing on boulders in parts of the Darling Downs have few erect litter-trapping roots and shorter pseudobulbs than usual which

can be narrowly tapered and the inflorescences are shorter with less-crowded flowers.

Conservation status: Widespread, common and conserved in National Parks and other reserves.

Etymology: The species was known by the Aborigines around Brisbane as "Tar Beri".

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Species	root habit	common pseudobulb shape	pseudobulb length (cm)	pseudobulb width (cm)	leaf number per pseudobulb	common leaf attitude	leaf length (cm)	leaf width (cm)	raceme length (cm)	peduncle length (cm)	peduncle/raceme ratio
<i>T.biconvexus</i>	spreading	fusiform	20-40	3.5-5	2-4	spreading	20-30	6-9	25-75	10-30	1/3 -1/2
<i>T.capricornicus</i>	spreading	cylindrical	7-15	2-3	1-3	erect	10-18	4-8	30-55	10-25	1/3 – ½
<i>T.coriaceus</i>	spreading	tapered	15-22	2-3	1-3	erect	8-16	3-6	25-55	8-15	1/3
<i>T.curvicaulis</i>	spreading	cylindrical	10-70	1-2	1-3	erect/ spreading	8-15	3-4.5	25-45	8-22	1/3 – ½
<i>T.epiphyticus</i>	spreading	cylindrical	50-80	2.5-5	2-5	spreading	20-40	6-8	25-45	8-15	1/3
<i>T.pedunculatus</i>	spreading	tapered	5-15	2.5-4	1-3	erect	5-15	2.5-5	25-50	12-30	½ -2/3
<i>T.rex</i>	erect and spreading	cylindrical	50-180	2.5-4	2-5	spreading	10-25	5-8	40-80	0-3	1/11 – 1/25
<i>T.rupicola</i>	spreading	tapered	15-24	3-4	1-3	erect	10-18	4-8	30-55	10-25	1/3 – ½
<i>T.speciosus</i>	spreading	tapered	15-40	3-6	2-5	spreading	10-25	4-8	20-60	0-5	¼ - 1/12
<i>T.spectabilis</i>	spreading	cylindrical	20-55	2-4	2-5	spreading	16-40	5-9	25-55	0-5	1/5 – 1/10
<i>T.tarberi</i>	erect and spreading	cylindrical	40-90	2-4	2-5	spreading	10-25	4-7	20-60	0-5	¼ - 1/12

Species	peduncle thickness (mm)	peduncle surface	flower number/raceme	flower length (flattened) (mm)	flower width (flattened) (mm)	common flower colour	labellum side gap (flattened)
<i>T.biconvexus</i>	7-8	smooth	40-75	45-55	35-40	white/cream	deep/wide
<i>T.capricornicus</i>	2-3	smooth	30-50	30-45	35-45	white	deep/wide
<i>T.coriaceus</i>	3-4	smooth	20-40	35-55	35-50	yellow	short/narrow
<i>T.curvicaulis</i>	2-3	smooth	25-45	20-30	20-30	white/cream	deep/wide
<i>T.epiphyticus</i>	7-10	ribbed	20-50	40-50	30-40	cream/pale yellow	short/narrow
<i>T.pedunculatus</i>	2-3	smooth	10-30	30-45	25-40	white/cream	deep/narrow
<i>T.rex</i>	6-8	ribbed	50-150	45-70	55-80	yellow	short/broad
<i>T.rupicola</i>	3-5	smooth	30-50	30-55	20-25	white	short/narrow
<i>T.speciosus</i>	7-10	ribbed	30-100	45-65	40-52	white/cream/yellow	short/narrow
<i>T.spectabilis</i>	8-10	ribbed	150-250	55-75	60-75	pale yellow	short/broad
<i>T.tarberi</i>	7-10	ribbed	70-200	35-50	30-50	white/cream	short/broad

Miscellaneous New Species of Australian Orchidaceae

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ABSTRACT

The following miscellaneous new taxa of Orchidaceae are described from Australia:- *Arachnorchis ampla*, *A. ancylosa*, *A. armata*, *A. branwhitei*, *A. cadyi*, *A. clavescens*, *A. cremna*, *A. cretacea*, *A. douglasiorum*, *A. ensigera*, *A. flindersica*, *A. fuliginosa*, *A. grampiana*, *A. leptochila* subsp. *dentata*, *A. orestes*, *A. oreophila*, *A. osmera*, *A. peisleyi*, *A. saxatilis*, *A. strigosa*, *A. whiteheadii*, *A. zephyra*, *Calochilus montanus*, *C. praeltus*, *C. pruinusos*, *C. pulchellus*, *C. sandrae*, *C. stramenicola*, *C. therophilus*, *C. uliginosus*, *Chiloglottis sphaerula*, *Corunastylis anthracina*, *Diteilis petricola*, *Diuris basaltica*, *D. curta*, *D. eborensis*, *D. eburnea*, *D. fucosa*, *D. gregaria*, *D. immaculata*, *D. protena*, *D. unica*, *Linguella timothyi*, *Luisia atacta*, *L. corrugata*, *Pterostylis aneba*, *cucullata* subsp. *sylvicola*, *P. crassichila*, *P. lustra*, *P. oblonga*, *P. riparia*, *P. subtilis*.

INTRODUCTION

The opportunity is taken to describe 54 new taxa of Orchidaceae from Australia.

MATERIALS AND METHODS

Descriptions of taxa were made from a range of sources including dried herbarium specimens, spirit preserved specimens stored in Bang mix, dissected floral cards, fresh specimens and 35 mm colour transparencies of flowers. I have seen the great majority of species in the field. Specimens were examined from the following herbaria: AD, BRI, CANB, CBG, HO, MEL, NSW, PERTH and P. Unless otherwise indicated, all types (or photographs thereof) and collections cited have been seen.

TAXONOMIC TREATMENT

Arachnorchis D.L.Jones & M.A.Clem.

An endemic genus of c. 134 named species and 18 subspecies. The genus is extraordinarily well developed in southern Australia and has generally been treated conservatively by botanists. The taxa from Western Australia have recently been revised (Hopper & Brown 2001) and there are many taxa from eastern Australia yet to be

named. Twenty one new species and one subspecies are described here.

The *Arachnorchis concolor* Complex

Caladenia concolor Fitzg. was described in 1882 from specimens collected in "granite hills around Albury, New South Wales" and illustrated by R.D.Fitzgerald in *Australian Orchids* 1(7): t.8 (1882). The type specimens have never been located and Fitzgerald's plate was designated as the lectotype (Clements 1989). In 1956 the species was reduced to a variety of *Caladenia patersonii* (Willis & Court 1956) and until 1991 most red-flowered spider orchids which lack tepaline clubs have been treated as either *C. concolor* or *C. patersonii* var. *concolor*. In 1991 *C. formosa* G.W.Carr (syn. *C. haemantha* D.L.Jones) was segregated from *C. concolor* (Carr 1991, Jones 1991). In 2001 the spider orchids were segregated from *Caladenia* as the genus *Arachnorchis* (Jones & Clements 2001). In this treatment *Arachnorchis concolor* and *A. formosa* are characterised and 3 new species with morphological similarities to *A. concolor* (Fitzg.) D.L.Jones & Clements (but not necessarily related) are described as new.

Key to Species

1. Osmophore cells in sepals and petals in moniliform chains of 3-4 cells, labellum with marginal teeth over most of its length.....5. *A. formosa*
Osmophore cells single (rarely in chains of 2 cells), labellum marginal teeth confined to the lateral lobes.....2
2. Sepals and petals 3-4 cm long, spreading stiffly, caudae relatively thick, but not club-like.....1. *A. concolor*
Sepals and petals 4.5-6.5 cm long, decurved or drooping, caudae thin or somewhat thickened and club-like.....3
3. Sepals and petals tapered to very thin caudae.....2. *A. branwhitei*
Sepals and petals ending in thickish caudae which are often somewhat clubbed.....4
4. Flowers cream to pink or light red, clubbed section of tepals blackish and contrasting with the rest of the flower (Burrinjuck area, NSW).....4. *A. orestes*
Flowers white, pink or dark red, thickened section of tepals hardly contrasting with the rest of the flower (Midlands, Vic).....3. *A. clavescens*

1. *Arachnorchis concolor* (Fitzg.) D.L.Jones & M.A.Clem., *Orchadian* 13(9): 393 (Oct. 2001); *Caladenia concolor* Fitzg., *Austral. Orch.* 1(7): [t. 8] (1882); *Caladenia patersonii* R. Br. Var. *concolor* (Fitzg.) J.H. Willis & Court, *Muelleria* 1: 45 (1956); *Calonema concolor* (Fitzg.) Szlach., *Polish Bot. J.* 46(1): 16 (2001), *nom. illeg.*; *Calonemorchis concolor* (Fitzg.) Szlach., *Polish Bot. J.* 46(2): 138 (31 Dec. 2001 [June 2002]). Type: 'Granite hills near Albury', Oct., *R.D.Fitzgerald s.n.* (holo not found; lectotype Fitzgerald's plate, *vide* Clements, 1989).

Description: Hirsute terrestrial *herb* growing singly or in small groups. *Leaf* linear-lanceolate, 8–15 cm long, 0.8–1 cm wide, dull green, base purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular, basal cell white. *Scape* 15–25 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes and short glandular trichomes. *Sterile bracts* spreading, narrowly obovate, 15–20 mm long, 3–4.5 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, elliptic, 15–20 mm long, 5–7 mm wide, acuminate, externally hirsute. *Flowers* 1 or 2, 5–7 cm across, uniformly dark red to crimson; tepaline caudae reddish black; labellum dark red, base paler; calli red; column red. *Tepals* ending in relatively thick caudae, densely covered with single ovoid to ellipsoid glands; dorsal sepal erect and incurved; lateral sepals widely divergent, stiffly spreading; petals stiffly spreading. *Dorsal sepal* 30–40 mm long, 2.5–3 mm wide, oblong-elliptic in proximal third, then suddenly tapered to to a blackish glandular cauda. *Lateral sepals* 30–40 mm long, 2.5–3 mm wide, ovate-elliptic in proximal third then tapered to blackish glandular caudae. *Petals* 25–35 mm long, 2–2.5 mm wide, oblong-lanceolate in proximal third then tapered to blackish glandular caudae. Labellum articulated on a short claw c. 0.5 mm long, c. 1 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 11–13 mm long, 8–9 mm wide, erect in proximal third then curved forwards, apex strongly recurved; lateral lobes c. 2.5 mm wide, erect, with 5–8 pairs of marginal teeth to 1 mm long, linear, spreading to incurved, head narrowly linear; midlobe ovate-deltate in outline when flattened, proximal margins with two-five pairs of short teeth or fused into an apical band that extends to the labellum apex. *Calli* in 4 crowded rows, the central rows extending well onto the midlobe; basal calli 6 or 8, erect, linear-clavate, c. 2 mm long, shortly stalked; main calli crowded, shortly stalked, the distal calli sessile and irregularly arranged; longest lamina calli c. 1.3 mm long, hockey-stick shape; stalk c. 0.3 mm long; head straight when viewed from the side, linear-tapered from above. *Column* 10–12 mm long, 3–4 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands obovoid, c. 1 mm long, c. 0.5 mm wide, yellow, base red. *Anther* c. 2 mm long, 1.5 mm wide, dark red; rostrum c. 0.3 mm long. *Pollinia* c. 2.5 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 1.5 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Occurs in Albury, New South Wales, and northern and central Victoria, mainly between Chiltern and Tallarook, extending south to some northern suburbs of Melbourne. This species grows on ridges and slopes among grass and shrubs in well-drained shallow soil, often skeletal or stony. Alt. 50–300 m. Flowering: September and October.

Recognition: Characterised by dark red to crimson flowers 4–5 cm across with stiffly spreading lateral sepals and petals, all sepals and petals ending in relatively short thick blackish caudae.

Notes: Flowering occurs in the absence of fire but it is generally noticeable that only a low proportion of plants in any area actually flower.

Conservation status: Populations of this species are disjunct and greatly fragmented by agriculture and urbanisation; considered endangered in New South Wales and vulnerable in Victoria.

Other specimens: NEW SOUTH WALES: Albury, 24 Sept. 1998, *P.Branwhite* (ORG 1563) (CANB). VICTORIA: Chiltern, 21 Sept. 1989, *P.Branwhite* (CANB); Loddon River, 1894, *A.W.Brotherton* (MEL 712189); Tyak, Oct 1982, *C.W.Divers* (MEL 691329); *ibid*, Oct. 1986 (MEL 1587032); One Tree Hill, Beechworth, 8 Sept. 1972, *F.Gladstone* (MEL 1563092); Wattle Glen, 14 Sept. 1935, *W.H.Nicholls* (MEL 579767).

2. *Arachnorchis branwhitei* D.L.Jones, *sp. nov.*; affinis *A. concolor* (Fitzg.) D.L.Jones & M.A.Clem. sed floribus amplioribus; perianthio segmentis decurvis usque ad demissa, et apicibus longioribus, tenuioribus, caudatis, differt.

Type: New South Wales. Bethungra, 17 Sept. 1998, *D.L.Jones* 15743, *M.Garratt*, *S. Clark* & *P.Branwhite* (holo CANB; iso MEL, NSW).

Description: Hirsute terrestrial *herb* growing singly or in small to large groups. *Leaf* linear-lanceolate, 5–11 cm long, 0.4–1 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 4 mm long, patent, transparent, eglandular, basal cell white. *Scape* 20–32 cm tall, wiry, densely hirsute, with a mixture of transparent, eglandular trichomes to 4 mm long and short glandular trichomes. *Sterile bracts* spreading, narrowly oblong-elliptic, 15–22 mm long, 3–5 mm wide, long-acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 15–23 mm long, 5–7 mm wide, acuminate, externally shortly hirsute. *Flowers* 1 or 2, 5–7 cm diam., usually dark red to maroon, occasionally pale red or greenish red, with a hot metal scent; tepaline caudae blackish; labellum dark red, paler towards the base; calli reddish black; column dark red. *Tepals* densely glandular distally, with single ovoid glands; dorsal

sepal erect and incurved; lateral sepals divergent, obliquely deflexed to drooping; petals obliquely deflexed to drooping. *Dorsal sepal* 35-55 mm long, 2.5-3.5 mm wide, oblong-elliptic in the proximal third, then tapered to a blackish, glandular cauda. *Lateral sepals* 35-55 mm long, 3.5-5 mm wide, ovate-lanceolate in proximal third, then tapered to blackish, glandular caudae. *Petals* 30-45 mm long, 2-3.5 mm wide, lanceolate in proximal third, gradually tapered to blackish, glandular caudae. *Labellum* articulated on a short claw c. 0.6 mm long, c. 1.6 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 13-20 mm long, 8-12 mm wide, erect in proximal third then curved forwards; apex strongly recurved; lateral lobes c. 3 mm wide, erect; marginal teeth on the lateral lobes 10-14, linear, 1-2 mm long, dark purplish, widely spreading to incurved; head narrowly linear; midlobe ovate-deltate in outline when flattened, acute to acuminate; proximal margins either with a few discrete short teeth, or all the marginal teeth of the midlobe fused into an irregular band which extends to the apex. *Calli* in 4 or 6 rows, extending well onto the midlobe, the basal calli distinct from the rest; basal calli 6 or 8, crowded, c. 2 mm long, hardly differentiated into a stalk, narrowly linear-ovate, erect; main lamina calli numerous, crowded, mostly prominently stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.3 mm long, hockey-stick-shape, stalked; stalk c. 1 mm long; head c. 0.4 mm long, straight when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 6-7 mm wide, recurved in the proximal third then shallowly incurved, broadly winged; basal glands obovoid, c. 1.2 mm long, c. 0.8 mm wide, yellow, base reddish. *Anther* c. 3.5 mm long, c. 3 mm wide, usually dark purplish red; rostrum linear, c. 1 mm long. *Pollinia* 4, 2.5-3 mm long, broadly deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 3 mm wide, sunken. *Capsule* not seen. **Fig. 3.1.**

Distribution and ecology: Endemic in southern New South Wales where known from three sites, two near Bethungra (one is on private land and the other is in the Ulandra Nature Reserve) and a small population near Mangain, north-west of Wagga Wagga. The species grows in box-ironbark forest with a sparse to shrubby understorey in clay loam. Alt: 300-600 m. Flowering: September and October.

Recognition: This species has been generally included in *A. concolor* (Fitzg.) D.L.Jones & M.A.Clem., which is not known from further north than the Albury area. It can be readily distinguished from *A. concolor* by its larger flowers (5-7 cm across compared with 4-5 cm in *A. concolor*), deflexed to drooping tepals (stiffly spreading in *A. concolor*) and very thin, attenuate tepaline caudae (relatively short and much thicker in *A. concolor*). It is most similar to *A. clavescens* which has thicker tepaline caudae which in some specimens resemble a thickened osmophore and its column glands are noticeably small when compared with those of *A. branwhitei*.

Notes: The localities of this species have been kept vague to reduce the impact of illegal collection. The type locality, which is on private property, has the protection of a Conservation Covenant.

This species flowers freely in the absence of fire but flowering is also enhanced after a summer fire, especially in overgrown habitats.

This species, which has been the subject of a Recovery Plan, is referred to as *Caladenia* sp. Bethungra with the vernacular of the Bethungra Spider Orchid.

Conservation status: Of very restricted distribution and conserved in the Ulandra Nature Reserve; suggest 2EC according to the criteria of Briggs & Leigh (1996).

Etymology: Named after Peter Gordon Branwhite (1956-), dedicated conservationist and keen orchidologist with a discerning eye.

Other specimens: NEW SOUTH WALES. Bethungra, 12 Oct. 1997, *P. Branwhite* (CANB); *ibid*, 4 Sept. 1988, *D.L.Jones* 2765 & *M.Clements* (CANB); *ibid*, 3 Oct. 1992, *M.Clements* 7998 (CANB); *ibid*, 27 Sept. 1989, *D.L.Jones* 5109 (CANB); *ibid*, 17 Sept. 1998, *D.L.Jones* 15744 (CANB); *ibid*, 17 Sept. 1998, *D.L.Jones* 15746 (CANB); *ibid*, Aug. 1968, *B.Whitehead* (CANB).

3. *Arachnorchis clavescens* D.L.Jones sp. nov.; affinis *A. concolor* (Fitzg.) D.L.Jones & M.A.Clem. sed labello marginis dentibus longioris et tenuibus; callis congestiore; et osmophoris parvioribus congestiore, differt; etiam affinis *A. branwhitei* D.L.Jones sed caudis tepalinis tumidioribus clavis.

Type: Victoria. The Monk Track, Castlemaine Historic Area, Chewton, 17 Sept. 1999, *D.L.Jones* 17009 & *M.Garratt* (holo CANB 606898).

Description: Hirsute terrestrial *herb* growing singly or in small groups. *Leaf* linear-lanceolate, 8-14 cm long, 0.6-1.2 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 5 mm long, patent, transparent, eglandular, basal cell white. *Scape* 20-35 cm tall, wiry, densely hirsute, with a mixture of transparent, eglandular trichomes to 5 mm long and short glandular trichomes. *Sterile bracts* spreading, narrowly oblong-elliptic, 17-25 mm long, 3-5 mm wide, long-acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 15-22 mm long, 5-7 mm wide, acuminate, externally shortly hirsute. *Flowers* 1 or 2, 5-7 cm across, usually dark red to maroon but in some populations a mixture of cream, pink and red flowers, with a hot metal scent; tepalline caudae relatively thick, blackish; labellum dark red, slightly paler towards the base; calli reddish black; column red. *Tepals* densely glandular distally, relatively thick and sometimes

expanded and somewhat club-like, with single ovoid to cylindrical glands in a dense column; dorsal sepal erect and incurved; lateral sepals divergent, obliquely deflexed to drooping; petals obliquely deflexed to drooping. *Dorsal sepal* 40-65 mm long, 3-4 mm wide, narrowly ovate-elliptic in the proximal third, then tapered to a blackish, glandular cauda. *Lateral sepals* 40-65 mm long, 4-5 mm wide, ovate-lanceolate in proximal third, then tapered to blackish, glandular caudae. *Petals* 35-50 mm long, 2.5-3.5 mm wide, lanceolate in proximal third, gradually tapered to blackish, glandular caudae. *Labellum* articulated on a short claw c. 0.8 mm long, c. 1.6 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 14-18 mm long, 8-11 mm wide, erect in proximal third then curved forwards; apex strongly recurved; lateral lobes c. 3 mm wide, erect; marginal teeth on the lateral lobes 7-11 pairs, linear, 1-1.8 mm long, dark purplish, erect to spreading; head narrowly linear; midlobe ovate-deltate to oblong-deltate in outline when flattened, acute to acuminate; margins either with short decrescent teeth nearly to the labellum apex or proximally with a few short teeth and the rest fused into an irregular band which extends to the apex. *Calli* in 4 or 6 rows, extending well onto the midlobe where they are often reduced to small bumps; basal calli distinct, 6 or 8, crowded, erect, narrowly clavate, c. 1.3 mm long; main lamina calli numerous, crowded, prominently stalked; longest lamina calli c. 2 mm long, hockey-stick-shape, stalked; stalk c. 1 mm long; head c. 1 mm long, shallowly curved when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 4-6 mm wide, recurved in the proximal third then shallowly incurved, broadly winged; basal glands ovoid, c. 0.8 mm long, c. 0.8 mm wide, yellow, base reddish. *Anther* c. 3 mm long, c. 3 mm wide, usually dark purplish red; rostrum linear, c. 0.3 mm long. *Pollinia* 4, 2.5-3 mm long, broadly deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2.8 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Restricted to central-western Victoria in the vicinity of Chewton, Castlemaine and Campbells Creek. It grows on sheltered ridges and slopes among grass tussocks and low shrubs in box-ironbark forest in brown loam that is often skeletal or stony. Alt: 300-350 m. Flowering: September and October.

Recognition: This species has similarities with *A. concolor* but has larger flowers (5-7 cm across compared with 4-5 cm in *A. concolor*), obliquely deflexed to drooping tepals (stiffly spreading in *A. concolor*), labellum margins with longer thinner teeth and larger crowded calli. Both taxa have relatively thick tepaline caudae but those of *A. concolor* are much shorter and impart a stubby appearance to the flower. *Arachnorchis clavescens* shares many features with *A. branwhitei* but can be distinguished by its thicker tepaline caudae which in some specimens resemble a thickened osmophore. White and pink-flowered specimens also occur in some populations of *A. clavescens* (red or pinkish in *A.*

branwhitei) and its column glands are noticeably small when compared with those of *A. branwhitei*.

Note: This species has been referred to as *Caladenia* sp. aff. *concolor* (Midlands) with the vernacular of the Midlands Spider Orchid.

Conservation status: Of restricted distribution but sometimes locally frequent; conserved within Special Protection Areas in The Castlemaine Diggings National Heritage Park (G.Nevill pers. comm.); suggest 2VC by the criteria of Briggs & Leigh (1996). It is listed as vulnerable in the DSE Advisory List of Rare or Threatened Plants.

Etymology: The Latin *clava*, club and *-escens*, becoming, not yet achieved; in reference to the thickish club-like caudae on the tepals of many specimens.

Other Specimens: VICTORIA: Castlemaine, Sept. 1996, *P.Branwhite* (CANB); Heathcote, 1904, *W.S.Brownscombe* (MEL 241709); Campbells Creek, 11 Oct. 1989, *P.Emmett* (CANB); Forest Ck, near Castlemaine, 1854, *F.Mueller* (MEL 683874); Arthurs Track, Chewton, 21 Oct. 2003, *G.Nevill* (ORG 4351) (CANB); Harcourt, 1917-1920, *R.Pescott* (?mixed coll.) (MEL 1530692); Rushworth, 1 Oct. 1932, *E.Rich* (MEL 579012); Chewton, Sept 2000, *D.Rouse* (ORG 3113) (CANB); Bendigo, no date, *C.S.Sutton* (MEL 2015962); Elphinstone, Sept. 1933, *A.J.Tadgell* (MEL 2016438).

4. *Arachnorchis orestes* D.L.Jones, sp. nov.; affinis *A. concolor* (Fitzg.) D.L.Jones & M.A.Clem. sed floribus roseocarnis; perianthio segmentis apicibus longioribus tenuioribus caudatis; labello magniore et perobscure trilobatis; et callis grandioribus congestis, differt.

Type: New South Wales. Burrinjuck, hill near village, *D.L.Jones* 15852, *M.Garratt*, *K.Fitzgerald*, *D.Mallinson* & *S.Clark*, 14 Oct. 1998 (holo CANB 605485).

Description: Hirsute terrestrial *herb* growing singly or in small groups. *Leaf* linear-lanceolate, 6-11 cm long, 0.6-1 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 4 mm long, patent, transparent, eglandular, basal cell white. *Scape* 20-35 cm tall, wiry, densely hirsute, with a mixture of transparent, eglandular trichomes to 4 mm long and short glandular trichomes. *Sterile bracts* spreading, narrowly oblong-elliptic, 15-20 mm long, 3-4 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-elliptic, 15-20 mm long, 5-7 mm wide, acuminate, externally shortly hirsute. *Flowers* 1 or 2, 5-7 cm across, cream to pink or light reddish, with a hot metal scent; tepaline caudae relatively thick, blackish; labellum pale towards the base, apex dark red; calli dark red; column pink to red. *Tepals* densely glandular distally, relatively thick and

sometimes expanded and somewhat club-like, with single (some in chains of 2 cells) ellipsoid to cylindrical glands in a dense column; dorsal sepal erect and incurved; lateral sepals divergent, obliquely deflexed to drooping; petals obliquely deflexed to drooping. *Dorsal sepal* 40-50 mm long, 2.5-3.5 mm wide, narrowly ovate-elliptic in the proximal third, then tapered to a blackish, glandular cauda. *Lateral sepals* 40-60 mm long, 3-4 mm wide, ovate-lanceolate in proximal third, then tapered to blackish, glandular caudae. *Petals* 35-45 mm long, 2-3 mm wide, lanceolate in proximal third, gradually tapered to blackish, glandular caudae. *Labellum* articulated on a short claw c. 0.8 mm long, c. 1.6 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 14-17 mm long, 8-11 mm wide, erect in proximal third then curved forwards; apex strongly recurved; lateral lobes c. 3 mm wide, erect; marginal teeth on the lateral lobes 7-14 pairs, linear, 0.5-1.2 mm long, dark purplish, erect to spreading; head narrowly linear; midlobe ovate-deltate to oblong-deltate in outline when flattened, obtuse to acute; margins with a few short teeth and the rest fused into an irregular band which extends to the apex. *Calli* in 4 or 6 rows, extending onto the base of the midlobe where they are often reduced to small bumps; basal calli distinct, 8 or 10, crowded, erect, narrowly clavate, c. 1 mm long; main lamina calli prominently stalked; longest lamina calli c. 1.5 mm long, hockey-stick-shape, stalked; stalk c. 1 mm long; head c. 0.7 mm long, shallowly curved when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 4-6 mm wide, recurved in the proximal third then shallowly incurved, broadly winged; basal glands ovoid-ellipsoid, c. 1 mm long, c. 0.8 mm wide, yellow, base reddish. *Anther* c. 3 mm long, c. 3 mm wide, reddish; rostrum linear, c. 0.3 mm long. *Pollinia* 4, 2.5-3 mm long, broadly deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2.6 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Restricted to hills around Burrinjuck in southern New South Wales growing on moderate to steep slopes covered with open forest which has a grassy or shrubby understorey. The soil on the lower slopes is a brown loam whereas on the upper slopes and ridges the soil is thin and skeletal with decomposing shale. Alt. 450-800 m. Flowering: October and early November.

Recognition: This species has affinities with both *A. concolor* and *A. branwhitei*. It can be distinguished from both by its cream to pink or light reddish flowers and the tips of both the sepals and petals being thickened and with the appearance of poorly formed clubs. *Arachnorchis concolor* can be immediately distinguished from *A. orestes* by its smaller dark red flowers and its stiffly spreading short, tapered, relatively thick tepals which give the flowers a stubby appearance. *Arachnorchis branwhitei* usually has dark red flowers and the tips of the sepals and petals are narrowed into very thin caudae. The new species also has similarities with *A. leptoclavia* (D.L.Jones) D.L.Jones & M.A.Clem.

which can be distinguished by its white to cream flowers with distinct dark clubs on the sepals.

Notes: *Arachnorchis orestes* is restricted to the hills around Burrinjuck Dam and despite extensive searching is only known from four sites totalling about 120-150 plants. It flowers in the absence of fire but is extremely variable in its annual flowering. One colony of about 20 plants monitored by the author between 1996 and 2005 produced flowering plants in only two years during that period.

A single flowering plant from private property at Urriara, New South Wales (M.A.Clements 11057 in CANB) has been seen by the author and may be this species, but further material is required for confirmation.

This species, which has been the subject of a Recovery Plan, is referred to as *Caladenia* sp. Burrinjuck with the vernacular of the Burrinjuck Spider Orchid.

Conservation status: Localised but afforded some security of tenure in the Burrinjuck Nature Reserve and the Burrinjuck Waters State Park; suggest 2EC according to the criteria of Briggs & Leigh (1996).

Etymology: The Greek *orestes*, mountaineer, in reference to the mountainous area and steep slopes where this species grows.

Specimens Examined: NEW SOUTH WALES: Burrinjuck, 7 Oct. 1999, *P.Branwhite* 19 & *K.Foley* (CANB); Burrinjuck State Recreation Area, 15 Oct. 1992, *D.L.Jones* 10346 & *B.E.Jones* (CANB); Burrinjuck, Oct/Nov. 1992, *D.Mallinson* (CANB); c. 1 km NW of Burrinjuck Village, 29 Oct. 1993, *D.Mallinson* 318 (CANB); Burrinjuck Dam, Oct. 1995, *D.Mallinson* (CANB); Burrinjuck, 9 Oct. 2003, *D.Mallinson* (CANB).

5. *Arachnorchis formosa* (G.W.Carr) D.L.Jones & M.A.Clem., *Orchadian* 13(9): 394 (Oct. 2001); *Caladenia formosa* G.W.Carr, *Indig. Fl. & Fauna Assoc. Misc. Paper* 1: 4 (8 Feb. 1991).

Type: Victoria; south west, Dergholm, 37 22'S, 141 13'E, Victorian plant grid D20, Oct. 1990, *P.F.Horsfall* s.n. (holo MEL 223591).

Caladenia haemantha D.L.Jones, *Austral. Orch. Res.* 2: 26, f. 29, t. (5 Apr. 1991); *Calonema haemantha* (D.L.Jones) Szlach., *Polish Bot. J.* 46(1): 18 (2001), *nom. illeg.*; *Calonemorchis haemantha* (D.L.Jones) Szlach., *Polish Bot. J.* 46(2): 140 (31 Dec. 2001 [June 2002]). Type: South Australia; Mt Scott Conservation Park, 36°45'S, 140°10'E, 2 Oct. 1988, *R.Bates* 21043 (holo AD; iso AD).

Description: See Jones (1991), pages 26-27.

Distribution and ecology: Occurs in south-eastern South Australia and south-western Victoria. It usually grows in heathy forest and grassy forest and woodland in well-drained sandy soils and clay loam, occasionally in low scrubby forest on limestone hillocks. Alt. 100-250 m. Flowering: September and October.

Recognition: Characterised by large red flowers (5-7 cm across), thin tepaline caudae, osmophore cells commonly in moniliform chains of 3-5 cells and labellum with marginal teeth extending over the whole length. The latter two characters serve to distinguish this species from all others in the *A. concolor* group. By contrast *A. concolor* has smaller flowers, stiffly spreading sepals and petals, much thicker caudae, single osmophore cells (not in chains) and the marginal teeth of the labellum mainly confined to the lateral lobes.

Note: This species has been referred to as the Elegant Spider Orchid (Backhouse & Jeanes (1995).

Conservation status: Considered to be endangered in both Victoria and South Australia.

Specimens examined: VICTORIA: Longbottoms Track, Langkoop area, 16 Oct. 1989, *K.Alcock* (CANB); *ibid.*, 16 Sept. 1999, *D.L.Jones 16992* & *M.Garratt* (CANB); SOUTH AUSTRALIA: Padthaway, 13 Oct. 1989, *K.Alcock* (CANB); Coonawarra, 2 Oct. 1988, *R.Bates 15659* (CANB); Reedy Ck Range, 19 Sept. 1990, *R.Bates 23233* (CANB); Yellands Scrub, NE of Naracoorte, 15 Sept. 1999, *D.L.Jones 16966*, *M.Garratt* & *K.Alcock* (CANB).

The *Arachnorchis reticulata* – *Arachnorchis australis* Complex

This is a highly evolved group of Spider Orchids that is characterised by prominent dark clubs on the tips of the sepals. These clubs contain globose to ellipsoid osmophore cells packed together so tightly that it is often difficult to discern the characteristics of individual cells. Although generally treated in the past as a loose group of few widespread taxa, recent studies of pollinator behaviour (Colin Bower pers. comm.) and molecular research have revealed a series of highly specialised taxa often with a narrow distribution pattern. Unfortunately these taxa are not always readily discerned by morphological patterns. Nine new species in this complex are described in this treatment, many with serious conservation issues, but no attempt is made to revise the group as new taxa are still being identified.

6. *Arachnorchis ampla* D.L.Jones, *sp. nov.*; affinis *A. reticulatae* (Fitzg.) D.L.Jones & M.A.Clem., sed labello latiore et planiore, basi rubida, differt.

Type: Victoria. Hard Hills Nature Conservation Reserve, 12 Oct. 2005, *A. & M. Morton (ORG5000)* (holo CANB; iso MEL).

Description: Hirsute, terrestrial *herb* growing singly or in small loose groups. *Leaf* linear-lanceolate, 6-10 cm long, 0.5-0.7 cm wide, dull green, base purple-blotched; trichomes dense on both surfaces, to 4 mm long, patent, white, eglandular. *Scape* 15-22 cm tall, usually reddish, wiry, densely hirsute, with a mixture of white eglandular trichomes to 3 mm long and very short glandular trichomes. *Sterile bracts* spreading, oblong, 10-18 mm long, 2-2.5 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 12-18 mm long, 4-6 mm wide, green to reddish, acute to acuminate, shortly hirsute externally. *Flower* 1 (-2), 3-4 cm diam., cream to yellowish with red lines, sometimes wholly reddish, with a hot metal smell; tepaline caudae cream to yellowish; labellum cream with prominent red veins and dark red apex; calli dark red; column red. *Sepaline* caudae with short thick osmophores densely packed with dark red to blackish globose glands; dorsal sepal erect; lateral sepals divergent, stiffly decurved; petals spreading to stiffly deflexed. *Dorsal sepal* 30-37 mm long, 2.5-3 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 6.5-9 mm long. *Lateral sepals* 30-37 mm long, 4-5 mm wide, ovate-lanceolate in the proximal third, then tapered to a narrow section, ending in a narrow osmophore 6-8 mm long. *Petals* 28-32 mm long, 2-3 mm wide, narrowly lanceolate in the proximal half, tapered, acuminate, sometimes with an apical cluster of glands. *Labellum* articulated on a short claw c. 0.5 mm long, c. 1.8 mm wide. *Lamina* unlobed or obscurely lobed, broadly ovate to broadly ovate-lanceolate in outline when flattened, 14-16 mm long, 10-12 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum marginal teeth* 9-12 pairs, proximal teeth linear, 1-2.5 mm long, distal teeth deltate, 0.2-1 mm long, dark purplish red, becoming decrescent and irregular towards the apex. *Calli* in 4 rows, extending half way to two thirds of the distance to the labellum apex, the basal calli distinct from the rest; basal calli 8-10, erect, purplish with yellowish markings, c. 1 mm long, ellipsoid to ovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 2 mm long, hockey-stick-shaped, stalked; stalk c. 1 mm long; head c. 1.6 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 5-6 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands obovoid, c. 1.3 mm long, c. 1.3 mm wide, yellow with a red base. *Anther* c. 2.6 mm long, c. 2.2 mm wide, burgundy; rostrum linear, c. 0.3 mm long. *Pollinia* 4, c. 2.3 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2.3 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: At the type locality this species grows under *Melaleuca decussata* in

areas of mallee scrub dominated by *Eucalyptus polybractea*, *E. polyanthemos* and *E. viridis*. The soil is a well-drained hard gravelly loam with a silcrete gravel surface. *Arachnorchis ampla* also occurs at Deep Lead growing in gravelly soil in open forest. Alt. 200-250 m. Flowering period: September and October.

Recognition: *Arachnorchis ampla* is part of the *A. reticulata* complex. It can be distinguished from *A. reticulata sens. strict.* by its proportionately broader labellum which lacks the distinctive whitish base and prominent reticulated striae found in *A. reticulata*. The labellum of *A. ampla* tends to be held flatter than other similar taxa (*A. Morton pers. comm.*).

Notes: This species is known by members of the St Arnaud Field Naturalist Club as the Hard Hills Spider Orchid.

Conservation status: Locally common but poorly known and conserved in a conservation reserve; suggest 2KC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *amplus*, large, in reference to the disproportionately broad labellum of this species.

Other Specimens: VICTORIA. Deep Lead, 18 Sept. 1990, *D.L.Jones 6538* (CANB); *ibid*, 1 Oct. 2001, *D.Rouse 37* (CANB).

7. *Arachnorchis ancyllosa* D.L.Jones, *sp. nov.*; affinis *A. australis* (G.Carr) D.L.Jones & M.A.Clem., sed sepalis et petalis latioribus et patentissimis; labello majoribus, apici revolutis; dentibus marginalibus crebrioribus; callis labelli propioribus ad apicem extendentibus, differt.

Type: Victoria. c. 10 km N of Genoa Creek Bridge, 17 Sept. 1996, *D.L.Jones 14875* & *B.E.Jones* (holo CANB 649362).

Description: Hirsute, terrestrial *herb* growing singly or in small, loose groups. *Leaf* lanceolate, 6-12 cm long, 0.5-1.1 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 2 mm long, patent, transparent, eglandular. *Scape* 12-25 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 2 mm long and short glandular trichomes. *Sterile bracts* spreading, elliptic-lanceolate, 15-22 mm long, 5-6 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, broadly elliptic-lanceolate, 12-17 mm long, 5-8 mm wide, acute to acuminate, shortly hirsute externally. *Flower* single, 4-6 cm diam., cream with pink to reddish stripes and suffusions, with a very faint scent; sepaline caudae dark red; labellum cream at the base, apex dark red; calli dark red; column translucent, with red suffusions and markings. *Sepal* caudae densely

glandular, with densely packed dark red, globose glands in a thick osmophore; dorsal sepal erect; lateral sepals divergent, stiffly spreading horizontally; petals stiffly spreading horizontally. *Dorsal sepal* 25-40 mm long, 2.5-3 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 7-10 mm long. *Lateral sepals* 25-40 mm long, 3.5-4.5 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a thickish osmophore 6-10 mm long. *Petals* 20-25 mm long, 2-2.3 mm wide, narrowly lanceolate in the proximal half, tapered to an acuminate apex. *Labellum* articulated on a short claw c. 1 mm long, c. 2 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 10-13 mm long, 7-9 mm wide, erect in the proximal third then curved forwards; apex strongly recurved. *Labellum lateral lobes* c. 2.5-3 mm wide, erect; marginal teeth 7-10 pairs, linear, 0.5-1.2 mm long, dark purplish red, spreading, incurved; head asymmetrically linear. *Labellum midlobe* narrowly ovate-deltate in outline when flattened, acute to obtuse; proximal margins with numerous pairs of short decrescent reddish teeth, extending nearly to the labellum apex. *Calli* in 6 rows, extending well onto the labellum midlobe, the basal calli distinct from the rest; basal calli 6 or 8, erect, c. 0.8 mm long, stalked with an asymmetrical ovoid head; main lamina calli numerous, crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1 mm long, hockey-stick-shaped, stalked; stalk c. 0.6 mm long; head c. 0.5 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 10-13 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands nearly globose, c. 1 mm long, c. 0.8 mm wide, yellow. *Anther* c. 2.5 mm long, c. 3 mm wide, purplish red; rostrum linear, c. 0.4 mm long. *Pollinia* 4, 2.5-3 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 3 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known with certainty only from far-eastern Victoria very close to the border with New South Wales and probably extending into the south-east corner of that state. It grows in tall open forest with a shrubby understorey in yellowish-brown gravelly loam. The species probably responds to fire since the habitat thickens considerably between burns and the plants only persist in open sites. Alt. c. 50 m. Flowering: September and October.

Recognition: Part of the complex of species surrounding *A. reticulata* and probably most similar to *A. australis* from which it differs by stiffly spreading sepals and petals, more numerous labellum marginal teeth which extend nearly to the labellum apex (in *A. australis* these teeth usually coalesce distally into a marginal band) and the calli are more widely dispersed on the labellum surface (the calli form a relatively compact group in *A. australis*). This species also has some similarities with both *A. osmera* – but has stiffly spreading broader tepals, shorter marginal teeth extending further towards the

labellum apex and the flowers only have a light scent; and also with *A. cadyi* which has much narrower sepaline clubs.

Conservation status: Poorly known and not conserved; suggest 2E by the criteria of Briggs & Leigh (1996)

Etymology: From the Greek *ancylosis*, stiffening of the joints; in reference to the stiffly spreading lateral sepals and petals.

Other Specimen: VICTORIA. Corner of Wallagarough Rd and Princes Highway, 2 Oct. 2005, *D.T.Rouse* 259 (CANB 672974).

8. *Arachnorchis armata* D.L.Jones, *sp. nov.*; affinis uterque *A. reticulatae* (Fitzg.) D.L.Jones & M.A.Clem. et *A. montanae* (G.W.Carr) D.L.Jones & M.A.Clem., sed floribus minoribus; osmophoris minoribus cellulis confertis; labello minore; dentibus marginalibus brevioribus et muticis, differt.

Type: Australian Capital Territory. Majura Field Firing Range, 19 Oct. 1998, *D.L.Jones* 15886, *M.A.Clements* & *P.O.Downey* (holo CANB 605519).

Description: Hirsute, terrestrial *herb* growing in small loose groups. *Leaf* linear-lanceolate, 6-9 cm long, 0.4-0.8 cm wide, dull green, base purple-blotched; trichomes dense on both surfaces, to 6 mm long, patent, white, eglandular. *Scape* 15-25 cm tall, usually reddish, wiry, densely hirsute, with a mixture of white eglandular trichomes to 4 mm long and a few very short glandular trichomes. *Sterile bracts* spreading, oblong, 10-16 mm long, 2-3 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 10-14 mm long, 3-5 mm wide, green to reddish, acute to acuminate, shortly hirsute externally. *Flower* 1, 2-3 cm diam., cream to pink with red lines; labellum mostly dark red to maroon, base cream with prominent red veins; calli dark red; column cream to green. *Sepaline* caudae with short thick osmophores with densely packed dark red to blackish globose glands; dorsal sepal erect; lateral sepals divergent, stiffly decurved; petals spreading to stiffly deflexed. *Dorsal sepal* 23-35 mm long, 2-2.5 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thick osmophore 3-7 mm long. *Lateral sepals* 23-35 mm long, 3-4 mm wide, ovate-lanceolate in the proximal third, then tapered to a narrow section, ending in a thick osmophore 3-7 mm long. *Petals* 20-30 mm long, 2-3 mm wide, narrowly lanceolate in the proximal half, tapered, acuminate. *Labellum* articulated on a short claw c. 0.5 mm long, c. 1 mm wide. *Lamina* unlobed or obscurely lobed, ovate to ovate-lanceolate in outline when flattened, 8-11 mm long, 5-8 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum marginal teeth* 5-12 pairs, linear, 0.3-0.8 mm long, dark purplish red, becoming decrescent and irregular towards the apex. *Calli* in 4 rows, extending half way to two thirds of the distance to the labellum apex, the basal calli distinct from the rest; basal calli 4-

6, erect, c. 1 mm long, ellipsoid to ovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, hockey-stick-shaped, stalked; stalk c. 0.7 mm long; head c. 1.3 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 9-11 mm long, 3-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands obovoid, c. 1 mm long, c. 0.8 mm wide, yellow with a red base. *Anther* c. 2 mm long, c. 1.8 mm wide, green; rostrum short. *Pollinia* 4, c. 1.8 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 1.8 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known only from a single site in the Majura Field Firing Range which is on the northern outskirts of the Australian Capital Territory. It grows on a gentle slope in open forest dominated by *Eucalyptus macrorrhyncha* and *E. rossii*, with a sparse understorey consisting of scattered low shrubs, forbs and tussocks. The soil is a well-drained brown gravelly loam. Alt. c. 750 m. Flowering: October.

Recognition: *Arachnorchis armata* is part of the *A. reticulata* complex and has similarities to both *A. reticulata* and *A. montana*. It can be distinguished from both species by its smaller flowers, short osmophores with the cells so densely packed that it is difficult to single out individual cells except on the peripheries, and a smaller labellum with short, blunt marginal teeth.

Notes: This species was discovered in 1988 by Paul Downey while surveying vegetation in the Army Firing Range at Majura.

Conservation status: Known only from a single locality, the population consisting of less than 10 plants; poorly known and not conserved; it may occur at other sites in the army firing range but very little suitable habitat remains nearby; suggest 1EK by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *armo*, *armatus*, army, armory, armature, an oblique reference to its only known site.

Other specimen: Australian Capital Territory: Majura Firing Range, Oct. 1988, *P.O.Downey* (ORG 1602) (CANB).

9. *Arachnorchis cadyi* D.L.Jones, *sp. nov.*; affinis *A. reticulatae* (Fitzg.) D.L.Jones & M.A.Clem., sed nervatura labelli pauciore et dilutiore; dentibus marginalibus brevioribus; osmophoris sepalinis gracilibus; callis exilibus. Quoque affinis *A. osmerae* D.L.Jones, sed plantis minoribus robustis; floribus minoribus; osmophoris exilibus, differt.

Type: New South Wales. c. 12 miles [19.2 km] SE of Nowra [road to Tomerong], 21 Sept. 1958, *L.I.Cady s.n.* (holo CBG 8103523).

Description: Hirsute, terrestrial *herb* growing singly or in small, loose groups. *Leaf* narrowly lanceolate, 8-15 cm long, 0.5-0.8 cm wide, dull green, base purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 15-30 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 3 mm long and short to relatively long glandular trichomes. *Sterile bracts* spreading, oblanceolate, 12-20 mm long, 3-4 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 10-15 mm long, 3-5 mm wide, acuminate, shortly hirsute externally. *Flower* single, 4-6 cm diam., greenish cream to cream with pink to reddish stripes and suffusions; sepaline caudae dark reddish-black; labellum greenish cream at the base, distal half to two-thirds dark red; calli dark red; column translucent, with red suffusions and markings. *Sepal* caudae with densely packed dark red, globose to spheroidal glands in a relatively thick osmophore; dorsal sepal erect; lateral sepals divergent, obliquely deflexed; petals spreading to obliquely deflexed. *Dorsal sepal* 25-40 mm long, 2-2.5 mm wide, oblong-elliptic in the proximal third, then tapered, ending in a thickish osmophore 5-9 mm long. *Lateral sepals* 25-40 mm long, 3.5-4.5 mm wide, narrowly ovate-lanceolate in the proximal third, then tapered to a narrow section, ending in a thickish osmophore 5-9 mm long. *Petals* 18-36 mm long, 1.5-2 mm wide, narrowly lanceolate in the proximal half, tapered to an acuminate apex. *Labellum* articulated on a short claw c. 1 mm long, c. 1.3 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 10-13 mm long, 7-8.5 mm wide, erect in the proximal third then curved forwards; apex strongly recurved. *Labellum lateral lobes* c. 2-2.5 mm wide, erect; marginal teeth 5-9 pairs, linear, 0.8-1.6 mm long, dark purplish red, spreading, incurved; head slightly clavate. *Labellum midlobe* narrowly ovate-deltate in outline when flattened, acute; proximal margins irregular or with a few short teeth, forming an irregular marginal band towards the apex. *Calli* in 4 or 6 rows, just extending onto the base of the labellum midlobe, the basal calli distinct from the rest; basal calli 6 or 8, erect, linear-clavate, c. 1 mm long; main lamina calli numerous, crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 2 mm long, linear to hockey-stick-shaped, stalked; stalk c. 1-1.2 mm long; head c. 0.5-0.8 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 9-12 mm long, c. 4 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands nearly globose, c. 0.8 mm wide, yellow. *Anther* c. 2.5 mm long, c. 3 mm wide, reddish; rostrum linear, c. 0.5 mm long. *Pollinia* 4, 2.5-3 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 3 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known only from the type locality which has now been destroyed (Leo Cady pers. comm.). The species grew in shrubby *Eucalyptus/Allocasuarina* forest in sandy clay

loam. Similar habitat still exists in areas fairly close to the type locality but the species has not been found, despite extensive searching over many years (L.Cady, R.Tunstall, pers. comms.). Alt. c. 75 m. Flowering: September.

Recognition: This species is part of the *A. reticulata* complex but can be immediately distinguished from *A. reticulata* by the absence of prominent dark veins on the labellum (two-three pairs of faint veins are present on *A. cadyi*, but six to eight pairs are very dark and prominent in *A. reticulata*), shorter marginal teeth (to 3 mm long in *A. reticulata*), thin sepaline osmophores (very thick and obvious in *A. reticulata*) and very narrow linear to hockey-stick-shaped calli (thick calli in *A. reticulata*). *Arachnorchis cadyi* also has similarities with *A. osmera* but that species is more robust with larger flowers and very thick sepaline osmophores.

Notes: This species was collected at the type locality between 1958 and 1960 by Leo Cady but has not been seen elsewhere. It occurred in a local hot spot which contained more than 30 species of terrestrial orchid, including the endangered *A. tessellata*, but the site was bulldozed in the early 1960's and planted with *Pinus radiata*. It is estimated that the population of *A. cadyi* consisted of about 20-30 plants. (Leo Cady pers. comm.). A copy of a coloured illustration, painted by Leo Cady in March 2000, is in the collection at CANB.

Specimens of this species, possibly isotypes, may have been distributed by Leo Cady to AD and MEL.

Conservation status: Probably extinct.

Etymology: Named after Leo Isaac Cady (1931-), horticulturist and dedicated orchidologist who established his own herbarium, discovered this species, and contributed specimens from his private herbarium to the collection at CANB.

Other Specimens: NEW SOUTH WALES. c. 12 km SE of Nowra, 20 Sept. 1960, *L.I.Cady* (CBG 65670); *ibid*, 25 Sept. 1960, *L.I.Cady* (CANB); Nowra, no date, *L.I.Cady* (CBG 8103527).

10. *Arachnorchis cremna* D.L.Jones, *sp. nov.*: affinis *A. australi* (G.W.Carr) D.L.Jones & M.A.Clem., sed floribus minoribus, flaveolis striis rubellis; sepalis lateralibus osmophoris minutis atrorubris; marginibus medioportionibus labelli dentibus aliquot brevibus serratis, differt.

Type: Victoria. Near Whitfield, 14 Oct. 2005, *P.Branwhite 340 & D.Daniels* (holo CANB).

Description: Hirsute, terrestrial *herb* growing singly or in small loose groups. *Leaf* linear-lanceolate, 8-10

cm long, 0.6 cm wide, dull green, base purple-blotched; trichomes relatively dense, to 5 mm long, patent, white, eglandular. *Scape* 15-20 cm tall, green, wiry, hirsute as in the leaf and with a mixture of very short glandular trichomes. *Sterile bracts* spreading, oblong, 15-22 mm long, 3-5 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, elliptic, 14-18 mm long, 5-7 mm wide, acute, shortly hirsute externally. *Flower* 1, 4-5 cm diam., pale yellow with some fine reddish striae; tepaline caudae dark red; labellum base pale yellow, apex dark red to maroon; calli dark red; column translucent, with red markings. *Sepaline* caudae with short thick osmophores densely packed with dark red, globose glands; dorsal sepal erect; lateral sepals widely divergent, stiffly decurved; petals spreading to stiffly deflexed. *Dorsal sepal* 30-35 mm long, c. 2.5 mm wide, oblong-elliptic in the proximal third, then tapered, ending in a thick osmophore 4-6 mm long. *Lateral sepals* 40-45 mm long, c. 5 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a short ovoid osmophore 0.5-1.5 mm long. *Petals* 27-30 mm long, c. 2.5 mm wide, narrowly lanceolate in the proximal half, tapered, acuminate. *Labellum* articulated on a short claw c. 1 mm long, c. 1.6 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 15-17 mm long, 9-10 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum* marginal teeth 5-8 pairs, linear, 0.2-1 mm long, dark purplish red, becoming decrescent and forming a marginal band towards the apex. *Calli* in 4 or 6 rows, extending onto the base of the midlobe, the basal calli distinct from the rest; basal calli 6 or 8, erect, clavate, c. 1 mm long; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.7 mm long, hockey-stick-shaped, stalked; stalk c. 0.8 mm long; head c. 1 mm long, flat when viewed from the side, narrowly linear-tapered from above. *Column* 11-13 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands ovoid, c. 1 mm long, c. 0.8 mm wide, yellow with a red base. *Anther* c. 2.5 mm long, c. 2.5 mm wide, yellow; rostrum linear, c. 0.3 mm long. *Pollinia* 4, c. 2 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2.5 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known from a single locality on a steep forested slope developed on slate. The orchid plants are confined to a very small area within this site, which is very fragile and susceptible to disturbance. Alt. c. 350 m. Flowering: October.

Recognition: Characterised by relatively small pale yellow flowers with reddish striae, stiffly held lateral sepals and petals, a relatively large, thick, prominent, dark red osmophore on the dorsal sepal, tiny dark red osmophores on the lateral sepals and, mid section of the labellum margins with a few short serrate teeth. This species is most similar to *A. australis* (G.W.Carr) D.L.Jones & M.A.Clem., which has longer osmophores on all the sepals and more numerous, longer, linear marginal teeth on the labellum. It

also has similarities with *A. valida* (Nicholls) D.L.Jones & M.A.Clem. which has cream to white flowers, labellum base white with red veins, a maroon apex and numerous marginal teeth.

Notes: This species was brought to my attention by Peter Branwhite. Locality details have been kept deliberately vague as the species is highly localised and grows on a steep fragile slope which is readily damaged by visitation.

Conservation status: Known from a single locality containing about 15 plants, but up to 35 plants have been recorded from the site many years previously; the species is not conserved and I suggest a conservation category of Critically Endangered (IUCN 2001).

Etymology: The Greek *cremnos*, steep, in reference to the steep slope where this species occurs.

11. *Arachnorchis douglasiorum* D.L.Jones, *sp. nov.*; affinis *A. australi* (G.Carr) D.L.Jones & M.A.Clem., sed floribus majoribus, galbinis ad flavidos; sepalis cum clavis amplis atrorubris; callis labelli brevioribus et columna angustiore, differt.

Type: Victoria. Private property in the Dalyenong/Emu area, 5 Oct. 2005, A. & M. Morton (ORG4982) (holo CANB).

Description: Hirsute, terrestrial *herb* growing singly or in small loose groups. *Leaf* linear-lanceolate, 6-11 cm long, 0.5-0.8 cm wide, dull green, base purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, white, eglandular. *Scape* 10-25 cm tall, usually reddish, wiry, densely hirsute, with a mixture of white eglandular trichomes to 3 mm long and very short glandular trichomes. *Sterile bracts* spreading, oblong, 10-20 mm long, 2.5-3.5 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 12-18 mm long, 5-8 mm wide, reddish, acute to acuminate, shortly hirsute externally. *Flower* 1, 3-4 cm diam., greenish cream to yellowish cream with red lines and striae (obvious externally), with a hot metal smell; tepaline caudae cream to yellowish; labellum cream with prominent red veins and dark red apex; calli dark red; column translucent, with red markings. *Sepaline* caudae with short thick osmophores densely packed with dark red to blackish globose glands; dorsal sepal erect; lateral sepals divergent, stiffly decurved; petals spreading to stiffly deflexed. *Dorsal sepal* 30-40 mm long, 2-3 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 7-10 mm long. *Lateral sepals* 35-45 mm long, 4-5 mm wide, ovate-lanceolate in the proximal third, then tapered to a narrow section, ending in a narrow osmophore 6-10 mm long. *Petals* 28-33 mm long, 2-3 mm wide, narrowly lanceolate in the proximal half, tapered, acuminate, sometimes with a narrow osmophore 2-4 mm long. *Labellum* articulated on a short claw c. 1 mm long, c. 2

mm wide. *Lamina* unlobed or obscurely lobed, broadly ovate to ovate-lanceolate in outline when flattened, 13-15 mm long, 8-9 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum* marginal teeth 12-18 pairs, proximal teeth linear, 1-3 mm long, distal teeth deltate, 0.2-1 mm long, dark purplish red, becoming decrescent and irregular towards the apex. *Calli* in 4 rows, extending half-two thirds to the labellum apex, the basal calli distinct from the rest; basal calli 8-10, often yellowish, erect, c. 1 mm long, obovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, hockey-stick-shaped, stalked; stalk c. 0.8 mm long; head c. 1 mm long, flat when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands obovoid, c. 1 mm long, c. 0.8 mm wide, yellow with a red base. *Anther* c. 2.3 mm long, c. 2.2 mm wide, burgundy; rostrum linear, c. 0.5 mm long. *Pollinia* 4, c. 2 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known only from private property in the Dalenong-Emu area of central Victoria. This species grows on gentle slopes in open forest dominated by *Eucalyptus gonicalyx* with an understorey of *Brachyloma daphnoides* and forbs, in well-drained grey-brown sandy loam. It flowers freely in the absence of fire. Alt. 180-220 m. Flowering: late September and October.

Recognition: This species is distinguished by its large greenish cream to yellowish cream flowers with large dark red sepaline clubs. It is most similar to *A. australis* but tends to have larger, more distinctly yellow flowers than that species, shorter labellum calli and a narrower column.

Notes: The new species grows sympatrically with *A. cruciformis* but flowering in the latter species is finishing as *A. douglasiorum* is beginning. Hybrids between the two are unknown. The new species is referred to as the Yellow Spider Orchid by the landholder.

Conservation status: Of restricted occurrence and not conserved; difficult to estimate numbers due to grazing; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: Named after the Douglas family (John Edward James Douglas (1939-), Debra Geraldine Douglas (1962-) and Kate Michelle Douglas (1998-), on whose property the species occurs. The Douglas family recognised the distinctiveness of the species and have taken steps to protect the habitat of it and other orchids on their property.

12. *Arachnorchis oreophila* D.L.Jones, *sp. nov.*; affinis *A. reticulatae* (Fitzg.) D.L.Jones & M.A.Clem., sed floribus minoribus, galbanis; sepalis et petalis lateralibus patentissimis; osmophoris sepalinis brevioribus; callis brevioribus; marginis centralibus labelli dentibus paucis brevibus, differt.

Type: New South Wales. Beside the Monaro Highway, south of Hopping Joe Creek, 4 Oct. 2004, *D.T.Rouse 201* (holo CANB; iso MEL).

Description: Hirsute, terrestrial *herb* growing singly or in small loose groups. *Leaf* lanceolate, 6-10 cm long, 0.5-7 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 12-20 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 3 mm long and short glandular trichomes. *Sterile bracts* spreading, oblong, 12-20 mm long, 3-4 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 10-15 mm long, 5-8 mm wide, acute to acuminate, shortly hirsute externally. *Flower* 1, 3-4 cm diam., greenish cream with some light red stripes, no detectable odour; tepaline caudae red-black; labellum with a greenish cream base and dark red apex or wholly dark red; calli dark red; column translucent, with red markings. *Sepaline* caudae with thick osmophores densely packed with dark red, globose to spheroidal glands; dorsal sepal erect; lateral sepals divergent, stiffly deflexed; petals spreading to stiffly deflexed. *Dorsal sepal* 20-30 mm long, c. 2 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 3-5 mm long. *Lateral sepals* 25-30 mm long, c. 3 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a narrow osmophore 2-4 mm long. *Petals* 20-25 mm long, c. 2 mm wide, narrowly lanceolate in the proximal third, tapered, acuminate. *Labellum* articulated on a short claw c. 1 mm long, c. 2 mm wide. *Lamina* unlobed, broadly ovate to ovate-lanceolate in outline when flattened, 11-13 mm long, 7-8 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum* marginal teeth 4-8 pairs, deltate, 0.2-0.5 mm long, dark purplish red, becoming decrescent and irregular towards the apex. *Calli* in 4 rows, extending about halfway to the labellum apex, the basal calli distinct from the rest; basal calli 6 or 8, erect, c. 1 mm long, obovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, hockey-stick-shaped, stalked; stalk c. 0.8 mm long; head c. 1 mm long, flat when viewed from the side, narrowly linear-tapered from above. *Column* 11-13 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands nearly globose, c. 1 mm long, c. 0.8 mm wide, yellow with a red base. *Anther* c. 2 mm long, c. 2 mm wide, yellow; rostrum linear, c. 0.5 mm long. *Pollinia* 4, c. 1.8 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known only from the upper reaches of the eastern branch of the Cann River in south-eastern New South Wales and just

over the border in adjacent areas of Victoria. This species grows in tall eucalypt forest with a sparse understorey in well-drained light brown clay loam. It flowers freely in the absence of fire. Alt. 450-480 m. Flowering: late September and October.

Recognition: This species is distinguished readily by its small greenish-cream flowers, stiffly held lateral sepals and petals, short sepaline osmophores, short calli and mid areas of the labellum margins with a few short serrate teeth.

Conservation status: Of restricted distribution and not known to be conserved; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Greek *oreos*, mountain, *philos*, loving, in reference to its habitat.

Other Specimens: VICTORIA: Cann Valley Highway, Nov. 1992, R.G.Tunstall (ORG 1352) (CANB 650582.1); Cann Valley Highway, c. 11 km S of Imlay Road turn-off, 5 Oct. 1999, R.G.Tunstall (ORG 2719) (CANB). NEW SOUTH WALES. Bindi State Forest, Monaro Highway, 1 Oct. 2005, D.T.Rouse 253 (CANB 672970).

13. *Arachnorchis osmera* D.L.Jones, sp. nov.; affinis *A. australis* (G.Carr) D.L.Jones & M.A.Clem., sed florescentia enoristera (September); floribus minoribus; osmophoris glandibus globosis (non ellipsoideis), differt.

Type: Victoria. Cemetery Track, c. 1.2 km N of Leslie's Track, Noorinbee North State Forest, 4 Oct. 2004, D.T.Rouse 200 (holo CANB).

Description: Hirsute, terrestrial *herb* growing singly or in small, loose groups. *Leaf* lanceolate, 6-12 cm long, 0.5-1. cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 15-30 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 3 mm long and short glandular trichomes. *Sterile bracts* spreading, oblanceolate, 15-22 mm long, 5-6 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 15-20 mm long, 5-8 mm wide, acuminate, shortly hirsute externally. *Flowers* 1 or 2, 5-7 cm diam., greenish cream to cream with pink to reddish stripes and suffusions, with a strong burnt plastic scent; sepaline caudae black; labellum greenish cream at the base, apex dark red; calli dark red; column translucent, with red suffusions and markings. *Sepal* caudae densely glandular, with densely packed dark red, globose to spheroidal glands in a narrow osmophore; dorsal sepal erect; lateral sepals divergent, obliquely deflexed; petals spreading to obliquely deflexed. *Dorsal sepal* 25-40 mm long, 2-2.5 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish

osmophore 5-12 mm long. *Lateral sepals* 30-45 mm long, 3-4 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a thickish osmophore 5-10 mm long. *Petals* 20-30 mm long, 2-2.5 mm wide, narrowly lanceolate in the proximal half, tapered to an acuminate apex. *Labellum* articulated on a short claw c. 1 mm long, c. 1.6 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 10-13 mm long, 7-9 mm wide, erect in the proximal third then curved forwards; apex strongly recurved. *Labellum lateral lobes* c. 2.5-3 mm wide, erect; marginal teeth 8-11 pairs, linear, 0.8-2.3 mm long, dark purplish red, spreading, incurved; head asymmetrically linear. *Labellum midlobe* narrowly ovate-deltate in outline when flattened, acute to obtuse; proximal margins with 7-10 pairs of very short reddish teeth, decrescent and forming an irregular marginal band towards the apex. *Calli* in 4 or 6 rows, extending well onto the labellum midlobe, the basal calli distinct from the rest; basal calli 6 or 8, erect; stalk 0.3-0.6 mm long; head 0.3-0.5 mm long, erect, ovoid; main lamina calli numerous, crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1 mm long, hockey-stick-shaped, stalked; stalk c. 0.6 mm long; head c. 0.5 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 11-13 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands nearly globose, c. 1 mm long, c. 0.8 mm wide, yellow. *Anther* c. 2.5 mm long, c. 3 mm wide, purplish red; rostrum linear, c. 0.4 mm long. *Pollinia* 4, 2.5-3 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 3 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Mainly found in East Gippsland, Victoria, between Colqhoun State Forest near Lakes Entrance and the Mallacoota-Genoa area, but also occurring in Bindi State Forest, New South Wales, 1-2 km N of the Victorian border. It may also extend into Nadgee Nature Reserve in south-eastern New South Wales. This species grows in tall open forest with a sparse grassy-sedgy groundcover in well-drained sandy loam, often occurring in open areas and beside tracks. It flowers freely in the absence of fire. Alt. 10-490 m. Flowering: September to October.

Recognition: This species, part of the *A. reticulata* group, is probably most similar to *A. australis* G.Carr, but has smaller flowers and the osmophore glands are globose rather than ellipsoid as in *A. australis*. *Arachnorchis osmera* tends to flower earlier than *A. australis*, reaching a peak in September, whereas *A. australis* flowers mainly in October, often extending to November. **Notes:** The flowers of *A. osmera* have a strong smell reminiscent of burnt plastic (Dean Rouse, pers. comm.).

Conservation status: Of restricted distribution and not known to be conserved; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: The Greek *osmeros*, odorous, in reference to the prominent floral scent.

Specimens Examined: VICTORIA. Colquoun Rd, Colquoun State Forest, 6 Oct. 1992, *R.Clark* (DLJ 10227) (CANB 9610267); Blackfellows Track, 6 Oct. 1992, *R.Clark* (DLJ 10228) (CANB 9610268); Cemetery Track, c. 1.2 km N of Leslies Track, Noorinbee, 1 Oct. 2005, *D.T.Rouse* 254 (CANB 672971). NEW SOUTH WALES. Bindi State Forest, Monaro Highway, 1 Oct. 2005, *D.T.Rouse* 252 (CANB 672969).

14. *Arachnorchis peisleyi* D.L.Jones, sp. nov.; affinis *A. reticulatae* (Fitzg.) D.L.Jones & M.A.Clem., and *A. oreophila* D.L.Jones, sed floribus minoribus; sepalis et petalis multo angustioribus; labello minoribus; callis minoribus; columna minore, differt.

Type: Victoria. Near Mallacoota, 29 Sept. 1992, *A.Peisley* (*D.L.Jones* 10188) (holo CANB).

Illustration: Top plate, page 43, Jeanes & Backhouse (2000) – as *Caladenia* sp. aff. *fitzgeraldii*.

Description: Hirsute terrestrial *herb* growing singly or in small loose groups. *Leaf* lanceolate, 6–12 cm long, 0.4–7 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 12–20 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 3 mm long and short glandular trichomes. *Sterile bracts* spreading, oblong, 10–17 mm long, 3–4 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 7–15 mm long, 5–7 mm wide, acute to acuminate, shortly hirsute externally. *Flower* 1, 2–4 cm diam., greenish yellow with some light red stripes, no detectable odour; tepaline caudae dark red; labellum with a greenish cream, red-striped base and dark red apex; calli dark red; column translucent, with red markings. *Sepaline* caudae with thick osmophores densely packed with dark red, globose to spheroidal glands; dorsal sepal erect; lateral sepals divergent, stiffly deflexed; petals spreading to stiffly deflexed. *Dorsal sepal* 20–30 mm long, 1.5–2 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 4–6 mm long. *Lateral sepals* 25–35 mm long, c. 3 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a narrow osmophore 3–5 mm long. *Petals* 20–25 mm long, c. 2 mm wide, narrowly lanceolate in the proximal third, tapered, acuminate, rarely with a small osmophore. *Labellum* articulated on a short claw c. 0.7 mm long, c. 1.5 mm wide. *Lamina* unlobed, broadly ovate to ovate-lanceolate in outline when flattened, 11–13 mm long, 7–8 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum* marginal teeth central, 4–6 pairs, deltate, 0.2–0.5 mm long, dark purplish red, becoming decrescent and irregular towards the apex, ending in a marginal band. *Calli* in 4 rows, extending about halfway to the labellum apex, the basal

calli distinct from the rest; basal calli 6 or 8, erect, c. 1.3 mm long, obovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, obliquely hockey-stick-shaped, stalked; stalk c. 0.7 mm long; head c. 1 mm long, flat when viewed from the side, narrowly linear-tapered from above. *Column* 10–13 mm long, 3–4 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands obovoid, c. 1 mm long, c. 0.6 mm wide, yellow with a red base. *Anther* c. 2 mm long, c. 2 mm wide, yellow; rostrum linear, c. 0.5 mm long. *Pollinia* 4, c. 1.8 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Poorly collected and known mainly from the Mallacoota-Genoa area of East Gippsland, Victoria, with a collection from near Lake Tyers, and single specimen from near Lake Wonboyn in south-eastern New South Wales. This species, which is restricted to coastal and near-coastal areas, grows in heathland and heathy forest in well-drained sandy loam and light sandy clay loam. Flowering is greatly enhanced by summer fires with the number of flowering plants decreasing rapidly as the vegetation thickens. Alt. 0–80 m. Flowering: late September and October.

Notes: This species is remarkably similar to *A. oreophila* but grows in a coastal habitat and flowers freely only after hot summer fires. Morphologically the flowers of *A. peisleyi* are smaller than those of *A. oreophila* and with noticeably thinner tepals, smaller labellum, smaller calli and smaller column.

It is likely that this species is more widespread than specimens suggest, but as it is basically a “fire-follower” botanising to check its distribution would need to be carried out in the first two seasons following summer fires.

Conservation status: Of restricted distribution but poorly known and apparently not conserved; suggest 2EK by the criteria of Briggs & Leigh (1996).

Etymology: Named after Allan Bertrand Peisley (1920–), orchidologist with a comprehensive knowledge of the orchids of East Gippsland.

Other Specimens Examined: VICTORIA. Mallacoota, 20 Sept. 1991, *P.Branwhite* (CANB 526987); Betka River, Nov. 1992, *R.G.Tunstall* (*ORG* 1351) (CANB 650581.1); NEW SOUTH WALES. S of Wonboyn near main road, 5 Oct. 1981, *M.A.Clements* 2353 (CBG 8111909).

15. *Arachnorchis strigosa* D.L.Jones, sp. nov.; affinis *A. australi* (G.W.Carr) D.L.Jones & M.A.Clem.; sed folio et pedunculo trichomibus

brevissimis (c. 1 mm longis) et rigidis; osmophoris sepalinis longioribus et densioribus; callis longioribus, differt.

Type: South Australia. Ruakkan, 25 Sept. 2005, R.Bates 65973 (holo CANB 673104; iso AD).

Description: Hirsute, terrestrial *herb* growing singly or in small loose groups. *Leaf* linear-lanceolate, 6-10 cm long, 0.8-1.2 cm wide, dull green, base purple-blotched; trichomes short (to 1 mm long), stiff to rigid, patent, white, eglandular, dense on both surfaces and imparting a grizzled appearance. *Scape* 12-20 cm tall, green or red, wiry, densely hirsute as in the leaf but with a mixture of short white eglandular trichomes to 1 mm long and very short glandular trichomes. *Sterile bracts* spreading, oblong, 12-20 mm long, 3-4 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, obovate, 10-15 mm long, 5-8 mm wide, acute to acuminate, shortly hirsute externally. *Flower* 1, 3-4 cm diam., greenish cream with some fine reddish striae, no detectable odour; tepaline caudae red-black; labellum cream with red stripes and dark red apex; calli dark red; column translucent, with red markings. *Sepaline* caudae with short thick osmophores densely packed with dark red, globose to hemispherical glands; dorsal sepal erect; lateral sepals divergent, stiffly decurved; petals spreading to stiffly deflexed. *Dorsal sepal* 20-30 mm long, c. 2 mm wide, oblong-elliptic in the proximal half, then tapered, ending in a thickish osmophore 3-5 mm long. *Lateral sepals* 25-30 mm long, c. 3 mm wide, narrowly ovate-lanceolate in the proximal half, then tapered to a narrow section, ending in a narrow osmophore 2-6 mm long. *Petals* 20-25 mm long, c. 2 mm wide, narrowly lanceolate in the proximal third, tapered, acuminate. *Labellum* articulated on a short claw c. 1 mm long, c. 2 mm wide. *Lamina* unlobed, broadly ovate to ovate-lanceolate in outline when flattened, 11-13 mm long, 7-8 mm wide, erect in the proximal third then curved forwards; apex recurved. *Labellum* marginal teeth 4-8 pairs, deltate, 0.2-0.5 mm long, dark purplish red, becoming decrescent and irregular towards the apex. *Calli* in 4 rows, extending about halfway to the labellum apex, the basal calli distinct from the rest; basal calli 6 or 8, erect, c. 1 mm long, obovoid; main lamina calli moderately crowded, mostly stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, hockey-stick-shaped, stalked; stalk c. 0.8 mm long; head c. 1 mm long, flat when viewed from the side, narrowly linear-tapered from above. *Column* 11-13 mm long, 4-5 mm wide, recurved in the proximal third then incurved, broadly winged; basal glands clavoid, c. 1.5 mm long, c. 0.8 mm wide, yellow with a red base. *Anther* c. 2 mm long, c. 2 mm wide, yellow; rostrum linear, c. 0.3 mm long. *Pollinia* 4, c. 1.8 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Reported to be common around the top of the Coorong and in Potters Scrub (R.Bates, field notes). It grows in low mallee shrubland dominated by *Eucalyptus diversifolia* in well-drained calcareous sand and sand over limestone. The plants are often partially hidden among shrubs and in some sites

grow among low mallee overlooking the sea. Alt. 2-50 m. Flowering: September and October.

Recognition: Characterised by relatively short habit, short stiff white trichomes densely covering the leaf and scape, relatively small greenish-cream flowers with reddish striae, stiffly held lateral sepals and petals, short, thin sepaline osmophores, short calli and mid areas of the labellum margins with a few short serrate teeth. It is similar to *A. australis* (G.W.Carr) D.L.Jones & M.A.Clem., which has softer trichomes to 5 mm long on the leaf and scape, longer thicker sepaline osmophores and longer calli.

Notes: This species was brought to my attention by Bob Bates.

Conservation status: Reported to be relatively common and conserved.

Etymology: The Latin *strigosus*, with short, rigid, bristle-like hairs, in reference to short dense hairs on the leaf and scape of this species.

Miscellaneous New *Arachnorchis* Species

Eight species and one subspecies are described here as new.

16. *Arachnorchis cretacea* D.L.Jones, *sp. nov.*; affinis *A. venustae* (G.W.Carr) D.L.Jones & M.A. Clem., sed floribus minoribus (5-7 cm laxis); labello minore (ad 16 × 10 mm); dentibus marginalibus paucioribus et brevioribus; callis timidioribus; columna angustiore (4-5 mm lata), differt.

Type: Victoria. Dalyenong Bushland Flora Reserve, 15 Sept. 2004, D.L.Jones 19090, K.J.Richards, A. & M. Morton & G. Nevill (holo CANB; iso MEL).

Description: Hirsute terrestrial *herb* growing singly or in small groups. *Leaf* linear-lanceolate, 5-12 cm long, 0.6-1 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular, basal cell white. *Scape* 20-35 cm tall, wiry, densely hirsute, with a mixture of transparent, eglandular trichomes to 3 mm long and short glandular trichomes. *Sterile bracts* spreading, narrowly oblong-elliptic, 12-20 mm long, 3-5 mm wide, long-acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 12-22 mm long, 4-6 mm wide, acuminate, externally shortly hirsute. *Flowers* 1 or 2, 5-7 cm diam., white to greyish white, the tepals often with a red median stripe; scent resembling hot metal; tepalline caudae greyish to greyish black; labellum cream with some reddish lines; calli reddish; marginal teeth reddish; column transparent with red markings. *Tepals* densely glandular in the distal half to two-thirds, with a mixture of transparent and purplish ellipsoid cells in chains of 2-4; dorsal sepal erect and incurved or recurved; lateral

sepals divergent, obliquely deflexed to drooping; petals obliquely deflexed to drooping. *Dorsal sepal* 45-60 mm long, 2.5-3 mm wide, oblong-elliptic in the proximal third, then tapered to a glandular cauda. *Lateral sepals* 45-60 mm long, 3.5-4 mm wide, ovate-lanceolate in proximal third, then tapered to glandular caudae. *Petals* 35-50 mm long, 2.5-3 mm wide, lanceolate in proximal third, gradually tapered to glandular caudae. *Labellum* articulated on a short claw c. 0.4 mm long, c. 1 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 14-16 mm long, 8-10 mm wide, erect in proximal third then curved forwards; apex strongly recurved; lateral lobes c. 3 mm wide, erect; marginal teeth on the lateral lobes 14-20, linear, 0.5-2 mm long, reddish with a white tip, widely spreading to incurved; head narrowly linear; midlobe ovate in outline when flattened, subacute; proximal margins with discrete short dentiform reddish teeth, decrescent to the apex. *Lamina calli* mainly in 4 rows, extending well onto the midlobe, the basal calli distinct from the rest; basal calli 6 or 8, erect, crowded, c. 1 mm long, hardly differentiated into a stalk, narrowly linear to clavate; main lamina calli numerous, crowded, mostly prominently stalked but those towards the apex sessile and irregularly arranged; longest lamina calli c. 1 mm long, linear, with a narrow apex; head c. 0.3 mm long, straight when viewed from the side, narrowly linear-tapered from above. *Column* 11-13 mm long, 4-5 mm wide, recurved in the proximal third then shallowly incurved, narrowly winged; basal glands obovoid, c. 1 mm long, c. 0.8 mm wide, yellow, base reddish. *Anther* c. 2.5 mm long, c. 2.5 mm wide, usually yellow; rostrum linear, c. 0.6 mm long. *Pollinia* 4, 2-2.5 mm long, broadly deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 3 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Known only from the Stuart Mill – Dalynong area of central Victoria. This species grows in open forest dominated by *Eucalyptus goniocalyx* with an understorey of *Brachyloma daphnoides* and forbs in well-drained grey-brown sandy loam. It flowers freely in the absence of fire. Alt. 180-220 m. Flowering: late August and September.

Recognition: Recognised by the relatively large white to greyish-white flowers, obliquely deflexed to drooping lateral sepals and petals which have relatively thick greyish to greyish-black caudae bearing chains of 2-4 ellipsoid osmophore cells, labellum with relatively short linear calli and short linear marginal teeth and a relatively narrow column. The new species is most closely related to *A. venusta* (G.W.Carr) D.L.Jones and M.A. Clem., but that species has much larger flowers (8-12 cm across), larger labellum (to 20 x 12 mm) with numerous thin marginal teeth to 2.5 mm long, longer (to 1.4 mm long), thinner calli and a much broader column (6-8 mm wide). Both species have very similar osmophore cells.

Note: This species has been referred to as *Caladenia* sp. aff. *venusta* with the vernacular of the Stuart Mill Spider Orchid.

Conservation status: Of very restricted distribution but conserved; suggest IEC according to the criteria of Briggs & Leigh (1996). It is listed as endangered in the DSE Advisory List of Rare or Threatened Plants.

Etymology: The Latin *cretaceus*, dull white with a touch of grey, in reference to the flower colour.

17. *Arachnorchis ensigera* D.L.Jones, sp. nov.; affinis *A. gladiolatae* (R.S.Rogers) D.L.Jones & M.A.Clem. sed floribus major; scapis elatiore; et labello lobis lateralibus dentibus 7-9 paribus usque ad 1.5 mm longos, differt.

Type: South Australia. Alligator Gorge, Mt Remarkable National Park, Circle Track, 5 Sep. 1999, D.L.Jones 16698 & M.Garratt (holo CANB; iso AD, MEL).

Description: Hirsute terrestrial *herb* growing singly or in loose groups. *Leaf* narrowly lanceolate, 8-15 cm long, 0.8-1.4 cm wide, dull green; base purple-blotched; trichomes dense on both surfaces, to 4 mm long, patent, transparent, eglandular. *Scape* 14-35 cm tall, wiry, densely hirsute, with transparent, eglandular trichomes to 4 mm long. *Sterile bracts* spreading, oblong-lanceolate to elliptic-lanceolate, 15-20 mm long, 5-7 mm wide, acute, involute, externally shortly hirsute. *Floral bracts* closely sheathing, narrowly ovate-lanceolate, 12-17 mm long, 6-8 mm wide, subacute, externally shortly hirsute. *Flowers* 1 or 2, 7-9 cm diam., cream-green to whitish green, sometimes with a faint reddish medial line, the sepals and petals with large, conspicuous blackish bayonet-like osmophores; labellum green with a maroon apex, calli reddish purple; column translucent with reddish dots and markings. *Dorsal sepal* erect; lateral sepals widely divergent, stiffly spreading; petals stiffly spreading. *Dorsal sepal* 45-56 mm long, 3.5-4 mm wide, oblong-elliptic in the proximal half then narrowed, ending in a thick, flat glandular osmophore 25-30 mm long and c. 1.5-2 mm wide. *Lateral sepals* 45-55 mm long, 3.5-4 mm wide, lanceolate in the proximal third, then with similar osmophores as in the dorsal sepal. *Petals* 32-45 mm long, 2-2.5 mm wide, narrowly lanceolate in proximal third to half, ending in a large osmophore 13-27 mm long, 1.5-2.3 mm wide, even more prominent than the osmophore on the sepals. *Labellum* articulated on a very short claw. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 13-16 mm long, 8-11 mm wide, erect in the proximal third then curved forwards; apex strongly recurved. *Lateral lobes* c. 3 mm across, suberect to erect; margins with 7-9 pairs of lateral teeth to 1.5 mm long; marginal teeth linear, widely spreading, straight, head narrowly clavate, outer face white or purplish. *Midlobe* narrowly ovate-deltate in outline when flattened, obtuse, the margins with numerous very short, blunt purplish teeth, decrescent towards the apex. *Calli* in four or six rows, extending well onto the midlobe, purplish red, most calli prominently stalked but those towards the

apex sessile and irregularly arranged. Basal calli not greatly differentiated, clavate, crowded, c. 2.5-2.8 mm long, stalked, erect; head much swollen, irregularly ovoid. Longest lamina calli c. 1.5-2 mm long, hockey-stick-shaped, stalked; head c. 1-1.3 mm long, curved when viewed from the side, tapered from above. *Column* 11-13 mm long, 5-6 mm wide, recurved in the proximal third then incurved; basal glands widely separated, narrowly oblong-ovoid, c. 1.3 mm long, c. 0.8 mm wide, yellow. *Anther* c. 3 mm long, c. 2.2 mm wide, yellow; rostrum linear, c. 0.4 mm long. *Pollinia* four, c. 2.8 mm long, boomerang-shaped, flat, yellow, mealy. *Stigma* c. 2.5 mm wide, elliptic, sunken. *Capsule* not seen.

Distribution and ecology: Apparently restricted to the Alligator Gorge region of the southern Flinders Ranges, South Australia. It grows in woodland dominated by *Eucalyptus cladocalyx* with a sparse shrubby understorey. The soil is a brown stony loam. Alt. 800-900 m. Flowering: August and September.

Recognition: Moderately large-flowered, greenish spider orchid with stiffly spreading tepals, all with prominent, thickened blackish osmophores and a greenish labellum with relatively long marginal teeth on the lateral lobes. The new species is very similar to *Arachnorchis gladiolata* (R.S.Rogers) D.L.Jones & M.A.Clements which has smaller flowers on shorter scapes and labellum lateral lobes with entire margins or occasionally with a very few short marginal teeth. Both species grow sympatrically but field studies show each taxon maintains itself separately with no intermediates apparent.

Conservation status: Very rare but conserved in Alligator Gorge within Mt Remarkable National Park. I suggest a conservation status category of 2EC according to the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Latin *ensiger*, sword-bearing; in reference to the prominent sword-shaped osmophores (clubs) which occur on the sepals and petals.

18. *Arachnorchis flindersica* D.L.Jones, *sp. nov.*; affinis *A. patersonii* (R.Br.) D.L.Jones & M.A.Clem.; sed sepalis et petalis lateralibus dimidio proximali patentissimis, apicibus declinatis demissive; caudis tepalinis, infuscat; osmophoris glandibus saepe fascicularibus; dentibus marginalibus brevioribus, differt.

Type: South Australia. Alligator Gorge, C. & M.Houston 41, 4 Sept. 2005 (holo CANB; iso AD, MEL).

Description: Hirsute terrestrial *herb* growing singly or in small loose groups. *Leaf* narrowly lanceolate, 8-22

cm long, 0.6-1.4 cm wide, dull green; base pale or red-purple-blotched; trichomes dense on both surfaces, to 3 mm long, multiserial, patent, transparent, eglandular. *Scape* 15-35 cm tall, wiry, densely hirsute, with transparent, multiserial, eglandular trichomes to 3 mm long. *Sterile bracts* spreading, oblong to oblong-ob lanceolate, 17-28 mm long, 4-5 mm wide, acuminate, involute, externally shortly hirsute. *Floral bracts* closely sheathing, broadly ovate-lanceolate, 14-22 mm long, 8-10 mm wide, acuminate, externally shortly hirsute. *Flower* 1-2, 5-10 cm diam., opening cream, ageing to white, all tepals with relatively thin, dark red or blackish glandular caudae, sometimes expanded into thickish osmophores; labellum white with cream or purplish calli; column translucent with a few reddish markings. *Dorsal sepal* erect and incurved; lateral sepals widely divergent, stiffly spreading with drooping tips or drooping; petals stiffly spreading with drooping tips. *Dorsal sepal* 40-80 mm long, 3-4 mm wide, oblong-elliptic in the proximal quarter then tapered to a cauda 30-55 mm long and c. 1 mm wide; osmophore c. 10 mm long, cells single, often clustered, crowded, ovoid-ellipsoid, longer than wide, red-brown. *Lateral sepals* 40-80 mm long, 4-6 mm wide, lanceolate in the proximal third, then tapered to caudae similar to those on the dorsal sepal; osmophore similar. *Petals* 30-55 mm long, 3-4 mm wide, lanceolate in proximal third then tapered to glandular caudae; osmophore similar to those on the dorsal sepal but shorter. *Labellum* articulated on a short claw c. 1 mm long, c. 2.5 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 13-18 mm long, 7-11 mm wide, erect in the proximal third then curved forwards; apex recurved. *Lateral lobes* 2-3 mm across, suberect to erect; margins with 5-8 pairs of teeth 1-2 mm long; marginal teeth linear with a curved head, erect to spreading, straight, head narrowly clavate, white, outer face white; midlobe narrowly ovate in outline when flattened, obtuse to apiculate, the margins with numerous short, blunt, white teeth, decrescent towards the apex. *Calli* in four or six rows, extending well onto the midlobe, purplish, most calli prominently stalked but those towards the apex sessile and irregularly arranged. Basal calli 4-6, crowded, c. 1.3 mm long, cream, stalked, erect to recurved; head swollen, clavate. Longest lamina calli c. 1.3 mm long, hockey-stick-shaped, stalked; head c. 1 mm long, flat to curved when viewed from the side, narrowly linear-tapered from above. *Column* 12-14 mm long, 5-7 mm wide, recurved in the proximal third then incurved; basal glands widely separated, obovoid, c. 1.2 mm long, c. 0.9 mm wide, yellow with numerous red glands. *Anther* c. 3 mm long, c. 2.5 mm wide, yellow; rostrum linear, c. 0.6 mm long. *Pollinia* four, c. 3 mm long, boomerang-shaped, flat, yellow, mealy. *Stigma* c. 3 mm wide, elliptic, sunken. *Capsule* not seen.

Distribution and ecology: Known only from the Alligator Gorge region of the Flinders Ranges growing among shrubs on sheltered slopes in moderately tall eucalypt forest. The soil is a brown stony loam. Alt. 800-900 m. Flowering: Late August and September.

Recognition: This species can be recognised by its moderately large white flowers, lateral sepals

and petals stiffly spreading in the basal part with downcurved to drooping tips, relatively thick brownish tepalline caudae, osmophore glands single, ovoid-ellipsoid, often clustered, labellum lateral lobes with narrow marginal teeth about 2 mm long and the midlobe with short teeth decrescent to the apex. The new species is allied to *Arachnorchis patersonii* (R.Br.) D.L.Jones & M.A.Clem., but that species, which occurs in coastal scrubs of northern Tasmania, has creamy white to creamy yellow flowers, obliquely spreading lateral sepals and petals with densely glandular caudae and a cream to white labellum with numerous, linear-tapered, white-tipped, marginal teeth to 2.5 mm long (Jones 1998).

Conservation status: Apparently rare but conserved in Alligator Gorge within Mt Remarkable National Park, where locally abundant in some seasons. I suggest a conservation status category of 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: *flindersica*, in reference to the Flinders Ranges, the only known locality of the species.

Other Specimens: SOUTH AUSTRALIA. Mt Remarkable, 4 Sept. 1988, *R.Bates 15362* (CANB); Alligator Gorge National Park, Circle Track, 5 Sept. 1999, *D.L.Jones 16703 & M.Garratt* (CANB).

19. *Arachnorchis fuliginosa* D.L.Jones, sp. nov., affinis *A. fragrantissimae* (D.L.Jones & G.W.Carr) D.L.Jones & M.A.Clem. sed florenti superiore; labello dentibus marginalis brevioribus apicibus latisque, et callis lineari-clavoidis stipatis; et glandibus osmophoris, vel singulariter vel binatim catenatis, dispositis, congestis, differt.

Type: South Australia. Corny Point – Marion Bay Road, Yorke Peninsula, 2 Sep. 2000, *D.L.Jones 17230 & M.Garratt* (holo CANB; iso AD, MEL).

Description: Hirsute terrestrial *herb* growing singly or in small loose groups. *Leaf* narrowly lanceolate, 6–12 cm long, 0.5–1 cm wide, dull green; base purple-blotched; trichomes dense on both surfaces, to 1 mm long, multiseriate, patent, transparent, eglandular. *Scape* 15–35 cm tall, wiry, densely hirsute, with transparent, multiseriate, eglandular trichomes to 1.3 mm long. *Sterile bracts* spreading, oblong to oblong-oblancoate, 15–26 mm long, 4–6 mm wide, acuminate, involute, externally shortly hirsute. *Floral bracts* closely sheathing, broadly ovate-lanceolate, 16–23 mm long, 8–10 mm wide, acute to acuminate, externally shortly hirsute. *Flower* solitary, 8–10 cm across, creamy yellowish, sometimes with reddish medial lines, with a smell like hot metal, all tepals with thick, long, blackish glandular caudae; labellum white to cream to creamy yellow with dark purple lines and purplish calli; column

translucent with prominent reddish markings. Dorsal sepal erect; lateral sepals widely divergent, stiffly spreading to drooping; petals stiffly spreading to drooping. *Dorsal sepal* 40–70 mm long, 3–4 mm wide, oblong-elliptic in the proximal third then tapered to a long, black, glandular cauda to 37 mm long and c. 1 mm wide; osmophore cells densely crowded, ovoid-ellipsoid, mostly black, some transparent, single or in twos in a short chain. *Lateral sepals* 40–70 mm long, 4–5 mm wide, lanceolate in the proximal third, then tapered to black caudae similar to those on the dorsal sepal; osmophore cells similar. *Petals* 37–63 mm long, 3–3.5 mm wide, lanceolate in proximal third then tapered to black, glandular caudae; osmophore cells similar to those on the dorsal sepal. *Labellum* articulated on a short claw c. 1.5 mm long, c. 2.5 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 16–20 mm long, 10–12 mm wide, erect in the proximal third then curved forwards; apex strongly recurved. *Lateral lobes* c. 3 mm across, suberect to erect; margins with 7–10 pairs of calli to 2 mm long; marginal calli linear, widely spreading, straight, head narrowly clavate, dark purplish to brownish, outer face white. *Midlobe* narrowly ovate in outline when flattened, obtuse, the margins with numerous short, blunt, purplish, white-tipped teeth, decrescent towards the apex. *Calli* in six rows, extending well onto the midlobe, purplish, most calli prominently stalked but those towards the apex sessile and irregularly arranged. Basal calli 8–10, crowded, c. 1 mm long, creamy yellow, stalked, erect to recurved; head swollen, clavate. Longest lamina calli c. 2 mm long, hockey-stick-shaped, stalked; head c. 1.3 mm long, flat to curved when viewed from the side, narrowly linear-tapered from above. *Column* 15–18 mm long, 6–8 mm wide, recurved in the proximal third then incurved; basal glands widely separated, ovoid, c. 1.2 mm long, c. 0.9 mm wide, yellow with numerous red glands. *Anther* c. 3.5 mm long, c. 2.5 mm wide, yellow; rostrum linear, c. 0.7 mm long. *Pollinia* four, c. 3 mm long, boomerang-shaped, flat, yellow, mealy. *Stigma* c. 3 mm wide, elliptic, sunken. *Capsule* not seen.

Distribution and ecology: Known only from south-western parts of Yorke Peninsula to the south of Corny Point. Occurs in low shrubland dominated by *Callitris canescens* and mallee eucalypts with the orchids growing in open areas among *Lepidosperma* tussocks. The soil is a brown loam over sheet limestone. Alt. 30–50 m. Flowering: Late August and September.

Recognition: This species can be recognised by its large creamy yellowish flowers, thick black tepalline caudae, short, broad-tipped angular labellum marginal teeth, crowded labellum calli with large heads and densely packed osmophore glands arranged singly or in chains of two. The flowers have a smell like hot metal. The new species is apparently allied to *Arachnorchis fragrantissima* (D.L.Jones & G.W.Carr) D.L.Jones & M.A.Clem., but that species, which occurs in dense coastal scrubs and heathy forests of south-western Victoria and south-eastern

South Australia, flowers slightly earlier, has strongly fragrant flowers, smaller labellum calli and longer, narrower labellum marginal teeth and osmophore cells arranged in moniliform chains, often consisting of 3 or more cells.

Conservation status: Poorly collected and not known to be conserved. I suggest a conservation status category of 2VK according to the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Latin *fuliginosus*, sooty, in reference to prominent blackish tips of the sepals and petals.

Other Specimen: SOUTH AUSTRALIA. Eyre Peninsula, Corny Point, 5 Sept. 1988, *R.Bates 15312* (CANB).

20. *Arachnorchis grampiana* D.L.Jones, *sp.*

nov.; affinis *A. oenochilae* (G.Carr) D.L.Jones & M.A.Clem., sed caudis tepalinis tenuioribus; glandibus tepalinis ellipsoidis ad oblongas, et singulariter et 2–3 in catenas moniliformes dispositis; callis labelli tenuioribus, in quoque seriem 8–10 callis distalibus sessilibus; columna multo angustiore (3–4 mm lata), differt.

Type: Victoria. Serra Range, Grampians, c. 1.5 km W of Henham Track, 16 Sept. 2004, *D.L.Jones 19108* & *K.J.Richards* (holo CANB; iso MEL).

Description: Hirsute, terrestrial *herb* growing singly or in small, loose groups. *Leaf* lanceolate, 5–10 cm long, 0.5–0.8 cm wide, dull green, base red to purple-blotched; trichomes dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 15–26 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 4 mm long and a few short glandular trichomes towards the apex. *Sterile bracts* spreading, oblong-lanceolate, 12–20 mm long, 2–3 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 12–20 mm long, 3–4 mm wide, acuminate, shortly hirsute externally. *Flowers* 1 or 2, 4–6 cm diam., pale tawny yellow, sometimes suffused with light brown, with a hot metal or plastic scent; tepaline caudae thin, reddish; labellum cream to red, often with darker veins; calli cream red; column translucent, cream or suffused with red. *Tepal* caudae glandular, mostly with short chains of 2–3 ellipsoid to oblong glands, others single; dorsal sepal erect; lateral sepals divergent, drooping; petals drooping. *Dorsal sepal* 40–55 mm long, 2.5–3 mm wide, oblong-elliptic in the proximal fifth, then tapered to a relatively thin cauda. *Lateral sepals* 40–55 mm long, 3–4 mm wide, ovate-lanceolate in proximal fifth then gradually tapered to relatively thin caudae. *Petals* 32–40 mm long, 2.5–3 mm wide, narrowly lanceolate in proximal third, gradually tapered to relatively thin caudae. *Labellum* articulated on a short claw c. 0.5 mm long, c. 1.8 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 13–17 mm long, 7–9 mm wide, erect in proximal third then curved forwards; apex recurved.

Labellum lateral lobes 2–3 mm wide, erect; marginal teeth 10–14, linear, 1–2 mm long, red, spreading, incurved; head asymmetrically linear, outer face white. *Labellum midlobe* narrowly ovate-deltate in outline when flattened, acute; basal margins with a few very short, asymmetrically rhombic reddish teeth with white outer margins, these decrescent and fused in a reddish marginal band. *Calli* in 4 or 6 rows, just extending nearly onto the base of the labellum midlobe, the basal calli distinct from the rest; basal calli 6 or 8, crowded, clavate, c. 1 mm long; stalk c. 0.2 mm long; head c. 0.8 mm long, erect, cream to yellowish and purple; main lamina calli 7–9 per row, distal 8–10 calli in each row sessile and irregularly arranged; longest lamina calli c. 1.5 mm long, hockey-stick-shape, stalked; stalk c. 1 mm long; head c. 0.7 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 10–12 mm long, 3–4 mm wide, recurved in the proximal third then incurved, winged; basal glands ovoid-oblong c. 1 mm long, c. 0.7 mm wide, yellow with red glands. *Anther* c. 2.5 mm long, c. 2.5 mm wide, purplish; rostrum linear, c. 0.6 mm long. *Pollinia* 4, 2.5–2.8 mm long, deltate, lobed, flat, yellow, mealy. *Stigma* elliptic, c. 2.8 mm wide, sunken. *Capsule* not seen.

Distribution and ecology: Apparently restricted to the Grampians in western Victoria where it grows on shrubby slopes in open forest in well-drained gravelly soil and laterite. It flowers freely in the absence of fire. Alt. 400–600 m. Flowering: Late August and September.

Recognition: This species has generally been included in *A. oenochila* (e.g. Carr 1991), but can be distinguished by thinner tepaline caudae with ellipsoid to oblong glands arranged both singly and also frequently in moniliform chains of 2–3 glands, thinner labellum calli with the distal 8–10 calli in each row sessile and irregularly arranged, and a much narrower column (3–4 mm across). By contrast *A. oenochila* has thicker tepaline caudae with single or clustered ellipsoid glands, thicker labellum calli with the distal 3–4 calli in each row sessile and a broader column (5–6 mm across).

Conservation status: Of fairly restricted distribution but conserved in a National Park; suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: *grampiana*, latinised version of the Grampians.

21. *Arachnorchis leptochila* Fitzg. *subsp.*

dentata D.L.Jones, *subsp. nov.* affinis *A. leptochilo* Fitzg. *subsp. leptochilo* sed floribus omnino rubris; et labello marginis dentatis, differt.

Type: South Australia. Alligator Gorge National Park, 9 Oct. 1988, *D.L.Jones 2966* & *M.A.Clements* (holo CANB; iso AD).

Description: *Leaf* linear-lanceolate, 6–10 cm long, 4–8 mm wide, dull green, base purpl-spotted, covered with

whitish eglandular and shorter glandular trichomes. *Scape* 18-25 cm tall, stiff, covered with similar trichomes to those on the leaf. *Flowers* 1-2, 25-35 mm across, mainly red, sometimes with yellowish markings. *Dorsal sepal* erect, 25-30 mm long, c. 3 mm wide at the base; basal part narrowly elliptic, suddenly contracted to a narrow section c. 8-10 mm long, ending in an osmophore; osmophore 5-7 mm long, thick, red. *Lateral sepals* stiffly upswep, 28-33 mm long, c. 2.5 mm wide in the basal part; basal part oblong-lanceolate, falcate, tapered to a narrow section c. 8-10 mm long, ending in an osmophore similar to that on the dorsal sepal. *Petals* spreading to decurved, narrowly elliptic-lanceolate, 20-25 mm long, c. 3 mm wide, tapered to an attenuate apex, a cluster of red osmophore cells near the apex. *Labellum* erect, oblong-lanceolate when flattened, 10-12 mm long, 5-6 mm wide, red, unlobed or very obscurely 3-lobed; margins with numerous linear teeth 0.4-0.7 mm long, decrescent to the apex; apex recurved to recoiled. *Calli* in 4 rows, red, extending about halfway along the lamina; basal calli 4-6, erect, 1-1.3 mm long, with a linear head; longest lamina calli c. 0.8 mm long, subsessile to sessile. *Column* incurved, red with yellowish markings, 10-12 mm long, 4.5-5 mm wide. *Basal glands* oblong-elliptic, c. 2 mm long, yellow. *Anther* c. 2.4 mm long, red. *Pollinia* deltate, c. 3 mm long, yellow. *Stigma* circular, c. 2 mm across, sunken. **Fig. 3.2.**

Distribution and ecology: Restricted to the Flinders Ranges, SA, growing among shrubs and in open areas on slopes in well-drained to moisture-retentive red-brown clay loam. Alt. 700-900 m. Flowering September and October.

Recognition: *Arachnorchis leptochila* subsp. *dentata* is distinguished from the typical subspecies by its flowers being predominately red and the labellum having well developed marginal teeth. *Arachnorchis leptochila* subsp. *leptochila* can be recognised by its flowers having yellow green perianth segments and a red labellum with entire or irregular margins. It occupies more southerly areas than the new subspecies with its distribution centred on the Mount Lofty Ranges.

Conservation status: Of restricted distribution but conserved in a National Park; suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *dentatus*, toothed, in reference to the marginal teeth on the labellum.

22. *Arachnorchis saxatilis* D.L.Jones, sp. nov.; affinis *A. stellatae* (D.L.Jones) D.L.Jones & M.A.Clem., sed floribus majoribus (45-55 mm laxis); callis labelli multo tumidioribus, apice breviter contracto, et columna majore (10-13 × 6-7 mm), differt.

Type: South Australia. Eastern outskirts of Mt Remarkable National Park, Alligator Gorge side, 5 Sep. 1999, D.L.Jones 16711 & M.Garratt (holo CANB).

Description: Hirsute terrestrial *herb* growing singly or in small loose groups. *Leaf* narrowly lanceolate, 10-

15 cm long, 0.5-1.4 cm wide, bright green; base red-blotched; trichomes relatively dense on both surfaces, to 3 mm long, patent, transparent, eglandular. *Scape* 20-35 cm tall, wiry, green to red, densely hirsute, with transparent, eglandular trichomes to 3 mm long. *Sterile bracts* spreading, oblong to oblong-lanceolate, 15-24 mm long, 3-4 mm wide, acute to acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate to ovate-lanceolate, 12-16 mm long, 7-10 mm wide, subacute, externally shortly hirsute. *Flowers* 1 or 2, 4.5-5.5 cm diam., pale creamy green to pale yellowish green, sometimes with faint, reddish medial lines; floral scent rancid; sepals with thick, dark red osmophores; petals with long-acuminate tips or sometimes with short dark red osmophores; labellum cream to pale yellow at the base, dark maroon in the distal half; column translucent with reddish markings. *Dorsal sepal* erect; lateral sepals widely divergent, stiffly decurved; petals stiffly spreading. *Dorsal sepal* 35-40 mm long, 2.5-3 mm wide, narrowly oblong-elliptic in the proximal third then tapered to a narrow section of similar length before ending in a prominent densely glandular osmophore 7-12 mm long. *Lateral sepals* 35-40 mm long, 3.5-5 mm wide, lanceolate in the proximal half, then tapered to a narrow section before ending in an osmophore slightly shorter than on the dorsal sepal. *Petals* 27-33 mm long, 2-3 mm wide, narrowly lanceolate in proximal third, tapered to a long-acuminate point, occasionally with a small, dense osmophore similar to those on the sepals. *Labellum* articulated on a short claw c. 1.2 mm long, c. 1 mm wide. *Lamina* obscurely three-lobed, broadly ovate-lanceolate in outline when flattened, 14-16 mm long, 8-11 mm wide, erect in the proximal third then curved forwards; apex recurved. *Lateral lobes* c. 3 mm across, suberect to erect; margins with 7-10 pairs of teeth to 1 mm long; marginal teeth linear, widely spreading, straight, head angled, narrowly clavate, outer face white or purplish. *Midlobe* ovate-deltate in outline when flattened, obtuse, the margins with numerous short, blunt purplish teeth, decrescent towards the apex. *Calli* in four or six rows, extending well onto the midlobe, dark red, most calli prominently stalked but those towards the apex sessile and irregularly arranged. Basal calli 6-8, crowded, c. 1 mm long, pale-coloured, stalked, erect; head swollen, clavate. Longest lamina calli c. 1.5 mm long, hockey-stick-shaped, stalked; head c. 0.7 mm long, curved when viewed from the side, narrowly linear-tapered from above. *Column* 10-13 mm long, 6-7 mm wide, recurved in the proximal third then incurved; basal glands widely separated, oblong-obovoid, c. 1.2 mm long, c. 0.5 mm wide, yellow. *Anther* c. 2.5 mm long, c. 2.2 mm wide, greenish; rostrum linear, c. 0.3 mm long. *Pollinia* four, c. 2.4 mm long, boomerang-shaped, flat, yellow, mealy. *Stigma* c. 2 mm wide, elliptic, sunken. *Capsule* not seen.

Distribution and ecology: Occurs in the southern Flinders Ranges, South Australia, although the extent of its distribution in these ranges is uncertain. It grows on south-facing slopes among rocks and scree under tall eucalypt and *Allocasuarina* forest with a relatively sparse understorey. The soil is a shallow skeletal grey loam. Alt. 800-900 m. Flowering: August and September.

Recognition: This species is an early-flowering, pale yellowish-green spider orchid with stiffly spreading tepals and with prominent, dark red osmophores on the sepals and sometimes also on the petals. It is allied to *Arachnorchis stellata* (D.L.Jones) D.L.Jones & M.A.Clem., but that species has smaller flowers (30-40 mm diam. versus 45-55 mm diam. in *A. saxatilis*), much thinner labellum calli, sharply tapered labellum apex and smaller column (8-10 mm x 4.5-5 mm vs 10-13 mm x 6-7 mm). A specimen from Wirrabara Forest in the Flinders Ranges, originally determined by me as *A. stellata* (Jones 1991), is here tentatively included in *A. saxatilis*, but differs in having prominent red flushes and lines in the tepals and a large, nearly wholly red labellum with short marginal teeth. Its status requires further study.

Arachnorchis saxatilis and *A. stellata* occur in different habitats with the skeletal soil and sheltered rocky slopes in hilly country occupied by *A. saxatilis* contrasting with the favoured habitat of *A. stellata* which is sandy soil on flats and low hills covered by *Callitris* woodland.

Conservation status: Possibly restricted in its distribution but poorly known and conserved in the Mt Remarkable National Park. I suggest a conservation status category of 2VKC according to Briggs & Leigh (1996).

Etymology: Derived from the Latin *saxatilis*, found among rocks; in reference to the rocky habitat this species seems to prefer.

Other Specimens Examined: SOUTH AUSTRALIA. Wirrabara Forest, Flinders Ranges, 5 Sept. 1988, *R.Bates 15383* (AD, CANB); Alligator Gorge National Park, NE of Rangers office, 11 Oct. 2000, *D.L.Jones 17480* & *M.Garratt* (CANB).

23. *Arachnorchis whiteheadii* D.L.Jones, sp. nov.; affinis *A. fitzgeraldii* (Rupp) D.L.Jones & M.A.Clem., sed sepalis sine osmophoris; glandibus tepalinis in catenis moniliformibus dispositis; callis paucioribus, multum tumidoribus, rectis et clavatis, differt.

Type: New South Wales. Central-western Slopes, Eugowra, 3 Oct. 1966, *B.Whitehead s.n.* (holo CBG 8109699).

Description: Hirsute, terrestrial *herb* growing singly or in small, loose groups. *Leaf* lanceolate, 5-14 cm long, 0.7-1.3 cm wide, dull green, base red to purple-blotched; trichomes very dense on both surfaces, to 4 mm long, patent, transparent or whitish, eglandular. *Scape* 15-30 cm tall, wiry, densely hirsute, with a mixture of transparent eglandular trichomes to 4 mm long and a few short glandular trichomes towards the

apex. *Sterile bracts* spreading, oblong-lanceolate, 12-20 mm long, 2-3 mm wide, acuminate, involute, externally hirsute. *Floral bracts* closely sheathing, ovate-lanceolate, 12-18 mm long, 3-4 mm wide, acute to acuminate, shortly hirsute externally. *Flower* single, 4-6 cm diam., pale yellow with relatively thick dark reddish caudae; labellum cream to yellowish with a red apex; calli red; column translucent, suffused with red. *Tepal* caudae glandular, the glands clustered, ellipsoid to oblong, single or more usually in moniliform chains of two or three glands; dorsal sepal erect to incurved; lateral sepals divergent, decurved; petals spreading or swept back. *Dorsal sepal* 35-40 mm long, 2-2.5 mm wide, oblong-elliptic in the proximal quarter, then tapered to a cauda. *Lateral sepals* 40-45 mm long, 3-4 mm wide, ovate-lanceolate in proximal third then gradually tapered to the caudae. *Petals* 30-35 mm long, 2.5-3 mm wide, narrowly lanceolate in proximal half, gradually tapered to relatively thin caudae. *Labellum* articulated on a short claw c. 0.5 mm long, c. 1.7 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 11-14 mm long, 8-10 mm wide, erect in proximal third then curved forwards; apex recurved. *Labellum lateral lobes* 3-4 mm wide, erect; marginal teeth 0-3 pairs, linear, 0.3-1 mm long, red, spreading, incurved. *Labellum midlobe* ovate-deltate in outline when flattened, acute; basal margins with 4-8 pairs of very short reddish teeth, these decrescent near the labellum apex and fused in a red marginal band. *Calli* in 4 rows, hardly extending to the base of the midlobe, the basal calli distinct from the rest; basal calli 4 or 6, crowded, clavate, c. 1.7 mm long, red; main lamina calli 5-7 per row, moderately crowded; longest lamina calli c. 1 mm long, linear or slightly curved. *Column* 10-12 mm long, 4-5 mm wide, recurved in the proximal third then incurved, winged; basal glands not seen. *Anther* c. 2 mm long, c. 2.5 mm wide, red to yellow. *Pollinia* not seen. *Stigma* not seen. *Capsule* not seen.

Distribution and ecology: Apparently known only from a single hill in the Eugowra district of central-western New South Wales, where it grew on a slope in shrubby forest in well-drained gravelly soil (Brian Whitehead, pers. comm.). Alt. c. 400 m. Flowering: September and October.

Recognition: This species is most similar to *A. fitzgeraldii* but can be immediately distinguished by the absence of clubs on the sepals, the distal third of both the sepals and petals thickish and densely covered with dark reddish-black glands arranged in moniliform chains (single glands densely crowded in sepaline clubs in *A. fitzgeraldii*), and the labellum with fewer, much thicker calli that are mostly straight and clavate (curved or bent towards at the apex and overall hockey-stick-shaped in *A. fitzgeraldii*).

Notes: This species has apparently not been seen since the original collection in 1966. Suitable habitat possibly still remains in the in the Eugowra district, where forested hills are still in evidence. This habitat is mostly on private land

and whether the orchid is still extant in the district is unknown.

Conservation status: Known from a single locality and last collected in 1966; poorly known but urgently in need of field work to relocate living plants; suggest 1KE by the criteria of Briggs & Leigh (1996).

Etymology: Named after Brian Thomas Whitehead (1935-), former teacher with a keen interest in native orchids. Brian's orchid herbarium, which is included in the collection at CANB, contains many interesting records including the only specimens of *A. whiteheadii* that I have seen.

24. *Arachnorchis zephyra* D.L.Jones, *sp. nov.*; affinis *A. arenariae* (Fitzg.) D.L.Jones & M.A.Clem., sed caudis tepalinis tumidioribus; osmophoris cellis plerumque singularibus, raro 2-3-catenatis; labello dentibus marginalibus brevioribus; callis capitibus majoribus; columna angustiore, differt.

Type: South Australia. Carrappee Hill Conservation Park, Eyre Peninsula, 5 Sep. 2004, D.T.Rouse 186, M.Duncan, G.Backhouse & P.McCauley (holo CANB).

Description: Hirsute terrestrial *herb* growing singly or in small loose groups. *Leaf* narrowly oblong-elliptical to oblong-lanceolate, 6-12 cm long, 0.5-0.7 cm wide, dull green; base purple-blotched; trichomes moderately dense on both surfaces, to 2 mm long, multiseriate, patent, transparent, eglandular. *Scape* 15-25 cm tall, wiry, densely hirsute, with transparent, multiseriate, eglandular trichomes to 2.3 mm long. *Sterile bracts* spreading, oblong-ob lanceolate, 12-16 mm long, 3-4 mm wide, acuminate, involute, externally shortly hirsute. *Floral bracts* closely sheathing, broadly ovate-lanceolate, 14-20 mm long, 4-6 mm wide, acute to acuminate, externally shortly hirsute. *Flower* solitary, 5-8 cm across, cream to very pale yellow, all tepals with moderately thick, blackish glandular caudae; labellum cream to creamy yellow with cream to yellow or reddish calli; column translucent with some reddish markings. Dorsal sepal erect; lateral sepals widely divergent, stiffly decurved; petals stiffly spreading to decurved. *Dorsal sepal* 45-60 mm long, 2-3.5 mm wide, oblong-elliptic in the proximal third then tapered to a dark glandular cauda to 40 mm long and c. 0.6 mm wide; osmophore cells crowded, ovoid-ellipsoid, mostly black, some transparent, mostly single, some in short chains of 2 or 3. *Lateral sepals* 55-70 mm long, 3-4.5 mm wide, lanceolate in the proximal third, then tapered to dark caudae similar to those on the dorsal sepal; osmophore cells similar. *Petals* 37-55 mm long, 2-3 mm wide, narrowly lanceolate in proximal third then tapered to dark glandular caudae; osmophore cells similar to those on the dorsal sepal. *Labellum* articulated on a short claw c. 1 mm long, c. 2 mm wide. *Lamina* obscurely three-lobed, ovate-lanceolate in outline when flattened, 13-17 mm long, 8-10 mm wide, erect in the proximal third then curved forwards; apex

recurved. *Lateral lobes* c. 3 mm across, suberect to erect; margins with 7-12 pairs of calli to 2 mm long; marginal calli linear-tapered, with a distinct ovate-deltate head, erect to obliquely spreading, yellow to brownish, outer face white. *Midlobe* narrowly ovate-deltate in outline when flattened, acute, the margins with numerous short, blunt, yellowish teeth, decrescent towards the apex, apparently remaining separate and not forming a marginal band. *Calli* in six rows, extending onto the base of the midlobe, most calli prominently stalked but those towards the apex sessile and irregularly arranged. Basal calli 8-10, crowded, clavate, c. 1 mm long, creamy yellow, stalked, erect to recurved. Longest lamina calli c. 1.3 mm long, hockey-stick-shaped, stalked; head c. 0.6 mm long, flat to curved when viewed from the side, narrowly linear-tapered from above. *Column* 13-15 mm long, 4.5-5.5 mm wide, recurved in the proximal third then incurved; basal glands widely separated, obovoid, c. 1.2 mm long, c. 0.7 mm wide, yellow with red or yellow glands. *Anther* c. 3 mm long, c. 2 mm wide, yellow; rostrum linear, c. 0.3 mm long. *Pollinia* four, c. 2.8 mm long, boomerang-shaped, flat, yellow, mealy. *Stigma* c. 2.6 mm wide, elliptic, sunken. *Capsule* not seen.

Distribution and ecology: Occurs on the Eyre Peninsula but exact distribution uncertain. Grows on flats and moderate slopes in mixed *Callitris/Allocasuarina* woodland in well-drained red-brown sandy loam. Alt. 50-200 m. Flowering: Late August and September.

Notes: This species can be recognised by its cream to very pale yellow flowers, moderately thick blackish tepalline caudae, short, broad-tipped angular labellum marginal teeth, labellum calli with large heads and relatively dense osmophore glands, these mostly arranged singly with a few in chains of two or three. The new species has been linked to *Arachnorchis arenaria* (Fitzg.) D.L.Jones & M.A.Clem., and the flowers of both have a similar general appearance. The latter species however, which occurs in inland areas of south-western New South Wales, can be readily distinguished by its densely packed osmophore glands which are mostly in chains of three to five. *Arachnorchis arenaria* often also has larger flowers (but is variable in this respect), which can be wholly cream to pale yellow or suffused with red, calli extending well onto the labellum midlobe, longer basal calli (1.3-2.5 mm long) and broader column wings. Additionally the marginal teeth on the labellum midlobe are generally fused to form a marginal band whereas in *A. zephyra* they are usually separate.

Conservation status: Poorly collected and conserved in Carrappee Hill Conservation Park. I suggest a conservation status category of 2VKC according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *zephyrus*, West Wind, in reference to the western distribution of this species in comparison to that of *A. arenaria* to which it has been linked.

Calochilus R.Br.

A genus of 30 species mainly developed in Australia with a few species in New Zealand, New Guinea and New Caledonia. Eight new species are described here.

25. *Calochilus montanus* D.L.Jones, sp. nov.; affinis *C. campestro* R.Br. sed plantis atrovirentibus, haud pruinosis; callis proximalibus et medialibus labelli non-glandulosis, setiformibus, brunneo-purpureis; callis distalibus glandulosis, viridis; cauda labelli c. 5 mm × 1 mm, differt.

Type: Australian Capital Territory. NE slope of Black Mountain, 6 Nov. 1992, *D.L.Jones 10683* (holo CANB; iso NSW).

Description: *Tubers* oblong-ovoid, 2-3 cm long, 1-2 cm wide, fleshy. *Leaf* fully developed at anthesis; lamina linear-lanceolate, 15-25 cm long, 7-15 mm wide, thick and fleshy, bluntly trigonous, ribbed, dark green; anterior surface broadly channelled; dorsal surface bluntly carinate; apex acute. *Inflorescence* 40-90 cm long, stout, green. *Sterile bracts* 2 or 3, ovate-lanceolate, 5-10 cm long, 5-10 mm wide, prominent, stiffly erect; apex long-acuminate. *Fertile bracts* ovate-lanceolate, 5-35 mm long, 5-12 mm wide, closely sheathing to spreading; apex acuminate. *Pedicels* 5-15 mm long, slender, curved. *Ovaries* obovoid, 5-8 mm long, 3-5 mm wide, green. *Buds* green. *Flowers* 2-15, 22-25 mm long, 14-18 mm wide; sepals and petals green marked with reddish lines; labellum calli brownish purple; marginal lobes greenish. *Dorsal sepal* oblong-ovate, 9-12 mm long, 4-6 mm wide, obliquely erect or erect, concave; apex acuminate. *Lateral sepals* narrowly ovate-lanceolate, 8-12 mm long, 3-4 mm wide, widely divergent, apex acuminate. *Petals* asymmetrically ovate-deltate, 5-7 mm long, 3-4 mm wide, porrect to spreading; apex acuminate. *Labellum* obliquely decurved; lamina narrowly ovate in outline, 11-15 mm long, 5-6 mm wide, c. 2.5 mm wide at the base, decurved, with a recurved ligulate apex; ligulate portion 3-4 mm long, c. 1 mm wide, naked, densely glandular. *Labellum margins* cut into numerous, crowded, simple or bifurcate, narrowly linear, glandular, spreading greenish lobes 1-4 mm long, becoming shorter distally. *Labellum dorsal surface* glandular along the distal margins and the ligulate apex. *Labellum calli* covering most of the ventral surface of the labellum, brownish-purple, bristly, to 4 mm long, glandular and non-glandular, porrect to decurved, in the proximal third reduced to 2 prominent, raised, shiny, metallic blue to purple plates. *Column* 5-6 mm long, c. 4 mm wide, pale green with reddish purple markings, broadly winged, the dorsal surface with a small, dense cluster of granular excrescences; inner basal margin each with a prominent eye-like gland, yellowish with a dark purple-black apex, lacking an anterior ridge. *Anther* c. 3 mm long, c. 3 mm wide, green, obliquely erect, apex decurved. *Pollinia* c. 3 mm long, curved. *Stigma* c. 2.5

mm wide. *Capsules* obovoid to broadly obovoid, 16-20 mm long, 6-8 mm wide, erect, ribbed. **Fig. 3.3.**

Distribution and ecology: New South Wales, where widely but disjunctly distributed between the Moonbi Ranges and Tumut, and the Australian Capital Territory. It grows among shrubs and tussocks in open forest and sclerophyll woodland. Soils are shallow skeletal clay loams. Alt. 600-1000 m. Flowering: October to December.

Recognition: This species is characterised by the following combination of characters; an overall dark green colouration; root system consisting of regular ovoid to oblong tubers and few slender roots; a large trigonous leaf present at anthesis; prominently curved labellum (distinct when viewed from the side); two broad, elongate, shiny purple plates on the proximal third of the labellum; a central tuft of bristly, brownish-purple, non-glandular and green glandular labellum calli; an apical glandular cauda (c. 5 mm × 1 mm); and, prominently swollen basal column lobes each with a dark terminal eye spot.

Conservation status: Widespread but disjunct, generally rare, poorly known and not known to be conserved; suggest 2K according to the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Latin *montanus*, montane, of the mountains, in reference to its habitat.

Other specimens: NEW SOUTH WALES: c. 15 km S of Tumut, 5 Jan. 1986, *M.A.Clements 3938* (CANB); Moonbi Ranges, 14 Dec. 1968, *I.Mathias* (CANB); The Bight, SE of Wingham, 16 Oct. 1990, *D.L.Jones 6740* & *C.Broers* (CANB); AUSTRALIAN CAPITAL TERRITORY: NW slope of Black Mountain, 28 Oct. 1963, *L.Adams 755* (CANB); W slope, Australian National Botanic Gardens (ANBG), 8 Nov. 1990, *M.A.Clements* (CANB); N slope Black Mountain, 1 Nov. 1988, *D.L.Jones 3415* (CANB); Gibraltar Falls, 24 Nov. 1990, *D.L.Jones 7245* & *B.E.Jones* (CANB); 22 Nov. 1991, *D.L.Jones 8551* (CANB); NE slope Black Mountain, 6 Nov. 1992, *D.L.Jones 10683* (CANB); Gibraltar Falls, 23 Nov. 2001, *D.L.Jones 18129*, *M.A.Clements*, *K.FitzGerald* & *M.Garratt* (CANB); NW base of Black Mountain, 29 Oct. 1961, *H.McKee 8786* (CANB); Mt Ainslie, 13 Nov. 1975, *J.Taylor 89* (CANB).

26. *Calochilus praeltus* D.L.Jones, sp. nov.; affinis *C. gracillimum* Rupp. sed dorsali sepalio longior, ovato-lanceolatum; lateralis sepalis acuminatis; labello brevius, late angustatum, glandulosis trichomatibus paucioribus et congestioribus; et apice labelli curtissimo, minus ligulato, differt.

Type: New South Wales. Northern Tablelands; Mt Kaputar, Bundaburra Circuit, 29 December

1993, D.L.Jones 12772 & B.E.Jones (holo CANB).

Description: *Tubers* not seen. *Leaf* fully developed at anthesis; lamina linear-lanceolate, 18-40 cm long, 4-8 mm wide, trigonous, pale green, pruinose; base purplish-red; anterior surface shallowly channelled; dorsal surface keeled. *Inflorescence* 28-50 cm long, slender, pruinose. *Sterile bracts* 2, linear-lanceolate, 4-10 cm long, 4-6 mm wide, spreading, pruinose; margins involute; apex acuminate. *Fertile bracts* narrowly ovate-lanceolate, 1-2.5 cm long, 3-5 mm wide, closely sheathing; margins involute; apex acuminate. *Pedicels* 7-16 mm long, slender, curved. *Ovaries* obovoid, 4-6 mm long, c. 3 mm wide, pruinose. *Flowers* 2-6, c. 2.5-3 cm long, c. 1.5 cm wide, pale green; sepals lightly marked with red; petals more boldly marked; labellum calli dark purple. *Dorsal sepal* broadly ovate-lanceolate, 12-14 mm long, 8-9 mm wide, obliquely erect, concave; distal margins incurved; apex apiculate. *Lateral sepals* asymmetrically lanceolate, 12-14 mm long, 4-5 mm wide, divergent; distal margins involute; apex acuminate. *Petals* asymmetrically ovate, 7-8 mm long, 5-5.5 mm wide, porrect; apex abruptly upcurved, subacute to apiculate. *Labellum* obliquely deflexed; lamina 22-24 mm long, c. 6.5 mm wide, c. 3 mm wide at the base, obovate, ending in a ligulate portion 15-17 mm long, tapered suddenly to the apex; surface of distal third glandular. *Labellum margins* with numerous crowded simple, linear, non-glandular, spreading, acuminate lobes 0.5-4 mm long; ligulate portion with widely spaced, simple or bifurcate, linear, glandular, spreading acuminate lobes 1-4 mm long; apical 2.5 mm entire, glandular. *Labellum calli* covering most of the ventral surface; proximal quarter towards the margins covered with irregular, short thick purple calli; central area sparsely covered with small purple calli; main area covered with linear, non-glandular, porrect and spreading purple calli to 6 mm long; ligulate portion with paler, sparse, glandular, porrect and spreading calli to 4 mm long; calli glands pale green to pale red. *Column* 4.5-5.5 mm long, c. 4 mm wide, pale green, an area of slight irregularity on the dorsal surface near the anther; wings broad, the inner basal margin of each with an anterior yellowish eye-spot with a dark purple apex, these connected by a faint anterior ridge. *Anther* pale green, obliquely erect. *Pollinia* narrowly clavate, c. 3 mm long, c. 0.5 mm wide, curved, pale yellow, mealy. *Capsules* obovoid, 13-15 mm long, 5-6 mm wide, erect, ribbed. **Fig. 3.4.**

Distribution and ecology: Known with certainty only from small populations on Mt Kaputar and the Barrington Tops. The species grows among tall grass in forest dominated by *Eucalyptus pauciflora* with associated *E. laevopinea* and *Kunzia ambigua*. The soil is a well-structured brown loam. Alt. 750-1200 m. Flowering: Late December to February.

Recognition: *Calochilus praeltus* has many similarities to *C. gracillimus* including the overall slender habit of the plant and generally dull coloured tepals. It can be distinguished immediately however by its much shorter

labellum (22-24 mm long versus 30-32 mm) which has a broadly tapered ligulate portion (narrowly tapered to nearly linear in *C. gracillimus*) with a very short apical tail (c. 2.5 mm versus 9 mm). Other differences include an ovate-lanceolate, apiculate dorsal sepal (ovate and acuminate in *C. gracillimus*) and acuminate lateral sepals (subacute in *C. gracillimus*). The montane, snow gum-dominated habitat of the new species is unusual for a *Calochilus* and contrasts with that of *C. gracillimus* which is restricted to central New South Wales, growing in sparse, stunted forest on gravelly soils of sandstone formation.

Conservation status: Known from only three collections but probably overlooked; conserved in Mt Kaputar National Park and Barrington Tops National Park; suggest 2RC according to the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Greek, *praeltus*, high altitude, elevation; in reference to its occurrence at high altitudes.

Other specimens: NEW SOUTH WALES: near intersection of Barrington Trail and Junction Hole Trail, Barrington Tops, 17 Feb. 2000, W.Dowling 133 & A.Heinrich (CANB); O'Grady's Plateau, Barrington Tops, 11 Feb. 1961, R.Filson 3761 (MEL).

27. *Calochilus pruinus* D.L.Jones, sp. nov.; affinis *C. herbaceum* Lindl, sed herbis robustioribus, subroseis, pruinosis; floribus minoribus (14-19 mm longis); segmentis perianthii non-diffusis; callis labelli sparsissimis; lobis marginalis in labello brevibus (1-2 mm longis), dimidio proximali purpuratis, non-glandulosis, dimidio distali brevis, viridis, glandulosis; apice labelli brevi, relative lato (1.5-2.5 mm x 1.5 mm); et columna lobis basalibus ampliatis, differt.

Type Western Australia. Hopetoun, 24 Sept. 1990, H.Taylor (D.L.Jones 6670); (holo CANB; iso PERTH).

Illustration: page 273, Hoffman & Brown (1992) – as *Calochilus* sp. aff. *campestris*.

Description: *Plants* overall greenish pink to pinkish brown, strongly pruinose. *Tubers* not seen. *Leaf* absent, replaced by a basal bract; basal bract ovate-lanceolate, 6-10 cm long, 12-18 mm wide, erect, closely sheathing except near the apex, fleshy; dorsal surface rounded to bluntly carinate; apex acute. *Inflorescence* 15-50 cm long, slender. *Sterile bracts* 2 or 3, oblong-lanceolate, 4-7 cm long, 6-11 mm wide; base closely sheathing; apex free or sheathing, acuminate. *Fertile bracts* narrowly ovate-lanceolate, 8-30 mm long, 4-6 mm wide, closely sheathing, apex acuminate. *Pedicels* 6-12 mm long, slender, curved. *Ovaries* obovoid, 5-7 mm long, 3-4 mm wide, green. *Buds* greenish pink to pinkish brown, pruinose. *Flowers* remaining cupped the

segments not spreading widely, 1-15, 14-19 mm long, 10-13 mm across; sepals and petals greenish pink to greenish brown, marked with reddish lines; labellum calli reddish purple to brownish purple; marginal lobes green. *Dorsal sepal* oblong-ovate, 5-7 mm long, 4-5.5 mm wide, porrect to obliquely erect, concave; apex shortly apiculate. *Lateral sepals* oblong-obovate to oblong-elliptic, 8-10 mm long, 3.5-4.5 mm wide, porrect to incurved, rarely divergent, dorsally carinate; distal margins involute; apex shortly acuminate. *Petals* asymmetrically broadly ovate, 5-7 mm long, 4-5.5 mm wide, porrect to incurved; apex apiculate. *Labellum* decurved; lamina ovate-lanceolate, 10-14 mm long, 5.5-6.5 mm wide, c. 2 mm wide at the base; margins often remaining incurved; apical portion narrowly deltate, 1.5-2.5 mm long, c. 1.5 mm wide, naked, tapered to a short, recurved, sinuous apex. *Labellum margins* cut into 11-15 pairs of simple, narrowly triangular lobes 1-2 mm long, those in the proximal half purple and non-glandular, those in the distal half short, green and glandular, becoming shorter and more widely spaced distally. *Labellum dorsal surface* glandular along the distal margins and the apex. *Labellum calli* sparse, reddish-purple to brownish-purple, to 4 mm long, non-glandular, porrect to decurved, in the proximal half reduced to 2-6 prominent, raised, shiny, dark purple plates, densely glandular. *Column* 5-6 mm long, c. 3.5 mm wide, green with a few reddish purple markings, the dorsal surface with a small cluster of granular excrescences; wings broad, the inner basal margin with a dark purple, eye-like gland, connected by an obscure reddish anterior ridge. *Anther* c. 3 mm long, c. 3 mm wide, green, obliquely erect. *Pollinia* c. 3.2 mm long, curved. *Stigma* c. 2.5 mm wide. *Capsules* obovoid to broadly obovoid, 10-16 mm long, 6-8 mm wide, erect, ribbed.

Distribution and ecology: Occurs in Western Australia, where known from the vicinity of South Stirling and in coastal areas between Hopetoun and Eyre, south of Cocklebidly; also South Australia, where its distribution needs to be elucidated, but recorded from Peebinga Conservation Park. It grows in mallee shrubland and mallee woodland, often on old consolidated dunes, usually within the canopy and litter layer of the trees. It has also been found growing among shrubs in tall shrubland. Soils are deep, well-drained red-brown sands. This species occurs as scattered individuals or in small clumps, with often two or three stems emerging in close proximity, as if resulting from clonal increase. Alt. 10-50 m. Flowering: August to October.

Recognition: This species is characterised by the following combination of characters; plants pinkish-green to pinkish-brown, pruinose; leaf absent, replaced by a basal sheathing bract; flowers small (14-19 mm long); perianth segments not spreading widely; very sparse labellum calli; short marginal lobes on the labellum (1-2 mm long), those in the proximal half purple and non-glandular, those in the distal

half short, green and glandular; a short, relatively broad labellum apex (1.5-2.5 mm x 1.5 mm); and, column with enlarged basal lobes.

Notes: This species was first found in October 1983 by B.Hall on Chillinup Rd south of the Stirling Range and a specimen was lodged in the Albany Museum (A.S.George pers. comm., R.Heberle pers. comm.). Further plants were found at this site in September 1994 and 1995, and a specimen was lodged at the Albany Regional Herbarium (A.P.Brown pers. comm.). In 1988 and 1990 it was found at Hopetoun and in 1992 it was found at Point Charles, west of Hopetoun, growing in low coastal heath, but no specimen was collected (A.P.Brown pers. comm.). In September 1994, three plants were seen in early flower near the Eyre Bird Observatory, south-east of Cocklebidly, and a specimen was lodged in PERTH (A.P.Brown pers. comm.). The species also occurs in South Australia R.Bates pers. comm.) but only a single herbarium collection has been seen by the author from an eastern part close to the Victorian border. It should also be looked for in the coastal districts south of the Nullarbor Plain in South Australia.

The flowers of this species often do not open widely, the perianth segments remaining cupped and the distal margins of the labellum hardly spreading.

Conservation status: Widely distributed but rarely collected and poorly known; suggest 3KC according to the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Latin, *pruinus*, covered with a waxy or powdery bloom.

Other specimens: WESTERN AUSTRALIA: Hopetoun, 6 Oct. 1988, *McQuoid* (PERTH 1191896). SOUTH AUSTRALIA: Peebinga Conservation Park, 22 Oct. 1989, *R.Bates* 21285 (CANB).

28. *Calochilus pulchellus* D.L.Jones, sp. nov.; affinis *C. grandifloro* Rupp sed habitu brevior et gracillimo; folio brevior et angustior; floribus minoribus (2.5-3 × 2 cm versus 3.5-4.5 × 2.5 cm) et flavovirentibus, differt.

Type: New South Wales. Morton National Park, Little Forest Trig, 14 Nov. 2004, *M.A.Clements* 11304 (holo CANB; iso MEL, NSW).

Description: *Tabers* ovoid to ellipsoid, 20-40 mm long, 8-14 mm wide. *Leaf* fully developed at anthesis; lamina linear to linear-lanceolate, 10-18 cm long, 4-8 mm wide, trigonous, dark green; base dark red; anterior surface deeply channelled; dorsal surface keeled. *Inflorescence* 20-30 cm long, slender. *Sterile bracts* 2 or 3, narrowly ovate-lanceolate, 2-3.5 cm long, 3-6 mm

wide, stiffly erect; margins incurved; apex acuminate. *Fertile bracts* narrowly ovate-lanceolate, 0.7-3.5 cm long, 4-6 mm wide, closely sheathing; apex acuminate. *Pedicels* 6-12 mm long, slender, curved. *Ovaries* obovoid, 5-7 mm long, 2-3 mm wide, pruinose. *Flowers* 1-5, 2.5-3 cm long, c. 2 cm wide; sepals and petals pale green to greenish yellow, the petals boldly marked with red lines, all segments pruinose externally; labellum calli coppery red, distal ones darker. *Dorsal sepal* broadly elliptical, 13-16 mm long, 8-9 mm wide, porrect, shallowly concave; apex bluntly acute. *Lateral sepals* oblong-ovate, 13-16 mm long, 5-6 mm wide, divergent; distal margins involute; apex subacute. *Petals* asymmetrically ovate, 8-9 mm long, 5-6 mm wide, porrect; apex abruptly upcurved, subacute to obtuse. *Labellum* obliquely decurved; lamina 28-30 mm long, 6-7 mm wide, c. 2 mm wide at the base, obovate-elliptical with a long ligulate apex; ligulate portion 15-17 mm long, c. 3 mm wide at the base, entire, glandular. *Labellum margins* with numerous crowded simple linear eglandular and glandular spreading acuminate lobes 1.5-5 mm long. *Labellum calli* covering most of the ventral surface of the main part of the lamina; proximal quarter covered with short thick red calli; main area covered with linear porrect and spreading reddish calli to 6 mm long which are eglandular with a slightly thickened glandular apex, the glands dark red. *Column* porrect from the end of the ovary, 5-6 mm long, c. 4 mm wide, pale green, the dorsal surface near the anther smooth to slightly irregular; wings broad, the inner basal margins with 2 purple-black eye-spots with a yellow surround, without an anterior ridge. *Anther* pale green, porrect. *Pollinia* narrowly clavate, c. 4 mm long, 0.6 mm wide, curved, pale yellow, mealy. *Capsules* not seen.

Distribution and ecology: At present known only from three small populations on the South Coast of New South Wales more or less between Morton National Park and Jervis Bay. At the type site this species grows in low heathland with scattered clumps of emergent *Eucalyptus* and *Banksia* in coarse white sand over sandstone sheets. In Jervis Bay the species was growing in dense low wet heath in wet sand over sandstone. At both sites the vegetation was recovering from a previous season's fire. Alt. 10-120 m. Flowering: October and November.

Recognition: *Calochilus pulchellus* is a slender species with some floral features similar to *C. grandiflorus*, particularly the pale perianth segments, the coppery red, eglandular labellum calli and absence of an anterior ridge on the column. It can be distinguished from *C. grandiflorus* by its shorter much more slender habit, shorter leaf and smaller flowers (2.5-3 x 2 cm cf. 3.5-4.5 x 2.5 cm in *C. grandiflorus*).

Conservation status: Poorly known but occurring in at least two National Parks (Morton and Booderee); suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin, *pulchellus*, beautiful, in reference to the attractive flowers.

29. *Calochilus sandrae* D.L.Jones, *sp. nov.*; affinis *C. gracillimo* Rupp sed sepalo dorsali ovato-lanceolato; sepalis lateralibus acuminatis; labello multum brevior (22 mm versus 30-32 mm) et cauda apicali brevissima (c. 2.5 mm versus 9 mm), differt.

Type: New South Wales. About 6 km E of Nimmitabel, 13 Dec. 1995, *D.L.Jones 14698* (holo CANB; iso AD, MEL, NSW).

Description: *Tubers* not seen. *Leaf* fully developed at anthesis; lamina linear-lanceolate, 12-20 cm long, 8-12 mm wide, trigonous, greenish brown; base reddish; anterior surface shallowly channelled; dorsal surface keeled. *Inflorescence* 30-40 cm long, slender. *Sterile bracts* 2, linear-lanceolate, 4-8 cm long, 4-6 mm wide, erect; margins involute; apex acuminate. *Fertile bracts* narrowly ovate-lanceolate, 1-3.5 cm long, 2-4 mm wide, closely sheathing; margins involute; apex acuminate. *Pedicels* 6-10 mm long, slender, curved. *Ovaries* obovoid, 6-9 mm long, c. 3 mm wide. *Flowers* 2-5, c. 2-2.5 cm long, c. 1.5 cm wide; sepals and petals brownish green boldly marked with red; labellum calli brownish purple. *Dorsal sepal* ovate-lanceolate, 10-12 mm long, 7-8 mm wide, obliquely erect, concave; apex bluntly apiculate. *Lateral sepals* asymmetrically lanceolate, 11-13 mm long, 4-5 mm wide, divergent; distal margins involute; apex acuminate. *Petals* asymmetrically ovate, 7-8 mm long, 5-6 mm wide, divergent; apex uncinat, subacute to apiculate. *Labellum* obliquely deflexed; lamina 18-22 mm long, c. 8 mm wide, c. 3 mm wide at the base; main part transversely obovate, suddenly contracted into a narrow, tapered section c. 9 mm long, ending in a ligulate portion 2-3 mm long. *Labellum margins* with numerous (c. 30-35) crowded, simple bifurcate or trifurcate, linear, glandular and non-glandular, spreading acuminate lobes 4-7 mm long; ligulate portion entire, glandular. *Labellum calli* covering most of the ventral surface; proximal quarter densely covered with crowded, irregular, short, thick, purple calli; central area densely covered with linear purple calli c. 2 mm long; main area covered with linear, non-glandular and glandular, porrect and spreading purple calli to 5 mm long; calli glands pale green to pale red. *Column* 4.5-5.5 mm long, c. 4 mm wide, pale green, an area of slight irregularity on the dorsal surface near the anther; wings broad, the inner basal margin of each with an anterior yellowish eye-spot with a dark purple apex, these connected by a purplish anterior ridge. *Anther* pale green, obliquely erect. *Pollinia* narrowly clavate, c. 2.5 mm long, c. 0.5 mm wide, curved, pale yellow, mealy. *Capsules* obovoid, 13-17 mm long, 5-6 mm wide, erect, ribbed. **Fig. 3.5.**

Distribution and ecology: Known with certainty only from small populations near Nimmitabel in the Southern Tablelands of NSW, a single specimen collected from Wadbilliga National Park and a small population in Namadgi National Park, Australian Capital Territory. The species grows among grass and shrubs in shrubby forest

dominated by *Eucalyptus rubida* and *E. pauciflora*. The soils are grey-brown gravelly loams. Alt. 900-1100 m. Flowering: December and January.

Recognition: *Calochilus sandrae* has many similarities with *C. gracillimus* but can be distinguished immediately by its much shorter labellum (22-24 mm long versus 30-32 mm) which has a broadly tapered ligulate portion (narrowly tapered to nearly linear in *C. gracillimus*) with a very short apical tail (c. 2.5 mm versus 9 mm). Other differences include an ovate-lanceolate, apiculate dorsal sepal (ovate and acuminate in *C. gracillimus*) and acuminate lateral sepals (subacute in *C. gracillimus*). The montane habitat of the new species is unusual for a *Calochilus* and contrasts with that of *C. gracillimus* which is restricted to central New South Wales, growing in sparse, stunted forest on gravelly soils of sandstone formation. *Calochilus sandrae* also has many similarities to *C. robertsonii* but can be distinguished by the late flowering period, the overall slender habit of the plant, strongly marked sepals and petals and the brownish-purple labellum calli.

Conservation status: Known from very few localities but two populations are conserved in National Parks; suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: Named after Sandra Raelene Jones (1969-), ecologist and environmental scientist who discovered the species.

Specimens examined: NEW SOUTH WALES: E of Nimmitabel, 11 Dec. 1995, *S.R.Jones & G.Bhalla* (*D.L.Jones* 14629) (CANB); Wadbilliga Natl Park, c. 2.5 km E of main gate, 10 Dec. 1995, *D.L.Jones* 14719 & *B.E.Jones* (CANB). AUSTRALIAN CAPITAL TERRITORY: Namadgi Natl Park, S of Glendale Crossing, 3 Dec. 1998, *D.L.Jones* 16228 & *M.Garratt* (CANB).

30. *Calochilus stramenicola* D.L.Jones, *sp.*

nov.; affinis *C. robertsonii* Benth., sed planta minus robusta; folio parvo (8-20 cm x 3-5 mm) anguste lineari; scapo gracili floribus paucis (1-5 floribus); floribus comparate parvis (17-23 x 10-12 mm); sepalis lateralibus oblongo-ovatis, (7-10 x 3.5-4 mm), nec late patentibus nec ensatis; labello obscure lobato, et callis laminae brevibus (ad 3 mm longis), differt.

Type: Western Australia. About 30 km W of Brookton, beside the Brookton Hwy, 7 Oct. 1991, *D.L.Jones* 8204, *M.A.Clements* & *B.E.Jones* (holo CANB; iso PERTH).

Description: *Tubers* obovoid, 15-25 mm long, 4-7 mm wide, fleshy. *Leaf* fully developed at anthesis; lamina narrowly linear-lanceolate, 8-20 cm long, 3-5

mm wide, erect, trigonous, ribbed, dark green, slightly pruinose; base reddish purple; anterior surface deeply channelled; dorsal surface carinate; apex acuminate. *Inflorescence* 12-42 cm long, very slender, green, slightly pruinose. *Sterile bracts* 1 or 2, narrowly ovate-lanceolate, 1.5-4.5 cm long, 4-6 mm wide, stiffly erect to spreading; apex long-acuminate. *Fertile bracts* narrowly ovate-lanceolate, 7-14 mm long, 3-5 mm wide, closely sheathing to spreading; apex acuminate. *Pedicels* 3-7 mm long, slender, curved. *Ovaries* obovoid, 4-6 mm long, 3-4 mm wide, green. *Buds* green. *Flowers* 1-5, 17-23 mm long, 10-12 mm wide; sepals and petals greenish, lightly marked with reddish to reddish brown lines; labellum calli reddish purple. *Dorsal sepal* ovate, 7-10 mm long, 6-8 mm wide, porrect to obliquely erect, concave; apex apiculate. *Lateral sepals* asymmetrically oblong-ovate, 7-10 mm long, 3.5-4 mm wide, divergent, dorsally carinate; apex long-acuminate. *Petals* asymmetrically ovate, 4-5 mm long, 3-4 mm wide, porrect to spreading; apex uncinat. *Labellum* obliquely deflexed; lamina ovate-lanceolate, 12-17 mm long, 6-8 mm wide, c. 2 mm wide at the base, with a ligulate apex; ligulate portion 2-3 mm long, c. 1 mm wide, sinuous, naked, densely glandular. *Labellum margins* cut into numerous, crowded, simple or bifurcate, narrowly linear, glandular and non-glandular, spreading acuminate lobes 1-3 mm long, becoming longer and more crowded distally. *Labellum dorsal surface* sparsely glandular in the distal third. *Labellum calli* covering most of the ventral surface, reddish-purple to purple, 0.5-3 mm long, porrect and spreading; distal calli paler; basal calli short, appressed to semi-erect, ovoid to linear, straight or curved; central calli smaller. *Column* 3-4 mm long, c. 3 mm wide, pale green, the dorsal surface with sparse, granular excrescences; wings broad, often curved outwards at base, the inner basal margin each with a dark purple-black eye-spot joined by an anterior ridge. *Anther* c. 3 mm long, c. 2 mm wide, pale green, obliquely erect. *Pollinia* c. 2.8 mm long, clavate. *Stigma* c. 2 mm wide. *Capsules* obovoid to broadly obovoid, 10-14 mm long, 5-7 mm wide, erect, ribbed.

Distribution and ecology: Confined to Western Australia, where occurring to the east of Perth in a narrow band between Narrogin and Wannamal. Occurs as scattered individuals growing on slopes and ridges in stunted Wandoo woodland. Ironstone outcrops and laterite concretions are frequent. The groundcover is sparse, consisting of scattered shrubs, and the soil surface is covered by a thick layer of litter. Soils are very well-drained, principally skeletal clay loams. Alt. 300-450 m. Flowering: September and October.

Recognition: This species has been confused with *C. robertsonii* but is much less robust and lacks the strongly outswept, scimitar-shaped lateral sepals of that species. It is characterised by; a small, narrowly linear leaf; slender scape; few-flowered inflorescence; relatively small flowers (17-23 mm x 10-12 mm); an obscurely lobed labellum; and, short lamina calli (to 3 mm long). Its closest congener would appear to be *C.*

uliginosus but that species is later flowering, grows in wetter habitats, is sturdier, and has reddish brown, strongly striped outer tepals and long-acuminate lateral sepals.

Notes: Plants are often found growing in piles of litter, consisting of fallen leaves, twigs and fruit which have accumulated beneath eucalypts.

Conservation status: Widely distributed, locally frequent and conserved in reserves.

Etymology: Derived from the Latin, *stramen*, litter, *-cola*, dweller, in reference to its apparent preference for growing in accumulations of litter.

Other specimens: WESTERN AUSTRALIA: York Rd, 20 km W of York on laterite rise, 25 Sept. 1984, *R.Bates* 4275 (AD); 15-20 km W of York, towards Perth, 4 Oct. 1980, *M.A.Clements* 2209 (CBG 8007023); 67.6 miles (c. 108 km) SE of Perth beside Brookton Hwy, 17 Oct. 1972, *A.S.George* 11630 (PERTH 258016); Nature Reserve, 5.3 km E of Wambyn Rd, on York-Perth Rd, 24.9 km W of York, 25 Sept. 1984, *S.D.Hopper* 4167 (PERTH 792365); Lupton Rd, 28 km W of Brookton, 15 Oct. 1988, *D.L.Jones* 3094 & *M.A.Clements* (CBG 8806757); Atalya Rd, Dryandra Forest, 24 Sept. 1983, *R.Peakall* 189 (PERTH 846775).

31. *Calochilus therophilus* D.L.Jones, *sp. nov.*; affinis *C. gracillimum* Rupp, sed habitu multo obsior et fortior; foliis majoribus, valde costatis; labello brevius, ovato-lanceolatum, aequaliter angustatum, dense obsitis lobis marginalis; glandulosis callis numerosioribus; et apice labelli dense glandulosis, differt.

Type: Australian Capital Territory. Black Mountain, S side of Black Mtn Drive, adjacent to Australian National Botanic Gardens, 18 Dec. 1989, *D.L.Jones* 5580 (holo CANB; iso NSW).

Illustrations: centre LHS, page 55 (Williams 1979) - as *C. robertsonii*; page 96, Pearson & Pearson (1990) - as *C. gracillimus*; page 124 (Backhouse & Jeanes 1995) - as *C. gracillimus*; plates A & B, page 180 (Jeanes & Backhouse 2000).

Description: *Tubers* oblong-ovoid, 3-3.5 cm long, 1-1.5 cm wide, fleshy. *Leaf* fully developed at anthesis; lamina broadly linear-lanceolate, 20-40 cm long, 20-28 mm wide, trigonous, dark green; base reddish purple; anterior surface deeply channelled; dorsal surface keeled and ribbed. *Inflorescence* 40-95 cm long, stout, slightly pruinose. *Sterile bracts* 3, ovate-lanceolate, 6-18 cm long, 6-15 mm wide, stiffly erect; apex acute to acuminate. *Fertile bracts* narrowly ovate-lanceolate, 1-3.5 cm long, 5-8 mm wide, closely sheathing; apex acute to acuminate. *Pedicels* 8-20 mm long, slender, curved. *Ovaries* obovoid, 7-10 mm long, 4.5-5 mm wide, slightly pruinose. *Flowers* 3-15, 2.5-3 cm long, c. 1.6 cm wide; sepals and petals greenish boldly marked with red lines; labellum calli dark purple. *Dorsal sepal*

ovate, 11-13 mm long, 7-8 mm wide, obliquely erect, concave; apex apiculate to acuminate. *Lateral sepals* asymmetrically ovate-lanceolate, 12-14 mm long, 5-5.5 mm wide, divergent; apical margins involute; apex acuminate. *Petals* asymmetrically ovate, 6-8 mm long, 5-5.5 mm wide, porrect; apex abruptly upcurved, obtuse to acute. *Labellum* obliquely deflexed; lamina 19-22 mm long, 5-6 mm wide, c. 2.5 mm wide at the base, ovate-lanceolate, tapered gradually; surface of distal half densely glandular; ligulate portion c. 6 mm long, 1.5 mm wide. *Labellum margins* with numerous, crowded, simple, linear, spreading, acuminate lobes 1-6 mm long, those in the proximal half non-glandular, those in the distal half glandular; apical 4-5 mm entire, densely glandular. *Labellum calli* covering most of the ventral surface; proximal sixth towards the margins densely covered with short, very thick, appressed purple calli; central area densely covered with small, narrow, purple calli; main area covered with linear, non-glandular, porrect and spreading purple calli to 8 mm long; ligulate portion densely covered with greenish or whitish, straight or sinuous, glandular, porrect and spreading, ribbon-like calli to 5 mm long; calli glands greenish to reddish. *Column* 5-5.5 mm long, c. 4 mm wide, pale green, the dorsal surface near the anther smooth to slightly irregular; wings broad, the inner basal margin each with a dark purple-black eye-spot connected by a faint anterior ridge. *Anther* pale green, porrect. *Pollinia* narrowly obovoid, c. 3.3 mm long, c. 0.5 mm wide, curved, pale yellow, mealy. *Capsules* obovoid, 12-15 mm long, 5-6 mm wide, erect, strongly ribbed. **Fig. 3.6.**

Distribution and ecology: Widely distributed, occurring south from central-eastern Queensland, New South Wales (NWS, NC, CWS, ST), Australian Capital Territory and Victoria (north-east) with a possible disjunct recording from the Grampians in the south-west. Also in CANB is a specimen from St Patricks Plains in Tasmania which is probably this species. The species grows in open forest with a sparse understorey or on slopes among grass and shrubs in mountainous regions. Soils are red-brown sandy loam or well-structured clay loams. Alt. 300-900 m. Flowering: December to March.

Recognition: *Calochilus therophilus* has been confused with *C. gracillimus* but is a much more robust species with larger, prominently ribbed leaves and a stouter scape. The labellum of the new species differs markedly being shorter (19-22 mm, versus 30-32 mm), ovate-lanceolate and evenly tapered with the margins densely lobed, more numerous crowded glandular calli and a densely glandular labellum apex. *Calochilus therophilus* is also similar in general habit to *C. russeus* but readily distinguished by its much narrower (6 mm versus 11 mm) labellum lamina which tapers gradually throughout (suddenly tapered in *C. russeus*) and the purple calli (reddish in *C. russeus*).

Conservation status: Widespread, often locally common and well conserved.

Etymology: Derived from the Greek, *theros*, summer, *philos*, loving, in reference to the summer flowering habit.

Other specimens: QUEENSLAND: Amosfield, 18 Dec. 1961, W.W.Abell (NSW); just S of Glen Aplin, 3 Jan. 1987, M.A.Clements 4469 (CBG 8703047); Sundown Natl Park, 8 Jan. 1993, R.Crane 933 (CANB); Glen Aplin, Stanthorpe District, 17 Jan. 1948, C.Gemmell (MEL, NSW). NEW SOUTH WALES: 5 km E of Coonabarabran towards Quirindi, 4 Jan. 1989, R.England (CBG 9004637); Coonabarabran, 4 Jan. 1990, R.England (CANB); Turill, 26 Dec. 2000, W.Holzinger (ORG 3284) (CANB); Coonabarabran, 28 Dec. 1993, D.L.Jones 12766 & B.E.Jones (CBG 9603672); 33 km N along Newell Hghy, from Oxley Hghy junction, 28 Dec. 1993, D.L.Jones 12769 & B.E.Jones (CBG 9603674); c. 24 km N Abercrombie Caves, 12 Jan. 2001, D.L.Jones 17791 & K.FitzGerald (CANB); Kanangra Walls Rd, 12 Jan. 2001, D.L.Jones 17795 & K.FitzGerald (CANB). AUSTRALIAN CAPITAL TERRITORY: Australian National Botanic Gardens, 1 Jan. 1994, M.A.Clements 8155 (CANB); Black Mtn, Canberra, 14 Dec. 1989, D.L.Jones (CBG); W boundary, Australian National Botanic Gardens, 12 Apr. 1990, D.L.Jones 5887 & D.Mallinson (CBG 9004931). VICTORIA: Beechworth, 15 Dec. 1989, P.Branwhite (CBG); near intersection, Klocker Tk and Burnside Tk, c. 10 km WNW of Benambra, 25 Jan. 1993, J.Jeanes 40 (MEL); Wombargo Ck, c. 7 km W of Wulgulmerang, 14 Jan. 1994, D.L.Jones 12813, B.E.Jones, C.French & P.Branwhite (CBG9603726); Smythesdale, c. 20 km SW of Ballarat, 7 Jan. 1974, no coll. (MEL). TASMANIA: St Patricks Plains, 18 Dec. 1996, Ellis (ORG 790) (CANB).

32. *Calochilus uliginosus* D.L.Jones, sp.

nov.; affinis *C. robertsonii* Benth., sed floribus minoribus segmentis minus patentibus, praecipue sepale dorsali porrecto vel fornicato; sepalis lateralibus oblongo-lanceolatis, ad 13 x 5 mm, pro ratione latis; labelli lobis marginalibus confertis fere ad apicem attingentibus; callorum seriebus irregularibus in basi labelli; et laminae callis brevioribus (ad 5 mm longis), differt.

Type: Western Australia. Collingwood Rd Swamp, East Albany, 24 Nov. 1986, R.Heberle (holo CANB; iso PERTH).

Description: *Plants* green, strongly pruinose. *Tubers* not seen. *Leaf* fully developed at anthesis; lamina linear-lanceolate, 10-40 cm long, 5-12 mm wide, bluntly trigonous, ribbed, dark green; base reddish purple; anterior surface deeply channelled; dorsal surface bluntly carinate; apex acute. *Inflorescence* 15-60 cm long, slender. *Sterile bracts* 2 or 3, ovate-lanceolate, 5-15 cm long, 7-12 mm wide, prominent, stiffly erect; apex long-acuminate. *Fertile bracts* narrowly ovate-lanceolate, 15-30 mm long, 5-9 mm wide, closely sheathing to spreading; apex acuminate. *Pedicels* 3-10 mm long, slender, curved. *Ovaries* obovoid, 4-6 mm long, 3-4 mm wide, green. *Buds* pinkish brown, pruinose. *Flowers* 1-7, 20-26 mm long, 10-12 mm wide; sepals and petals greenish to brownish,

strongly marked with reddish to crimson lines and suffusions; labellum calli reddish purple. *Dorsal sepal* oblong-ovate to oblong-obovate, 9-13 mm long, 5.5-7 mm wide, porrect to fornicate, concave; apex apiculate. *Lateral sepals* oblong-lanceolate, 9-13 mm long, 4-5 mm wide, divergent; apex shortly acuminate. *Petals* asymmetrically ovate-deltate, 4-6 mm long, 2.5-3.5 mm wide, porrect to slightly spreading, apex uncinata. *Labellum* decurved; lamina narrowly ovate-lanceolate in outline, 14-18 mm long, 6-7 mm wide, c. 2 mm wide at the base, with a sinuous, naked ligulate apex; ligulate portion 2-4 mm long, c. 0.7 mm wide, naked, densely glandular. *Labellum margins* cut into numerous, crowded, simple, narrowly linear, glandular and non-glandular, spreading acuminate lobes 2-3 mm long, crowded almost to the apex. *Labellum dorsal surface* glandular in the distal third. *Labellum calli* covering most of the ventral surface, dense, reddish-purple, to 5 mm long, glandular and non-glandular, porrect and spreading, near the base reduced to short, slender appressed to semi-erect, ovoid to linear, straight or curved purple calli, a number of larger ones forming an irregular marginal row, shorter and sparser towards the centre. *Column* 5-6 mm long, c. 3 mm wide, pale green, the dorsal surface with sparse, granular excrescences; wings broad, inner basal margins each with an eye-like gland, yellowish with a dark purple-black apex, joined by a prominent reddish anterior ridge. *Anther* c. 3 mm long, c. 2 mm wide, dark green, obliquely erect. *Pollinia* c. 2.7 mm long. *Stigma* c. 2 mm wide. *Capsules* obovoid to broadly obovoid, 10-14 mm long, 4-7 mm wide, erect, ribbed.

Distribution and ecology: Restricted to Western Australia where scattered in a near-coastal band from Bunbury to just east of Albany, with disjunct populations from Perth to Gingin, and east in the Fitzgerald River National Park. It grows in moist to wet swamps, seepage areas and along drainage lines. May also colonise road verges and ditches (C.French pers. comm.). Frequently grows among dense shrubby undergrowth and is difficult to discern except in the season following a summer burn. Soils are damp to moist, black sands and peaty loams. Alt. 5-100 m. Flowering: October to December.

Recognition: This species has been confused for many years with *C. robertsonii*. While it shares some similarities with that species it is quite different and can be characterised by the following features; smaller flowers in which the segments do not spread as widely, the dorsal sepal in particular remaining porrect to fornicate; dorsal sepal ovate-oblong to obovate-oblong; lateral sepals oblong lanceolate, broad for their length; marginal lobes on the labellum crowded nearly to the apex; irregular row of large calli on the labellum base; shorter lamina calli.

The closest congener of this species would appear to be *C. stramenicolus* but that species is earlier flowering, grows in a much drier habitat, is

even more slender, has paler green, lightly striped outer tepals and long-acuminate lateral sepals.

Notes: Hoffman & Brown (1992) note the existence of two forms of *C. uliginosus*, a short growing variant (to 25 cm tall) from north of Perth and a taller growing variant (to 60 cm tall) from the southern parts of its range. Herbarium material of this species is scant and fragmentary and I have been unable to ascertain whether floral differences accompany this variation in habit. Flowering in this species is dramatically stimulated by summer fires. Plants growing on road verges may be stimulated to flower following slashing or mowing.

Conservation status: Widely distributed, locally common and conserved in a National Park and other reserves. Perceived to be rare due to its habit of flowering profusely only in the year following summer burns.

Etymology: Derived from the Latin, *uliginosus*, growing in marshy places, in reference to the preferred habitat.

Other specimens: WESTERN AUSTRALIA: Kent River, 10 Oct. 1980, *A.P.Brown* (PERTH 257990); c. 15 km from Albany towards Jerramungup, 24 Oct. 1975, *M.A.Clements* 180 (CBG 63380); Two Peoples Bay Nature Reserve, 12 Nov. 2002, *M.A.Clements* 10672 (CANB); E of Oyster Harbour, Albany, 117°59'E, 34°59'S, 11 Oct. 1969, *A.S.George* 9690; Nannup-Pemberton Rd, 25 Oct. 1959, *M.C.George* (PERTH 257974); 4 miles (c. 6.5 km) S of Mt Barker townsite, 6 Oct. 1973, *K.Kenneally* 1218 (PERTH 1185969); c. 3 km S of Mt Barker, 25 Oct. 1977, *K.Kenneally* 6457 (PERTH 1186043); c. 20 km W of Pemberton, 22 Oct. 1985, *R.Peakall* 81 (PERTH 561177);

Chiloglottis R.Br.

Nine named species all endemic in eastern Australia. One new species is described here.

33. *Chiloglottis sphaerula* D.L.Jones, *sp. nov.*; affinis *C. sphyrnoidi* D.L.Jones, sed petalis angustioribus obovato-spathulatis; labello elongato-cuneato apice truncato; glande stipitata principali proximali globosa; aliis columinae angustioribus, differt.

Type: New South Wales. Barrington Tops, 5 Feb. 1993, *R.Tunstall, D.Herd, G.Hillman & J.Riley* (*D.L.Jones* 11282) (holo CANB 677939).

Illustration: Plate 296, Bishop (1996), as *C. sp.* aff. *sphyrnoides*.

Description: Terrestrial tuberous herb forming colonies. *Tubers* obovoid, fleshy, to 19 mm long and 10 mm wide. *Leaves* initially erect, becoming ground-

hugging; lamina linear-ovate to ovate-oblong, 4.5-5.5 cm long, 15-20 mm wide, dark green adaxially, paler beneath with prominent dark veins, margins entire; petioles 5-12 mm long. Peduncle erect, 8-12 cm long, c. 2.5 mm wide, green to purplish. *Fertile bracts* obovate-lanceolate, 10-20 mm long, 5-7 mm wide, closely sheathing, long-acuminate. *Pedice* erect, 18-30 mm long, slender. *Flower* solitary, 20-25 mm long, green to reddish pink with darker calli. *Dorsal sepal* erect and incurved, linear-obovate-spathulate, 14-16 mm long, c. 2.5 mm wide; osmophore linear-terete, c. 2 mm long. *Lateral sepals* linear, 14-17 mm long, c. 1.6 mm wide, connate at the very base, erect in the proximal third then recurved in a semi-circle, divergent, flat, tapered to the osmophore; osmophore linear-terete, 3-6 mm long, green to reddish, narrower than the lamina. *Petals* linear-obovate, 12-15 mm long, c. 4 mm wide, reflexed against the ovary. *Labellum* articulated on a very short claw, held obliquely erect; lamina cuneate-trullate, 12-14 mm long, 8-8.5 mm wide, green to reddish purple, tapered to the base, basal part c. 4 mm long, 2 mm wide, lateral margins obtuse, level with the apex when flattened, the apex broadly obtuse to truncate. *Callus* occupying the central half of the adaxial surface of the labellum, black, shiny, subtended by numerous, long, slender, dark reddish-black, clavate calli; major stalked gland c. 4 mm long, obliquely erect, smooth or verrucose, apex deflexed to incurved, c. 2 mm across, entire or obscurely lobed, the base flanked by numerous clavate calli; major sessile gland more or less rectangular, c. 2 mm long, c. 2.3 mm wide, black, shiny, distally a dense tapered band of sessile black calli extending towards the labellum apex; numerous, long-stalked, dark reddish clavate calli to 2 mm long flank the major sessile gland; one pair of small calli on narrowed base of labellum. *Column* incurved, 9.5-10.5 mm long, c. 4 mm wide, incurved, pale green with reddish flecks on the anterior surface; central ridge c. 2 mm wide; wings narrow, about as high as the anther. *Anther* smooth, c. 2.3 mm long, c. 2.8 mm wide, yellow, with a short rostrum. *Pollinia* boomerang-shaped, c. 2.8 mm long, bright yellow, mealy. *Stigma* transversely elliptic, c. 2.8 mm wide, sunken. *Capsule* not seen. **Fig. 3.7.**

Distribution and Ecology: Occurs in northern New South Wales where known from the Barrington Tops and southern regions of the New England Tableland. It grows in moist areas of tall montane forest in well-structured brown loam. Alt. 800-1200 m. Flowering: December to February.

Recognition: Characterised by relatively narrow, obovate-spathulate petals, elongate cuneate labellum with a truncate apex, globose major proximal stalked gland and narrow column wings.

Similar species: Similar in general appearance to *C. sphyrnoides* D.L.Jones but that species has oblong-lanceolate petals, obovate labellum with broadly obtuse apex, handlebar-like major proximal stalked gland and broad column wings.

Conservation status: Of restricted distribution but conserved in National Parks; suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *sphaera*, *sphaerula*, globular, spherical, in reference to the globose shape of the major proximal stalked gland.

Corunastylis Fitzg.

About 50 named species in Australia. One new species is described here.

34. *Corunastylis anthracina* D.L.Jones, *sp.*

nov.; affinis *C. rufae* (R.Br.) D.L.Jones & M.A.Clem., sed florescentia posteriore; plantis fortioribus; inflorescentiis longioribus; floribus majoribus, confertis, furvis; sepalis lateralibus glandes globosas prominentes habent, differt.

Type: New South Wales. About 12 km S of Byron Bay, road to Ballina, 29 April 1986, *D.L.Jones 2318* (holo CANB 613245; iso BRI, NSW).

Description: Terrestrial tuberous herb. Leaf terete, 10–20 cm long, c. 0.15 cm wide, green; base reddish; lamina subulate, 15–28 mm long, 1.5–2.5 mm wide, closely sheathing the scape, ending 10–30 mm below first flower. Inflorescence 15–30 cm tall, bearing 8–30 flowers in a moderately crowded spike 15–40 mm long. Flowers semi-deflexed, c. 5.5 mm diam., coal black; scent not obvious. Floral bracts ovate, c. 1.6 mm long, c. 1.8 mm wide, closely sheathing; apex obtusely apiculate. Ovary linear-obovoid, c. 3.5 mm long, asymmetrically arcuate. Dorsal sepal broadly ovate, 3–3.5 mm long, c. 2.5 mm wide, concave, cucullate, black; margins entire; apex attenuate, with a vestigial apical gland. Lateral sepals porrect to deflexed, linear-lanceolate, 5.5–6 mm long, c. 1.3 mm wide, shallowly gibbous proximally, widely divergent; distal margins involute; apex subacute, with a prominent globose gland. Petals widely spreading, ovate-lanceolate, 2.2–2.7 mm long, c. 1 mm wide, black; margins entire; apex long acuminate to attenuate. Labellum porrect, hinged by a short claw, apex recurved. Lamina oblong-elliptic to oblong-obovate, 2.2–2.6 mm long, 1–1.3 mm wide, black, fleshy; margins irregular, especially distally; apex long-acuminate; callus occupying about two-thirds the area of the ventral surface of the lamina, extending nearly to the labellum apex, oblong to narrowly sagittate, black, thickest and broadest above the base then tapered to the apex; ventral surface colluviate, especially distally. Column c. 1.6 mm long, c. 1.2 mm wide, blackish; foot ligulate, c. 0.5 mm long, curved. Column wings deeply notched, the lobes of similar length, not divergent; posterior lobe linear-oblong, acute, paler, entire; anterior lobe narrowly deltate, blackish, acuminate, curved; anterior margin minutely ciliate. Anther c. 0.8 mm long, with a filiform rostrum c. 0.3 mm long. Pollinarium c. 1 mm long; pollinia c. 0.8 mm long, yellow, coarsely granular; caudicle c. 0.15 mm long; viscidium c. 0.2 mm across. Stigma ovate-elliptic, c. 0.8 mm long, c. 0.5 mm wide. Capsules obliquely erect, obovoid, c. 4 mm long, c. 2 mm wide.

Fig. 3.8.

Distribution and ecology: Coastal areas of northern New South Wales between Wardell and Byron Bay. It grows in open areas in low dense heath; less commonly in open areas among tall dense heath dominated by *Banksia ericifolia*. Colonises track verges and roadsides; also in cemeteries. Soils are well-drained grey sands and sandy loams. Flowering is stimulated by mowing and slashing. Alt. 5–30 m. Flowering: April and May.

Recognition: Within the "rufa group" recognised by the relatively late flowering habit; robust plants; long dense inflorescences; relatively large, coal black flowers; and, prominent globose glands on the lateral sepals and often also on the dorsal sepal.

Similar species: *Corunastylis rufa* is less robust with smaller, reddish flowers in shorter spikes.

Notes: Unlike most members of the "rufa group" the flowers of *C. anthracina* have no red colouration.

Conservation status: Populations have suffered badly from urbanisation, especially in recent times; not known to be conserved; suggest 2V according to Briggs & Leigh (1996).

Etymology: From the Latin *anthracinus*, coal black, in reference to the very dark flower colouration.

Other specimen: NEW SOUTH WALES: c. 5 km N of Lennox Head, 1 July 1985, *D.L.Jones 1838* (CANB).

Diteilis Raf.

About 25 named species in Central and South America, China, Japan, South-East Asia, Philippines, Indonesia, New Guinea and New Caledonia. Three endemic species occur in Australia, one described as new here.

35. *Diteilis petricola* D.L.Jones & B.Gray, *sp. nov.*; affinis *D. simmondsii*, sed plantis majoribus; caulibus invicem usque ad 3–4 in quoque planta; pseudobulbis cylindricis; foliis latioribus; floribus atrorubineis; columna virida, differt.

Type: Flowered in cultivation at the Australian National Botanic Gardens, Canberra, Australian Capital Territory, 2 Dec. 1998, *D.L.Jones 19358* (holo CANB; iso BRI). Provenance: plant originally collected from Carron Creek, Queensland, below the crossing on the Kennedy-Kirrama Road, 11 Sept. 1998, *D.L.Jones 15721*, *M.A.Clements & A.M.Mackenzie*.

Description: Pseudobulbs 3-4, cylindrical to conical, 9-12 cm long, 9-12 mm wide, curved, tapered. Leaves 2-3 terminal, petiolate; petioles 10-20 mm long, channelled; lamina broadly ovate, 8-12 cm long, 4-6 cm wide, thin-textured, dark green, with 5 veins prominent; margins undulate. Racemes 15-25 cm long, winged, purplish, 3-15-flowered. Flowers 8-12 mm long, 10-15 mm wide, deep reddish purple with a green column. Sepals and petals narrow, widely spreading. Dorsal sepal 9-11 mm long, 2.5-3 mm wide. Lateral sepals 9-11 mm long, 3.5-4 mm wide; apex twisted. Petals twisted, 9-11 mm long, c. 1 mm wide. Labellum porrect; lamina obovate, 8-9 mm long, 6-7 mm wide; base deeply channelled, with 2 short basal ridges; apex broadly rounded or truncate, with irregular margins. **Fig. 3.21. & 3.22.**

Distribution and ecology: Occurs in north-eastern Queensland where sporadically distributed between Black Mountain near Kuranda and the Kirrama Range; 400-1200 m alt. It grows in rainforest, usually among detritus and leaf litter on large granite boulders in stream beds and in sheltered gullies. The plants are quiescent or dormant during autumn and winter and produce new shoots and synanthous inflorescences in late spring and early summer, with the flowers opening as the leaves mature. Alt. 400-1200 m. Flowering: October to December.

Recognition: This species is very similar to *D. simmondsii* but the plants grow larger with 3-4 growths common (1-2 in *D. simmondsii*), cylindrical pseudobulbs (elliptical in *D. simmondsii*), broader leaves and deep reddish purple flowers with a green column. The two species are separated by a geographical distance of about 1000 km and they grow in different habitats; *D. simmondsii* occurs in the sandy soil of coastal and near-coastal rainforest and *D. petricola* in litter on boulders in dense montane rainforest.

Conservation status: Highly localised, disjunct but conserved in a National Park; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Greek *petricola*, dwelling on rocks.

Diuris R.Br.

About 65 named species mostly in Australia, one in Timor. Many unnamed species occur in Australia, 9 of which are described as new here.

36. *Diuris basaltica* D.L.Jones, sp. nov.; affinis *D. chryseopsis* D.L. Jones, sed caespitibus plantarum confertis ex ad 30 plantis constantibus; statura brevi (foliis 3-10 cm longis, scapo 6-15 cm alto); floribus croceis; petalis incurvis laminis ovatis ad ovato-ellipticis; labelli lobo medio late ovato ad ovato-elliptico; et labelli callo profunde et irreguliter lobato, differt.

Type: Victoria: Tottenham, W.H.Nicholls, 8 Sept. 1928 (holo MEL 649396).

Illustrations: Figs b & g, plate 65, Nicholls (1969), as *Diuris pedunculata*; page 178, Backhouse & Jeanes (1995).

Description: Glabrous terrestrial herb growing singly or more usually in densely crowded tufts of up to 30 plants. Leaves erect in a loose basal tuft, 3-7, narrowly linear, 3-10 cm long, 1-2 mm wide, green; base sheathing; apex acute. Scape 6-15 cm tall, slender, green to brownish, 1-2-flowered. Sterile bracts 2, the bottom one sometimes extended and leaf-like, narrowly ovate-lanceolate, 20-35 mm long, 4-5 mm wide, acute to acuminate, closely sheathing. Fertile bracts narrowly ovate-lanceolate, 20-35 mm long, 2-4 mm wide, acute to acuminate, closely sheathing. Pedicels 10-25 mm long, very slender. Ovary obovoid, 4-8 mm long, 1.5-2.5 mm wide. Flowers porrect to semi-nodding, 15-20 mm diam., not opening widely, bright golden yellow, orange-yellow, orange or rarely with reddish hues, with a few short, dark striae on the labellum and base of the dorsal sepal; petals often paler; lateral sepals pale green to yellowish green. Dorsal sepal porrect in the proximal third then obliquely erect, ovate, 7-12 mm long, 6-8 mm wide, apex obtuse to subacute or apiculate. Lateral sepals obliquely deflexed, narrowly linear-oblongate to ensiform, 10-16 mm long, 1.5-3 mm wide, parallel, margins involute, apex asymmetrically acute to acuminate. Petals incurved; lamina ovate to ovate-elliptic, 6-10 mm long, 3.5-6 mm wide, apex obtuse to subacute; claw 3-4 mm long, green, widest near the apex, tapered to the base. Labellum obliquely decurved, 10-15 mm long, deeply 3-lobed; lateral lobes oblong-cuneate, 2-3 mm long, 0.5-1.5 mm wide, divergent, erect, outer margins shallowly and irregularly lobed, minutely papillate; midlobe broadly ovate to broadly ovate-elliptical, 7-10 mm long, 7-11 mm wide, flat or shallowly concave, margins entire, apex broadly obtuse. Callus usually orange, consisting of 2 short, irregular, densely papillate-hirsute, usually orange ridges, well-developed on the labellum base and on the basal part of the midlobe where deeply and irregularly lobed, the central part extending nearly to the apex of the midlobe as a slender, tapered, shallow longitudinal ridge. Column porrect from the end of the ovary, 3-3.5 mm long, 2.3-2.8 mm wide. Column wings narrowly lanceolate, 2-2.3 mm long, c. 0.5 mm wide. Stigma cordate, c. 2.5 mm long, c. 2.5 mm wide. Anther ovate, c. 2.5 mm long, c. 2 mm wide, brown. Pollinarium c. 2.3 mm long, c. 1.5 mm wide; viscidium elliptic, c. 1 mm long; pollinia clavate, 2 mm long, white, mealy. Capsule not seen. **Fig. 3.9.**

Distribution and ecology: Victoria, where recorded from eastern areas of the basalt plain immediately to the west of Melbourne. Most of this area was cleared for agriculture and is now largely urbanised. The species formed localised colonies in grassland dominated by *Themeda triandra*, growing in flat areas, on gentle slopes and especially among rocks on basalt outcrops. Soils are well-structured red-brown loams and dark brown to black loams with a nuggety

structure. Alt. 10-30 m. Flowering: September and October.

Recognition: Similar to *D. chryseopsis* but usually growing in densely crowded tufts of up to 30 plants; of short stature (leaves 3-10 cm long; scape 6-15 cm tall); small (12-20 mm diam.), bright golden to orange-yellow or orange flowers, sometimes even with reddish hues (light lemon yellow in *D. chryseopsis*); incurved petals with ovate to ovate-elliptic laminae (widely spreading and ovate-lanceolate to elliptic-lanceolate in *D. chryseopsis*); broadly ovate to ovate-elliptic labellum midlobe (ovate-lanceolate to ovate-cordate in *D. chryseopsis*); and, a deeply and irregularly lobed labellum callus (entire ridges in *D. chryseopsis*).

Notes: Prior to white settlement the basalt plain to the west and north-west of Melbourne was mostly vegetated by grasses and forbs, with trees and shrubs mainly confined to the valleys (Savio 1991). This area was one of the first parts near Melbourne to be occupied by squatters and nowadays most of the plain has been greatly altered for agricultural use and the eastern parts close to Melbourne have been densely urbanised. These changes have resulted in a dramatic fragmentation of the indigenous flora, with much of it reduced to small relict populations, often only along road verges.

Diuris basaltica, once relatively frequent in localised colonies on the eastern areas of the basalt plain immediately to the west of Melbourne, is now probably on the verge of extinction (J. Jeanes pers. comm.). The decline in the populations of this species over the last 40 years has been dramatic. Nicholls (1932, 1969) knew it from Sydenham, St Albans, Tottenham and Keilor Plains. In the late 1950's I saw it in relative abundance while on rabbiting trips in the Altona-Laverton area. Plants still survived at Tottenham and Lara in the early 1960's, mostly on railway reserves but occasionally on land being grazed (Jones 1965), and a substantial colony was also still extant in 1966 in a paddock of the Melbourne University Field Station at Mt Derrimut in Deer Park (D.L. Jones pers. obs.). It is apparently now extinct at the majority of these localities and the only place where plants might still survive in the wild is at Altona (Milburn 1996). A limited number of plants are maintained in cultivation (J. Jeanes pers. comm., H. Richards pers. comm.).

Conservation status: Most of the habitat of this species has been alienated by clearing for farmland, industrial use, urbanised or invaded by weeds; suggest Critically Endangered (IUCN 2001).

Etymology: Derived from the Latin *basalticus*, basalt, in reference to the basaltic soils where this species grows.

Other Specimens: VICTORIA: Laverton North, 4 Oct. 1987, *D. Tonkinson* (CANB); cult. ex Laverton, Oct. 1995, *P. Branwhite*, (CANB).

37. *Diuris curta* D.L. Jones, sp. nov.; affinis *D. chrysantha* D.L. Jones & M.A. Clem., sed florescentia superiore; floribus multo majoribus; sepalis dorsali ovato-oblongo; laminis petali majoribus; medio-lobo labelli late ovato-cuneato, differt.

Type: New South Wales. Hat Head, 13 Sept. 2005, *R. Tunstall* & *J. Riley* (ORG 4940) (holo CANB; iso AD, BRI, MEL, NSW).

Description: Tuberous terrestrial *herb* growing singly or in loose groups. *Leaf* basal, erect, conduplicate, deeply channelled, usually solitary, occasionally 2, linear, 15-25 cm long, 5-8 mm wide, green; base sheathing, usually purple; apex acuminate. *Scape* 5-20 cm tall, sturdy, green, 1-5-flowered. *Sterile bracts* closely sheathing, usually 2, narrowly lanceolate, 30-50 mm long, 5-7 mm wide, acute, tips often reddish. *Fertile bracts* closely sheathing, lanceolate, 12-30 mm long, 3-6 mm wide, often curved, acute to acuminate. *Pedicels* 5-15 mm long, very slender, straight. *Ovaries* obovoid, 3-6 mm long, 2-3 mm wide. *Flowers* porrect to semi-nodding, 20-30 mm diam., bright yellow to almost golden, with dark petal claws and 2 small dark spots on the dorsal sepal; lateral sepals greenish. *Dorsal sepal* porrect in the proximal quarter then erect, ovate to nearly orbicular, 9-14 mm long, 7-12 mm wide; apex broadly obtuse. *Lateral sepals* obliquely deflexed, parallel or crossed, obovate-spathulate, 13-22 mm long, 3-5 mm wide; proximal margins involute; apex subobtusely to broadly obtuse. *Petals* obliquely erect to recurved; claw 4-5 mm long, blackish, widest near the apex, tapered to the base, straight or curved; lamina broadly ovate to broadly elliptic, 9-15 mm long, 7-10 mm wide; apex broadly obtuse. *Labellum* obliquely decurved, 10-12 mm long, 3-lobed; lateral lobes oblong to cuneate, 3-5 mm long, 2-3.5 mm wide, erect and flanking the column; outer margins entire or slightly irregular; midlobe broadly ovate-cuneate, 7-11 mm long, 8-12 mm wide, keeled medially, with a short, broad basal neck; margins entire; apex broadly obtuse. *Labellum callus* consisting of 2 thick divergent ridges c. 5-6 mm long, an obscure central ridge extending to the midlobe. *Column* porrect from the end of the ovary, 3.5-4 mm long, c. 2-2.5 mm wide. *Column wings* oblong-lanceolate, c. 4-5 mm long, c. 1.3-1.5 mm (wider at the base), cream to pale yellow with a yellow, convoluted basal flange; distal margins irregular. *Anther* narrowly ovate, c. 4 mm long, c. 2 mm wide, green with a purplish tip. *Pollinarium* c. 2 mm long, c. 1.3 mm wide; *viscidium* elliptic, c. 0.5 mm long; *pollinia* clavate, 2 mm long, white, mealy. *Stigma* elliptic, c. 2.5 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: This species occurs on coastal headlands, often on exposed slopes facing the sea. Its distribution appears to be

patchy and is uncertain, but is more or less between Stockyard Point Headland near Byfield in Queensland and Hat Head in New South Wales. At Hat Head it grows in windswept grassy sites on a basalt headland close to the sea. At Noosa in Queensland, it grows among shrubs and tussocks on headlands. Alt. 20-50 m. Flowering: August to early October.

Recognition: Similar to *D. chrysantha* D.L.Jones & M.A.Clem., but flowering much earlier, with much larger flowers, ovate-oblong dorsal sepal, larger petal laminae and broadly ovate-cuneate labellum midlobe. By contrast, *D. chrysantha*, which occurs on inland tablelands and ranges flowering in October-November, usually has two leaves and has smaller, distinctively bright golden to orange flowers.

Notes: More collections are required to determine the distribution of this species.

Conservation status: Of uncertain distribution but conserved in Hat Head National Park and Noosa Heads National Park; at Hat Head this species grows in open grassy areas and is threatened by the encroachment of native shrubs and trees as well as Bitou Bush; at this site regular burning is required to maintain the grassy habitat.

Etymology: The Latin *curta*, shortened, abbreviated, in reference to the short habit of this species which has more than likely arisen from the exposed habitat where it grows.

Other specimens: QUEENSLAND: Stockyard Point Headland, Byfield, 28 Aug. 1996, *R.Melzer* (ORG 203) (CANB); Noosa Heads, 1 Sept. 1999, *J.Riley & R.Tunstall* (ORG 2764) (CANB). NEW SOUTH WALES: Red Rock, 28 Aug. 1987, *D.L.Jones s.n.* (CANB); Arrawarra Headland, 31 Aug. 1989, *D.L.Jones* 4919 (CANB); Grants Head, 6 Sept. 2005, *R.Tunstall* (ORG 4929) (CANB).

38. *Diuris eborensis* D.L.Jones, *sp. nov.*; affinis *D. venosae* Rupp, sed floribus luteolis, sepalo dorsali et labello striis purpurascensibus ornato; labelli lobis lateralibus oblongo-cuneatis marginibus abaxialibus irregulariter et obtuse lobatis; lobo medio ovato-cordato marginibus regulatim crenatis; et labelli callo porcis 2 marginalibus latis et porca centrali anguste contracta fere ad apicem attingente, differt. Etiam *D. ochromae* D.L. Jones similis, sed labelli marginibus fere integris vel parce irregularibus, et callo complexiore porcis 2-4 marginalibus, porca centrali et porcis subsidiariis inconspicuis in lobum medium radiantibus, differt.

Type: New South Wales. Rigney Ck, W. of Ebor, 27 Nov. 1996, *D.L.Jones* 15017 & *M.Garratt*, (holo CANB; iso AD, BRI, MEL, NSW).

Illustration: Plate 36, Bishop (1996)-as *D. sp. aff. ochroma* (New England).

Description: Glabrous, terrestrial *herb*, growing singly or in loose groups. *Leaves* 3 to 6, basal, linear, 7-30 cm long, 3-6 mm wide at the base, obliquely erect to lax, involute, green. Inflorescence 15-35 cm tall, slender. *Sterile bracts* narrowly lanceolate, 5-15 cm long, 3-7 mm wide, acuminate, closely sheathing. *Fertile bracts* narrowly lanceolate, 15-45 mm long, 3-5 mm wide, acuminate, closely sheathing. *Flowers* 1 to 4, c. 20 mm diam., semi-erect to semi-pendant, pale yellowish with dark reddish purple striae. *Pedicels* 15-55 mm long, slender, straight or curved. *Ovary* obovoid, 5-8 mm long, 2-3 mm wide. *Dorsal sepal* ovate, 8-12 mm long, 6-9 mm wide, porrect, cucullate and tightly column-embracing in the proximal half, then obliquely erect, obtuse, pale yellow with prominent reddish purple striae. *Lateral sepals* oblanceolate to ensiform, 15-20 mm long, 2.5-4 mm wide, obliquely deflexed below the labellum, parallel to slightly divergent, margins involute, acuminate, green with purplish suffusions. *Petals* incurved or spreading horizontally; lamina asymmetrically ovate to dolabriform, 6-9 mm long, 3-5.5 mm wide, obtuse, anterior surface pale yellow, dorsal surface with purplish striae at the base; claw 5.5-7 mm long, purplish, widest near the apex. *Labellum* 11-14 mm long, porrect in proximal quarter, then obliquely decurved, pale yellow with purplish striae on most of the ventral surface, deeply 3-lobed; lateral lobes oblong-cuneate, 3-5 mm long, c. 2 mm wide, obliquely erect, divergent, with prominent purplish striae, apex irregularly and obtusely lobed, margins densely covered with short, clear, siliceous cells; midlobe ovate-cordate in outline when flattened, 7-10 mm long, 8-12 mm wide, more or less flat with a shallow, rounded central ridge, pale yellowish with numerous fine radiating purplish striae, obtuse, margins regularly and shallowly scalloped, basal margins with short, clear siliceous cells. *Callus* consisting of 3 ridges, 2 raised, broad, more or less parallel anterior ridges, incurved near the apex, densely beset with short, clear, papillate, siliceous cells, and a narrow, central, tapered ridge extending nearly to the apex. *Column* porrect from the end of the ovary, c. 4 mm long, c. 3 mm wide. *Column wings* linear-oblong, c. 3 mm long, tapered near the apex, irregularly lobed, white with purple markings, about as long as the anther. *Stigma* cordate, c. 2.8 mm long, c. 2.2 mm wide, higher than anther, white with purple markings. *Anther* broadly ovate, c. 2.5 mm long, c. 2.5 mm wide, cream and pale brown. *Pollinarium* c. 3 mm long, c. 2 mm wide; viscidium oblong-elliptic, c. 0.8 mm long; pollinia linear-clavate, white. *Capsule* obovoid, 10-12 mm long, 4-5 mm wide.

Fig. 3.10.

Distribution and ecology: Endemic to the New England Tableland, New South Wales. Grows in open sites on moist grassy flats and gentle slopes near streams, occasionally among shrubs and trees. Soils are well-structured brown clay loams. Alt. 1100-1200 m. Flowering: late October to December.

Recognition: Recognised by the pale yellowish flowers with fine purplish striae on the dorsal sepal and labellum; oblong-cuneate labellum

lateral lobes with the outer margins irregularly and obtusely lobed; ovate-cordate labellum midlobe with regularly scalloped margins; and, labellum callus consisting of two broad marginal ridges and a narrowly tapered central ridge extending nearly to the labellum apex.

Notes: *Diuris eborensis* is similar to *D. ochroma* which has a southerly distribution, less prominent striae on the labellum, nearly entire to slightly irregular labellum margins and a more complex callus consisting of two to four marginal ridges, a broad central ridge and faint accessory ridges radiating onto the labellum midlobe. It also has similarities with *D. venosa* which has smaller, mauve, lilac or bluish flowers, coarse dark purple striae on the dorsal sepal and labellum and often also on the lateral sepals and the petal laminae, nearly entire to slightly irregular labellum margins and shallowly toothed lateral lobes.

Conservation status: Of restricted distribution and not known to be conserved; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: From the town of Ebor, which is the main site on which the current distribution of this species is centred.

Other Specimens: NEW SOUTH WALES: Walcha-Nowendoc Rd, *P. Metcalfe*, no date (photo CANB); Ebor Sports Ground, 27 Nov. 1996, *D.L. Jones 15021* & *M. Garratt* (CANB); Ebor Town, 23 Nov. 1993, *J. Riley* (CANB); Ebor turnoff, 23 Nov. 1993, *J. Riley* (CANB); Ebor, Guy Fawkes River, near showground, 27 Oct. 1993, *J. Riley (D.L. Jones 12513)* (CANB); .

39. *Diuris eburnea* D.L. Jones, *sp. nov.*; affinis *D. picta* J. Drumm., sed florescentia posteriore; floribus parum minoribus, cremis vel albis, signis floralibus paucioribus et minus prominentibus; differt.

Type: Western Australia. Pasinto Road, off Bunney Road, N of Eneabba, 18 Oct. 1993, *D.L. Jones 12405* & *B.E. Jones* (holo CBG 9710376).

Illustration: Page 434, Hoffman & Brown (1998), as *D. aff. picta*.

Description: Tuberous terrestrial herb growing in small groups. Leaves erect in a loose basal tuft, 4-6, conduplicate, linear, 10-16 cm long, 1-3 mm wide, green; base sheathing; apex acuminate. Scape 20-45 cm tall, slender, green, 1-8-flowered. Sterile bracts closely sheathing, 1-2, narrowly lanceolate, 30-70 mm long, 3-4 mm wide, acuminate. Fertile bracts closely sheathing, narrowly lanceolate, 10-25 mm long, 3-4 mm wide, acute to acuminate. Pedicels 7-35 mm long, very slender, straight. Ovaries obovoid, 4-7 mm long, 2-3 mm wide. Flowers porrect to semi-nodding, 14-20 mm diam., cream to white with purplish-brown markings; lateral sepals

green to purplish. Dorsal sepal porrect in the proximal third then obliquely erect, ovate, 9-13 mm long, 5-6.5 mm wide, cream to white with purplish-brown marginal bands and an apical blotch; apex apiculate. Lateral sepals obliquely deflexed, parallel or crossed, oblong, 9-14 mm long, 2-3 mm wide; proximal margins involute; apex acute to acuminate. Petals obliquely erect, divergent; claw 2.5-4 mm long, purplish brown, widest near the apex, tapered to the base, straight or slightly curved; lamina ovate to elliptic, 7-11 mm long, 6-8 mm wide; apex broadly obtuse. Labellum obliquely decurved, 9-12 mm long, 3-lobed, folded along the midline; lateral lobes obovate, 4.5-6 mm long, 2.5-3.5 mm wide, divergent, often recurved; outer margins entire or irregular; midlobe broadly ovate-cuneate, 8-11 mm long, 7-10 mm wide, with a relatively thick, tapered basal neck; margins entire; apex broadly obtuse to rounded. Labellum callus consisting of 2 divergent ridges 4-5 mm long, outlined with purple-brown. Column porrect from the end of the ovary, 3.5 mm long, c. 3 mm wide. Column wings ovate-lanceolate, c. 3.5 mm long, c. 1.5 mm wide, white, incurved; distal margins irregularly erose. Anther ovate, c. 3 mm long, c. 2 mm wide. Pollinarium c. 2.5 mm long, c. 1.6 mm wide; viscidium elliptic, c. 0.6 mm long; pollinia clavate, 2.5 mm long, white, mealy. Stigma elliptic, c. 2 mm long, c. 2 mm wide. Capsules not seen.

Distribution and ecology: Apparently restricted to banks of the Arrowsmith River north of Eneabba in Western Australia. It grows in shrubland on laterite ridges in areas that are wet in winter and spring. Alt. 100-120 m. Flowering: October and November.

Recognition: This new species is similar to *D. picta* J. Drumm. but it flowers later and is well isolated from that species occurring much closer to the coast than the northernmost population of *D. picta*. It also grows in a different habitat with *D. picta* occurring in seepage areas on and around granite outcrops. Morphologically the flowers of the two species are very similar however *D. eburnea* generally has smaller paler flowers with fewer and less-prominent floral markings.

Notes: This species was discovered in 1990 by Alan Tinker.

Conservation status: Highly restricted and known from only two small colonies; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *eburneus*, ivory white, in reference to the flower colour.

Other specimen: WESTERN AUSTRALIA. Pasinto Road, Oct. 1997, *W.H. Burton (ORG 902)* (CANB).

40. *Diuris fucosa* D.L. Jones, *sp. nov.*; affinis *D. behrii* Schldtl., sed quidem florescentia priori (Aug.-Sept.) floribus luteolis semi-erectis ad porrectos, et centro labelli dense striato et fuscato brunneo; quoniam *D. behrii* differt autem Oct.-Nov.

florescentia, floribus aureis ad aurantiacos, porrectis ad semi-nutantes, et labello sine dense fucoso brunneo.

Type: New South Wales. Cocketgedong Farm, near Urana, 2 Sept.1998, *D.L. Jones 15708 & M. Garratt* (holo CANB 668138; iso AD, BRI, MEL, NSW).

Description: Glabrous terrestrial *herb* growing singly or in loose groups. *Leaves* erect in a loose basal tuft, 4-7, narrowly linear, 10-25 cm long, 1-3.5 mm wide, green; base sheathing; apex acute to acuminate. *Scape* 15-30 cm tall, green, 1-4-flowered. *Sterile bracts* 2, the bottom one sometimes extended and leaf-like, narrowly ovate-lanceolate, 50-100 mm long, 4-8 mm wide, acute to acuminate, closely sheathing. *Fertile bracts* narrowly ovate-lanceolate, 25-40 mm long, 2-4 mm wide, acute to acuminate, closely sheathing. *Pedicels* 25-50 mm long, very slender, straight. *Ovary* obovoid, 5-8 mm long, 2-3.5 mm wide. *Flowers* semi-erect to porrect, 30-40 mm diam., pale yellow, usually the labellum heavily stained with tan brown markings and striae, a few short striae on the base of the dorsal sepal; lateral sepals pale green with purplish markings. *Dorsal sepal* wholly porrect or obliquely erect in the proximal third, ovate, 11-15 mm long, 7-11 mm wide; apex obtuse or apiculate. *Lateral sepals* obliquely deflexed, narrowly linear-ob lanceolate to ensiform, 15-25 mm long, 1.5-4 mm wide, parallel, margins involute, apex asymmetrically acute to acuminate. *Petals* spreading; claw 4-7 mm long, green to brown, widest near the apex, tapered to the base; lamina ovate-lanceolate or elliptic-lanceolate, 10-18 mm long, 5-10 mm wide, apex obtuse to subacute. *Labellum* porrect to obliquely decurved, 15-22 mm long, deeply 3-lobed; lateral lobes oblong-cuneate, 2-4 mm long, 1-2 mm wide, divergent, outer margins irregularly erose, minutely papillate; midlobe broadly ovate, 12-17 mm long, 7-14 mm wide, margins entire or slightly irregular, often recurved; apex subacute. *Callus* very thick, brown, consisting of 2 irregularly lobed, densely papillate-hirsute ridges, well-developed on the labellum base and on the basal part of the midlobe, the central part extending nearly to the apex of the midlobe as a tapered, papillate, longitudinal ridge. *Column* porrect from the end of the ovary, 4-5 mm long, 2.5-3 mm wide. *Column wings* lanceolate, 3.5-4 mm long, c. 1 mm wide. *Anther* ovate, c. 3 mm long, c. 2.3 mm wide, brown. *Pollinarium* c. 3 mm long, c. 2 mm wide; viscidium elliptic, c. 1.5 mm long; pollinia clavate, 2.5 mm long, white, mealy. *Stigma* cordate, c. 3 mm long, c. 2.5 mm wide. *Capsules* obovoid, c. 18 mm long, c. 5 mm wide, green with purplish ribs. **Fig. 3.11.**

Distribution and ecology: Known from two sites in southern New South Wales, one in the northern section of Buckingham State Forest and the other on a private farm near Lake Urana. It grows in *Callitris* woodland in well-drained sands and sandy loam. Alt. 100-160 m. Flowering: August and September.

Recognition: This species is characterised by early flowering period (August-September), large (30-40 mm diam.) pale yellow, mostly semi-erect

flowers, large labellum midlobe with prominent dark striae and the central part heavily marked with tan-brown (resembling a stain) and, thick, extensive callus. It is similar to *D. behrii* which generally flowers later (September-November), is more robust (to 50 cm tall) with bright yellow to orange-yellow, porrect to semi-nodding flowers, often striated, and usually without a prominent brown stain on the central part of the labellum midlobe.

Notes: It is noticeable that a moderately high proportion of the flowers at the type locality have strongly recurved margins on the labellum midlobe, which imparts the impression of a narrow labellum. When flattened the midlobe is actually very broad.

Conservation status: Of restricted occurrence, locally common and apparently not conserved; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *fucosus*, coloured, painted, stained, in reference to the labellum markings.

Other Specimens: NEW SOUTH WALES: Cocketgedong Farm, near Urana, 5 Aug. 1999, *D.L.Jones 16499* (CANB); Buckinbong State Forest, 26 Sept. 2000, *D.L.Jones 17521* (CANB); *ibid*, Sept. 2000, *D.Rouse (ORG 3110)* (CANB).

41. *Diuris gregaria* D.L. Jones, *sp. nov.*; affinis *D. basalticae* D.L.Jones, sed habitu robustiore (scapo 10-20 cm alto); floribus rectis vel porrectis, citreis; labelli lobo medio ovato ad late ovato; petalorum lamina ovato-lanceolata vel elliptico-lanceolata. Etiam *D. chryseopsis* D.L.Jones et *D. monticolae* D.L.Jones similis, sed caespitibus plantarum confertis et floribus minoribus, differt.

Type: Victoria. Chatsworth Rd, Derrinallum, 11.Oct.1997 *D.L. Jones 15583 & E. Foster* (holo CANB; iso AD, BRI, MEL, NSW).

Description: Glabrous terrestrial *herb* growing singly or more usually in densely crowded tufts of up to 30 plants. *Leaves* erect in a loose basal tuft, 3-7, narrowly linear, 5-10 cm long, 1-2 mm wide, green; base sheathing; apex acute. *Scape* 10-20 cm tall, slender, green to brownish, usually single-flowered, occasionally 2. *Sterile bracts* 2, the bottom one sometimes extended and leaf-like, narrowly ovate-lanceolate, 30-60 mm long, 4-5 mm wide, acute to acuminate, closely sheathing. *Fertile bracts* narrowly ovate-lanceolate, 25-35 mm long, 2-3 mm wide, acute to acuminate, closely sheathing. *Pedicels* 10-25 mm long, very slender. *Ovary* obovoid, 5-10 mm long, 1.5-2.5 mm wide. *Flowers* semi-erect to porrect, 12-20 mm diam., often not opening widely, bright yellow, with a few short, dark striae on the base of the dorsal sepal and sometimes on the labellum; lateral sepals pale green, often with purplish striae. *Dorsal sepal* wholly porrect or obliquely erect in the proximal third, ovate, 7-12 mm

long, 4-8 mm wide, apex obtuse to subacute or apiculate. *Lateral sepals* obliquely deflexed, narrowly linear-oblancoate to ensiform, 14-18 mm long, 1.5-2.5 mm wide, parallel, margins involute, apex asymmetrically acute to acuminate. *Petals* incurved to spreading; lamina ovate or ovate-elliptic, 8-12 mm long, 4-6 mm wide, apex obtuse to subacute; claw 3-4 mm long, green, widest near the apex, tapered to the base. *Labellum* porrect to obliquely decurved, 10-17 mm long, deeply 3-lobed; lateral lobes oblong-cuneate, 2-3 mm long, 0.5-1.5 mm wide, divergent, erect, outer margins irregularly lobed, minutely papillate; midlobe ovate to broadly ovate, 7-12 mm long, 6-10 mm wide, flat or concave, margins entire, apex obtuse to subacute. *Callus* dark yellow, consisting of 2 densely papillate-hirsute terete ridges, well-developed on the labellum base and on the basal part of the midlobe, slightly lobed or irregular at the apex, the central part extending nearly to the apex of the midlobe as a slender, tapered, shallow longitudinal ridge. *Column* porrect from the end of the ovary, 3-3.5 mm long, 1.6-2 mm wide. *Column wings* narrowly lanceolate, 2-2.3 mm long, c. 0.7 mm wide. *Anther* ovate, c. 2.2 mm long, c. 1.8 mm wide, brown. *Pollinarium* c. 2.3 mm long, c. 1.5 mm wide; viscidium elliptic, c. 1 mm long; pollinia clavate, 2 mm long, white, mealy. *Stigma* cordate, c. 2.2 mm long, c. 2 mm wide. *Capsules* obovoid, c. 15 mm long, c. 4 mm wide, green with purplish ribs. **Fig. 3.12.**

Distribution and ecology: Victoria, where known only from central parts of the basalt plain to the west of Melbourne. Grows in grassland with a range of grass species and other herbs. The topography is mostly flat, but the orchid also occupies gentle slopes and occasionally occurs on rock outcrops. Soils are well-structured red-brown loams. Altitude c. 160 m. Flowering period September and October.

Recognition: Similar to *D. chryseopsis* but usually growing in densely crowded tufts of up to 30 plants; small (12-20 mm diam.), bright yellow flowers (light lemon yellow in *D. chryseopsis*); incurved petals with ovate to ovate-elliptic laminae (widely spreading and narrowly ovate-lanceolate to narrowly elliptic-lanceolate in *D. chryseopsis*); and, broadly ovate to ovate-elliptic labellum midlobe (ovate-lanceolate to ovate-cordate in *D. chryseopsis*). Also similar to *D. basaltica* but generally more robust (scapes 10-20 cm tall); bright yellow, semi-erect to porrect flowers; an ovate to broadly ovate labellum midlobe narrowly obtuse at the apex; and, entire or slightly irregular callus ridges.

Notes: This species is apparently confined to the central parts of the basalt plain (see also *Notes* under *D. basaltica*) and its current distribution is centred on the Derrinallum - Woorndoo area. Plants of *D. gregaria* are taller than those of *D. basaltica* and the majority have bright yellow flowers, although occasional plants have orange-yellow flowers or orange colouration in the

labellum. Flowers from both regions share the incurved petals and distinctive shape of the petal laminae. The question of whether intermediate states occurred between these eastern and western populations is unknown because of habitat alienation and the extreme fragmentation of the relictual populations.

Flowering in this species is generally brief with most plants in a colony finishing within 2 weeks of the first flower opening.

Conservation status: Much of the habitat of this species has been alienated through clearing for farmland and it is now reduced to a few relict roadside reserves; suggest 2E by the criteria of Briggs & Leigh (1996).

Etymology: From the Latin *gregarius*, growing in company, in reference to the clumping habit.

Other Specimens Examined: VICTORIA: Woorndoo-Dundonnell Rd, *D.L.Jones 15590* & *E.Foster*, 11 Oct. 1997 (CANB); Woorndoo, *D.L.Jones 15593* & *E.Foster*, 11 Oct. 1997 (CANB); c. 2.5 km W. of Woorndoo, *D.L.Jones 15597* & *E.Foster*, 11 Oct. 1997 (CANB); Vite Vite, *D.L.Jones 15598* & *E.Foster*, 11 Oct. 1997 (CANB, MEL).

42. *Diuris immaculata* D.L.Jones, *sp. nov.*; affinis *D. laxiflorae* Lindl., sed floribus minoribus aureis sine signis; columinibus calli inferioribus et minus prominentibus; differt.

Type: Western Australia. Coolinup Road, NE of Esperance, 15 Oct. 1991, *D.L.Jones 8438*, *M.A.Clements* & *B.E.Jones* (holo CANB 668628).

Illustration: Page 429, Hoffman & Brown (1998), as *D. aff. emarginata*.

Description: Tuberous terrestrial herb growing singly. *Leaves* erect in a loose basal tuft, 4-6, conduplicate, linear-lanceolate, 4-8 cm long, 1-3 mm wide, green; base sheathing; apex acuminate. *Scape* 8-15 cm tall, slender, green, 1-3-flowered. *Sterile bracts* closely sheathing, 1-2, narrowly lanceolate, 30-45 mm long, 3-4 mm wide, acuminate. *Fertile bracts* closely sheathing, narrowly lanceolate, 10-22 mm long, 3-4 mm wide, acute to acuminate. *Pedicels* 5-20 mm long, very slender, straight. *Ovaries* obovoid, 4-7 mm long, 2-3 mm wide. *Flowers* porrect to suberect, 12-16 mm diam., golden yellow, unmarked; lateral sepals green. *Dorsal sepal* porrect in the proximal third then obliquely erect, ovate, 9-14 mm long, 5-7 mm wide; apex obtuse. *Lateral sepals* obliquely deflexed, parallel, oblong-obovate, 10-16 mm long, 2.5-4 mm wide; proximal margins involute; apex subobtusely. *Petals* obliquely erect; claw 3-4 mm long, green, widest near the apex, tapered to the base, straight or slightly curved; lamina ovate to elliptic, 7-12 mm long, 6-8 mm wide; apex broadly obtuse. *Labellum* obliquely decurved, 10-13 mm long, 3-lobed; lateral lobes obovate, 4.5-7 mm long, 2.5-4 mm wide, erect and flanking the column;

outer margins entire or irregular; midlobe broadly ovate-cuneate, 8-11 mm long, 7-11 mm wide, with a relatively long basal neck; margins entire; apex broadly obtuse to rounded. *Callus* consisting of 2 divergent ridges 4-5 mm long, this area sometimes orange. *Column* porrect from the end of the ovary, 3-3.5 mm long, c. 2.5 mm wide. *Column wings* oblong-lanceolate, c. 3.5 mm long, c. 1 mm wide, white, incurved over the column apex; distal margins irregularly. *Anther* ovate, c. 3 mm long, c. 2 mm wide. *Pollinarium* c. 1.8 mm long, c. 1.2 mm wide; *viscidium* elliptic, c. 0.4 mm long; *pollinia* clavate, 1.8 mm long, white, mealy. *Stigma* elliptic, c. 1.3 mm long, c. 1 mm wide. *Capsules* not seen.

Distribution and ecology: Apparently restricted to the vicinity of Coolinup Nature Reserve north-east of Esperance in Western Australia. Grows among forbs, shrubs and low trees in patches of sand and laterite that are wet in winter. Altitude: 30-60 m. Flowering period: September and October.

Recognition: This new species is part of a complex of taxa surrounding *D. laxiflora* Lindl. It is immediately distinguished from *D. laxiflora sens. strict.* by its unmarked golden yellow flowers with green lateral sepals. It is also distinguished by its generally smaller flowers with less-developed callus ridges on the labellum.

Notes: This species was discovered in 1990 by Don Voigt.

Conservation status: Highly restricted and in low numbers; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *immaculatus*, unspotted, unstained, in reference to the pure unmarked flowers.

Other specimens: WESTERN AUSTRALIA. Coolinup Road, 13 Sept. 1990, *D. Voigt* (CANB); *ibid*, 4 Oct. 1990, *D. Voigt* (CANB).

43. *Diuris protena* D.L.Jones, *sp. nov.*; affinis *D. behrii* Schldl., sed florescentia superiore; floribus minoribus, flaveolis, differt; affinis *D. fucosae* D.L.Jones quoque, sed floribus minoribus; medilobo labelli angustiore, differt.

Type: Victoria. Fabians Paddock, Terrick Terrick National Park, 14 Sept. 2004, *D.L. Jones* 19078 & *K.J. Richards* (holo CANB 661333; iso MEL, NSW).

Description: Glabrous terrestrial *herb* growing singly or in loose groups. *Leaves* erect in a loose basal tuft, 4-8, narrowly linear, 7-12 cm long, 1-3 mm wide, green; base sheathing; apex acute to acuminate. *Scape* 12-20 cm tall, green, 1-3-flowered. *Sterile bracts* 2, the

bottom one sometimes extended and leaf-like, narrowly ovate-lanceolate, 40-60 mm long, 4-6 mm wide, acute to acuminate, closely sheathing. *Fertile bracts* narrowly ovate-lanceolate, 25-40 mm long, 2-4 mm wide, acute to acuminate, closely sheathing. *Pedicels* 25-60 mm long, very slender, straight. *Ovary* obovoid, 5-8 mm long, 2-3 mm wide. *Flowers* semi-erect to porrect, 15-25 mm diam., pale yellow, usually the labellum lightly stained with tan brown markings and striae, a few short striae on the base of the dorsal sepal; lateral sepals pale green with purplish markings. *Dorsal sepal* wholly porrect or obliquely erect in the proximal third, ovate, 9-15 mm long, 4-8 mm wide; apex obtuse or apiculate. *Lateral sepals* obliquely deflexed, narrowly linear-ob lanceolate to ensiform, 13-20 mm long, 1.5-3 mm wide, parallel, margins involute, apex asymmetrically acute to acuminate. *Petals* incurved or slightly spreading; claw 3-5 mm long, green to brown, widest near the apex, tapered to the base; lamina ovate or elliptic to ovate-lanceolate, 7-15 mm long, 3.5-7 mm wide, apex obtuse to subacute. *Labellum* porrect to obliquely erect, 10-18 mm long, deeply 3-lobed; lateral lobes oblong-cuneate, 2-3.5 mm long, 1-1.5 mm wide, divergent, outer margins irregularly erose, minutely papillate; midlobe narrowly ovate, 7-14 mm long, 6-10 mm wide, flat, margins entire or slightly irregular; apex obtuse to subacute. *Callus* thick, consisting of 2 relatively broad, irregularly lobed, densely papillate-hirsute ridges, well-developed on the labellum base and on the basal part of the midlobe, the central part thickened and extending onto the midlobe as a tapered papillate ridge. *Column* porrect from the end of the ovary, 4-5 mm long, 2.5-3 mm wide. *Column wings* narrowly lanceolate, 3.5-4 mm long, c. 1 mm wide. *Anther* 2.5-3 mm long, c. 2 mm wide, green to purplish. *Pollinarium* c. 2.6 mm long, c. 2 mm wide; *viscidium* elliptic, c. 1.5 mm long; *pollinia* clavate, 2.5 mm long, white, mealy. *Stigma* cordate, c. 2.5 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: Known from four sites in northern Victoria, three in grassland and the other (Mt Jeffcott) on the top of a granite hill among Sheoaks (*D. Rouse*, pers. comm.). At Terrick Terrick and Hunter, the species grows in windswept grassland with forbs in red-brown clay loam. Early flowering plants with similar floral features were seen by the author near Yan Yean in the 1970's. Alt. 150-200 m. Flowering: August and September.

Recognition: This species has similarities with both *D. behrii* and *D. fucosa*. It is most similar to *D. fucosa* and both species flower in early spring, but the flowers of *D. protena* are generally smaller with a narrower labellum midlobe (the midlobe is very broad in *D. fucosa*). In both species the labellum has a darkish central patch around the callus that resembles a stain but this feature is lightly coloured in *D. protena* compared with *D. fucosa* where it is generally dark and heavily stained. *Diuris protena* flowers much earlier than *D. behrii* (October-November

in *D. behri*) and has smaller, pale yellow flowers (golden to orange in *D. behrii*).

Notes: The collection from Terrapee exhibited more variation than the population at Terrick Terrick and may have had some introgression with *D. behrii*.

Conservation status: Of restricted occurrence and conserved in Terrick Terrick National Park; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *protenus*, before, in front of, in reference to the early flowering habit of the species.

Other Specimens: VICTORIA: Hunter Grassland Reserve, 14 Sept. 2004, *D.L.Jones 19076 & M.Garratt* (CANB); Fabians Paddock, Terrick Terrick National Park, 6 Sept. 2004, *D.T.Rouse 158* (CANB); Mt Jeffcott, 7 Sept. 2003, *D.T.Rouse 159* (CANB); Terrapee, W of Boort, 21 Sept. 2005, *N.Stimson (ORG 4945)* (CANB).

44. *Diuris unica* D.L.Jones, *sp. nov.*; affinis *D. chrysanthae* D.L.Jones & M.A.Clem., sed florescentia superiore; folio singulari; floribus flaveolis; portionibus perianthii minoribus; columinibus calli tumidioribus, differt.

Type: Queensland. About 6 km NE of Maryborough beside road to Hervey Bay, 9 Aug. 1986, *D.L.Jones 2336* (holo CANB 668528).

Description: Tuberous terrestrial *herb* growing singly or in loose groups. *Leaf* basal, erect, conduplicate, deeply channelled, usually solitary, rarely 2, linear, 15–28 cm long, 3–7 mm wide, green; base sheathing, usually purple; apex acuminate. *Scape* 15–45 cm tall, slender, green, 1–8-flowered. *Sterile bracts* closely sheathing, usually 2, narrowly lanceolate, 40–70 mm long, 5–7 mm wide, acute to acuminate. *Fertile bracts* closely sheathing, lanceolate, 12–30 mm long, 3–6 mm wide, acute to acuminate. *Pedicels* 8–45 mm long, very slender, straight. *Ovaries* obovoid, 4–7 mm long, 2–3 mm wide, often curved. *Flowers* porrect to semi-nodding, 18–25 mm diam., bright lemon yellow, with dark petal claws and dark markings on the dorsal sepal and labellum; labellum sometimes orange; lateral sepals green to brownish. *Dorsal sepal* porrect in the proximal third then erect, ovate, 7–10 mm long, 5–7 mm wide; apex broadly obtuse. *Lateral sepals* obliquely deflexed, parallel or crossed, narrowly oblong-obovate to obovate-spathulate, 8–18 mm long, 2–3 mm wide; proximal margins involute; apex subobtuse to broadly obtuse. *Petals* erect; claw 4–5 mm long, blackish, widest near the apex, tapered to the base, straight or slightly curved; lamina elliptic to orbicular, 5–8 mm long, 5–8 mm wide; apex broadly obtuse. *Labellum* obliquely decurved, 7–9 mm long, 3-lobed, folded along the midline; lateral lobes oblong to broadly cuneate, 3–4 mm long, 2–2.5 mm wide, erect and flanking the column; outer margins entire or slightly irregular; midlobe ovate to cuneate, 6–8 mm long, 5–8 mm wide, keeled medially, with a short, broad basal neck; margins entire; apex acute to obtuse.

Callus consisting of 2 thick divergent ridges c. 4–5 mm long, an obscure central ridge extending well onto the midlobe. *Column* porrect from the end of the ovary, 3–3.5 mm long, c. 2–2.5 mm wide. *Column wings* oblong-lanceolate, c. 3 mm long, c. 0.7 mm wide, cream to pale yellow with a yellow convoluted basal flange; anterior margins irregular. *Anther* narrowly ovate, c. 3 mm long, c. 1.5 mm wide, green. *Pollinarium* c. 3 mm long, c. 1.3 mm wide; *viscidium* elliptic, c. 0.4 mm long; *pollinia* clavate, 3 mm long, white, mealy. *Stigma* elliptic, c. 2 mm long, c. 2 mm wide. *Capsules* not seen. **Fig. 13.13.**

Distribution and ecology: Widely distributed in coastal and near-coastal districts of south-eastern Queensland and occurring disjunctly in north-eastern New South Wales at least as far south as Lake Cathie. It grows in coastal and near-coastal habitats in wallum and heath in sandy soils and clay loams in situations ranging from freely drained to moisture-retentive or even semi-swampy. Alt. 20–100 m. Flowering: July to September.

Recognition: Similar to *D. chrysantha* D.L.Jones & M.A.Clem., but flowering much earlier, usually with a single leaf that is purple at the base and bright lemon yellow flowers. By contrast *D. chrysantha*, which occurs on inland tablelands and ranges flowering in October–November, usually has two leaves and has similar-sized but distinctive bright golden to orange flowers. Also similar to *D. curta* D.L.Jones which mainly grows on coastal headlands and usually has two leaves and larger flowers.

Notes: This species has been generally included in *D. chrysantha* and may have been referred to as *D. sp. aff. chrysantha* (coastal) or *D. sp. aff. chrysantha* (wallum).

Conservation status: Widely distributed and well-conserved.

Etymology: The Latin *unicus*, single, solitary, one, in reference to the single leaf.

Other Specimens: QUEENSLAND: Mt Coolum, 18 July 1993, *R.Crane 942* (BRI, CANB); Toolara, 30 Aug. 1995, *R.Crane 1317* (BRI, CANB); Maryborough, 26 Aug. 1996, *R.Crane 1565* (BRI, CANB); Peregian Beach, 8 Sept. 1987, *D.L.Jones s.n.* (CANB); Boonooroo, 12 Sept. 1989, *P.D.Jones* (CANB). NEW SOUTH WALES: Yuragir National Park, 28 Aug. 1987, *D.L.Jones s.n.* (CANB); Lake Innes Reserve, 8 Sept. 1990, *D.L.Jones 6447* (CANB).

Linguella D.L.Jones & M.A.Clem.

An endemic genus of 4 named species. Numerous unnamed species occur in Western Australia one of which is described here as new.

45. *Linguella timothyi* D.L.Jones, *sp. nov.*; affinis *L. nanae* (R.Br.) D.L.Jones & M.A.Clem. sed

foliis rosulatis minoribus, venis valde; scapo gracili, fragili; flore minore, angustiore; labello ovato, glabro; et punctatis apicalibus sepalorum longiore, differt.

Type: Western Australia. About 5 km S of Jerramungup, 28 Aug. 1986, *D.L.Jones 2409*, *T.D.Jones & R.Heberle* (holo CBG8605805; iso PERTH).

Description: *Rosette leaves* 4-7, in a neat basal rosette; petiole 5-12 mm long; lamina ovate, 5-11 mm long, 4-6 mm wide, bright green with prominent veins; margins entire; apex acute. *Scape* 6-13 cm tall, thin, smooth or slightly roughened, 1-flowered. *Flower* stiffly erect, 11-12.5 mm long, 3-4 mm wide, translucent white with green stripes and suffusions. *Galea* apex horizontal to shallowly decurved. *Dorsal sepal* 13-16 mm long, 6-8 mm wide, slightly longer than the petals; apex long-acuminate to filiform. *Lateral sepals* closely embracing the galea; synsepalum shallowly curved when viewed from the side; sinus shallowly notched, with a brown central area; free points 12-18 mm long, filiform, erect, held high above the galea. *Petals* oblong, falcate, 10-13 mm long, 3-4 mm wide. *Labellum* not visible from the exterior of the flower; lamina ovate, curved near the apex, 3-4 mm long, 1.5-2.2 mm wide, glabrous, brown; basal appendage c. 1.3 mm long, curved, penicillate. *Column* 6-7 mm long, incurved.

Distribution and ecology: Occurs in south-western Western Australia between Lake Cronin and the Pallinup River; 5-200 m alt. It grows in dense shrubby habitats with the plants often hidden under the shrubs, in well-drained red gravelly clay loam. Alt. 5-200 m. Flowering: July and August.

Recognition: Within the *Linguella nana* complex this species is recognised by a basal rosette of 4-7 small, ovate, dark green leaves with prominent veins, thin, smooth or slightly rough, brittle scape, narrow, stiffly erect flower which is translucent white with green stripes and suffusions, horizontal or shallowly decurved galea apex, a short, ovate, glabrous labellum and long thin free points on the lateral sepals.

Notes: This species generally forms small groups or sparse clonal colonies. The plants are very brittle and easily damaged by handling.

Conservation status: Relatively widespread but disjunct, conserved in National Parks.

Etymology: Named after Timothy David Jones (1971-), who discovered this species while participating in a collecting trip to Western Australia in 1986.

Other Specimens: WESTERN AUSTRALIA. Lake Cronin Nature Reserve, 26 July 1994, *C.French s.n.*

(CANB); c. 13 km W of Ravensthorpe, 20 July 1995, *C.French (D.L.Jones 14067)* (CANB); highway 1, Pallinup R. bridge, 21 July 1995, *C.French (D.L.Jones 14069)* (CANB); Highway 1, West River crossing, 18 Aug. 1997, *C.French 635* (CANB); Oldfield Road, 5.2 km S of River Road, 23 Aug. 1997, *C.French 710* (CANB).

Luisia Gaud.

About 30 species distributed in Asia, Japan, India, Malaysia, Polynesia, Indonesia and New Guinea. Two species occur in Australia, both included in *L. teretifolia* Gaud., but they are here described as new. The type of *L. teretifolia* was collected in 1826 by the French naturalist and circumnavigator Charles Gaudichaud-Beaupré from the Mariana Islands (probably Guam) in Micronesia. The type specimen, which is held in Paris, is sterile, but Gaudichaud's original description is accompanied by a plate which depicts a flowering plant and floral dissections (see Seidenfaden 1971), which are unfortunately generalised and show limited floral detail. *Luisia teretifolia sens. strict.* is illustrated in colour by Lynn Raulerson and Agnes Rinehart in *Ferns and Orchids of the Mariana Islands* (1992) and I was able to examine spirit-preserved flowers collected by them from Guam (see accompanying figure). A study of living plants together with fresh and spirit-preserved flowers of *Luisia* from New Guinea, New Caledonia, Vanuatu and northern Australia clearly shows that vegetative evolution in *Luisia* is ultraconservative however, floral features, particularly development in the labellum, reveals a high degree of specialisation. The vegetative conservatism and general similarity of floral morphology within the genus, has led to significant synonymisation, usually resulting from examination of dried herbarium specimens which preserve poorly. By contrast, examination of fresh and spirit-preserved flowers reveals the high degree of specialisation that has occurred within the genus. Based on these studies, *L. tristis* (G.Forst.) Kuntze from New Caledonia and *L. beccarii* Rchb.f. from New Guinea, should be reinstated as distinct from *L. teretifolia*. Additionally the flowers of neither native species match those of *L. teretifolia* or any other taxon from New Guinea, New Caledonia, Vanuatu and Indonesia, and both are described here as new.

46. *Luisia teretifolia* Gaud.

Florally this species is characterised by greenish to yellowish green flowers with much of the labellum maroon to burgundy and a distinct, broad, yellowish apical band on the epichile; dorsal sepal correct, oblong-ovate, c. 5 x 3 mm, obtuse; lateral sepals widely divergent, broadly oblong-ovate, c. 5 x 3 mm wide, apex strongly cymbiform; petals correct, obovate-spathulate, c.

6 x 2 mm, obtuse; labellum c. 7 x 6.5 mm, the epichile of similar width to the hypochile when flattened; hypochile deeply concave, c. 4.5 x 6 mm, the lateral margins expanded into 2 large wing-like lobes; epichile transversely reniform, c. 2.6 x 6.5 mm, smooth; column c. 4 x 3 mm; anther c. 1.5 x 2.3 mm; stigma c. 1.7 x 2.3 mm, occupying most of the ventral surface. **Fig. 3.14.**

Luisia beccarii can be distinguished from this species by its smaller labellum (c. 4-5 x 5-5.5 mm), the hypochile and epichile of similar length and width to each other when flattened. *Luisia tristis* can be distinguished by its linear-oblong petals (slightly expanded at the apex), hypochile broad at the base and narrowed to near its junction with the epichile and the epichile itself distinctly cordate.

47. *Luisia atacta* D.L.Jones, sp. nov.; affinis *L. teretifoliae* Gaud., sed floribus majoribus; sepalo dorsali latiore; epichilo quam hypochilo multo angustiore, limbis basalibus angustioribus projectis; columnina multo angustiore, differt.

Type: Queensland. Mulingar, 4 Dec. 2001, B.Gray 7919 (holo QRS 122619).

Description: *Epiphyte* forming straggly clumps consisting of 1-several stems. *Roots* thick, cord-like, somewhat flattened. *Stems* slender, erect to semi-pendulous, 100-500 mm long, wiry. *Leaves* widely spaced, 2-12 per stem, obliquely erect, rigid, terete, 50-200 mm long, 3-5 mm wide, dark green, often with blackish markings. *Racemes* axillary, leaf-opposed, 5-15 mm long, erect, with numerous overlapping glabrous bracts, persistent for many years. *Pedicels* short, thick, incurved, merging with the ovary. *Ovaries* spirally twisted, more or less round in cross-section. *Flowers* 1-3, at sporadic intervals, facing inwards or downwards, 7-8 mm long, 9-11 mm wide, green with a dark burgundy labellum. *Perianth segments* glabrous. *Dorsal sepal* porrect, ovate, 4.5-5 mm long, 3-3.5 mm wide, broadly obtuse. *Lateral sepals* widely divergent, broadly ovate-oblong, 4.5-5 mm long, 3.5-4 mm wide, apex cymbiform. *Petals* projected forwards, incurved, linear obovate-spathulate, 7-8 mm long, c. 2.5 mm wide, obtuse. *Labellum* stiffly attached to the column base, projected downwards, 6-6.5 mm long, 5-5.5 mm wide, the hypochile narrower than the epichile when flattened; hypochile 3-3.5 mm long, c. 2.5 mm wide, grooved, with 2 basal flanges flanking the column base, narrowed before expanding into the epichile; epichile reniform-cordate, c. 4 mm long, 5-5.5 mm wide, thick, fleshy, smooth to verrucose. *Column* porrect from the end of the ovary, c. 4 mm long, c. 2.5 mm wide. *Anther* c. 1 mm long, c. 1.5 mm wide. *Pollinarium* c. 1.5 mm long; pollinia ellipsoid, c. 1 mm long, orange, waxy. *Stigma* ovate, c. 1.3 mm across, sunken. *Capsules* erect, oblong-ellipsoid, 35-40 mm long, 4-6 mm wide, glabrous, on twisted pedicels 4-6 mm long. **Fig. 3.15.**

Distribution and ecology: Occurs on some islands in the Torres Strait and in north-eastern

Qld from Cape York to the Daintree River. Probably also in southern New Guinea. This species grows on mangroves and in humid coastal scrub and rainforest, often on trees that have scaly or papery bark. It usually occurs in situations of bright light. Young plants grow erect but older clumps are often straggly and semi-pendulous. Alt. 0-200 m. Flowering: Sporadically between November and April.

Recognition: This species has been confused in Australia with *L. teretifolia* Gaud. from which it can be distinguished by larger flowers, broader dorsal sepal, epichile grooved, much narrower than the hypochile, with narrow projecting basal flanges and a much narrower column with a constriction towards the base. It also has similarities with *L. corrugata* from the Northern Territory which has racemes with sparsely hairy bracts, ridged sparsely hairy lateral sepals, and a grooved or wrinkled labellum without basal flanges. By contrast *L. atacta* has racemes with glabrous bracts, glabrous flowers and a labellum with 2 basal flanges and a smooth or slightly warty surface.

Conservation status: Widespread and well conserved.

Etymology: From the Greek *atacta*, untidy, dishevelled, in reference to the plant habit.

Other Specimens: Queensland: Daintree River, 2 Jan. 1990, L.W.Archer & B.M.Borger (QRS); between McIvor River and Cape Flattery, 21 Nov. 1972, A.Dockrill (QRS); c. 1.3 km E of Pudding Pan Hill, 26 Aug. 1987, D.Fell (QRS); Tagan Hill, Moa Island, 15 Feb. 1989, B.Gray 5015 (QRS); Archer River, 16 Sept. 1974, B.Hyland 7574 (QRS); c. 4 km S of Cape York, 11 Feb. 1986, D.L.Jones 2239 (CANB); Moa Peak, Moa Island, 11 Feb. 1989, D.L.Jones 3581 (CANB); SE of Tagan Hill, Moa Island, 15 Feb. 1989, D.L.Jones 3655 (CANB); Mt Cornwallis, Dauan Island, 17 Feb. 1989, D.L.Jones 3672 (CANB); between Pine River Basin and Gulf Coast, N of Duyfken Point, 17 Feb. 1981, A.Morton (QRS).

48. *Luisia corrugata* D.L.Jones, sp. nov.; affinis *L. teretifoliae* Gaud., sed racemis bractis sparsim hirsutis; sepalis sparsim extra hirsutis; sepalis lateralibus angustioribus, extra carinatis; epichilo quam hypochilo multo angustiore; epichilo sulcato vel rugato, differt.

Type: Northern Territory. Jump-up Jungle, Melville Island, 1 Feb. 1984, D.L.Jones 1336 (holo DNA 22948).

Description: *Epiphyte* forming straggly clumps consisting of 1-several stems. *Roots* thick, cord-like. *Stems* slender, erect to semi-pendulous, 100-500 mm long, wiry. *Leaves* widely spaced, 2-12 per stem,

obliquely erect, rigid, terete, 50-200 mm long, 3-5 mm wide, dark green, often with blackish markings. *Racemes* axillary, leaf-opposed, 5-15 mm long, erect, with numerous overlapping sparsely hirsute bracts, persistent for many years. *Pedicels* short, thick, incurved, merging with the ovary. *Ovaries* spirally twisted, more or less trigonous in cross-section. *Flowers* 1-3, at sporadic intervals, facing inwards or downwards, 6-8 mm long, 7-9 mm wide, green with a prominently marked, dark red to burgundy labellum. *Sepals* sparsely hirsute externally. *Dorsal sepal* porrect, oblong-ovate, 5-6 mm long, c. 2.5 mm wide, broadly obtuse. *Lateral sepals* widely divergent, narrowly oblong-ovate, 5-6 mm long, c. 2.5 mm wide, prominently ridged externally, obtuse. *Petals* projected forwards, incurved, oblong-obovate, 6-7 mm long, c. 2 mm wide, glabrous, obtuse. *Labellum* stiffly attached to the column base, projected downwards, 6-7 mm long, 6-7 mm wide, the hypochile much narrower than the epichile when flattened; hypochile 3-3.5 mm long, c. 3.5 mm wide, grooved, without basal flanges, widening towards the epichile, margins sparsely hirsute; epichile reniform, c. 3.5 mm long, 6.5-7 mm wide, thick, fleshy, wrinkled with prominent radiating grooves. *Column* porrect from the end of the ovary, c. 4 mm long, c. 3 mm wide, sparsely hirsute. *Anther* c. 2.5 mm long, c. 2.5 mm wide. *Pollinarium* c. 2 mm long; pollinia ellipsoid, c. 1 mm long, orange, waxy. *Stigma* ovate, c. 1.3 mm across, sunken. *Capsules* erect, oblong-ellipsoid, 3-3.5 mm long, 5-6 mm wide, sparsely hirsute. **Fig. 3.16.**

Distribution and ecology: Endemic in northern parts of the NT, including Melville Island. This species grows on rough-barked trees in coastal forest and rainforest. It usually occurs in situations of bright light and can form large untidy clumps. Alt. 0-50 m. Flowering: Sporadically between November and April.

Recognition: This species has been confused in Australia with *L. teretifolia* Gaud. from which it can be distinguished by its racemes with sparsely hirsute bracts, sepals which are sparsely hirsute externally, narrower lateral sepals that are externally carinate, hypochile much narrower than the epichile and the epichile with prominent grooves or wrinkles. It also has similarities with *L. atacta* from Queensland which has racemes with glabrous bracts, smooth, glabrous lateral sepals, and a smooth labellum with narrow basal flanges. By contrast *L. corrugata* has ridged sparsely hairy lateral sepals, labellum without basal flanges and with a grooved or wrinkled surface.

Notes: The hairs on the floral parts are not easy to discern and seem to be readily dislodged or are shed as the flowers age.

Conservation status: Relatively widespread in the Northern Territory and conserved.

Etymology: The Latin *corrugata* – wrinkled, corrugated, in reference to the surface of the epichile.

Other Specimens (all DNA): Melville Island, Hanguana Jungle, 6 Dec. 1995, *J.L.Egan 5185* & *L.Tumbilis*; Melville Island, Jump-up Jungle, 5 Dec. 1984, *D.L.Jones 1674*; W end of Black Jungle, 17 Dec. 1984, *D.L.Jones 1744*; SE edge of Bankers Jungle, 3 Dec. 1992, *S.M.Taylor 123*; *ibid*, 4 Nov. 1993, *S.M.Taylor 155*.

Pterostylis R.Br.

A genus of about 40 species distributed in Australia, Lord Howe Island, New Zealand, New Caledonia, New Guinea, New Britain, New Ireland and Ceram. About 25 species occur in Australia, many unnamed. Six species and one subspecies are described as new here.

49. *Pterostylis aneba* D.L.Jones, *sp. nov.*; affinis *P. monticola* D.L.Jones, sed floribus minoribus et angustioribus; galea apice erecta vel obliqua; sinu anguste et profunde inciso; labello obtuso, curvato circa medio, differt.

Type: New South Wales. Packers Swamp, 18 Dec. 2004, *D.T.Rouse 236* (holo CANB).

Description: *Leaves* 3-5, scattered up the scape, 30-60 mm long, 8-16 mm wide, dark green, fleshy; margins flat or undulate. *Scape* 10-20 cm tall, 2-3 mm thick, scabrous, 1-flowered. *Flower* erect, 30-40 mm long, 8-12 mm wide, light green to dark green and white; galea apex mostly erect. *Dorsal sepal* 30-40 mm long, 14-17 mm wide, slightly longer than the petals, dorsally scabrid, acute. *Lateral sepals* with a relatively wide lateral gap; synsepalum 26-30 mm long, 14-17 mm wide, green and white, curved when viewed from the side; sinus narrowly and deeply notched; free points 15-20 mm long, tapered, erect or recurved. *Petals* oblong, falcate, 35-40 mm long, 6-7 mm wide, green and white; posterior flange vestigial; apex blunt. *Labellum* protruding when set; lamina oblong-elliptical, 15-18 mm long, 3-3.5 mm wide, curved abruptly forwards just above the middle, obtuse; basal appendage recurved, c. 2.5 mm long, penicillate. *Column* 15-17.5 mm long, nearly straight, green and white. *Column wings* c. 6 mm long, c. 2 mm wide; anterior margin incurved; apical lobe linear, c. 1.3 mm long. *Anther* c. 1.8 mm long. *Pollinia* oblong, c. 1.4 mm long, yellow, mealy. *Stigma* ovate-elliptic, c. 5 mm long, c. 2 mm wide, emarginate. *Capsules* not seen. **Fig. 3.17.**

Distribution and ecology: Occurs in south-eastern New South Wales (near Nimmitabel, Snowy Mountains) and Falls Creek in north-eastern Victoria. It grows in grassy sites and near streams in montane forest and grassy areas near swamps in moisture-retentive loam. Alt. 700-1000 m. Flowering: December to February.

Recognition: Similar to *P. monticola* but with smaller narrower flowers, the tip of the galea erect or obliquely erect, narrowly, deeply notched sinus and a blunt labellum curved near the middle. *Pterostylis monticola*, which is more widespread and common, has larger flowers, usually with a horizontal galea, broad shallowly notched sinus and a larger pointed labellum usually curved near the middle.

Conservation status: Relatively widespread but localised and poorly known; suggest 2KC by the criteria of Briggs & Leigh (1996).

Etymology: The Greek *anebos*, young, immature; the flowers of this species resemble undeveloped flowers of *P. monticola*.

50. *Pterostylis crassichila* D.L.Jones, sp. nov.; affinis *P. strictae* Clemesha & B.Gray, sed scapo brevior; floribus majoribus; sinu latissimo; labello succulento aliquantum, differt.

Type: Queensland. Cook District: Herberton Range, 17 July 1983, *D.L.Jones 1165* (holo CANB; iso AD, BRI, MEL, NSW).

Description: *Leaves* 5-7 in a basal rosette; lamina elliptic-oblong, 20-60 mm long, 15-23 mm wide, green; margins smooth or crinkled; petiole 3-12 mm long. *Scape* 15-30 cm tall, c. 2 mm thick, wiry, 1-flowered. *Flower* erect, 25-32 mm long, 20-25 mm wide, white with green lines, apex reddish brown. *Galea* apex horizontal or slightly erect. *Dorsal sepal* 40-50 mm long, 16-22 mm wide, of similar length to the petals, acute to acuminate. *Lateral sepals* with a wide lateral gap; synsepalum 2-25 mm long, 6-12 mm wide, bulging when viewed from the side; sinus broad, shallowly notched; free points 15-20 mm long, erect or recurved, tapered. *Petals* broadly oblong, shallowly falcate, 30-40 mm long, 7-9 mm wide, acute. *Labellum* protruding prominently when set; lamina elliptic-oblong, 20-23 mm long, 4-5 mm wide, reddish brown, curved forwards near middle, dark reddish brown; margins scabrid; apex obtuse; basal appendage c. 5.5 mm long, penicillate. *Column* 17-22 mm long, erect to incurved, green or brown and white. *Column wings* 6-8 mm long, c. 2 mm wide; apical lobe porrect, linear-tapered, c. 3 mm long. *Anther* c. 2 mm long, erostate. *Pollinia* oblong, c. 2 mm long, yellow, mealy. *Stigma* elliptical, c. 7 mm long, c. 1.5 mm wide, emarginate. *Capsules* not seen.

Distribution and ecology: North-eastern Queensland, mainly on the Atherton and Evelyn Tableland and apparently extending south to Paluma. It grows among grass and shrubs in sheltered gullies and slopes in open forest in well-drained to moist loam. Alt. 800-1250 m. Flowering: April to July.

Recognition: This species is similar to *P. stricta* but has a shorter scape and larger flowers with a

very broad sinus and a thick fleshy labellum that protrudes prominently when set.

Conservation status: Locally common and conserved in National Parks.

Etymology: From the Latin *crassus*, thick and Greek *cheilos*, lip, in reference to the thick fleshy labellum.

51. *Pterostylis cucullata* R.Br. subsp. *sylvicola* D.L.Jones, subsp. nov.; affinis *P. cucullatae* R.Br. sed habitu elatiore (usque 25 cm altae); foliis plerumque extendentibus sursum super scapum; flore parum minore; pedicello prolato, ab flore bracta superiore separatissima, differt.

Type: South Australia. Lobethal, 25 Sept. 1998, *D.E.Murfet 3291* & *R.L.Taplin* (holo CANB 619670).

Description: *Leaves* 4-6, 2-3 in a loose basal rosette, the others scattered on the scape, elliptic, 40-100 mm long, 15-30 mm wide, dark green, fleshy; margins entire. *Scape* 10-25 cm tall, 3-4.5 mm thick, smooth, fleshy, 1-flowered. *Flower* semi-nodding, 35-40 mm long, 20-25 mm wide, green, white and dark reddish brown; tip curved forwards in a semicircle. *Dorsal sepal* 45-50 mm long, 20-25 mm wide, green and white, of similar length to the petals, acute. *Lateral sepals* with a wide lateral gap; synsepalum 33-38 mm long, 12-14 mm wide, shallowly curved when viewed from the side, densely scabrous; sinus deeply notched, flat; free points 20-25 mm long, tapered, often curved, just exceeding the top of the galea. *Petals* broadly oblong, shallowly falcate, 34-38 mm long, 7-10 mm wide, scabrous; margins flared; apex subacute. *Labellum* not protruding when set; lamina oblong to oblong-elliptic, 14-17 mm long, 3.5-4.5 mm wide, dark brown, shiny, shallowly curved forwards near the apex, obtuse; basal appendage penicillate. *Column* 18-22 mm long, brown. *Column wings* 6-7 mm long, 2-2.5 mm wide; apical lobe erect, linear, c. 1.7 mm long. *Anther* c. 2.2 mm long. *Pollinia* oblong, c. 2.2 mm long, yellow, mealy. *Stigma* broadly ovate-oblong to scutiform, c. 4 mm long, c. 2 mm wide. *Capsules* not seen. **Fig. 3.18.**

Distribution and ecology: Occurs in the Adelaide Hills, South Australia, and highland areas of eastern and north-eastern Victoria. It grows on sheltered slopes and near streams in tall moist forests, sometimes in rich loams. Alt. 500-900 m. Flowering: September and October.

Recognition: This subspecies is very similar to *P. cucullata* subsp. *cucullata* but differs by its taller habit (to 25 cm tall), leaves usually extending up the scape, flower slightly smaller and pedicel elongated with the upper bract well separated from the flower. The habitat of each subspecies is generally distinct with *P. cucullata* subsp. *cucullata* mostly found in coastal and

near-coastal habitats (with the exception of colonies in Mt Eccles in western Victoria), whereas subsp. *sylvicola* occurs in highland and montane habitats well away from the coast. The latter subspecies forms rare sporadic hybrids with *P. alpina* and *P. falcata* (the latter hybrid has been described as *P. X aenigma*).

Conservation status: Localised but disjunct, suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *sylvicola*, dwelling in forests, in reference to its preferred habitat.

52. *Pterostylis lustra* D.L.Jones, sp. nov.; affinis *P. falcatae* R.S.Rogers, sed plantis brevioribus et gracilioribus; foliis et floribus minoribus; labello minore et angustiore, differt.

Type: Victoria. Wilsons Promontory National Park, 11 Dec. 1989, *P.Branwhite* (*D.L.Jones* 5560) (holo CBG 8914089; iso MEL, NSW).

Description: *Leaves* 6-10, 3-6 in a loose basal rosette, the rest scattered up the scape, oblong to elliptic, 20-60 mm long, 8-15 mm wide, bright green, fleshy; margins entire. *Scape* 8-20 cm tall, 3-3.5 mm thick, smooth, 1-flowered. *Flower* erect to semi-nodding, 30-45 mm long, 20-25 mm wide, green and white. *Galea* sickle-shaped, tips of petals and dorsal sepal loosely joined. *Dorsal sepal* 45-55 mm long, 17-20 mm wide, green and white, longer than the petals, swollen at the base then long-tapered, acute. *Lateral sepals* with a lateral gap; synsepalum 40-45 mm long, 10-15 mm wide, slightly bulging when viewed from the side, smooth; sinus broadly notched; free points 20-30 mm long, linear, erect or recurved. *Petals* oblong, falcate, 35-40 mm long, 6-7 mm wide, acute to acuminate. *Labellum* protruding prominently when set; lamina oblong-elliptic, 15-25 mm long, 3-3.5 mm wide, curved, dark brown to blackish, subacute; basal appendage recurved, c. 4.5 mm long, penicillate. *Column* 17-19 mm long, erect to incurved, green and white. *Column wings* 6-8 mm long, c. 2 mm wide; apical lobe erect, linear, c. 1 mm long. *Anther* c. 1.7 mm long, erostrate. *Pollinia* oblong, c. 2 mm long, yellow, mealy. *Stigma* oblong-ovate, c. 6 mm long, c. 1.6 mm wide, emarginate. *Capsules* not seen. **Fig. 3.19.**

Distribution and ecology: Occurs in southern Victoria, between Wilsons Promontory and Picanniny Ponds, Perkins Island in northern Tasmania, and south-eastern South Australia. This species is restricted to swampy areas under dense thickets of Woolly Tea Tree (*Leptospermum lanigerum*) in permanently wet black alkaline mud. Although localised it is sometimes common. Alt. 5-50 m. Flowering: November to February.

Recognition: Basically very similar to *P. falcata* but the plants much more slender, the leaves and

flowers smaller and the labellum smaller and narrower.

Conservation status: Widely distributed, locally common and conserved in National Parks and reserves.

Etymology: The Latin *lustrō*, *lustratus*, illuminate, light up, in reference to the flowers showing up in the gloomy conditions of their habitat.

53. *Pterostylis oblonga* D.L.Jones, sp. nov.; affinis *P. pedunculato* R.Br. sed floribus pallidioribus, olivaceis et albis; apice galeae oblique erecto puncto; sinu profunde inciso; labello oblongo, differt.

Type: New South Wales. Just N of Meroo Lake, N of Bawley Point, 24 Aug. 2000, *D.L.Jones* 17201 & *B.E.Jones* (holo CANB 621222; iso BRI, MEL, NSW).

Description: *Leaves* 3-6 in a basal rosette; lamina oblong, 20-60 mm long, 10-20 mm wide, dark green; margins smooth or crinkled; petioles 5-20 mm long. *Scape* 8-22 cm tall, thin, smooth, 1-flowered. *Flower* erect, 14-17 mm long, 5-9 mm wide, greenish brown and white with darker brown tips. *Galea* apex obliquely erect. *Dorsal sepal* 18-21 mm long, 10-13 mm wide, longer than the petals, acuminate. *Lateral sepals* with a wide lateral gap; synsepalum 17-21 mm long, 5-6 mm wide, shallowly curved when viewed from the side; sinus deeply notched; free points 16-22 mm long, erect, tapered, parallel or divergent. *Petals* oblong, falcate, 11-13 mm long, 2-2.5 mm wide, acute. *Labellum* just visible when set; lamina oblong, 5-6 mm long, c. 2 mm wide, brown, margins parallel, blunt; basal appendage 2.3 mm long, penicillate. *Column* 9-11 mm long, incurved, brown and white. *Column wings* c. 3 mm long, c. 1.7 mm wide; apical lobe erect, linear, c. 1.5 mm long. *Anther* c. 1.2 mm long, erostrate. *Pollinia* linear, c. 1.8 mm long, yellow, mealy. *Stigma* elliptic, c. 4 mm long, c. 1.8 mm wide. *Capsules* not seen.

Distribution and ecology: Occurs in New South Wales between Coffs Harbour and Nowra. This species forms clonal colonies under shrubs and bracken in coastal forests in well-drained sandy soil. Alt. 5-100 m. Flowering: July to September.

Recognition: This species has been confused with *P. pedunculata* but can be distinguished by paler flowers which are greenish brown and white with brown tips, obliquely erect tip in the galea, deeply notched sinus and an oblong labellum with margins parallel. By contrast *P. pedunculata* has much darker brown or blackish flowers, horizontal galea, flat sinus and ovate labellum with curved margins. The new species also has affinities with *P. erecta* Hunt which has larger dark brown flowers with a longer, narrower erect galea and longer labellum.

Conservation status: Locally common and conserved in National Parks and reserves.

Etymology: The Latin *oblongus*, oblong, in reference to the labellum shape.

54. *Pterostylis riparia* D.L.Jones, sp. nov.; affinis *P. cucullatae* R.Br., sed foliis carnosius; flore erecto virido et albo rufescenti graviter suffuse; sepalis lateralibus scabridulis; sinu inciso profunde; labello angusto non exserto ubi dormienti, differt.

Type: New South Wales. Barrington Tops, beside Omadale Brook, 30 Nov. 1999, *D.L.Jones 17067, M.Garratt & W.Dowling* (holo CANB; iso NSW).

Description: *Leaves* 5-8, most in a basal rosette, 1-2 on the scape, sessile; lamina broadly elliptic, 25-70 mm long, 10-25 mm wide, dark green, fleshy, smooth. *Scape* 5-20 cm tall, 2-3 mm thick, smooth, 1-flowered. *Flower* erect to leaning, 27-35 mm long, 12-15 mm wide, green, white and reddish brown. *Galea apex* nearly flat to slightly decurved. *Dorsal sepal* 32-36 mm long, 13-16 mm wide, of similar length to the petals, acute to acuminate. *Lateral sepals* with a wide lateral gap, scabrous; synsepalum 3-33 mm long, 9-11 mm wide, nearly flat when viewed from the side, scabrous; sinus deeply notched; free points 15-18 mm long, tapered, exceeding the galea. *Petals* oblong, strongly falcate, 25-30 mm long, 5-6 mm wide, scabrous, acute. *Labellum* not protruding; lamina narrowly elliptic, 12-14 mm long, 3-3.5 mm wide, dark brown, curved forwards near the apex, obtuse; basal appendage recurved, c. 4.5 mm long, penicillate. *Column* 18-20 mm long, incurved. *Column wings* 5-7 mm long, c. 3 mm wide. *Anther* c. 2 mm long, with a short rostrum. *Pollinia* oblong, c. 2.2 mm long, yellow, mealy. *Stigma* oblong, c. 7 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: Restricted to the Barrington Tops in northern New South Wales at about 1000 m alt. The species grows on the edge of small streams under shrubs, particularly *Leptospermum* thickets, forming small clonal colonies which can be inundated during periods of peak flow. Flowering: October and November.

Recognition: Similar to *P. cucullata* but leaves even more fleshy, flowers smaller, with a narrower dorsal sepal, narrower synsepalum with more sharply tapered free points, much narrower, more strongly falcate petals, and a narrower labellum which is elliptic rather than oblong.

Conservation status: Of restricted distribution, highly localised but conserved in a National Park; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *riparius*, of stream banks, in reference to its habitat.

55. *Pterostylis subtilis* D.L.Jones, sp. nov.; affinis *P. monticola* D.L.Jones, sed floribus minoribus et angustioribus; apice galeae oblique erecto; sinu angusto inciso profunde; labello longo curvato, differt.

Type: New South Wales. Butchers Creek Swamp, Barrington Tops, 22 Dec. 1993, *J.Riley, R.Tunstall & G. Bradburn* (holo CANB; iso BRI, MEL, NSW).

Description: *Leaves* 5-6, either in a loose rosette or scattered up the scape, sessile; lamina broadly elliptic, 30-50 mm long, 15-25 mm wide, dark green, fleshy, smooth. *Scape* 12-25 cm tall, 2.5-3 mm thick, scabrous, 1-flowered. *Flower* erect, 35-45 mm long, 15-20 mm wide, dark green and white. *Galea apex* horizontal to obliquely erect. *Dorsal sepal* 43-47 mm long, 23-26 mm wide, slightly longer than the petals, acute. *Lateral sepals* with a narrow lateral gap; synsepalum 40-45 mm long, 12-20 mm wide, curved when viewed from the side; sinus narrowly and deeply notched; free points 15-20 mm long, erect, narrowly tapered. *Petals* oblong-obovate, nearly straight, 38-42 mm long, 8-9 mm wide, acute. *Labellum* protruding when set; lamina oblong-tapered, 16-20 mm long, 3-3.5 mm wide, brown, curved, obtuse; basal appendage recurved, 4-5 mm long, penicillate. *Column* 14-16 mm long, incurved. *Column wings* 45-50 mm long, 14-17 mm wide; apical lobe erect, c. 0.7 mm long. *Anther* c. 1.5 mm long, erostate. *Pollinia* c. 2 mm long, yellow, mealy. *Stigma* elliptic, c. 6 mm long, c. 1.8 mm wide. *Capsules* not seen. **Fig. 3.20.**

Distribution and ecology: Restricted to the Barrington Tops in northern New South Wales. This species grows on sheltered slopes and flats in grassy areas of montane and subalpine woodland, often near streams and swamp margins. Soils are well-drained to moisture-retentive loams. Alt. 900-1200 m. Flowering: December and January.

Recognition: Similar to *P. monticola* but with smaller, narrower flowers, galea apex obliquely erect, narrow, deeply notched sinus and a long curved labellum. *Pterostylis monticola* has larger flowers, usually with a horizontal galea, broad shallowly notched sinus and a larger pointed labellum usually curved near the middle. The two species are separated by a geographical distance of about 800 km.

Conservation status: Of restricted distribution but conserved in a National Park; suggest 2EC according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *subtilis*, thin, fine, slender, lean, in reference to the narrow flowers when compared with the broad flowers of its congener *P. monticola*.

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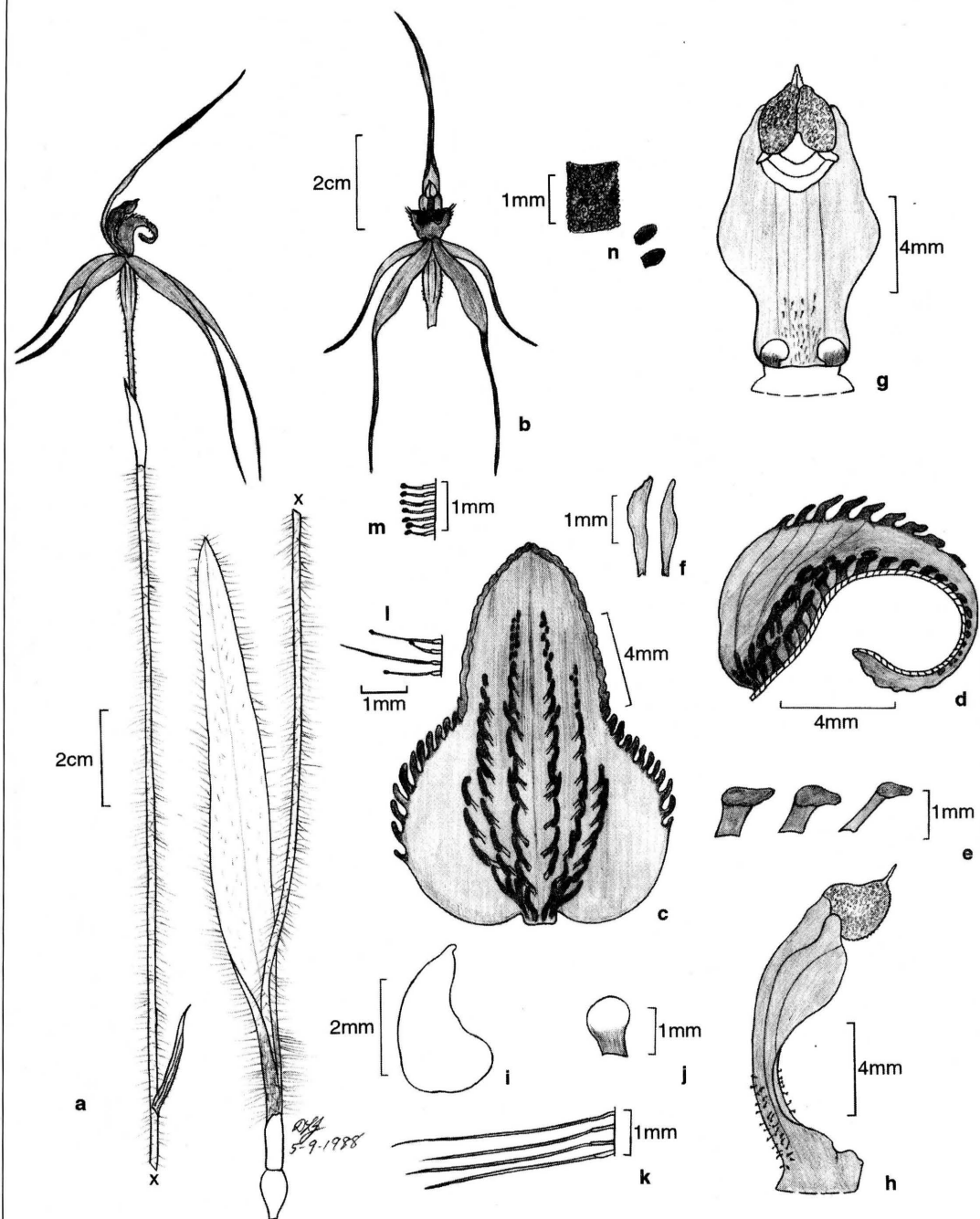


Figure 3.1. *Arachnorchis branwhitei*, Bethungra, New South Wales, D.L.Jones 2765. a. plant; b. flower from front; c. labellum, anterior view, flattened; d. longitudinal section of labellum; e. labellum calli; f. basal calli; g. column from front; h. column from side; i. pollinium; j. column gland; k. leaf trichomes; l. scape trichomes; m. ovary trichomes; n. section of sepaline cauda and osmophore cells.

Drawing 5/9/1988 by D.L.Jones.©

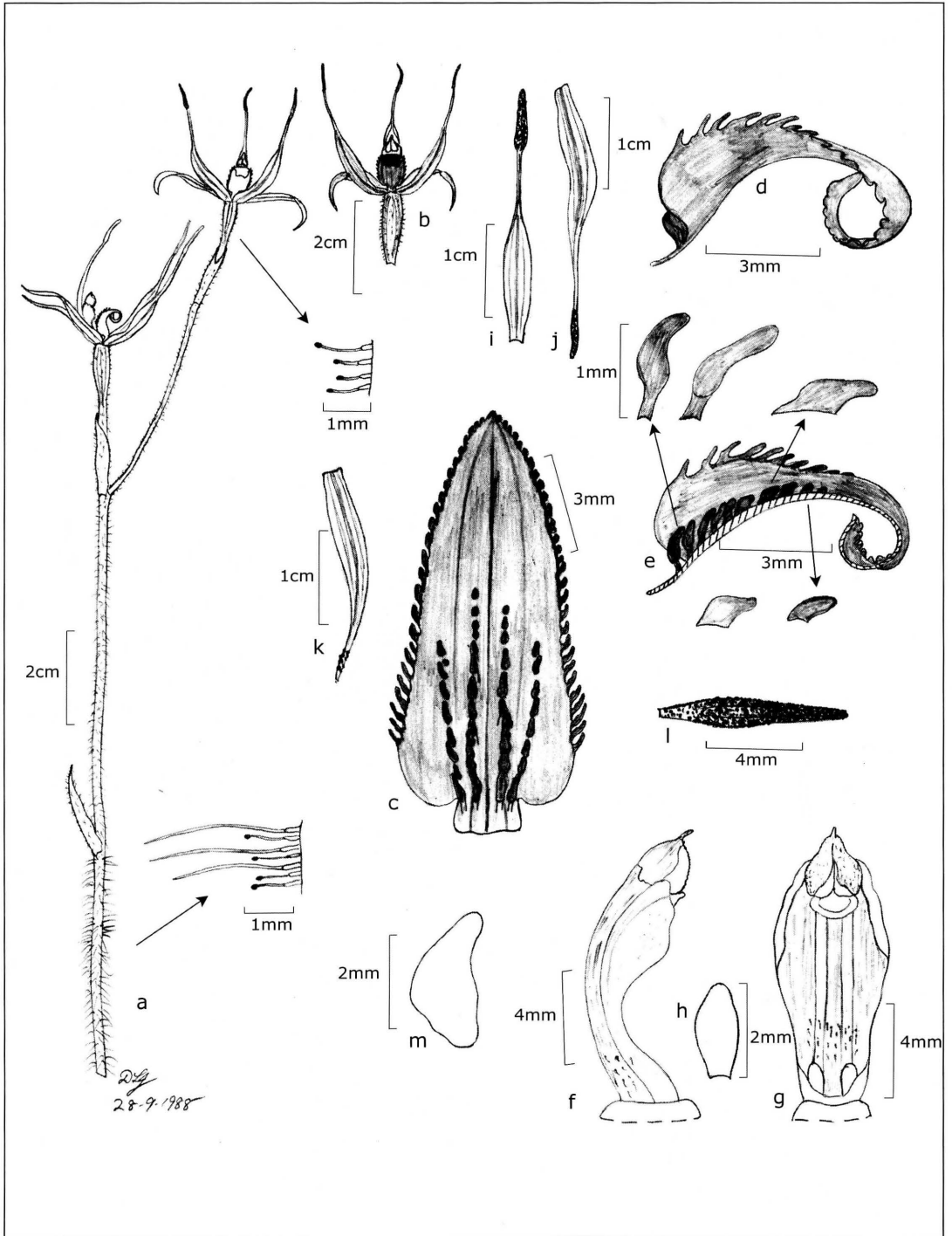


Figure 3.2. *Arachnorchis leptochila* subsp. *dentata*, Alligator Gorge, South Australia, M.A.Clements 4316. a. flowering scape; b. flower from front; c. labellum, anterior view, flattened; d. labellum from side; e. longitudinal section of labellum and calli; f. column from side; g. column from front; h. column gland; i. dorsal sepal; j. lateral sepal; k. petal; l. sepaline osmophore; m. pollinium.

Drawing 28/9/1988 by D.L.Jones.©

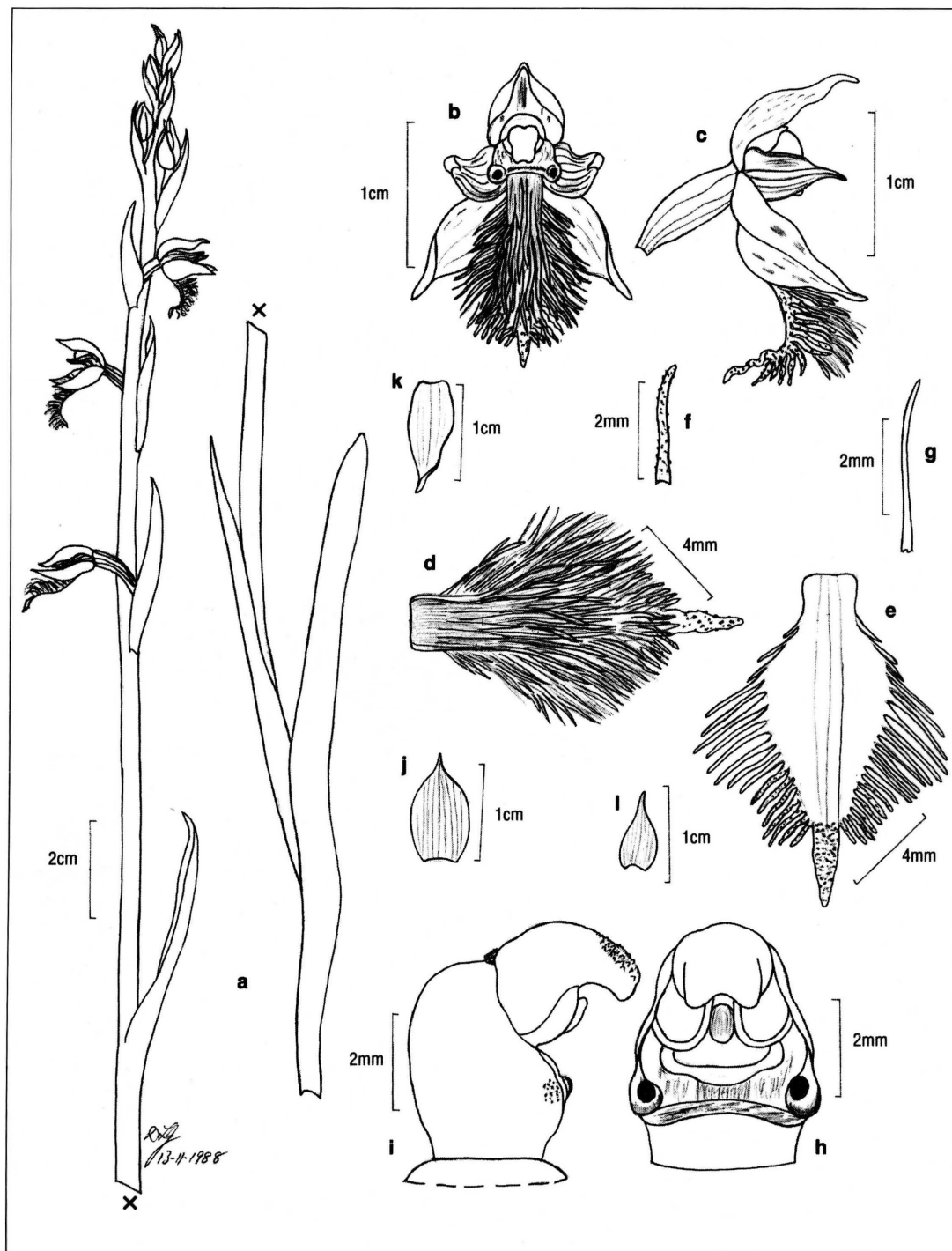


Figure 3.3. *Calochilus montanus*, Tidbinbilla, Australian Capital territory, M.A.Clements. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum, rear view; f. glandular labellum trichome; g. non-glandular labellum trichome; h. column from front; i. column from side; j. dorsal sepal; k. lateral sepal; l. petal. **Drawing 13/11/1988 by D.L.Jones.©**



Figure 3.4. *Calochilus praeltus*, Mt Kaputar, New South Wales, D.L.Jones 12772; from the type collection. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum, rear view; f. column from front; g. column from side; h. pollinium; i. dorsal sepal; j. lateral sepal; k. petal; l. leaf cross-section. **Drawing 11/1/1994 by D.L.Jones.©**

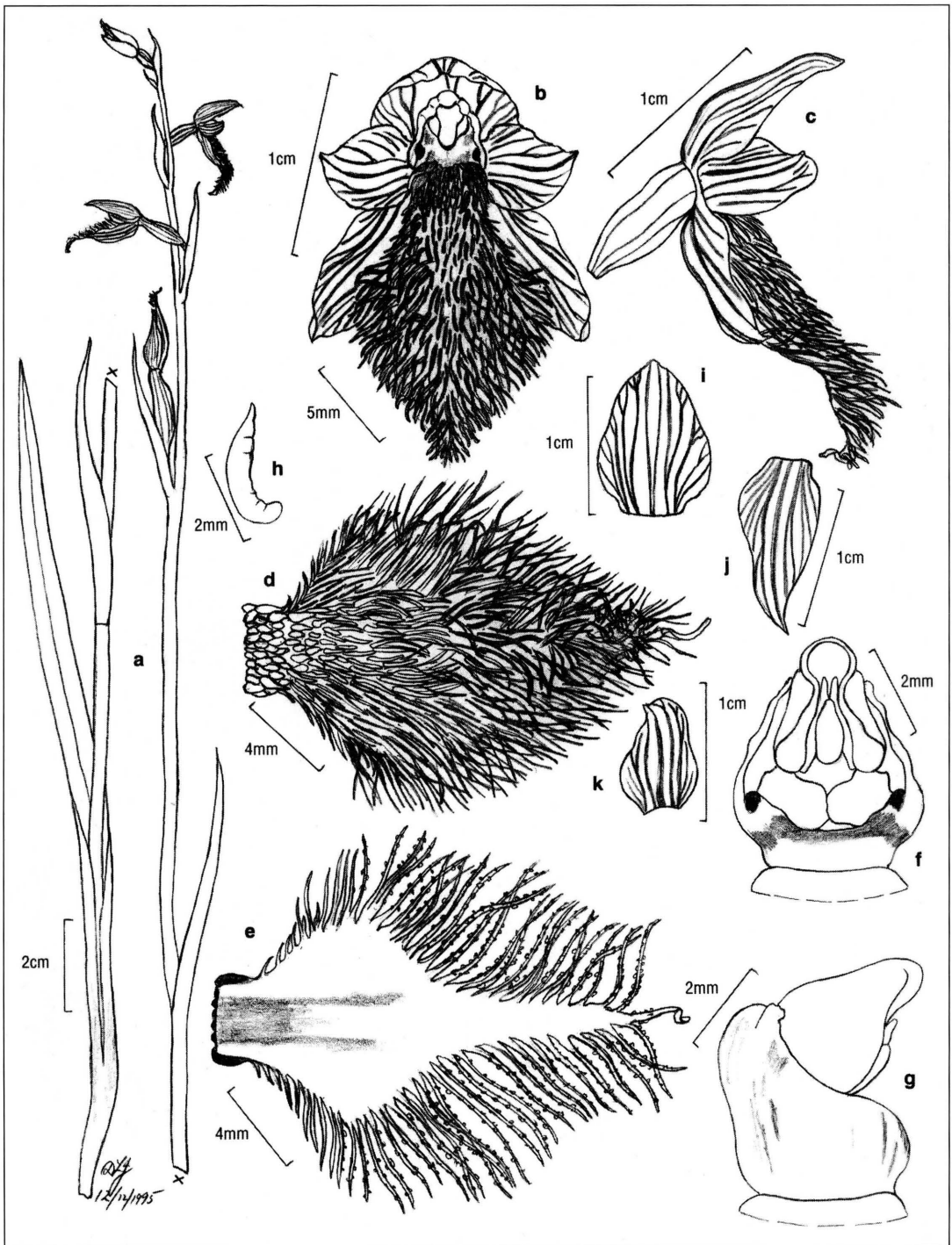


Figure 3.5. *Calochilus sandrae*, near Nimmitabel, New South Wales, S.R.Jones. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum, rear view; f. column from front; g. column from side; h. pollinium; i. dorsal sepal; j. lateral sepal; k. petal. Drawing 12/12/1995 by D.L.Jones.©

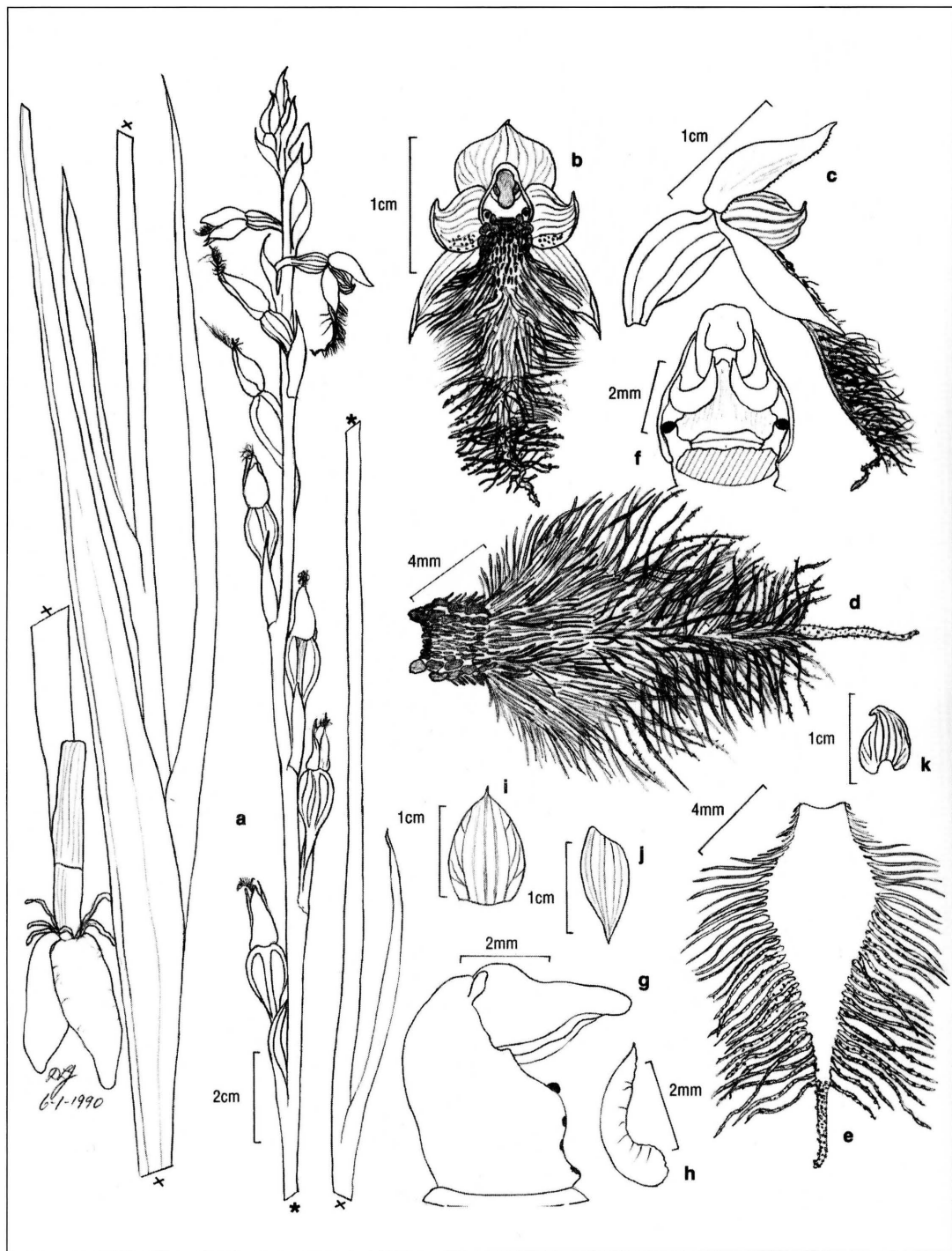


Figure 3.6. *Calochilus therophilus*, Black Mountain, Australian Capital Territory, D.L.Jones. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum, rear view; f. column from front; g. column from side; h. pollinium; i. dorsal sepal; j. lateral sepal; k. petal.

Drawing 6/1/1990 by D.L.Jones.©

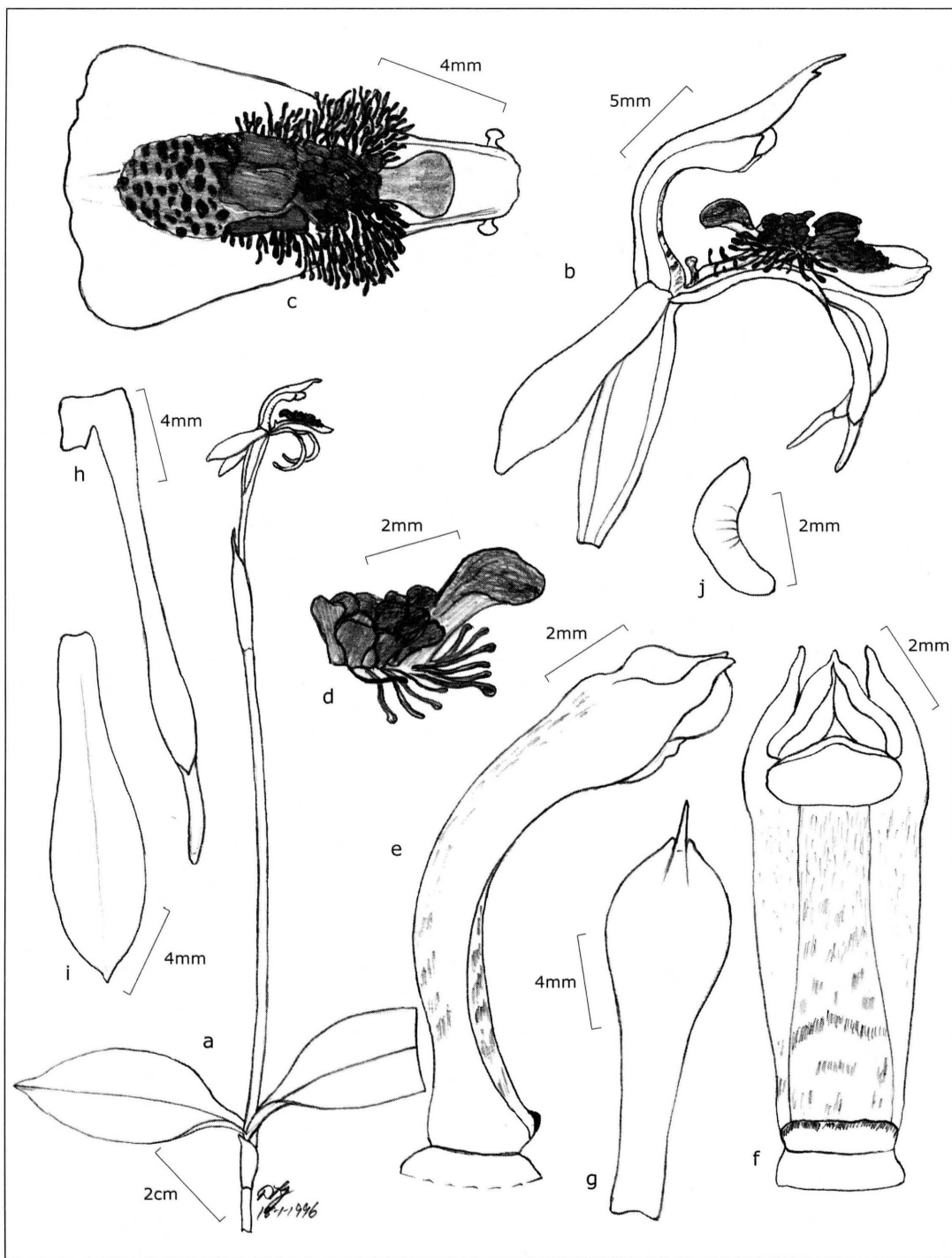


Figure 3.7. *Chiloglottis sphaerula*, Barrington Tops, New South Wales, D.L.Jones 11282. a. plant; b. flower from side; c. flattened labellum from above; d. callus; e. column from side; f. column from front; g. dorsal sepal; h. lateral sepals; i. petal; j. pollinium. **Drawing 18/1/1996 by D.L.Jones.©**

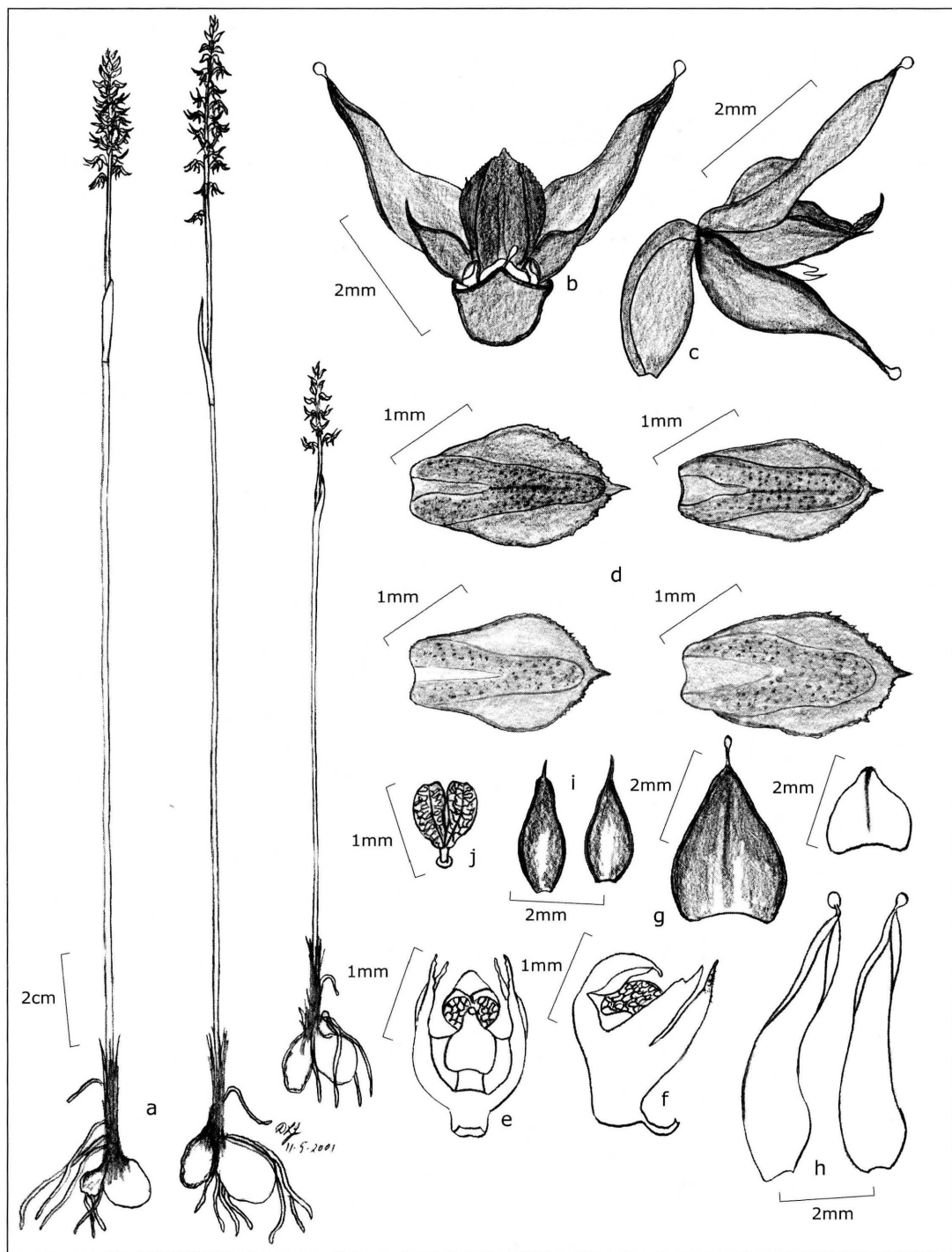


Figure 3.8. *Corunastylis anthracina*, near Byron Bay, New South Wales, D.L.Jones. a. plants; b. flower from front; c. flower from side; d. four flattened labella, from above; e. column from front; f. column from side; g. dorsal sepal; h. lateral sepals; i. petals; j. pollinarium; k. fertile bract.

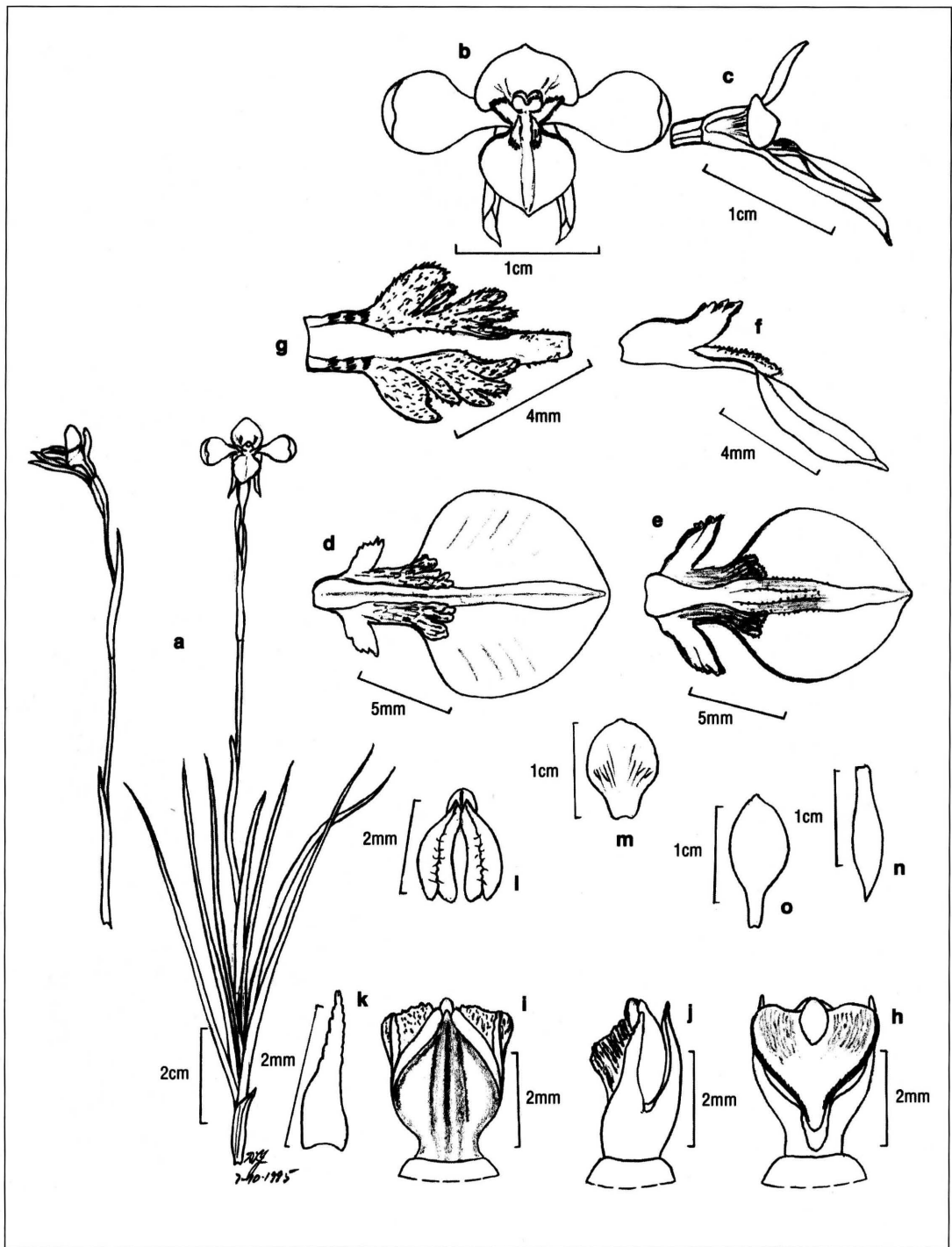


Figure 3.9. *Diuris basaltica*, Laverton, Victoria, P.Branwhite. a. plant and flowering scape; b. flower from front; c. flower from side; d.,e. two labella, anterior view, flattened; f. labellum, side view; g. callus; h. column from front; i. column from side; j. column from rear; k. column wing; l. pollinarium; m. dorsal sepal; n. lateral sepal; o. petal. **Drawing 7/10/1995 by D.L.Jones.©**

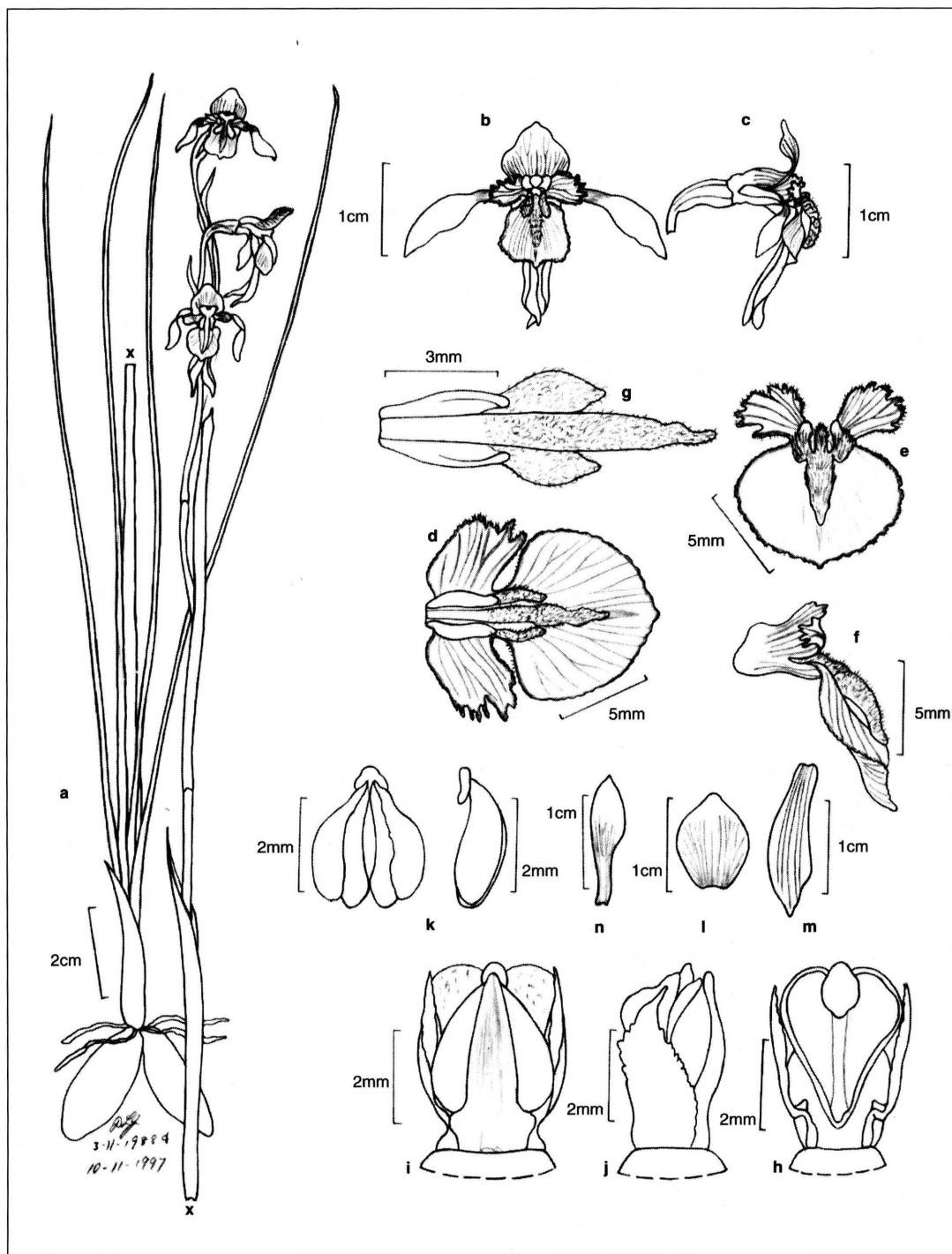


Figure 3.10. *Diuris eborensis*, near Ebor, New South Wales, R.Bates. a. plant; b. flower from front; c. flower from side; d. labellum from above, flattened; e. labellum, front view; f. labellum from side; g. callus; h. column from rear; i. column from side; j. column from front; k. pollinarium, front and side view; l. dorsal sepal; m. lateral sepal; n. petal. **Drawing 3/11/1988 and 10/11/1997 by D.L.Jones.©**

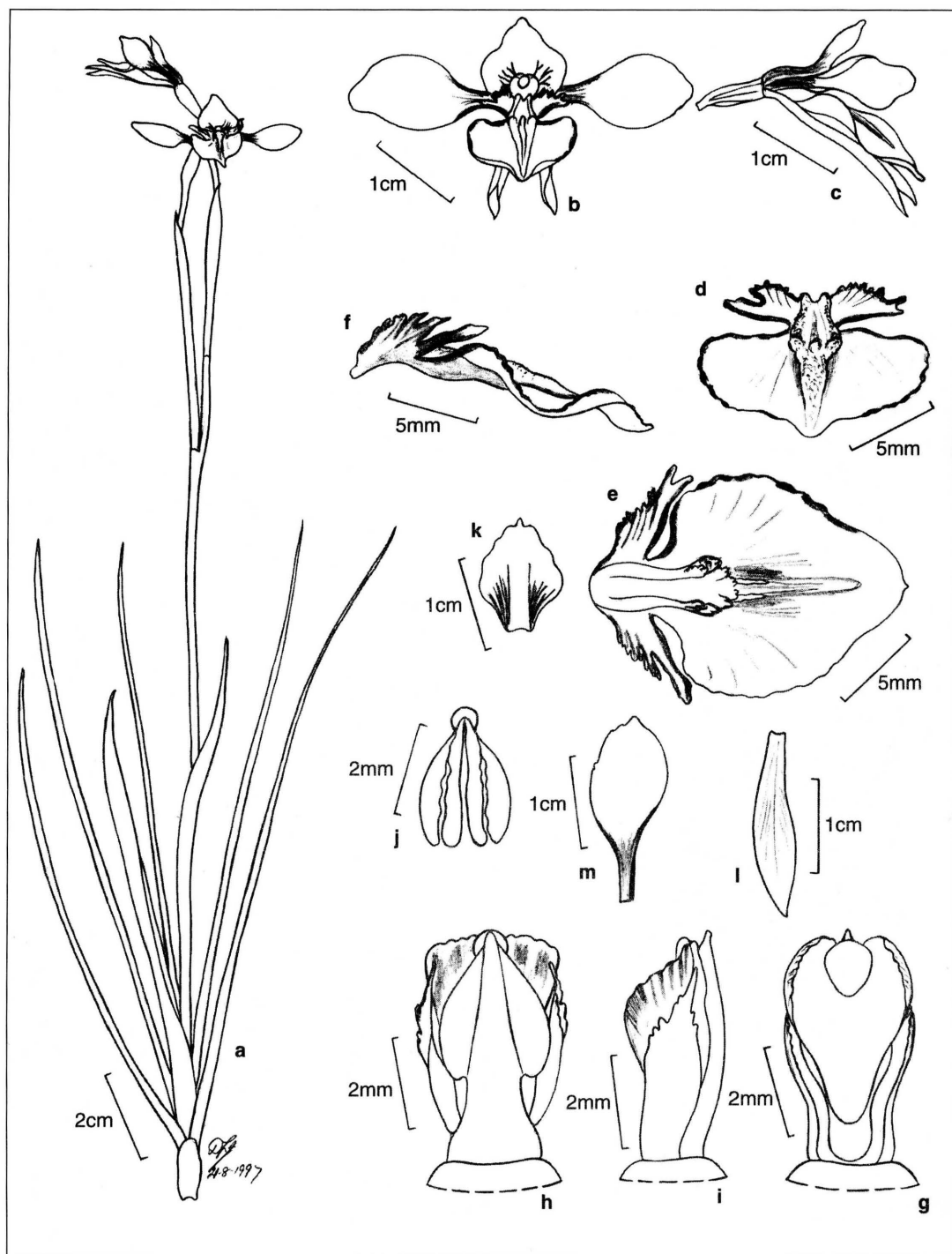


Figure 3.11. *Diuris fucosa*, Cocketgedong Farm, Urana, New South Wales, D.L.Jones 14915. a. plant; b. flower from front; c. flower from side; d. labellum, front view; e. labellum from above, flattened; f. labellum from side; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal. **Drawing 21/8/1997 by D.L.Jones.©**

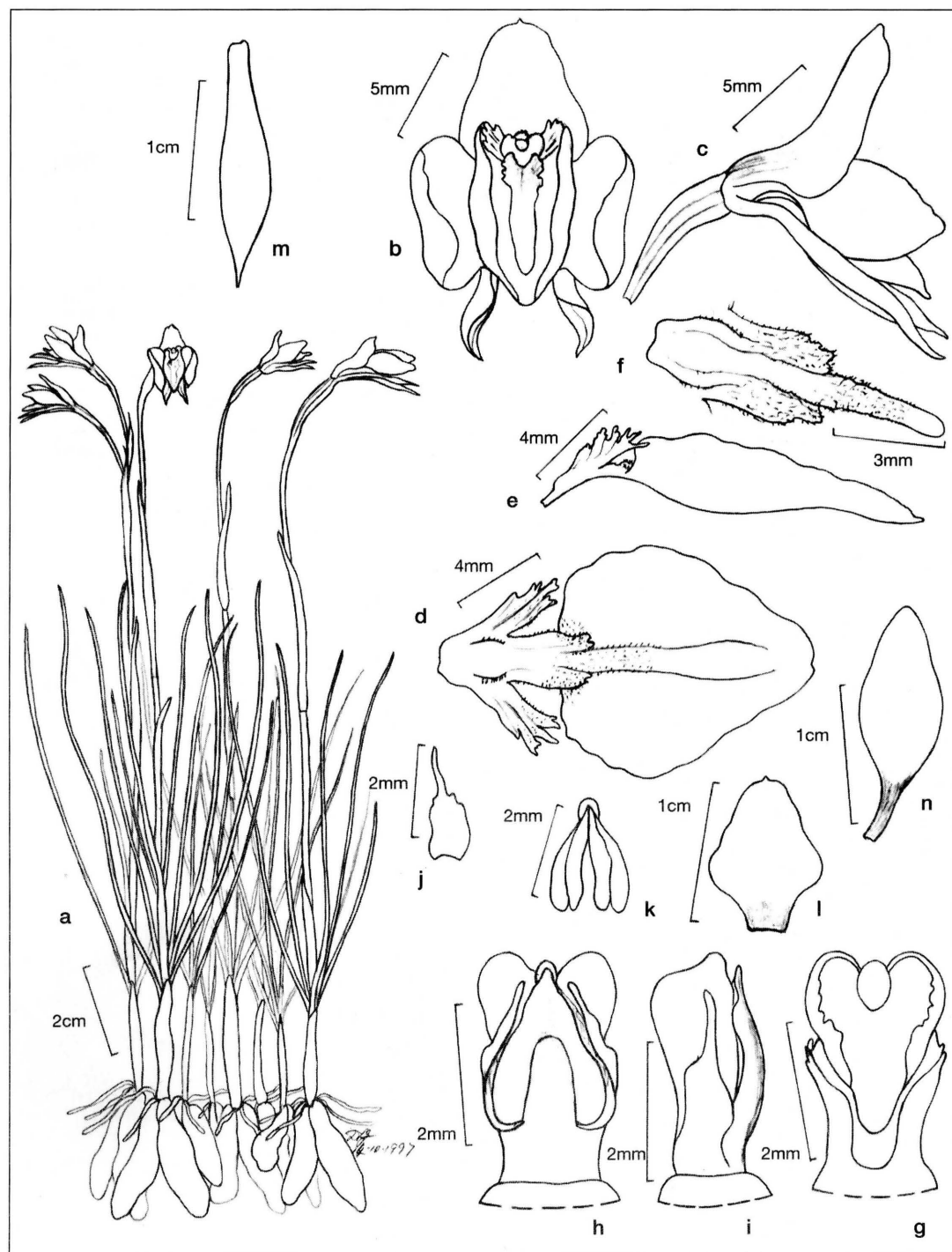


Figure 3.12. *Diuris gregaria*, Derinallum, Victoria, D.L.Jones 15583, from the type collection.
a. tuft of plants; b. flower from front; c. flower from side; d. labellum from above, flattened;
e. labellum from side; f. callus; g. column from front; h. column from rear; i. column from side;
j. column wing; k. pollinarium; l. dorsal sepal; m. lateral sepal; n. petal. **Drawing 14/10/1997 by D.L.Jones.©**

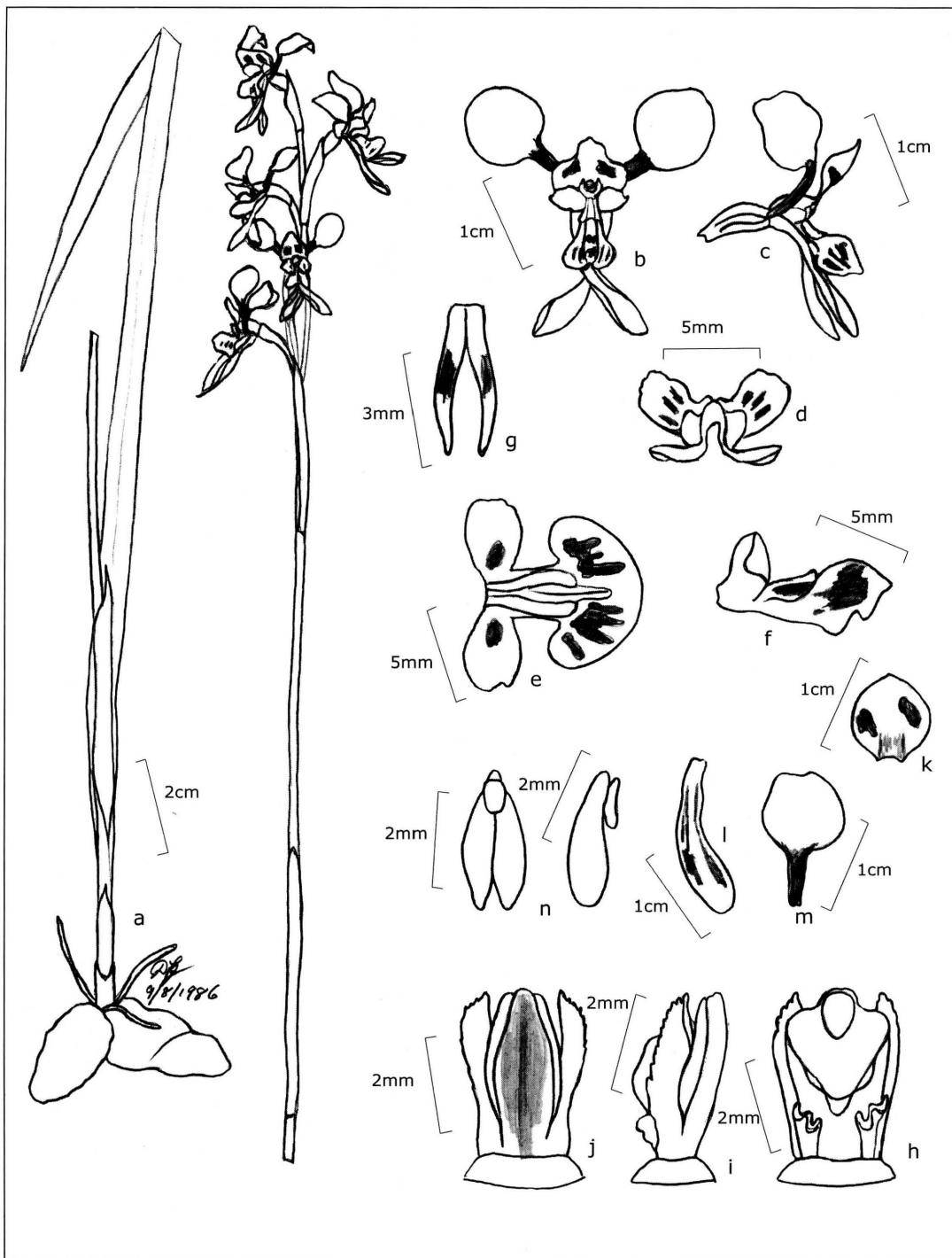


Figure 3.13. *Diuris unica*, south-east of Maryborough, Queensland, D.L.Jones. a. plant; b. flower from front; c. flower from side; d. labellum from front; e. labellum from above, flattened; f. labellum from side; g. callus; h. column from front; i. column from side; j. column from rear; j. column wing; k. dorsal sepal; l. lateral sepal; m. petal; n., o. pollinarium, anterior and side views. **Drawing 9/8/1986 by D.L.Jones.©**

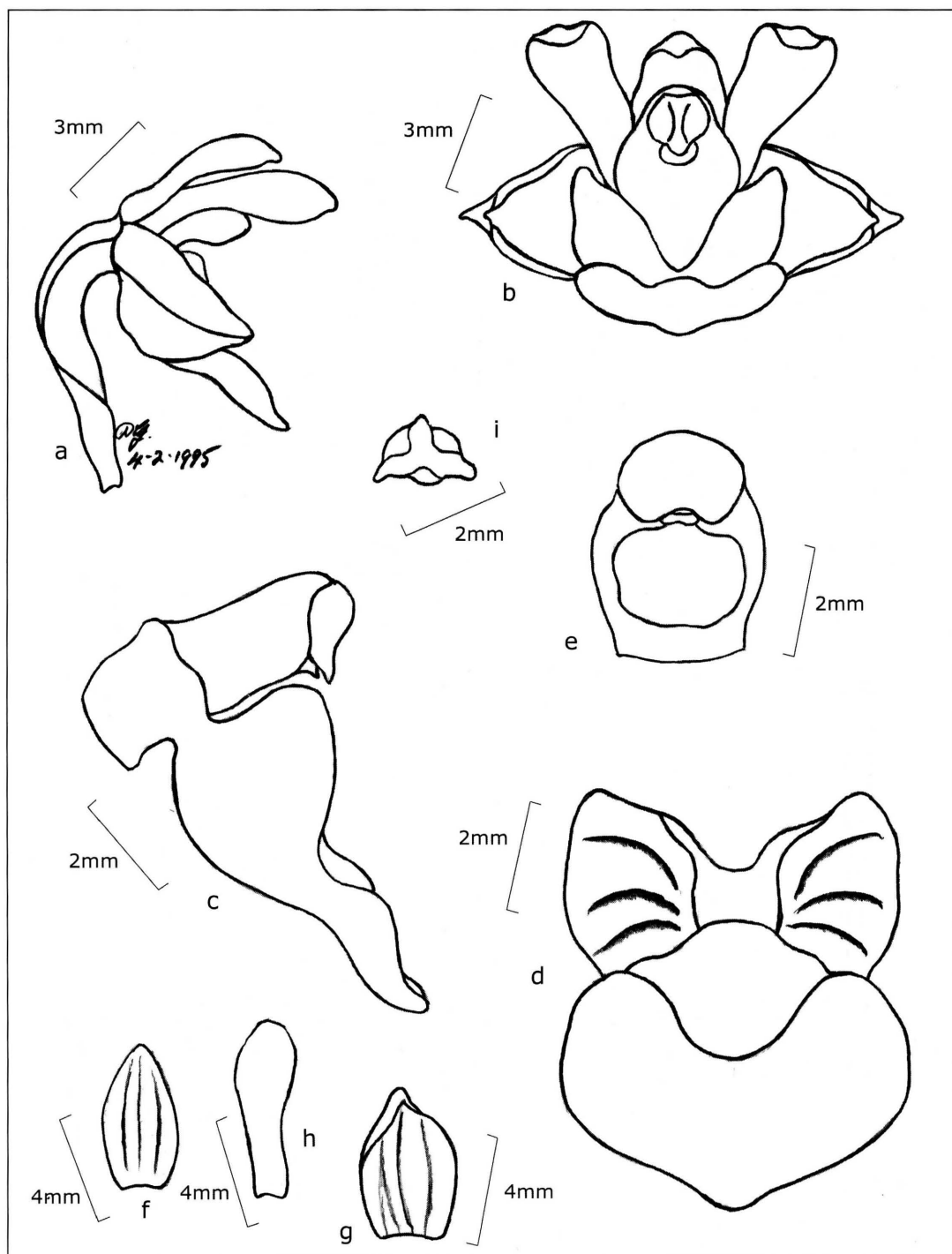


Figure 3.14. *Luisia teretifolia*, Dededo, Guam, A.Rinehart. a. flower from side; b. flower from front; c. column and labellum from side; d. labellum from above; e. column from front; f. dorsal sepal; g. lateral sepal; h. petal; i. cross-section of ovary. **Drawing 4/2/1995 by D.L.Jones.©**

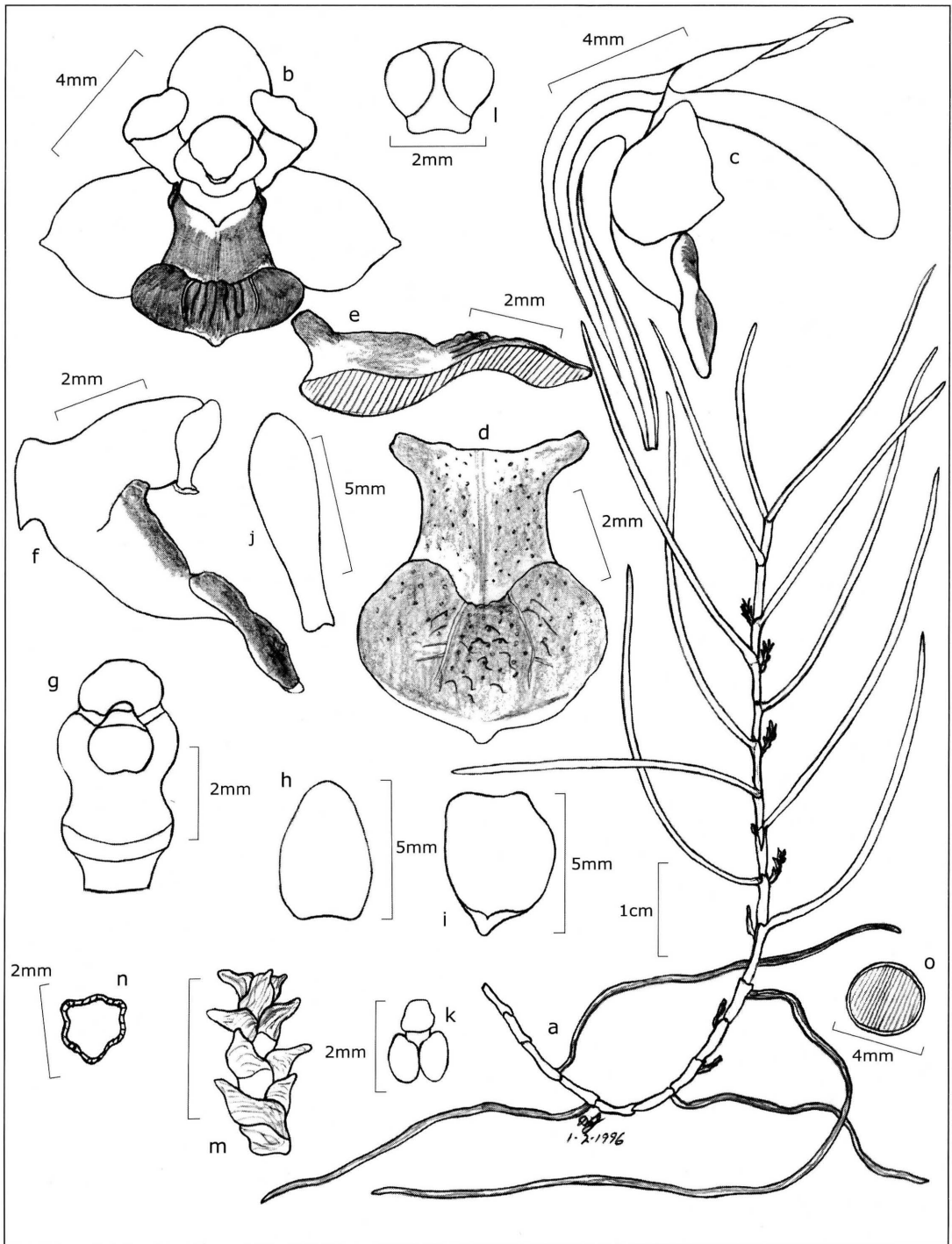


Figure 3.15. *Luisia atacta*, Iron Range, Queensland, J. Wrigley. a. flower from side; c. flower from front; d. labellum from above; e. longitudinal section of labellum; f. column and labellum from side; g. column from front; h. dorsal sepal; i. lateral sepal; j. petal; k. pollinarium; l. anther cap; m. inflorescence; n. cross-section of ovary; o. cross-section of root. **Drawing 1/2/1996 by D.L.Jones.©**

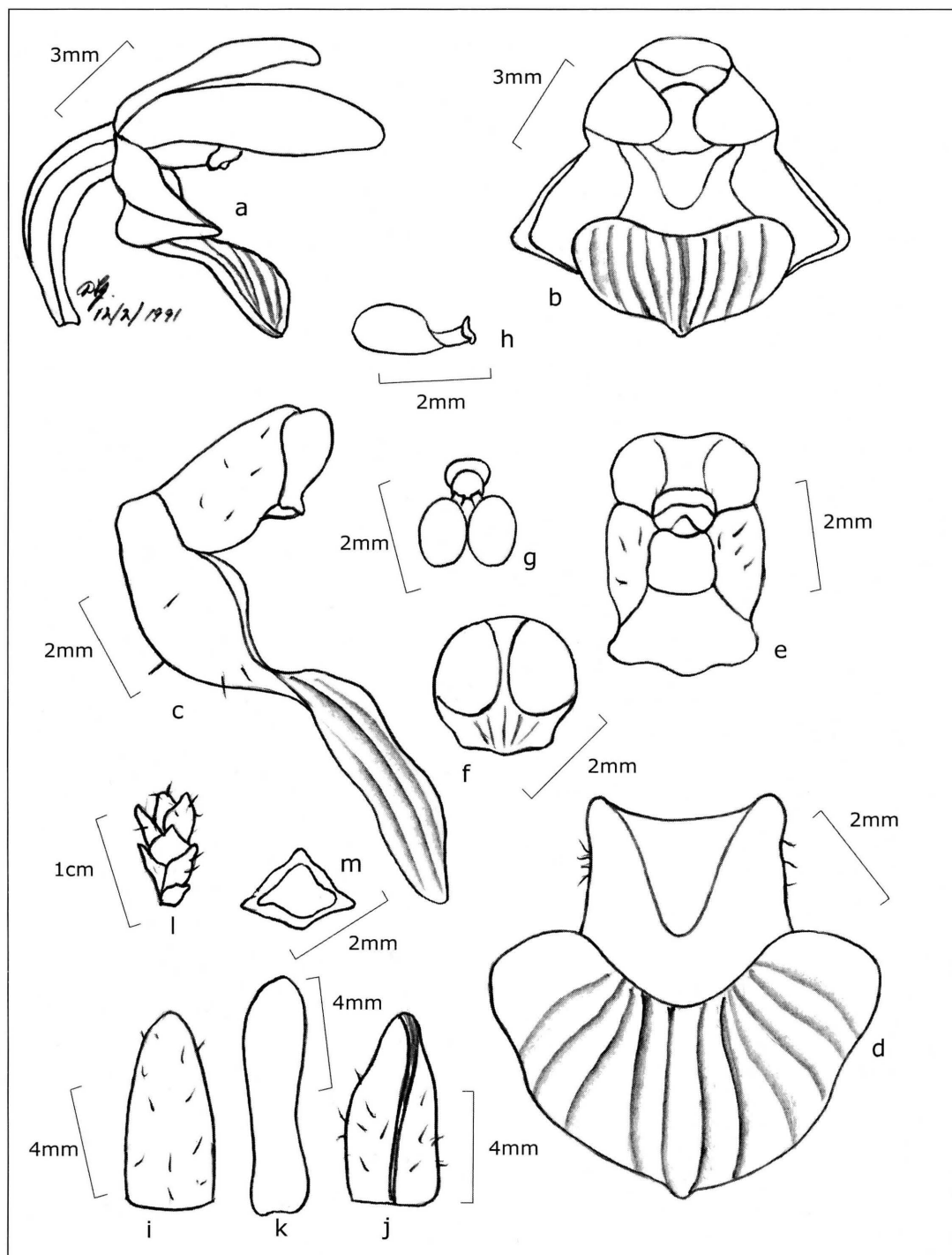


Figure 3.16. *Luisia corrugata*, Melville Island, Northern Territory, D.L.Jones 1674. a. flower from side; b. flower from front; c. column and labellum from side; d. labellum from above; e. column from front; f. anther cap; g. pollinarium from above; h. pollinarium from side; i. dorsal sepal; j. lateral sepal; k. petal; l. inflorescence; m. cross-section of ovary. **Drawing 12/2/1991 by D.L.Jones.©**

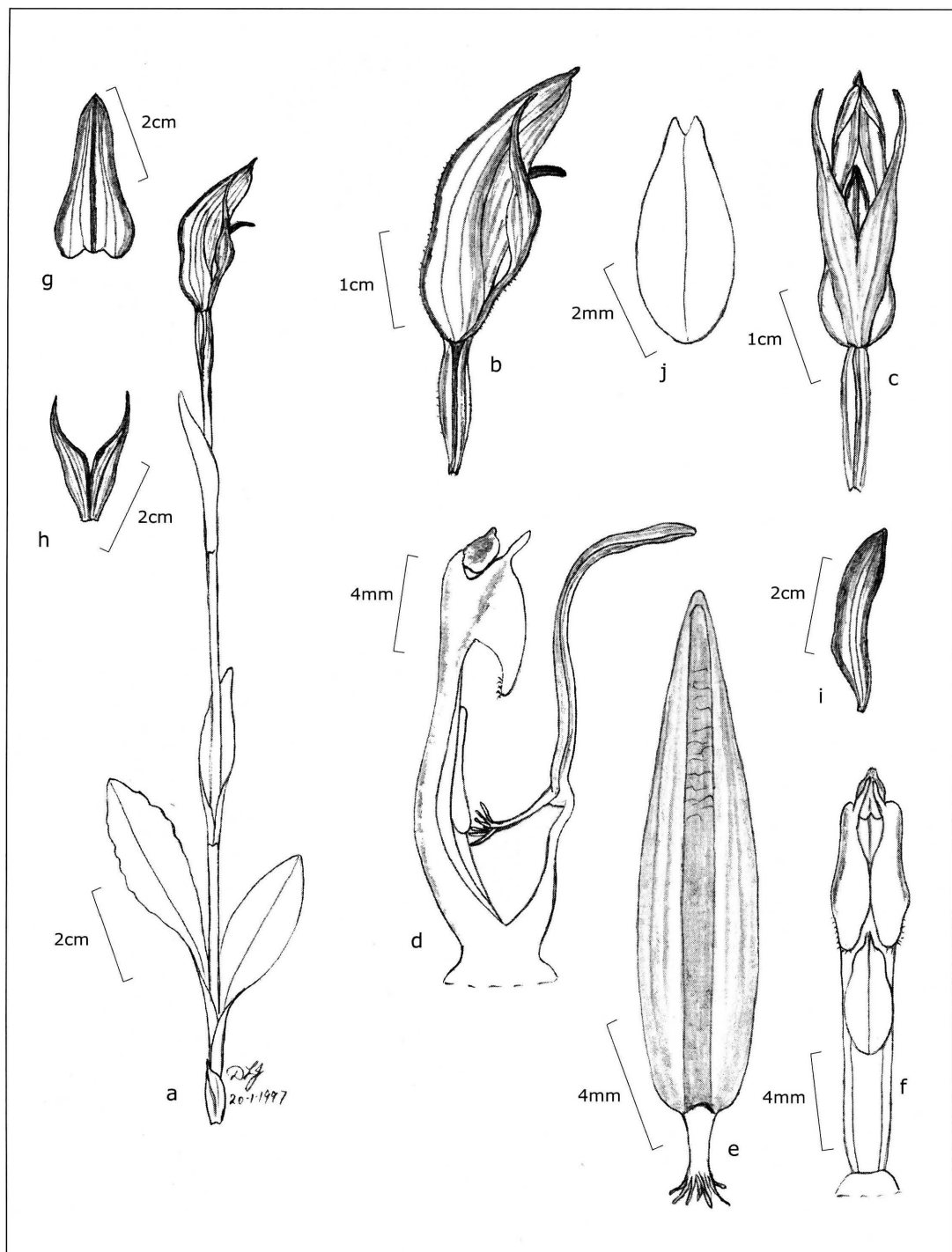


Figure 3.17. *Pterostylis aneba*, Falls Creek, Victoria, R.Tunstall. a. plant; b. flower from side; c. flower from front; d. column and labellum from side; e. labellum from above, flattened; f. column from front; g. dorsal sepal; h. synsepalum; i. petal; j. stigma. **Drawing 20/12/1997 by D.L.Jones.©**

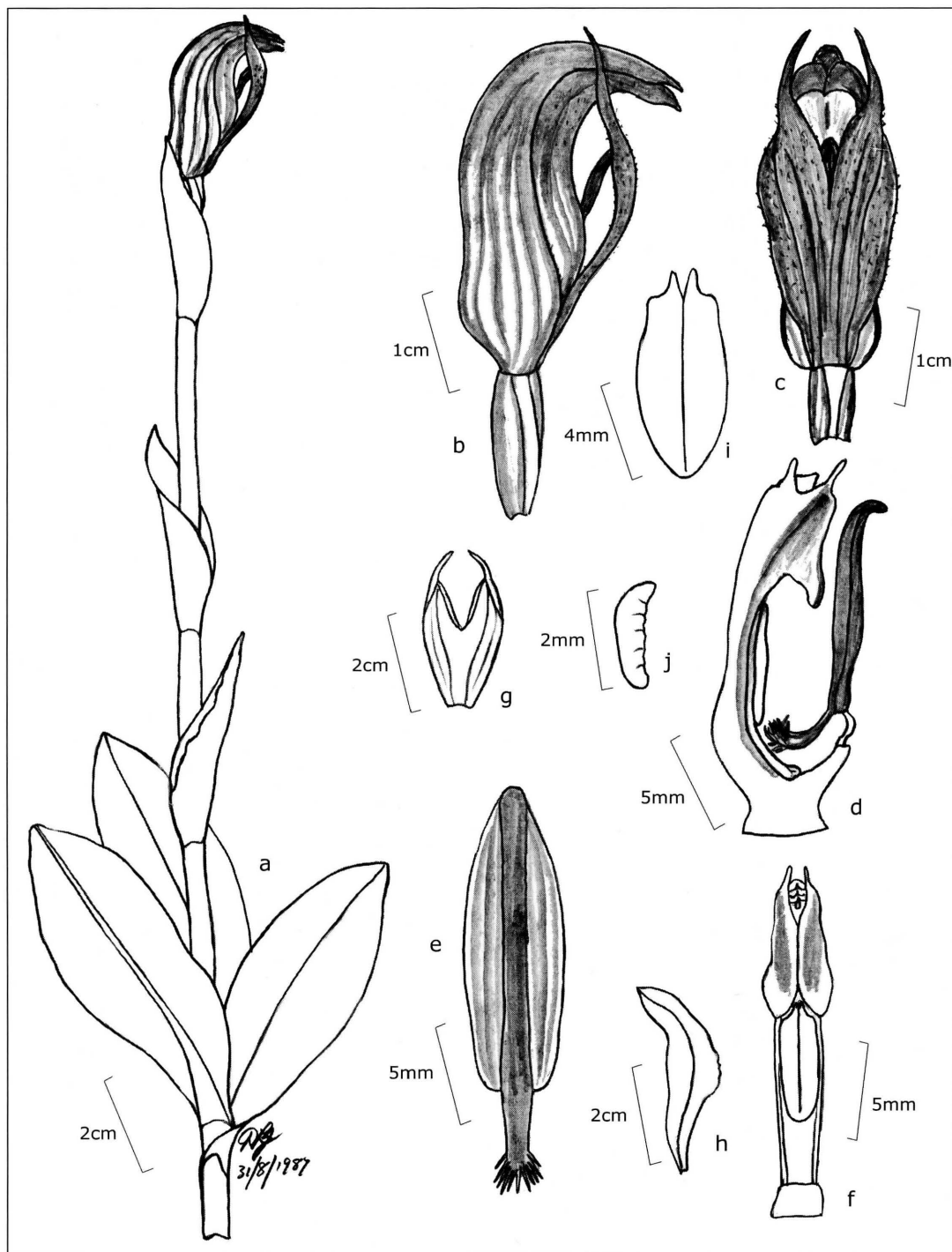


Figure 3.18. *Pterostylis cucullata* subsp. *sylvicola*, Lobethal, South Australia, R.Bates 10174.
a. plant; b. flower from side; c. flower from front; d. column and labellum from side;
e. labellum from above, flattened; f. column from front; g. synsepalum; h. petal; i. stigma; j. pollinium.
Drawing 31/8/1987 by D.L.Jones.©

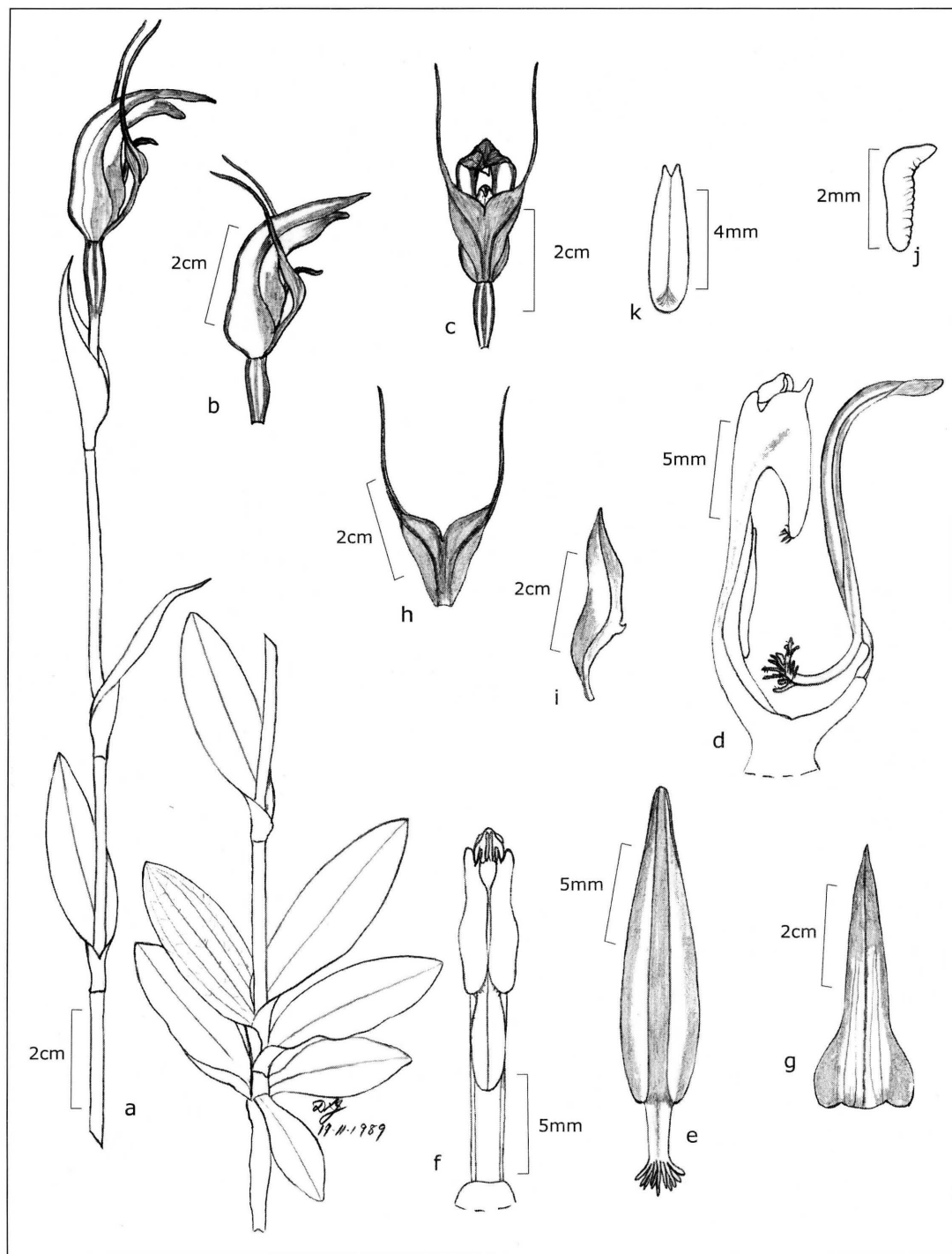


Figure 3.19. *Pterostylis lustra*, Wilsons Promontory, Victoria, P. Branwhite. a. plant; b. flower from side; c. flower from front; d. column and labellum from side; e. labellum from above, flattened; f. column from front; g. dorsal sepal; h. synsepalum; i. petal; j. pollinium; k. stigma. **Drawing 19/11/1989 by D.L. Jones. ©**

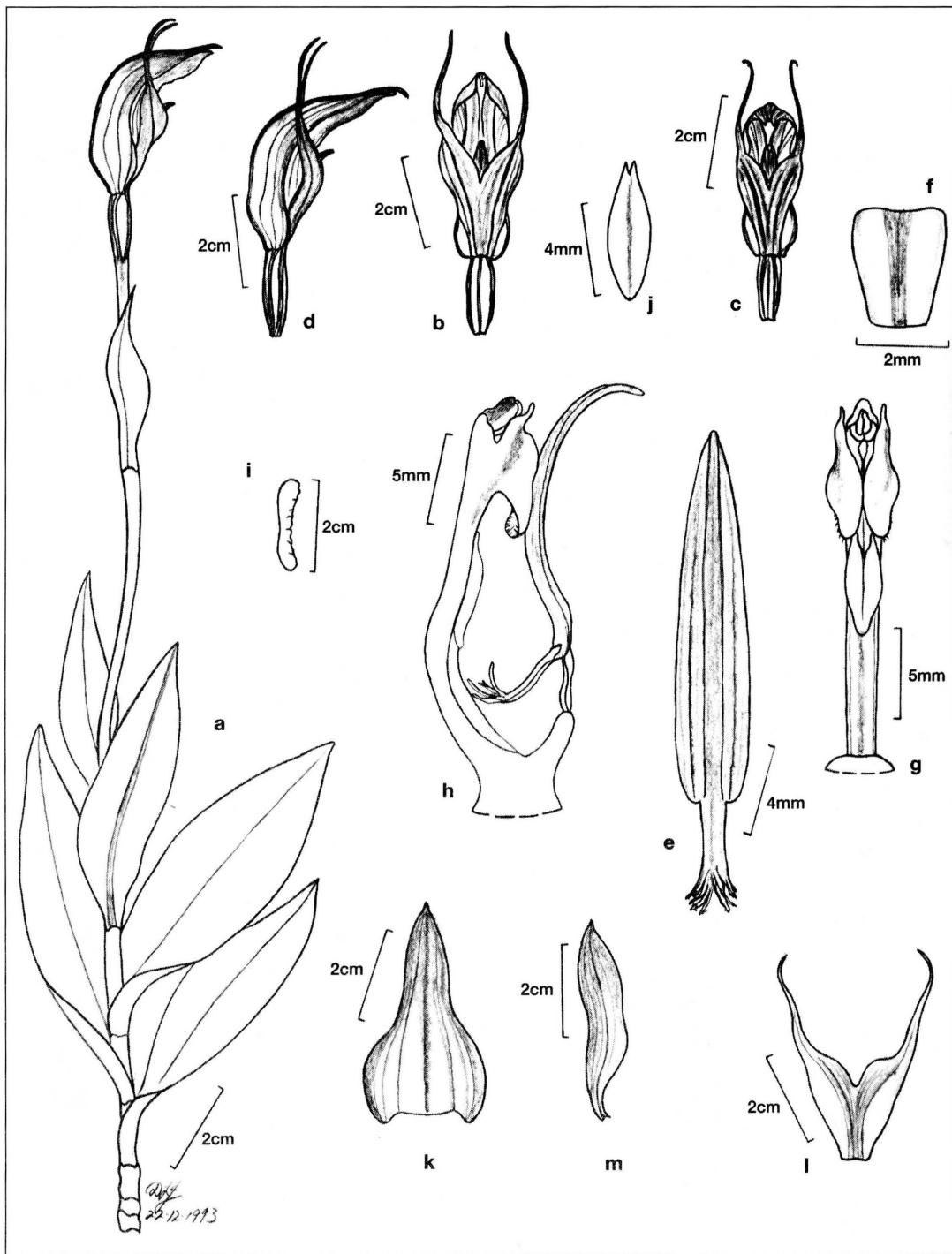


Figure 3.20. *Pterostylis subtilis*, Barrington Tops, New South Wales, J.Riley. a. plant; b., c. two flowers from front; d. flower from side; e. labellum from above, flattened; f. labellum hinge; g. column from front; h. column and labellum from side; i. pollinium; j. stigma; k. dorsal sepal; l. synsepalum; m. petal.
Drawing 22/12/1993 by D.L.Jones.©



Figure 3.21. *Diteilis petricola*, Kirrima Range, Queensland, DLJ15721
Plant and inflorescence. Drawing 24/11/1998 by D.L.Jones.©

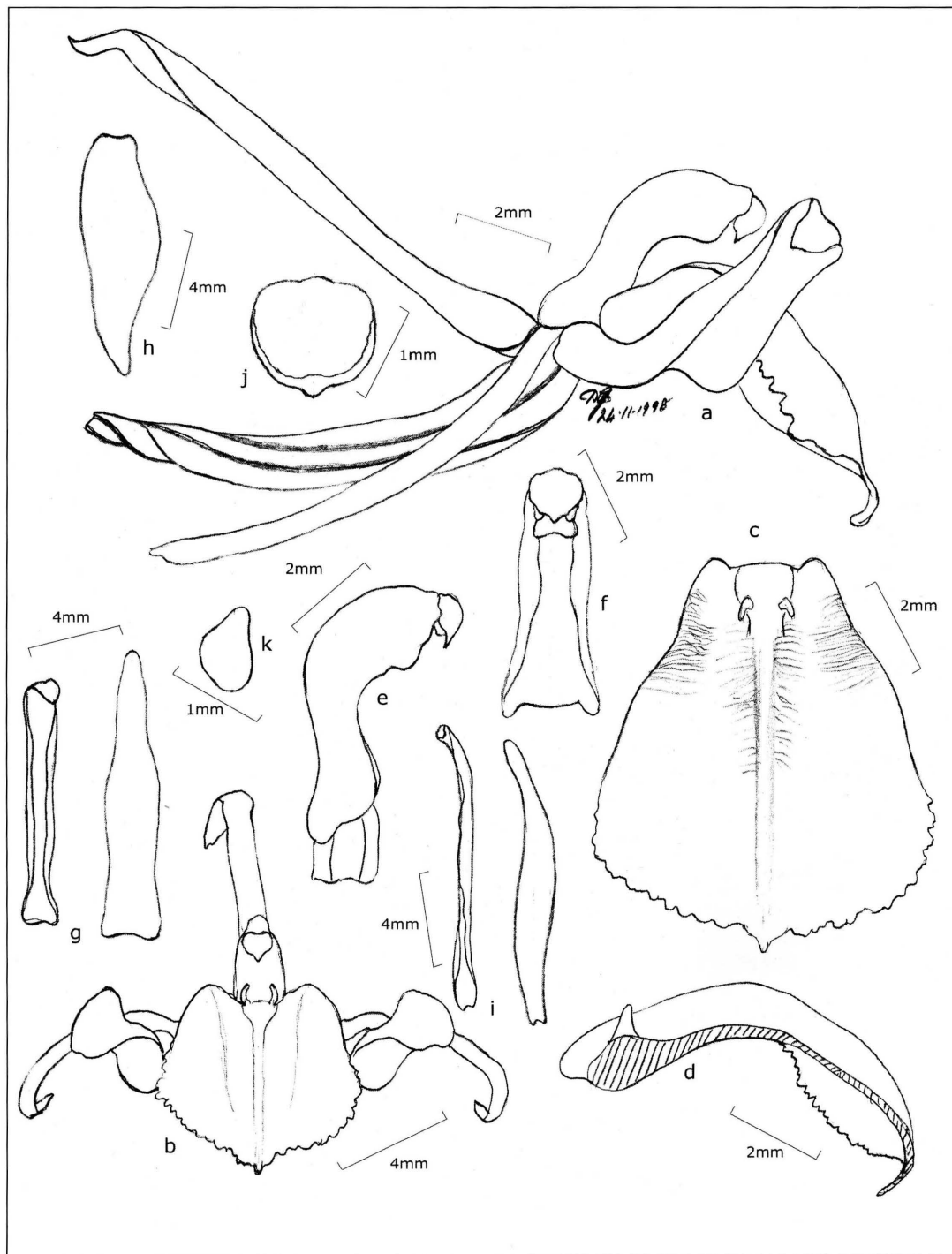


Figure 3.22. *Diteilis petricola*, Kirrima Range, Queensland, DLJ15721

a. flower from side; b. flower from front; c. labellum from above, flattened; d. longitudinal section of labellum; e. column from side; f. column from front; g. dorsal sepal, intact and flattened; h. lateral sepal; i. petal, intact and flattened; j. anther cap; k. pollinium. Drawing 24/11/1998 by D.L.Jones.©

Towards a Revision of *Bunochilus* D.L.Jones & M.A.Clem.

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ABSTRACT

A preliminary review of *Bunochilus* is presented. This genus, which is endemic in eastern Australia, consists of 26 species, 19 described as new in this paper. These are *B. barringtonensis* D.L.Jones, *B. chocolatinus* D.L.Jones, *B. crassus* D.L.Jones, *B. diminutus* D.L.Jones, *B. flavovirens* D.L.Jones, *B. lineatus* D.L.Jones, *B. littoralis* D.L.Jones, *B. loganii* D.L.Jones, *B. macilentus* D.L.Jones, *B. macrosepalus* D.L.Jones, *B. majus* D.L.Jones, *B. montanus* D.L.Jones, *B. parvus* D.L.Jones, *B. prasinus* D.L.Jones, *B. stenosepalus* D.L.Jones, *B. tenuis* D.L.Jones, *B. umbrinus* D.L.Jones, *B. viriosus* D.L.Jones and *B. vitreus* D.L.Jones. The new section *Macrosepalae* D.L.Jones is erected to accommodate 4 species which have a broadly ovate synsepalum and unusual petals. *Bunochilus smaragdinus* D.L.Jones & M.A.Clem., is recorded from New South Wales for the first time and *B. chlorogrammus* from South Australia.

INTRODUCTION

Bunochilus was segregated from *Pterostylis* by Jones & Clements (2002) based on dimorphic sterile and fertile plants, multiflowered raceme, deflexed flat to convex synsepalum with white bubble-like micropapillae on the anterior surface, short triangular free points on the lateral sepals, labellum fully exposed in the set position, labellum lamina three-lobed without a basal appendage, the labellum base enlarged and mounded, often with an erect or recurved lobe, and column wings with unbranched, thickened, multiseriate barrier trichomes. Sterile plants of all species of *Bunochilus* consist solely of a rosette of narrow leaves perched above ground on a slender stalk. Occasionally a rosette is produced on a lateral growth from the base of a flowering plant.

Bunochilus shares some characters with *Urochilus* but is distinguished from that genus by its narrow green flowers, flat to convex lateral sepals and the absence of a basal appendage on the labellum.

Bunochilus is a distinctive genus that is confined to south-eastern Australia. It has generally been included in *Pterostylis* and most early workers have taken a very conservative view of the group and have included all taxa under *Pterostylis longifolia* R.Br., treating it as a single widespread and variable taxon. It is obvious from an examination of fresh specimens that, although there is considerable vegetative similarity within the group, significant morphological differences are apparent in the flowers (for example see range of photos of the “*Pterostylis longifolia* group” in Bishop 1996). In 1989 *P. tunstallii* D.L.Jones & M.A.Clem. was segregated from *P. longifolia* (in Clements 1989) and in 1998 a further three species were described from Tasmania (Jones 1998). In this preliminary treatment which is based on more than 25 years study of the group, 19 species are described as new. This treatment should not be construed as a complete revision of the genus as a

number of poorly collected or poorly studied taxa await closer examination.

Illustrations: A detailed drawing of the type of the genus, *B. longifolius* (R.Br.) D.L.Jones & M.A.Clem., is included to illustrate morphological features common to all species within the genus. Also included are drawings of sample flowers from each section within the genus and drawings of the side view and top view of labella of all species to facilitate identification. These labellum drawings are labelled individually and arranged in the same order as the species appear in the text.

TAXONOMIC TREATMENT

Bunochilus D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 66 (2002). Type species: *Bunochilus longifolius* (R.Br.) D.L.Jones & M.A.Clem. (*Pterostylis longifolia* R.Br.).

Oligochaetochilus D.L.Szlachetko subgen. *Apicuchilos* D.L.Szlachetko, *Polish Bot. J.* 46(1): 23 (2001), (*pro parte*). Type species: *Pterostylis vittata* Lindl.

Perennial geophytic herbs, sympodial. *Plants* glabrous. *Roots* filamentous. *Tubers* fleshy, paired; replacement tuber formed at the end of a short dropper; daughter tubers absent. *Stem* erect, short, unbranched, with membranous cataphylls at each node. *Flowering and non-flowering plants* dimorphic. *Sterile plants* consist of a perched rosette of narrow, shortly petiolate leaves. *Flowering plants* consist of a scape with large, basally sheathing, sessile, spreading cauline leaves. *Venation* acrodromous, without included veinlets. *Inflorescence* terminal, racemose, one-several-flowered. *Peduncle* wiry. *Flowers* resupinate, facing outwards, often semi-nodding to nodding, without any noticeable scent. *Nectar* absent. *Dorsal sepal* of similar length to the petals, overlapping the petal margins and adherent with them to form a galea; apex short, blunt, sometimes of a different colour, lacking an apical extension. *Galea* with a single opening facing more or less downwards. *Lateral sepals* deflexed, fused over most of their length to form a synsepalum; synsepalum longer than wide, flat or convex, lacking a thickened pad and labellum pit, the anterior surface adorned with tiny, white, bubble-

like papillae; distal parts free, with short, deltate, involute tips. *Petals* about as long as the dorsal sepal, sessile, asymmetrical, straight, with a prominent thickened dorsal ridge; dorsal surface vestigial; anterior surface much expanded, transparent, with greenish veins; dorsal flange absent; basal part with or without a lateral flange. *Labellum* free, actively motile, attached to the column foot by a short irritable ligulate claw; when set fully exposed and held just above the synsepalum; when triggered travelling in an arc of c. 150°, blocking off the base of the galea, leaving the only exit from the flower via the column wings. *Labellum lamina* 3-lobed, covered in reflective siliceous bead-like and acicular cells; midlobe longer than the lateral lobes, the apex upturned, the tip emarginate; lateral lobes short, blunt, protruding from the midlobe; base of lamina lacking an appendage, thickened into a conspicuous mound, this mound extending apically as a blunt knob or lobe. *Spur* absent. *Callus* obscure, consisting of a rounded ridge. *Column* lacking free filament and style. *Column wings* hatchet-

shaped, fused to the column basally, distally free, obscurely two-lobed; upper margins unadorned, with a short, thick apical lobe; medial area with thickened, mutiseriate, moniliform barrier trichomes; basal lobe free, the anterior margin ciliate. *Column foot* prominent, much shorter than the column. *Pseudospur* absent. *Anther* erect to incumbent. *Pollinarium* absent. *Pollinia* 4, free, arranged in 2 pairs, one member of each pair slightly shorter than the other, linear-oblong, soft and mealy, yellow. *Stigma* bilobed, medial, much longer than wide, wider than the column. *Rostellum* terminal. *Capsules* dehiscent, erect, smooth; pedicels elongating in fruit; peduncle not elongating in fruit. *Seeds* numerous, light coloured, winged.

As circumscribed here, *Bunochilus* is an endemic Australian genus of 26 species arranged in 3 sections, distributed in Queensland, New South Wales, Victoria, Tasmania and South Australia.

Key to *Bunochilus* species

1. Petal flanges reduced or absent, not blocking off the internal base of the galea, labellum either with a blackish central stripe or the whole labellum brown or blackish 2
Petal flanges large, projecting and blocking off the internal base of the galea, labellum either wholly green or brownish green..... 19
2. Synsepalum elliptic (broadest near the middle), petals with greatly reduced basal flanges, the anterior margin straight or shallowly curved..... 3
Synsepalum ovate (broadest near the base, then tapered), petals without any basal flanges, the anterior margin broadly curved 16
3. Labellum appearing hairy with transparent acicular siliceous cells over most of its surface..... 4
Transparent acicular cells mostly confined to the labellum base or absent..... 7
4. Flowers dark green, labellum narrowly oblong (Grampians, flowering Sept.-Dec.) 4. *B. macilentus*
Flowers bright green to whitish green, labellum widest at base then tapered (Qld, NSW, flowering April-Sept.)..... 5
5. Flowers 10-13 mm long, labellum midlobe 0.5-1 mm long..... 1. *B. longifolius*
Flowers 14-18 mm long, labellum midlobe 1-1.6 mm long..... 6
6. Flowers pale translucent green to whitish with indistinct stripes, labellum strongly tapered, cream to yellowish with a dark central stripe (Qld)..... 3. *B. vitreus*
Flowers bright green with darker green stripes, labellum weakly tapered, pale green to yellowish green with a dark central stripe (NSW) 2. *B. majus*
7. Labellum cream to pale yellow (rarely light brown) with a conspicuous blackish central stripe..... 8
Labellum wholly brown or blackish, central stripe inconspicuous 14
8. Labellum with numerous acicular (hair-like) cells at the base..... 9
Labellum with few acicular cells at the base 11
9. Flowers dark green with bright orange-brown tips on the sepals (ACT, S NSW, NE Vic) .. 6. *B. montanus*
Flowers pale green with light-brown tips on the sepals 10
10. Flowers 12-15 mm long, labellum midlobe c. 1 mm long (S Vic, Tas, ? SA)..... 5. *B. melagrammus*
Flowers 17-20 mm long, labellum midlobe 1.5 mm long (NSW - Blue Mtns, Barrington Tops) 10. *B. lineatus*

11. Labellum with a long recurved apical lobe on the basal mound..... **9. *B. barringtonensis***
 Labellum with a short erect lobe on the basal mound..... **11**
12. Labellum widest towards the apex, light brown with a dark central stripe (NSW) **7. *B. loganii***
 Labellum of equal width throughout, yellowish with a black stripe (Vic)..... **8. *B. diminutus***
13. Flowers 17-20 mm long, labellum 5-7.5 mm long, midlobe 1.5 mm long **11. *B. chokolatinus***
 Flowers 7-15 mm long, labellum 3.5-5 mm long, midlobe 0.5-1 mm long **14**
14. Labellum without any acicular cells **12. *B. parvus***
 Labellum base with a few short acicular cells **15**
15. Flowers 7-10 mm long, labellum more or less of equal width throughout **13. *B. tunstallii***
 Flowers 10-14 mm long, labellum much wider at the base than the apex **14. *B. williamsonii***
16. Labellum with numerous long acicular cells **17. *B. crassus***
 Labellum without any acicular cells or a few at the base **17**
17. Labellum of more or less equal width throughout, pale green with a blackish stripe. **15. *B. macrosepalus***
 Labellum widest towards the apex, brown with a blackish stripe..... **18**
18. Labellum basal mound small, rounded, with a vestigial apical lobe..... **18. *B. tenuis***
 Labellum with a well-developed basal mound and an erect apical lobe **16. *B. umbrinus***
19. Galea wider than the synsepalum, synsepalum oblong..... **20**
 Galea about as wide as the synsepalum, synsepalum elliptic **21**
20. Synsepalum similar colour to galea, labellum 6-7.5 mm long (near-coastal Vic, SA)
 **22. *B. chlorogrammus***
 Synsepalum paler than galea (often translucent bluish-green), labellum 7-9 mm long (inland NSW)
 **21. *B. stenosepalus***
21. Flowers 16-22 mm long, labellum 6-9 mm long **22**
 Flowers 9-15 mm long, labellum 4.5-7 mm long **23**
22. Plants to 90 cm tall, flowers dark green with darker green stripes, labellum lateral lobes mainly erect to incurved (SA)..... **20. *B. viriosus***
 Plants to 50 cm tall, flowers translucent green with darker green stripes, labellum lateral lobes mainly spreading (S NSW, Vic) **19. *B. smaragdinus***
23. Labellum with numerous acicular cells at the base (Tas.) **23. *B. stenochilus***
 Labellum without acicular cells or with a few short ones at the base..... **24**
24. Flowers dark green, labellum of similar width throughout (Vic, SE SA)..... **26. *B. prasinus***
 Flowers pale green to whitish green, labellum widest towards the apex **25**
25. Labellum yellowish green, basal mound with a prominent erect apical lobe (mallee habitats)
 **24. *B. flavovirens***
 Labellum pale green to whitish, basal mound with a vestigial apical lobe (dense coastal scrub)
 **25. *B. littoralis***

TAXONOMY

Bunochilus sect. *Bunochilus*

Flowers small to moderately large, porrect to suberect; petals with greatly reduced basal flanges, these not meeting and not blocking off the lower entrance to the flower; synsepalum elliptical; labellum whitish or brownish with a dark stripe or wholly brown to blackish.

Pterostylis R.Br. sect. *Squamatae* G.Don in Loudon's, *Hortus Britannicus* 369 (1830). Lectotype species: *Bunochilus longifolius* (R.Br.) D.L.Jones & M.A.Clem. (*Pterostylis longifolia* R.Br.), *vide* Jones & Clements (2002).

As currently recognised this section consists of 14 species distributed in south-eastern Queensland, New South Wales, Victoria, Tasmania and South Australia.

1. *Bunochilus longifolius* (R.Br.) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 66 (2002); *Pterostylis longifolia* R.Br., *Prod.* 327 (1810). Type: "(J.) *D.Caley & Bauer v.s.*" [New South Wales. Port Jackson, North Brush, June 1804, *G.Caley s.n.*] (lecto BM, *vide* Clements 1989; isolecto AD, W).

Illustration: Plate 233, Bishop (1996), as *Pterostylis longifolia*.

Description: *Roseite* stalk 30–70 mm long; leaves 3–6, narrowly ovate-lanceolate or narrowly elliptical, 10–35 mm long, 2–5 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 12–50 cm tall; stem leaves 5–6, linear-lanceolate to narrowly elliptical-lanceolate, 15–95 mm long, 2–7 mm wide. *Flowers* 1–11, porrect, widely spaced, 10–13 mm long, 5.5–6.5 mm wide, pale translucent green with indistinct darker green stripes; sepal tips green to brown. *Dorsal sepal* 11–14 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 9–13 mm long, 5.5–6.5 mm wide, flat, notched (3.5–4 mm deep); margins curved; tips parallel to divergent, 3–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 10–13 mm long, 2–2.5 mm wide; anterior margin straight or shallowly curved; basal flanges absent. *Labellum* ovate-oblong, 4.5–5.5 mm long, 2.3–3 mm wide, pale yellowish green to pale green with dark brown to black basal mound and brown to blackish central stripe; surface cells acicular to 0.7 mm long over most of labellum except the midlobe; basal mound c. 2.5 mm high, prominent, with an erect or slightly recurved apical lobe, obtuse, similar colour to the central stripe; margins shallowly incurved; lateral lobes narrow; midlobe c. 1–1.3 mm long, narrow, shortly notched, the lobes acute to obtuse, parallel; apex upcurved. *Column* 10–12 mm long, curved; wings 3–3.5 mm long, c. 1.8 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.3 mm long, shortly rostrate. *Pollinia* oblong, c. 1.4 mm long. *Stigma* narrowly-

elliptic to scutiform, c. 5 mm long, 1.6–2 mm wide. *Capsules* ovoid-obovoid, 9–12 mm long, 4–6 mm wide.

Distribution and ecology: Relatively widespread in central New South Wales where mainly occurring in coastal districts between Nelson Bay and Narooma, extending to the adjacent ranges and inland to the Putty Road. It grows in moist to wet heathy and shrubby forest in well-drained sands, gravels and loam. It is often prominent on the edges of moist gullies dominated by rainforest and tree ferns. Alt. 2–650 m. Flowering: April to September.

Recognition: Characterised by slender, relatively small (10–13 x 5.5–7 mm), pale green flowers with indistinct darker green stripes, elliptic synsepalum, narrowly oblong petals with no basal flanges, the anterior margin flat or curved, labellum relatively small (4.5–5.5 x 2.3–3 mm), broadest at the base then tapered to the apex, pale yellowish green to pale green with a blackish central stripe, most of the lamina covered with long acicular cells (to 0.7 mm), and a relatively short labellum midlobe.

Similar species: *Bunochilus majus* D.L.Jones, from the Northern Tablelands of New South Wales, has larger darker green flowers and a longer, less-tapered labellum.

Note: Tall robust plants are the exception in this species with most plants being less than 25 cm tall and with 1–5 flowers.

Selected specimens (c. 30 seen): NEW SOUTH WALES: Bundana, 20 July 1990, *R.Angus* (CANB); Nattai, 24 Aug. 1990, *P.Branwhite* (DLJ 6383); Nowra-Braidwood Road, 29 June 1990, *D.L.Jones* 6092 (CANB); Nelson Bay, 26 July 1991, *D.L.Jones* 7307 (CANB); Macquarie Pass, 9 Aug. 1992, *D.L.Jones* 9789 (CANB); Flat Rock Creek, Nowra, 9 Aug. 1992, *D.L.Jones* 9804 (CANB); c. 1.5 km E of Minto Shopping Centre, Sydney, May 1992, *D.J.Mallinson* 224 (CANB); Oakdale, 11 June 1991, *J.Riley* (CANB); Howes Swamp, Putty Road, 17 June 1991, *J.Riley* (CANB); Wang Wauk Way, 22 July 1987, *R.Tunstall* (CANB); 7 Mile Beach, 20 May 1992, *R.Tunstall* (DLJ 9475) (CANB).

2. *Bunochilus majus* D.L.Jones, sp. nov.; affinis *B. longifolius* (R.Br.) D.L.Jones & M.A.Clem., sed floribus majoribus (14–18 x 6.5–8.5 mm); petalis apicibus attenuatis; labello longiore et relative angusto (5.5–7 x 2–2.6 mm), minor acuminato; labello lobo longiore, differt.

Type: New South Wales. c. 1.7 km along road to New England National Park from Ebor-Armidale Road, 4 May 1994, *D.L.Jones* 12966 & *B.E.Jones* (holo CBG 9408036; iso BRI, MEL, NSW).

Description: *Rosette* stalk 5–12 cm long; leaves 3–6, ovate-lanceolate or narrowly elliptical, 8–40 mm long, 4–8 mm wide, margins entire or crinkled; petioles 0–4 mm long. *Flowering plants* 12–65 cm tall; stem leaves 5–7, linear-lanceolate to narrowly elliptical-lanceolate, 15–95 mm long, 2–8 mm wide. *Flowers* 1–11, porrect, widely spaced, 14–18 mm long, 6.5–8.5 mm wide, translucent bright green with darker green stripes; sepal tips green to brown. *Dorsal sepal* 14–18 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 13–16 mm long, 6.5–8.5 mm wide, flat, notched (4–5.5 mm deep); margins curved; tips parallel to divergent, 3–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 13–15 mm long, 2.5–3 mm wide; anterior margin straight or shallowly curved; basal flanges absent; apex attenuate. *Labellum* ovate-oblong, 5.5–7 mm long, 2–2.6 mm wide, pale yellowish green to pale green with dark brown to black basal mound and brown to blackish central stripe; surface cells acicular, to 0.7 mm long over most of labellum except the midlobe; basal mound c. 2 mm high, with an erect apical lobe, obtuse, similar colour to the central stripe; margins shallowly incurved; lateral lobes narrow; midlobe c. 1.3–1.6 mm long, narrow, shortly notched, the lobes acute to acuminate, parallel; apex upcurved. *Column* 11–14 mm long, curved; wings 3–3.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.3 mm long, shortly rostrate. *Pollinia* oblong, c. 2 mm long. *Stigma* narrowly-elliptic, c. 6 mm long, 1.6–2 mm wide. *Capsules* ovoid-obovoid, 10–14 mm long, 5–7 mm wide.

Distribution and ecology: Occurs in northern New South Wales where it is frequent on the New England Tableland and extends to Copeland and Gloucester, but is apparently absent from the adjacent coast. It may also occur in south-eastern Qld. It grows among shrubs and tussocks in tall, moist to wet forest in well-drained gravel and loam. Alt. 900–1400 m. Flowering: April to September.

Recognition: Characterised by relatively large (14–18 x 6.5–8.5 mm), bright green flowers with indistinct darker green stripes, elliptic synsepalum, narrowly oblong petals with no basal flanges and attenuate apex, the anterior margin flat or curved, labellum long and relatively narrow (5.5–7 x 2–2.6 mm), broadest at the base then tapered to the apex, pale yellowish green to pale green with a blackish central stripe, most of the lamina covered with long acicular cells (to 0.7 mm), and a long labellum midlobe.

Similar species: This species, which is common on the Northern Tablelands of New South Wales, is very similar in most of its features to *B. longifolius*, but is generally more robust with larger flowers and a longer labellum which exhibits less of a taper from the base to the apex, and the labellum midlobe is much longer.

Etymology: The Latin *majus*, larger, greater, in reference to the close similarity between this species and *B. longifolius*, the most obvious distinction being the robust habit, larger flowers and longer labellum.

Other specimens: NEW SOUTH WALES: Bald Rock, 24 May 1977, *M.Crisp* 2526 & *R.Ellyard* (CANB); Top of Spirabo Range, 21 April 1954, *M.Gray* 2763 (CANB); Copeland, 26 July 1991, *D.L.Jones* 2635 (CANB); Serpentine Nature Reserve, 26 July 1991, *D.L.Jones* 6023 (CANB); 26 km NW of Backwater, 4 May 1994, *D.L.Jones* 12957 (CANB); Doughboy Creek crossing, Guyra-Ebor Road, 5 May 1994, *D.L.Jones* 12970 (CANB); Enfield State Forest, 29 Aug. 1997, *D.L.Jones* 15136 (CANB); Halls Peak, 10 Sept. 1967, *I.Matthias* (CANB); Wollomombi Falls, 1 April 1988, *I.Metcalf* 2 (CANB); 10 miles E of Yarrowitch, 24 Aug. 1967, *I.Telford* 17 (CANB); Coopernook Creek, NE of Dorrigo, 29 Aug. 1967, *I.Telford* 170 (CANB); Pheasant Mountain, NE of Backwater, 1 Sept. 1969, *I.Telford* 1384 (CANB).

3. *Bunochilus vitreus* D.L.Jones, sp. nov.; affinis *B. longifolius* (R.Br.) D.L.Jones & M.A.Clem., sed floribus viridis dilutis; labello vitreo, eburneo ad flavescentem, virga centrali nigricanti; medilobo acuminato longiore, differt.

Type: Queensland. Maleny (Frasers Selection, private property), 5 May 1999, *R.Crane* 2392 (CANB 665640; iso BRI).

Description: *Rosette* stalk 3–6 cm long; leaves 3–6, ovate-lanceolate or narrowly elliptical, 10–40 mm long, 3–5 mm wide, margins entire or crinkled; petioles 0–4 mm long. *Flowering plants* 15–40 cm tall; stem leaves 5–7, linear-lanceolate to narrowly elliptical-lanceolate, 25–90 mm long, 2–4 mm wide. *Flowers* 1–7, porrect, widely spaced, 14–17 mm long, 6–8 mm wide, pale translucent green to whitish with indistinct darker green stripes and transparent areas; sepal tips green to brown. *Dorsal sepal* 12–15 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 12–14 mm long, 6–7.5 mm wide, flat, notched (4–5 mm deep); margins curved; tips parallel to divergent, 2–4 mm apart. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 10–13 mm long, 2–2.5 mm wide; anterior margin straight or shallowly curved; basal flanges absent. *Labellum* ovate-oblong, 5–7 mm long, 2–2.6 mm wide, cream to yellowish with dark blackish basal mound and brown to blackish central stripe; surface cells acicular, to 0.5 mm long over most of labellum except the midlobe; basal mound c. 2 mm high, with an erect apical lobe, obtuse, similar colour to the central stripe; margins straight or shallowly incurved; lateral lobes narrow; midlobe c. 1–1.6 mm long, narrow, shortly notched, the lobes acute to acuminate, parallel; apex upcurved. *Column* 11–13 mm long, curved; wings 2.5–3 mm long, c. 2 mm wide, with a blunt apical lobe 0.6 mm long. *Anther* c. 1.5 mm long, shortly rostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* narrowly-elliptic, c. 5 mm long, 1.5 mm wide. *Capsules* not seen.

Distribution and ecology: Occurs in south-eastern Queensland extending disjunctly north from the McPherson Ranges to near Kenilworth. It may also occur in northern New South Wales. This species grows in moist to wet forest, including wet sclerophyll forest, along rainforest margins and on rocky escarpments close to rainforest, in well-drained loamy soil. Alt. 150–1100 m. Flowering: April to August.

Recognition: Characterised by relatively small, pale translucent green to whitish flowers with darker stripes; elliptic synsepalum, narrowly oblong petals with vestigial basal flanges, the anterior margin flat or slightly outcurved towards the middle, labellum broadest at the base then tapered to the apex, cream to yellowish with a blackish central stripe, most of the lamina covered with transparent acicular hair-like cells, and the labellum midlobe long and sharply pointed.

Similar species: This species has obvious similarities with *B. longifolius* but can be distinguished by its much paler flowers, cream to yellowish glassy labellum with a blackish central stripe and longer acuminate midlobe. It is also similar to *B. majus* which has larger darker green flowers and a longer labellum.

Conservation status: Relatively widespread and conserved in National Parks.

Etymology: The Latin *vitreus*, glassy, in reference to the glassy appearance of the pale flowers, especially the synsepalum and labellum.

Other specimens: QUEENSLAND: Kenilworth, 24 Apr. 1990, *R.Crane* 396 (CANB); Bellthorpe, 1 June 1990, *R.Crane* 423 (CANB); Jimna, 12 June 1990, *R.Crane* 457 (CANB); Crows Nest, 4 Aug. 1885, *R.Crane* 1228 (CANB); Numinbah Valley, 17 July 1987, *D.L.Jones* (CANB); Toowoomba, 30 July 1997, *M.Mathieson* (CANB).

4. *Bunochilus macilentus* D.L.Jones, sp. nov.; affinis *B. longifolius* (R.Br.) D.L.Jones & M.A.Clem., sed florescentia posteriore; floribus viridis atrioribus; labello longiore et angustiore marginibus incurvis, differt.

Type: Victoria. Mt William, Grampians, 19 Nov. 1996, *D.L.Jones* 14977 & *M.Garratt* (holo CANB 9908967; iso MEL).

Description: *Rosette* stalk 30–60 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptical, 10–35 mm long, 3–7 mm wide, margins entire or crinkled; petioles 0.5 mm long. *Flowering plants* 15–35 cm tall; stem leaves 5–6, linear-lanceolate to narrowly elliptical-lanceolate, 25–80 mm long, 3–10 mm wide. *Flowers* 1–6, porrect, relatively

crowded, 16–20 mm long, 7–8.5 mm wide, dark translucent green with darker green stripes, shiny. *Dorsal sepal* 12–15 mm long when flattened, shallowly curved, tip brown to orange-brown. *Synsepalum* elliptical, 10–15 mm long, 7–8.5 mm wide, flat, notched (4–5 mm deep); margins curved; tips parallel to divergent, 4–5 mm apart, brown to orange-brown. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 11–14 mm long, 2–2.5 mm wide; anterior margin straight or shallowly curved; basal flanges absent. *Labellum* narrowly oblong, 5.5–7 mm long, 2–2.5 mm wide, pale yellow to brown with dark brown basal mound and brown to blackish central stripe; surface cells acicular to 0.7 mm long over most of labellum; basal mound c. 2 mm high, prominent, recurved, obtuse, similar colour to the central stripe; margins shallowly incurved; lateral lobes narrow; midlobe c. 2 mm long, narrow, shortly notched, the lobes acute, parallel or divergent; apex upcurved. *Column* 12–14 mm long, curved; wings 4–4.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.5 mm long, shortly rostrate. *Pollinia* oblong, c. 2 mm long. *Stigma* narrowly-elliptic to scutiform, c. 6 mm long, 1.6–2 mm wide. *Capsules* not seen.

Distribution and ecology: Apparently restricted to the Grampians in south-western Victoria. This species, which can be locally common, grows in moist to wet shrubby forest in well-drained soil. Plants also colonise disturbed sites such as quarries, gravel scrapes and road embankments. Alt. 200–750 m. Flowering: September to December.

Recognition: Characterised by its late flowering habit, dark green flowers with darker lines, orange sepal tips, elliptic synsepalum, petals without basal flanges, labellum narrow overall, broadest at the base then slightly tapered, the margins of the lateral lobes with a broad medial constriction, pale yellow to brown with dark brown basal mound and central stripe and, most of the lamina covered with short to long transparent acicular hair-like cells.

Similar species: The distinctly hairy labellum of this species suggests that it is probably related to *B. longifolius*, which is confined to central areas of New South Wales. *Bunochilus macilentus* can be immediately distinguished from that species by its late flowering habit and longer, narrower labellum. It grows sympatrically with *B. melagrammus* which can be distinguished by its shorter, oblong labellum which has the acicular cells mainly confined to the base.

Notes: This species grows sympatrically with *B. melagrammus* in some areas but natural hybrids have not been observed.

Conservation status: Of restricted occurrence but locally common and well conserved.

Etymology: The Latin *macilentus*, thin, meagre, in reference to the narrow labellum.

Other specimens: VICTORIA: Heatherly Quarry, Grampians, 21 Oct. 1992, *P.Branwhite* (D.L.Jones 10430) (CANB); *ibid.*, 18 Sept. 1993, *P.Branwhite* (D.L.Jones 12044) (CANB); *ibid.*, 2 Oct. 1995, *P.Branwhite* (CANB); Golton Gorge, 25 Oct. 1995, *P.Branwhite* (CANB); Grampians, Oct. 2001, E.James (ORG 3713) (CANB).

5. *Bunochilus melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 66 (2002); *Pterostylis melagramma* D.L.Jones, *Austral. Orch. Res.* 3: 145-146, fig. 7.6 (1998). Type: Tasmania. King Island, Pegarah, 4 Nov. 1991, *D.L.Jones* 8461 (holo CANB!; iso AD!, BRI!, HO!, MEL!, NSW!).

Illustrations: Plate 230, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Southern Vic); page 239, Jones *et al.* (1999), as *Pterostylis melagramma*; page 117, Jeanes & Backhouse (2000), as *Pterostylis melagramma*.

Description: *Rosette* stalk 5–100 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptical, 10–50 mm long, 4–8 mm wide, margins entire or crinkled; petioles 0–5 mm long. *Flowering plants* 15–80 cm tall; stem leaves 5–7, linear-lanceolate to narrowly ovate-lanceolate, 25–80 mm long, 5–10 mm wide. *Flowers* 1–20, porrect, relatively crowded, 12–15 mm long, 5.5–7 mm wide, translucent pale green with indistinct darker green stripes; sepal tips green to light brown. *Dorsal sepal* 12–16 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 9–12 mm long, 5.5–7 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 3–4 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.5 mm wide), 10–13 mm long, 2.5–3 mm wide; anterior margin straight or shallowly curved; basal flanges narrow and elongate. *Labellum* oblong to oblong-obovoid, 5–6 mm long, c. 2–2.5 mm wide, tawny, brownish, cream or yellowish with a brown to black basal mound and black central stripe; surface cells round and bead-like, with numerous acicular cells to 0.5 mm long towards the base; basal mound c. 1.5 mm high, prominent, erect, obtuse, similar colour to the central stripe; margins parallel; lateral lobes well-developed; midlobe c. 1 mm long, shortly notched, the lobes acute; apex upcurved. *Column* 12–16 mm long, curved; wings 3–3.5 mm long, c. 3 mm long, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.4 mm long, shortly rostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* narrowly-elliptic, c. 6 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 8–14 mm long, 4–6 mm wide.

Distribution and ecology: Widely distributed in southern Victoria and Tasmania, including several Bass Strait islands; possibly also South Australia (River Wirra, Para Wirra) where poorly known and in need of further study. In eastern Victoria this species extends into East Gippsland close to the New South Wales border and its

occurrence in the Nadgee area of south-eastern New South Wales is possible. It grows in wet sclerophyll forest, moist areas of open forest, heathy forest and coastal scrub in sandy loam, shallow clay loams and well-structured loam. Alt. 10–500 m. Flowering: mainly July to October, but as late as November in southern Tasmania.

Recognition: Characterised by numerous (up to 20) relatively small flowers (12–15 x 5.5–7 mm), elliptical synsepalum, petals with narrow elongate flanges which do not meet, oblong labellum which is tawny, pale brown, cream or yellowish with a prominent dark brown or black central stripe, the surface with round beaded cells, numerous acicular cells towards the base, and a short midlobe.

Notes: The original description of *B. melagrammus* (Jones 2002), included *B. montanus* D.L.Jones, which is segregated in this paper. The above description applies to *B. melagrammus sens. strict.*

This species grows with other species of *Bunochilus* such as *B. macilentus*, *B. smaragdinus* and *B. stenochilus*. Natural hybrids are generally rare or absent however, hybrids with the latter species have been collected at Roaring Bay in Tasmania. Large-flowered plants, possible polyploids, sometimes occur mixed in populations of more typical specimens.

Conservation status: Widespread, common and well conserved.

Etymology: Derived from the Greek *melas*, *melanos*, dark, black, *gramme*, line; in reference to the dark central stripe on the labellum.

Selected specimens (c. 40 examined): VICTORIA: Yarram, 16 Oct. 1989, *E.Foster* (CANB); Lang Lang, 9 Aug. 1991, *G.Glare* (CANB); Diamond Ck, 28 July 1987, *H.Richards* (CANB); Bats Ridges, 1 Sept. 1987, *C. & D.Woolcock* (CANB); TASMANIA: Smithton, 21 Aug. 1992, *L.Porteus* (CANB); Big Dog Island, 24 Sept. 1992, *C.Spry* (Jones 10128) (CANB); Coles Bay, 6 Sept. 1993, *R.Williamson* (CANB).

6. *Bunochilus montanus* D.L.Jones, *sp. nov.*; affinis *B. melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., sed floribus viridis atrioribus, sepalis apicibus vivide tangerines; labello anguste ovato-oblongo brunneo, virga centrali manifesta fusca vel nigricanti; basi labelli cellulis acicularibus aliquot, et medilobo longiore, differt.

Type: New South Wales. Brindabella Valley – Tumut Road, 23 Oct. 2005, *D.L.Jones* 19322 & *B.E.Jones* (holo CANB 673027; iso NSW).

Description: *Rosette* stalk 20–80 mm long; leaves 3–6, narrowly ovate to narrowly elliptical or ovate, 6–25 mm long, 2–6 mm wide, margins entire or crinkled; petioles 0.3 mm long. *Flowering plants* 15–70 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 10–70 mm long, 3–5 mm wide. *Flowers* 1–11, porrect, not crowded, 13–16 mm long, 6–8 mm wide, translucent dark green with indistinct darker green stripes, shiny; sepal tips bright orange-brown. *Dorsal sepal* 13–17 mm long when flattened, shallowly curved. *Synsepalum* elliptical to broadly elliptical, 12–15 mm long, 6–8 mm wide, flat, notched (4–5 mm deep); margins curved; tips divergent, 3–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.8 mm wide), 12–14 mm long, 3.5–4 mm wide; anterior margin shallowly curved; basal flanges narrow and elongate. *Labellum* oblong to narrowly ovate-oblong, 5.5–6.5 mm long, c. 2.5 mm wide, tawny or brown with a dark brown to black basal mound and black central stripe; surface cells bead-like, with numerous acicular cells to 0.5 mm long towards the base; basal mound prominent, recurved, obtuse, similar colour to the central stripe; margins parallel; lateral lobes well-developed; midlobe 1.5–2 mm long, shortly notched, the lobes acute; apex upcurved. *Column* 12–16 mm long, curved; wings 3–3.5 mm long, c. 3 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.4 mm long, shortly rostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* narrowly-elliptic, c. 6 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 12–14 mm long, 4–6 mm wide.

Distribution and ecology: Occurs in the Australian Capital Territory, southern New South Wales and north-eastern Victoria. This species grows in wet sclerophyll forests, moist areas of montane open forest and on drier slopes and ridges in tall forest in rainshadow areas. Soils include well-structured red-brown loam, shallow clay loam and stony soils. Plants frequently colonise road verges and embankments. Alt. 500–1300 m. Flowering: August to November.

Recognition: Characterised by relatively large (13–16 x 6–8 mm) shiny flowers which are dark translucent green with indistinct darker stripes and bright orange-brown tips on the sepals, elliptical to broadly elliptical synsepalum, petals with narrow elongate flanges which do not meet, oblong to narrowly ovate-oblong labellum which is tawny or brown with a prominent dark brown or black central stripe, the surface with round beaded and numerous acicular cells towards the base, and a long midlobe.

Similar species: *Bunochilus melagrammus* has smaller, usually paler green flowers with less prominent brown tips on the sepals and a distinctly oblong labellum which is usually pale with a dark stripe, numerous acicular cells at the base and a short midlobe.

Notes: This species is a segregate from *B. melagrammus sens. lat.* It basically occurs in

montane to highland areas, perhaps even subalpine zones in some parts. Plants from lower altitudes in northern Victoria (e.g. around Chiltern at about 300 m) are provisionally included in this species but further study is needed. This species was included in the original circumscription of *B. melagrammus* (Jones 2002). In some areas this species grows with *B. umbrinus* and *B. crassus* but natural hybrids are unknown.

Conservation status: Relatively widespread, locally common and well conserved.

Etymology: The Latin *montanus*, montane, growing in the mountains.

Other specimens: AUSTRALIAN CAPITAL TERRITORY: Gibraltar Falls, 5 Oct. 1998, M.A.Clements 9736 (CANB); Waarks Road, Brindabella Ranges, 23 Aug. 1992, D.L.Jones 9868 (CANB); Fishing Gap Fire Trail, 8 Sept. 1991, T.D.Jones 1 (CANB); Tidbinbilla Nature Reserve, 4 Oct. 1991, T.D.Jones 10 (CANB); Woods Reserve, 30 Sept. 1991, D.Mallinson 127 (CANB); . NEW SOUTH WALES: Woomagama State Forest, P.G.Branwhite 15, 25 Sept. 1999 (CANB); Carabost State Forest, 2 Sept. 1990, A.Logan (D.L.Jones 6393) (CANB); VICTORIA: Knocker Track, Omeo, 14 Nov. 1989, P.Branwhite (CANB); Ingrams Rock, Beechworth, 15 Sept. 1995, P.Branwhite (CANB); Murmungee, 15 Sept. 1995, P.Branwhite (CANB); Cravensville, 20 Oct. 1999, P.Branwhite 27 (CANB).

7. *Bunochilus loganii* D.L.Jones, sp. nov.; affinis *B. melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., sed floribus viridis dilutis; labello oblong-obovato brunneo pallido, virga nigricanta manifesti; lobis lateralis apicibus rotundatis; basi labelli cellulis brevibus acicularibus aliquot, differt.

Type: New South Wales. Carabost State Forest, 2 Sept. 1990, A.E.Logan (D.L.Jones 6393) (holo CANB 9015858; iso MEL, NSW).

Illustration: Plate 231, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Carabost).

Description: *Rosette* stalk 20–60 mm long; leaves 3–6, narrowly ovate to narrowly elliptical or ovate, 10–30 mm long, 2–5 mm wide, margins entire or crinkled; petioles 0.3 mm long. *Flowering plants* 15–50 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 10–60 mm long, 3–7 mm wide. *Flowers* 1–9, porrect, not crowded, 10–15 mm long, 5–6.5 mm wide, translucent pale green with darker green stripes, shiny; sepal tips brown. *Dorsal sepal* 12–16 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 9–12 mm long, 5–6.5 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 3–4 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.8 mm wide), 11–13 mm long, 2.5–3 mm wide; anterior margin straight or shallowly curved; basal flanges narrow and elongate. *Labellum* oblong to oblong-obovate, 5–6 mm long, c.

2.5 mm wide, tawny or buff brown with a black basal mound and black central stripe; surface cells mostly round and bead-like, a few acicular cells to 0.3 mm long at the base; basal mound prominent, erect, obtuse, similar colour to the central stripe; margins parallel or widening to the apex; lateral lobes well-developed, rounded; midlobe 0.5–0.8 mm long, shortly notched, the lobes obtuse to acute; apex upcurved., *Column* 11–14 mm long, curved; wings 2.5–3 mm long, c. 2.5 mm wide, with a blunt apical lobe 0.3 mm long. *Anther* c. 1.2 mm long, shortly rostrate. *Pollinia* oblong, c. 1.8–2 mm long. *Stigma* narrowly-scutiform, c. 6 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: Occurs near Beechworth, Stanley, Mt Pilot and Corryong in north-eastern Victoria and Carabost State forest, near Tarago and Morton National Park in southern New South Wales. Bishop (1996) also records the species from Talbingo in southern New South Wales. It possibly also occurs in the Australian Capital Territory (Tidbinbilla and Bendora Dam road) but these records require verification. This species grows among shrubs and tussocks in open forest in shallow clay loam and stony soils. Alt. 250–500 m. Flowering: August to October.

Recognition: Characterised by relatively small (10–15 x 5–6.5 mm) flowers which are pale translucent green with darker green stripes and brown tips on the sepals, elliptical synsepalum, petals with narrow elongate flanges which do not meet, oblong to oblong-obovate labellum which is tawny or buff brown with a prominent black central stripe, rounded tips on the lateral lobes, the surface mostly covered with round beaded cells, a few short acicular cells towards the base, and a short midlobe.

Similar species: *Bunochilus montanus* has larger dark green shiny flowers, an ovate-oblong labellum with numerous acicular cells towards the base and a much longer midlobe. *Bunochilus melagrammus* has a smaller distinctly oblong labellum with numerous acicular cells at the base and a short midlobe.

Notes: The distribution of this species is uncertain.

Conservation status: Poorly known, sometimes locally common but not well conserved; suggest 2KV by the criteria of Briggs & Leigh (1996).

Etymology: Named after Alan Edward Logan (1930–), farmer and keen naturalist with a special interest in orchids and discover of the species.

Other specimens: NEW SOUTH WALES: Gum Ridge, Beechworth, 15 Sept. 1995, *P.Branwhite*

(*D.L.Jones* 14371) (CANB); near Corryong, 31 Oct. 2004, *P.G.Branwhite* 249 (CANB); near Tarago, 29 Sept. 1992, *H.Hadobas* (CANB); Tianjara Falls, 9 July 1992, *D.L.Jones* 9586 (CANB); Carabost State Forest, 23 Aug. 1990, *A.E.Logan* (*D.L.Jones* 6254) (CANB) VICTORIA: Stanley Forest, 27 Sept. 2002, *J.Hawker* (*ORG* 4071) (CANB); Mt Pilot, 27 Sept. 2002, *J.Hawker* (*ORG* 4077) (CANB).

8. *Bunochilus diminutus* D.L.Jones, *sp. nov.*; affinis *B. melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., sed floribus minoribus confertis; labello minore oblongo; basi labelli cellulis acicularibus aliquot, differt.

Type: Victoria. Deep Lead Reserve, 18 Sept. 1990, *D.L.Jones* 6542, *C.H.Broers* & *P.Branwhite* (holo CANB 9016007; iso MEL, AD).

Illustration: Top plate, RHS side, page 118, Jeanes & Backhouse (2000), as *Pterostylis* aff. *melagramma* (Ararat).

Description: *Rosette* stalk 15–30 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptical, 15–25 mm long, 3–5 mm wide, margins entire or crinkled; petioles 0–5 mm long. *Flowering plants* 8–40 cm tall; stem leaves 4–7, linear-lanceolate, 15–80 mm long, 2.5–4 mm wide. *Flowers* 1–20, porrect, relatively crowded, 10–14 mm long, 4–6 mm wide, translucent green with dark green stripes. *Dorsal sepal* 10–14 mm long when flattened, shallowly curved, tip orange-brown. *Synsepalum* elliptical, 8–11 mm long, 4–6 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 2–4 mm apart, orange–brown (sometimes reddish). *Petals* obliquely oblong, narrow at the base (c. 0.5 mm wide), flared near the middle, 9–11 mm long, 2.5–3 mm wide; anterior margin shallowly curved; basal flanges absent. *Labellum* oblong, 4–5 mm long, c. 2 mm wide, yellowish brown with darker basal mound and black central stripe; surface cells mostly bead-like, sometimes a few longer acicular cells at the base; basal mound short, recurved backwards, obtuse, similar colour to the central stripe; margins parallel; lateral lobes well-developed; midlobe c. 1 mm long, shortly notched, the lobes acute; apex upcurved., *Column* 11–13 mm long, curved; wings 3–3.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.4 mm long. *Anther* c. 1.3 mm long, erostrate. *Pollinia* oblong, c. 1.5 mm long. *Stigma* narrowly-scutiform, c. 5 mm long, c. 1.2 mm wide. *Capsules* ovoid-obovoid, 10–13 mm long, 5–6 mm wide.

Distribution and ecology: Apparently restricted to south-central parts of Victoria more or less between Ballarat and Ararat. This species, which can be locally common, grows in woodland and open forest with a tussocky or sparse shrubby understorey in well-drained gravelly or stony soil. Alt. 300–500 m. Flowering: September to November.

Recognition: Characterised by relatively small (10–15 x 4–6 mm), somewhat crowded flowers

with dark green hood and translucent lateral sepals, oblong petals without basal flanges, relatively small labellum (4-5 x 2 mm) which is oblong, yellowish brown with a dark basal mound and black central stripe, the surface cells mostly bead-like, some longer acicular cells at the base.

Similar species: This species is very similar in general appearance to *B. melagrammus* but is consistently smaller in its floral parts.

Notes: This species, although small-flowered, is often tall and can have up to 20 flowers in a raceme. Short-growing plants with similar features to *B. diminutus* (small flowers, small oblong labellum) have been sent to the author from the vicinity of the River Wirra and Para Wirra areas in South Australia. These require further investigation.

Conservation status: Of restricted distribution and conserved in a couple of reserves; suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *diminutus*, diminished, made small, in reference to the smaller flowers and floral parts of this species when compared with *B. melagrammus*.

Other specimens: VICTORIA: McDonald Park, Ararat, 11 Sept. 1989, *P.Branwhite* (CANB); *ibid*, 15 Sept. 1995, *P.Branwhite* (CANB); Deep Lead, 15 Sept. 1995, *P.Branwhite* (CANB); Ararat, 1 Oct. 1992, *J.Jeanes* (CANB); c. 10 km W of Ballarat towards Skipton, 11 Oct. 1997, *D.L.Jones 15581* & *E.Foster* (CANB); McDonald Park, 8 Oct. 1998, *D.L.Jones 15822* (CANB).

9. *Bunochilus barringtonensis* D.L.Jones, *sp. nov.*; affinis *B. melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., sed florescentia superiore (Aprilis–Julius); lobo basi labelli multo majore, differt.

Type: New South Wales. Barrington Tops State Forest, 22 July 1999, *W.M.Dowling 19* (holo CANB 665543).

Description: *Rosette* stalk 20–60 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptical, 15–50 mm long, 4–8 mm wide, margins entire or crinkled; petioles 0–5 mm long. *Flowering plants* 20–30 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 30–65 mm long, 3–6 mm wide. *Flowers* 1–7, porrect to slightly nodding, well-spaced, 14–18 mm long, 4–6 mm wide, dark green with darker green stripes, shiny. *Dorsal sepal* 13–17 mm long when flattened, shallowly curved, tip green to brown. *Synsepalum* elliptical, 11–13 mm long, 6–8 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 4–5 mm apart, green to brown. *Petals* obliquely oblong, narrow at the base (c. 0.5 mm wide), 12–14 mm long, 3–3.5 mm wide; anterior margin

straight or shallowly curved; basal flanges absent. *Labellum* oblong, 6–7 mm long, c. 3 mm wide, brownish with large dark basal mound and brown to black central stripe; surface cells mostly bead-like, some acicular cells to 1 mm long at the base and on the underside; basal mound c. 2.5 mm high, prominent, recurved, obtuse to truncate, similar colour to the central stripe; margins parallel or shallowly concave; lateral lobes rounded; midlobe c. 1 mm long, shortly notched, the lobes acute; apex upcurved. *Column* 13–16 mm long, curved; wings 4–4.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.4 mm long, shortly rostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* narrowly-elliptic-scutiform, c. 6.5 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: NSW where apparently restricted to the Barrington Tops. It grows in small groups on slopes among grass tussocks, *Lomandra* and shrubs in tall forest in well-drained but moist loamy soil. Plants colonise track margins, road verges and embankments. Alt. 750–1200 m. Flowering: April–July.

Recognition: Characterised by April–July flowering period, montane to subalpine habitat and oblong labellum with a few acicular cells at the base and a large, prominent, recurved basal mound.

Similar species: This species has affinities with *B. melagrammus* but is earlier flowering and the labellum has a much larger and more prominent basal lobe.

Notes: All specimens seen have narrower cauline leaves than most other species but this requires verification. *Bunochilus lineatus* also occurs on Barrington Tops but flowers August–September and has a much larger labellum.

Conservation status: Apparently of restricted distribution but conserved in Barrington Tops National Park; suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: From Barrington Tops.

Other specimens: NEW SOUTH WALES: The Rock, off Dilgry Circuit road, Barrington Tops State Forest, 21 April 1999, *W.M.Dowling 18* (CANB); Boranel Mountain, 23 May 2001, *W.M.Dowling 179* (CANB).

10. *Bunochilus lineatus* D.L.Jones, *sp. nov.*; affinis *B. melagrammus* (D.L.Jones) D.L.Jones & M.A.Clem., sed habitu elatiore; floribus viridis majoribus; labello oblongo majore; basi labelli cellulis acicularibus numerosis; medilobo longi-acuminato, differt.

Type: New South Wales. Wilsons Glen, Woodford, *D.L.Jones 16504* & *K.J.Fitzgerald*, 9 Aug. 1999 (holo CANB 607093).

Illustration: Plate 232, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Blue Mountains).

Description: *Rosette* stalk 20–100 mm long; leaves 4–6, ovate to ovate-lanceolate or elliptical, 10–45 mm long, 3–10 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 20–60 cm tall; stem leaves 5–8, narrowly linear-lanceolate, 20–80 mm long, 3–6 mm wide. *Flowers* 1–10, porrect, well-spaced, 17–20 mm long, 5–7 mm wide, pale translucent green with darker green stripes, shiny, sepal tips orange to orange-brown. *Dorsal sepal* 13–16 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 10–13 mm long, 5–7 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 3–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 12–15 mm long, 2.5–3 mm wide; anterior margin straight or slightly curved; basal flanges absent. *Labellum* oblong, 6–7 mm long, 3–3.5 mm wide, tawny yellow to yellowish brown with a black central stripe; surface cells bead-like, numerous longer acicular cells to 0.5 mm long towards the base; basal mound erect, rounded, obtuse, similar colour to the central stripe; margins parallel or shallowly concave; lateral lobes well-developed; midlobe c. 1.5 mm long, shortly notched, the lobes acute; apex upcurved. *Column* 13–16 mm long, curved; wings 3–3.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.4 mm long, shortly rostrate. *Pollinia* oblong, c. 2 mm long. *Stigma* narrowly elliptic-scutiform, c. 6.5 mm long, c. 2 mm wide. *Capsules* not seen.

Distribution and ecology: Mainly found on the central and western peaks of the Blue Mountains and around Lithgow, but also occurring on the Barrington Tops. This species grows among shrubs and grass tussocks on slopes in moist to wet tall forest in well-drained to moisture-retentive loam and in light sandy soils over sandstone. It also colonises track margins and road embankments. Alt. 400–1100 m. Flowering: August to October.

Recognition: Characterised by tall habit, relatively large (17–20 x 5–7 mm) green flowers, translucent green synsepalum, narrowly oblong petals without basal flanges, relatively large (6–7 x 3–3.5 mm), oblong, tawny yellow to yellowish brown labellum with a black central stripe, the surface covered with short bead-like cells, numerous acicular cells towards the labellum base, a long acuminate midlobe and an erect basal mound.

Similar species: The affinities of this species are difficult to determine but probably lie with *B. melagrammus*, which is readily distinguished by its southern distribution and much smaller flowers.

Conservation status: Of disjunct distribution, poorly known and conserved in National Parks; suggest 2VC by the criteria of Briggs & Leigh.

Etymology: The Latin *lineatus*, marked with a linear line, in reference to the labellum markings.

Other specimens: NEW SOUTH WALES: Katoomba, 31 July 1996, *A.D.Bishop 960030* (CANB); Cubark Picnic Area, Barrington Tops, 15 Sept. 1991, *A.D.Bishop* (CANB); Hartley Road, Lithgow, 2 Oct. 1998, *C.Bower (ORG 1595)* (CANB); Sutton Park, 8 Aug. 1994, *D.L.Jones 13199* (CANB); Wilsons Glen, 9 Aug. 1999, *D.L.Jones 16503* (CANB); Boddington Hill, 9 Aug. 1999, *D.L.Jones 16504* (CANB); Browns Gap, SE of Lithgow, 10 Aug. 1999, *D.L.Jones 16514*, *K.J.Fitzgerald* & *C.Bower* (CANB); Wentworth Falls, 9 Aug. 1994, *J.Riley (DLJ 13194)* (CANB); Wilsons Glen, Woodford, 9 Aug. 1994, *J.Riley (D.L.Jones 13196)* (CANB).

11. *Bunochilus chocolatinus* D.L.Jones, sp. nov.; affinis *B. longifolio* (R.Br.) D.L.Jones & M.A.Clem., sed floribus multo majoribus; labello majore oblongi-contracto nigricanti; basi labelli cellulis acicularibus aliquot et tumulo basali reclini; medilobo longi-acuminato, differt.

Type: New South Wales. Boddington Hill, E of Wentworth Falls, 9 Aug. 1999, *D.L.Jones 16507* & *K.J.Fitzgerald* (holo CANB 607097; iso MEL, NSW).

Illustration: Plate 235, Bishop (1996), as *Pterostylis* sp. aff. *tunstallii* (Blue Mountains).

Description: *Rosette* stalk 60–110 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptical, 10–30 mm long, 4–7 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 20–90 cm tall; stem leaves 5–8, narrowly linear-lanceolate, 20–100 mm long, 3–9 mm wide. *Flowers* 3–13, porrect, well-spaced, 17–20 mm long, 6–8 mm wide, pale translucent green with narrow darker green stripes, shiny, sepal tips orange-brown to brown. *Dorsal sepal* 12–16 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 12–15 mm long, 6–8 mm wide, flat, notched (3.5–5 mm deep); margins curved; tips divergent, 3–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 1 mm wide), 12–15 mm long, 2.5–3.5 mm wide; anterior margin shallowly curved; basal flanges absent. *Labellum* oblong to ovate-oblong, 5–7.5 mm long, 2.5–3 mm wide, dark red brown to blackish with blackish basal mound and blackish central stripe; surface cells mostly bead-like or shortly elongated, some acicular cells at the base; basal mound prominent, leaning back, truncate to obtuse, similar colour to the central stripe; margins shallowly concave; lateral lobes well-developed; midlobe c. 1.5 mm long, shortly notched, the lobes acute; apex upcurved. *Column* 14–16 mm long, curved; wings 3 mm long, c. 1.8 mm wide, with a blunt apical lobe 0.5 mm long. *Anther* c. 1.3 mm long, crostrate. *Pollinia* oblong, c. 1.6 mm long. *Stigma* narrowly elliptic, 7–8 mm long, c. 1.8 mm wide. *Capsules* not seen.

Distribution and ecology: Known from Wilsons Glen near Woodford, Wentworth Falls and western parts of the Blue Mountains in central New South Wales. It grows on flat sheltered sites and gentle slopes among tussocks, bracken and shrubs in tall moist to wet open forest in well-drained sand over sandstone. Alt. 900–1150 m. Flowering: July to September.

Recognition: Characterised by tall habit, relatively large (17–20 x 6–8 mm), shiny, green flowers with darker lines, narrowly obovate petals without basal flanges, relatively large (5–7.5 x 2.5–3 mm) ovate-oblong, dark red brown to blackish labellum with short bead-like surface cells, a few acicular cells at the base, a blackish basal mound leaning backwards into the flower, and a long-acuminate midlobe.

Similar species: Somewhat similar to *B. tunstallii* which has a shorter, oblong labellum with parallel sides and a much shorter labellum midlobe.

Conservation status: Of restricted distribution, often locally frequent but possibly not conserved; suggest 2V by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *chocolatinus*, chocolate-brown, in reference to the labellum colour.

Other specimens: NEW SOUTH WALES: Leura, 31 July 1996, *A.D.Bishop* 960032 (CANB); bottom of Boddington Hill, 4 Aug. 1994, *C.Bower* (*D.L.Jones* 13306) (CANB); Leura, 18 Sept. 1992, *P.Branwhite* (*D.L.Jones* 10098) (CANB); *ibid*, 20 Sept. 1994, *P.Branwhite* (CANB); Wilsons Glen near Woodford, 9 Aug. 1999, *D.L.Jones* 16503 (CANB); Blackheath, 9 Aug. 1992, *J.Riley* (*DLJ* 9814) (CANB); Wentworth Falls, 9 Aug. 1994, *J.Riley* (*D.L.Jones* 13194) (CANB); Wilsons Glen, 9 Aug. 1994, *J.Riley* (*D.L.Jones* 13197) (CANB); Lawson, 23 July 1992, *R.Tunstall* (*D.L.Jones* 9618) (CANB).

12. *Bunochilus parvus* D.L.Jones, *sp. nov.*; affinis *B. tunstallii* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed labello oblongo pallidiore, sine cellulis acicularibus, et medilobo brevi, differt.

Type: New South Wales. Browns Gap, SE of Lithgow, 10 Aug. 1999, *D.L.Jones* 16515, *K.J.Fitzgerald* & *C.Bower* (holo CANB 607106; iso NSW).

Description: *Rosette* stalk 30–60 mm long; leaves 3–5, ovate to ovate-lanceolate or elliptical, 10–35 mm long, 3–6 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 15–45 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 30–70 mm long, 3–5 mm wide. *Flowers* 1–8, porrect, well-spaced, 13–15 mm long, 4.5–6.5 mm wide, pale translucent green with thin darker green stripes, shiny, sepal tips brown

to orange-brown. *Dorsal sepal* 10–15 mm long when flattened, shallowly curved. *Synsepalum* elliptical, 10–12 mm long, 4.5–6.5 mm wide, flat, notched (3–4 mm deep); margins curved; tips divergent, 2–3 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.5 mm wide), 10–12 mm long, 2–3 mm wide; anterior margin straight or slightly curved; basal flanges absent. *Labellum* oblong, 3.5–4 mm long, 1.5–2 mm wide, reddish brown with a darker central stripe; surface cells bead-like, no acicular cells present; basal mound erect, obtuse; margins parallel; lateral lobes small; midlobe c. 0.5–1 mm long, very shortly notched, the lobes acute; apex upcurved. *Column* 9–11 mm long, curved; wings 2.5–3 mm long, c. 1.5 mm wide, with a blunt apical lobe 0.3 mm long. *Anther* c. 1 mm long, shortly rostrate. *Pollinia* oblong, c. 1.5 mm long. *Stigma* narrowly-elliptic-scutiform, c. 4.5 mm long, c. 1.3 mm wide. *Capsules* not seen.

Distribution and ecology: Apparently localised in the Lithgow-Bathurst area of central New South Wales. This species grows on sheltered slopes in moist to wet, tall forest with a grassy and shrubby understorey in well-drained to moisture-retentive loam. Alt. 300–400 m. Flowering: August to October.

Recognition: Characterised by relatively small (13–15 x 5–6.5 mm) pale translucent green flowers, narrow petals without basal flanges, elliptical synsepalum and small (3.5–4 x 1.5–2 mm) oblong labellum which is reddish brown with a darker central stripe and short bead-like surface cells (no acicular hair-like cells present).

Similar species: This species is similar to *B. tunstallii* which has a much darker brown labellum with a longer, acuminate midlobe and short acicular trichomes on the labellum base.

Notes: At the type locality this species grows with both *B. tenuis* and *B. lineatus* but natural hybrids have not been observed.

Conservation status: Poorly known, possibly of restricted distribution and conserved in a Nature Reserve; suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *parvus*, sparing, moderate, frugal, in reference to the small labellum.

Other specimens: NEW SOUTH WALES: Wambool Nature Reserve, 20 Sept. 1998, *C.Bower* (*ORG* 1566) (CANB); near Little Hartley Road, Lithgow, 2 Oct. 1998, *C.Bower* (*ORG* 1594) (CANB).

13. *Bunochilus tunstallii* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 66 (2002); *Pterostylis tunstallii* D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 1: 128 (1989). Type: New South Wales.

Nowra-Braidwood road, 200 m N of Tomerong intersection, June 1987, *R.G.Tunstall 201* (holo CANB).

Illustrations: Page 317, Backhouse & Jeanes (1995); plate 234, Bishop (1996); page 244, Jones *et. al* (1999); page 119, Jeanes & Backhouse (2000), all as *Pterostylis tunstallii*.

Description: *Rosette* stalk 20–40 mm long; leaves 3–5, ovate to elliptical, 10–40 mm long, 4–9 mm wide, margins entire or crinkled; petioles 0–7 mm long. *Flowering plants* 25–50 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 25–85 mm long, 3–5 mm wide. *Flowers* 3–10, porrect, well-spaced, 7–10 mm long, 5–7 mm wide, pale translucent green with narrow darker green stripes, shiny, sepal tips brown. *Dorsal sepal* 8–12 mm long when flattened, shallowly curved. *Synsepalum* often reflexed against ovary, elliptical, 7–10 mm long, 5–7 mm wide, flat, notched (3.5–4.5 mm deep); margins curved; tips divergent, 3–4.5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.6 mm wide), 8–11 mm long, 2–2.5 mm wide; anterior margin shallowly curved; basal flanges absent. *Labellum* oblong to oblong-tapered, 4–5 mm long, 2–2.5 mm wide, dark brown with a blackish basal mound and broad blackish central stripe; surface cells bead-like or shortly elongated, some acicular cells to 0.3 mm long at the base; basal mound prominent, leaning back, truncate to obtuse, similar colour to the central stripe; margins parallel; lateral lobes well-developed; midlobe c. 0.8 mm long, shortly notched, the lobes acute to obtuse; apex upcurved. *Column* 8–10 mm long, curved; wings 2–2.5 mm long, c. 1.6 mm wide, with a blunt apical lobe 0.3 mm long. *Anther* c. 1.1 mm long, erostrate. *Pollinia* oblong, c. 1.4 mm long. *Stigma* narrowly elliptic, 4.5–5.5 mm long, c. 1.5 mm wide. *Capsules* ovoid-obovoid, 9–12 mm long, 3–5 mm wide.

Distribution and ecology: South-eastern New South Wales, Victoria and Tasmania (Furneaux Island Group in eastern Bass Strait). Grows in coastal forests and coastal scrub in sandy loam or clay loam. Alt. 0–50 m. Flowering: July to September.

Recognition: Characterised by small (7–10 x 5–7 mm) pale translucent green flowers, narrow petals without basal flanges, elliptical synsepalum and small (4–5 x 2–2.5 mm) oblong labellum which is dark brown with a blackish basal mound and broad blackish central stripe, the surface covered with short bead-like surface cells and short acicular cells at the base.

Similar species: Most similar to *Pterostylis williamsonii* which but has an ovate-oblong labellum prominently thickened at the base, a larger basal mound and a shallowly incised apical notch on the midlobe. *Bunochilus chokolatinus* also has similarities but has a longer, proportionately narrower labellum with a much

longer, recurved basal lobe and longer acuminate midlobe.

Notes: *Bunochilus tunstallii* and *B. longifolius* grow sympatrically in some areas of southern New South Wales but natural hybrids have not been observed.

Other specimens: NEW SOUTH WALES: Bodalla State Forest, 29 Aug. 1990, *E.Foster* (CANB); Nowra-Braidwood Road, 29 June 1990, *D.L.Jones 6091* (CANB); Mummuga Lake, near Narooma, 12 Aug. 1990, *D.L.Jones 6203* (CANB); Tomerong, 25 July 1992, *D.L.Jones 9684* (CANB); Nattai, 10 July 1992, *J.Riley (D.L.Jones 9588)* (CANB); Manning Lookout, 26 May 1987, *R.Tunstall* (CANB); VICTORIA: Jarvis Creek Conservation Park, 29 June 1999, *P.Branwhite 4* (CANB); Wilsons Promontory, 9 July 1992, *G.Glare (D.L.Jones 9575)* (CANB); near Genoa Peak, 18 July 1993, *A.Peisley* (CANB); TASMANIA: Vansittart Island, Furneaux Group, 22 Aug. 1973, *J.Whinray 537* (CANB); Swan Island, 7 Sept. 1979, *J.Whinray* (herb. Whinray).

14. *Bunochilus williamsonii* (D.L.Jones) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 66 (2002); *Pterostylis williamsonii* D.L.Jones, *Austral. Orch. Res.* 3: 157–158, fig. 7.16 (1998). Type: Tasmania. Coles Bay, 25 July 1991, *Ron & Kath Williamson (Jones 7532)* (holo CANB; iso HO).

Illustration: Page 247, Jones *et al.* (1999), as *Pterostylis williamsonii*.

Description: *Rosette* stalk 10–30 mm long; leaves 4–6, ovate to ovate-lanceolate, 3–35 mm long, 3–8 mm wide, margins entire or crinkled; petioles 0–7 mm long. *Flowering plants* 9–30 cm tall; stem leaves 5–7, narrowly linear-lanceolate, 40–70 mm long, 4–7 mm wide. *Flowers* 1–9, porrect to semi-nodding, well-spaced, 10–14 mm long, 5–7 mm wide, pale translucent green with prominent darker green stripes, shiny, sepal tips brown. *Dorsal sepal* 8–10 mm long when flattened, shallowly curved. *Synsepalum* often reflexed against ovary, elliptical, 9–12 mm long, 5–7 mm wide, flat or convex, notched (3.5–4 mm deep); margins curved; tips divergent, 4–5 mm apart. *Petals* obliquely oblong, narrow at the base (c. 0.6 mm wide), 10–12 mm long, 2–2.5 mm wide; anterior margin shallowly curved; basal flanges absent. *Labellum* ovate-oblong, 4–5 mm long, 2.5–3 mm wide, dark brown with a blackish basal mound and broad blackish central stripe; surface cells bead-like, a few acicular cells on the proximal margins; basal mound prominent, sloping back, obtuse, similar colour to the central stripe; margins parallel; lateral lobes well-developed; midlobe c. 1 mm long, broadly emarginate, the lobes acute to obtuse; apex upcurved, tawny. *Column* 8–10 mm long, curved; wings 2.5–3 mm long, c. 1.8 mm wide, with a blunt apical lobe 0.2 mm long. *Anther* c. 1 mm long, erostrate. *Pollinia* oblong, c. 1.4 mm long. *Stigma* narrowly elliptic, 4–4.5 mm long, c. 1.8 mm wide. *Capsules* ovoid-obovoid, 10–12 mm long, 4–6 mm wide.

Distribution and ecology: Endemic to Tasmania. This species grows in open forest among low shrubs and bracken in sandy loam, gravelly loam and clay loam. Alt. 5-250 m. Flowering: June to September.

Recognition: Characterised by relatively small (10-14 mm long), semi-nodding, very shiny flowers, dark reddish brown, ovate-oblong labellum (4-5 x 2.5-3 mm) prominently thickened at the base, the surface covered with beaded siliceous cells, a few short acicular cells at the base, and, broadly emarginate apex.

Similar species: *Bunochilus williamsonii* is very similar to *B. tunstallii* which has smaller flowers, an oblong labellum which is hardly expanded at the base, a smaller basal mound and a smaller midlobe with a deeply incised apical notch.

Notes: A population of *P. williamsonii* at South Arm, Tasmania, has a high proportion of plants with honey-brown flowers. Some plants are wholly this colour, including the scape and leaves (J.E. Wapstra pers. comm.).

Conservation status: Widely distributed and conserved.

Etymology: Named after Ronald Herbert Williamson (1931-2003), keen Tasmanian orchid enthusiast.

Other specimens: TASMANIA: S. side of Gog Range, 30 Sept. 1991, W.Barker (QVM); Pittwater, 20 Sept. 1931, H.Long 629 (HO 400035); Dalgarth Park, Asbestos Range, 6 Aug. 1995, P.Tonelli (Clements 8327) (CANB); Coles Bay, 22 July 1987, R.Williamson (CANB); South Arm, 5 Aug. 1992, D.Ziegeler (Jones 9756) (CANB); Big Dog Island, 23 Sept. 1992, D.Ziegeler (CANB); South Arm Rd, 11 Aug. 1992, D.Ziegeler 231 (CANB); Mt Nelson, 11 Aug. 1992, D.Ziegeler (CANB).

Sect. *Macrosepalae* D.L.Jones, sect. nov.

Floribus magni, porrecti ad semi-pendulos; petala marginibus anticis valde curvatis, sine alis basalibus; synsepalum late ovatum in ambitus; labellum albidum vel infuscatum virga fuscata, vel omnino brunneum ad nigricans.

Type species: *Bunochilus macrosepalus* D.L.Jones (see below).

Flowers large, porrect to semi-pendulous; petals narrow at the base and broadly flared near the middle, with a strongly curved anterior margin, without basal flanges and not blocking off the lower entrance to the flower; synsepalum very broad, broadly ovate in outline; labellum whitish

or brownish with a dark stripe or wholly brown to blackish.

As currently recognised this section consists of 4 species distributed between north-eastern New South Wales and north-eastern Victoria.

15. *Bunochilus macrosepalus* D.L.Jones, sp. nov.; affinis *B. longifolius* (R.Br.) D.L.Jones & M.A.Clem., sed floribus multo majoribus porrectis versus seminutantes; synsepalo late ovato; petalis angustis marginibus anterioribus valde curvatis; labello oblongo majore sine cellulis acicularibus, differt.

Type: New South Wales. Conimbla Range, 14 Aug. 1988, D.L.Jones 2728 & M.A.Clements (holo CANB 8806393; iso AD, BRI, MEL, NSW).

Illustration: Plate 227, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Cowra).

Description: *Rosette* stalk 20-50 mm long; leaves 3-5, ovate to ovate-lanceolate or elliptical, 10-30 mm long, 5-10 mm wide, margins entire or crinkled; petioles 0-8 mm long. *Flowering plants* 20-60 cm tall; stem leaves 5-10, linear-lanceolate, 20-60 mm long, 3-7 mm wide. *Flowers* 1-8, porrect to semi-nodding, 16-20 mm long, 10-12 mm wide, translucent green with narrow dark green stripes (sometimes appearing wholly green). *Dorsal sepal* 16-20 mm long when flattened, shallowly curved, tip orange-brown. *Synsepalum* broadly ovate, 15-18 mm long, 10-12 mm wide, flat, deeply notched (5-6 mm deep); margins curved; tips divergent, 7-10 mm apart, orange-brown. *Petals* narrow at the base (c. 2 mm wide), broadly flared near the middle, 14-16 mm long, 4-5 mm wide; anterior margin strongly curved, denticulate; basal flanges absent. *Labellum* oblong, 7-8 mm long, 2.7-3.3 mm wide, pale green with a blackish central stripe; surface cells rounded and bead-like, with few or no acicular cells towards the base; basal mound short, erect, truncate, similar colour to central stripe; margins parallel or slightly concave; lateral lobes well-developed; midlobe 2-2.5 mm long, narrowly notched, the lobes acuminate; apex upcurved. *Column* 13-15 mm long, curved; wings 4-5 mm long, c. 2.5 mm wide, with a blunt apical lobe 0.3 mm long. *Anther* c. 1.7 mm long, erostrate. *Pollinia* oblong, c. 2 mm long. *Stigma* elliptic-scutiform, c. 8 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 8-12 mm long, 6-8 mm wide.

Distribution and ecology: Currently known from a single locality in the Conimbla Range south of Gooloogong in central-western New South Wales, but probably more widespread and perhaps occurring in other parts of Conimbla National Park and possibly extending to the Weddin Mountains. At the type site it grows on a sheltered southern slope in open forest dominated by *Eucalyptus polyanthemus* and *E. albens* with a sparse shrubby understorey. The

soil is a well-drained shallow clay loam. Alt. 320–350 m. Flowering: July to September.

Recognition: Characterised by large porrect to semi-nodding flowers which are translucent green with narrow darker green stripes (sometimes wholly green), broadly ovate synsepalum, narrow petals with a strongly flared medial area, the anterior margin strongly curved and denticulate, and a relatively large oblong labellum that is pale green with a blackish central stripe, the surface covered with rounded bead-like cells and few or no acicular cells.

Similar species: Most similar to *B. umbrinus* which has smaller flowers with a narrower synsepalum and brown labellum. It also has similarities with *B. tenuis* which has smaller flowers and a narrow brown labellum.

Notes: *Bunochilus macrosepalus* has the largest synsepalum in the genus. At the type site this species grows sympatrically with *B. stenosepalus* but hybrids have not been observed.

Conservation status: Of restricted distribution but poorly collected; conserved in Conimbla National Park; suggest ILC by the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Greek *macro*, large and *sepalus*, sepal, in reference to the conspicuously large synsepalum.

Other specimens: NEW SOUTH WALES: Conimbla Range, 27 July 1988, *D.L.Jones s.n.* & *R.Tunstall* (CANB); *ibid*, 28 July 1987, *R.Tunstall* (CANB); *ibid*, 9 Aug. 1991, *D.L.Jones 7568* (CANB); *ibid*, 10 Aug. 1999, *D.L.Jones 16519* (CANB).

16. *Bunochilus umbrinus* D.L.Jones, *sp. nov.*; affinis *B. longifolio* (R.Br.) D.L.Jones & M.A.Clem., sed floribus multo majoribus porrectis; synsepalo late ovato; petalis angustis marginibus anterioribus valde curvatis; labello majore oblongo-ovato basi cellulis acicularibus, differt.

Type: Australian Capital Territory. Southern slope of Little Black Mountain, 16 Aug. 1990, D.L.Jones 6205 & C.H.Broers (holo CBG 9015671; iso BRI, MEL, NSW).

Illustration: Plate 228, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Canberra).

Description: *Rosette* stalk 20–65 mm long; leaves 3–5, ovate to lanceolate or elliptical, 7–35 mm long, 4–10 mm wide, margins entire or crinkled; petioles 0.4 mm long. *Flowering plants* 15–60 cm tall; stem leaves 4–7, linear-lanceolate, 20–80 mm long, 4–9 mm wide. *Flowers* 1–6, 14–17 mm long, 7–9 mm wide, green

with dark green stripes. *Dorsal sepal* 16–20 mm long when flattened, shallowly curved, tip orange-brown. *Synsepalum* broadly ovate, 13–15 mm long, 7–9 mm wide, flat, deeply notched (5–6 mm deep); margins curved; tips divergent, 5–7 mm apart, orange-brown. *Petals* narrow at the base (c. 2 mm wide), broadly flared near the middle, 13–15 mm long, 3–4 mm wide; anterior margin curved; basal flanges absent. *Labellum* oblong to oblong-obovate, 6–7 mm long, 2.3–3 mm wide, light brown to brown with a darker brown to blackish central stripe; surface cells rounded and bead-like, with short acicular cells clustered around the base; basal mound short, erect, truncate, similar colour to central stripe; margins parallel or shallowly concave; lateral lobes well-developed; midlobe 2–2.3 mm long, narrowly notched, the lobes acuminate; apex upcurved. *Column* 11–13 mm long, curved; wings 3–4 mm long, c. 2.5 mm wide, with a blunt apical lobe 0.4–0.6 mm long. *Anther* c. 1.5 mm long, erostate. *Pollinia* oblong, c. 2 mm long. *Stigma* scutiform, c. 6 mm long, c. 2.5 mm wide. *Capsules* ovoid-obovoid, 10–14 mm long, 6–8 mm wide.

Distribution and ecology: Occurs on Black Mountain in the Australian Capital Territory and central parts of New South Wales, extending from Burrinjuck south to near Tumut, Woomargama and Carabost. This species, which has a fragmented distribution, grows on sheltered slopes, gullies and ridges in open forest with a sparse tussocky to dense shrubby understorey. It sometimes occurs in drier types of eucalypt forest developed in rainshadow areas. Soils range from well-drained shallow clay loam to gravelly loam and stony skeletal soils. Alt. 400–900 m. Flowering: August to October.

Recognition: Characterised by large porrect flowers which are green with darker green stripes, broadly ovate synsepalum, narrow petals with an expanded medial area, the anterior margin shallowly curved and denticulate, and a relatively large oblong to oblong-obovate labellum that is brown with a dark brown to blackish central stripe, the surface covered with rounded bead-like cells and acicular cells clustered towards the base.

Similar species: Most similar to *B. macrosepalus* which has larger porrect to nodding flowers with a broader synsepalum and pale green labellum. *Bunochilus tenuis* has a narrower labellum.

Conservation status: Relatively widespread but disjunct and conserved in Kosciuszko National Park in New South Wales and Black Mountain Nature Reserve in the Australian Capital Territory.

Etymology: The Latin *umbrinus*, dull brown, in reference to the brown labellum compared with that of *B. macrosepalus*.

Selected specimens: NEW SOUTH WALES: upper slopes of Australian National Botanic Gardens, 17 Aug. 1990, *D.L.Jones* 6215 (CANB); c. 1.8 km SE of Tumut-3 Power Station, Talbingo, 22 Aug. 1991, *D.L.Jones* 7608 (CANB); c. 1.7 km S of Jounama Dam, 22 Aug. 1991, *D.L.Jones* 7616 (CANB).

17. *Bunochilus crassus* D.L.Jones, sp. nov.; affinis *B. longifolio* (R.Br.) D.L.Jones & M.A.Clem., sed floribus multo majoribus porrectis; synsepalo late ovato; petalis angustis marginibus anterioris valde curvatis; labello majore crasso oblongo atro-brunneo cellulis acicularibus numerosis, differt.

Type: Victoria. Mt Hamilton, 8 Sept. 1991, *P.G.Branwhite* (*D.L.Jones* 7844) (holo CANB 9609452; iso MEL).

Illustration: Plate 229, Bishop (1996), as *Pterostylis* sp. aff. *longifolia* (Mt Hamilton); LHS photo, page 118, Jeanes & Backhouse (2000).

Description: *Rosette* stalk 20–55 mm long; leaves 3–5, ovate to ovate-lanceolate, 5–25 mm long, 4–10 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 15–40 cm tall; stem leaves 4–7, linear-lanceolate, 15–75 mm long, 3–7 mm wide. *Flowers* 1–6, porrect (sometimes suberect), 14–16 mm long, 7–9 mm wide, shiny, translucent green with thin dark green stripes. *Dorsal sepal* 16–20 mm long when flattened, shallowly curved, tip orange-brown. *Synsepalum* broadly ovate, 13–15 mm long, 7–9 mm wide, flat, deeply notched (5–6 mm deep); margins curved; tips divergent, 5–7 mm apart, orange-brown. *Petals* narrow at the base (c. 2 mm wide), broadly flared near the middle, 12–15 mm long, 3–4.5 mm wide; anterior margin curved; basal flanges greatly reduced. *Labellum* oblong, 6–7.3 mm long, 3–3.8 mm wide, thick, fleshy, brown with a darker brown to blackish central stripe; surface cells acicular over most of the surface, to 0.5 mm long; basal mound relatively large, erect, obtuse to truncate, apex blackish; margins parallel or shallowly concave; lateral lobes well-developed; midlobe 1.8–2 mm long, narrowly notched, the lobes acute to acuminate; apex upcurved. *Column* 12–15 mm long, curved; wings 3–4 mm long, c. 2.7 mm wide, with a blunt apical lobe 0.4–0.6 mm long. *Anther* c. 1.5 mm long, erostate. *Pollinia* oblong, c. 2.2 mm long. *Stigma* scutiform, c. 7.5 mm long, c. 2.8 mm wide. *Capsules* ovoid-obovoid, 9–14 mm long, 6–8 mm wide.

Distribution and ecology: Occurs in north-eastern Victoria where known with certainty from Mt Hamilton near Wulgulmerang and near Omeo. It grows on sheltered slopes and ridges in drier eucalypt forest in well-drained gravelly or stony soil. Alt. 800–1000 m. Flowering: September and October.

Recognition: Characterised by large porrect (sometimes suberect), fleshy flowers which are translucent green with darker green stripes, broadly ovate synsepalum, narrow petals with an expanded medial area, the anterior margin shallowly curved and denticulate, and a relatively

large, thick, oblong labellum that is brown with a dark brown to blackish central stripe, the surface covered with acicular cells to 0.5 mm long.

Similar species: Readily distinguished from other species in section *Macrosepalae* by its labellum features.

Note: Grows with *B. montanus* but natural hybrids have not been observed.

Conservation status: Of restricted distribution and poorly collected; suggest 2KV by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *crassus*, thick, in reference to the thick fleshy flowers and labellum.

Other specimens: VICTORIA: Mt Hamilton, 26 Aug. 1991, *P.Branwhite* (*D.L.Jones* 7670) (CANB); *ibid.*, 26 Aug. 1991, *P.Branwhite* (*D.L.Jones* 7671) (CANB); Knocker Track, Omeo, 22 Oct. 1990, *P.Branwhite* (CANB).

18. *Bunochilus tenuis* D.L.Jones, sp. nov.; affinis *B. longifolio* (R.Br.) D.L.Jones & M.A.Clem., sed floribus multo majoribus porrectis carnosius; synsepalo late ovato; petalis angustis marginibus anterioribus valde curvatis; labello oblong-obovato brevi tumulo basali et cellulis acicularibus paucibus, differt.

Type: New South Wales. Cadia Reserve, 9 Sept. 1994, *C.Bower* (*D.L.Jones* 13308) (holo CANB 9613153).

Description: *Rosette* stalk 15–45 mm long; leaves 3–5, ovate to ovate-lanceolate, 5–30 mm long, 4–9 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 15–55 cm tall; stem leaves 4–7, ovate-lanceolate to linear-lanceolate, 20–65 mm long, 3–6 mm wide. *Flowers* 1–5, porrect, 14–16 mm long, 7–10 mm wide, shiny, translucent green with prominent dark green stripes. *Dorsal sepal* 15–20 mm long when flattened, shallowly curved, tip orange-brown. *Synsepalum* broadly ovate, 13–18 mm long, 7–10 mm wide, flat, deeply notched (5–9 mm deep); margins curved; tips divergent, 6–9 mm apart, orange-brown. *Petals* narrow at the base (c. 1.5 mm wide), broadly flared near the middle, 13–16 mm long, 3.5–4.5 mm wide; anterior margin curved; basal flanges absent. *Labellum* oblong to oblong-obovate, 6.5–8 mm long, 2.5–3 mm wide, yellowish, light brown or dark brown with a darker brown to blackish stripe; surface cells mostly short and bead-like, a few acicular cells towards the base; basal mound short and obscure; margins parallel or shallowly concave; lateral lobes well-developed; midlobe 1.5–2 mm long, narrowly notched, the lobes acute to acuminate; apex upcurved. *Column* 12–15 mm long, curved; wings 3–4 mm long, c. 2.5 mm wide, with a blunt apical lobe c. 0.4 mm long. *Anther* c. 1.4 mm long, erostate. *Pollinia* oblong, c. 2 mm long. *Stigma* scutiform, c. 7 mm long, c. 2.6 mm wide. *Capsules* ovoid-obovoid, 12–16 mm long, 6–8 mm wide.

Distribution and ecology: Widely but disjunctly distributed in northern and central western New South Wales, ranging from Torrington to near Bathurst and Abercrombie Caves. This species, which is commonest in southern parts of its range, grows on slopes and ridges in both moist and drier types of forest in well-drained gravelly or stony soil. Alt. 350–1000 m. Flowering: September and October.

Recognition: Characterised by large porrect flowers which are translucent green with prominent darker green stripes, broadly ovate synsepalum, narrow petals with an expanded medial area, the anterior margin shallowly curved, and a relatively narrow, oblong to oblong-obovate labellum that is yellowish, light brown or dark brown with a darker brown to blackish stripe, the surface covered with short, bead-like cells, a few acicular cells towards the base, the basal mound short and obscure.

Conservation status: Widely distributed, often locally common, and conserved in Gibraltar Range National Park and some nature reserves.

Etymology: The Latin *tenuis*, slender, in reference to the relatively narrow labellum.

Other specimens: NEW SOUTH WALES: Copper Gully Creek, above the Cadia Mine, 27 Aug. 1998, *C.Bower (ORG 1479)* (CANB); Four Mile Creek, c. 23 km S of Orange, 12 Sept. 1998, *C.Bower (ORG 1522)* (CANB); Lees Mountain, Canobolas State Forest, 12 Sept. 1998, *C.Bower (ORG 1525)* (CANB); Wambool Nature Reserve, 20 Sept. 1998, *C.Bower (ORG 1565)* (CANB); Hartley Road, Lithgow, 2 Oct. 1998, *C.Bower (ORG 1596)*; Gibraltar Range National Park, 9 Sept. 2004, *L.M.Copeland 3785* (CANB, NE, NSW); Browns Gap, SE of Lithgow, 10 Aug. 1999, *D.L.Jones 16513* (CANB); Cadia, 29 Aug. 1997, *D.L.Jones 13027a* (CANB); Yetholme Trig, 30 Sept. 1987, *R.Tunstall 210* (CANB); Abercrombie Caves, 25 Sept. 1987, *R.Tunstall 218* (CANB); *ibid*, 28 Aug. 1997, *R.Tunstall (ORG 813)* (CANB).

Sect. *Smaragdinae* D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 67 (2002). Type species: *Bunochilus smaragdinus* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem. (*Pterostylis smaragdina* D.L.Jones & M.A.Clem.).

Flowers small to moderately large, porrect; petals with large projecting basal flanges that meet and block off the lower entrance to the flower; synsepalum oblong to elliptic; labellum pale green to emerald green (rarely brownish), sometimes with a darker green stripe.

As currently recognised this section consists of 8 species distributed in southern New South Wales, Victoria, Tasmania and South Australia.

19. *Bunochilus smaragdinus* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 67 (2002). *Pterostylis smaragdina* D.L.Jones et M.A.Clem., *Muelleria* 8(1): 82–83, fig. 1f–i (1993). Type: Victoria. Ironbark Road, Diamond Creek, 9 July 1987, *H.M.E.Richards 201* (holo CANB, iso MEL).

Illustrations: Page 312, Backhouse & Jeanes (1995), plate 225, Bishop (1996), both as *Pterostylis smaragdina*.

Description: *Rosette* stalk 20–50 mm long; leaves 3–5, ovate to ovate-lanceolate or elliptic, 9–35 mm long, 4–8 mm wide, margins entire or crinkled; petioles 0–4 mm long. *Flowering plants* 9–55 cm tall; stem leaves 4–7, linear-lanceolate to lanceolate, 20–95 mm long, 3–6 mm wide. *Flowers* 1–10, porrect, 16–22 mm long, 6–8 mm wide, translucent green with prominent darker green stripes, shiny. *Dorsal sepal* 17–22 mm long when flattened, shallowly curved, tip brownish. *Synsepalum* narrowly elliptical, 16–19 mm long, 7–8 mm wide, flat, deeply notched (4–5 mm deep); tips parallel or divergent, 4–5 mm apart, orange-brown. *Petals* obliquely oblong, 15–16 mm long, 3–4 mm wide, narrow at base (c. 1.5 mm wide); anterior margin shallowly curved; basal flanges large. *Labellum* oblong to oblong-obovate, 6–8 mm long, 3.5–4 mm wide, emerald green with darker green basal mound and central stripe; surface cells rounded and bead-like, short acicular cells present towards the base; basal mound erect, similar colour to lamina; lateral lobes incurved to spreading, well-developed; midlobe c. 2 mm long, narrowly notched, the lobes acute to acuminate; apex upcurved. *Column* 13–15 mm long, curved; wings 3.5–4 mm long, c. 2–2.5 mm wide, with a blunt apical lobe 0.5–0.6 mm long. *Anther* c. 1.4 mm long, erostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* oblong-elliptic, c. 7 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 12–14 mm long, 4–6 mm wide.

Distribution and ecology: New South Wales, where known from Livingstone National Park and possibly Maragle State Forest, and Victoria, where generally widespread but disjunct, occurring in central areas and extending to the western district and north-east. It grows in a range of habitats including moist flats among grass tussocks and on ridges, slopes and gullies in drier forests and woodland, commonly in well-drained shallow clay loam. Alt. 150–600 m. Flowering: June to October.

Recognition: Characterised by large translucent green flowers (17–22 x 7–9 mm) with darker stripes, narrowly elliptic synsepalum of similar width to the galea, petals with large basal flanges, large (7–8 x 3.5–4 mm), oblong-obovate, emerald green labellum with darker green basal mound and central stripe, widening noticeably towards the

apex, with broad protruding lateral lobes, most of the surface covered with beaded siliceous cells, long acicular hair-like cells clustered at the base.

Similar species: This species is most similar to *B. viriosus* which is generally more robust in its habit and with slightly larger flowers, broader petals with larger basal flanges and an oblong to obovate labellum with a longer erect basal lobe and incurved lateral lobes.

Notes: In drier habitats, such as inland sites dominated by *Callitris*, plants of this species are noticeably dwarfed and few-flowered, but still retain their basic distinguishing characters, although sometimes the flowers are narrower than usual. Occasional natural hybrids are formed with *B. melagrammus* where the two species are sympatric.

Conservation Status: Widespread, often locally common and well conserved.

Etymology: The Latin *smaragdinus*, emerald green, in reference to the labellum colour.

Other specimens: NEW SOUTH WALES: Maragle State Forest, 24 Sept. 2005, *P.Branwhite* (CANB); Livingstone State Forest, 2 Sept. 1990, *A.E.Logan* (*D.L.Jones* 6394) (CANB); VICTORIA: McDonald Park, Ararat, 11 Sept. 1989, *P.Branwhite* (CANB); Ironbark Reserve, Stawell, 7 Aug. 1990, *P.Branwhite* (CANB); Rushworth, 5 Aug. 1991, *P.Branwhite* (CANB); Beechworth, 15 Aug. 1995, *P.Branwhite* (*D.L.Jones* 14211) (CANB); Brisbane Ranges, 14 July 1993, *E.Foster* (CANB); Deep Lead, 8 Aug. 1996, *E.Foster* (*ORG* 152) (CANB); Dadsells Bridge, 1 Oct. 1992, *J.Jeanes* (*D.L.Jones* 10212) (CANB); Greensborough, 10 Aug. 1987, *D.Tonkinson* (CANB).

20. *Bunochilus viriosus* D.L.Jones, sp. nov.; affinis *B. smaragdino* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed habitu robusto; petalis latioribus ala basali grandi in quoque; labello oblongo lobo basali longo erecto et lobis lateralibus incurvis, differt.

Type: South Australia. Belair National Park, NW boundary, 8 Aug. 1993, *D.L.Jones* 11846 & *B.E.Jones* (holo CBG 9706956; iso AD).

Illustration: Plate 171, Bates & Weber (1990), as *Pterostylis longifolia*.

Description: Rosette stalk 20–70 mm long; leaves 3–8, ovate to ovate-lanceolate or elliptic, 5–40 mm long, 3–9 mm wide, margins entire or crinkled; petioles 0.4 mm long. Flowering plants 8–95 cm tall; stem leaves 4–10, ovate-lanceolate to lanceolate, 25–95 mm long, 4–10 mm wide. Flowers 1–12, porrect, 16–22 mm long, 7–9 mm wide, dark green with prominent darker green stripes, shiny. Dorsal sepal 17–23 mm long when flattened, shallowly curved, tip brownish. Synsepalum narrowly

elliptical, 15–20 mm long, 7–9 mm wide, flat, deeply notched (5–7 mm deep); tips parallel or divergent, 3–4 mm apart, orange–brown. Petals obliquely oblong, 14–18 mm long, 3.5–4.5 mm wide, narrow at base (c. 2 mm wide); anterior margin shallowly curved; basal flanges very large. Labellum oblong to oblong-obovate (obvious when flattened), 7–9 mm long, 3.5–4 mm wide, bright green with darker green basal mound and central stripe; surface cells rounded and bead-like, short acicular cells present towards the base; basal mound well-developed, erect, similar colour to lamina; margins incurved; lateral lobes usually erect to incurved, well-developed; midlobe 2–2.5 mm long, narrowly notched, the lobes acute to acuminate; apex upcurved. Column 13–17 mm long, curved; wings 3.5–4 mm long, c. 2–2.5 mm wide, with a blunt apical lobe 0.5–0.6 mm long. Anther c. 1.3 mm long, erostate. Pollinia oblong, c. 2 mm long. Stigma oblong-elliptic, c. 7 mm long, c. 2 mm wide. Capsules ovoid-obovoid, 14–16 mm long, 6–8 mm wide.

Distribution and ecology: Restricted to South Australia where common in the hills around Adelaide, extending south to Victor Harbour and west to the Eyre Peninsula. It grows on sheltered slopes, gullies and ridges among shrubs and tussocks in open forest and woodland, in shallow well-drained clay loam. Alt. 10–450 m. Flowering: July to September.

Recognition: Characterised by large (16–22 x 7–9 mm), bright green, shiny flowers with prominent darker green stripes, elliptic synsepalum (about as wide as the galea), petals with large basal flanges that meet at the base of the galea, large (7–9 x 3.5–4 mm), broad, oblong to oblong-obovate labellum that is emerald green with darker green basal mound and central stripe, the surface covered with beaded siliceous cells with short acicular cells towards the base. The labellum has a relatively long, erect basal lobe and incurved lateral lobes that are more pronounced when flattened.

Similar species: This species is most similar to *B. smaragdinus* which is generally less robust in its habit and with slightly smaller flowers, narrower petals with smaller basal flanges and a more distinctly obovate labellum with a smaller incurved basal lobe and larger, prominent lateral lobes.

Conservation status: Relatively widespread, sometimes locally common and conserved in National Parks and reserves.

Etymology: The Latin *viriosus*, strong, robust, in reference to the robust nature of this species and its large flowers.

Other specimens: SOUTH AUSTRALIA: 2 km S of Hahndorf, Sept. 1982, *R.Bates* 2251 (CANB); Cut Hill, Victor Harbour, 4 July 1987, *R.Bates* 10008 (CANB); Willunga Hill, 17 July 1988, *R.Bates* 14802 (CANB);

Dicks Knob, Flinders Ranges, 11 Aug. 1989, *R.Bates* 20060 (CANB); Telowie Gorge Cons. Park, 10 Sept. 1989, *R.Bates* 20451 (CANB); Hardys Scrub, 1 Sept. 1991, *R.Bates* 25933 (CANB); Fairview Park, 5 Sept. 1993, *R.Bates* 33958 (CANB); Douglas Scrub via McLaren Vale, 20 July 1995, *R.Bates* 41800 (CANB); Heathfield, 9 July 1986, *M.Clements* 4096 (CANB); Upper Sturt, 16 Aug. 1999, *M.Clements* 8276 (CANB); Scott Creek Conservation Park, 8 Aug. 1993, *D.L.Jones* 11852 (CANB); E outskirts of Alligator Gorge National Park, 5 Sept. 1999, *D.L.Jones* 16712 (CANB); 11.2 km from Tumby Bay towards Koppio, 7 Sept. 2000, *D.L.Jones* 17388 & *M.Garratt* (CANB); Hahndorf, Aug. 1966, *R.Nash* (CANB).

21. *Bunochilus stenosepalus* D.L.Jones, *sp.*

nov.; affinis *B. smaragdino* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed synsepalo angustiore quam galea; labello oblongi-obovato angustiore, basi cellulis acicularibus brevibus aliquot, differt.

Type: New South Wales. Conimbla National Park, 10 Aug. 1999, *D.L.Jones* 16518 & *K.J.Fitzgerald* (holo CANB 607110; iso MEL, NSW).

Illustration: Plate 226, Bishop (1996), as *Pterostylis* sp. aff. *smaragdina* (Inland).

Description: *Rosette* stalk 20–70 mm long; leaves 3–5, ovate to ovate-lanceolate, 12–40 mm long, 5–13 mm wide, margins entire or crinkled; petioles 0.3 mm long. *Flowering plants* 10–35 cm tall; stem leaves 3–8, ovate-lanceolate, 15–70 mm long, 4–7 mm wide. *Flowers* 1–6, porrect, 12–18 mm long, 4–6 mm wide, bright green with prominent darker green stripes, shiny. *Dorsal sepal* 12–15 mm long when flattened, shallowly curved, tip brownish. *Synsepalum* oblong to narrowly elliptical, 13–17 mm long, 4–6 mm wide, flat or shallowly convex with recurved margins, deeply notched (4–5 mm deep); tips divergent, 3–5 mm apart, orange-brown. *Petals* obliquely oblong, 13–17 mm long, 3–3.5 mm wide, narrow at base (c. 2 mm wide); anterior margin straight or slightly curved; basal flanges large. *Labellum* oblong to oblong-obovate, 7–9 mm long, 2–3 mm wide, bright green with darker green basal mound and central stripe; surface cells rounded and bead-like, occasionally a few short acicular cells towards the base; basal mound well-developed, erect to incurved, similar colour to lamina; margins incurved; lateral lobes well-developed; midlobe c. 1.5 mm long, narrowly notched, the lobes acuminate; apex upcurved. *Column* 12–15 mm long, curved; wings 3–3.5 mm long, c. 2 mm wide, with a blunt apical lobe 0.3–0.4 mm long. *Anther* c. 1.3 mm long, erostrate. *Pollinia* oblong, c. 2 mm long. *Stigma* narrowly elliptic, c. 6.5 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 12–14 mm long, 5–6 mm wide.

Distribution and ecology: Occurs in central-western New South Wales more or less between Orange and Cowra. It grows on sheltered slopes, gullies and ridges among shrubs and tussocks in heathy forest and sparse open forest and woodland dominated by eucalypts and *Callitris* spp., in shallow well-drained clay loam and

sandy loam. Alt. 320–600 m. Flowering: August to October.

Recognition: Characterised by relatively large (12–18 x 5–7 mm), bright green, shiny flowers with prominent darker green stripes, narrowly oblong-elliptic, bluish-green synsepalum (narrower than the galea) which is often concave with recurved margins, petals with large basal flanges that meet at the base of the galea, large (7–9 x 2–3 mm.), narrow, oblong to oblong-obovate labellum that is emerald green with darker green basal mound and central stripe, the surface covered with beaded siliceous cells with short acicular cells towards the base, or absent.

Notes: This species is most similar to *B. smaragdinus* which has the lateral sepals of similar width to the galea and the labellum widest towards the apex with long acicular hair-like cells towards the base. In some areas *B. stenosepalus* is sympatric with *B. tenuis* and *B. macrosepalus* but hybrids have not been observed.

Conservation status: Relatively widespread but disjunct, sometimes locally common, conserved in National Parks and other reserves.

Etymology: The Greek *stenos*, narrow and *sepalus*, sepal, in reference to the conspicuously narrow synsepalum.

Other specimens: NEW SOUTH WALES. 4 km NW of Mullion Creek, 15 Aug. 1995, *C.Bower* (*D.L.Jones* 14294) (CANB); Copper Gully Creek, above the Cadia Mine, 27 Aug. 1998, *C.Bower* (*ORG* 1480) (CANB); Calula Range, N of Orange, 27 Aug. 1998, *C.Bower* (*ORG* 1481) (CANB); Wambool Nature Reserve, 20 Sept. 1998, *C.Bower* (*ORG* 1565) (CANB); Kangaroooby Range, W end, 14 Aug. 1988, *D.L.Jones* 2731 & *M.Clements* (CANB); near Yambira Mountain, 1 Aug. 1990, *D.L.Jones* 6125 & *C.Broers* (CANB); Conimbla National Park, 9 Aug. 1991, *D.L.Jones* 7567 (CANB); Cadia Reserve, 12 June 1994, *D.L.Jones* 13029, *B.Jones* & *C.Bower* (CANB); Wambool Nature Reserve, 10 Aug. 1999, *D.L.Jones* 16517 (CANB); Yetholme Trig, 3 Sept. 1987, *R.Tunstall* (CANB).

22. *Bunochilus chlorogrammus* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., *Austral. Orch. Res.* 4: 67 (2002). *Pterostylis chlorogramma* D.L.Jones & M.A.Clem., *Muelleria* 8(1): 78–79, fig. 1,j–m (1993). Type: Victoria. Near Grantville, 21 Aug. 1991, *G.Glare* (*Jones* 7585) (holo CANB; iso MEL).

Illustrations: Page 275, Backhouse & Jeanes (1995); plate 224, Bishop (1996), both as *Pterostylis chlorogramma*.

Description: *Rosette* stalk 20–65 mm long; leaves 3–6, ovate to ovate-lanceolate or elliptic, 10–30 mm long, 3–7 mm wide, margins entire or crinkled; petioles 0–5 mm long. *Flowering plants* 20–55 cm tall; stem leaves 4–9, linear-lanceolate to lanceolate, 10–65 mm long, 3–6 mm wide. *Flowers* 1–7, porrect, 14–18 mm long, 5–7 mm wide, pale translucent green with prominent darker green stripes, shiny; sepal tips green or brownish. *Dorsal sepal* 14–18 mm long when flattened, shallowly curved. *Synsepalum* narrowly oblong, 13–16 mm long, 5–7 mm wide, flat, deeply notched (4–5 mm deep); tips parallel or divergent, 5–6 mm apart. *Petals* obliquely oblong, 14–16 mm long, 2.5–3 mm wide, narrow at base (c. 2 mm wide); anterior margin shallowly curved; basal flanges large. *Labellum* narrowly oblong, 6–7.5 mm long, 2.5–3 mm wide, emerald green with darker green basal mound and central stripe, sometimes wholly brownish green; surface cells rounded and bead-like, short acicular cells present towards the base; basal mound erect, truncate, similar colour to lamina; lateral lobes incurved to spreading, well-developed; midlobe 2–2.5 mm long, narrowly notched, the lobes acute to acuminate; apex upcurved. *Column* 13–15 mm long, curved; wings c. 3 mm long, c. 2 mm wide, with a blunt apical lobe 0.5–0.6 mm long. *Anther* c. 1.4 mm long, erostrate. *Pollinia* oblong, c. 1.8 mm long. *Stigma* oblong-elliptic, c. 6 mm long, c. 2 mm wide. *Capsules* ovoid-obovoid, 9–12 mm long, 4–6 mm wide.

Distribution and ecology: Occurs in southern Victoria, extending disjunctly west from Mallacoota and in south-eastern South Australia. It is apparently restricted to coastal and near-coastal districts and grows in heathy and shrubby forests in well-drained sandy loam. Alt. 5–100 m. Flowering: July to September.

Recognition: Characterised by relatively broad, flat leaves, relatively large (15–18 x 7–9 mm) pale translucent green flowers with prominent darker stripes in the galea, petals with large basal flanges, elliptic synsepalum, relatively large (6–7 x 2.5–3 mm) oblong labellum, emerald green with dark green basal mound and dark central stripe, most of the surface covered with beaded siliceous cells, long acicular hair-like cells towards the base.

Similar species: This species is generally similar to *B. smaragdinus* but has smaller, narrower flowers which are pale translucent green with prominent darker stripes in the galea, a narrowly elliptic-oblong synsepalum, and a smaller narrower labellum of equal width throughout with smaller, less-protruding lateral lobes.

Notes: This species occurs as scattered individuals or in small groups.

Conservation status: Generally uncommon to rare; listed as 3VC (Jones & Clements 1993, Backhouse & Jeanes 1995).

Etymology: From the Greek *chloros*, green, *gramme*, line, in reference to the prominent green lines on the galea.

Other specimens: VICTORIA: Wilsons Promontory, 2 July 1991, *P. Branwhite* (CANB); South Arm track, off Mallacoota-Genoa Road, 18 Sept. 1985, S. Forbes & G. Lucas (MEL); The Gurdies, 9 Aug. 1991, *G. Glare* (CANB); Tarwin, 14 Aug. 1991, *G. Glare* (DLJ 7574) (CANB); Wilsons Promontory, 15 Sept. 1991, *G. Glare* (CANB); Grantville, 9 Oct. 1992, *G. Glare* (CANB); near Woodside, 23 July 1994, *G. Glare* (*D.L. Jones 13124*) (CANB); Anglesea, 26 July 1991, *D.L. Jones 7537* (CANB); Mt Clay, 28 July 1987, C. & D. Woolcock (CANB). SOUTH AUSTRALIA: Glencoe, 4 July 1988, *R. Bates 14596* (CANB); c. 2 km N of Wandilo Research Station, 13 Aug. 1966, *I.B. Wilson 472* (AD, CANB).

23. *Bunochilus stenochilus* (D.L. Jones) D.L. Jones & M.A. Clem., *Austral. Orch. Res.* 4: 67 (2002); *Pterostylis stenochila* D.L. Jones, *Austral. Orch. Res.* 3: 153–154, fig. 7.12 (1998). Type: Tasmania. Brooks Bay, 22 Aug. 1992, *Wapstra* (*Jones 9918*) (holo CANB!; iso HO!).

Illustration: Page 242, Jones *et al.* (1999), as *Pterostylis stenochila*.

Description: *Rosette* stalk 30–50 mm tall; leaves 3–5, lanceolate to ovate-lanceolate, 20–40 mm long, 6–8 mm wide; margins entire or wrinkled; apex acute; petioles 0–5 mm long. *Flowering plants* 12–30 cm tall; stem leaves 5–6, lanceolate to ovate-lanceolate, 15–50 mm long, 5–9 mm wide. *Flowers* 1–7, porrect to slightly nodding, 12–15 mm long, 4.5–5.5 mm wide, transparent green with darker green stripes, shiny; sepal tips green. *Dorsal sepal* 13–17 mm long, 10–12 mm wide. *Synsepalum* narrowly elliptic to oblong-elliptic, 10–13 mm long, 4.5–5.5 mm wide, deeply notched (3–5 mm deep), tips widely divergent, 4–5 mm apart. *Petals* narrowly oblong-obovate, 12–14 mm long, 3–3.5 mm wide; anterior margin curved; basal flanges large. *Labellum* narrowly linear-oblong to narrowly linear-obovate, constricted medially, 6–7 mm long, c. 2.5 mm wide, brownish green to bright green, covered with beaded siliceous cells, numerous acicular cells to 0.5 mm long on the base; basal mound c. 2 mm thick, prominent, erect; lateral lobes well developed, 5–5.5 mm long, strongly ridged in the distal half; midlobe c. 1.5 mm long, strongly upcurved, notched for 0.3 mm; lobes divergent. *Column* 14–16 mm long, curved; wings c. 5 mm long, c. 3 mm wide, with a blunt apical lobe c. 0.6 mm long. *Anther* c. 1.4 mm long, shortly rostrate. *Pollinia* linear-oblong, c. 2 mm long, yellow, mealy. *Stigma* narrowly-elliptic, c. 6 mm long, c. 2 mm wide. *Capsules* obovoid, 8–12 mm long, 4–6 mm wide.

Distribution and ecology: Eastern Tasmania, especially lowland areas of the south-east. Grows in open forest, heathy forest and coastal scrub in sandy loam, gravelly loam and shallow clay loam. Alt. 0–300 m. Flowering: July to September.

Recognition: Characterised by relatively narrow flowers (12–15 x 6–7 mm), petals with large basal flanges, synsepalum elliptical, long, labellum narrow, green (6–7 x 2.5 mm), constricted near the middle, most of the surface covered with short beaded siliceous cells, a few long acicular cells towards the base.

Notes: This is the only species from section *Smaragdinae* found in Tasmania.

Conservation Status: Relatively widespread and well represented in reserves (Jones *et al.* 1999).

Etymology: Derived from the Greek *stenos*, narrow, *cheilos*, lip; in reference to the narrow labellum.

Other specimens: TASMANIA: Brooks Bay, 22 Aug. 1992, *H.Wapstra* (*D.L.Jones* 9918) (CANB); Coles Bay, 5 Aug. 1988, *R.Williamson* (CANB); *ibid.*, 10 Aug. 1988, *R.Williamson* (*D.L.Jones* 2717) (CANB); *ibid.*, 25 July 1991, *R.Williamson* (*D.L.Jones* 7530) (CANB); South Arm, 4 Aug. 1992, *D.Ziegeler* (*D.L.Jones* 9755) (CANB); Brown Mtn, 11 Aug. 1992, *D.Ziegeler* (CANB); Kingston, 11 Aug. 1992, *D.Ziegeler* (CANB); Georges Bay, July 1893, *collector unknown* (QVM).

24. *Bunochilus flavovirens* D.L.Jones, *sp. nov.*; affinis *B. smaragdino* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed floribus minoribus et pallidioribus; synsepalo anguste ellipticalo ad oblongem; labello angusta oblongi-obovato tumulo brevi erecto basali, flavovirenti, et basi sine cellulis acicularibus, differt.

Type: South Australia. Port Lincoln, coastal reserve towards Lincoln Cove, 7 Aug. 1995, *D.L.Jones* 14110 & *B.E.Jones* (holo CANB 664135).

Description: *Rosette* stalk 20–50 mm long; leaves 3–5, ovate to ovate-lanceolate, 5–27 mm long, 3–9 mm wide, margins entire or crinkled; petioles 0–3 mm long. *Flowering plants* 3–20 cm tall; stem leaves 3–6, ovate to ovate-lanceolate, 5–40 mm long, 2–9 mm wide. *Flowers* 1–7, 9–13 mm long, 4–6 mm wide, very pale whitish green to translucent green with green stripes. *Dorsal sepal* 12–15 mm long when flattened, shallowly curved, tip brownish. *Synsepalum* oblong to narrowly elliptical, 9–13.5 mm long, 4–6 mm wide, flat or shallowly concave with recurved margins, deeply notched (3–3.5 mm deep); tips divergent, 3–3.5 mm apart, brown to orange-brown. *Petals* obliquely oblong, 9–12 mm long, 2–2.3 mm wide, narrow at base (c. 1 mm wide); anterior margin shallowly curved; basal flanges smallish. *Labellum* oblong-obovate, 4.5–6 mm long, 1.5–2.3 mm wide, yellowish green with a slightly darker green central stripe; surface cells rounded and bead-like, occasionally a few short acicular cells towards the base; basal mound short, erect, often truncate, similar colour to lamina; margins concave;

lateral lobes well-developed, erect to incurved; midlobe c. 1 mm long, narrowly notched, the lobes acuminate; apex upcurved. *Column* 10–11 mm long, curved; wings 3–3.5 mm long, c. 1.5 mm wide, with a blunt apical lobe 0.4–0.5 mm long. *Anther* c. 1 mm long, eorate. *Pollinia* oblong, c. 1.5 mm long. *Stigma* oblong, c. 6 mm long, c. 1 mm wide. *Capsules* ovoid-obovoid, 8–12 mm long, 5–6 mm wide.

Distribution and ecology: Occurs in South Australia where very widely distributed and extending at least as far west as Streaky Bay. It forms localised groups mainly in mallee communities, with the orchid plants commonly found in accumulations of litter under mallee eucalypts and among broombush. Soils, which are well-drained, include acid and calcareous sands, limey soil with limestone nodules and terra rossa over sheet limestone. In nutritionally poor limey soils the plants are usually dwarfed, with relatively broad, short leaves and often with only 1–2 smallish flowers. Alt. 5–300 m. Flowering: July to September.

Recognition: Characterised by small (9–13 x 4–6 mm), very pale whitish green to translucent green flowers with darker stripes, sepal tips brownish to orange-brown, oblong to narrowly elliptical synsepalum, narrow petals with basal flanges, labellum narrowly oblong-obovate, yellowish green, with incurved medial margins, (4.5–6 x 1.8–2.5 mm), the surface covered with rounded beaded siliceous cells, occasionally a few short acicular cells towards the base, and a short erect basal mound.

Similar species: This species is most similar to *B. prasinus* which is generally more robust in its habit and has larger, brighter green, strongly striped, shiny flowers with a shorter, broader, dark green, oblong labellum, the sides parallel or nearly so (uncommonly curved inwards). In some specimens of *B. prasinus* the labellum widens slightly towards the apex but this is not usual.

Conservation Status: Very widely distributed and well conserved in National Parks and reserves.

Etymology: The Latin *flavovirens*, green stained with yellow, in reference to the labellum colour.

Other Specimens: SOUTH AUSTRALIA. Warrenben Conservation Park, 2 Aug. 1987, *R.Bates* 10060 (CANB); between Winulta and Weefulta, 1 July 1995, *R.Bates* 41505 (CANB); Kelvin Powrie Conservation Park, 26 Aug. 1991, *P.Branwhite* (*D.L.Jones* 7666) (CANB); S of Ardrossan, 7 July 1992, *M.Clements* 7740 (CANB); Bales Bay, Kangaroo Island, 11 Aug. 1993, *D.L.Jones* 11874 (CANB); Hanson Bay Road, Kangaroo Island, 14 Aug. 1993, *D.L.Jones* 11888 (CANB).

25. *Bunochilus littoralis* D.L.Jones, sp. nov.; affinis *B. smaragdino* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed floribus minoribus et amatis; synsepalo elliptico; labello angusto gracili, fere plano, basi sine (vel raro aliquot) cellulis acicularibus; labello tumulo brevi globoso basali, differt.

Type: South Australia. Bog Road, near Sunland, opposite Lake St Clair, 7 July 1999, *D.L.Jones 16461, M.Garratt & R.Bates* (holo CANB 607047; iso AD).

Description: *Rosette* stalk 30–70 mm long; leaves 3–5, ovate to ovate-lanceolate, 10–30 mm long, 3–7 mm wide, margins entire or crinkled; petioles 0.4 mm long. *Flowering plants* 10–25 cm tall; stem leaves 3–5, ovate to ovate-lanceolate, 10–70 mm long, 4–10 mm wide. *Flowers* 1–5, 11–14 mm long, 4–5 mm wide, very pale whitish green with light green stripes; sepal tips light brown. *Dorsal sepal* 12–15 mm long when flattened, shallowly curved. *Synsepalum* narrowly elliptical, 9–12 mm long, 4–5 mm wide, flat with recurved margins, notched (2.5–3 mm deep); tips divergent, 3–4 mm apart. *Petals* obliquely oblong, 9–11.5 mm long, 2–2.5 mm wide, narrow at base (c. 0.6 mm wide); anterior margin very shallowly curved; basal flanges well-developed. *Labellum* oblong-obovate, 4.5–5.5 mm long, 1.8–2.5 mm wide, thin-textured, nearly flat, pale green to whitish with slightly darker green central stripe; surface cells mainly rounded and bead-like, sometimes a few short acicular cells towards the base; basal mound rounded, without an obvious lobe, similar colour to lamina; margins shallowly incurved; lateral lobes well-developed, flat; midlobe c. 0.8–1.3 mm long, narrowly notched, the lobes acuminate; apex upcurved. *Column* 9–11 mm long, curved; wings 2.3–3 mm long, c. 1.5 mm wide, with a blunt apical lobe 0.4–0.6 mm long. *Anther* c. 1 mm long, erostrate. *Pollinia* oblong, c. 1.3 mm long. *Stigma* narrowly elliptic, c. 5 mm long, c. 1 mm wide. *Capsules* not seen.

Distribution and ecology: Currently known only from sites in the Robe-Lake George-Lake St Clair area of south-eastern South Australia where it grows in deep white sand on stabilised dunes in tall dense coastal scrub. The flowers are possibly self-pollinating but this requires verification. Alt. 2–10 m. Flowering: July to September.

Recognition: Characterised by small (11–14 x 4–5 mm), very pale whitish green flowers with light green stripes, sepal tips light brownish, elliptical synsepalum, petals with well-developed basal flanges, narrow, thin, nearly flat, pale green labellum, most of the surface covered with short beaded siliceous cells, sometimes a few short acicular cells near the base, the basal mound poorly developed, short and rounded without a prominent lobe.

Similar species: This species is most similar to *B. flavovirens* which has brighter green flowers with a thicker, yellowish green labellum with

incurved margins and a basal mound with a short erect lobe. Both species also grow in very different habitats and soil types.

Conservation Status: Apparently of restricted distribution but poorly known; suggest IVK according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *littoralis*, pertaining to the sea shore, in reference to its coastal habitat.

Other specimens: SOUTH AUSTRALIA: Lake George, 4 July 1988, *R.Bates* (CANB); *ibid*, 31 July 1992, *P.Branwhite* (*D.L.Jones 9733*) (CANB); *ibid*, 11 July 1995, *P.Branwhite* (*D.L.Jones 14028*) (CANB).

26. *Bunochilus prasinus* D.L.Jones, sp. nov.; affinis *B. smaragdino* (D.L.Jones & M.A.Clem.) D.L.Jones & M.A.Clem., sed floribus minoribus; synsepalo elliptico; labello angusta oblongo marginibus parallelis; basi labelli cellulis brevibus acicularibus differt; affinis quoque *B. flavovirenti* D.L.Jones, sed plantis multo robustibus; floribus majoribus et viridis atrioribus; labello latiore, differt.

Type: South Australia. Sherlock, 30 Aug. 1999, *D.L.Jones 16550 & M.Garratt* (holo CANB 607142).

Description: *Rosette* stalk 20–60 mm long; leaves 3–5, ovate to ovate-lanceolate, 7–50 mm long, 4–15 mm wide, margins entire or crenulate; petioles 0.4 mm long. *Flowering plants* 10–35 cm tall; stem leaves 4–7, narrowly ovate-lanceolate, 10–60 mm long, 3–9 mm wide. *Flowers* 1–8, 11–15 mm long, 4–6 mm wide, translucent green with prominent darker green stripes, shiny. *Dorsal sepal* 11–18 mm long when flattened, shallowly curved, tip brownish. *Synsepalum* elliptical, 10–16 mm long, 4–6 mm wide, flat or convex, deeply notched (3–4 mm deep), tips divergent, 2.5–3 mm apart, brown to orange-brown. *Petals* obliquely oblong, 12–15 mm long, 2.5–3.5 mm wide, with well-developed basal flanges. *Labellum* oblong, 5.5–6.5 mm long, 2–3 mm wide, green with a darker green central stripe; surface cells rounded and bead-like, short acicular cells towards the base; basal mound short, erect, similar colour to lamina; margins parallel or sometimes shallowly concave; lateral lobes well-developed, erect to incurved; midlobe 1–1.5 mm long, narrowly notched, the lobes obtuse to acuminate, apex upcurved. *Column* 10–13 mm long, curved; wings 3–3.5 mm long, c. 1.7 mm wide, with a blunt apical lobe 0.4–0.5 mm long. *Anther* c. 1.2 mm long, erostrate. *Pollinia* oblong-clavate, c. 2 mm long. *Stigma* narrowly scutiform, 5–6 mm long, 1.5–2 mm wide. *Capsules* ovoid-obovoid, 10–13 mm long, 6–7 mm wide.

Distribution and ecology: Occurs in north-western Victoria and adjacent areas of the Murray district of South Australia. This species commonly grows in small groups in taller mallee communities and mixed mallee-*Callitris*

shrubland. Soils are mainly sands, often with ironstone nodules, and red terra rossa over sheet limestone. Alt. 50–200 m. Flowering: July to September.

Recognition: Characterised by relatively large (10–17 x 4–6 mm), translucent green, shiny flowers with prominent darker green stripes, sepal tips brownish to orange-brown, synsepalum, elliptical, petals with well-developed basal flanges, labellum oblong (5–6.5 x 2–3 mm), green, with parallel margins, the surface covered with short beaded siliceous cells and short acicular cells towards the base.

Similar species: This species is most similar to *B. flavovirens* which is generally much less robust in its habit and has smaller, very pale green flowers with a narrower, oblong-obovate yellowish green labellum with incurved margins.

Conservation Status: Widely distributed and well conserved in National Parks and other reserves.

Etymology: The Greek *prasinus*, grass green, in reference to the colour of the flowers and the labellum.

Other specimens: VICTORIA: Kiata, 11 Sept. 1989, *P.Branwhite* (CANB); Nhill-Goroke Road, 28 Aug. 1990, *P.Branwhite* (*D.L.Jones* 6385) (CANB); Little Desert, 9 July 1995, *P.Branwhite* (*D.L.Jones* 14023); Little Desert, 8 Aug. 1996, *E.Foster* (ORG 150) (CANB); SOUTH AUSTRALIA: Donovans Landing, 4 July 1988, *R.Bates* 14592 (CANB); Ki Ki, 6 July 2004, *R.Bates* 62831a (CANB); Tintinara, 7 Aug. 1990, *P.Branwhite* (CANB); Ferries McDonald Conservation Park, 28 Aug. 1990, *P.Branwhite* (*D.L.Jones* 6390) (CANB); Sherlock, 20 Aug. 1993, *D.L.Jones* 11919 & *B.E.Jones* (CANB).

Taxa in need of further study:

Several populations of *Bunochilus* warrant further study. Most of these are poorly collected and represented by one or few collections in herbaria. Field studies and more specimens are needed to determine if they require formal botanical status.

1. A collection at CANB from Malua Bay in south-eastern New South Wales (*D.J.Mallinson* 115) apparently belongs to section *Macrosepalae*, the only collection of this group from a coastal site.
2. Specimens similar to *B. tunstallii* from Jervis Creek Regional Park near Albury. This species is usually coastal and the specimens at CANB have strongly striped flowers held more or less upright
3. Small-flowered specimens from near Woohlpooer in western Victoria with a thin labellum which has a large basal lobe.
4. A specimen in section *Macrosepalae* from near Guildford, Victoria, which has a distinctly rectangular labellum with a very short midlobe.
5. A December flowering taxon from Mt McIntyre in south-eastern South Australia similar to *B. chlorogrammus*.
6. A taxon from Flinders Island similar to *B. chlorogrammus* but with broadly rectangular labellum.
7. Taxon from Mambray Creek in South Australia similar to *B. chlorogrammus* but with a broadly rectangular labellum.
8. An October–November flowering taxon in section *Smaragdynae* from East Kangaloon in New South Wales with an elongated narrow labellum.
9. A late October flowering taxon from near Omeo, Victoria, possibly belonging to section *Smaragdynae*, with a narrowly obovate labellum.
10. Taxon from Lamington National Park with an obovate yellowish-brown to brown labellum.
11. Small-flowered taxon with affinities to *B. diminutus* from the Para Wirra area of South Australia

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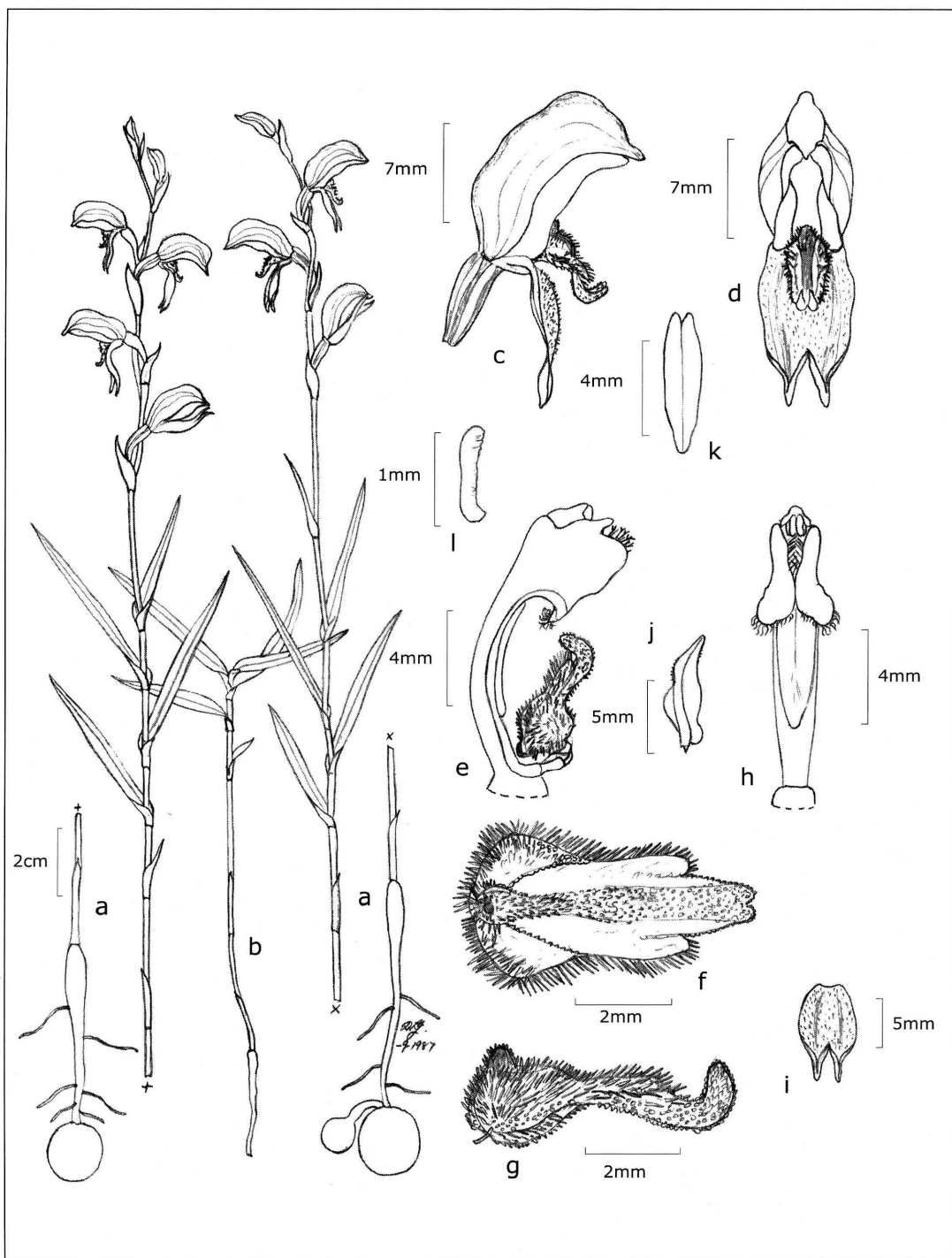
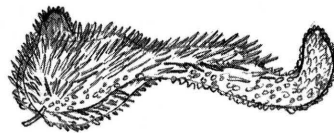
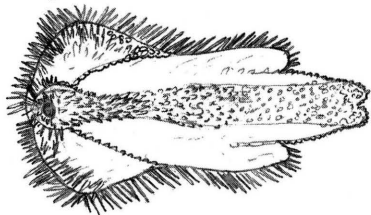
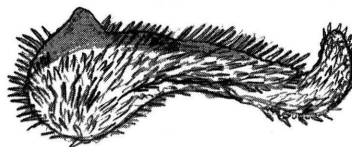
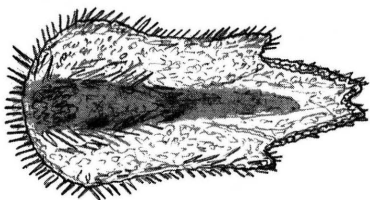


Figure 4.1. *Bunochilus longifolius*, Nowra, New South Wales, R.Tunstall. a. flowering plants; b. rosette, c. flower from side; d. flower from front; e. column and labellum from side; f. labellum from above, flattened; g. labellum from side; h. column from front; i. synsepalum; j. petal; k. stigma; l. pollinium. Drawing 9/1987 by D.L.Jones.©

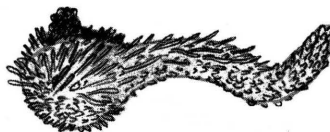
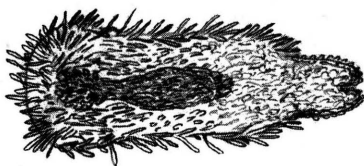
B. longifolius



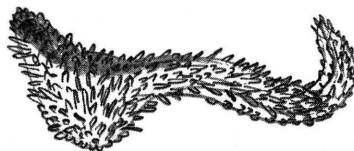
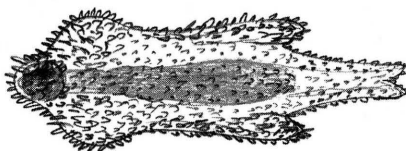
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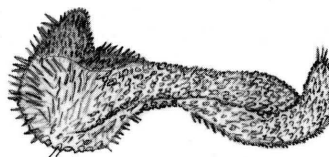
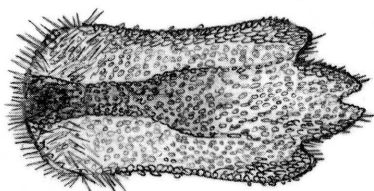
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B. macilentis



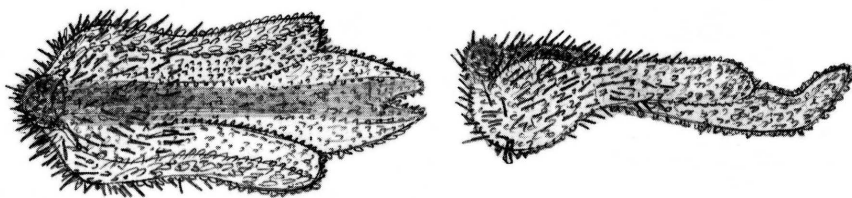
B. melagrammus



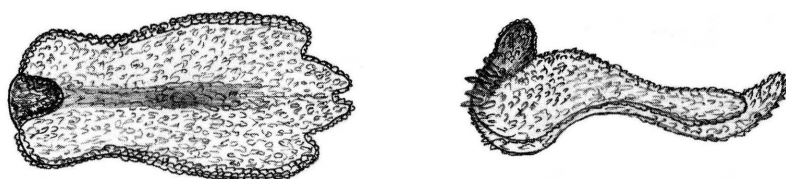
2mm

Figure 4.2. *Bunochilus* labellum comparisons.
Drawing by D.L.Jones.©

B. montanus



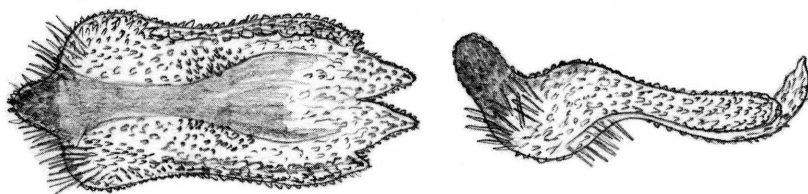
B. loganii



B. diminutus



B. barringtonensis



B. lineatus

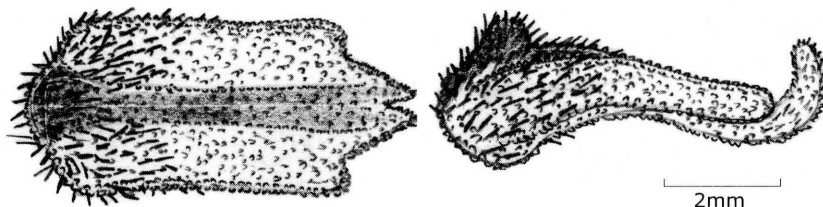
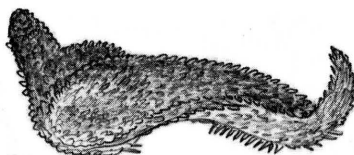
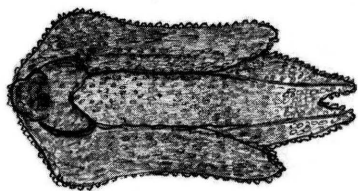
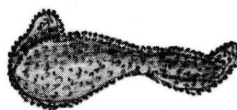
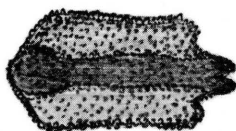


Figure 4.3. *Bunochilus* labellum comparisons.
Drawing by D.L.Jones.©

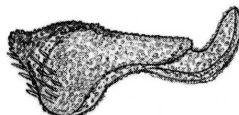
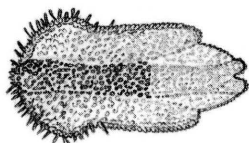
B. chocolatinus



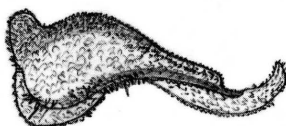
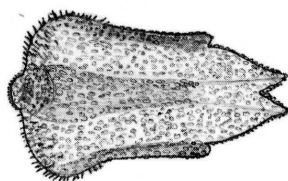
B. parvus



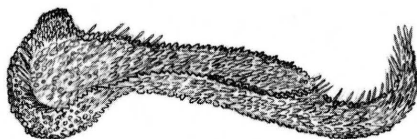
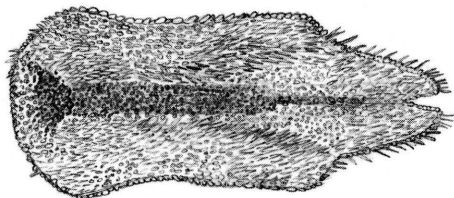
B. tunstallii



B. williamsonii



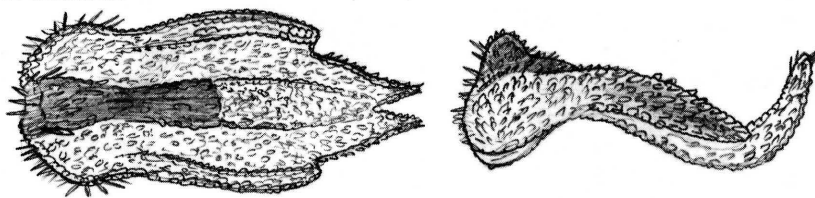
B. macrosepalus



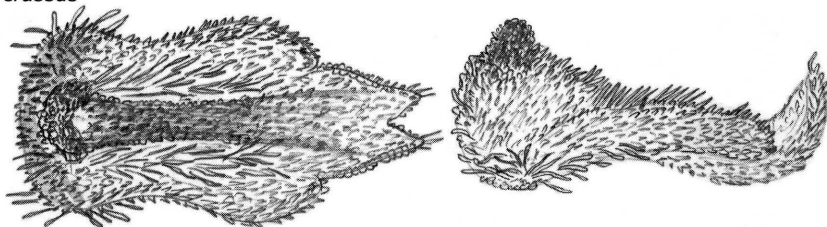
2mm

Figure 4.4. *Bunochilus* labellum comparisons.
Drawing by D.L.Jones.©

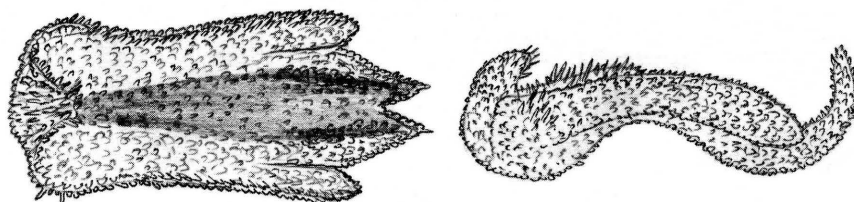
B. umbrinus



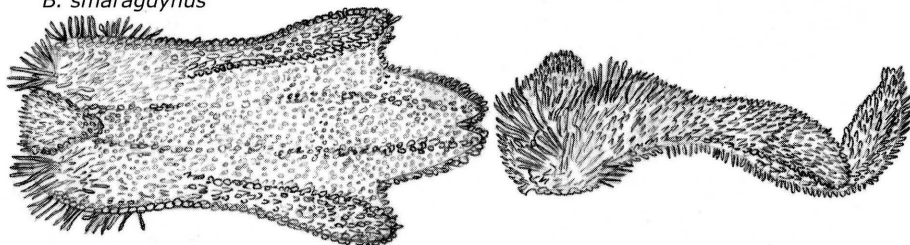
B. crassus



B. tenuis



B. smaragdinus



B. viriosus

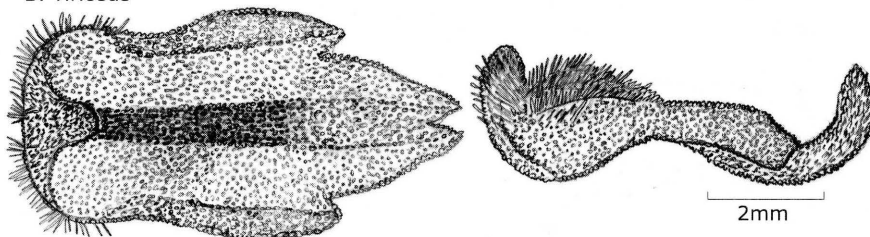
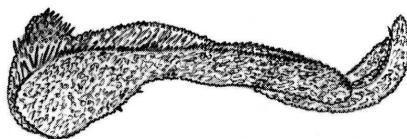
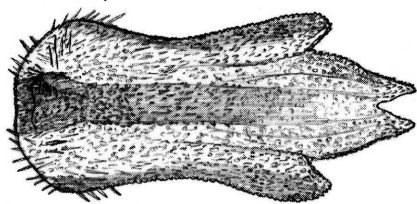
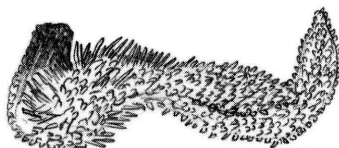
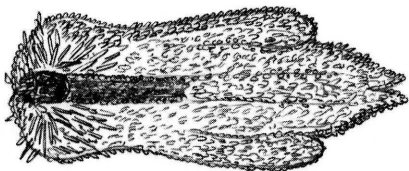


Figure 4.5. *Bunochilus* labellum comparisons.
Drawing by D.L.Jones.©

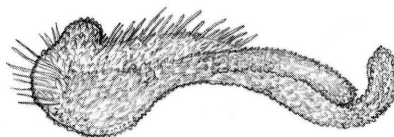
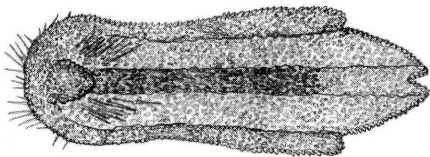
B. stenosepalus



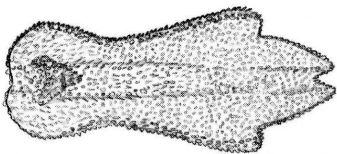
B. chlorogrammus



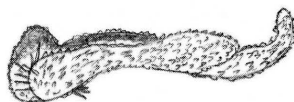
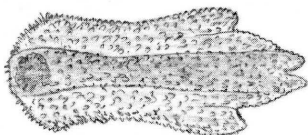
B. stenochilus



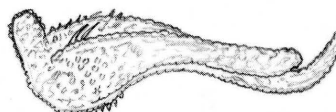
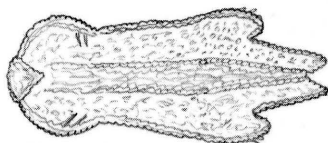
B. flavovirens



B. littoralis



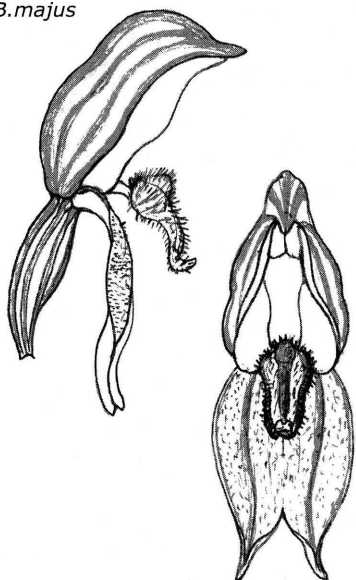
B. prasinus



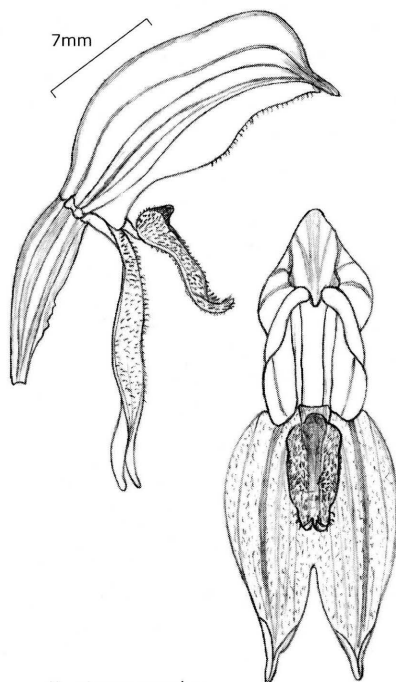
2mm

Figure 4.6. *Bunochilus* labellum comparisons.
Drawing by D.L.Jones.©

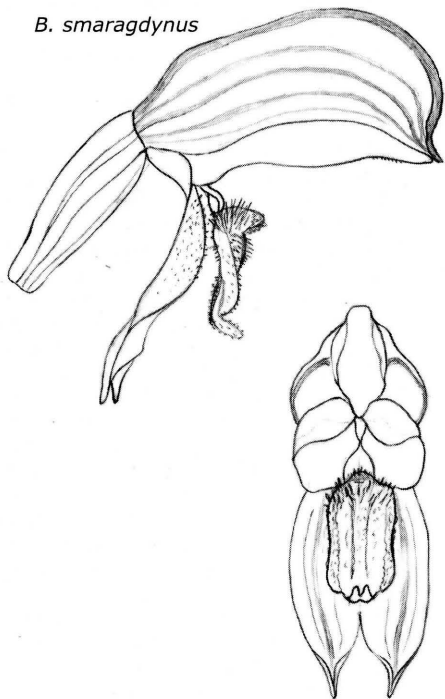
B. majus



B. macrosepalus



B. smaragdinus



B. stenosepalus

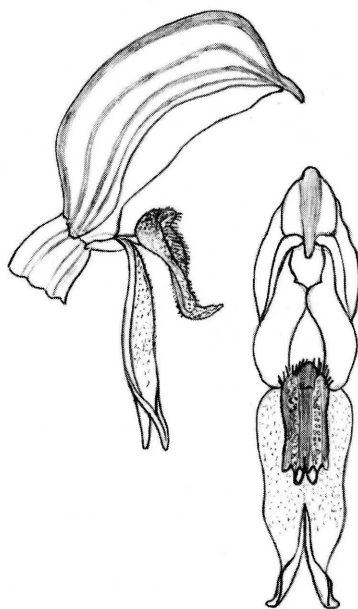


Figure 4.7. *Bunochilus* flower comparisons.
Drawing by D.L.Jones.©

Fourteen New Species of *Prasophyllum* from Eastern Australia

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ABSTRACT

Fourteen species of *Prasophyllum* from eastern Australia are described as new. These are *P. anticum* D.L.Jones & D.T.Rouse, *P. atratum* D.L.Jones, *P. barnettii* D.L.Jones & D.T.Rouse, *P. beatrix* D.L.Jones & D.T.Rouse, *P. catenemum* D.L.Jones, *P. collinum* D.L.Jones, *P. erythrocommum* D.L.Jones & D.T.Rouse, *P. gilgai* D.L.Jones & D.T.Rouse, *P. helophilum* D.L.Jones & D.T.Rouse, *P. limnetes* D.L.Jones, *P. maccannii* D.L.Jones & D.T.Rouse, *P. praecox* D.L.Jones, *P. readii* D.L.Jones & D.T.Rouse and *P. viretrum* D.L.Jones & D.T.Rouse.

INTRODUCTION

The opportunity is taken to describe 14 new species of *Prasophyllum* from south-eastern Australia. Many of these species were discussed in a report prepared for the Australian Orchid Foundation (Rouse 2002). Further papers are planned to elucidate complexes within the genus.

MATERIALS AND METHODS

This study is based on the morphological examination of fresh flowers, examination of dissected flowers mounted on cards, dried and spirit-preserved herbarium specimens and images of living flowers. Herbarium collections (spirit and dried) were examined from the following herbaria: AD, BRI, CANB, CBG, HO, MEL and NSW. Type specimens of all species having similarities or possible relationships to these new taxa have been examined. Measurements given in the descriptions are from living plants or dissected flowers on cards. Notes on distribution, habitat and ecology, were derived from our own observations. Notes on conservation status were derived from our own field work or in consultation with the relevant authorities.

TAXONOMY

1. *Prasophyllum anticum* D.L.Jones & D.T.Rouse, *sp. nov.*; affinis *P. diversiflorum* Nicholls, sed florescentia superiore; floribus majoribus; labello majore; callo oblongo canaliculato, columninibus lateralibus duobus, differt.

Type: Victoria. Pretty Hill Flora Reserve, near Orford, 1 Nov. 2000, A.Pritchard & E.Foster (ORG 3155) (holo CANB; iso MEL).

Illustrations: Plate 35, Rouse (2002), as *Prasophyllum* sp. aff. *diversiflorum*; top left plates, page 128, Jeanes & Backhouse (2004), as *Prasophyllum* sp. aff. *diversiflorum*1.

Description: Tuberous terrestrial herb growing as scattered individuals. *Tubers* not seen. *Leaf* erect, 20–40 cm long, 3–6 mm wide, terete, dark green, base 3–4 mm

diam., reddish-purple; free lamina erect, 15–25 cm long, withered towards the apex at anthesis. *Inflorescence* a moderately dense to dense spike 6–12 cm long. *Floral bracts* transversely ovate, 1.5–2 mm long, 2–2.5 mm wide, closely embracing the ovary, apex bluntly apiculate. *Ovaries* at about 40° to the rachis, obovoid, 5–6 mm long, c. 3 mm wide, green. *Flowers* 10–c.25, 7–9 mm across, greenish brown to brownish with a white labellum, lightly fragrant, sessile. *Dorsal sepal* ovate-lanceolate, 7–8.5 mm long, 3–3.5 mm wide, deflexed, shallowly concave to flat, sometimes recurved distally, apex shortly apiculate, with 3–5 distinct darker veins. *Lateral sepals* free, linear-lanceolate, 9–10.5 mm long, 2.3–2.8 mm wide, obliquely erect, widely divergent, shallowly recurved distally, base not gibbous, distal margins involute, apex horn-like, darker than the rest of the sepal. *Petals* oblong-lanceolate, porrect to spreading, 7.5–8.5 mm long, c. 2 mm wide, entire, white with a reddish central band, apex obtuse to subacute. *Labellum* sessile, obliquely erect in the proximal half, recurved at about 90° just above the middle, distal half erect, the tip protruding through the lateral sepals; lamina broadly broadly ovate-lanceolate, 6.5–7 mm long, 4.5–5 mm wide, white, base not gibbous, proximal margins flared, entire to slightly irregular, minutely papillate, tapered from just below the middle to the apex, distal margins slightly undulate-crispate, apex bluntly apiculate. *Callus* oblong-ovate, extending two-thirds of the distance to the labellum apex, fleshy, c. 4 mm long, c. 2.5 mm wide, dark green proximally, rest bright green to pale green, shiny, channelled proximally with two flanking ridges, constricted slightly above the middle, the apex shallowly emarginate and minutely papillate. *Column* porrect from the end of the ovary, c. 4 mm long, c. 3.5 mm wide; appendages oblong, c. 3 mm long, c. 1 mm wide, slightly falcate, slightly divergent, apex obtuse, about as long as the stigmatic plate. *Anther* ovate, c. 2.3 mm long, c. 1.5 mm wide, burgundy. *Pollinarium* c. 3.3 mm long; viscidium ovate, c. 0.3 mm long; hamulus narrowly ligulate, c. 1.3 mm long; pollinia c. 2 mm long, yellow, sectile. *Stigma* quadrate, c. 2 mm long, c. 2 mm wide, the rostellum of equal height to the appendages. *Capsules* not seen. **Fig. 5.1.**

Distribution and ecology: Known only from the type locality where it grows in grassland on moist to wet, black basaltic loam. Alt. c. 50 m. Flowering: Late October and November.

Recognition: *Prasophyllum anticum* is a sturdy species with crowded spikes of brownish-green flowers having a contrasting white labellum, widely divergent, obliquely erect lateral sepals, each with a prominent dark horn-like tip; an obliquely erect labellum with the apex recurved at about 90°; the labellum when flattened is broadly ovate-lanceolate, tapering from just below the middle to the apex, minutely papillate, undulate-crispate margins; and, a smooth, oblong callus channelled at the base, with two flanking ridges.

Similar species: This species is similar to *P. diversiflorum* but flowering in October-November (December-January for *P. diversiflorum*), with much larger flowers, a broader voluminous cream to white labellum and a channelled callus flanked on each side by a low ridge.

Notes: This species grows sympatrically with *P. viretrum*, also described as new in this paper but flowers earlier, just finishing as the latter species is starting.

Conservation status: Known only from the type locality which is reserved; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *anticus*, earlier, foremost, in reference to the early flowering habit when compared with *P. diversiflorum*.

Other specimen: VICTORIA. Pretty Hill Flora Reserve, 6 Nov. 2001, D.T.Rouse 81 (CANB).

2. *Prasophyllum atratum* D.L.Jones, sp. nov.; affinis *P. rostratum* Lindl. sed floribus minorissimis, atrationis; labello brevi, basiliter suborbiculari, apicaliter attenuato; callo planiore; hamulo brevissimo vel vestigiali, differt.

Type: Tasmania. Three Hummock Island, Telecom Airstrip, 40°25'S, 144°55'E, 4 Nov. 2001, P.Tonelli (ORG 3754) (holo CANB; iso HO).

Description: Slender tuberous terrestrial herb growing singly or in loose groups. *Tubers* not seen. *Leaf* erect, 12-40 cm long, 3-5 mm wide, terete, dark green, base 3-5 mm diam., reddish to purple; free lamina suberect, 8-15 cm long, usually partly withered at anthesis. *Inflorescence* a well-spaced to moderately dense spike 5-10 cm long. *Floral bracts* transversely ovate, 2 mm long, c. 2.6 mm wide, closely embracing the ovary, apex bluntly apiculate. *Ovaries* at about 30° to the rachis, obovoid, 3-4 mm long, c. 2 mm wide, bright green to blackish. *Flowers* 8-25, 5-7 mm across, brownish green to purplish green, the labellum darker than the other segments, opening widely, fragrant, sessile to subsessile. *Dorsal sepal* ovate-lanceolate, 5-7 mm long, 3-3.5 mm wide, deflexed, with 3 darker veins, apex subacute to acuminate. *Lateral sepals* free

or united at the base, linear-lanceolate, 5.5-7.5 mm long, 1.5-2 mm wide, erect or recurved, base not gibbous, distal margins involute, apex entire or slightly bidentate. *Petals* porrect to incurved, linear to narrowly linear-lanceolate, 5-7 mm long, 1.2-1.5 mm wide, apex obtuse. *Labellum* very shortly stalked, porrect in the basal half, distal half recurved at right angles, the tip not projecting through the lateral sepals; basal claw reduced, c. 0.4 mm long, c. 1.2 mm wide; lamina more or less broadly ovate-lanceolate in outline when flattened, 4.5-5.5 mm long, 3-4 mm wide, dark brownish purple; proximal half almost orbicular, suddenly constricted just above the middle and ending in a tapered tail-like section 2.5-3 mm long; base shallowly gibbous; proximal margins flat, entire; distal margins entire or slightly irregular. *Callus* ovate-lanceolate, 4-5 mm long, c. 3 mm wide, raised, fleshy, greenish purple, channelled centrally, margins entire or crenate, narrowed beyond the bend and extending to 1.5 mm of the labellum apex, distally slightly rugose. *Column* porrect from the end of the ovary, c. 2.5 mm long, c. 2.3 mm wide, partly exposed when viewed from the side; appendages linear-oblong, c. 3 mm long, c. 1 mm wide, reddish or purplish, parallel; apex truncate, slightly shorter than the stigmatic plate. *Anther* ovate, c. 2 mm long, c. 2.5 mm wide, purplish brown. *Pollinarium* c. 1.8 mm long; viscidium ovate, c. 0.2 mm long, white; hamulus vestigial; pollinia c. 1.4 mm long, yellow, setile. *Stigma* quadrate, c. 1.4 mm long, c. 2 mm wide, the rostellum about as high as the appendages. *Capsules* obovoid, 7-8 mm long, 4-5 mm wide, shiny, greenish to purplish. **Fig. 5.2.**

Distribution and ecology: Apparently endemic on Three Hummock Island in Bass Strait, Tasmania, but possibly also extending to north-western parts of Tasmania and King Island. On Three Hummock Island the species grows in mowed heath on the edge of an old airstrip in grey sandy loam. Alt. c. 20 m. Flowering: October and November.

Recognition: *Prasophyllum atratum* is recognised by the relatively small, dark-coloured flowers, free lateral sepals (occasionally connate at the base), short labellum which is nearly orbicular at the base and with an extended tail-like apex, broad column wings with a truncate apex and pollinarium with a very short or vestigial hamulus.

Similar species: *Prasophyllum atratum* is allied to *P. rostratum* but this latter species can be distinguished by larger greenish to greenish-brown flowers; longer, broader, more prominently tapered, often falcate lateral sepals; labellum lamina elliptical in the proximal half, suddenly contracted medially and ending in a sharply tapered tail-like distal portion which is often recurved towards the lateral sepals; a thick labellum callus which is swollen and almost bulbous towards the apex; and, a pollinarium with a distinct hamulus.

Notes: This species was brought to the senior author's (DLJ) attention by Peter Tonelli, who has made all the collections of the species to date. About 70 plants are known from along the margins of an old Telecom airstrip which is maintained by slashing. The surrounding heathland, which probably contains more plants of the *Prasophyllum*, has not been burnt for about 10 years and is now very dense (Peter Tonelli pers. comm.).

Conservation status: Currently known only from Three Hummock Island in Bass Strait; the whole island is a Nature Reserve and there are now no domestic stock animals grazing on the island so any current threats are minimal; a conservation status of 2VC, according to the criteria of Briggs & Leigh (1996), seems appropriate.

Etymology: The Latin *atratus*, dressed in black, in reference to the dark flower colour.

Other specimens: TASMANIA. Three Hummock Island, 7 Nov. 1999, *P.Tonelli* (ORG 2830 & 2831) (CANB); *ibid*, 12 Nov. 2002, *P.Tonelli* & *A.Dalgleish* (ORG 4096) (CANB).

3. *Prasophyllum barnettii* D.L.Jones & D.T. Rouse, sp. nov.; affinis *P. rostratum* Lindl. sed floribus minores et colorato vividius; labello pauciore, basiliter latiore et argute contracto; callo contracto; lamina stigmatica quam anthera longiore, differt.

Type: Victoria. Anglesea, Messmate Track, below Mt Ingoldsby, 19 Nov. 2001, *D.T.Rouse* 95 (holo MEL).

Illustrations: Bottom plates, page 209, Jeanes & Backhouse (2001); plates 39a-c, Rouse (2002) – as *P. sp. aff. pyriforme* A.

Description: Slender tuberous terrestrial herb 20–35 cm tall, growing singly or in loose groups. *Tubers* not seen. *Leaf* erect, 12–30 cm long, 2–4 mm wide, terete, green; base 2–3 mm diam., purple; free lamina suberect, 8–12 cm long, sometimes partly withered at anthesis. *Inflorescence* an open to densely crowded spike 7–12 cm long. *Floral bracts* obovate, 2.5 mm long, c. 2.6 mm wide, closely embracing the ovary; apex acute. *Ovaries* at about 30° to the rachis, obovoid, 4–6 mm long, 2–2.5 mm wide, bright green. *Flowers* 12–30, 6–8 mm across, yellowish green to reddish or brownish with reddish-brown stripes and markings, pink, red or white in the labellum, fragrant, opening widely, subsessile. *Dorsal sepal* ovate-lanceolate, 7–9.5 mm long, 3–4 mm wide, porrect to deflexed, darkening towards the tip and with 3 darker veins; apex acuminate. *Lateral sepals* free or connate basally, linear-lanceolate, 8–10.5 mm long, 1.5–2 mm wide at the base, tapered evenly to the apex, slightly falcate, straight or recurved distally; base not gibbous; distal margins involute; apex entire, usually

bidentate. *Petals* porrect, incurved distally, linear to linear-lanceolate, 6.5–8 mm long, 1–1.3 mm wide, apex subacute. *Labellum* very shortly stalked, porrect to obliquely erect in the proximal half, distal half recurved at right angles, the tip erect and not projecting through the lateral sepals; basal claw reduced, c. 0.5 mm long, c. 1.2 mm wide; lamina 6.5–8 mm long, 3.5–4.5 mm wide, ovate-lanceolate in outline when flattened; base not gibbous; proximal two-thirds widest, ovate-elliptical, the margins entire or slightly irregular, constricted just above the middle; apical part sharply tapered c. 2–3 mm long; distal margins slightly irregular; apex acute. *Callus* narrowly ovate-lanceolate, broad at the base then tapered to the apex, extending to within c. 1–1.5 mm of the labellum apex, 5.5–6 mm long, c. 2–3 mm wide, raised, fleshy, green or red; basal part channelled centrally, margins entire; apex obtuse. *Column* porrect from the end of the ovary, c. 2.6 mm long, c. 2.5 mm wide, partly exposed when the flower is viewed from the side; appendages as long as the stigmatic plate, linear, c. 2.2 mm long, c. 0.6 mm wide, greenish, straight; apex acute. *Anther* ovate, c. 2 mm long, c. 2 mm wide, brownish or purplish. *Pollinarium* c. 2.3 mm long; viscidium ovate, c. 0.2 mm long, white; hamulus 0.4 mm long; pollinia c. 1.8 mm long, yellow, sectile. *Stigma* quadrate, c. 1 mm long, c. 2 mm wide, the rostellum as high as the appendages. *Capsules* not seen.

Fig. 5.3.

Distribution and ecology: Apparently restricted to central parts of southern Victoria to the south-west of Melbourne. Grows in dense shrubby or heathy forest in near-coastal areas in well-drained grey sandy loam. Flowering in this species is dramatically stimulated by summer fires and mowing or slashing can also induce flowering. Flowering plants can also occur on sites of disturbance such as road verges, embankments or track margins. The shrubby habitat quickly becomes dense again after a burn, indeed to such an extent that no plants of *P. barnettii* can be found 2–3 years after a fire (*P. Barnett* pers. comm.). Alt. 10–50 m. Flowering: October to December.

Recognition: *Prasophyllum barnettii* can be recognised by its relatively small, colourful flowers (brownish, reddish or pink tones); short, broad, sharply tapered labellum; thick tapered callus; and a column with the stigmatic plate longer than the anther but of similar length to the column wings.

Notes: Rouse (2002) listed this species as *Prasophyllum sp. aff. pyriforme* A.

Conservation status: Of restricted distribution but apparently conserved in Crinoline Creek Flora and Fauna Reserve (Rouse 2002) and reported to be locally common after fire (pers. comms. E. Foster and P. Barnett); we suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: Named after Paul Barnett (1927-1996), avid naturalist with a special passion for Australian native orchids. Paul was gifted with a very discerning eye and in his travels discovered many plant species new to science.

Other specimens: VICTORIA: Corner of Sandpit Rd and Lower Gellibrand Rd, 26 Nov. 1981, *P. Barnett* (*D.L.Jones* 8575) (CANB); Anglesea, coal mining area, 3 Dec. 1993, *E. Foster* (*D.L.Jones* 12709) (CANB).

4. *Prasophyllum beatrix* D.L.Jones & D.T.Rouse, *sp. nov.*; affinis *P. odorato* R.S.Rogers sed habitu multo validiore; floribus numerosioribus, congestis et multo magnioribus; periantho partibus longioribus; labello multo longiore et latiore, acute recessim recurvato infra medium; et callo elliptico et latiore, differt.

Type: New South Wales. Buckingbong State Forest, 26 Sep. 2000, *D.L.Jones* 17526 & *K.J. FitzGerald* (holo CANB; iso AD, MEL, NSW).

Illustration: Plates 18a, b, Rouse (2002), as *P. sp. aff. odoratum* N.

Description: Tuberous terrestrial herb growing singly. *Tubers* not seen. *Leaf* terete, 20-50 cm long, 4-8 mm wide, dark green, shiny; base c. 3-4 mm across, purple; free lamina erect, 15-25 cm long, often distally withered at anthesis. *Inflorescence* a dense spike 5-12 cm long, consisting of c. 8-35 flowers. *Floral bracts* oblong-ovate, c. 4 mm long, 4 mm wide, closely embracing the ovary; apex apiculate. *Ovaries* at 20-30° to the rachis, obovoid, 6-9 mm long, 2.5-3.3 mm wide, green, shiny. *Flowers* lemon scented, subsessile to shortly pedicellate, 11-14 mm diam., dark greenish brown to purplish brown with white and greenish petals and a white labellum. *Dorsal sepal* porrect to decurved, narrowly ovate-lanceolate, 10-12 mm long, 4-4.5 mm wide, with three to five fine dark nerves; apex somewhat attenuate. *Lateral sepals* free, obliquely erect to erect, divergent, linear-lanceolate, 10-12 mm long, 2-2.2 mm wide, not gibbous, falcate; distal margins involute; apex entire. *Petals* obliquely erect, linear to linear-tapered, 10.5-14 mm long, 1.6-2 mm wide, greenish to brownish in proximal half, white distally; distal margins slightly irregular; apex obtuse. *Labellum* sessile, porrect in the proximal half, recurved sharply back on itself at more than 90° near the middle; apex protruding prominently through the lateral sepals; *lamina* oblong-lanceolate when flattened, 12-15 mm long, 5.5-7 mm wide, white; base not gibbous; proximal margins entire; distal margins strongly undulate/crispate; apex acute to acuminate. *Callus* oblong-elliptic, 6-7 mm long, 2.5-3.3 mm wide, yellowish green, with a dark green basal area; apex entire. *Column* porrect from the end of the ovary, c. 5 mm long, c. 4.5 mm wide, white; appendages narrowly oblong-tapered, c. 3.5 mm long, c. 1 mm wide, curved, white; apex obtuse. *Anther* as long as the stigmatic plate, ovate, c. 3 mm long, c. 2.2 mm wide, dark purple. *Pollinarium* c. 3.6 mm long; viscidium ovate-elliptic, c. 0.5 mm long; hamulus broadly ligulate, c. 0.7 mm long; pollinia c. 3 mm long, yellow, sectile. *Stigma* quadrate, c. 2 mm long, c. 2.5 mm wide; rostellum higher than the appendages. *Capsules* not seen. **Fig. 5.4.**

Distribution and ecology: Occurs in the South-western Slopes and South-western Plains of southern New South Wales. Probably once widely distributed in this region but now restricted to remnant patches of vegetation and with its main distribution centred on Buckingbong State Forest near Narranderra. Grows in woodland dominated by *Callitris glaucophylla* in well-drained red sandy loam; the groundcover is mostly sparse consisting mainly of annual forbs with exotic weeds prominent in some areas. Alt. 120 – 200 m. Flowering: September and October.

Recognition: Robust inland leek orchid with large leaves and crowded racemes of large lightly-scented flowers with widely divergent, greenish-brown to brown lateral sepals, decurved narrowly ovate-lanceolate dorsal sepal, very narrow, erect tapered petals and a long narrow white labellum sharply recurved back on its self near the middle and with strongly undulate-crispate margins. The callus is relatively short, small, and entire at the apex.

Similar species: *Prasophyllum odoratum* is much less robust with fewer, much smaller, less crowded flowers; shorter perianth parts; a much shorter narrower labellum which is not as sharply recurved near the middle; and, a narrower callus which tapers from near the base to the apex.

Conservation status: Relatively widely distributed but apparently not conserved; suggest 3V according to Briggs & Leigh (1996).

Etymology: Derived from the Latin *beatrix*, makes happy, in reference to the pleasant feelings engendered when finding this species in its natural habitat.

Other specimens: Buckingbong State Forest, 18 Sept. 1998, *P. Branwhite* (*ORG* 1560) (CANB); Lonesome Pine State Forest, 27 Sept. 2000, *D.L.Jones* 17537 & *K. FitzGerald* (CANB); Yarranjerry State Forest, 25 Sept. 2005, *D.L.Jones* 19255 & *B.E.Jones* (CANB); 3 km E of Moomboldool, beside road to Ardlethan, 28 Sept. 1993, *D. Mallinson* 296 (CANB); *ibid*, 20 Oct. 1995, *D. Mallinson* 418 (CANB); *ibid*, 7 Oct. 2003, *D. Mallinson* 685 (CANB); Buckingbong State Forest, Sept. 2000, *D.T.Rouse* (*ORG* 3111) (CANB); Currajong State Forest, 6 Oct. 2003, *D.T.Rouse* 165 (CANB); Yarranjerry State Forest, 19 Sept. 2004, *D.T.Rouse* 190, (CANB).

5. *Prasophyllum catenemum* D.L.Jones, *sp. nov.*; affinis *P. odorato* R.S.Rogers sed habitu brevior; folio pallido-viridi, nitido; sepalis dorsali anguste ovato; sepalis lateralibus angustioribus; labello anguste oblongo-elliptico; callo angustiore, contracto; et columna alis angustioribus, contractis, differt.

Type: South Australia. About 22 km N of Streaky Bay township towards Ceduna, 8 Sept. 2000, *D.L.Jones 17451 & M.Garratt* (holo CANB; iso AD, MEL, NSW).

Description: Tuberous terrestrial *herb* growing singly. *Tubers* ovoid to globose, 8–14 mm long, 7–10 mm wide. *Leaf* terete, 15–30 cm long, 2–4 mm wide, pale green, shiny; base c. 2–3 mm diam., reddish purple; free lamina erect, 9–15 cm long, usually distally withered at anthesis. *Inflorescence* a dense spike 5–8 cm long, consisting of c. 6–20 flowers. *Floral bracts* transversely ovate, 1.5–2 mm long, c. 2.4 mm wide, closely embracing the ovary; apex obtusely apiculate. *Ovaries* at 20–30° to the rachis, obovoid, 5–6 mm long, 2.5–3 mm wide, green, shiny. *Flowers* strongly lemon-scented, sessile to subsessile, 8–10 mm diam., green to purplish with white and green to purplish petals and a white labellum. *Dorsal sepal* decurved, ovate-lanceolate, 6.5–10 mm long, 3–5 mm wide, with three fine darker nerves; apex apiculate to acuminate. *Lateral sepals* free to partially connate, obliquely erect, linear-lanceolate, 8–10 mm long, 1.5–2.2 mm wide, not gibbous, straight or slightly falcate; distal margins involute; apex entire. *Petals* perrect to spreading, linear, 7–8 mm long, 1–1.5 mm wide, with green to purplish central suffusions; distal margins slightly dilated; apex obtuse. *Labellum* sessile, obliquely erect in the proximal half, recurved at right angles near the middle; apex approaching the lateral sepals; *lamina* broadly elliptic-oblong to broadly ovate-lanceolate when flattened, 7.5–9.5 mm long, 4.5–6 mm wide, white; base not gibbous; proximal margins entire, broadly rounded; distal margins entire or slightly undulate/crispate; apex obtusely apiculate. *Callus* more or less ovate-oblong, 4.5–5 mm long, 2–2.5 mm wide, yellowish green, with a dark green basal area; apex irregular. *Column* perrect from the end of the ovary, c. 3.2 mm long, c. 3 mm wide; appendages oblong, c. 2.5 mm long, c. 1 mm wide, slightly falcate, white; apex obtuse to truncate. *Anther* much shorter than the stigmatic plate, ovate, c. 2 mm long, c. 1.5 mm wide, brownish purple to dark purple. *Pollinarium* c. 3 mm long; viscidium ovate-elliptic, c. 0.4 mm long; hamulus broadly ligulate, c. 0.8 mm long; pollinia c. 2 mm long, yellow, sectile. *Stigma* quadrate, c. 1.4 mm long, c. 1.5 mm wide, set very high on the column; rostellum higher than the appendages. *Capsules* not seen. **Fig. 5.5.**

Distribution and ecology: Restricted to coastal dunes around the margins of Streaky Bay and Smoky Bay, South Australia, more or less between Perlubie Hill and Laura Bay. It grows in shrubland adjacent to towering unstable sand dunes that are constantly moving and engulfing the adjacent shrubland. The shrubland is relatively sparse and consists of *Acacia* spp., *Geijera linearifolia*, *Olearia* spp., *Maireana* spp. and occasional mallee eucalypts, with scattered clumps of *Triodia* sp. and *Austrostipa* sp. The soil is a deep white sand. Alt. 3–10 m. Flowering: September and October.

Recognition: Slender coastal leek orchid with a dense crowded spike of lemon-scented flowers with free or partially connate, green to purplish-brown, non-gibbous lateral sepals, decurved ovate-lanceolate dorsal sepal, spreading oblong petals and a relatively short, broad white labellum which is not gibbous at the base, sharply recurved near the middle with entire to slightly undulate-crispate margins. The callus is relatively narrow and irregular at the apex.

Similar species: *Prasophyllum odoratum* is generally taller growing than this new species with slender dark green leaves. It has similar flowers to *P. catenemum* but with a narrowly ovate dorsal sepal, narrower lateral sepals, a narrowly oblong-elliptic labellum (to 11 mm x 4 mm) with a narrow, tapered callus (c. 7 mm x 2.3 mm). It also has narrower, tapered column wings. The habitats of both species are very different with *P. odoratum* growing in shrubby forest and woodland in loamy soils.

Notes: *Prasophyllum catenemum* has adapted to a habitat which is largely unstable due to continual encroachment by loose drifting sand. The orchid apparently survives by growing, flowering and reproducing in those parts of the habitat which are relatively stable and takes the opportunity to colonise new sites as they become sufficiently stable to support new populations of the species.

Conservation status: Restricted to an unstable habitat and not known to be conserved; some of the dune system is being planted with exotic grasses, presumably for stabilisation purposes; suggest 2V according to Briggs & Leigh (1996).

Etymology: Derived from the Greek *catenemos*, wind-blown, in reference to the unusual habitat of this species.

6. *Prasophyllum collinum* D.L.Jones, *sp.*

nov.; affinis *P. odorato* R.S.Rogers sed foliis major; racemis floribus confertis; sepalis lateralibus olivaceis; labello lato, mediante abrupte recurvato; et callo relative lato, apicaliter inciso, differt.

Type: South Australia. Eyre Peninsula: Southern end of Mt Olinthus, 5 Sep. 2000, *D.L.Jones 17333 & M. Garratt* (holo CANB; iso AD).

Description: Tuberous terrestrial *herb* growing singly. *Tubers* ovoid to obovoid, 10–20 mm long, 8–14 mm wide. *Leaf* terete, 25–50 cm long, 6–10 mm wide, dark green, shiny; base c. 6 mm across, reddish; free lamina erect, 15–33 cm long, often distally withered at anthesis. *Inflorescence* a dense spike 8–15 cm long, consisting of c. 12–30 flowers. *Floral bracts* transversely ovate, c. 2.5 mm long, 3 mm wide, closely

embracing the ovary; apex obtusely apiculate. *Ovaries* at 20–30° to the rachis, obovoid, 3–4 mm long, 2–2.7 mm wide, green, shiny. *Flowers* lemon scented, subsessile to shortly pedicellate, 8–12 mm diam., dark greenish brown with white and greenish petals and a white labellum. *Dorsal sepal* porrect to decurved, ovate-lanceolate, 9–12.5 mm long, 4–5 mm wide, with three fine darker nerves; apex subobtusely. *Lateral sepals* free, obliquely erect to erect, divergent, linear-lanceolate, 9–14 mm long, 2–2.8 mm wide, not gibbous, straight or slightly falcate; distal margins involute; apex entire or bidentate. *Petals* porrect to slightly incurved to spreading, linear-spathulate, 9–12 mm long, 1.6–1.8 mm wide, greenish in proximal half, white distally; distal margins slightly irregular; apex obtuse. *Labellum* sessile, porrect in the proximal half, recurved sharply at more than 90° near the middle; apex just protruding through the lateral sepals; *lamina* broadly ovate-oblong to broadly ovate-lanceolate when flattened, 12–15 mm long, 6–7.5 mm wide, white; base not gibbous; proximal margins entire; distal margins strongly undulate/crispate; apex obtusely apiculate. *Callus* ovate-oblong, 6–7 mm long, 4–4.5 mm wide, yellowish green, with a dark green basal area; apex emarginate. *Column* porrect from the end of the ovary, c. 4 mm long, c. 3.2 mm wide, white; appendages narrowly oblong, c. 3.5 mm long, c. 0.7 mm wide, strongly curved, white; apex obtuse. *Anther* shorter than the stigmatic plate, ovate, c. 2.3 mm long, c. 2 mm wide, dark purple. *Pollinarium* c. 3 mm long; viscidium ovate-elliptic, c. 0.5 mm long; hamulus broadly ligulate, c. 0.9 mm long; pollinia c. 1.9 mm long, yellow, sectile. *Stigma* quadrate, c. 1.6 mm long, c. 2 mm wide; rostellum higher than the appendages. *Capsules* not seen. **Fig. 5.6.**

Distribution and ecology: Occurs in central and southern parts of Eyre Peninsula, South Australia, but possibly more widespread. Grows in sparse woodland dominated by *Allocasuarina verticillata* and occasional eucalypts; the groundcover is dominated by tussocks of *Lepidosperma* sp. and *Cheilanthes austrotenuifolia*. The orchid often occurs on the sheltered slopes of low hills. Soils include stony brown loam and red-brown loam developed on micaceous schist. Alt. 250–350 m. Flowering: September and October.

Recognition: Robust lowland leek orchid with large leaves and dense crowded racemes of shortly pedicellate, moderately large lemon-scented flowers with widely divergent, greenish-brown lateral sepals, decurved ovate-lanceolate dorsal sepal, incurved to weakly spreading linear-spathulate petals and a broad white labellum sharply recurved near the middle with strongly undulate crispate margins. The callus is relatively broad and notched at the apex.

Similar species: *Prasophyllum odoratum* is less robust with smaller, thinner leaves; fewer, less crowded smaller flowers; a much narrower labellum which is sharply recurved near the

middle; and a narrowly tapered callus which is not notched at the apex.

Conservation status: Poorly known but apparently not conserved; suggest 2V according to the criteria of Briggs & Leigh (1996).

Etymology: The Latin *collinus*, pertaining to hills; in reference to the low hills which this species apparently favours.

Other Specimens: SOUTH AUSTRALIA: Eyre Peninsula: c. 12 km from Mangalo towards Yabmana, 5 Sep. 2000, D.L.Jones 17359 & M.Garratt (CANB); Elbow Hill, 16 Sep. 1998, D.Murfet 3262 (CANB).

7. *Prasophyllum erythrocommum* D.L.Jones & D.T. Rouse, *sp. nov.*; affinis *P. occidentale* R.S.Rogers, sed floribus minoribus; petalis anguste linearibus; labello minore, callo-lamina angusta valde elevata, differt.

Type: Victoria. Yan Yean Water Reserve, 27 Oct. 2001, C. Beardsell & D. Rouse 68 (holo CANB; iso: MEL, AD, NSW).

Illustrations: Plate 63, a,b, Rouse (2002), as *P. sp. aff. occidentale* E; top left plate, page 132, Jeanes & Backhouse (2004), as *P. sp. aff. occidentale* 3.

Description: Tuberous terrestrial herb growing singly. *Tubers* not seen. *Leaf* linear-terete, 15–30 cm long, bright green, base reddish to purple; free lamina erect, usually partially withered at anthesis. *Floral bracts* elliptic-oblong, c. 2 mm long, c. 2.3 mm wide, obtusely apiculate. *Ovary* narrowly obovoid, 4–5 mm long, c. 2 mm wide, green, shiny, set at about 40° to the rachis, sessile or stalked. *Inflorescence* a narrow, loose spike 5–10 cm long, consisting of 10–30 flowers. *Flowers* 8–10 mm diam., tawny greenish brown to dark brown, opening widely, strongly fragrant. *Dorsal sepal* ovate-lanceolate, 4.5–5.3 mm long, 2–2.5 mm wide, with 3–5 darker striae, subacuminate. *Lateral sepals* free, linear-lanceolate, 5–6 mm long, 1–1.4 mm wide, recurved distally, subacuminate, distal margins involute. *Petals* obliquely erect, widely divergent, narrowly oblong-lanceolate, 4–5.5 mm long, c. 1 mm wide, with a dark central vein; apex subobtusely. *Labellum* stalked, obliquely erect in proximal half, distal half recurved at less than a right angle, apex not protruding through the lateral sepals; lamina ovate-lanceolate in outline when flattened, 4–5 mm long, 2–3 mm wide, pale green to pinkish, shallowly gibbous at the base when viewed from the side; margins entire or slightly irregular; apex obtusely attenuate, straight or sometimes recurved. *Callus* ovate-lanceolate, fleshy, brown, margins entire, prominently thickened and fleshy in distal third, extending to 1 mm from the labellum apex. *Column* porrect from the end of the ovary, c. 2 mm long, c. 3 mm wide; appendages oblong, c. 1.5 mm long, c. 1 mm wide, pale green, obtuse. *Anther* ovate, c. 1.7 mm long, c. 1.3 mm wide, dark brown. *Pollinarium* c. 1.2 mm long; viscidium ovate, c.

0.1 mm long, white; hamulus ligulate, c. 0.1 mm long; pollinia 4, linear-clavoid, c. 1 mm long, yellow, sectile. Stigma transversely quadrate, c. 1 mm long, c. 1 mm wide, the rostellum slightly lower than the appendages. Capsules not seen. **Fig. 5.7.**

Distribution and ecology: Known only from the type locality which is an open grassy flat in cleared woodland which was probably originally covered with Red Gum, *Eucalyptus camaldulensis*. The soil is a water-retentive dark brown clay loam. Alt. c. 200 m. Flowering: October and November.

Similar species: This species is similar to the earlier flowering *P. occidentale* R.S.Rogers, but with smaller flowers, narrowly linear petals, and a smaller labellum with a narrow, strongly raised callus plate.

Notes: The flowers of *P. erythrocomma* readily emit a sickly sweet smell in warm weather.

Conservation status: Possibly once widespread in Red Gum Woodland to the immediate north of Melbourne, but this habitat has now been extensively cleared and the orchid is currently known from a single site in the Yan Yean Water catchment area; suggest 2EC by the criteria of Briggs & Leigh (1996).

Etymology: From the Greek *erythros*, red and *kommi*, gum, resin; an oblique reference to its habitat of Red Gum woodland.

8. *Prasophyllum gilgai* D.L.Jones & D.T.Rouse, *sp. nov.*; affinis *P. pyriforme* E.Coleman, sed floribus dispersis; sepalis lateralibus tenuibus, basibus liberis; petalis tenuibus; labello basi obovato, margines effusos late habent; lamina circa medio constrictissima; apice caudato; callo carnosio, fere apici pertinet, differt.

Type: Victoria. Chesney, north of Benalla, Benalla-Yarrawonga Rail Reserve, 9 Nov. 2003, D.T.Rouse 170, M.Duncan & R.Weber (holo CANB; iso MEL).

Illustrations: Top left plates, page 137, Jeanes & Backhouse (2004), as *P. sp. aff. pyriforme* 4.

Description: Slender tuberous terrestrial herb growing singly or in loose groups. Tubers not seen. Leaf erect, 20-35 cm long, 2-4 mm wide, terete, green, base 2-3 mm diam., purple; free lamina suberect, 10-15 cm long, usually partly withered at anthesis. Inflorescence an open spike 5-12 cm long. Floral bracts ovate, c. 2.5 mm long, c. 2 mm wide, closely embracing the ovary; apex bluntly apiculate. Ovaries at about 30° to the rachis, obovoid, 3-5 mm long, c. 2 mm wide, bright green. Flowers 10-20, 6-8 mm across, greenish brown with light brown, pink or white in the labellum,

opening widely, subsessile. Dorsal sepal ovate-lanceolate, 8-11.5 mm long, 3-3.5 mm wide, deflexed, with 3 slightly darker veins, apex long-acuminate. Lateral sepals free or connate at the base, narrowly linear-lanceolate, 9-12 mm long, 1-1.5 mm wide at the base then suddenly narrowed and very thin, erect or recurved, base not gibbous, distal margins involute; apex entire, acuminate or slightly bidentate. Petals porrect to incurved, linear to linear-lanceolate, 6-9 mm long, 1-1.2 mm wide, apex subacute to obtuse. Labellum very shortly stalked, porrect to obliquely erect in the proximal half, distal half recurved at right angles, the tip not projecting through the lateral sepals; basal claw reduced, c. 0.5 mm long, c. 0.7 mm wide; lamina 6-8 mm long, 4-4.5 mm wide, when flattened with a distinct basal part and a narrow, distal tail-like section, whitish or with mauve to pinkish tints; base very shallowly gibbous; proximal half widest, ovate-elliptical, the margins entire, constricted just above the middle; apical part a tapered caudate section 3.5-4.5 mm long; distal margins slightly irregular; apex acute to apiculate. Callus broad at the base, narrowed beyond the bend and extending to within c. 1 mm of the labellum apex, 6-7.5 mm long, c. 2-2.3 mm wide; base narrowly elliptic then constricted and ending in a narrow, tapered, tail-like section, raised, fleshy, greenish, channelled centrally, margins entire; apex obtuse. Column porrect from the end of the ovary, c. 2 mm long, c. 2.4 mm wide, partly exposed when the flower is viewed from the side; appendages shorter than the stigmatic plate, linear, c. 1.8 mm long, c. 0.6 mm wide, green, incurved; apex obtuse. Anther ovate, c. 1.6 mm long, c. 2 mm wide, brownish. Pollinarium c. 2 mm long; viscidium ovate, c. 0.2 mm long, white; hamulus c. 0.5 mm long; pollinia c. 1.7 mm long, yellow, sectile. Stigma quadrate, c. 1.4 mm long, c. 1.6 mm wide, the rostellum higher than the appendages. Capsules not seen.

Distribution and ecology: Known only from the type locality which is on railway reserve. The new species grows in seasonally inundated depressions (gilgais) in a relict patch of vegetation in an area which was once a plain dominated by *Eucalyptus camaldulensis*. The vegetation on the ground is dominated by grasses and forbs. The soil is a heavy grey clay loam which is saturated at the time the orchids flower. Alt. 150 m. Flowering: October and November.

Recognition: *Prasophyllum gilgai* is recognised by its widely spaced, greenish-brown flowers with light brown, pink or white in the labellum; thin lateral sepals which are free to the base; thin petals; labellum with an obovate basal area which has broadly flared margins and is then strongly constricted just above the middle and with a distal, tapered, tail-like apex; and, fleshy callus extending close to the labellum apex.

Similar species: *Prasophyllum gilgai* is similar in general appearance to *P. pyriforme* but flowers earlier, and the latter species is more robust with numerous (20-50), larger flowers (7-10 mm across)

in a crowded spike. Additionally its lateral sepals are broader, usually connate for much of their length, with free tips, and taper evenly from the base to the apex (broadest at the base then suddenly contracted and thin to the apex in *P. gilgai*). The labellum of *P. pyriforme* is ovate-lanceolate with a broad elliptical basal area, a slight central constriction and is then tapered to the apex. In shape this is quite unlike the sharply constricted labellum of *P. gilgai* with its narrow caudate apex. Additionally *P. pyriforme* grows in well-drained soils in hilly forested areas whereas *P. gilgai* grows in seasonally wet soil in flat areas in a grass-forb habitat.

Notes: This species was first noted by Louise Saunders in 1995, a botanical artist who, at that time, was living in Benalla. It was brought to the attention of the senior author by Glen Johnson, National Parks Ranger and shortly after Peter Branwhite sent specimens to CANB.

Conservation status: Restricted to a single relict population of less than 50 plants which is on a heavily weed-infested railway reserve; considered to be critically endangered (IUCN 2001).

Etymology: Gilgai is a name for a landform developed on clays which crack when dry and swell when wet, resulting in irregular mounds and potholes or crabholes; reference to the habitat occupied by the new species.

Other specimens: VICTORIA. Benalla-Yarrawonga Rail Reserve, c. 10 km NNW of Benalla, 1 Nov. 1996, G. Johnson (ORG 406, 407, 408) (CANB); *ibid*, 10 Nov. 1996, P. Branwhite (ORG 436) (CANB, MEL).

9. *Prasophyllum helophilum* D.L.Jones & D.T.Rouse, *sp. nov.* affinis *P. alpestri* D.L.Jones sed habitu minus validiore; foliis tenuioribus; floribus parviore; petalis oblongis, porrectis versus leniter effusis; labello parviore et oblongo-lanceolato; et callo angusto, differt.

Type: New South Wales. Kowmung River Trail, Kanangra Boyd National Park, 12 Jan. 2001, D.L.Jones 17788, K.J.FitzGerald, D.T.Rouse, J.Riley and R.Tunstall (holo CANB, iso NSW).

Illustration: Plate 116, Bishop (1996) - as *P. sp. aff. suttonii*.

Description: Tuberous terrestrial *herb* growing singly. *Tubers* not seen. *Leaf* terete, 15-45 cm long, 2-6 mm wide, dark green, shiny; base c. 3 mm across, whitish or purple; free lamina erect, 9-20 cm long, often distally withered at anthesis. *Inflorescence* a dense spike 4-7 cm long, consisting of c. 10-25 flowers. *Floral bracts* transversely ovate, c. 1.5 mm long, 2 mm wide, closely embracing the ovary; apex obtusely apiculate. *Ovaries* at

20-30° to the rachis, obovoid, 3-4 mm long, 2-2.7 mm wide, green, shiny. *Flowers* unscented, sessile to subsessile, 6-8 mm diam., purplish brown with white and purplish petals and a white labellum. *Dorsal sepal* porrect to decurved, elliptic-ovate, 5.5-6.5 mm long, 3-3.3 mm wide, with three fine darker stripes; apex apiculate. *Lateral sepals* connate, forming a synsepalum behind the labellum, occasionally breaking free and divergent, linear-lanceolate, 6.5-7 mm long, 1.7-2 mm wide, strongly gibbous, straight or slightly falcate, obliquely erect to erect; distal margins involute; apex entire or shortly bidentate. *Petals* porrect to slightly spreading, linear, 7.5-8 mm long, 1.6-1.8 mm wide, with purplish central suffusions; distal margins slightly irregular; apex obtusely apiculate. *Labellum* sessile, porrect in the proximal half, recurved sharply in the distal half; apex not reaching anywhere near the lateral sepals; lamina broadly oblong to oblong-lanceolate when flattened, 7-8.5 mm long, 3.6-4 mm wide, white; base shallowly gibbous; proximal margins entire; distal margins strongly undulate/crispate; apex narrowly obtuse. *Callus* more or less oblong, 4.5-5 mm long, 1.7-2 mm wide, yellowish green, with a dark green central area towards the base; apex emarginate, slightly papillate. *Column* porrect from the end of the ovary, c. 3.2 mm long, c. 2.4 mm wide, mostly purple; appendages narrowly oblong, c. 2.3 mm long, c. 0.6 mm wide, falcate, mauve-purple; apex obtuse. *Anther* much shorter than the stigmatic plate, ovate, c. 1.8 mm long, c. 1.3 mm wide, brownish purple. *Pollinarium* c. 2.5 mm long; viscidium ovate-elliptic, c. 0.3 mm long; hamulus ligulate, c. 0.8 mm long; pollinia c. 1.6 mm long, yellow, sectile. *Stigma* quadrate, c. 1.4 mm long, c. 1.5 mm wide, set very high on the column; rostellum higher than the appendages. *Capsules* not seen. **Fig. 5.9.**

Distribution and ecology: Restricted to the Boyd Plateau and Mt Werong in the Central Tablelands of New South Wales. Grows in wet swampy areas dominated by *Epacris* spp. and restionaceous plants. Soils are wet dark loams and fibrous peats. Alt. 1000-1200 m. Flowering: January and February.

Recognition: Slender montane to subalpine leek orchid with a dense crowded spike of unscented narrowly opening flowers with connate, dark purplish-brown, strongly gibbous lateral sepals, porrect to suberect dorsal sepal, porrect to weakly spreading oblong petals and a white labellum which is shallowly gibbous at the base, sharply recurved near the middle with strongly undulate crispate margins. The callus is relatively narrow and notched at the apex.

Similar species: *Prasophyllum helophilum* has similarities with *P. alpestre* D.L.Jones, but the latter species is more robust with thicker leaves and larger flowers. It also has widely spreading petals which broaden noticeably towards the apex and a much larger, ovate-oblong labellum with a broadly obtuse apex and much broader callus.

Conservation Status: Apparently of restricted distribution but conserved in Kanangra Boyd National Park; suggest 2VC by the criteria of Briggs & Leigh (1996).

Etymology: Derived from the Greek *helos*, marsh, meadow and *-philum*, loving, in reference to its marshy or swampy habitat.

Other Specimens: NEW SOUTH WALES. Yerranderie Road, Mt Werong, 22 Jan. 1989, Bower (DLJones 3507) (CANB).

10. *Prasophyllum limnetes* D.L.Jones, *sp.*

nov.; affinis *P. pyriforme* E.Coleman sed floribus pauciores, minores, pallidiores, dispersiores; sepalis lateralibus liberis; labello basiliter obovato, marginibus patentissimis inde constrictissimis superne, et apice angusto et caudiformi, differt.

Type: Tasmania. Hillier's Marshland, Squeaking Point Road, near Port Sorell, 17 Dec. 1999, P. Tonelli (ORG 2889) (holo CANB; iso HO).

Description: Slender tuberous terrestrial *herb* growing singly or in loose groups. *Tubers* not seen. *Leaf* erect, 20-35 cm long, 2-4 mm wide, terete, green, base 2-3 mm diam., greenish to purplish; free lamina suberect, 10-15 cm long, usually partly withered at anthesis. *Inflorescence* a dense spike 8-12 cm long. *Floral bracts* ovate, 2.5 mm long, c. 2.5 mm wide, closely embracing the ovary; apex bluntly apiculate. *Ovaries* at about 30° to the rachis, obovoid, 3-4 mm long, c. 2 mm wide, bright green. *Flowers* 15-35, 6-8 mm across, green to greenish with light brown, pink or mauve tones, opening widely, subsessile. *Dorsal sepal* ovate-lanceolate, 7-9 mm long, 3-3.5 mm wide, deflexed, with 3 slightly darker veins, apex acuminate to long-acuminate. *Lateral sepals* free, linear-lanceolate, 6-7.5 mm long, 2-2.3 mm wide, tapered evenly from the base to the apex, erect or recurved, base not gibbous, distal margins involute; apex entire, acuminate or slightly bidentate. *Petals* porrect to incurved, linear-oblancheolate, 6-7 mm long, 1-1.2 mm wide, apex subacute. *Labellum* very shortly stalked, porrect to obliquely erect in the proximal half, distal half recurved at right angles, the tip not projecting through the lateral sepals; basal claw reduced, c. 0.5 mm long, c. 0.7 mm wide; lamina 6-7 mm long, 3-3.5 mm wide, when flattened with a distinct basal part and a narrow, distal tail-like section, green or with mauve to pinkish tints; base very shallowly gibbous; proximal half widest, obovate, the margins entire, constricted just above the middle; apical part a tapered caudate section 2.5-3 mm long only just wider than the callus; distal margins slightly irregular; apex acute to subacuminate. *Callus* narrowly elliptic at the base then narrowed and tapered, 5-6.5 mm long, c. 2-2.3 mm wide, raised, fleshy, greenish, channelled centrally, margins entire, narrowed beyond the bend and extending to within c. 1 mm of the labellum apex, distally slightly rugose; apex obtuse. *Column* porrect from the end of the ovary, c. 2 mm long, c. 2.4 mm wide, partly exposed when the flower is viewed from the side; appendages shorter than the stigmatic plate, linear, c. 1.8 mm long, c. 0.6 mm

wide, green, incurved; apex obtuse. *Anther* ovate, c. 1.6 mm long, c. 2 mm wide, brownish. *Pollinarium* c. 2 mm long; viscidium ovate, c. 0.2 mm long, white; hamulus c. 1 mm long; pollinia c. 1.7 mm long, yellow, sectile. *Stigma* quadrate, c. 1.4 mm long, c. 1.6 mm wide, the rostellum higher than the appendages. *Capsules* not seen.

Distribution and ecology: Known only from the type locality which has recently been purchased by the Tasmanian government and is now known as the Dorothy Reeves Private Reserve. The new species grows in low-lying marshy habitat among a dense growth of rushes and sedges with sporadic clumps of *Lomandra longifolia*. The soil is a heavy clay loam which is wet at the time the orchid flowers but dries out in the summer months. Altitude: c. 10 m. Flowering: December and January.

Recognition: *Prasophyllum limnetes* is recognised by its basically greenish-white flowers with pink tones in the labellum; lateral sepals free; labellum with an obovate basal area which has broadly flared margins and is then strongly constricted just above the middle and with a distal, tapered, tail-like apex, this region having a very narrow lamina which is not much wider than the callus; and, fleshy callus extending close to the labellum apex.

Similar species: *Prasophyllum limnetes* is most similar in appearance to *P. pyriforme* but the latter species is more robust with numerous (20-50), larger flowers (7-10 mm across) in a crowded spike. Additionally its lateral sepals are usually connate for much of their length, with free tips, and the labellum is ovate-lanceolate with a broad elliptical basal area, a slight central constriction and is then tapered to the apex. In shape this is quite unlike the sharply constricted labellum of *P. limnetes* with its narrow caudate apex. Also of significance are the broad distal margins of the labellum lamina of *P. pyriforme*, which contrast with those of *P. limnetes* which are scarcely wider than the callus. Additionally *P. pyriforme* grows in well-drained soils in hilly forested areas whereas *P. limnetes* grows in wet soil in a swampy habitat.

Notes: This species was brought to the attention of the senior author by Peter Tonelli after publication of the review of the genus for Tasmania (Jones 1998).

Conservation status: Known only from the type locality which is reserved, but the population consists of less than 50 plants and must be considered critically endangered (IUCN 2001).

Etymology: From the Greek *limnetes*, which means marsh-dweller, in reference to the habitat occupied by the new species.

11. *Prasophyllum maccannii* D.L.Jones et D.T.Rouse, sp. nov.; affinis *P. pyriforme* E.Coleman sed floribus pauciores, luridus, hepaticus vel subrosaceis; labello angustiorissimo venis inconspicuis, et apicem versus attenuatissimo, differt.

Type: Victoria. Beside Pomonal-Halls Gap Road, NW of Pomonal, 27 November 2000, *D.L.Jones 17719 & K.J.FitzGerald* (holo CANB; iso MEL).

Illustrations: Plate A, page 209, Jeanes & Backhouse (2001); plate 41, Rouse (2002), as *P. sp. aff. pyriforme* C.

Description: Slender terrestrial tuberous herb 15-60 cm tall, growing singly or in loose groups. *Tubers* 8-14 mm long, 6-10 mm wide, ovoid to subglobose, fleshy. *Leaf* erect, 20-55 cm long, 2-5 mm wide, terete, dark green; base 3-5 mm diam., red to purple; free lamina suberect, 10-20 cm long, usually partly withered at anthesis. *Floral bracts* ovate-oblong, c. 4 mm long, c. 3.5 mm wide; apex bluntly apiculate. *Ovaries* at about 30° to the rachis, obovoid, 6-9 mm long, 2-3 mm wide, shiny green. *Inflorescence* a narrow crowded spike 8-20 cm long, consisting of 15-40 flowers. *Flowers* 11-15 mm diam., yellowish green, greenish pink or brownish pink, opening widely, lightly fragrant, subsessile. *Dorsal sepal* porrect to recurved, narrowly ovate-lanceolate, 9-12.5 mm long, 3-4 mm wide, green to brownish with darker stripes; apex acuminate to long-acuminate. *Lateral sepals* erect, often recurved distally, narrowly linear-lanceolate, 8.5-13.5 mm long, 1.5-2 mm wide, widest near the base then tapered to the apex, connate throughout or in the basal half; distal margins involute; apex long-acuminate-attenuate or slightly bidentate. *Petals* porrect to spreading with incurved tips, narrowly linear to narrowly linear-lanceolate, 7-11.5 mm long, 0.8-1.1 mm wide, greenish, pinkish or brownish; apex subacute to acute. *Labellum* very shortly stalked, obliquely erect in the proximal half, distal half recurved more or less at right angles or the labellum obliquely erect throughout, the tip not projecting through the lateral sepals; basal claw reduced, c. 0.5 mm long, c. 1 mm wide; lamina whitish, pinkish or brownish, 7-11 mm long, 3-4.5 mm wide, more or less ovate-lanceolate in outline, when flattened with a broad, elliptic proximal part then slightly constricted and ending in a narrow, tapered, tail-like section; basal part not gibbous when viewed from the side, with narrowly flared entire margins, either constricted just above the middle or tapered from the widest part to the apex; distal margins entire or slightly crenulate; apex long-acuminate to attenuate. *Callus* narrowly ovate-lanceolate, narrowed beyond the bend and extending to within 1-2 mm of the labellum apex, 6-9 mm long, 2-2.5 mm wide at the base, fleshy, green, channelled centrally, margins entire or slightly irregular, raised distally. *Column* porrect from the end of the ovary, c. 3.5 mm long, 3 mm wide, partly exposed when the flower is viewed from the side; appendages slightly shorter than the stigmatic plate, oblong, c. 2.6 mm long, 0.8 mm wide, erect to outcurved, pale green or purplish; apex truncate or emarginate.

Anther ovate, c. 2 mm long, 1.7 mm wide, brownish. *Pollinarium* c. 2.5 mm long; viscidium ovate, c. 0.25 mm long, white; hamulus ligulate, c. 0.7 mm long; pollinia clavate, c. 1.8 mm long, yellow, sectile. *Stigma* quadrate, c. 1.2 mm long, 1.5 mm wide, the rostellum slightly higher than the appendages. *Capsules* obovoid, c. 8 mm long, 4 mm wide, green, shiny. **Fig. 5.9.**

Distribution and ecology: Apparently restricted to western Victoria where currently known from about four sites totalling approximately 350 plants. It grows in open forest dominated by stringybarks, particularly *Eucalyptus baxteri*, and *Callitris rhomboidea*, with an open understorey consisting of scattered shrubs, grass tussocks and *Xanthorrhoea* sp. The soils are well-drained reddish gravelly or sandy loams. Alt. 200-350 m. Flowering: November-December.

Recognition: *Prasophyllum maccannii* can be recognised by its robust habit, large, crowded yellowish green, pinkish or brownish flowers, connate lateral sepals, large labellum which is broad at the base, constricted just above the middle and ending in a long, attenuate to long-acuminate apex and an ovate-lanceolate, tapered callus.

Similar species: *Prasophyllum maccannii* is most similar to *P. pyriforme* and shares with that species a robust habit and large flowers in a dense spike. *Prasophyllum pyriforme* however has even more numerous flowers (20-50) which are basically green to greenish brown often with pink or mauve tones in the labellum; labellum lamina which is ovate-lanceolate with a much broader basal area than in *P. maccannii*, and tapered to the apex, with broad lamina margins which often have conspicuous radiating veins (very narrow with inconspicuous veins in *P. maccannii*), and the labellum apex is much less drawn-out than in *P. maccannii*. Some specimens of *P. maccannii* (for example *DLJ 17719*) have even larger flowers than those of *P. pyriforme* (sepals to 13.5 mm long).

Notes: Rouse (2002) detailed a population of 24 plants from the Flat Rock region of the northern Grampians as being distinct from this taxon by having smaller pinkish flowers and a flatter callus plate. A detailed examination of dissected flowers from this collection shows limited differences from *P. maccannii* and this collection is provisionally included in *P. maccannii* until additional fresh material can be obtained for examination. In that study specimens from the latter site were listed as *Prasophyllum* sp. aff. *pyriforme* B and *P. maccannii* was listed as *Prasophyllum* sp. aff. *pyriforme* C (Rouse 2002).

Conservation status: Currently known from 4 sites but old records from the region indicate that

it may also still occur in other areas in western Victoria. The largest known populations are on private land with only small numbers in the Nook Flora Reserve near Moyston. We suggest a conservation status category of 3VCI according to the criteria of Briggs & Leigh (1996).

Etymology: Named after Ian Robert McCann (1914-2003), dedicated Victorian naturalist, author, photographer and noted authority on the flora and fauna of the Grampians region.

Specimens examined: VICTORIA: Deep Lead Flora and Fauna Reserve, 20 Nov. 1990, *P.Branwhite* (DLJ 7222) (CANB); Northern Grampians, 20 Nov. 2001, *D.T.Rouse 100* (CANB); 1 km N of Pomonal, E side of Pomonal-Halls Gap Road, 21 Nov. 2001, *D.T.Rouse 103* (CANB) 3 km N of Pomonal, W side of Pomonal-Halls Gap Road, 24 Nov. 2001, *D.T.Rouse 109* (CANB); Nook Flora Reserve, 19 Dec. 2001, *D.T.Rouse 121* (CANB).

12. *Prasophyllum praecox* D.L.Jones, *sp.*

nov.; affinis *P. odorato* R.S.Rogers sed florescenti superiore; habitu tenuiore; foliis exilioribus; floribus paucioribus; labello late ovato-lanceolato; et callo late ovato, differt.

Type: South Australia. Near Brentwood, 30 Aug. 1999, *R.Bates 53511* (holo CANB; iso AD, MEL).

Description: Tuberous terrestrial *herb* growing singly. *Tubers* ovoid to obovoid, 9-15 mm long, 7-10 mm wide. *Leaf* terete, 9-20 cm long, 2-4 mm wide, dark green, slender, shiny; base c. 2-3 mm diam., purple; free lamina erect, 5-10 cm long, often distally withered at anthesis. *Inflorescence* a relatively open spike 2-8 cm long, consisting of c. 4-10 flowers. *Floral bracts* transversely ovate, c. 2.5 mm long, 3 mm wide, closely embracing the ovary; apex obtusely apiculate. *Ovaries* at 20-30° to the rachis, obovoid, 6-8 mm long, 2.5-3 mm wide, green, shiny. *Flowers* lightly lemon-scented, sessile to subsessile, 10-13 mm wide, green to greenish brown with white and greenish-brown petals and a white labellum. *Dorsal sepal* decurved, narrowly ovate-lanceolate, 8-9 mm long, 2.8-3.2 mm wide, with three fine darker nerves; apex apiculate to acuminate. *Lateral sepals* free, obliquely erect to erect, linear-lanceolate, 8-9 mm long, 2-2.5 mm wide, not gibbous, straight or slightly falcate; distal margins involute; apex entire or shortly bidentate. *Petals* widely spreading, linear, 8-9 mm long, 1.6-2 mm wide, with greenish-brown central suffusions; distal margins entire; apex subobtusely. *Labellum* sessile, obliquely erect in the proximal half, recurved at right angles near the middle; apex recurved, meeting with or just protruding through the lateral sepals; *lamina* broadly ovate-lanceolate to broadly elliptic-lanceolate when flattened, 8-9 mm long, 5-6 mm wide, white; base not gibbous; proximal margins entire or slightly irregular towards the apex; distal margins undulate/crispate; apex narrowly obtuse to obtusely apiculate. *Callus* broadly ovate, 4-4.5 mm long, 4.2-4.5 mm wide, yellowish green, with a dark

green central area towards the base; apex broadly emarginate, minutely papillate. *Column* porrect from the end of the ovary, c. 3.5 mm long, c. 3 mm wide, white; appendages linear, c. 3 mm long, c. 0.7 mm wide, strongly incurved, white; apex obtuse. *Anther* much shorter than the stigmatic plate, ovate, c. 2 mm long, c. 1.3 mm wide, brownish purple. *Pollinarium* c. 3.2 mm long; viscidium ovate-elliptic, c. 0.35 mm long; hamulus ligulate, c. 1 mm long; pollinia c. 2 mm long, yellow, sectile. *Stigma* quadrate, c. 1.2 mm long, c. 1.8 mm wide; rostellum higher than the appendages. *Capsules* not seen. **Fig. 5.10.**

Distribution and ecology: Occurs in southern parts of the Yorke Peninsula, South Australia, but possibly more widespread. Grows among low heath, sometimes adjacent to gypsum lakes, and in sparse to dense shrubland in red-brown loam over sheet limestone. Survives light grazing. Alt. 20-60 m. Flowering: Late July to September.

Recognition: Short, slender, early-flowered lowland leek orchid with few-flowered (4-10 flowers) spikes of lemon-scented flowers with free, green to greenish-brown, non-gibbous lateral sepals, decurved dorsal sepal, widely spreading linear petals and a white, broadly ovate-lanceolate to broadly elliptic-lanceolate labellum which is not gibbous at the base, sharply recurved near the middle with undulate crispate margins. The broadly ovate callus is notched and minutely papillate at the apex and the column wings are incurved.

Similar species: *Prasophyllum odoratum*, which flowers much later (October and November) is much more robust with thicker leaves and more numerous flowers, a narrowly oblong-elliptic labellum (to 11 mm x 4 mm) with a narrow, tapered callus (c. 7 mm x 2.3 mm) and tapered, nearly straight column wings. The two species grow in very different habitats.

Conservation Status: Poorly known but conserved in Warrenben Conservation Park; suggest 2VC according to the criteria of Briggs & Leigh (1996).

Etymology: From the Latin *praecox*, precocious, early; in reference to early flowering period of this species.

Other Specimens examined: SOUTH AUSTRALIA: Yorke Peninsula: c. 7 km E of Brentwood, 2 Sep. 2000, *D.L.Jones 17224* & *M.Garratt* (CANB); c. 19 km S of Corny Point towards Warrenben Conservation Park, 2 Sep. 2000, *D.L.Jones 17247* & *M.Garratt* (CANB); Warrenben Conservation Park, 2 Sep. 2000, *D.L.Jones 17253* & *M. Garratt* (CANB).

13. *Prasophyllum readii* D.L.Jones et D.Rouse *sp. nov.*; affinis *P. rostratum* Lindl. sed floribus pauciores, minores, dispersiores; labello et callo basilater angustiore, constrictissimo superne et caudiformi apicem versus, differt.

Type: Victoria. Private property along Streatham-Caringham Road, 9 Dec. 2000, E.Foster (ORG 3239) (holo CANB).

Illustrations: Plate 43, Rouse (2002) – as *Prasophyllum* sp. aff. *pyriforme* E; bottom RHS plates, p. 136, Jeanes & Backhouse (2004), as *P.* sp. aff. *pyriforme* 3.

Description: Slender terrestrial tuberous herb 15-30 cm tall, growing singly or in loose groups. *Tubers* not seen. *Leaf* erect, 12-25 cm long, 3-5 mm wide, terete, dark green; base 3-5 mm diam., red to purple; free lamina suberect, 8-12 cm long, usually partly withered at anthesis. *Floral bracts* ovate to rhomboid, c. 2.2 mm long, c. 2.5 mm wide; apex acute. *Ovaries* at about 30° to the rhachis, obovoid, 4-5 mm long, 2-3 mm wide, green to purplish. *Inflorescence* a narrow loose spike 7-13 cm long, consisting of 12-25 flowers. *Flowers* 7-9 mm diam., greenish brown to reddish brown or maroon with a whitish or pinkish labellum, opening widely, fragrant, subsessile. *Dorsal sepal* porrect to recurved, ovate-lanceolate, 7-9 mm long, 3-4 mm wide, green to brown or reddish with darker veins; apex acuminate to long-acuminate. *Lateral sepals* erect, free throughout, widely divergent, straight or slightly recurved distally, linear-lanceolate, 7-9 mm long, 1.2-1.7 mm wide, widest near the base then tapered evenly to the apex; distal margins involute; apex acute to shortly acuminate or bidentate. *Petals* porrect to incurved, linear-lanceolate, 6.5-8.5 mm long, 0.8-1.1 mm wide, greenish, brown or reddish, darker centrally; apex subacute. *Labellum* very shortly stalked, porrect to obliquely erect in the proximal half, distal half recurved at right angles, the tip occasionally projecting through the lateral sepals; basal claw reduced, c. 0.5 mm long, c. 0.8 mm wide; lamina whitish or pinkish, 5.5-8 mm long, 3.5-4.5 mm wide, when flattened with a distinct broad, elliptic proximal part then sharply constricted and ending in a narrow, tapered, tail-like section; basal part not gibbous when viewed from the side, with broadly flared entire margins, sharply constricted just above the middle; distal margins entire or slightly crenulate; apex apiculate. *Callus* broad at the base, narrowed beyond the bend and extending to within c. 1.5 mm of the labellum apex, 4-6.5 mm long, 2-3 mm wide at the base, sharply constricted just above the middle tapered gradually from just above the middle to the apex, fleshy, green, with a broad basal channel, margins entire or slightly irregular, raised distally. *Column* porrect from the end of the ovary, c. 3 mm long, 3.5 mm wide, partly exposed when the flower is viewed from the side; appendages about as long as the stigmatic plate, oblong, c. 2.3 mm long, 0.8 mm wide, erect to incurved, pale green; apex truncate or broadly rounded. *Anther* ovate, c. 2 mm long, 1.8 mm wide, dark reddish brown or purplish. *Pollinarium* c. 2 mm long; viscidium ovate, c. 0.25 mm long, white; hamulus ligulate, c. 0.3 mm long; pollinia clavate, c. 1.2 mm

long, yellow, sectile. *Stigma* quadrate, c. 1.5 mm long, 1.5 mm wide, the rostellum slightly higher than the appendages. *Capsules* obovoid, c. 6 mm long, 3 mm wide, green, shiny. **Fig. 5.11.**

Distribution and ecology: Known only from a single site near Streatham in western Victoria, which is on the property of Myles Read. It grows among sedges, rushes and forbs in a swamp with a base of white silty clay loam. The swamp is kept relatively open by light grazing of sheep over summer and autumn when the soil dries out. Altitude: c. 280 m. Flowering: December to early January.

Recognition: *Prasophyllum readii* is recognised by its short habit, short, loose spike of relatively small green, brown or maroon flowers, labellum broad at the base then suddenly constricted near the middle and with a narrow, tapered apical portion and a callus of similar shape to the labellum with a broad basal area then a pronounced medial constriction and ending in a narrow apical tail-like portion.

Similar species: *Prasophyllum readii* is a very distinct species which appears to be closest to *P. rostratum*, however, *P. rostratum* is much more robust than *P. readii* and has larger flowers in longer, denser spikes. Additionally the labellum callus of *P. rostratum* has a broad base and then more or less tapers to the apex, whereas that of *P. readii* is sharply constricted just above the middle and then has a narrow apical tail-like portion. *Prasophyllum readii* also flowers later than *P. rostratum*.

Notes: The significance of this orchid was apparently first noted by Adam Merrick in 1999 and specimens were collected and sent to the senior author in the following season by Everett Foster. The grazing regime of the swamp where *P. readii* grows has probably benefited the orchid by keeping the habitat open and encouraging flowering. Part of this swamp extends outside the property onto the adjacent road verge and here the growth of sedges and rushes is much denser and the orchids are not apparent (Rouse 2002). Although the evidence is not clear, flowering in *P. readii* is probably enhanced following summer fires. Rouse (2002) listed this species as *Prasophyllum* sp. aff. *pyriforme* E.

Conservation status: Known from a single site which contains approximately 1000 plants distributed over about one hectare. The site is on private property and has no security of tenure, although the owners are participating in conservation measures. These include the erection of a fence with materials supplied by the Department of Sustainability and Environment

and strategic grazing to avoid the flowering and fruiting periods of the orchid. The paddocks surrounding the area where the orchid occurs has been totally cleared for farming. We suggest a conservation status of 2E according to the criteria of Briggs & Leigh (1996).

Etymology: Named after Myles Read, owner of the property on which the only known colony of the species occurs.

Other Specimen: VICTORIA. Near Streatham, 19 Dec. 2001, *D.T.Rouse 120* (CANB).

14. *Prasophyllum viretrum* D.L.Jones & D.T.Rouse, *sp. nov.*; affinis *P. murfetii* D.L.Jones, sed segmentis perianthi latioribus; sepalis lateralibus late divergentibus, apicibus bidentatis; labello ovato-elliptico, superne contracto apicem caudiformem; quoque *P. frenchii* F.Muell. sed floribus dispansis; callo sulcato apice caudiformi, differt.

Type: Victoria. Pretty Hill Flora Reserve, near Orford, 15 Nov. 2000, *D.L.Jones 17686* & *K.J.Richards* (holo CANB 620161, iso AD, BRI, MEL, NSW).

Illustrations: Plate 27, Rouse (2002) – as *Prasophyllum* sp. aff. *frenchii* A; bottom LHS, p. 202, Jeanes & Backhouse (2004), as *P. sp. aff. frenchii* 1.

Description: Tuberos terrestrial herb growing as scattered individuals. *Tubers* not seen. *Leaf* erect, 20–50 cm long, 3–6 mm wide, terete, dark green, base 2–3 mm diam., reddish-purple; free lamina erect, 15–30 cm long, withered towards the apex at anthesis. *Inflorescence* a moderately dense to dense spike 8–15 cm long. *Floral bracts* irregularly ovate, 2.5–4 mm long, c. 3–4.5 mm wide, closely embracing the ovary, apex apiculate. *Ovaries* at about 30° to the rachis, obovoid, 5–6 mm long, c. 3 mm wide, green. *Flowers* 12 – c.35, 7–9 mm across, greenish brown to brownish with a cream to pinkish labellum, lightly fragrant, sessile. *Dorsal sepal* ovate-lanceolate, 7–9 mm long, 3–4 mm wide, deflexed, shallowly concave to flat, sometimes recurved distally, apex apiculate, with 3 distinct darker veins. *Lateral sepals* free, broadly linear-lanceolate, 7.5–9 mm long, 2.3–2.8 mm wide, obliquely erect, widely divergent, shallowly recurved distally, base not gibbous, distal margins strongly involute, apex strongly bidentate. *Petals* linear-lanceolate, porrect to spreading, 6.5–7.5 mm long, c. 2 mm wide, entire, apex obtuse to subacute. *Labellum* sessile, obliquely erect in the proximal half, recurved at about 75° just above the middle, distal half obliquely erect, the tip not protruding through the lateral sepals; lamina broadly ovate to broadly ovate-lanceolate, 6.5–7.5 mm long, 4.5–5.5 mm wide, whitish to pinkish, base not gibbous, proximal margins flared, spreading, entire to slightly irregular, either tapered suddenly from just above the middle to the apex or contracted in the distal third to a narrow tail-like extension 2–3 mm long, distal margins strongly crenulate-crispate, apex apiculate. *Callus* broadly ovate,

extending three-quarters of the distance to the labellum apex, fleshy, c. 6 mm long, c. 4 mm wide, dark green proximally, rest bright green, shiny, broadly channelled basally, constricted distally from the bend in the labellum lamina into an irregular, narrowly grooved, short, tail-like section. *Column* porrect from the end of the ovary, c. 3.5 mm long, c. 3.5 mm wide; appendages oblong, c. 3 mm long, c. 1.4 mm wide, straight, slightly divergent, apex truncate, about as long as the stigmatic plate. *Anther* ovate, c. 2 mm long, c. 2 mm wide, purplish brown. *Pollinarium* c. 2.6 mm long; viscidium ovate, c. 0.3 mm long; hamulus narrowly ligulate, c. 0.5 mm long; pollinia c. 2 mm long, yellow, sectile. *Stigma* quadrate, c. 1.5 mm long, c. 2 mm wide, the rostellum of equal height to the appendages. *Capsules* not seen. **Fig. 5.12.**

Distribution and ecology: Restricted to a few sites in south-western Victoria in the vicinity of Warmambool / Orford / Port Fairy / Mortlake, growing in moist to wet grassland in black basaltic loam. Alt. 20–80 m. Flowering: Late October to December.

Recognition: *Prasophyllum viretrum* is a tall growing (to c. 60 cm tall), slender species with spikes of brownish-green flowers with whitish or pinkish labella; widely divergent, obliquely erect lateral sepals with strongly bidentate tips; an obliquely erect labellum with the apex recurved at about 75°; the labellum when flattened is very broadly ovate-lanceolate and contracts suddenly from just above the middle to the apex; the smooth, raised, very broad callus is channelled at the base, with a short, irregular, grooved, tail-like apex and, oblong column appendages with a truncate apex.

Similar species: The new species is similar to *P. murfetii* but the latter can be distinguished by its narrower perianth segments, more or less parallel lateral sepals with entire tips, a labellum apex strongly recurved at about 90°, a narrower ovate-lanceolate labellum which tapers from near the base to the apex, narrower callus and ovate-elliptic column appendages with an obtuse apex. *P. frenchii* is somewhat similar can be immediately distinguished by its compact, strongly cupped flowers with the labellum callus ending in a distinctly horseshoe-shaped verrucose structure.

Notes: This species, a totally unexpected find, was discovered by Andrew Pritchard and Everett Foster while searching for specimens of *P. anticum*, which is also described as new in this paper. Both species grow sympatrically but *P. viretrum* is just beginning to flower as *P. anticum* is finishing.

Conservation status: Known from 4 or 5 small sites and afforded some protection in 2 small reserves; suggest 2Ec by the criteria of Briggs & Leigh (1996).

Etymology: The Latin *viretrum*, sward, sod, turf, in reference to the moist grassy habitat favoured by this species.

Other specimens: VICTORIA: Pretty Hill Flora Reserve, 1 Nov. 2000, *A.Pritchard* (ORG 3156) (CANB); Maam Wetlands Reserve, 21 Nov. 2000, *A.Pritchard* (ORG 3194) (CANB); *ibid*, 29 Nov. 2000, *A.Pritchard* (ORG 3211) (CANB); Mortlake, Dec. 2005, *A.Pritchard* (ORG 5144) (CANB).

ACKNOWLEDGEMENTS

We are especially grateful to the directors of the Australian Orchid Foundation for the financial support given to Dean Rouse for field work. We thank Laurie Adams for the Latin diagnoses and Marion Garratt and Karina Richards for technical assistance. We also thank the following people for providing specimens, assistance and information; Kath Alcock, Gary Backhouse, Paul Barnett, Cam Beardsell, Geoff Beilby, Peter Branwhite, Michael Duncan, John Eichler, Everett Foster, Jeff Jeanes, Glen Johnson, Dave Mallinson, Ian McCann, Adrian & Myra Morton, Andrew Pritchard, Peter Tonelli, James Turner, Hans & Annie Wapstra, Mark Wapstra, Rolf Weber.

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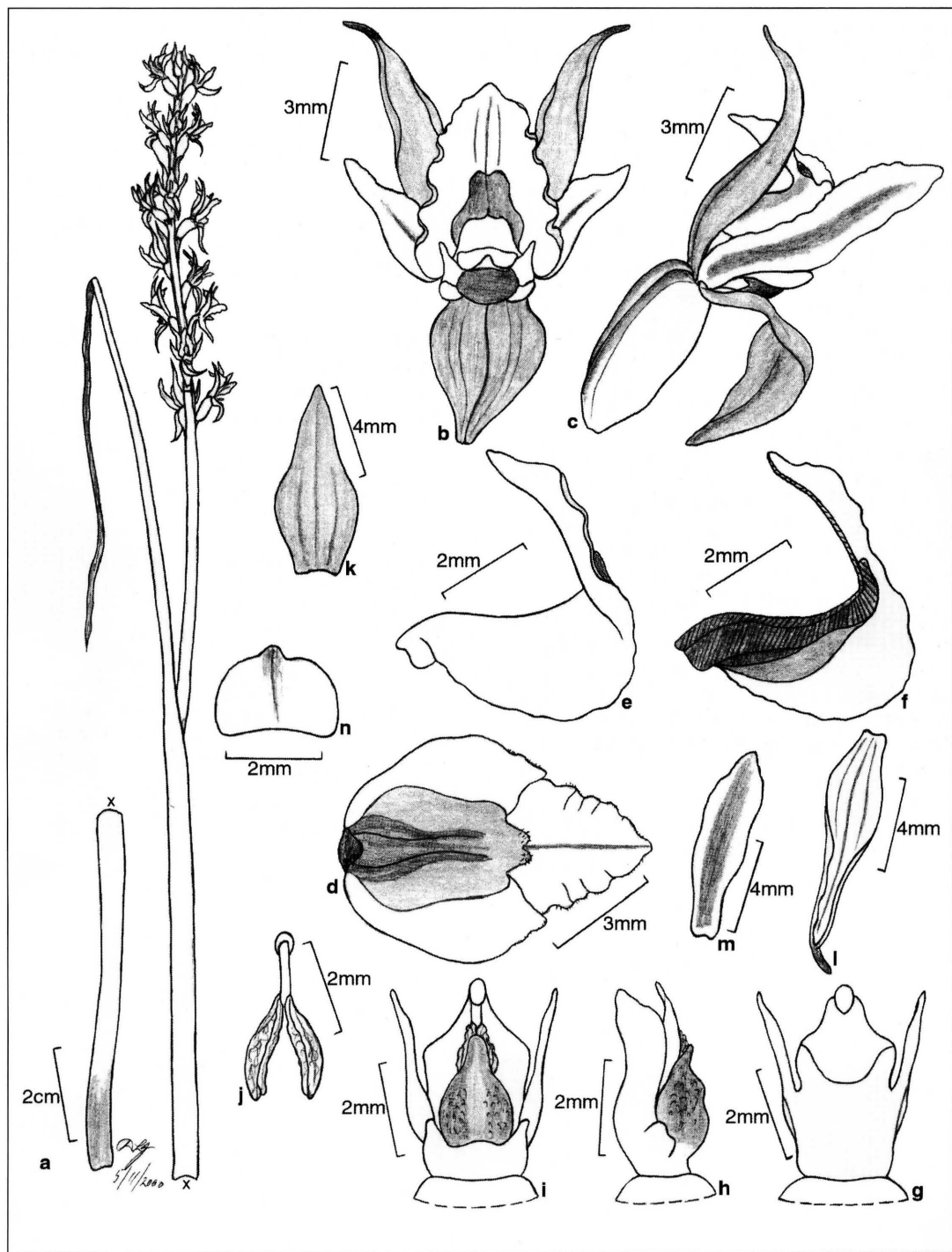


Figure 5.1. *Prasophyllum anticum*, Pretty Hill Flora Reserve, Victoria, A.Pritchard & E.Foster (ORG 3155); from the type collection. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract.

Drawing 5/11/2000 by D.L.Jones.©

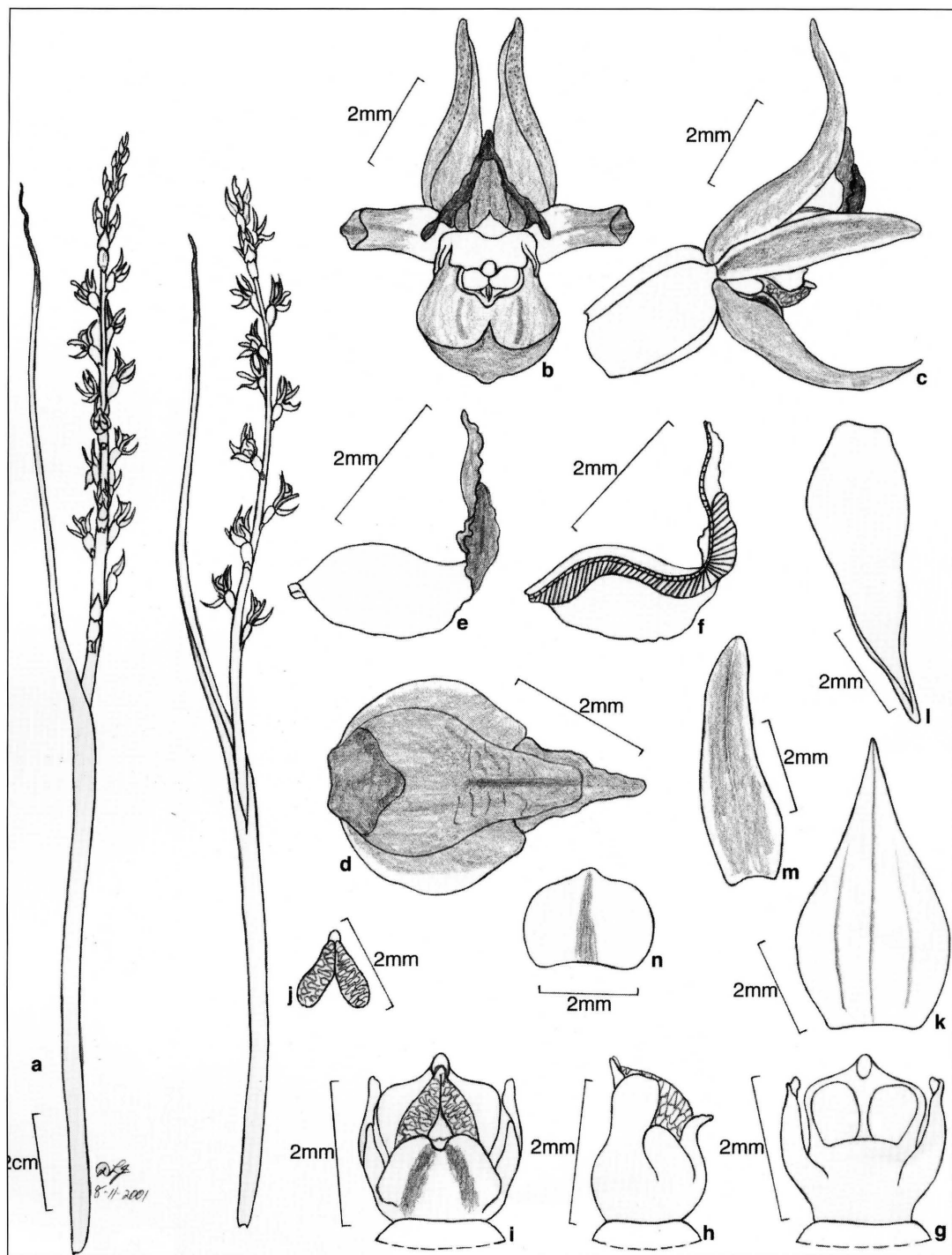


Figure 5.2. *Prasophyllum atratum*, Three Hummock Island, Tasmania, P.Tonelli (ORG 3754); from the type collection. a. plants; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract.

Drawing 8/11/2001 by D.L.Jones.©

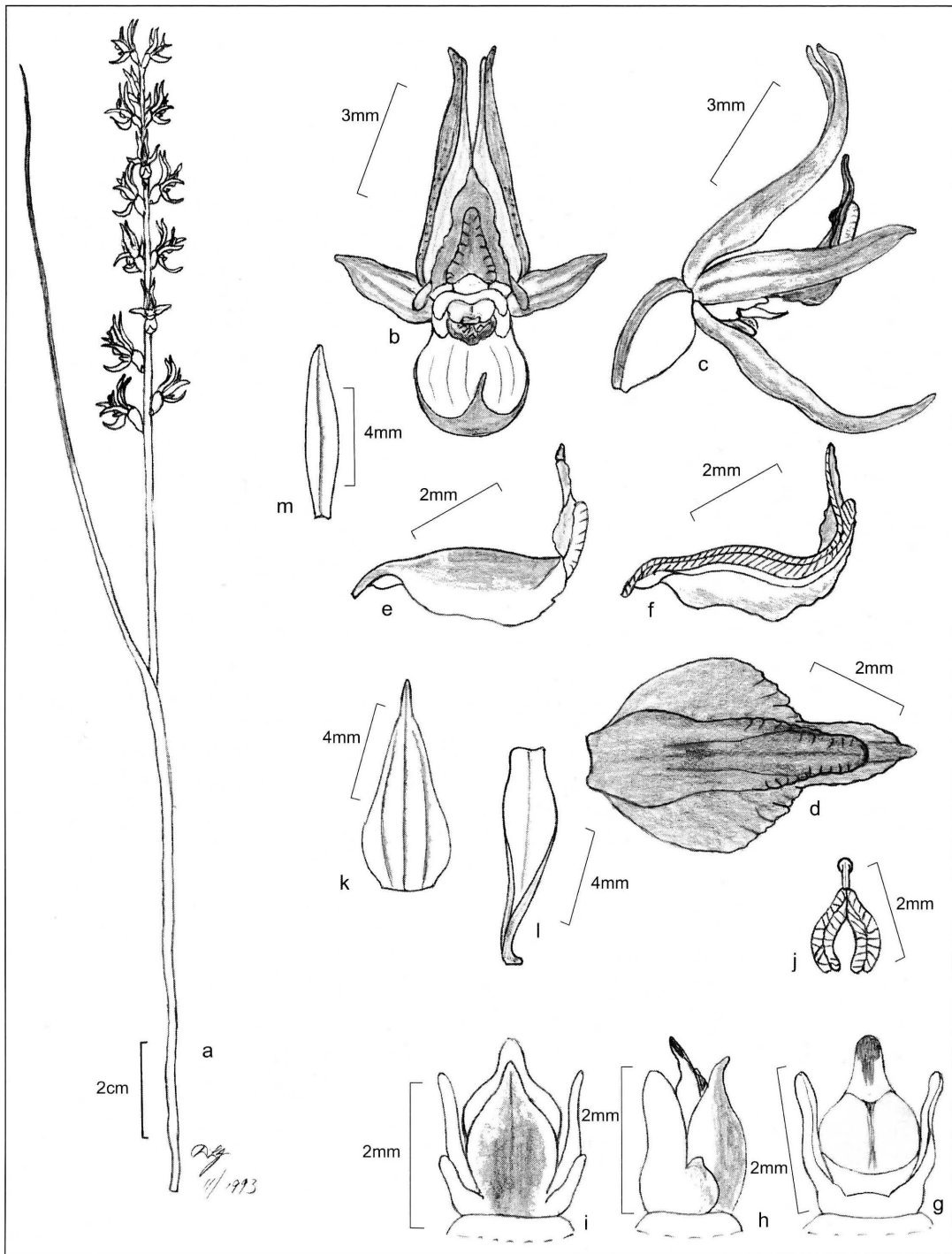


Figure 5.3. *Prasophyllum barnettii*, Anglesea, Victoria, E.Foster (D.L.Jones 12709).
a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side;
f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear;
j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal. **Drawing 11/1993 by D.L.Jones.©**

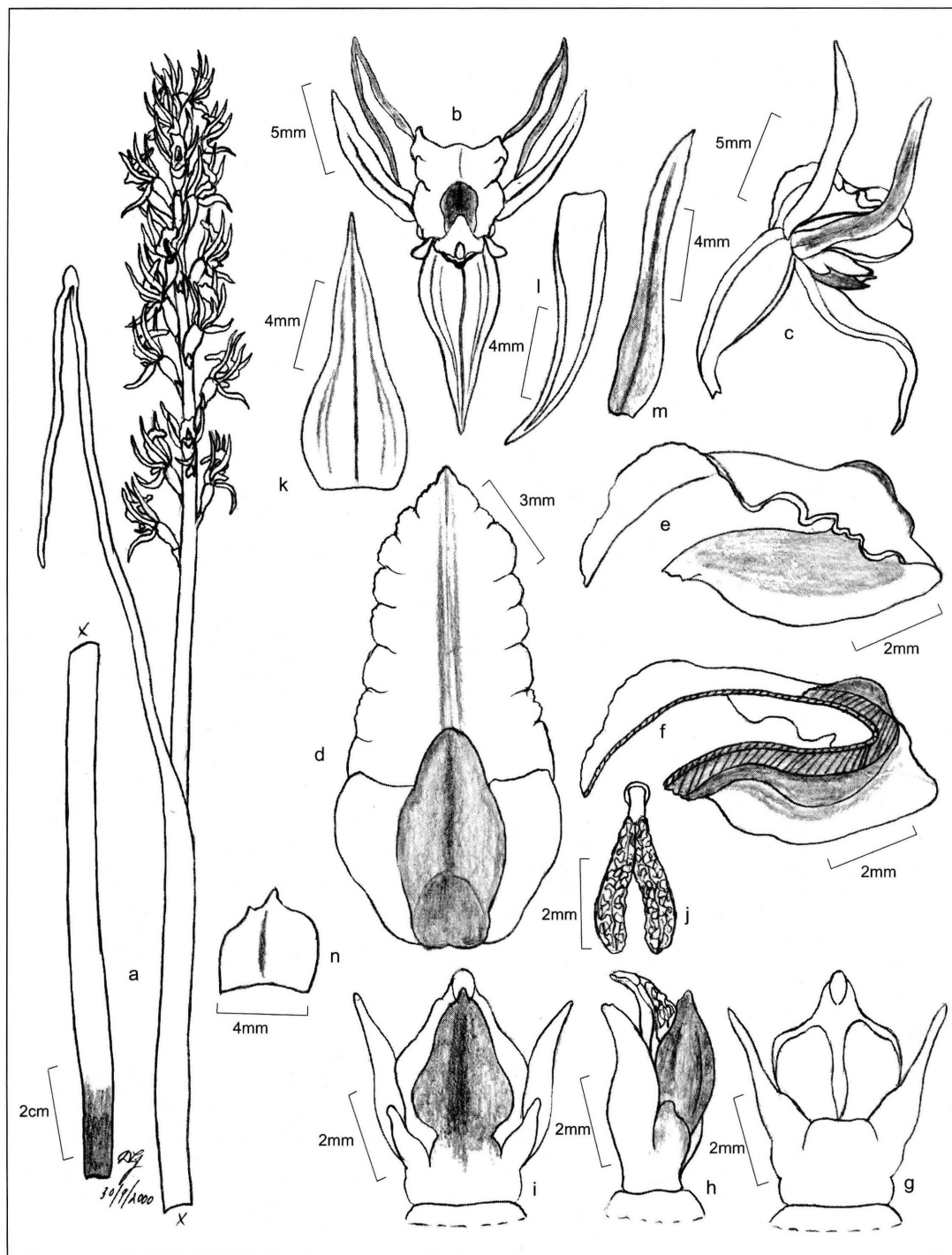


Figure 5.4. *Prasophyllum beatrix*, Buckingbong State Forest, New South Wales, D.L.Jones 12709; drawn from the type. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract.

Drawing 30/9/2000 by D.L.Jones.©

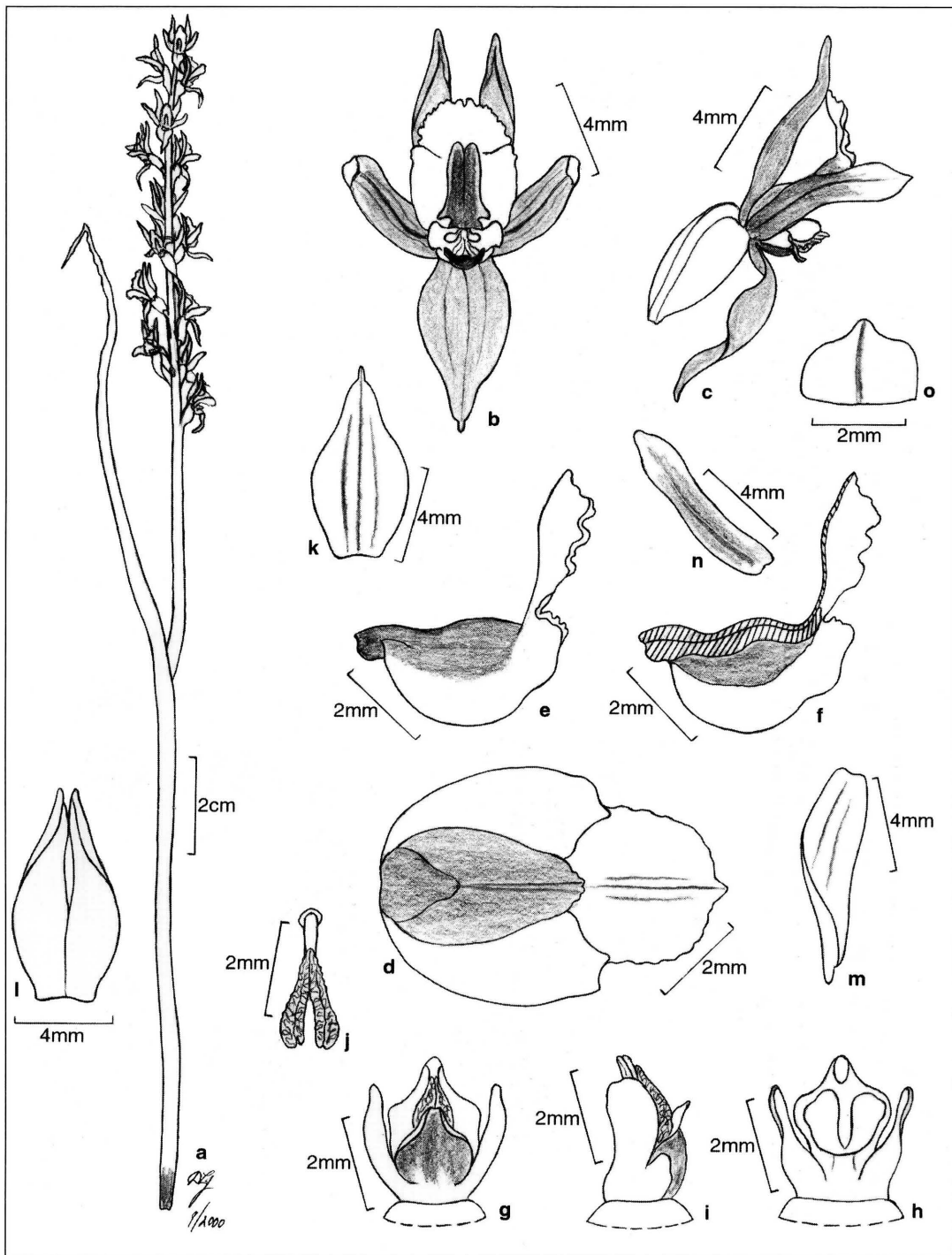


Figure 5.5. *Prasophyllum catenemum*, Near Streaky Bay, South Australia, D.L.Jones 17451 & M.Garratt; from the type collection. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from rear; h. column from front; i. column from side; j. pollinarium; k. dorsal sepal; l,m. lateral sepals; n. petal; o. fertile bract.

Drawing 9/2000 by D.L.Jones.©

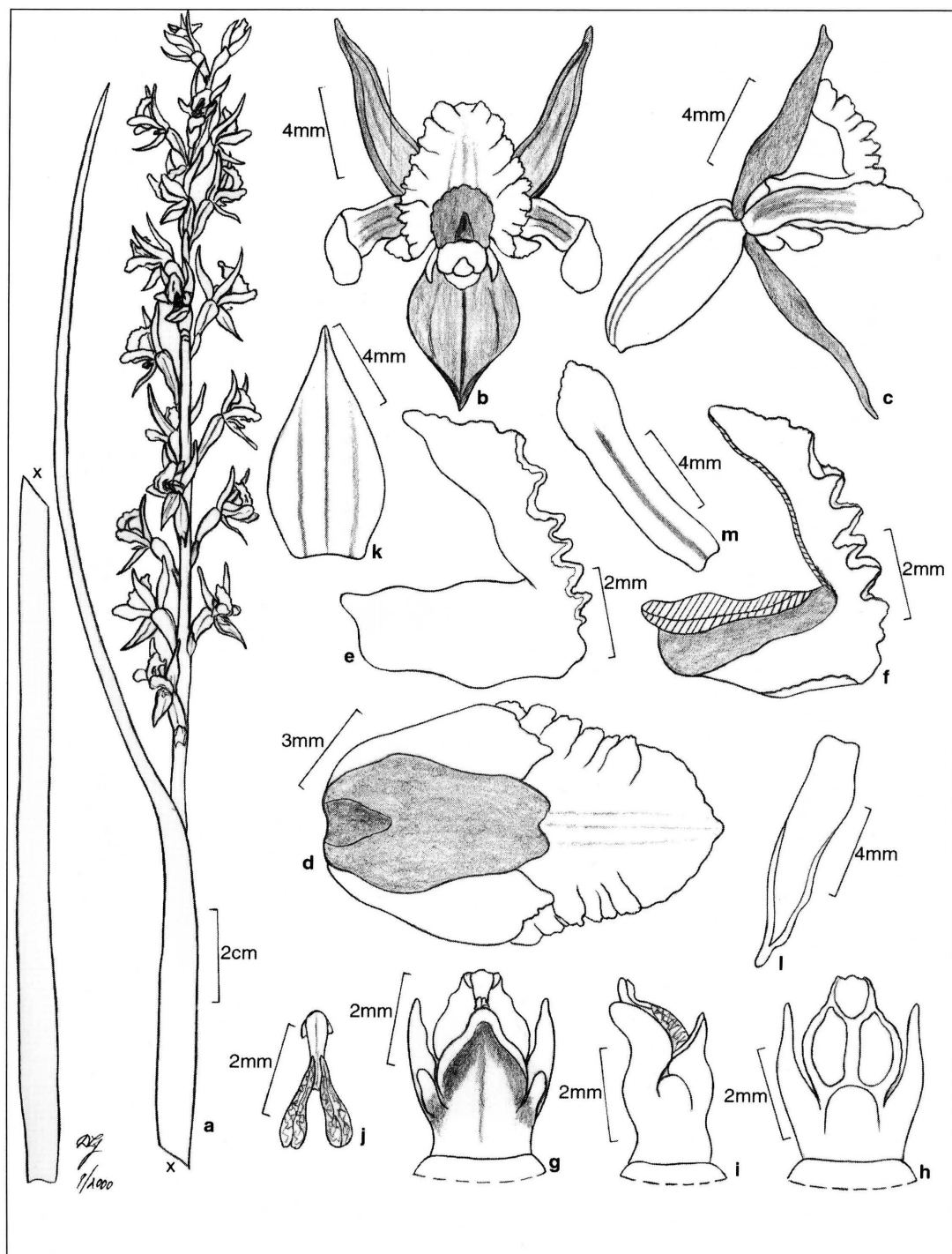


Figure 5.6. *Prasophyllum collinum*, Mount Olinthus, South Australia, D.L.Jones 17333 & M.Garrat; from the type collection. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from rear; h. column from front; i. column from side; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal.

Drawing 9/2000 by D.L.Jones.©

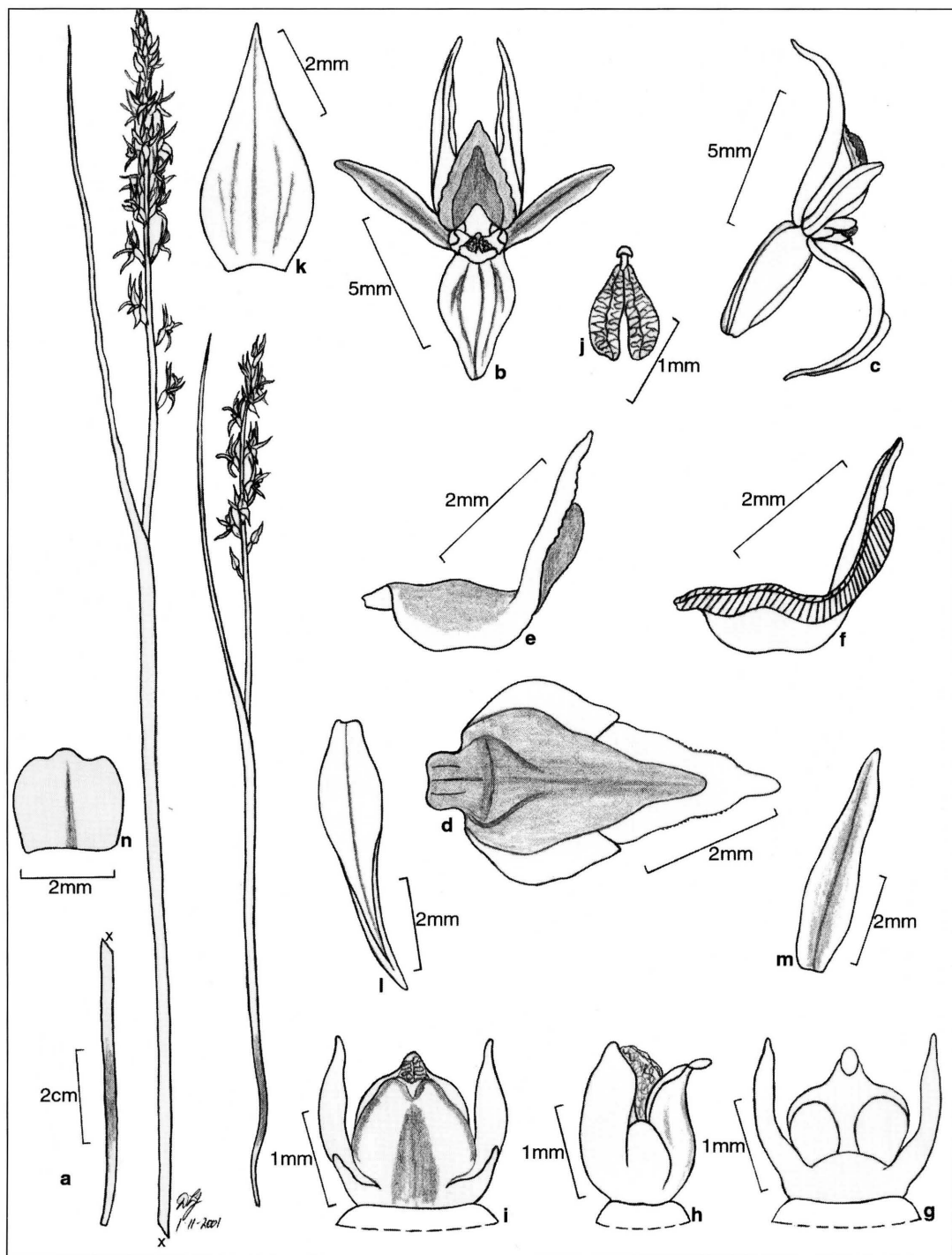


Figure 5.7. *Prasophyllum erythrocommum*, Yan Yean Water Reserve, Victoria, D.Rouse 68; from the type collection. a. plants; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract.

Drawing 1/11/2001 by D.L.Jones.©

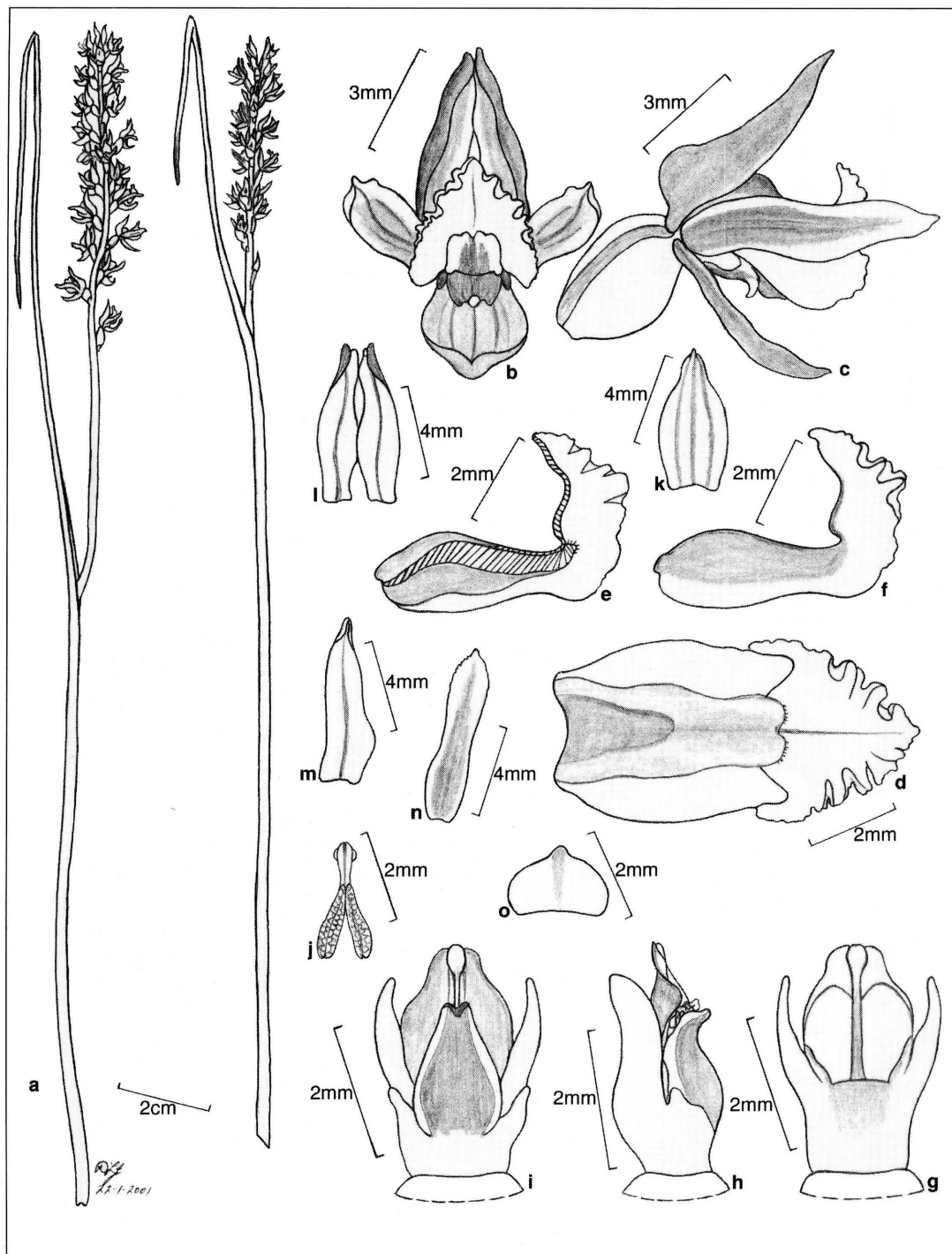


Figure 5.8. *Prasophyllum helophilum*, Kanangra Boyd, New South Wales, D.L.Jones 17788; from the type collection. a. plants; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. longitudinal section of labellum; f. labellum from side; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l.m. lateral sepals; n. petal; o. fertile bract.

Drawing 22/1/2001 by D.L.Jones.©

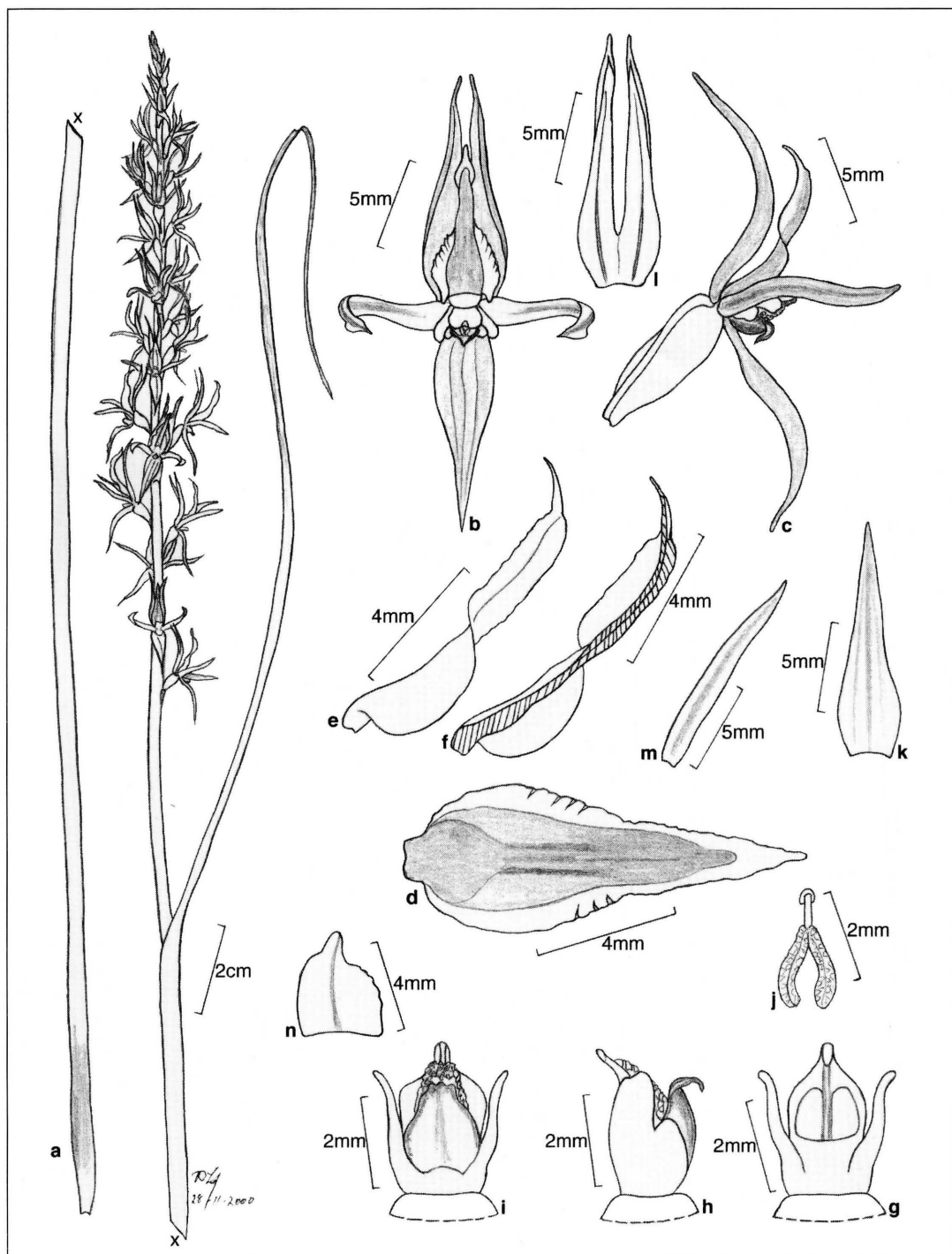


Figure 5.9. *Prasophyllum maccannii*, Pomonal, Victoria, D.L.Jones 17719; from the type collection. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear; j. pollinarium; k. dorsal sepal; l. lateral sepals; m. petal; n. fertile bract. **Drawing 28/11/2000 by D.L.Jones.©**

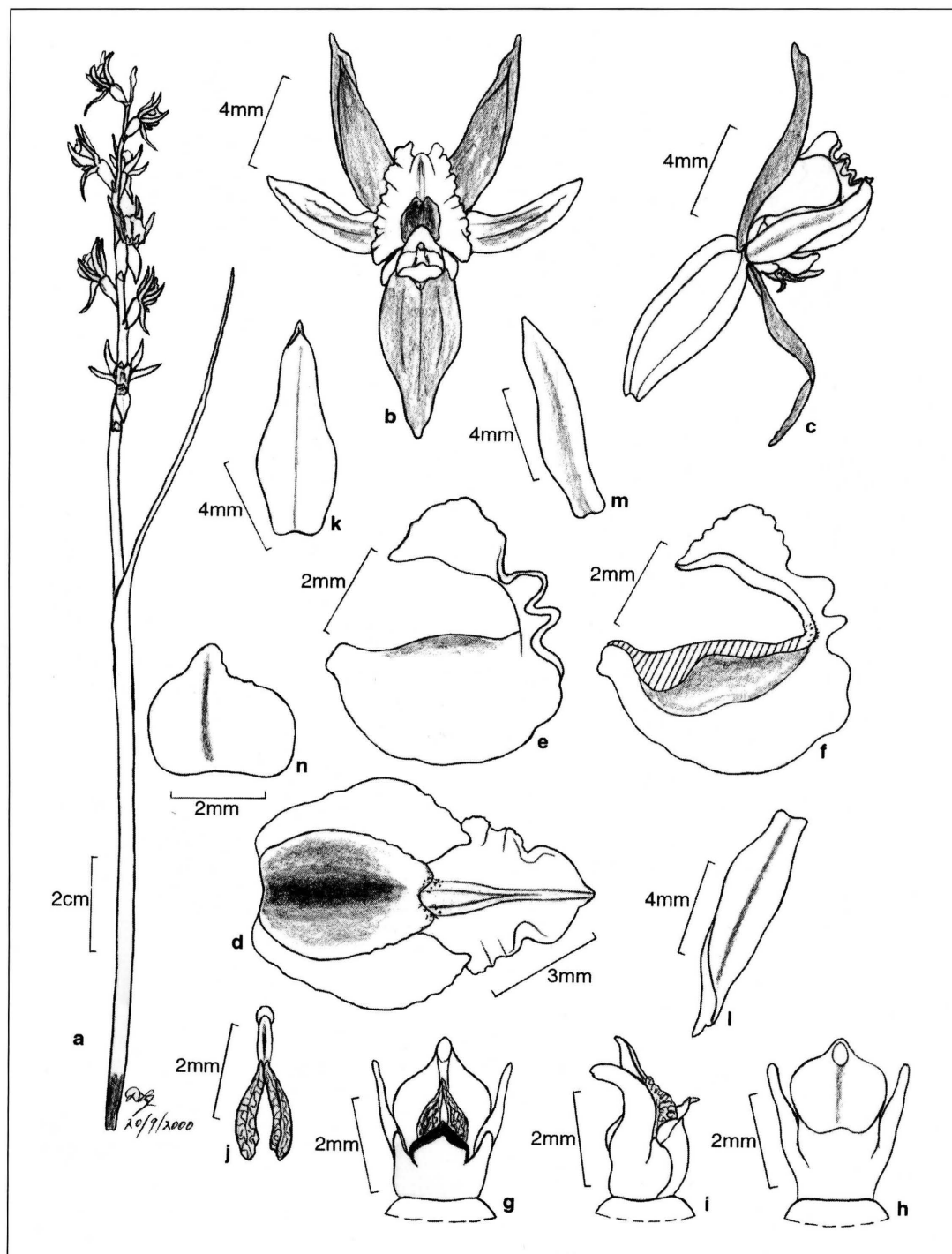


Figure 5.10. *Prasophyllum praecox*, Warrenben Conservation Park, South Australia, D.L.Jones 17253 & M.Garratt. a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side; f. longitudinal section of labellum; g. column from rear; h. column from front; i. column from side; j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract.

Drawing 9/2000 by D.L.Jones.©

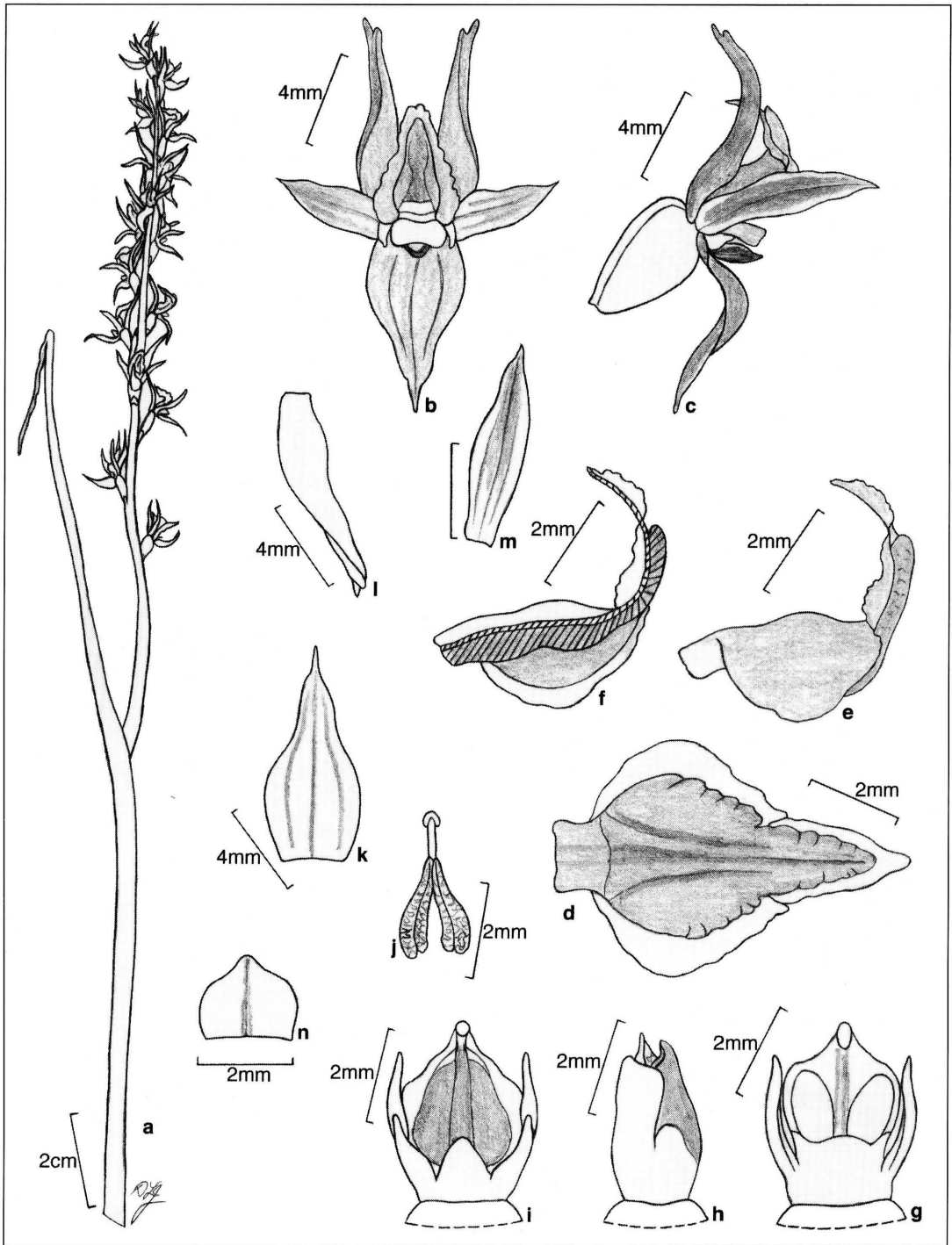


Figure 5.11. *Prasophyllum readii*, Streatham, Victoria, E.Foster (ORG 3239); from the type collection.
a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side;
f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear;
j. pollinarium; k. dorsal sepal; l. lateral sepal; m. petal; n. fertile bract. **Drawing 12/12/2000 by D.L.Jones.©**

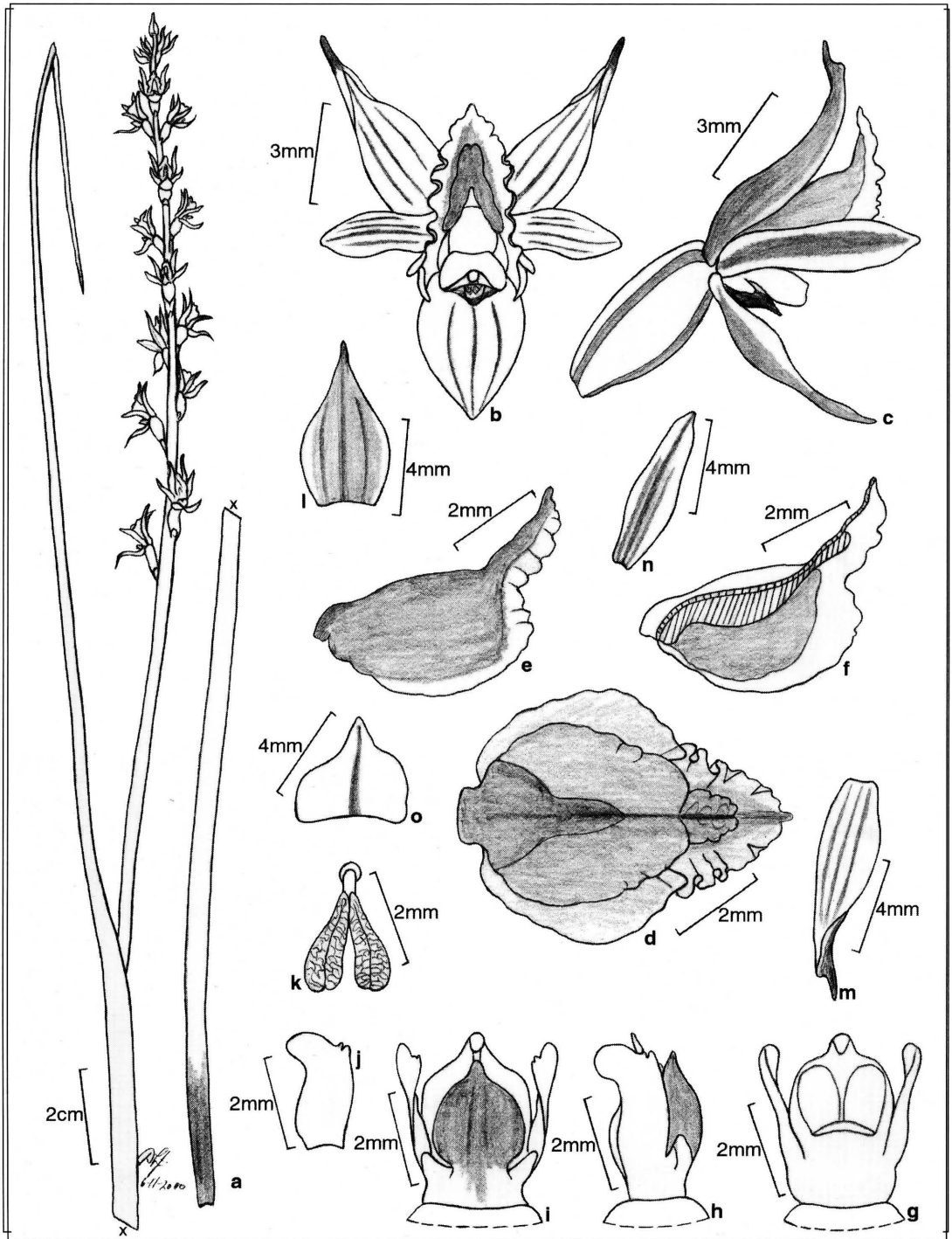


Figure 5.12. *Prasophyllum viretrum*, Pretty Hill Flora Reserve, Victoria, A.Pritchard (ORG 3156).
a. plant; b. flower from front; c. flower from side; d. labellum, anterior view, flattened; e. labellum from side;
f. longitudinal section of labellum; g. column from front; h. column from side; i. column from rear;
j. column wing; k. pollinarium; l. dorsal sepal; m. lateral sepal; n. petal; o. fertile bract.

Drawing 6/11/2000 by D.L.Jones.©



Adrian Morton

Arachnorchis ampla
St. Arnaud, Victoria.



Dean Rouse

Arachnorchis ancylosa
Genoa, Victoria.



Dean Rouse

Arachnorchis ancylosa
(yellow clubs) Genoa, Victoria.



Mike Duncan

Arachnorchis ancylosa
(yellow clubs) Genoa, Victoria.



Mike Duncan

Arachnorchis ancylosa
Genoa, Victoria.



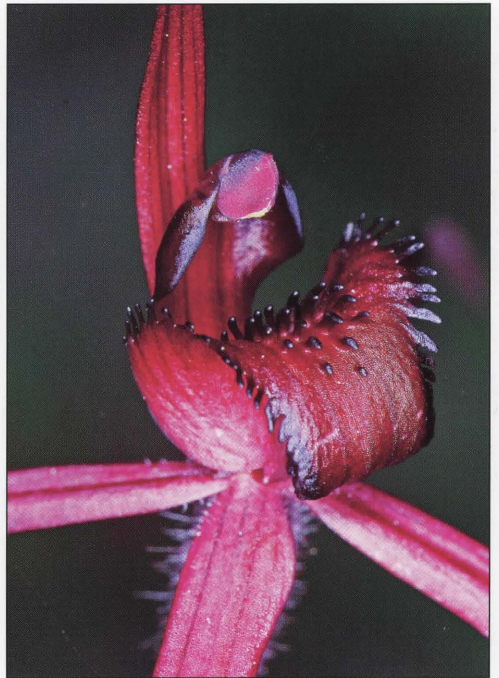
Mike Duncan

Arachnorchis clavescens
Chewton, Victoria.



Mike Duncan

Arachnorchis clavescens
Chewton, Victoria.



Mike Duncan

Arachnorchis clavescens
Chewton, Victoria.



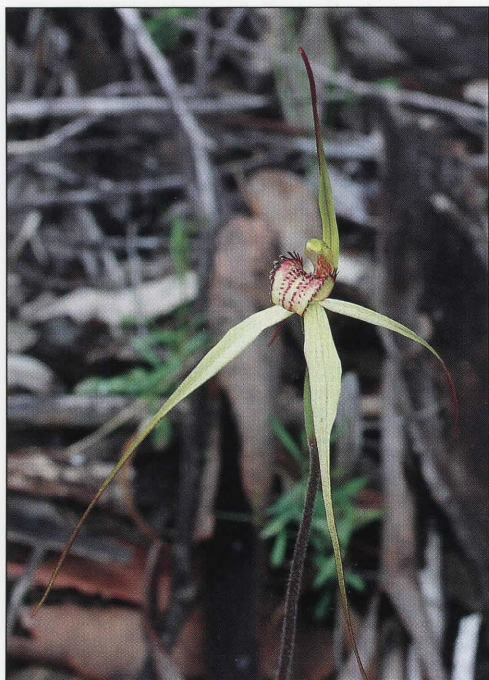
Myra Morton

Arachnorchis cretacea
Dalyenong, Victoria.



Adrian Morton

Arachnorchis douglasiorum
Dalyenong, Victoria.



Dean Rouse

Arachnorchis flindersica
Mt. Remarkable, South Australia.



Mike Duncan

Arachnorchis grampiana
Grampians, Victoria.



Mike Duncan

Arachnorchis grampiana
Grampians, Victoria.



Dean Rouse

Arachnorchis oreophila
Bombala, New South Wales.



Mike Duncan

Arachnorchis oreophila
Bombala, New South Wales.



Mike Duncan

Arachnorchis oreophila
Bombala, New South Wales.



Dean Rouse

Arachnorchis orestes
Burrinjuck, New South Wales.



Dean Rouse

Arachnorchis osmera
Hopping Joe Creek, New South Wales.



Gary Backhouse

Arachnorchis peisleyi
Mallacoota, Victoria.



Dean Rouse

Arachnorchis saxatilis
Alligator Gorge, South Australia.



Mike Duncan

Arachnorchis zephyra
Carrappee Hill, South Australia.



Dean Rouse

Arachnorchis zephyra
Carrappee Hill, South Australia.



Dean Rouse

Arachnorchis zephyra
Carrappee Hill, South Australia.



Mark Clements

Bunochilus barringtonensis
Barrington Tops, New South Wales.



David Banks

Bunochilus chocolatinus
Blackheath, New South Wales.



Ron Tunstall

Bunochilus macilentus
Grampians, Victoria.



Ron Tunstall

Bunochilus macrosepalus
Conimbla, New South Wales.



Mark Clements

Bunochilus stenosepalus
Wambool, New South Wales.



Mark Clements

Bunochilus tenuis

Cadia, New South Wales.



Mark Clements

Bunochilus viriosus

Upper Sturt, South Australia.



Mark Clements

Bunochilus vitreus

Bellthorpe, Queensland.



Mark Clements

Calochilus montanus

Gibraltar Falls, Australian Capitol Territory



Mark Clements

Calochilus stramenicola
Brookton, Western Australia.



David Jones

Crepidium fontinale
Black Jungle, Northern Territory.



David Banks

Diteilis petricola
Kirrama Range, Queensland.



Mark Clements

Diuris eborensis
Ebor, New South Wales.



David Banks

Diuris eborensis
Ebor, New South Wales.



Mark Clements

Diuris fucosa
Urana, New South Wales.



David Jones

Diuris unica
Maryborough, Queensland.



Mark Clements

Oxysepala schilleriana* subsp. *maritima
Russell River, Queensland.



Dean Rouse

Prasophyllum anticum
Pretty Hill, Victoria.



Ron Parsons

Prasophyllum atratum
Three Hummock Island, Tasmania.



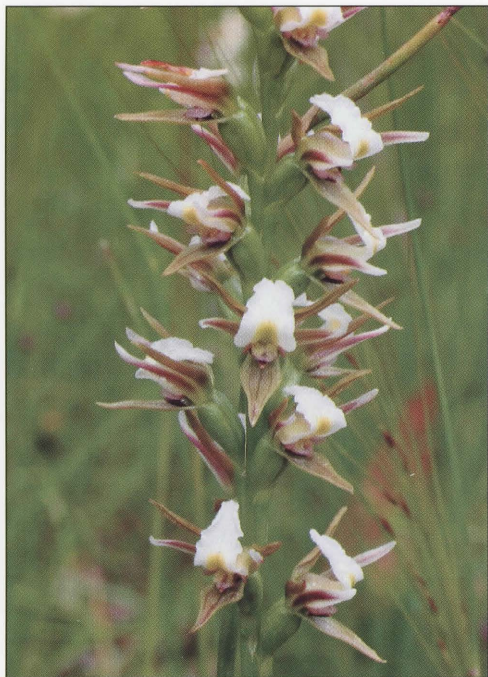
Mike Duncan

Prasophyllum barnettii
Anglesea, Victoria.



Dean Rouse

Prasophyllum barnettii
Anglesea, Victoria.



Dean Rouse

Prasophyllum beatrix
Temora, New South Wales.



Gary Backhouse

Prasophyllum erythrocommum
Yan Yean, Victoria.



Dean Rouse

Prasophyllum gilgai
Chesney, Victoria.



Gary Backhouse

Prasophyllum maccannii
Pomonal, Victoria.



Dean Rouse

Prasophyllum praecox
Brentwood, South Australia.



Jeff Jeanes

Prasophyllum readii
Streatham, Victoria.



Dean Rouse

Prasophyllum viretrum
Pretty Hill, Victoria.



Ron Tunstall

Pterostylis aneba
Falls Creek, Victoria.



Ron Tunstall

Pterostylis riparia

Barrington Tops, New South Wales.



Mark Clements

Thelychiton biconvexus

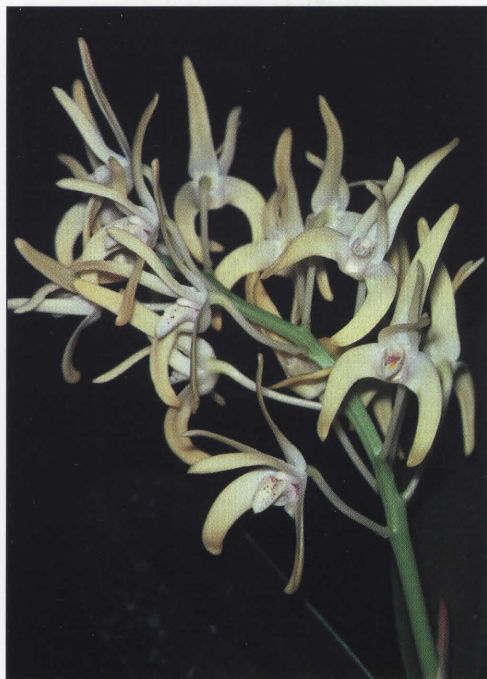
Windsor Tableland, Queensland.



Mark Clements

Thelychiton biconvexus

Windsor Tableland, Queensland.



Mark Clements

Thelychiton coriaceus

Expedition Range, Queensland.



Mark Clements

Thelychiton spectabilis
Eungella, Queensland.



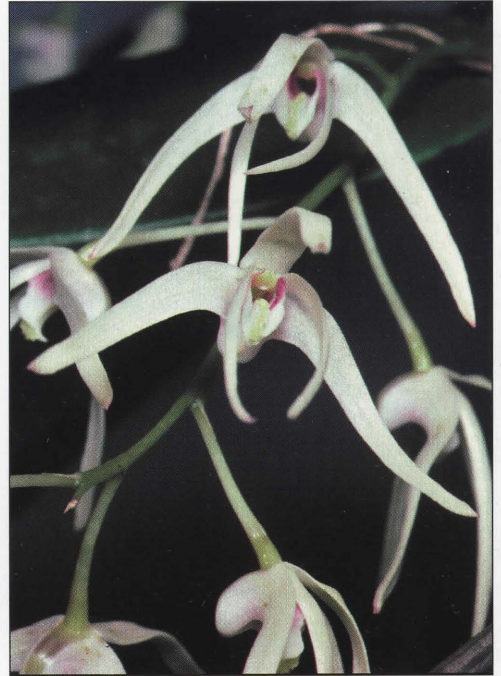
Mark Clements

Thelychiton spectabilis
Eungella, Queensland.



David Banks

Tropilis aemula
Picton, New South Wales.



Mark Clements

Tropilis angusta
Dave's Creek, Queensland.



Mark Clements

Tropilis crassa
Herberton, Queensland.



Mark Clements

Tropilis eburnea
Dharug, New South Wales.



David Banks

Tropilis eungellensis
Eungella, Queensland.



Mark Clements

Tropilis radiata
Fraser Island, Queensland.

Colour Photographs (refer pages 169-184)

- | | |
|---------------------------------------|--|
| 1. <i>Arachnorchis ampla</i> | 33. <i>Calochilus stramenicola</i> |
| 2. <i>Arachnorchis ancylosa</i> | 34. <i>Crepidium fontinale</i> |
| 3. <i>Arachnorchis ancylosa</i> | 35. <i>Diteilis petricola</i> |
| 4. <i>Arachnorchis ancylosa</i> | 36. <i>Diuris eborensis</i> |
| 5. <i>Arachnorchis ancylosa</i> | 37. <i>Diuris eborensis</i> |
| 6. <i>Arachnorchis clavescens</i> | 38. <i>Diuris fucosa</i> |
| 7. <i>Arachnorchis clavescens</i> | 39. <i>Diuris unica</i> |
| 8. <i>Arachnorchis clavescens</i> | 40. <i>Oxysepala schilleriana</i> subsp. <i>maritima</i> |
| 9. <i>Arachnorchis cretacea</i> | 41. <i>Prasophyllum anticum</i> |
| 10. <i>Arachnorchis douglasiorum</i> | 42. <i>Prasophyllum atratum</i> |
| 11. <i>Arachnorchis flindersica</i> | 43. <i>Prasophyllum barnettii</i> |
| 12. <i>Arachnorchis grampiana</i> | 44. <i>Prasophyllum barnettii</i> |
| 13. <i>Arachnorchis grampiana</i> | 45. <i>Prasophyllum beatrix</i> |
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| 15. <i>Arachnorchis oreophila</i> | 47. <i>Prasophyllum gilgai</i> |
| 16. <i>Arachnorchis oreophila</i> | 48. <i>Prasophyllum maccannii</i> |
| 17. <i>Arachnorchis orestes</i> | 49. <i>Prasophyllum praecox</i> |
| 18. <i>Arachnorchis osmera</i> | 50. <i>Prasophyllum readii</i> |
| 19. <i>Arachnorchis peisleyi</i> | 51. <i>Prasophyllum viretrum</i> |
| 20. <i>Arachnorchis saxatilis</i> | 52. <i>Pterostylis aneba</i> |
| 21. <i>Arachnorchis zephyra</i> | 53. <i>Pterostylis riparia</i> |
| 22. <i>Arachnorchis zephyra</i> | 54. <i>Thelychiton biconvexus</i> |
| 23. <i>Arachnorchis zephyra</i> | 55. <i>Thelychiton biconvexus</i> |
| 24. <i>Bunochilus barringtonensis</i> | 56. <i>Thelychiton coriaceus</i> |
| 25. <i>Bunochilus chocolatinus</i> | 57. <i>Thelychiton spectabilis</i> |
| 26. <i>Bunochilus macilentus</i> | 58. <i>Thelychiton spectabilis</i> |
| 27. <i>Bunochilus macrosepalus</i> | 59. <i>Tropilis aemula</i> |
| 28. <i>Bunochilus stenosepalus</i> | 60. <i>Tropilis angusta</i> |
| 29. <i>Bunochilus tenuis</i> | 61. <i>Tropilis crassa</i> |
| 30. <i>Bunochilus viriosus</i> | 62. <i>Tropilis eburnea</i> |
| 31. <i>Bunochilus vitreus</i> | 63. <i>Tropilis eungellensis</i> |
| 32. <i>Calochilus montanus</i> | 64. <i>Tropilis radiata</i> |

We thank the following photographers for providing images used in this volume:
 Gary Backhouse, David Banks, Mark Clements, Mike Duncan, Jeff Jeanes, David Jones,
 Adrian Morton, Myra Morton, Ron Parsons, Dean Rouse and the late Ron Tunstall.



Arachnorchis branwhitei



The Australian Orchid Foundation