HANDBOOKS to the FLORA OF SOUTH AUSTRALIA

Published by
THE FLORA AND FAUNA OF SOUTH AUSTRALIA HANDBOOKS COMMITTEE
(formerly the Handbooks Committee of the British Science Guild, South Australian Branch)
between 1921 and 2001
on behalf of the
GOVERNMENT OF SOUTH AUSTRALIA

administered by the
Board of the Botanic Gardens and State Herbarium,
Adelaide, South Australia

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

Orchids
OF SOUTH AUSTRALIA

BY R.J. BATES AND J.Z. WEBER

Cover photographs—

Left. Thelymitra nuda.
Centre. Glossodia major.
Right. Thelymitra azurea.

ORCHIDS
OF
SOUTH AUSTRALIA

by

R. J. Bates, B.Sc. and J. Z. Weber, M.Sc.

THE FLORA
AND FAUNA
OF SOUTH
AUSTRALIA
HANDBOOKS
COMMITTEE

Wholly set up and printed in Australia
A. B. CAUDELL, Government Printer, South Australia
7 December 1990

HANDBOOKS COMMITTEE

Bates, R.J.
Orchids of South Australia.

Bibliography.
Includes index.
ISBN 0 7243 6588 5.

1. Orchids—South Australia. I. Weber, J.Z. (Joseph Zvonko), 1930— . II. Flora and Fauna of South Australia Handbooks Committee. III. Title. (Series : Handbook of the flora and fauna of South Australia).

584.15099423

Handbook of the Flora and Fauna of South Australia, issued by the Handbooks Committee on behalf of the South Australian Government and published by favour of the Honourable the Premier (J. C. Bannon, B.A., LL.B., M.P.)

FOREWORD

Orchids hold a special fascination for many people. While many are familiar with the large tropical epiphytic orchids, the smaller terrestrial orchids found in the more temperate parts of Australia are just as diverse and interesting.

This beautifully illustrated book has a colour picture of every orchid found in South Australia. Apart from the fascinating range of flower shapes, orchids also have an interesting biology which is described in the first chapters. Comments are also made about the conservation status of the orchids occurring in the State—some have already disappeared because of loss of habitat.

Orchids of South Australia with its detailed information and coloured plates will be an invaluable companion to all those interested in natural history. The authors have long been involved in the study of orchids and I am pleased that the Flora and Fauna Handbooks Committee has been able to add their colourful book to its growing list of publications.

Susan Lenehan

Susan Lenehan
Minister for Environment and Planning

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PREFACE

A book on the orchids of South Australia was first conceived in 1982 following the donation of a full set of colour prints of South Australian native orchids to the Adelaide Botanic Gardens by the Native Orchid Society of South Australia. This publication which is the result of that initiative contains colour photographs, which are intended for use as a field guide, and information on orchid biology, ecology and history and descriptions of 140 or so species recorded for South Australia. It also contains diagnostic keys accompanied by drawings, which the careful observer will find invaluable. We hope anyone interested in orchids will be able to identify them using this book, the only complete account of South Australian orchids to have all species illustrated by colour pictures. Distribution maps and habitat notes are included for each orchid.

Most of the colour transparencies were made by R. Bates before it was decided to publish this book. The planning, editing and organising have been undertaken by J. Weber. The biography of R.S. Rogers* is from notes by the late J.T. Simmons. The chapter on pollination was prepared by W. Stoutamire and expanded by R. Bates. A chapter on mycorrhiza, seed and germination was prepared by J. Warcup. The introductory chapters and descriptions are generally the combined authorship of both authors. The illustrations are a very important feature of this field guide and were made by artist Erika Stonor whose detailed drawings will fill the gap between the text and the photographs.

*This book is dedicated to the late South Australian orchidologist, surgeon and scholar R.S. Rogers for his love of orchids and advancement of orchid knowledge.

ACKNOWLEDGEMENTS

We are deeply indebted to the many amateur photographers who responded to our request for pictures and generously lent their colour transparencies thus enabling us to make this record as complete as it is. We are similarly indebted to Erika Stonor who patiently prepared the line drawings. We also thank Miss T. Eadsforth who typed the manuscript on the word processor.

The following people provided material which has been used in this book; K. Alcock, D. Beardsell, C. Bower, A. Brown, G. Brown, C. Brew, G. Carr, M. Clements, I. Dunn, J. Eichner, J. Fanning, E. Fink, P. Foreman, O. Fuller, H. Goldsack, S. Hopper, I. Jackson, J. Jeanes, D. Jones, A. McElroy, B. Mahar, R. Markwick, D. Murfett, R. Peakall, P. Reece, N. Ridley, A. Sheppard, R. Taplin, D. Wells, C. and D. Woolcock.

Credits for photographs go to C. Bower (83, 156), C. Brew, (94, 124), I. Dunn (186), J. Fanning (3, 4), O. Fuller (60), J. Jeanes (67, 210), R. Markwick (20, 62, 70, 72, 77, 78, 86, 100, 104, 107, 112, 113, 119, 128, 134, 158, 161, 162, 168, 182, 200, 205, 213, 223, 225), P. Reece (46, 55, 64, 79, 92, 106, 110, 117, 147, 165, 171, 174, 217), A. Sheppard (25, 41), J. Warcup (13, 14, 15, 16, 17), D. Wells (129), C. and D. Woolcock (145); all other photographs are those of R. Bates.

1. INTRODUCTION

The orchids belong to the flowering plant division of the plant kingdom. They are classed as Monocotyledons because the embryo has one cotyledon, the leaves have more or less parallel nerves and the perianth is made up of two whorls of three parts each. Some authors include them in the order Liliales while others treat them as a distinct order Orchidales because of their peculiar column structure. The family Orchidaceae shows such fantastic diversity of shape, colour and habitat that one might expect that some orchids would be difficult to recognise as such. Indeed the orchids represent one of the largest and most diverse plant families. Considering the many taxonomic problems, a figure between 20,000 and 30,000 orchid species in the world seems reasonable. This is slightly less than one tenth of the total number of flowering plants. In this actively evolving family highly specialised adaptations have developed for attracting, deceiving and manipulating insects to achieve cross-pollination.

Orchids are cosmopolitan, occurring in many different habitats from Alaska north of the Arctic circle to as far south as the sub-Antarctic Macquarie Island. They reach their greatest diversity and concentration in the moist tropics. Orchids may be divided into two main groups according to their habitat: *epiphytes* which grow aerially on trees, bushes or rock faces (lithophytes) and occur mainly in the tropics and subtropics; and *terrestrials* which grow on the ground and are more common in temperate regions.

The major interest in orchids, whether epiphytic or terrestrial has been in their flowers. They are grown extensively for commercial purposes, but hobbyists too have been attracted to orchids, cultivating them in greenhouses, gardens, windows and basements around the world.

Many aspects of orchid biology have been inadequately studied but what has been learnt of their germination, symbiotic relationships with soil fungi, pollination systems and diversity of habitat is fascinating. During the last few years taxonomic research on Australian indigenous orchids has intensified. Most genera are being revised and the results are due to appear in the Flora of Australia. This will mean that many of the names (and actual species concepts) used in this book may change. New species are constantly being discovered or separated from the present species complexes and are yet to be named.

ECOLOGY AND PHYTOGEOGRAPHY

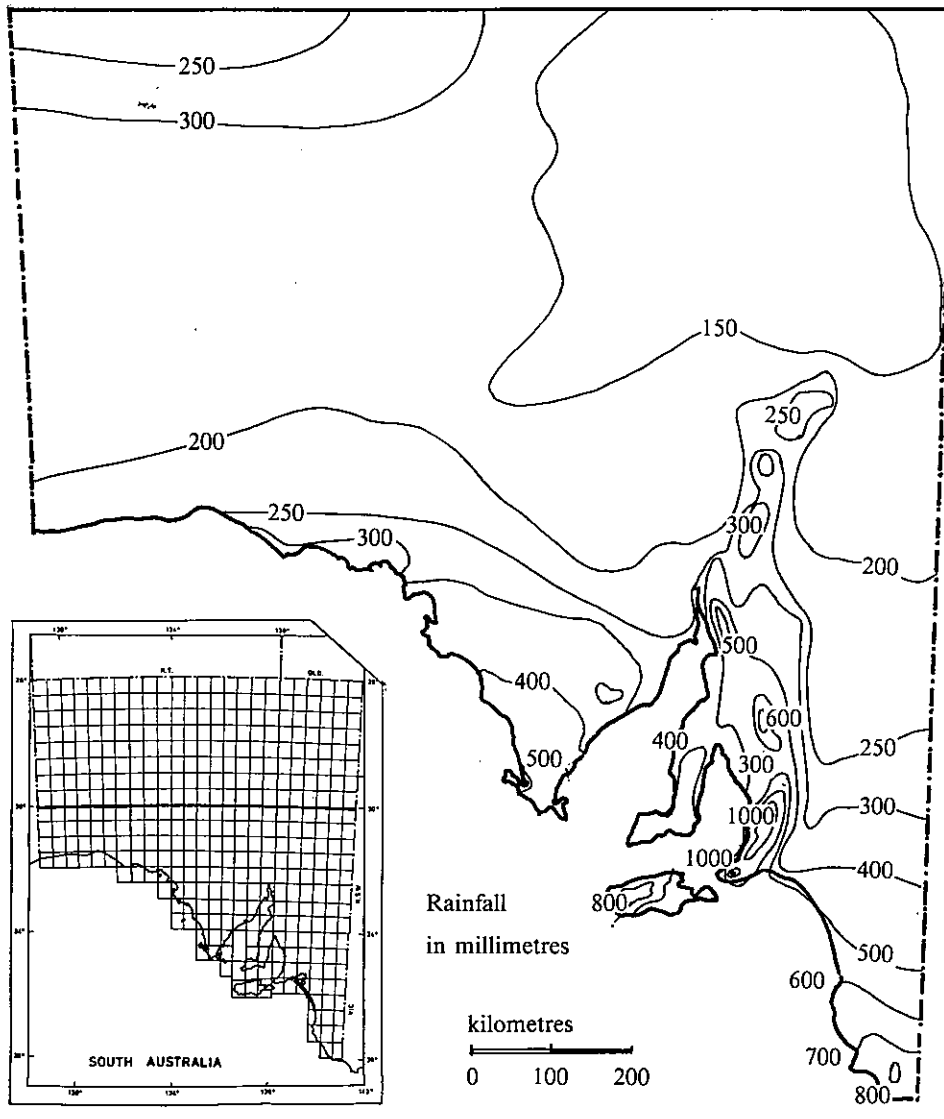
All South Australian orchids are terrestrial and largely confined to the southern areas of the state which receive reliable winter rainfall. Orchids rarely occur in areas receiving less than 250 mm yearly precipitation and are absent from the truly arid areas which account for more than 50% of South Australia. Species diversity is greatest in areas of high rainfall and varied habitat and may exceed 80 species/100 km^2 in parts of the Adelaide Hills. In semi-arid areas diversity is usually less than 5 species per 100 km^2.

Most species exist during the hot, dry summer months only as underground tubers or tuberoids which sprout after the onset of cool damp weather, usually in April–May. Growth is rapid during winter and the majority of species flower during spring (early September in the north to late October in cooler, damper districts). There are a few evergreen species in permanent bogs where orchid flowering peaks in early summer. It is possible to find orchids in flower in South Australia during every month of the year.

There are very few orchids endemic to South Australia. This can be explained by the State's arid climate and position midway between the areas of greatest orchid diversity in Australia i.e. the south-west and the east coast. For a majority of species, their occurrence in

South Australia represents an extension of a wider eastern States distribution. This is especially true of species occurring in swamps or areas of high rainfall, particularly orchids confined to the lower South-East. Very few Western Australian forms extend into South Australia, the arid Nullarbor Plain acting as a barrier.

Except for areas of high salinity native orchids once occurred in all major habitats within the 250 mm isohyet (see Rainfall Map); from swamp to blue-bush plains; from the coast to hundreds of kilometres inland in the northern Flinders Ranges; from sea level to mountain peaks see Plates 1-6. Many species, however, have very specific requirements; some growing only in acid sand, others only on limestone. Some perish if the soil dries out, others soon rot away if the soil becomes waterlogged. The existence of suitable microhabitats plays a large part in controlling the local distribution of orchids.



Within a general woodland habitat certain species may be confined to damper creeksides, heavier, moisture-retentive soils, rocky places which afford some protection from animals or even the southern side of shrubs where cooler damper conditions prevail. In semi-arid country suitable microhabitats may occur only in rich soil at the base of large rocks on the cooler southern slopes of hills particularly where native pines (*Callitris* spp.) grow. Orchids are much easier to find if their favoured micro-habitats are known.

CONSERVATION

Before settlement, distribution of native orchids throughout southern South Australia would have been more or less continuous, but after 150 years this distribution has shrunk dramatically to its present one in small islands of native vegetation in a sea of farmland.

Orchids do not survive in cleared land, nor do they persist on roadside verges. In areas grazed by domestic stock they soon succumb to damage done by the hooves and feeding habits of these animals. In areas not grazed, rabbits and introduced snails and insects invade bushland and decimate orchid populations. Fertilizer and other chemicals may be blown or washed from nearby pasture to alter nutrient levels. Native insects which carry out pollination may die out and the introduction of weeds through logging, traffic or controlled spring burning is detrimental to orchids. Increased soil salinity and the draining of swamps are also disastrous. Two of the richest orchid habitats have all but disappeared; (1) open woodland with its understorey of native grasses and sparse shrubs provided an ideal environment for orchids but was also most attractive for farming and the first habitat to be destroyed, and (2) swamps or bogland, most of which has now been drained and converted to pasture, provided habitat for some 25% of orchid species.

There are many large Conservation Parks in South Australia but most are in arid or infertile areas generally with a scant orchid flora. It is surprising that so few species are known to have become extinct but it is almost certain that some rarer species were destroyed before they were ever collected! At this stage less than 50% of South Australian orchid species are adequately conserved. Many no longer occur in viable wild populations; for these, cultivation is at present the only chance for their continued survival.

Of interest is the recent spread of an introduced South African species, *Monadenia bracteata* (Plate 227), which has been found in the Adelaide Hills.

CULTIVATION

Although many South Australian orchids are difficult to grow there are some which have proved amenable to pot cultivation, particularly the colourful spring flowered *Diuris*, and colony forming *Pterostylis*, of which there are some species in flower every month of the year. None are suitable as garden plants as they are mostly small and susceptible to snails, slugs and insect pests.

Methods: The most suitable way to grow native orchids is in squat, 10–20 cm diam. plastic pots. The soil mixture used should be light and freely draining. Commercial potting mixes are quite suitable for many easy to grow *Pterostylis* and *Diuris* species but most growers prefer to make up their own media by mixing coarse sand with peat moss and bush soil. Garden soil is not suitable. Other growers have found that a gravelly, friable, bush loam is suitable for a wider range of species. Pots can be placed on benches to afford protection from garden pests. A shadecloth covered frame (or commercial greenhouse) should be erected over the benches to give protection from hail, frost and animals. In very wet districts a waterproof but translucent roof is recommended.

Watering: Plants should be watered only during the growing season. Summer-dormant species should be kept dry but cool once leaves begin to die back. Watering frequently in summer causes tubers to rot, but should start again about mid-March. Species which increase vegetatively should be repotted during the dormant period, otherwise repotting is not necessary except to replace mixes which have begun to break down or if plants have shown signs of tuber rot.

Seeds: With species which do not increase vegetatively it is wise to sow seed on the surface of pots already containing orchid plants in April/May, covering this seed with a fine layer of dried pine or sheoak needles or bush leaf litter.

Fertilizer: Care should be taken with the use of fertilizers, some *Pterostylis* and *Diuris* species may benefit from application of organic fertilizer either to the potting mix or as a foliar spray. Other genera such as *Caladenia* do not benefit and may even be harmed. Use of fertilizer can inhibit germination of seedlings. Any fertilizer used should be in small amounts. Better than fertilizer is the use of bush leaf litter which can gradually be built up around plants during the growing season (pine needles, or any small hard leaves may suffice). This leaf litter serves to control moisture and temperature fluctuations. It also adds small amounts of nutrient and therefore takes the place of fertilizer. A topping of leaf litter also reduces soil loss due to rain splash and helps to support flower spikes.

Pests and Insecticides: Slugs and snails are the worst orchid pests and can destroy a thriving colony of the hardiest native orchid overnight. Metaldehyde snail pellets should not be placed on the pots as they induce fungal infection, rather they should be placed between pots or under benches. Leaf chewing grubs are best removed by hand. Indiscriminate use of pesticides is not recommended but careful application of insecticide is the best way of controlling aphids and thrips. The latter are a serious problem in Adelaide during the dry months and the first sign of their presence is usually malformed flower buds.

Quarantine: Plants showing signs of virus (yellow streaked or twisted leaves), fungal or bacterial infection are best removed from the orchid house and not returned until satisfactorily treated.

Obtaining Native Orchids: The species most suitable for cultivation are those which are available from native orchid nurseries or orchid societies. Native orchids are strictly protected and must not be removed from the bush. Transplanted wild plants rarely survive.

2. A CLASSIFICATION HISTORY

The Greeks Plato and Aristotle attempted to classify plants according to their use and assembled a list of over 500 plants, including one orchid. Some terrestrial orchids common in the Mediterranean lands have fleshy tuberoids which are more or less paired and may resemble a pair of testicles—the Greek word for which is *orchis*.

Linnaeus who originated our present system of classification in 1753, listed eight genera of orchids with 59 species of which 45 were terrestrials. None of these was Australian. The first comprehensive systematic account of the Australian Orchidaceae was made by R. Brown in 1810 in his Prodromus Florae Novae Hollandiae, listing 26 genera with 114 species. He was the first European to collect an orchid in South Australia, during the first circumnavigation of Australia with Matthew Flinders. Brown collected his first South Australian orchid at Memory Cove near Port Lincoln in March 1802.

Among other early botanists to visit South Australia and known to collect orchids was the German born Hans Herman Behr. He collected in the Barossa region (1845–1849) and several of these orchids were named by D.F.L. von Schlechtendahl in 1849.

The first orchidologist in South Australia was the German/Australian J.G.O. (Otto) Tepper who wrote several articles on orchids in the 1880's and cultivated many native orchids. In 1847, the 22-year old Ferdinand J.H. von Mueller arrived in Adelaide. He had trained in medicine and pharmacy in Husum, Germany, but his main interest was botany. In 1852 he obtained the post of Victorian Government Botanist in Melbourne. He worked closely with eminent English botanist George Bentham on "Flora Australiensis" which contained a systematic treatment of Australian Orchids (1873), comprising 48 genera with 225 species of which 12 genera and 39 species were listed for South Australia.

At about the same time, in Sydney, an Irish-Australian Deputy Surveyor-General, Robert Desmond Fitzgerald was contributing in a monumental way to Australian orchidology with his "Australian Orchids" which consisted of two volumes of drawings and paintings of Australian orchids. He collected and named several new species from near Adelaide including one of our more common endemics *Caladenia leptochila*. Ralph Tate, a Natural History Professor at Adelaide University for some 26 years and a founder of the Royal Society of South Australia and the South Australian Field Naturalists, was a botanist with enthusiasm for orchids and named several of our caladenias.

In the 1890's Mueller also befriended a young clergyman, Herman Montague Rupp, in Sydney. Rupp later published 216 scientific papers and 2 books on orchids. A contemporary of Rupp was William Henry Nicholls in Melbourne, a bookbinder by trade, who became interested in orchids when he was 38 years old and painted over 500 Australian species of orchids.

A forceful South Australian contemporary of Rupp and Nicholls was Dr Richard Sanders Rogers to whom this book is dedicated. The following section is based on notes made by the late J.T. Simmons.

RICHARD SANDERS ROGERS

Rogers was born in Adelaide on 2 December 1861 and after a public school education, attended Adelaide University, graduating with a Batchelor of Arts degree in 1882. The following year he went to Edinburgh University, Scotland, where he distinguished himself by winning prizes in Chemistry, Botany, Zoology and Anatomy, gaining his Batchelor of Medicine

degree in 1887 and later being awarded an M.D. He met and married Jean Paterson while in Scotland and returned to Adelaide as a ship's doctor in 1888 to take up practice at Port Wakefield. The same year he joined the British Medical Association and was later to serve as President (1932–37). In 1893 he set up as a general practitioner in Adelaide and was appointed to the Board of Management at the Royal Adelaide Hospital and eventually became Chairman of the Board. He continued to study at Adelaide University gaining his M.A. in 1897. He was later a lecturer in forensic medicine at the University (for twenty years) until he retired in 1939 at the age of 78. He was awarded a Doctor of Science degree in 1936, a remarkable 55 years after gaining his first degree.

Dr R. S. Rogers

During his medical career he served as Surgeon Major in South Africa during the Boer War and in 1914 he was again in uniform as Lieutenant Colonel and Officer in Command of the 7th Australian General Hospital at Keswick. Later, in addition to his work as a surgeon at the Royal Adelaide Hospital he became interested in Psychiatry and was in 1939 appointed Honorary Consulting Psychiatrist to all South Australian mental institutions.

Rogers' eminence in medicine was rivalled by his involvement in public affairs. He was elected a Fellow of the Royal Society of South Australia in 1905 and later served as President. He and his wife were actively involved with the Field Naturalists Society. In 1914 he was elected President of the Justices Association of South Australia and from 1909 to 1911 he served as President of the Literary Society of South Australia.

Rogers' interest in botany apparently began while he was a schoolboy enjoying rambles in the bush around Burnside. While a student at Adelaide University his Natural History Professor, Ralph Tate encouraged him to undertake a botanical collecting trip to Kangaroo Island in 1881. The orchids he collected then together with the extensive orchid herbarium he set up in later years are now housed at the State Herbarium (AD) of South Australia. His first orchid paper was published in 1905 and at about the same time he wrote a series of articles for the Education Department's "Children's Hour". In 1909 these were reprinted as a publication entitled "Some South Australian Orchids" which was updated in 1911 as "An Introduction to the study of South Australian Orchids". These little books were placed in every South Australian school and have been responsible for many a child's interest in orchids, indeed many schoolchildren sent him the orchids they collected.

His wife was very keen on orchid collecting and also accompanied him on trips to various parts of the state and as far afield as Western Australia. Rogers was able to study and describe orchids from other states, New Guinea and New Zealand, he corresponded with H.M.R. Rupp, W.H. Nicholls, J.J. Smith and Rudolf Schlechter and others, but it is unfortunate that very little of this correspondence is preserved. During his lifetime he described almost 100 new orchids, over 80 of these from Australia.

Rogers had a long association with Rosa Fiveash (1854–1938) a botanical artist and he supplied her with many of the orchids which she painted, paintings which later formed the basis of the popular book "Rosa Fiveash—Australian Orchids". In 1922 Rogers was author of the orchid section of the first edition of Black's "Flora of South Australia", and in 1926 he wrote the orchid section for the "Australian Encyclopedia" edited by Jose & Carter. In 1924 he was elected a fellow of the Linnean Society and in 1932, as President of the Botanical section of the Australia & New Zealand Association for the Advancement of Science, he gave the presidential address.

When he died on 28 March 1942 Richard Sanders Rogers left a long and remarkable career of academic achievement and public life which made him a most distinguished South Australian.

3. ORCHID MORPHOLOGY

All South Australian species are terrestrial with an erect habit, producing a single stem from underground tuberoids or corms. The stems are terminated by an inflorescence of a single or several to many flowers and most are deciduous after fruiting and seeding are completed. The tubers continue the life cycle after an annual period of dormacy.

Roots are primarily for anchorage as the nutrients are chiefly obtained by absorption from symbiotic fungi. Being monocotyledons, orchids never have developed taproots or primary roots, the entire root system being made up of thin secondary roots. These vary greatly in thickness but are never as thin and fibrous as those of grasses.

Tuberoids or *tubers* of Australian terrestrial orchids are generally spheroid to ovoid but may be irregular or elongate in shape (Plates 228 and 229) (see section on Growth of Terrestrial Orchids).

Scapes or *stems* arise annually from tuberoids and display a morphological diversity from thin and wiry to somewhat woody or soft and succulent; they may be short inconspicuous and one-flowered or robust terminating in a several to numerous flowered spike, raceme or panicle. Like the stems of other monocotyledonous plants, the orchid stem has vascular tissue scattered in many bundles which are denser towards the periphery of the scape.

Leaves are generally present but there are some genera which bear only bracts, which may be leaf-like or reduced to sheathing scales. Leaf arrangement varies from spiral which is the primitive condition to the advanced distichous condition; through reduction of internodes, leaves may form rosettes at ground level or be loosely placed along the stem or scape (cauline). In many cases the basal portion of the leaf forms a sheath around the stem (as in *Thelymitra*) or the base forms a narrow subcylindric scape (as in *Microtis*). Most orchid leaves are typical of monocotyledonous plants having a leaf-blade with many parallel veins, the connecting veins between the longitudinal ones often being inconspicuous. Their primary function is photosynthesis, providing a large surface area for exposure to light, particularly in shady and moist situations. The arrangement of leaves, size, shape and texture is useful in determining each genus or species although not all species can be recognised from their leaves alone.

Flowers of South Australian orchids are bisexual and of the common monocotyledonous arrangement but bilaterally symmetrical. Perianth segments alternate in two whorls of three, sepals outside, petals inside, surrounding the column. Flowers are either fertilised by insects or are self pollinated, they are often colourful and fragrant.

Sepals have a protective function while the bud is developing and they are usually valvate, with the edges meeting but not overlapping, often colourful. They can be similar or dissimilar in shape, as when the dorsal sepal forms a "hood" or the two lateral sepals are more or less conjoined to form a "lower lip".

Petals are commonly thinner than the sepals and usually overlap in bud. In size and shape they are sometimes similar to the sepals or dissimilar and often the median petal is differentiated from the other two and modified into the "labellum" or lip.

The *labellum* is usually a characteristic feature of an orchid, often lobed, spurred, adorned with glands, appendages or calli (callus, a hardened swelling or thickening of the skin), sometimes mobile and highly irritable and often brightly coloured, it plays an important role in pollination.

The *column* (or gynostemium) is a distinctive feature of all orchids and a unique structure in the plant kingdom. It is formed by fusion of the male parts "stamens" and female organ

"pistil". The column, set to one side of the flower centre, is usually terminated by the anther, with the stigma lower and facing the labellum. The column may be adorned with various appendages, it may be long and thin or short and broad, easily visible on the flower or hidden within. The stigma or stigmatic plate is usually borne on the lower part of the column. It may consist of two or three lobes which are often not readily discernible. The median lobe is sometimes well represented by a small distinct process, the "rostellum" which is often deep in a notch of the elongated stigmatic plate.

Anther position is usually erect and parallel to the axis. It sits on the apex of the column, but may bend backwards or forwards. It is divided usually into two compartments, "locules", where there are 2 - 4 "pollinia". It dehisces by longitudinal slits.

Pollen grains are not free but are granular, mealy or waxy, often united to form large masses or pollinia which are variously shaped. Elastic fibres often connect together the component parts of the pollinia and may be produced at their apices into a strap-like extension or "caudicle". The caudicle when present is adherent to the viscid disk or gland, the "viscidium". Caudicles and viscid disk are absent in some genera. Since the orchid pollen is not used as a food by bees, the principal food reward offered by orchids is *nectar*, often at the column foot on the labellum or in a nectar spur.

The *ovary* is inferior (meaning that it is below the flower) usually slender at flowering time and it may be difficult to see any distinction between it and the pedicel, which may be short or long. The bases of the sepals, petals and column are completely united with the ovary so that they appear to arise from it. Once orchid flowers are fertilized, the flowers often collapse. Ovaries swell to form vertical seed capsules, unilocular or trilocular and opening by three or six longitudinal slits. In most South Australian species dehiscence and release of seeds normally occurs on warm windy days.

Seeds are very numerous, minute (see the section on Orchid Seed, p. 23).

The *pedicel* is immediately below the ovary and in many orchids the pedicel twists at an early stage in bud so that the labellum in fully developed flowers instead of being above the column as in *Prasophyllum* is placed below it as in *Caladenia*. When this happens the flowers are said to be "resupinate".

4. ORCHID POLLINATION

by W. Stoutamire* and R. Bates

Orchid flowers are finely tuned devices for attracting insects, ensuring pollen transfer and seed production. We usually think of them only in terms of fragrance, bright colour and unusual form without relating these characteristics to natural function. We have some knowledge of the floral mechanism of the Australian terrestrial orchids but the functioning of most species is still unknown.

Wind pollination does not occur in orchids because the pollen masses (pollinaria) are much too heavy for wind transport. Animal transport is highly developed and the refinements and unusual structures of most orchid flowers should be viewed in terms of the animal-attraction mechanisms. The need for transport of pollen by animals is reduced or eliminated in those species which allow pollen to contact the stigma of the same flower, ensuring self pollination (autogamy). This occurs in many Australian orchids and is particularly prevalent in South Australian species. Most *Thelymitra* species (sun orchids) are self-pollinated and in other genera there are some species or at least forms which self-pollinate. Orchids may bypass pollination entirely by producing viable seeds directly from the tissues of the parent plant, a process called "agamospermy". This is a specialised form of vegetative reproduction or "apomixis" (a process by which the flowers produce seeds without any sexual union of cells; the embryo is derived from maternal tissues and is genetically identical to the mother plant). These asexually produced seeds give rise to large numbers of genetically identical offspring. Some agamospermous orchids do occur in South Australia. Self pollination and/or agamospermy should be suspected in plants where all capsules enlarge during or soon after flowering.

Biologists interpret self pollination and apomixis as methods for ensuring seed production when insect pollination is likely to fail for lack of appropriate insects, for severe or unstable environmental conditions or where there is a premium on rapid seed production because of some other environmental problem. It is essentially a trade-off between short-term advantage (large numbers of new plants identical to the parent, all well adapted to the local conditions) and long-term disadvantage (the entire population of identical individuals may die if environmental conditions change since there are no variants which might be able to survive the change).

Orchid flowers are usually designed for sexual reproduction by cross pollination. The common approach is to advertise food in the form of nectar or pollen to a searching insect although there may be much deception involved in the advertisement. Orchid flowers do not always provide what they promise. In Australian species producing nectar, the secretion is usually from the base or surface of the labellum. Nectar feeders, including flies, native bees, introduced honey bees, wasps and beetles may visit these orchid flowers in numbers on warm days, busily removing the secretion from the labellum. *Acianthus, Microtis* and some *Prasophyllum* species flowers produce such liquid foods from the labellum surfaces (see Plate 7).

Both pollen and nectar advertising flowers may be fragrant, but fragrance is usually stronger or better developed in the nectar flowers. *Acianthus* species and other inconspicuous orchids attracting fungus gnats and other small flies, sometimes have faint odours which are not at all flower-like but which apparently function as attractants. The insect visitors are not deliberate pollen collectors in any event. We know little about the products of the glandular structures of such flowers: they may be superficial nectar, oil or other unidentified secretions collected by the insects. Some strongly coloured and sometimes fragrant orchids in the genera *Caladenia* and *Thelymitra* appear to be promising food but there is no obvious source of liquid nectar.

*University of Akron, Ohio, U.S.A.

Orchids that attach their highly organised pollen masses to insects cannot provide pollen as food to a visitor. Pollen masses become attached to the head, thorax or abdomen of visitors in positions where they cannot be removed easily by the insect (Plate 8). The pollen functions only for the purpose of orchid reproduction, not for insect food. Some orchids do suggest food pollen, however. The bright yellow masses in the centre of some *Thelymitra* (sun orchid) flowers are not true pollen but bees investigate these structures, reacting to them as food lures (Plate 9). Other orchids produce yellow tissue which resembles stamens, such as the yellow-tipped calli on the labellum of colourful *Caladenia* species.

The insect is deceived into alighting and functions in flower pollination but gains no food by doing so. *Gastrodia sesamoides* produces yellow mealy cells on the labellum of the tubular flowers. These cells may be collected as false pollen by visiting bees. Many species of *Diuris* (donkey orchids) are thought to mimic bush peas and although they provide no nectar or pollen their resemblance to the pea flowers ensures that bees which feed on the peas will visit the orchids often enough (in error) to effect pollination.

There are other strategies exhibited by orchids to attract insects. One of the most interesting of these is the use of sexual deceit to attract male insects. Wasps, ants or sawflies (always male) attempt to mate with the flowers, which are imitations, physically and chemically, of the females of their species (Plate 10). The chemical compounds being released by the flowers mimic the compounds produced by the female insect for mating purposes. Such airborne chemical messages are called sexual pheromones. The process by which flowers of some orchid species act as decoy females to ensure pollination during a mating attempt is called pseudocopulation. Insects which attempt to mate with the flower, remove pollen or deposit pollen on the stigma during their activity.

Orchids which attract male insects through simulation of the female odour and form, share certain characteristics: flower colours are usually shades of green, yellow and maroon, or have dull red veining on a cream background. They are usually, but not always, odourless to humans; and they often have a movable labellum attached to the flower by a narrow, flexible claw. Species in which the labellum can be moved by the insect into position under the column (passive movement) occur in the genera *Caladenia* (Plate 11) and *Chiloglottis* while species of *Paracaleana* and *Caleana* have a trigger device in which the labellum is moved into the vicinity of the column by the flower (active movement) when the labellum is touched. The labellum snaps back catapulting the insect into the column (Plate 12). Flowers of these orchids are not brightly coloured by human standards, and some, such as *Paracaleana minor*, are not easily detected, by the inexperienced eye. We are atuned to the character syndrome associated with food flowers, but the syndrome associated with wasp sexual attraction is much less obvious to us.

Orchids which mimic alternative food sources include *Thelymitra* species and *Dipodium* (Plates 13 and 14). Some *Caladenia* species are food flowers, or at least suggest food. *C. patersonii* and *C. latifolia* are both brightly coloured and fragrant. They attract an assortment of bees, wasps and flies without sexual attraction. In contrast, *C. dilatata* is odourless to us and lacks bright floral colours, although we may notice it because of the apple green and maroon colour and unusual form. The labellum carries large, dark calli which function as a female wasp visual equivalent. This species attracts a non-social wasp of the family Tiphiidae, subfamily Thynninae (see Plate 15 for thynnid wasps on *C. tentaculata*). Wasps of this group produce winged males and smaller wingless females which are ant-like in appearance. Wasp-attracting *Caladenia* species usually exhibit large dark calli which do not appear particularly insect-like to us. They function in this context for the insect participant, whether or not we see the resemblance. Each of the wasp-attracting *Caladenia* species appear to attract the males of only one wasp species in any given area, but there is some indication that other orchids may use the same wasp at a different time or in an adjacent area. Sepals of most wasp-attracting *Caladenia* species are enlarged near the tips. These clubbed sepals (osmophores) appear to be the source of much of the sexually attractive pheromone. Attraction can be

demonstrated by removing the clubs and exposing them to a wasp population separately from the remainder of the flower. Wasps will visit the clubs preferentially and may even attempt to carry them away.

Sexual attraction occurs in several genera with large ornate labella: in *Calochilus, Cryptostylis* and *Leporella* actual pseudocopulation occurs (Plate 16), but in *Caladenia* and *Chiloglottis* the wasp usually grasps the labellum or labellum calli and simply tries to fly away with them. Sometimes the pollinating wasp visits only a single species of orchid, or one species of orchid is visited by several species of wasp or as in *Cryptostylis* one species of wasp may visit several species of orchid.

The point should be made that all geographic races of an orchid species are not necessarily pollinated in the same way nor are different mechanisms mutually exclusive. Insect pollination in one region could be partially replaced by self pollination in another for example, even within the same orchid species. *Caladenia carnea*, (common pink fairies) of the Adelaide Hills has both insect and self-pollinated variants which may be found growing together on the same hillside.

Another kind of deceit seems to occur in *Corybas* (helmet orchids). These resemble the fruiting bodies of fungi (toadstools) and are visited by female fungus flies, possibly searching for a place to lay their eggs. Other orchids such as *Acianthus caudatus*, (mayfly orchid), or autumn flowering prasophyllums, (midge orchids), produce odours of decay, as of mould or fermenting fruit, to attract flies and fungus gnats. *Pterostylis* (greenhoods) are also pollinated by fungus gnats, but how the orchids attract these insects is not known as they provide no nectar and in most cases are neither perfumed nor colourful to our human senses (Plates 17 and 18). Even at the level of the individual plant different strategies or a combination of strategies may be used for reproduction. *Microtis unifolia* (common onion orchid) may take advantage of a "triple chance" reproduction system. It is commonly visited by a whole range of small gregarious insects in search of nectar, but if these do not visit the flower, it self-pollinates within a few days and if the pollinia are removed without contacting the stigma seed may still be produced by apomixis.

Although many insect pollinators visit South Australian orchids curiously enough none of the orchids is pollinated by butterflies or moths which are important orchid pollinators in the northern hemisphere and tropics. Introduced honey bees, *Apis mellifera* have occasionally been observed to carry and perhaps transfer pollinia in *Caladenia* and *Thelymitra.*

DETERRING NON-POLLINATORS

Many insects and other small creatures seen on orchid flowers are not pollinators. These non-pollinators may visit to steal nectar or pollen (hoverflies, ants), to eat the flowers (aphids, thrips, beetles) or to hide in wait for other visitors (flower spiders). Those which actually prevent pollination either by eating the flowers or their pollinators, are termed as *anti-pollinators.*

Orchid flowers exhibit various mechanisms for deterring non-pollinators. Firstly, the flowers are generally held well above ground on slender scapes. This serves to prevent visits by crawling visitors such as ants. Some genera have the scape covered with bristly hairs which make it almost impossible for anything to climb up. *Thelymitra* keep their flowers closed except during optimum pollination conditions. Other species have their pollinia concealed either inside protective shells (*Pterostylis, Corybas*), behind the stigma (*Diuris*) or on top of a slender, slippery column (*Acianthus, Cyrtostylis*). Genera with numerous flowers as *Microtis* and *Prasophyllum* have poorly protected pollinia but because they are multiple flowered they can afford some pollen loss.

5. MYCORRHIZA

by J.H. Warcup

Apart from their flowers, orchids as a group are remarkable for their complex pollination systems (see chapter 4), their mycorrhizas, and the method of germination of their seed. The aim of this brief account is to indicate that our terrestrial orchids may be as fascinating, complex and diverse below as above ground.

Mycorrhizas are associations of specific fungi with the roots or absorbing organs of plants, occurring on the vast majority of terrestrial plants from bryophytes and ferns to angiosperms. Research has shown that in soils low in available nutrients especially phosphate, (as are the majority of natural soils) a plant without its mycorrhizas is a handicapped plant showing poor growth compared with one with mycorrhizas. In soils rich in available nutrients, such as those in most gardens and fertilised agricultural soils, mycorrhizal associations are less important for under these conditions plants are capable of absorbing their own nutrients. Further, high levels of available phosphate may depress mycorrhiza formation. (This is why many gardeners and farmers are not familiar with mycorrhizas.) Mycorrhizas are considered to be examples of symbiosis, associations of benefit to both members, where the fungus usually obtains carbon compounds for growth from the host whereas the host obtains phosphate and probably other nutrients from the fungus.

There are four major types of mycorrhizas, two of which occur on a wide range of different plants. First, associations with wide host ranges are ectomycorrhizas where the fungus forms a sheath on the surface of feeding roots and may penetrate between, but not into host root cells. These occur predominantly on forest trees such as pines, oak and beech and in Australia on eucalypts and other Myrtaceae, myrtles (*Nothofagus*) and casuarinas, though they may also occur on some shrubs and herbs.

In the other three kinds of mycorrhizas the fungus occurs predominantly within host cells. The second type is vesicular-arbuscular mycorrhiza, more commonly known as VA mycorrhizas or VAM which occur on a wide range of plants and are far more abundant than all other types of mycorrhizas. The third and fourth types of mycorrhiza are associated only with certain families, the heaths, Epacridaceae and most Ericaceae (ericoid mycorrhizas) and the orchids. Most members of the Ericaceae and Epacridaceae have very fine roots or "hair roots". Ericoid mycorrhizal infection of fine septate hyphae is typically confined to the outermost or sole layer of cortical cells. The fungi of VA and orchid mycorrhizas also occur predominantly in cortical cells. Typically VAM fungi have coarse aseptate hyphae that form arbuscules (cauliflower-like hyphal clusters) and/or vesicles (swollen spore-like cells) in the host cortex; orchid fungi are septate and form hyphal coils in cells.

ORCHID MYCORRHIZAS

The fungi associated with orchids are, with few exceptions, different from those that form mycorrhizas with other plants, all have been found to be basidiomycetes belonging to genera such as *Thanatephorus, Ceratobasidium, Tulasnella* and *Sebacina*, but many still await identification. Some rhizoctonias, notably *Rhizoctonia solani* (*Thanatephorus cucumeris*) are plant pathogens, often causing damping-off or root rot of a wide range of plants. Nevertheless, *R. solani* may on occasion be mycorrhizal with orchids. In South Australia it has been found occasionally with species of *Pterostylis*. Infected plants may have brown roots as *R. solani* has dark brown hyphae and may form brown hyphal coils.

All species of orchid so far investigated have been found to contain mycorrhizal fungi. Only once have I found an orchid without a mycorrhizal fungus, a plant of *Spiranthes sinensis* subsp. *australis* growing in a swamp. The fungi occur within the roots or absorbing organs of the orchid forming hyphal coils within cortical cells. Very young roots may be without fungus, in older roots the infection may be complete, occurring throughout the cortex, or sporadic, occurring only in patches. In old roots most of the fungus may be dead having been digested by the host. Usually only one fungus is found in a plant but occasionally two or very rarely more may occur. Infection usually occurs soon after root growth commences but may occur throughout the growing season. Infection is considered to arise from the soil. Other fungi may also occur in orchid roots, as they do within the roots of many plants, but these parasites (they are not necessarily pathogens and do little or no damage to the root) do not form coils within the cortical cells.

Isolations from orchids collected from the field have shown that there is some degree of specificity of association between orchids and fungi. Table 1 records the fungi commonly associated with southern Australian orchids. Specificity, however, is far from complete, for different rhizoctonias may occur in an orchid either alone or with the more usual species. A few orchids, notably *Microtis unifolia* and *Spiranthes sinenis*, associate with a wide range of rhizoctonias.

Most work has been directed at understanding the role of the fungi in assisting germination of orchid seed rather than supplying nutrients to adult plants. However, orchids, especially epiphytes, given fertilizers may grow well without mycorrhizas or infection may be light and sporadic. With many terrestrials there is circumstantial evidence that plants with mycorrhizas grow better than those without, but this may be because we do not know what would be a balanced fertilizer for such orchids.

TABLE 1

The fungi commonly associated with South Australian orchids.

Fungus	**Orchid**
Ceratobasidium cornigerum	*Pterostylis; Prasophyllum*
Tulasnella calospora	*Thelymitra; Diuris; Orthoceras; Acianthus exsertus*
Tulasnella cruciata	*Thelymitra; Acianthus caudatus*
Tulasnella spp.	*Thelymitra*
Sebacina vermifera	*Caladenia; Glossodia; Microtis; Eriochilus; Cyrtostylis reniformis*
Many/all above fungi	*Microtis unifolia; Spiranthes; Lyperanthus nigricans* (?)
Unknown	*Corybas; Cryptostylis; Caleana; Paracaleana; Chiloglottis; Calochilus*

ORCHID SEED

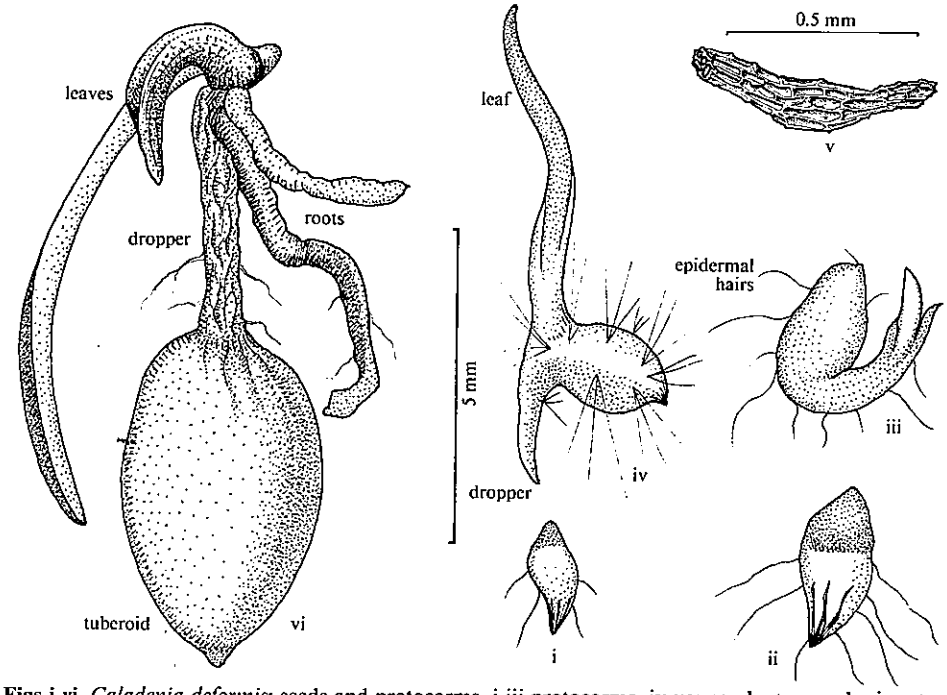
Orchids differ from most other plants in that the great majority produce large numbers of minute seed, each weighing about 0.3 x 10^{-6} to 6 x 10^{-6} g. Such minute seeds are often called dust seed as they may be blown passively over long distances. Little is known about the longevity of seed in nature, but mature seed of many terrestrial orchids if kept cool and dry may remain viable for 10 to 15 or more years. Seed of *Thelymitra aristata* that I collected in 1968 was still viable in 1986.

Each seed is composed of a thin, usually transparent seed coat testa and a small round or oval mass of cells comprising the embryo. Seed varies in colour from white to almost black and in shape from ovoid to spindle-shaped. In the latter case the testa is free from and larger than the embryo. Testa cells are dead, air-filled, and have a characteristic net-like appearance. Many orchids may be identified by the size, shape, colour and testa pattern of their seed. Orchid seed does not contain endosperm, the storage tissue that supplies nutrients for germination. Further, the embryo lacks a cotyledon and apical meristems (cells of growing point) and many contain as few as ten cells. The cells at the micropylar (distal opening of ovule) end may be larger than the remainder but that is generally the extent of differentation in the embryo. Food reserves in the embryo are few and mainly lipids (fat-like substances) and protein with little or no carbohydrates such as starch. Thus orchid seed have gained mobility at the expense of food reserves. When the orchid seed is shed, the embryo is completely undifferentiated and depends for survival upon an extraordinary combination of chances. Since it is provided with neither nourishment nor protection, except for airy testa or seed-coat, the seed must not only fall into an suitable environment, but must also rely upon a symbiotic association with a specific fungus to supply it with enzymes and nutrients. It is, therefore, easy to comprehend that the chance for survival of an orchid seed to grow to maturity approaches one in a million.

GERMINATION OF SEED

In nature, orchid seed only germinates to form seedlings in the presence of an appropriate mycorrhizal fungus which provides most of the nutrients for growth. Such fungi are not carried by the seed but occur in the environment; in soil, on the bark of trees, and other habitats. The limited work done suggests that rhizoctonias capable of being orchid mycorrhizal fungi are widely distributed in nature. But probably few seed, except those near an adult plant, land with an appropriate fungus in their immediate vicinity.

On a moist substrate some orchid seed germinate within a week or so by absorbing water, swelling, bursting the testa and forming one or a few epidermal hairs (Fig. i). This structure is called a protocorm and in nature does not develop further unless it becomes infected by a mycorrhizal fungus. Living epidermal hairs or the larger basal cells of the protocorm are sites of entry for the fungus which then forms hyphal coils in the basal cells so that the basal region becomes heavily infected (Fig. ii). The infected cells remain alive and the fungus is enclosed within an encasement layer probably of host origin. Experiments have shown that there is a transfer of nutrients including carbohydrates from the fungus to the orchid. This stimulates cell division and growth at the non-infected top end of the protocorm. Later the hyphal coils start to degenerate, the hyphae collapse and are digested by the host. When degeneration of hyphae is complete they become aggregated into yellow amorphous masses. Host cells may become infected more than once and have further coils form within them. Seed of caladenias, some species of *Prasophyllum* and *Microtis unifolia* germinate this way but with many other southern Australian orchids initial swelling is either very slow or is absent except in the presence of a mycorrhizal fungus. Whether infection precedes swelling is not clear.



Figs i-vi. *Caladenia deformis*; seeds and protocorms. i-iii protocorms, iv young plant, v seed, vi mature plant.

Many protocorms develop to form a top-shaped structure with the infected end at the base. At the other end an apical bud is differentiated (Fig. iii) from which develop one or more leaves depending on the species of orchid. At this stage the young plant may become more self-sufficient and less dependent on its fungus for nutrients. Some protocorms themselves, if they receive light, may develop chloroplasts and turn green in the region of the developing shoot (Fig. iv, v). Protocorms vary in size. Those of *Thelymitra* are globose and about 1–1.5 mm in diameter. Most other orchids have protocorms about 3–5 mm long (Plate 19), but those of some *Prasophyllum* species may be up to 11 mm long.

Protocorm development of southern Australian orchids is often considered to be similar to that of Northern Hemisphere terrestrial orchids. However, the environmental constraints on growth are quite different in the two areas. In northern Europe protocorms have to survive a long cold winter, whereas in southern Australia, except for the species of swamp margins or bogs, the major constraint on growth is the hot dry summer. There is a tendency for tuberoids or the growing shoot of the protocorm to develop away from the soil surface as soon as possible, presumably to minimise the possibility of desiccation at the surface. Some protocorms, such as those of *Prasophyllum archeri* (Plate 20), elongate downwards before developing a leaf. In other species of *Prasophyllum* and in *Microtis unifolia* the neck of the protocorm elongates downwards carrying the shoot with it. Little is known of the effect of heat on protocorms but the fact that protocorm development in the laboratory is poor in midsummer and that many orchids in semi-arid areas are clustered in litter under trees suggests that heat, as well as dryness, may be a limiting factor in orchid development.

Protocorms differentiate to form young plants in a number of ways depending on the species of orchid. In a few cases, including *Spiranthes sinensis* (Plate 22), the protocorm develops into a short underground axis, possibly a stem or scape, from which a number of

fleshy roots develop. In *Gastrodia sesamoides* the protocorm forms a horizontal rhizome which is the vegetative body of the orchid. Most terrestrial orchids, however, form tuberoids which serve to tide the orchid over during periods unsuitable for growth, in southern Australia the summer dry period. Shortly after formation of the shoot, the protocorm produces a dropper (Plate 23) which at the end is differentiated into a tuber (Plates 19, 20, 21). Botanically speaking, a tuber is of stem origin. As the origin of orchid tubers is uncertain other terms such as "root-stem tuberoid" or just tuberoid have been suggested for these structures. It is often difficult to compare structures in orchids with those in other plants because extensive modifications of vegetative structures have occurred in orchids, also the exact nature of the protocorm remains uncertain.

While orchid seed in nature appears dependent on mycorrhizal fungi to assist in germination, this is not necessary in the laboratory. A method of germinating orchids from seed by growing them asymbiotically (without micro-organisms or mycorrhizal fungi present) on glucose or sucrose media was successful, in particular with the seed of epiphytic orchids. The majority of terrestrial orchids, however, grow much more slowly and less successfully in asymbiotic culture, probably due to inadequate knowledge of their growth requirements.

Thus all orchids pass through a prolonged seedling phase before they are able to synthesize their own food. During this time, and often later, they are dependent on their mycorrhizal fungi for most if not all their nutrients including carbon compounds. It is interesting to note that in seed germination there has been a reversal of roles between orchid and fungus, for in other mycorrhizal systems, it is the plant which supplies carbon compounds for the fungus. The origins of the orchid-fungus association are obscure, however, judging by the number of orchid species, and their occurrence in most ecological habitats around the world, it has been a very successful association.

GROWTH OF TERRESTRIAL ORCHID PLANTS

As most of our orchids oversummer as tuberoids, growth and development of plants from tuberoids are discussed here.

After the soil becomes moist in the autumn, tuberoids begin to grow, and may do this in a number of ways depending on the orchid. In *Pterostylis* the apical bud forms a stem- or root-like axis which grows to the surface of soil or litter to form a rosette of leaves or a flowering scape with cauline leaves. Species of *Pterostylis* vary in their pattern of vegetative growth. In some the flowering scape arises from the rosette of leaves, in others, such as *P. longifolia* and *P. vittata*, non-flowering plants have a rosette of leaves whereas flowering ones have a cauline scape. While the axis from tuberoid to soil surface resembles a root in appearance and is mycorrhizal it bears scale leaves with buds in their axils and has stomata and is therefore a modified stem. In the axil of a scale just above the tuberoid a dropper is formed at the end of which a replacement tuberoid is differentiated. Nearby, and sometimes further up the axis, arises a short root. These roots have simple, single epidermal root hairs whereas the root hairs on axis and dropper arise in clumps of 3–4 from a raised base, i.e. are quite different in structure. The replacement tuberoid often lies close to the original tuberoid so that when plants are dug up they appear to have paired tuberoids, but one is often grey and wrinkled whereas the other is generally white and smooth. These paired tuberoids resemble mammalian testicles (see Plates 228 and 229). At the end of the growing season the old tuberoid together with the aerial parts of the orchid die and the replacement tuberoid oversummers until the next growing season.

Many species of *Pterostylis*, and other tuberoid forming orchids, may also produce daughter tuberoids. In *Pterostylis* secondary droppers form from the buds in the axils of the scale leaves on the underground stem, their number, usually one to seven, depending on the vigour of the plant. Droppers may also be formed from one or more of the buds that occur at the base of each rosette leaf. On the other hand, a further rosette of leaves may be formed

from these buds if the original set is damaged or lost. Species that form daughter tuberoids freely often occur in large colonies, e.g. *P. nana, P. nutans, P. pedunculata,* etc. In species that only form a replacement tuberoid, as do members of the *P. rufa* series, daughter tuberoids may often be stimulated to grow by removal of the replacement tuberoid after its bud has formed.

Other orchids that develop similarly to *Pterostylis* include *Acianthus, Corybas, Caladenia* and *Glossodia.* Some caladenias and glossodias differ from the other genera in that the oversummering tuberoid is surrounded by a brown fibrous sheath. The extent of the sheath varies in different species and may include the site of the underground stem. The fibrous sheath is composed of a series of net-like layers representing part of the thickening of epidermal cells from previous tuberoids. Caladenias often form replacement tuberoids deeper each year unless they meet some obstacle to downward growth. In these species a string of sheaths may occur along the old axis, each representing the site of a previous tuberoid.

In *Diuris, Thelymitra* and *Prasophyllum* there is no elongated root-like axis but a short non-persistent axis, possibly a stem, is formed just above the tuberoid from which arises one or more leaves with a ring of roots below. These roots bear copious epidermal root hairs that arise singly and stomata are absent. Replacement tuberoids and, in colonial species, daughter tuberoids also arise from the axis.

Spiranthes, Cryptostylis and *Dipodium* are similar in that the protocorm develops into a short persistent underground stem from which arise a number of stout fleshy roots (tuberoids?). These roots usually survive for more than one year; new roots arise from the same general area of the stem. In other respects these orchids are very different, for *Spiranthes* and *Cryptostylis* have a number of leaves and are inhabitants of swamp margins whereas *Dipodium* is leafless and associated with stringybark forests.

ORCHIDS DEPENDENT ON THEIR FUNGI

Dipodium punctatum is an example of what is often called a "saprophytic" orchid. However, this use of the word is incorrect because a saprophyte is an organism that obtains its nutrients from decomposing organic matter and no orchid is able to do this. On the contrary the orchid obtains all or most of its nutrients from its associated fungus. A more preferred term is achlorophyllous, i.e. having no chlorophyll, but some "saprophytic" orchids do contain chlorophyll, for instance the flowering scape of *D. punctatum.* There is no general term that covers all cases of "saprophytic" orchids so it is perhaps better to consider them individually.

In South Australia *D. punctatum* and *Gastrodia sesamoides* are orchids that depend on their associated fungi throughout their life. *Gastrodia* occurs in soil or at the base of deep litter in forests. The plant consists of a series of swollen rhizomes which bear scale leaves and buds. Terminal swollen rhizomes produce flowering scapes in summer. Most of the rhizome system apart from the terminal portions may contain coils of the associated fungus(i). Research suggests that the fungi associated with *Gastrodia* are able to rot fallen twigs and other sources of cellulose, but apart from the fact that they are Basidiomycetes their identity is not known. Neither the identity nor the source of carbon compounds of the fungus(i) associated with *Dipodium punctatum* is known.

6. ORCHID IDENTIFICATION AND DESCRIPTIONS

KEY TO GENERA

A. Leaves with lamina (Figs 1, 7, 13 & 16) ..... C.
A. Leaves scale-like (Fig. 2) ..... B.

B. Perianth-segments free (Fig. 3) ..... DIPODIUM (p. 77)
B. Perianth-segments fused (Fig. 4) ..... GASTRODIA (p. 89)

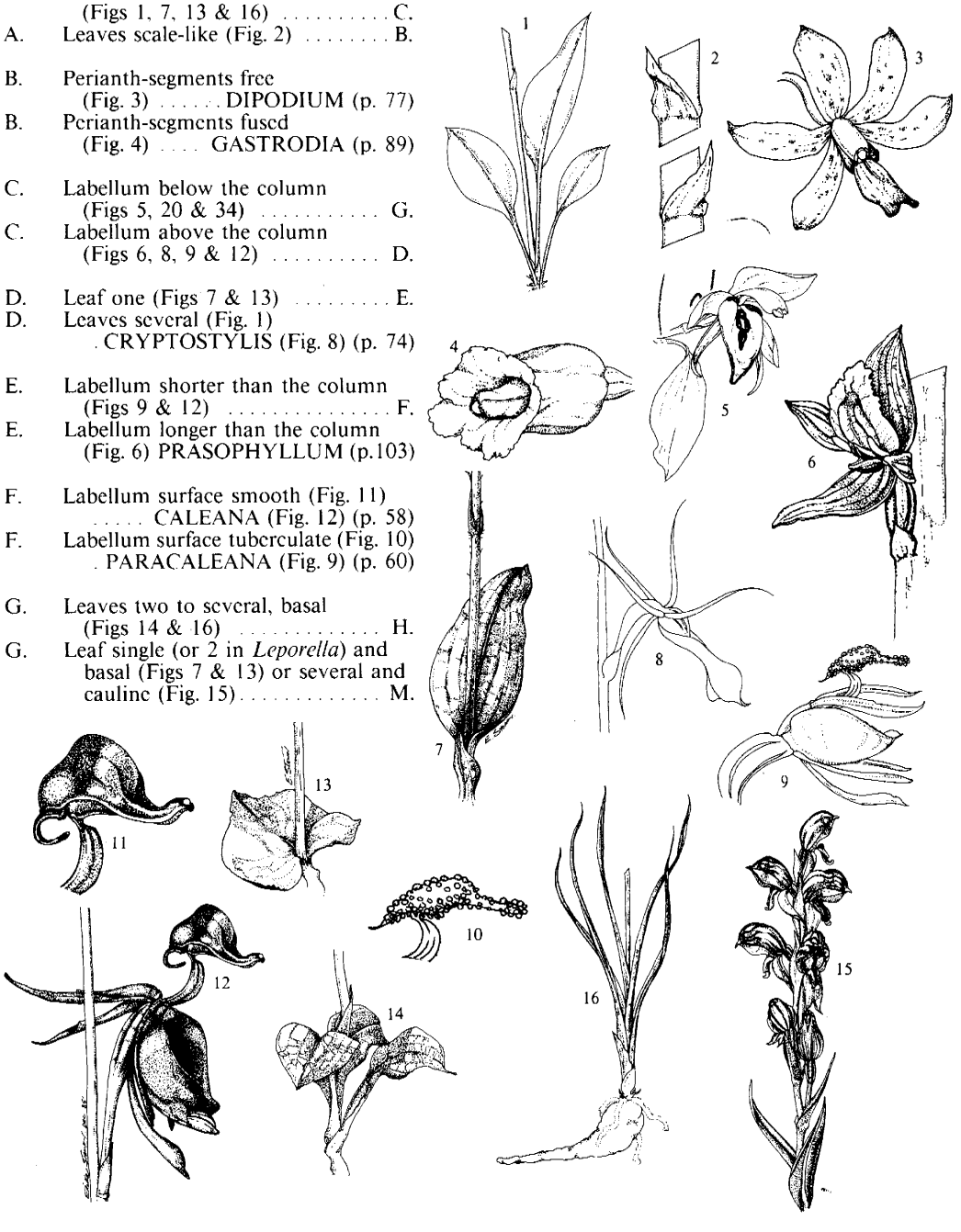
C. Labellum below the column (Figs 5, 20 & 34) ..... G.
C. Labellum above the column (Figs 6, 8, 9 & 12) ..... D.

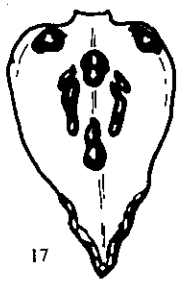
D. Leaf one (Figs 7 & 13) ..... E.
D. Leaves several (Fig. 1) ..... CRYPTOSTYLIS (Fig. 8) (p. 74)

E. Labellum shorter than the column (Figs 9 & 12) ..... F.
E. Labellum longer than the column (Fig. 6) PRASOPHYLLUM (p.103)

F. Labellum surface smooth (Fig. 11) ..... CALEANA (Fig. 12) (p. 58)
F. Labellum surface tuberculate (Fig. 10) ..... PARACALEANA (Fig. 9) (p. 60)

G. Leaves two to several, basal (Figs 14 & 16) ..... H.
G. Leaf single (or 2 in *Leporella*) and basal (Figs 7 & 13) or several and cauline (Fig. 15) ..... M.

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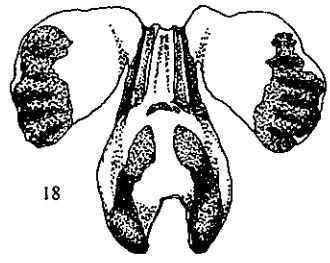
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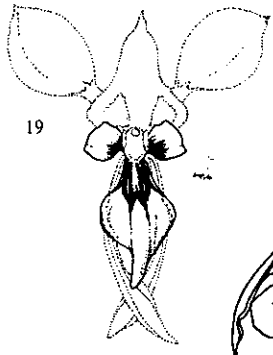
H. Labellum lamina not lobed (Fig. 17) ..... J.
H. Labellum lamina 3-lobed (Fig. 18) . I.

I. Petals clawed, more than 13 mm long (Fig. 19); dorsal sepal not hooded ..... DIURIS (p. 79)
I. Petals not clawed, less than 6 mm long; dorsal sepal hooded (Fig. 20) . ORTHOCERAS (p. 101)

J. Labellum margin smooth (Fig. 22) L.
J. Labellum margin fringed (Figs 21 & 37) ..... K.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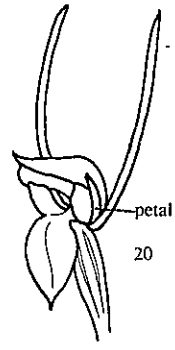

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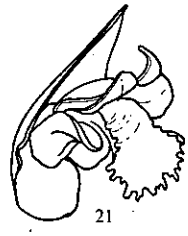
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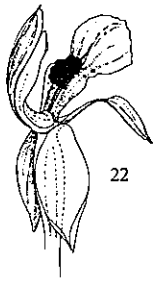
K. Flowers 1–3 ... LEPORELLA (Fig. 45) (p. 93)
K. Flowers numerous in spiral . SPIRANTHES (Fig. 21) (p. 143)

L. Perianth-segments free, radially spreading (Fig. 22) ..... CHILOGLOTTIS (p. 66)
L. Dorsal sepal and petals cohering to form a hood (Fig. 23) . PTEROSTYLIS (p. 118)

M. Leaf glabrous (Fig. 30) ..... O.
M. Leaf pubescent (Fig. 24) ..... N.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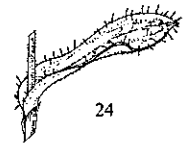
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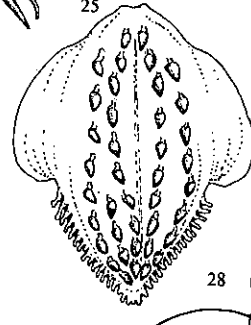
N. Labellum with calli (Fig. 25) ... CALADENIA (Fig. 26) (p. 33)
N. Labellum without calli (Fig. 27) ... GLOSSODIA (Fig. 28) (p. 91)

O. Leaf as wide or nearly as wide as long (Fig. 29) ..... R.
O. Leaf at least twice as long as wide and sheathing the scape (Fig. 30) ... P.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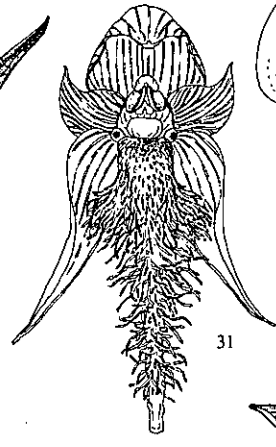
P. Flowers strongly zygomorphic with a well differentiated labellum (Figs 31, 34 & 38) ..... Q.
P. Flowers almost actinomorphic; labellum not differentiated (Fig. 32) . THELYMITRA (p. 145)


30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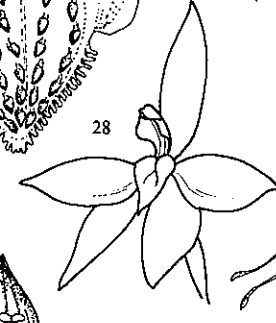
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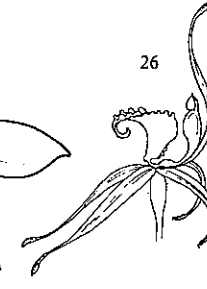
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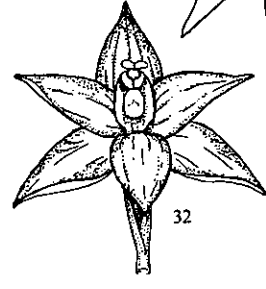
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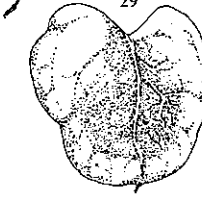
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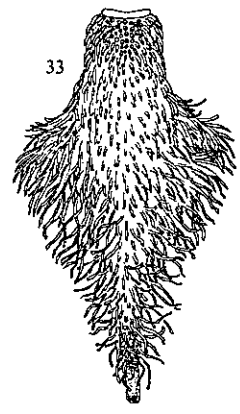
Q. Labellum 8–28 mm long, densely covered with hairs (Fig. 33) . . CALOCHILUS (Fig. 31) (p. 62)
Q. Labellum 1–5 mm long without hairs (Fig. 34) .MICROTIS (p. 96)

R. Flowers one to several; scape longer than flower (Fig. 35) ..... S.
R. Flower solitary; scape shorter than flower (Fig. 36) CORYBAS (p. 69)

S. Labellum fimbriate (Fig. 37) or pubescent (Fig. 44) ..... V.
S. Labellum entire, glabrous (Fig. 39) ..... T.

T. Leaf lanceolate (Fig. 42); petals erect; labellum calli in 2 rows ..... LEPTOCERAS (*Caladenia menziesii*) (Fig. 43)
T. Leaf cordate or orbicular (Figs 35 & 40); petals not erect (Figs 38 & 41); labellum with 2 basal calli (Fig. 39) ..... U.

U. Leaf cordate (Fig. 35) . . . ACIANTHUS (Fig. 38) (p. 30)
U. Leaf orbicular (Fig. 40) CYRTOSTYLIS (Fig. 41) (p. 75)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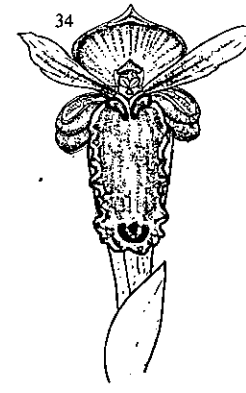
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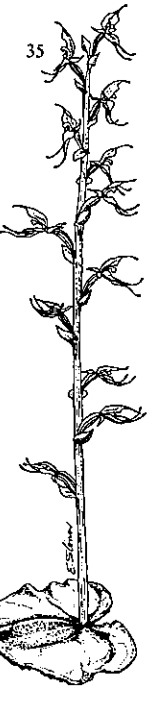
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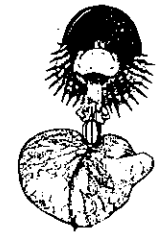
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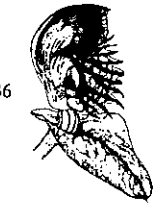

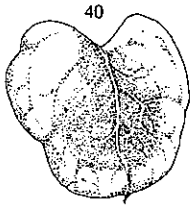
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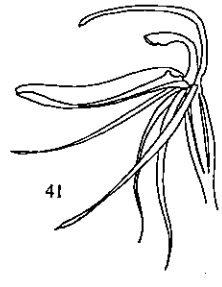
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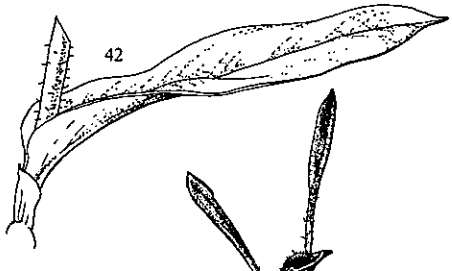
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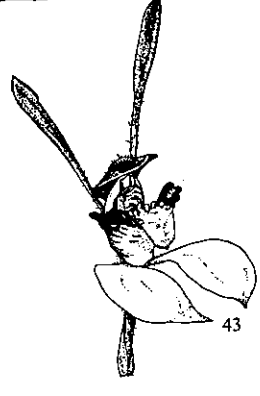
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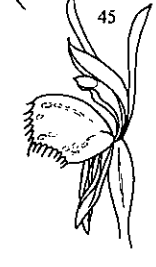
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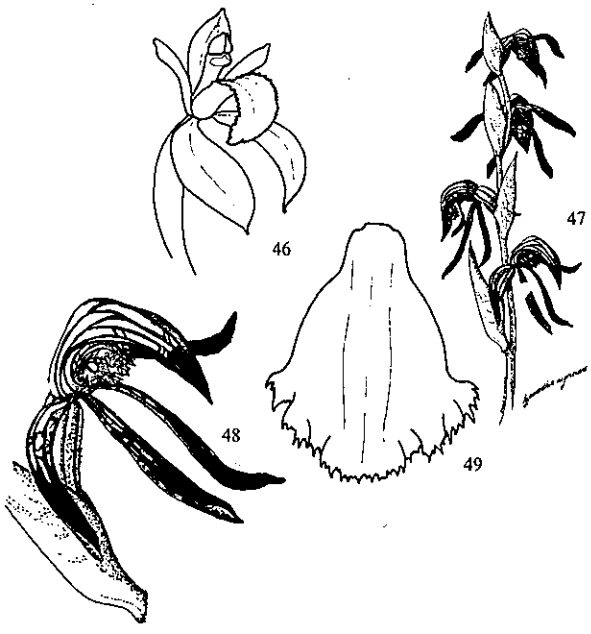


V. Labellum longer than wide (Figs 44 & 49); petals not glandular (Figs 46 & 48) ..... W.

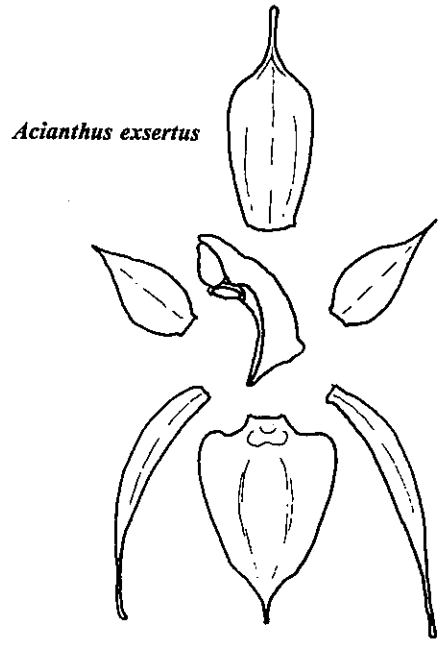
V. Labellum wider than long (Fig. 37) (fimbriate); petals glandular ... LEPORELLA (Fig. 45) (p. 93)

W. Labellum margin entire (Fig. 44); lateral sepals longer than the other perianth-segments (Fig. 46) ... ERIOCHILUS (p. 87)

W. Labellum fringed (Fig. 49); lateral sepals similar to other segments (drying black) (Fig. 48) LYPERANTHUS (Fig. 47) (p. 94)

ACIANTHUS

Mosquito orchids



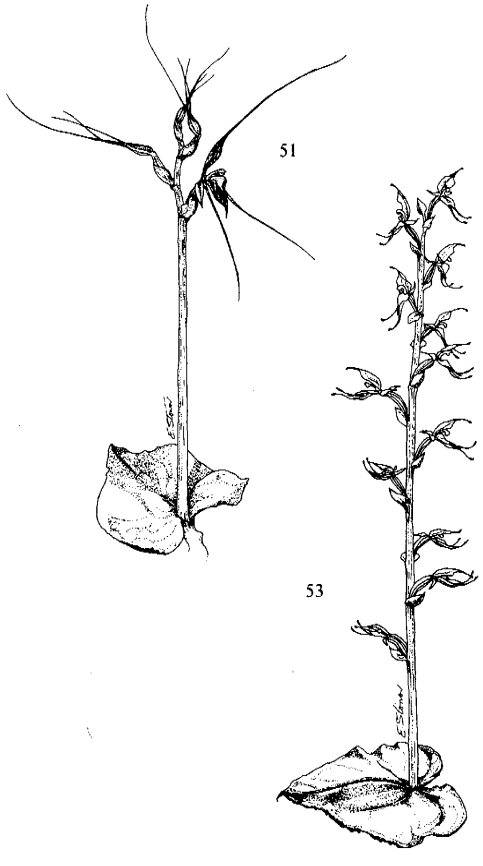
The name is derived from *akis* (barb, needle); *anthos* (flower) and refers to the slender and acuminate floral segments of some species.

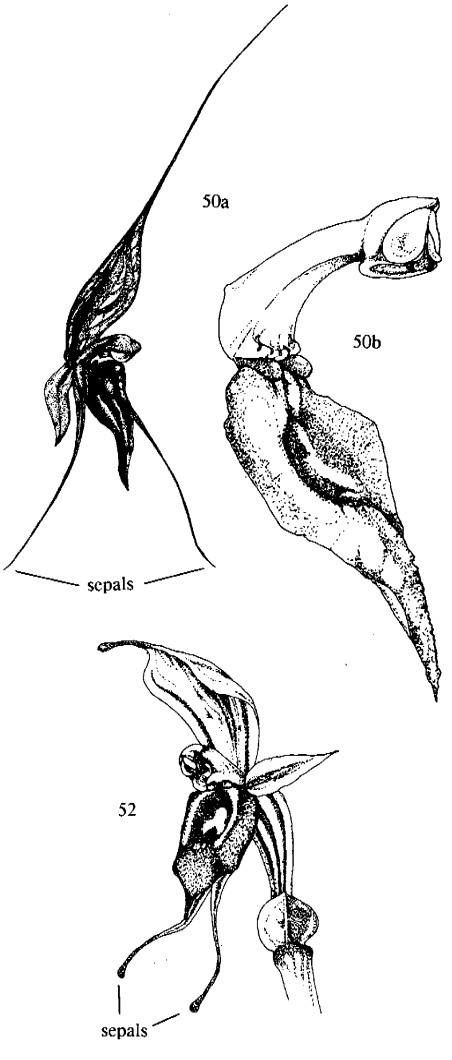
Stem glabrous, often reddish, slender, 5–15 cm high; leaf solitary, petiolate, ovate-cordate, red below. Flowers green or purplish, few to several, resupinate, with free perianth-segments, petals shorter than sepals. Labellum distinct, immobile, ornamented. Column conspicuous, recurved above, semi-terete; anther terminal with 4 small hard rounded pollinia, stigma near the top of the column.

About 15 species, in New Caledonia, New Guinea, New Zealand and the Solomon Islands. Of the 5 species in Australia 1 extends also to New Zealand.

The deep-red, greenish or brownish colour of the flowers is commonly associated with fly pollinated plants. The labellum has the nectary at its base. Ants, beetles, and other insects feed on the nectar but only flies have been observed to transfer pollen. The flies are attracted to some species by musty odours reminiscent of decaying organic material.

A. Sepals more than 2 cm long, caudate (Fig. 50) . . *A. caudatus* 1. (Fig. 51)
A. Sepals to 1 cm long (Fig. 52) . . *A. exsertus* 2. (Fig. 53)





1. **A. caudatus**. *Mayfly orchid.* Plate 24

The name *caudatus* (tailed) refers to the long filamentous (or caudate) sepals.

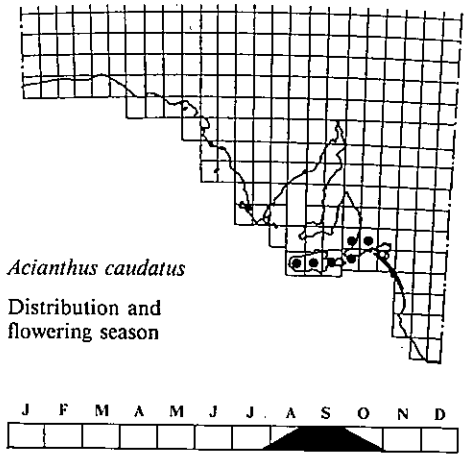
The dorsal sepal can reach 4 cm in length and is the most prominent part of the flower, clearly separating it from other species. Leaf heart-shaped, with crenulate margins, dark-green above, red below, strongly veined. Flowers 1–6, usually deep-maroon although a smaller flowered green form occurs (var. *pallidus*.)

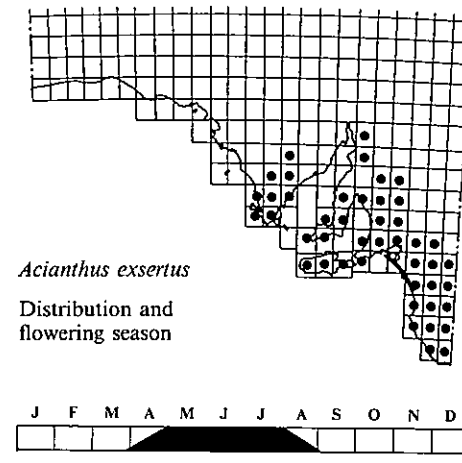
Locally common. Forms small to quite extensive colonies in leaf litter especially in *Eucalyptus baxteri* forest in acid sand or clay soils, and sometimes invading *Pinus radiata* plantations. Restricted to regions of high rainfall.

Occurs also in New South Wales, Victoria and Tasmania.

The species has not been very successful in cultivation.

The flowers have a distinctive, rather unpleasant musty odour likened to wet dogs. They are pollinated by fungus gnats which are actually long bodied flies of the family Mycetophilidae. These flies are apparently attracted by the foul scent as they are usually observed approaching from down wind. They feed on the nectar which collects in a basin on the labellum. The flies feed in much the same way as a mosquito (indeed they look very much like mosquitoes) so that the thorax moves upward each time nectar is drawn in and contacts the pollinia which are then withdrawn. Usually only one half comes away at a time. As in other species of *Acianthus* the column is arched forward so that stigma and anther are directly above the well of nectar on the labellum. The long filamentous sepal tips of *A. caudatus* are another feature commonly associated with fly pollinated orchids.

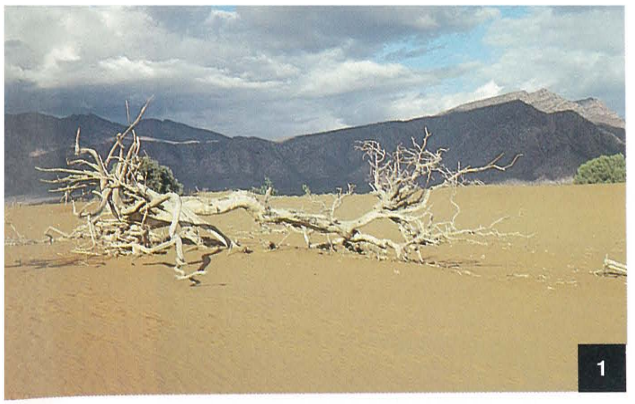


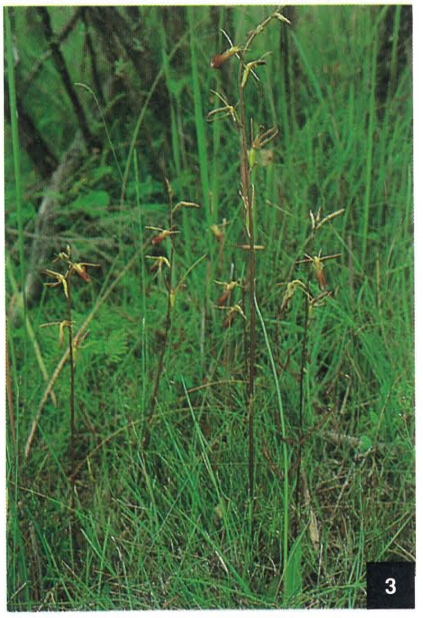


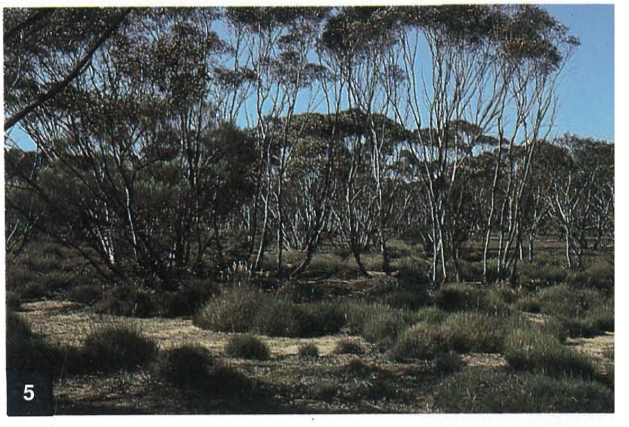
2. **A. exsertus**. *Mosquito orchid.* Plate 25

The name *exsertus* (protruding) refers to the anther which protrudes, from the end of the column.

Usually less than 15 cm high; leaf single, heart-shaped, dark-green above and maroon below, often situated some way up the stem rather than on the ground. Flowers usually numerous, c. 6 mm in diam., varying from a clear pale-maroon through shades of red and green to a pure greenish-yellow; labellum normally darker. Flower usually odourless.







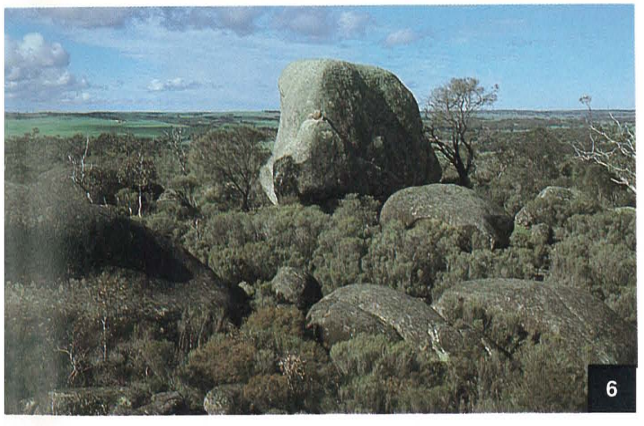


Plate 1. The plains east, north and west of the Flinders Ranges are too dry for orchids yet the Ranges seen here in the distance support numerous species.

Plate 2. Around the coast conditions are much wetter. Heathland, shown here on southern Yorke Peninsula, may support as many as 40 species/km^2.

Plate 3. Some 25% of South Australian orchids are found in swamps which occupy less than 0.0001% of the State. These evergreen *Cryptostylis* are growing on the edge of a swamp in the Adelaide Hills.

Plate 4. The greatest number of species and the showiest displays of orchids are found in open woodland, shown here reflected in a man-made lake near Adelaide. The pine plantation beyond is an unnatural habitat, but some 30 species occur in such plantations.

Plate 5. The most extensive orchid habitat in South Australia is in the mallee, where orchid diversity is low and individuals are widely spaced. Tussocks of the spiky grass *Triodia* provide shelter from grazing animals.

Plate 6. Rock outcrops may occur in the mallee and semi-arid scrublands. Protection afforded by the rocks and extra runoff water after rain ensure a greater abundance and diversity of orchid species. Outcrops like these prevent clearing for agriculture.

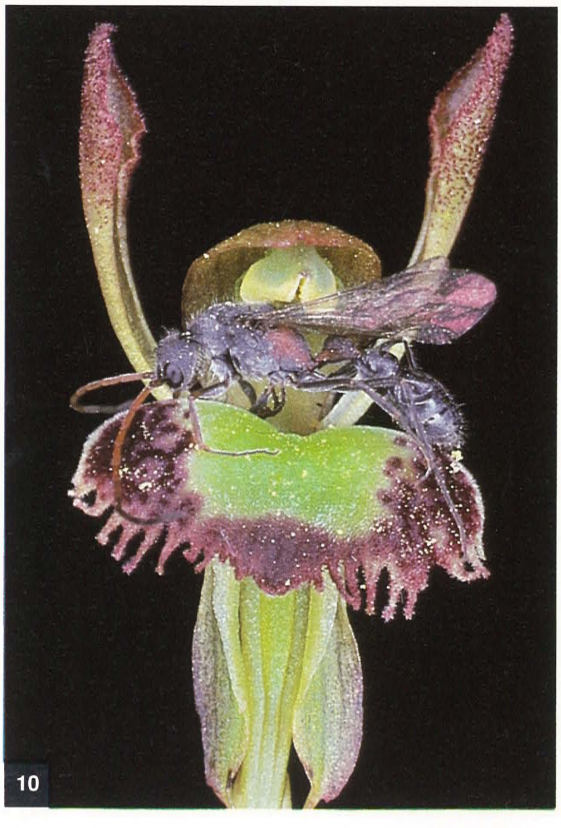
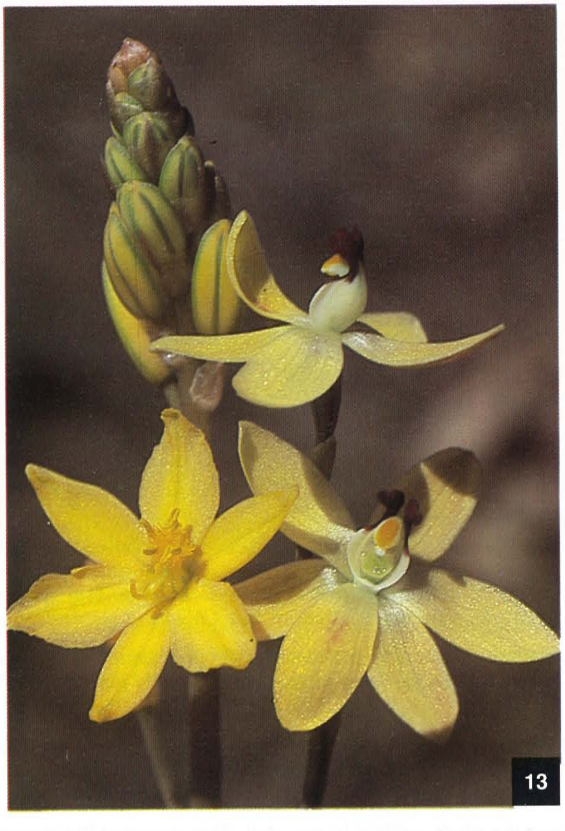


Plate 7. Autumn flowering (prasophyllums) genoplesiums are pollinated exclusively by tiny fruit flies, which appear to feed on secretions at the base of the labellum. Two pale bodied flies can be seen on the lower flowers of this Adelaide Hills form of *(Prasophyllum) Genoplesium archeri.*

Plate 8. Multiflowered prasophyllums provide nectar and are visited by a variety of insects, especially wasps. At each flower visited another set of pollinia becomes glued to the wasp's head. This wasp on *Prasophyllum validum* has a bundle of pollinia stuck between its eyes.

Plate 9. Column appendages of sun-orchids resemble anthers. The visiting native bee on this *Thelymitra venosa* flower is chewing on the yellow column appendage while gathering the orchid pollen on its hairy undersides (perhaps unintentionally).

Plate 10. *Leporella*, the fringed hare orchid is unique in that it is pollinated only by sexually attracted male ants (*Myrmecia* or jumper ants). This flower with ant was photographed in the Adelaide Hills.



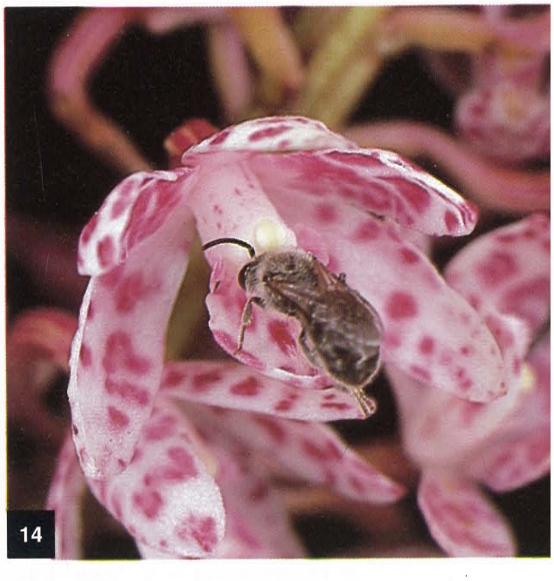


Plate 11. A native bee has landed on the labellum of a *Caladenia rigida* flower. As it moves forward it upsets the balance of the labellum which tips the insect back against the column from which it must struggle free transferring and removing pollen as it does so.

Plate 12. Duck-orchids *Caleana major* are the only Australian orchids known to be pollinated by sawflies. Here the male sawfly is attracted sexually and has landed on the labellum. It has been flung back and imprisoned in the column. It will withdraw the pollinia as it struggles free.

Plate 13. Sun-orchids are thought to be general mimics of vernal lilies. *Thelymitra antennifera* is often found with the yellow Bulbine lily. The two are shown together for comparison.

Plate 14. This colourful *Dipodium* flower exhibits floral mimicry. It provides no reward to the visiting

Plate 15. Wasps are sexually attracted to many spider-orchids of the genus *Caladenia*. Two flower wasps *Thynnoides pugionatus* are jostling for position on the labellum of this *Caladenia tentaculata*.

Plate 16. Perhaps the ultimate form of mimicry is sexual deception. This male wasp, *Lissopimpla semipunctata* is pseudo-copulating with a flower of *Cryptostylis subulata*, unintentionally removing and depositing pollinia with its genitalia.

Plate 17. Most greenhoods (*Pterostylis*) are pollinated by fungus gnats. What attracts these insects to the flowers is not known. A male mycetophilid fly is shown here emerging from a flower of *Pterostylis furcata* after removing the pollinia.

Plate 18. The pollinating insect often removes the whole pollinia in one visit. This mycetophilid shown inside a *Pterostylis* flower has the pollinia attached to its thorax.

Plate 19. *Pterostylis pulchella* x *baptistii*. Young plants. p = protocorm; pn = neck of protocorm; yt = young tuber; t = tuber.

Plate 20. *(Prasophyllum) Genoplesium archeri*. Inverted protocorm and developing plant. p = protocorm; pn = neck of protocorm; r = root; yt = young tuber; l = leaf.

Plate 21. *Acianthus caudatus*. Inverted protocorm with an elongated "neck". p = protocorm; pn = neck of protocorm; l = leaf; yt = young tuber.

Plate 22. *Spiranthes sinensis* subsp. *australis*. Young plant. p = protocorm; fr = fleshy root; a = axis.

Plate 23. *Pterostylis biseta*. Protocorms with young plants. p = protocorm; pn = neck of protocorm; d = "dropper"; r = root.

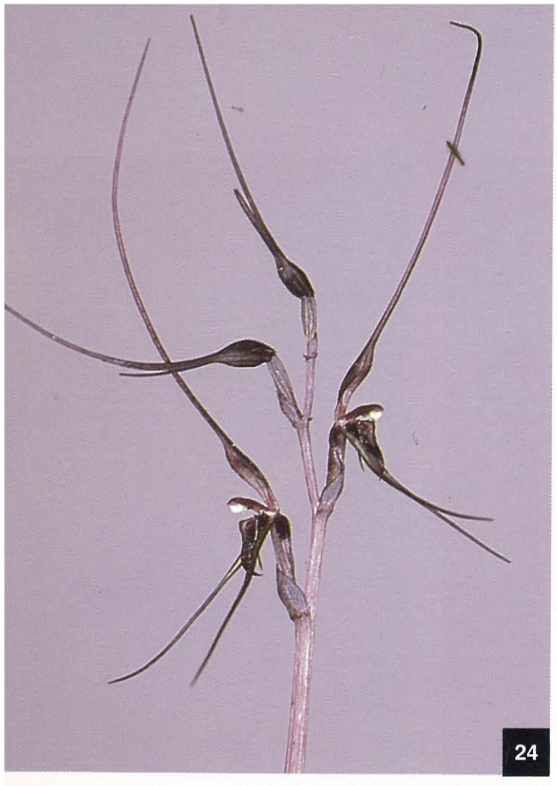
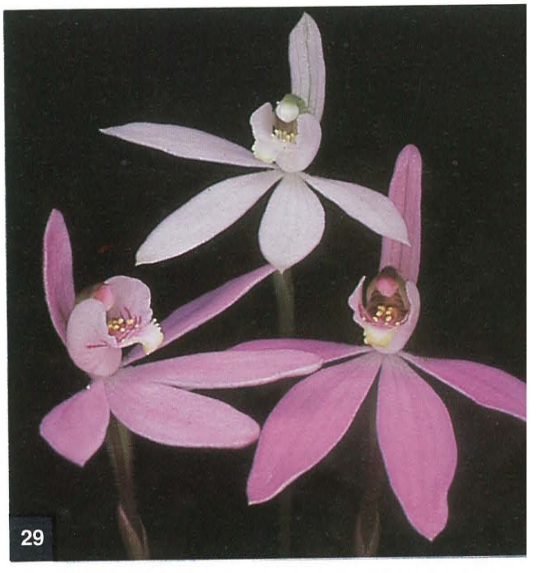


Plate 24. *Acianthus caudatus* from in the southern Mt Lofty Range.

Plate 25. *Acianthus exsertus* in the Adelaide Hills.

Plate 26. *Caladenia bicalliata* on coastal dunes of Yorke Peninsula.

Plate 27. *Caladenia calcicola* close up of cultivated plant showing the glossy labellum.



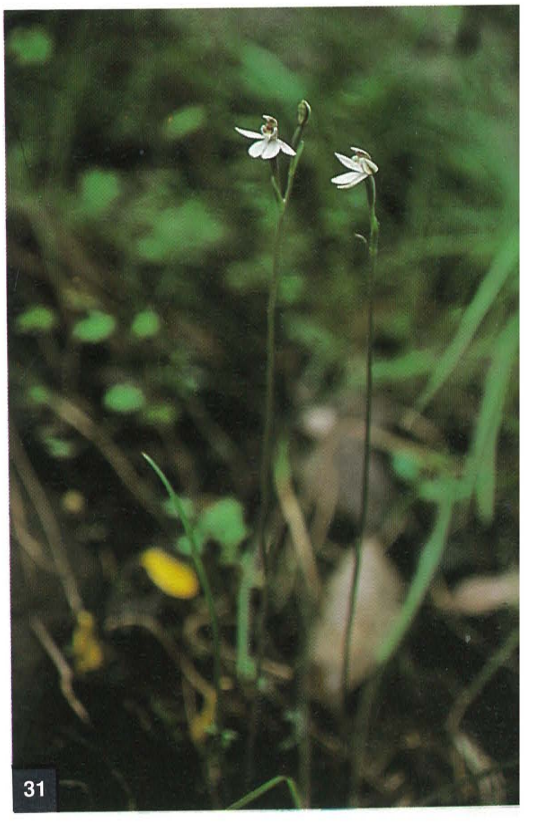


Plate 28. *Caladenia cardiochila* from Minnipa, Eyre Peninsula. This is the deeply coloured inland form.

Plate 29. *Caladenia carnea.* This group from southern Yorke Peninsula shows the typical range of colours.

Plate 30. *Caladenia carnea* var. *B* unusual form from the southern Flinders Ranges.

Plate 31. *Caladenia carnea* var. *C* from Fleurieu Peninsula, showing the very small dull flowers of this form.

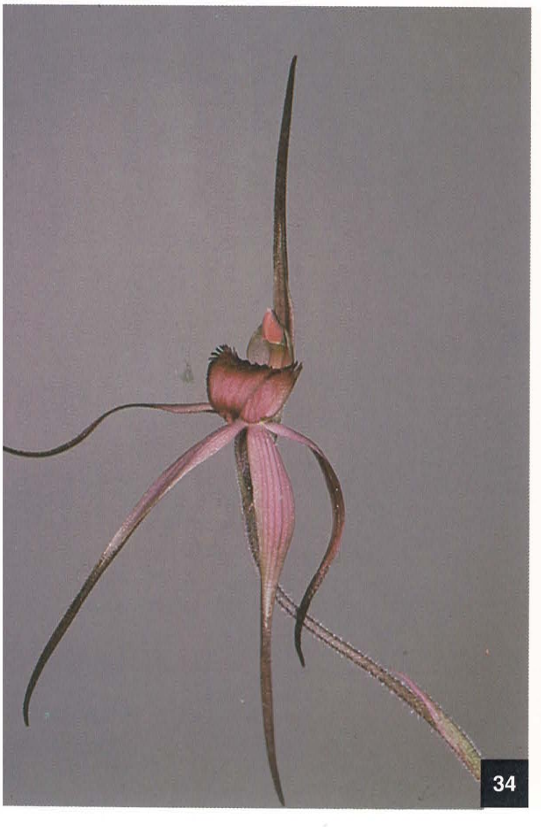


Plate 32. An undescribed variety of *C. carnea* from southern Flinders Ranges. The flowers are always pure white.

Plate 33. *Caladenia clavigera* from the lower South East.

Plate 34. *Caladenia concolor* is a name applied to several forms of *C. patersonii*. This plant was found at Monarto. True *C. concolor* may be extinct in South Australia.

Plate 35. *Caladenia congesta* near Mt Burr.

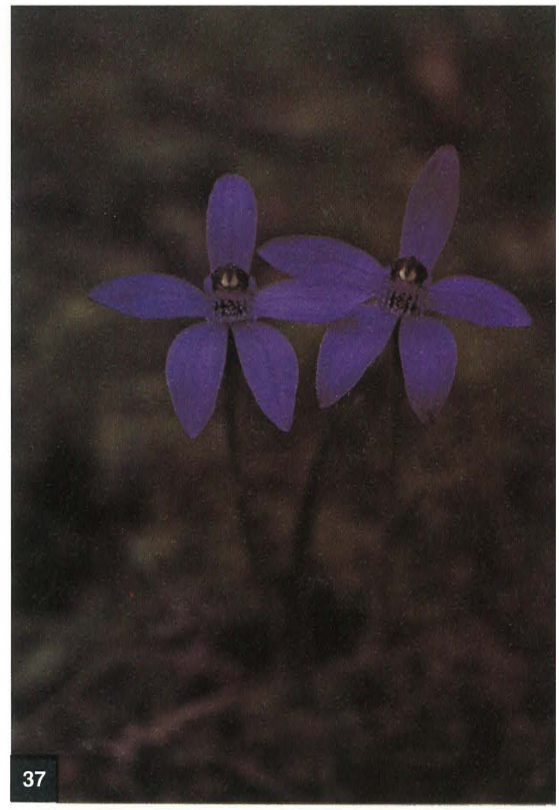


Plate 36. *Caladenia cucullata* from the lower south-east of South Australia. Showing the typical multiflowered inflorescence.

Plate 37. *Caladenia deformis* near Clare. The deep blue colour is typical.

Plate 38. *Caladenia* aff. *dilatata*—small flowers, crossed sepals and pale-yellow clubs distinguish this mallee species.

Plate 39. *Caladenia* aff. *dilatata*—this mallee form from Eyre Peninsula typically has a broad red labellum.

Plate 40. *Caladenia* aff. *dilatata*—this form with straight sepals is common in rocky places especially in the Flinders Ranges.

Plate 41. *Caladenia* aff. *dilatata.* A rare form with large brown bayonet-shaped clubs.

Plate 42. *Caladenia filamentosa* var. *filamentosa*—this mainland form is shown in its natural habitat; a rocky ledge in the southern Flinders Range.

Plate 43. The short stemmed, inland form of *Caladenia filamentosa* var. *tentaculata*, which forms clumps and has a hairy leaf.

Plate 44. *Caladenia* aff. *fitzgeraldii* is a very variable species usually with pale flowers and red tipped labellum, such as this one from Monarto.

Plate 45. *Caladenia fragrantissima* from coastal sandhills on Yorke Peninsula.

Plate 46. *Caladenia gladiolata* is a rare South Australian endemic. This long sepalled form is found only in southern Flinders Range.

Plate 47. *Caladenia gracilis* is a species almost extinct in South Australia, this colourful flower spike was photographed near the South Australia/Victoria border.

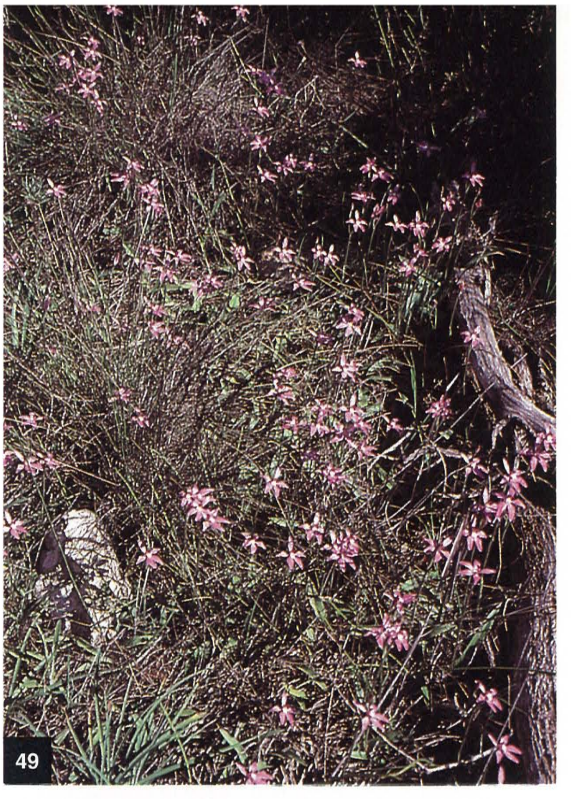


Plate 48. *Caladenia* affin. *huegelii* from coastal, sandy areas.

Plate 49. *Caladenia latifolia* often forms large colonies such as this one on Yorke Peninsula.

Plate 50. *Caladenia latifolia* occurs in many shades of pink, it may also have white or bicoloured flowers.

Plate 51. The only known *Caladenia latifolia* hybrid in S.A. *C. latifolia* x *C. patersonii*, found on Yorke Peninsula.

Plate 52. The upswept petals and sepals of *Caladenia leptochila* are a most distinctive feature. This, the type form with green segments was photographed at Belair, Adelaide Hills.

Plate 53. The much rarer red flowered form of *Caladenia leptochila* growing in the shelter of a fallen Sugar gum in the southern Flinders Range.

Plate 54. A large colony of *Caladenia menziesii* on Fleurieu Peninsula.

Plate 55. *Caladenia menziesii* is so different from other caladenias that it is often treated as belonging to a genus of its own. Photographed in the southern Mount Lofty Range.

Plate 56. *Caladenia ovata* is an endangered species from Kangaroo Island and Fleurieu Peninsula.

Plate 57. *Caladenia patersonii* usually occurs as single scattered plants but under ideal conditions may become massed as in this group growing in the shelter of an *Acacia*.

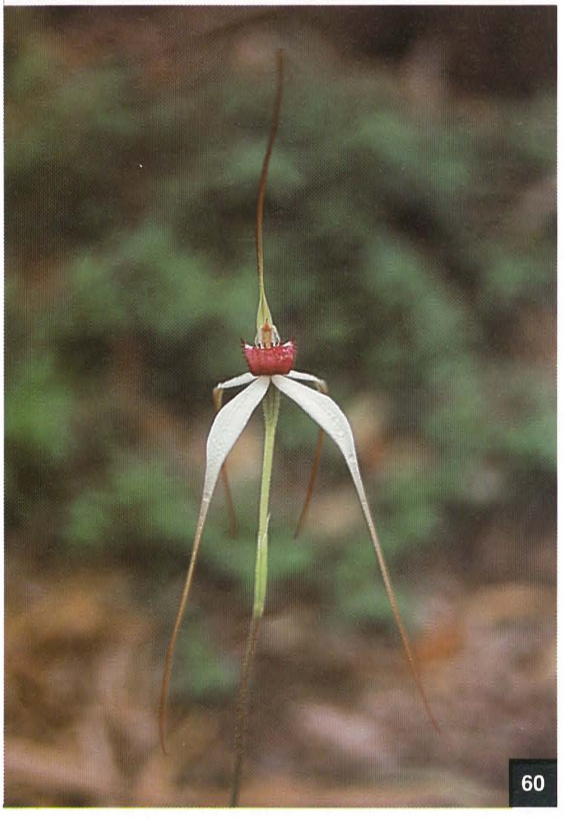


Plate 58. The commonest form of *Caladenia patersonii* is the one with cream coloured, unscented flowers, with a short labellum fringe. This one was photographed at Moonta.

Plate 59. Two unnamed species at present referred to as "*C. patersonii*" in the broad sense. [Large flower-Kapunda, small flower-Bordertown].

Plate 60. *Caladenia* aff. *patersonii*. This species has pale sepals and a red labellum. The flowers have a musty fragrance. Photographed in the Adelaide Hills.

Plate 61. *Caladenia pusilla* often forms small clumps such as this one on Fleurieu Peninsula.

Plate 62. *Caladenia reticulata* has flowers strongly veined in red. The form illustrated occurs in the Mt Lofty Ranges.

Plate 63. *Caladenia rigida* is endemic to the Adelaide Hills. This twin flowered specimen was photographed near Mylor but has been eradicated by land clearance.

Plate 64. *Caladenia stricta* from the Murray Plains.

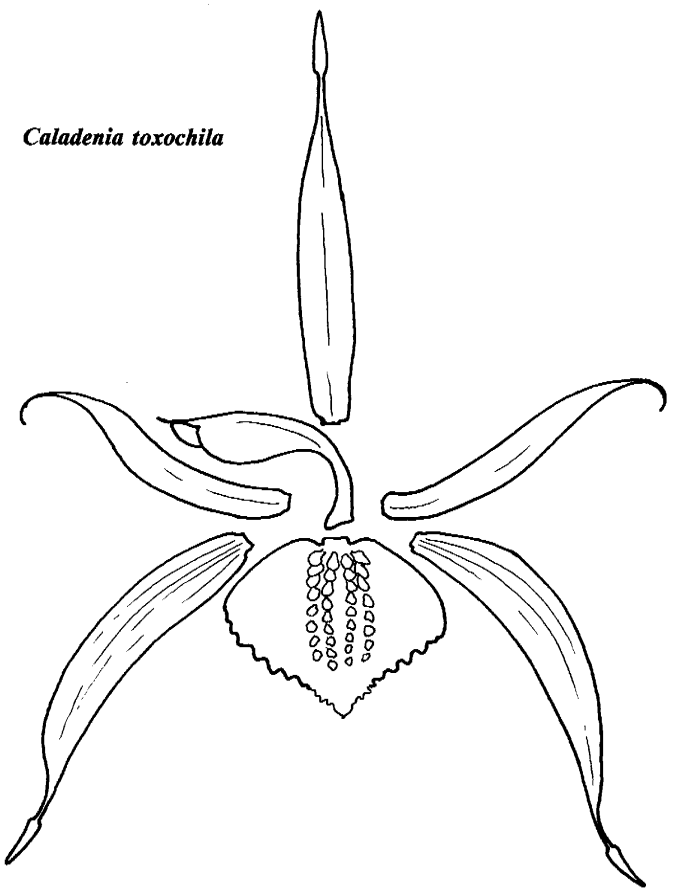
Plate 65. *Caladenia tentaculata* the common spider orchid of the Adelaide Hills.

Common and very widespread. Occurs in a wide range of habitats from coastal sand-hills, sandy heathland, mallee heathland, to light scrub and forest, often in rocky places. A low percentage of plants flower in harsh, exposed sites, but in very shady places flowering can be profuse. In favourable locations large colonies of several thousand plants may form.

Also occurs in southern Queensland, New South Wales, Victoria and Tasmania. In cultivation it is a popular and easily grown species. Does well in a light soil-mix and flowers best under well-shaded, cool, humid conditions where the scape may reach 20 cm high with as many as 20 flowers. Pure colour forms such as yellow-green or pale-red are preferred by growers.

CALADENIA

Spider-orchids



Caladenia toxochila

The name is derived from *calos* (beautiful), *aden* (gland), referring to the conspicuous glandular labellum.

True caladenias have hairy scapes and hairy leaves. (*C. menziesii* now believed to belong to a separate genus is glabrous). The solitary leaf is generally narrow-lanceolate. Flowers are from one to several in a loose raceme on an erect scape bearing one or more empty bracts (stem-bracts) similar to the floral ones. Flowers usually widely expanding and often colourful,

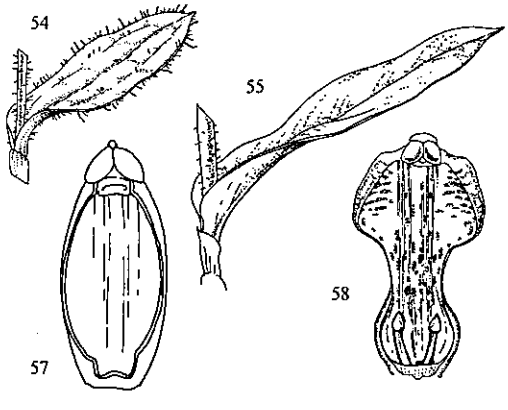
with lanceolate perianth segments which are sometimes attenuated into long filamentous tips. Labellum differentiated from the other segments, conspicuous and ornamented with gland-like calli. Column erect or incurved, sometimes with two yellow basal glands and terminated by the anther which has two pollinia in each cell. Pollen granular-coherent.

The genus is mostly endemic to Australia with over 100 species, New Zealand having 3–4 species and one species extending to New Caledonia, Indonesia and Malaysia.

Caladenias exhibit several rather diverse systems of pollination. Some species have flowers which are large and attractive, often brightly coloured and/or sweetly perfumed, they advertise food but do not appear to provide it to the small native bees which are their chief pollinators (flies and beetles also visit). Flowers of this group possibly mimic small native lilies such as *Caesia* and *Burchardia*. Species of this kind include the brilliant blue *C. deformis*, the bright pink *C. carnea*, *C. pusilla* and *C. congesta* and the very fragrant *C. gracilis*. This group all have short segments. A second group with attractive, long segmented flowers, are often called "spider-orchids". They include *C. patersonii*, *C. rigida* and *C. filamentosa*. The pollination system of this group is not very well understood but flowers are visited by bees, flies, beetles and wasps which land on the labellum and crawl forward with their legs on either side of the rows of calli; at a certain point the insects pass the centre of balance of the delicately hinged labellum and are tipped back into the column, collecting the sticky stigmatic secretion on their thorax and as they struggle out of the flowers the pollinia are glued on. Many of these insects are not strong enough to escape and become trapped and die in the flowers which cannot then be pollinated. These trapped flies (for that is what they usually are) have given rise to stories that the orchids actually eat insects; a totally erroneous notion. Some forms belonging to the groups discussed so far are self pollinated—these include *C. bicalliata* and *C. minor*.

The third group of species all have red, green, brown and maroon flowers and are pollinated by sexually attracted male thynnid wasps. The orchids emit a chemical similar to the sex pheromone produced by the female wasps to attract the males. Once attracted to an orchid by the pheromone the wasp lands on the labellum, the calli of which resemble a female wasp. The male wasp clasps the decoy and attempts to carry it away; as it moves forward it upsets the balance of the labellum and is tipped against the column. South Australian species using this method include *C. dilatata*, *C. toxochila* and *C. cardiochila*. In the species *C. leptochila* and *C. ovata* the red labellum itself is the decoy and calli are largely absent. In general those species which sexually attract wasps are not scented. An exception is *C. gladiolata* which is a wasp pollinated species but also has a very strong scent.

Pollination success rates in *Caladenia* are often very low whether effected by sexually attracted or food seeking insects. In one season it is not uncommon to find the percentage of pollinated flowers varying from 90% in one population to less than 10% in others. As many *Caladenia* species have only a single flower per plant, outcrossing is more or less ensured, and this compensates for the reduced seed production.



A. Leaf pubescent (Fig. 54) ..... B.
A. Leaf glabrous (Fig. 55)
..... *C. menziesii* 19. (Fig. 56)

B. Base of column with 2 sessile yellow glands (Fig. 58) ..... M.
B. Base of column without glands (Fig. 57) ..... C.

C. Perianth-segments not tapering into glandular-filiform tips (Fig. 59) . E.
C. Perianth segments tapering into glandular-filiform tips (Figs 60, 82, 87 & 92) ..... D.

D. Perianth-segments less than 3 cm long (Fig. 61) ..... *C. bicalliata* 1.
D. Perianth-segments c. 5 cm long (Fig. 60) ..... *C. filamentosa* 11.

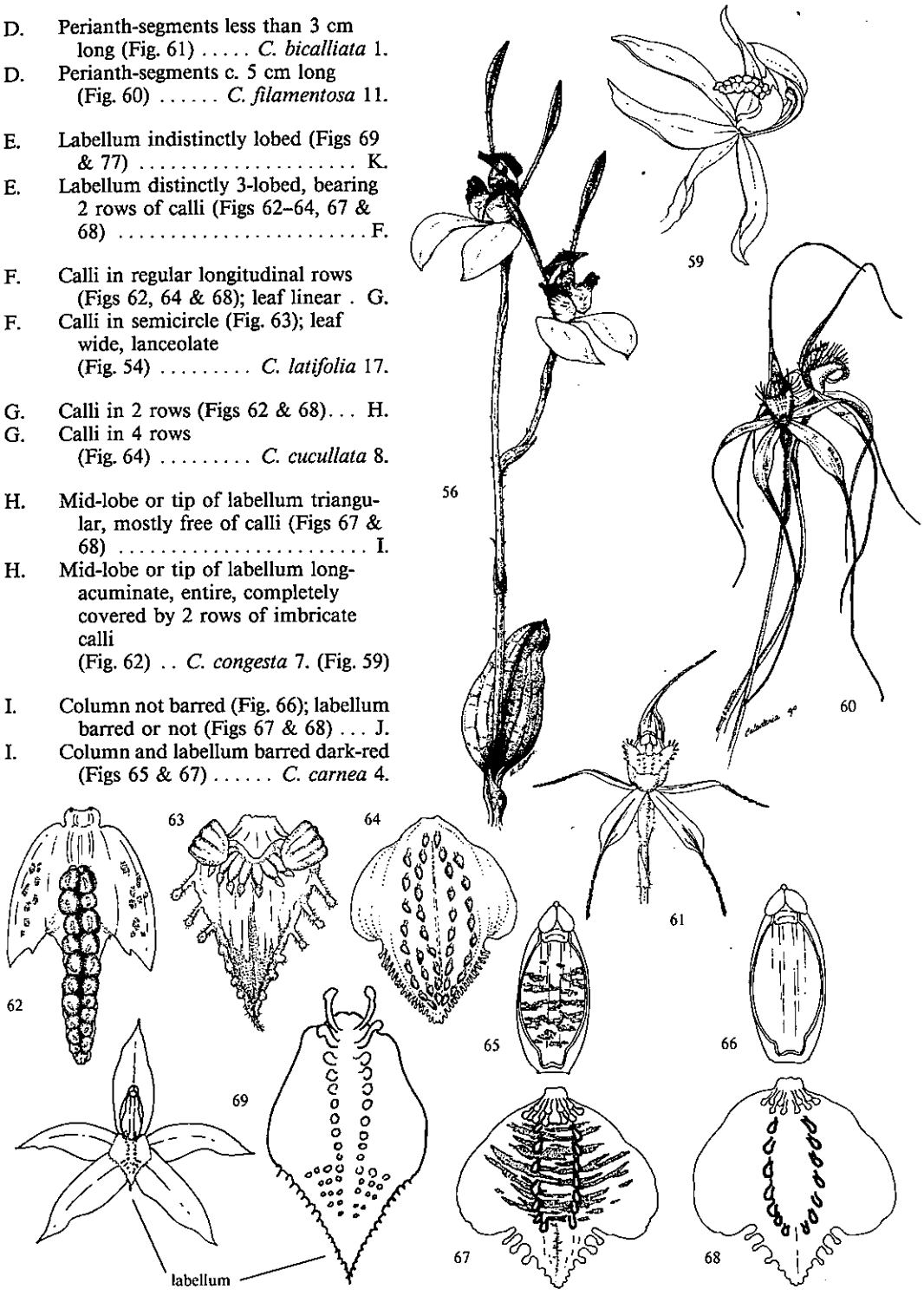
E. Labellum indistinctly lobed (Figs 69 & 77) ..... K.
E. Labellum distinctly 3-lobed, bearing 2 rows of calli (Figs 62–64, 67 & 68) ..... F.

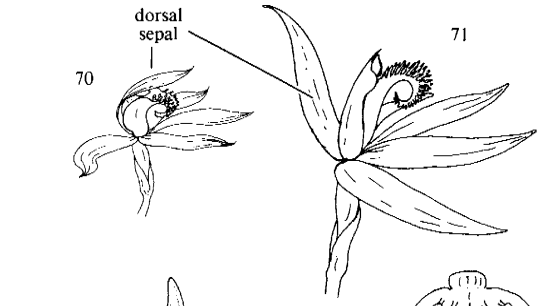
F. Calli in regular longitudinal rows (Figs 62, 64 & 68); leaf linear . G.
F. Calli in semicircle (Fig. 63); leaf wide, lanceolate (Fig. 54) ..... *C. latifolia* 17.

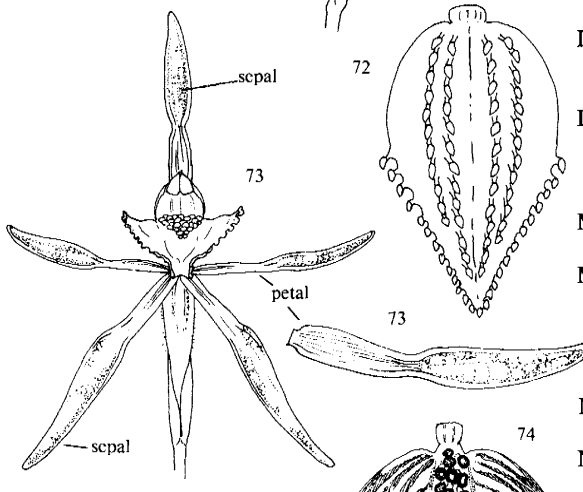
G. Calli in 2 rows (Figs 62 & 68)... H.
G. Calli in 4 rows (Fig. 64) ..... *C. cucullata* 8.

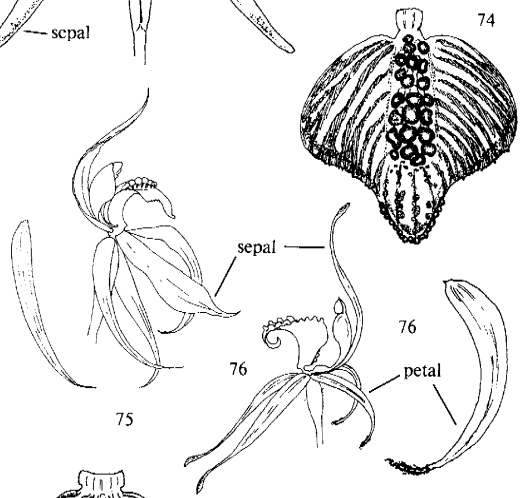
H. Mid-lobe or tip of labellum triangular, mostly free of calli (Figs 67 & 68) ..... I.
H. Mid-lobe or tip of labellum long-acuminate, entire, completely covered by 2 rows of imbricate calli (Fig. 62) .. *C. congesta* 7. (Fig. 59)

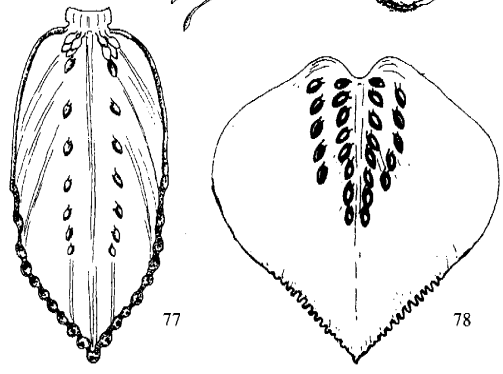
I. Column not barred (Fig. 66); labellum barred or not (Figs 67 & 68) ... J.
I. Column and labellum barred dark-red (Figs 65 & 67) ..... *C. carnea* 4.











J. Labellum not barred (Fig. 68) ..... *C. carnea* 4.
J. Labellum barred (Fig. 67) ..... *C. pusilla* 23.

K. Calli in 4–6 rows (Figs 72, 86, 91 & 94) ..... L.
K. Calli in 2 distinct rows in the basal half of the labellum (Fig. 69) ..... *C.* x *tutelata* 29.

L. Dorsal sepal hooded (Fig. 70); labellum 3-lobed (Fig. 64) ..... *C. gracilis* 15.
L. Dorsal sepal upright (Fig. 71); labellum not lobed (Fig. 72) ..... *C. deformis* 9.

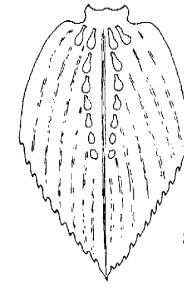
M. Margins of labellum serrate (Fig. 93) or comb-like (Figs 89 & 94).... S.
M. Margins of labellum entire or slightly toothed apically (Figs 77, 78 & 80); dorsal sepal hooded or erect (Figs 70 & 71) ..... N.

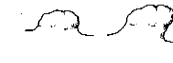
N. Sepal tips glandular or clavate (Figs 73, 76 & 82)..... O.
N. Sepal tips shortly acuminate, not glandular-clavate (Fig. 75); labellum with dark veins (Fig. 74) ..... *C. cardiochila* 3.

O. Petal tips not glandular nor clavate (Figs 75 & 81) ..... Q.
O. Petal tips glandular or clavate (Fig. 73 & 76) ..... P.

P. Perianth-segments with bayonet-like tips (Fig. 73).... *C. gladiolata* 14.
P. Perianth segments with filiform tips (Fig. 76) ..... *C. toxochila* 28.

Q. Labellum cordate or wide-ovate, nearly as wide as long (Fig. 78) . R.
Q. Labellum oblong, 2–3 times as long as wide (Fig. 77) . *C. leptochila* 18.





R. Calli flat-topped (Figs 83 & 84) in 4 rows (Fig. 78); veins inconspicuous .... *C. clavigera* 5.
R. Calli mamillary (Fig. 79) in 2 or 4 rows; veins conspicuous (Fig. 80) ..... *C. ovata* 20.

S. Petals not glandular-tipped (Fig. 81 & 92) ..... X.
S. Petals glandular-tipped (Figs 76 & 82) ..... T.

T. Labellum 1.5–2 cm long; calli linear-club shaped (Fig. 83), loose (Fig. 86 & 88). ..... U.
T. Labellum to 1 cm long; calli short, stout, imbricate (Fig. 84) ..... *C.* x *variabilis* 30.

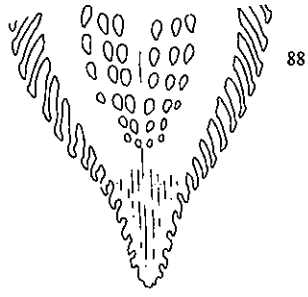
U. Labellum uniformly coloured to the tip (Fig. 86 & 89); flowers lemon-scented or not ..... V.
U. Labellum tip bright-red to pink, base greenish; flowers strongly musky scented ..... *C.* aff. *patersonii* 22.

V. Flowers wholly red or generally creamy, yellow, pinkish or crimson; not scented ..... W.
V. Flowers yellow-green, strongly lemon scented ..... *C. fragrantissima* 13.

W. Flowers wholly red ... *C. concolor* 6.
W. Flowers white, creamy, yellow or pinkish ..... *C. patersonii* 21.

X. Labellum 9–13 mm long, not lobed, ovate (Fig. 91) ..... AA.
X. Labellum 15–20 mm long, lobed, cordate-ovate (Fig. 89) ..... Y.

Y. Sepals 3–8 cm long (Fig. 60), slender (Figs 90 & 92), clubbed, falcate or drooping; calli on the labellum club-shaped (Fig. 83) not crowded (Figs 85 & 86) ..... Z.
Y. Sepals 2–4 cm long, broad (Fig. 75), not clubbed; calli on the labellum pear-shaped, crowded (Fig. 89) ..... *C. stricta* 26.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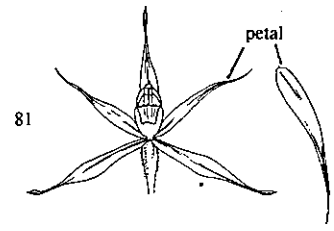

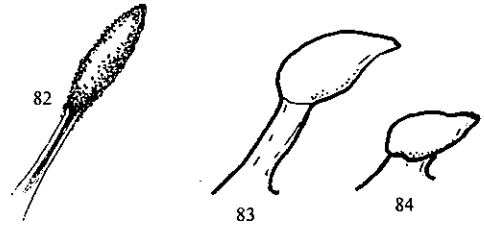

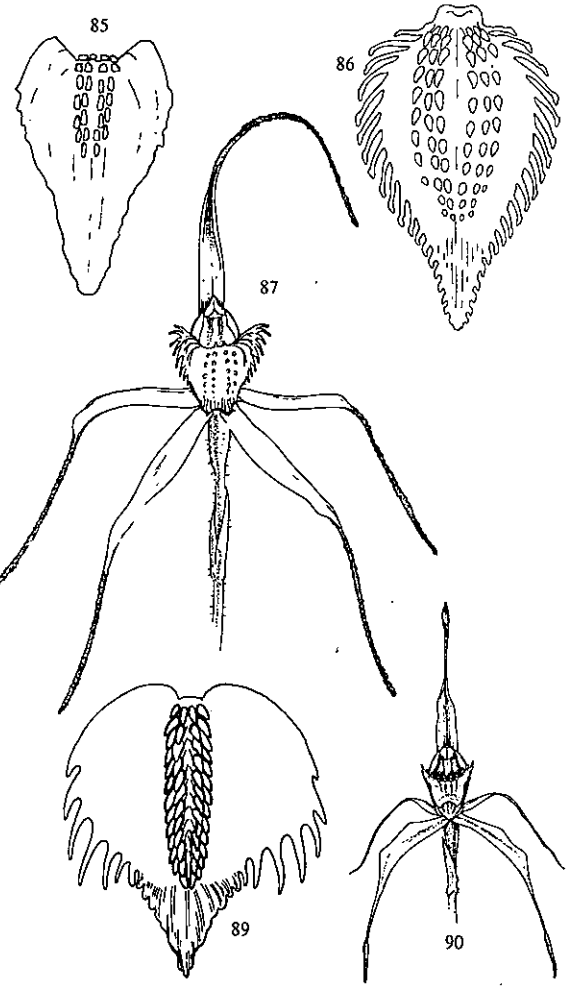

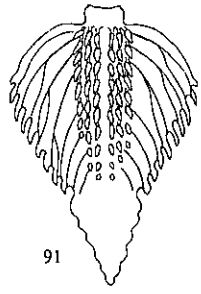

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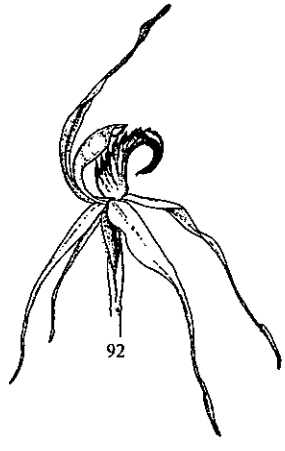

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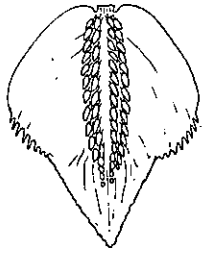

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Z. Sepals not falcate (Fig. 87), 3–4 cm long; labellum basal teeth of fringe less than 5 mm long (Fig. 89) ..... *C. dilatata* 10.

Z. Sepals falcate, longer than 4 cm; labellum basal teeth of fringe more than 5 mm long (Fig. 94) ..... *C. tentaculata* 27.

AA. Labellum reddish; perianth-segments yellowish-cream to crimson .. BB.

AA. Labellum white; perianth-segments cream-white. *C. rigida* 25. (Fig. 90)

BB. Labellum without conspicuous veins (Figs 93 & 94); no median strip on sepals ..... DD.

BB. Labellum with conspicuous dark veins (Fig. 91); sepals with red median strip ..... CC.

CC. Calli very shortly stalked (Fig. 84), to 2.5 mm high with broad and more or less flat heads, dark to light-yellowish red or dark with paler flat surface ... *C. calcicola* 2.

CC. Calli long-stalked (Fig. 83), to 3.5 mm high, narrow, bicoloured ..... *C. reticulata* 24. (Fig. 92)

DD. Leaves 8–20 mm wide (felt-like); labellum ovate-acute, flat (Fig. 93) ..... *C. fitzgeraldii* 12.

DD. Leaves 3–6 mm wide; labellum nearly cordate, lamina hollowed (Fig. 94) ..... *C.* aff. *huegelii* 16.

1. **C. bicalliata.** *Limestone spider-orchid.* Plate 26

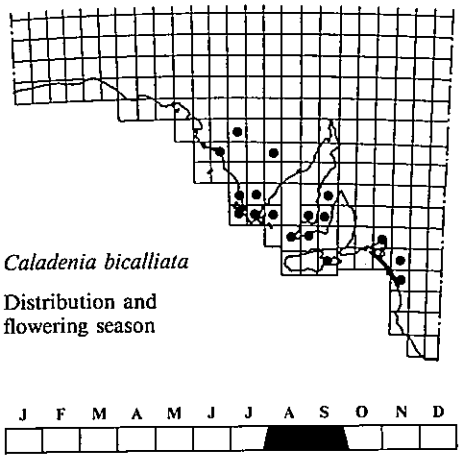
The name *bicalliata* refers to the 2 distinct rows of calli on the labellum.

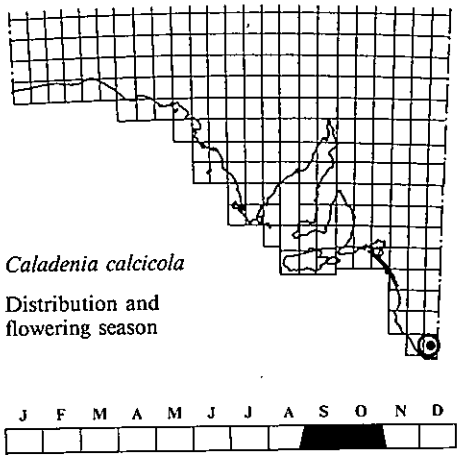
A small hairy plant generally less than 10 cm high; leaf long, often reaching as high as the flower. Flower commonly one, perianth-segments lanceolate, about 2 cm long, greyish-white with dull maroon markings, suddenly contracted into darker rounded and glandular filaments nearly as long as the lamina. Labellum cream-coloured, ovate, about 7 mm long, with conspicuous red veins running toward bluntly serrate margins; calli white, club-shaped, in 2 well defined rows but not reaching the obtuse tip. Flower not scented, lasting only a few days before self pollinating, or not opening.

Locally common near the coast on limestone or in calcareous sands, usually under mallee, rarely extending inland. It once grew in the sandhills behind Adelaide beaches. The species was described from Kangaroo Island but is rare there now. Also widespread along the coast of south-western Australia.

Often confused with *C. filamentosa* var. *tentaculata* which has segments 4–7 cm long, is insect pollinated and has the leaf less hairy.

It has been cultivated successfully but the cleistogamous nature of the flowers makes them more of a curiosity than a decoration.





2. **C. calcicola.** Plate 27

The name *calcicola* (growing on limestone) refers to the limestone outcrops with which this species is associated.

Slender, 10–28 cm high, leaf lanceolate, about 1.5 cm wide, shortly hairy. Flower usually solitary, red-brown and yellow, glossy, sepals clubbed, yellow or reddish, all segments with median stripes on both sides. Labellum ovate, 10–12 mm long, yellow at the base otherwise red, somewhat flat-topped; calli in 5–6 short obscure rows, very shortly stalked to 2.5 mm high with broad and more or less flattened heads, dark to light yellowish-red or dark with paler flat surface. Flowers scented, faint and sweet with animal-like overtones.

Very restricted in South Australia. Collected only once near Mt Burr in 1976 but probably more widespread before settlement. Occurs on terra-rosa or sandy soils over limestone in scrubby woodland.

Previous reports of *C. reticulata* in the South-east may refer partly to this species. *C. reticulata* differs in its narrower leaf with longer hairs, its less glossy flowers, the more distinctly reticulate labellum with its decurved tip and larger, long-stalked calli and dark red-brown clubs on sepals.

3. **C. cardiochila.** *Thick-lipped spider-orchid.* Plate 28

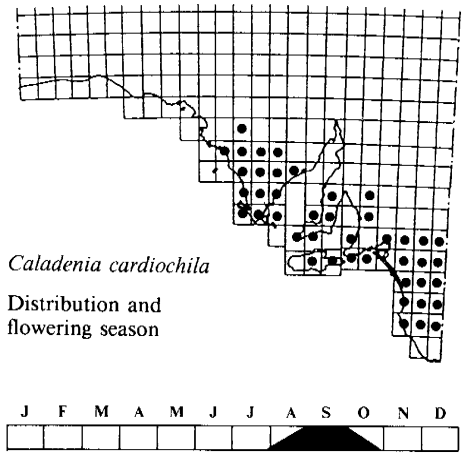
The name *cardiochila* (heart-lipped) refers to the labellum shape.

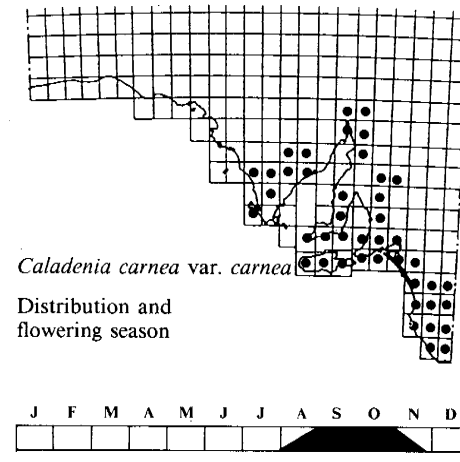
A small slender plant, inland 5–15 cm tall; or quite robust, to 30 cm tall near the coast; leaf lanceolate and hairy. Flowers 1 or 2, perianth-segments yellowish with a red-brown central stripe, lanceolate with short acuminate non glandular tips. Labellum cordate, 10–20 mm long, red-brown or yellow with dark divergent veins and smooth margins except for a conspicuous dark-brown thickening around the apex; calli dark, clavate, fleshy, crowded in 2 or rarely in 4 rows. Not perfumed.

Occurs mainly in mallee-heathland, especially on limestone near the coast and in deep sand inland. Pollinated by the wasp *Phymatothynnus victor.*

The species was named from plants collected on an excursion made by the South Australian Field Naturalists to Golden Grove near Adelaide in the 1880's. It was at that time common in sandy places under native pines (*Callitris* sp.) on the Adelaide Plains and in the Barossa Valley. For some time considered to be the same as *C. tessellata* which is now believed to be restricted to the south-east coast of Australia.

Not very successful in cultivation, plants usually rotting away. A putative hybrid with *C. patersonii* has been named as *C.* x *variabilis.* A much rarer putative hybrid with *C. stricta* has been collected in the Monarto area.





4. **C. carnea**. *Pink fingers, white rabbits.* Plates 29 and 30

The name *carnea* (fleshy coloured), refers to the colour of the flowers.

Plants slender to robust, 7–60 cm high; leaf linear, with a few sparse hairs, often as long as the scape. Flowers 1–3, resembling an open hand; segments lanceolate, 10–20 mm long, often pink inside and dusky-green, glandular, outside.

A. Column and labellum barred with dark-red ..... B.
A. Column and labellum not barred ..... var. A 4d.

B. Tip of labellum yellow; calli in 2 rows; flowers pink or white; plants 7–30 cm high ..... C.
B. Tip of labellum orange; calli in 2–6 rows; flowers usually bright-pink; plants 30–60 cm high .. var. B 4b.

C. Perianth-segments 10–15 mm long; flowers expanding up to 6 weeks, insect pollinated .. var. *carnea* 4a.
C. Perianth-segments 5–7 mm long; flowers expanding only briefly, self-pollinated ..... var. C 4c.

The varietal names used here are only tentative. Other names which may be applied to S.Aust. material include *C. fuscata* and var. *attenuata. C. carnea* in the narrow sense may prove to be endemic to eastern Australia.

4a. var. **carnea.**

5–20 cm tall, leaf short, almost glabrous. Flowers 1.5–2.5 cm in diam., from brilliant almost iridescent carmine to pale-pink or white. Red bars on the column and labellum are a constant feature in all but the purest albino specimens, as are the 2 rows of yellow calli on the labellum. Perfume is not strongly developed. Bee pollinated.

Widespread and locally common in a variety of habitats from clay soils in heavy forest to sandy soils near the coast or rocky places far inland, often on limestone.

Also occurs in Queensland, New South Wales, Victoria, Tasmania and New Zealand

There are long or short stemmed races which may have consistently narrow or rounded sepals, the dorsal sepal leaning back or hooded over the column. Has been confused with *C. catenata* (*C. alba*) which is a narrow segmented white-flowered species with more slender white labellum calli. This eastern State species apparently does not occur in South Australia.

Popular in cultivation but not easy to grow. It prefers well drained soil. As for most *Caladenia* species seed may be sown in autumn and covered with leaf litter. The white flowered forms from the Adelaide Hills may produce multiple blooms. Deep pink forms from the bush tend to produce pale coloured flowers in cultivation.

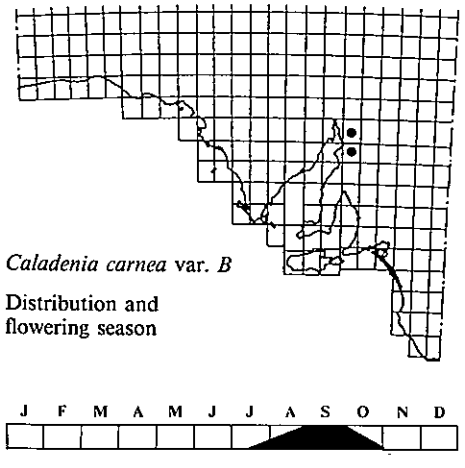
4b. var. **B.**

Usually more than 20 cm tall, sparsely pubescent. Flowers usually large, 1 or 2, bright-pink, with bright-yellow or orange calli on the labellum, these often in 4 irregular rows rather than in the 2 regular rows of var. *carnea.* The flowers are usually sweet-scented and bee pollinated.

Occurs mainly in exposed sites in woodlands of *Eucalyptus cladocalyx* and *Callitris collumellaris.* Restricted to the southern Flinders Ranges. Also in New South Wales, Victoria and Tasmania.

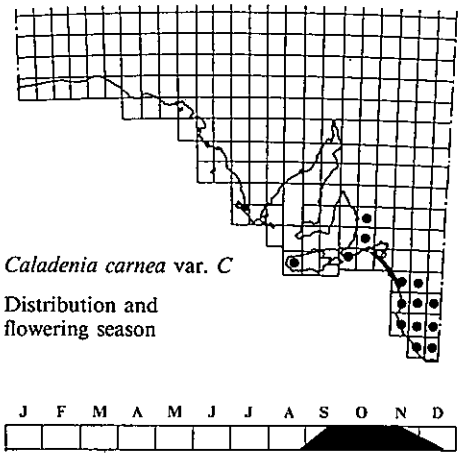
Previously referred to *C. carnea* var. *gigantea* which is confined to coastal New South Wales.

In cultivation it does well if left undisturbed in fairly dry soil and given plenty of light.



Caladenia carnea var. *B*

Distribution and flowering season



Caladenia carnea var. *C*

Distribution and flowering season

4c. var. **C.** Plate 31

The name alludes to the minute size of the flowers in this variety.

Scape very slender but often quite tall, to 20 cm with an equally long leaf. Flowers 1 or 2, normally greenish-white inside and green-brown outside, less than 1 cm in diam. Column and labellum barred red. Flowers often only half expanding or not opening at all, apparently self-pollinated. Pink flowered forms are rare.

Often occurs under the shelter of trees and in thickets where a deep layer of bark and leaves has accumulated; in sandy or gravelly soils, sometimes invading pine plantations.

Locally common.

The small self-pollinated flowers make this variety unsuitable for cultivation.

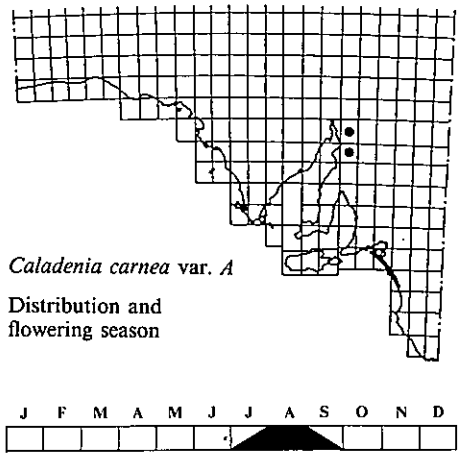
Previously referred to the New Zealand *C. carnea* var. *minor*.

4d. var. **A** Plate 32

Slender plants to 10 cm high; leaf long, almost glabrous. Flower single, about 2 cm diam., perianth-segments obtuse, white inside with greenish tints outside, the dorsal sepal curved forward over the column; neither column nor labellum barred red.

Confined to grassy rock ledges or gorges near Mambray Creek and Telowie Gorge in the Flinders Ranges. Usually in fertile loams and in deep shade cast by rocks or native pine (*Callitris* sp.). Sometimes found growing with *C. carnea* var. *B* which flowers later and does not intergrade with it.

This variety was previously confused with *C. catenata* but shows more similarities with *C. carnea* var. *carnea* which differs in having acute segments, the column and labellum barred red.



Caladenia carnea var. *A*

Distribution and flowering season

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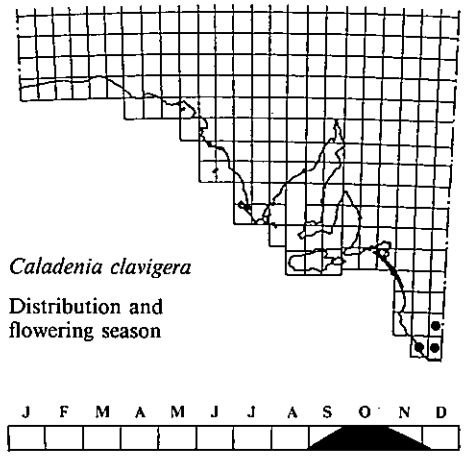


Caladenia clavigera

Distribution and flowering season

J F M A M J J A S O N D

5. **C. clavigera.** *Plain-lip spider-orchid.* Plate 33

The name *clavigera* (bearing clubs), refers to the small black glandular tips to the sepals.

Slender to robust, 10–30 cm high; leaf lanceolate, hairy. Flower usually single, rarely 2, red and brown or cream, streaked red longitudinally, 3–5 cm in diam.; segments narrowing

into fine points, the sepals slightly longer with small black glandular clubs at their tips. Labellum ovate, side lobes yellowish or emerald-green, entire, the middle lobe dark reddish-brown, triangular with entire or slightly irregular margins, 4 rows of flat-topped dark calli. Flowers not scented.

Very rare in South Australia, in damp clay or sandy flats in open *Eucalyptus* woodland; an environment now largely converted to pasture.

Occurs also in New South Wales, Victoria and Tasmania.

The species can be confused with *C.* x *variabilis* which does not have clubbed sepals and has some degree of thickening to the labellum tip.

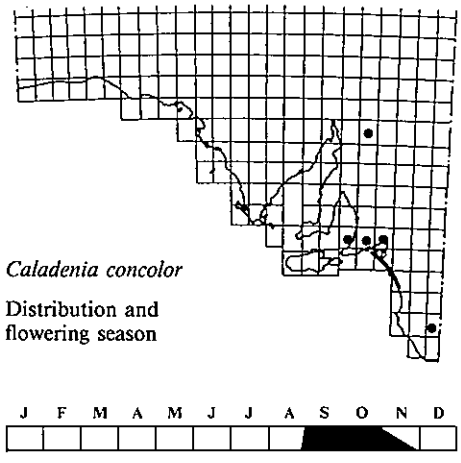
6. **C. concolor**. *Crimson spider-orchid.* Plate 34

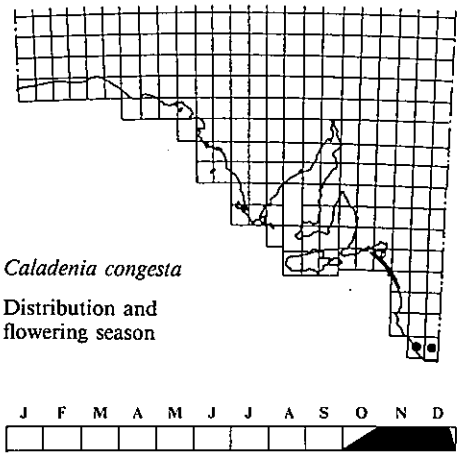
The name *concolor* (all the one colour), refers to the one colour on all the perianth segments.

Slender, to 40 cm tall; leaf narrow, sparsely hairy, stem red, wiry; flower single, uniformly deep red, about 8 cm across, the segments drooping (except for the dorsal sepal) acuminate and glandular toward the tips. Labellum finely fringed, the tips curled under; calli short, golf club-like, in 4–6 rows extending toward the tips. Column with 2 yellow glands at the base. Wasp pollinated.

Occurs in more fertile soils—gravelly clays or sands in open forest, woodland or grassland in well drained soils. Previously treated as a colour variant of *C. patersonii* and indeed some specimens identified as *C. concolor* may be merely red forms of that species. Almost extinct in this state but also reported from southern New South Wales and Victoria.

Cultivation not known.





7. **C. congesta**. *Black-tongue caladenia.* Plate 35

The name *congesta* (close together) refers to the dense (congested) black calli on the labellum.

Slender, 15–60 cm high; leaf slightly hairy. Flowers 1–3, 2–3 cm in diam.; segments pink, oblong-lanceolate. Labellum 3-lobed, about 1 cm long when extended; lateral lobes falcate and

pinkish, the central lobe maroon with a dense mass of almost black calli running to the tip. Flowers faintly scented. Bee pollinated; the bees grasp the labellum and shake it vigorously as they do the anthers of some native lily flowers.

Quite rare, occurs in sandy heathland or swampy flats near Glencoe and sometimes forms small colonies on fire-breaks.

Also occurs in New South Wales, Victoria and Tasmania where it is locally common.

The flowers on their fragile scapes protrude above the low shrubs and sway about in the breeze; if not pollinated they may stay open for up to 10 weeks.

8. **C. cucullata**. *Hooded caladenia.* Plate 36

The name *cucullata* (hooded) refers to the dorsal sepal which forms a hood over the column.

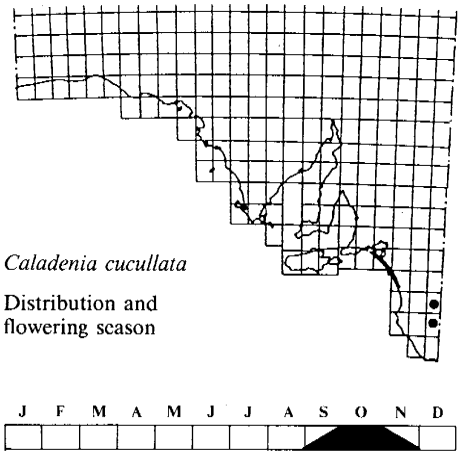
Slender plants 10–25 cm high; leaf long, linear, slightly hairy. Flowers few to 10, 1–2 cm across, segments similar, oblanceolate, white inside, greenish or brownish outside; the dorsal sepal distinctly hooded over the column. Labellum 3-lobed; lateral lobes stained deep-mauve, with crenulate margins; mid-lobe broad, wholly deep purple-mauve, margins denticulate, with tuberculate calli in 4 regular rows, the basal calli yellow-headed, those of the mid-part deep-purple or mauve and the anterior ones variable, purple, pink or white, sessile, often crowded.

Very restricted in its range, occurring in small groups in sandy open forest or heathland north of Naracoorte.

More common in New South Wales, Victoria and Tasmania.

Has not proved amenable to cultivation.

Similar to *C. gracilis* which has fewer, more colourful and more strongly perfumed flowers and the tip of its labellum nearly smooth.



Caladenia cucullata

Distribution and flowering season

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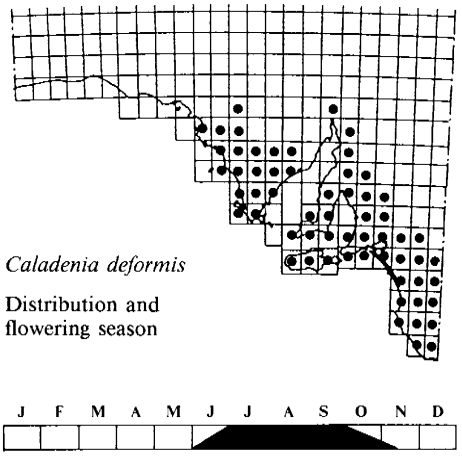

Caladenia deformis

Distribution and flowering season

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9. **C. deformis**. *Blue fairies, bluebeard caladenia.* Plate 37

The name *deformis* (misshapen) apparently refers to the crowded labellum calli with their fine irregular protuberances.

Usually short, 5–20 cm high; leaf slightly hairy, linear-lanceolate. Flower single, to 3 cm across, usually sky-blue, but occasionally white, rarely pink or yellow. Labellum ovate, 10–15 mm long, darker than the other segments, with a dense brush of linear or slightly clubbed papillate dark calli in 4 or 6, more or less ill-defined rows; white flowers have calli which may be pink, yellow, grey or white. Flowers slightly sweet-scented. Bee pollinated.

Widespread and often common. Found in a wide variety of habitats from coastal sandhills, woodland and mallee-heathland to rocky places far inland. In heavily forested country flowering is triggered by bushfires but elsewhere no such stimulus is required. Often found in large numbers with up to 20 plants clumped together.

Also in Western Australia, New South Wales, Victoria and Tasmania.

This is the only blue-flowered *Caladenia* in South Australia. *C. caerulea* which occurs in western Victoria, is a smaller species, lacking the dense mass of dark calli on the labellum.

A hybrid between *C. deformis* and *C. carnea* has been collected in the Flinders Ranges. This hybrid has purple flowers, like another hybrid with *C. filamentosa* var. *tentaculata* collected in 1987 near Monarto.

Its bright blue flowers make *C. deformis* popular in cultivation but it does require well drained soils and shelter from the weather when in flower. If not repotted plants gradually form small clumps which make for attractive displays.

10. **C. aff. dilatata.** *Green comb orchid, fringed spider-orchid.* Plates 38–41

The name *dilatata* (expanded) refers to the widely spreading perianth segments.

Plants 10–40 cm high; leaf variously hairy, oblong to lanceolate, stem with numerous hairs. Flowers 1 or 2 in various shades of maroon, green or yellow; perianth segments linear-lanceolate to 5 cm long, with red median striped sepals with glandular clubbed tips (osmophores). Labellum ovate, tremulous on a movable claw, fringed, the tip often curled under, bright maroon; calli red in several rows, variously shaped, 2 yellow glands at base of column. Wasp pollinated.

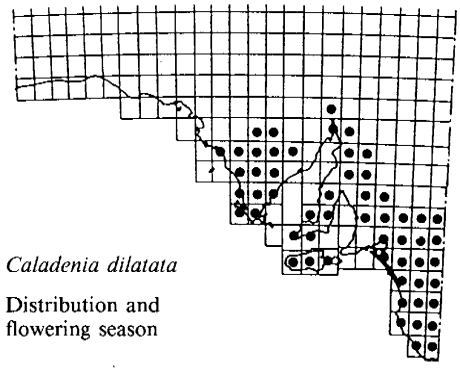
C. dilatata as presently understood appears to be a complex of many similar taxa each genetically isolated through being pollinated by a different species of wasp. *C. dilatata* in the strict sense may not even occur in South Australia. Some of the South Australian species previously known as *C. dilatata* have already been given other names. The common King Spider-orchid of the Adelaide Hills is now known as *C. tentaculata* while the mallee plant without clubs is now *C. stricta.* Other forms are found in varying habitats from swamp margins to rocky outcrops. Flowering from late winter through to mid-summer.

11. **C. filamentosa.**

The name *filamentosa* refers to the long filamentous perianth-segments.

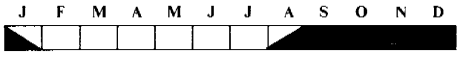
Plant rather slender, to 30 cm high, the scape with long straight hairs; leaf linear. Flowers 1–3, scarlet, grey-white, pink, crimson or creamy yellow with red markings; segments drooping, narrow, 4–7 cm long, produced into long hairy filaments (caudae). Labellum ovate to cordate, 4–7 mm long, white, red and white or wholly crimson; calli club-shaped in 2 closely set rows in the lower half of the labellum. Flowers with a faint musk like perfume.

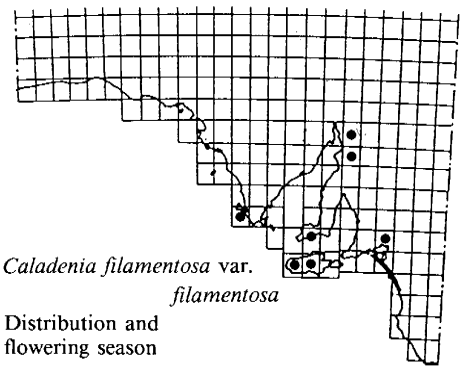
A. Flowers red; labellum margins serrate or serrulate . . var. *filamentosa* 11a.
A. Flowers grey-white; labellum margins dentate . . . . . var. *tentaculata* 11b.



Caladenia dilatata

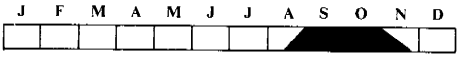
Distribution and flowering season





Caladenia filamentosa var. *filamentosa*

Distribution and flowering season



11a. var. **filamentosa**. *Daddy-long-legs, red spider-orchid.* Plate 42

Perianth-segments deep scarlet, crimson or pink; labellum margins only slightly serrulate.

Locally common in limestone country or in *Eucalyptus cladocalyx* woodland. The Kangaroo Island form has smaller, glossier, darker coloured flowers and may represent a distinct taxon.

Occurs in all States except the Northern Territory.

In cultivation it does best in a shallow clay pot and may increase vegetatively to form small clumps. Prefers not to be repotted.

11b. var. **tentaculata**. *Wispy spider-orchid.* Plate 43

The name *tentaculata* refers to the long tentacle-like perianth-segments.

Flowers greyish or creamy-white often with red divergent veins.

Widespread in different habitats, on coastal limestone, in mallee and mallee-heathland especially in deep sands or in rocky places far inland. Drought tolerant and will flower when only a few cm high. The inland form has shorter segments, more erect petals and forms clumps of plants due to vegetative increase. It also has much hairier leaves.

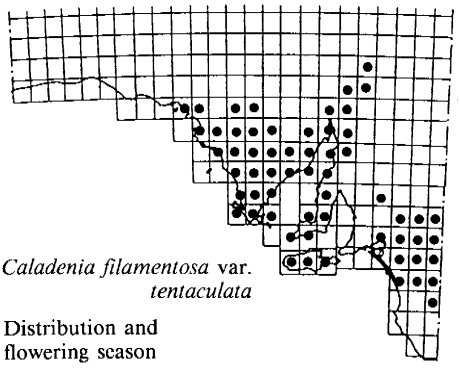
C. filamentosa var. *tentaculata* is soon to be raised to species status.

Also occurs in Western Australia, western Victoria and south-western New South Wales.

Cultivation as for var. *filamentosa.*

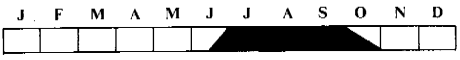
12. **C.** aff. **fitzgeraldii**. Plate 44

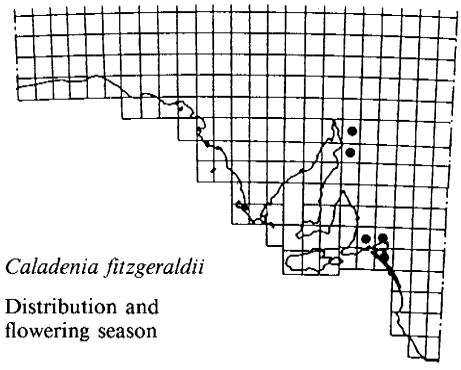
H.M.R. Rupp (1943) named this species in honour of R.D. Fitzgerald (1830–1892), Australian botanical artist of Irish birth.



Caladenia filamentosa var. *tentaculata*

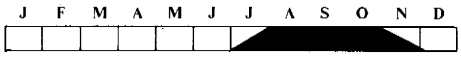
Distribution and flowering season





Caladenia fitzgeraldii

Distribution and flowering season



Slender to robust, 10–60 cm high, scape with short rigid hairs; leaf large, broadly lanceolate, surface felt-like. Flower single, rarely 2, yellow or green and red; segments lanceolate, 2–5 cm long, attenuated into fine points, the sepals with glandular-clavate tips. Labellum ovate, acute, rather flat, 10–15 mm long, yellow-green with a contrasting red apex, the margins usually only shallowly toothed, the calli clubbed, red-brown, in 4 rows, mainly in the basal half of the labellum. Flowers not scented.

Locally common, especially in the southern Flinders Ranges in fertile loams in open woodland or scrub, occurring in small scattered groups. Wasp pollinated (*Phymatothynnus* aff. *monilicornis*).

Also in New South Wales and ?Victoria.

Similar to *C. reticulata* which has a narrower leaf, the labellum reticulate, with 6 rows of calli.

In the past it has been confused with *C. huegelii* which is a Western Australian species and with *C. reticulata* which does not occur in the same areas. Some populations have wholly green flowers and these closely resemble *C. pallida* from Tasmania which has a more recurved labellum. Some workers regard the South Australian plants as being an unnamed species and suggest that *C. fitzgeraldii* in the true sense does not occur here.

Putative hybrids have been reported with *C. gladiolata* and *C. patersonii*. In disturbed areas the putative hybrid swarms exhibit a wide range of variation in floral morphology.

13. **C. fragrantissima** (*C. patersonii* var. *suaveolens*). *Scented spider-orchid.* Plate 45

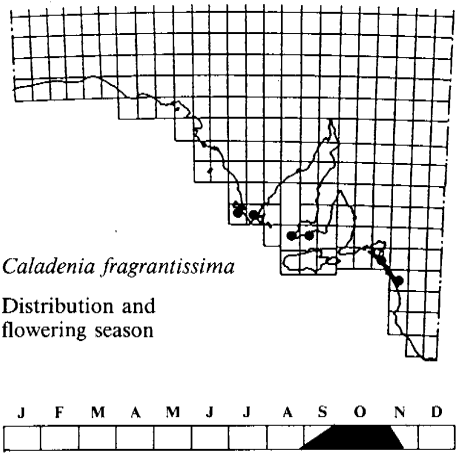
The name refers to the fragrant, lemon or fruity scented flowers.

Usually robust to 40 cm high; leaf to 10 cm long, broadly lanceolate with coarse hairs. Flower usually single, up to 10 cm in diameter, of heavy texture, yellow-green or cream, segments drooping, apically covered with dark reddish-brown domed glands (trichomes); labellum broad, undivided, with clubbed marginal teeth, tip curled under, calli red-brown, in 4–6 rows; column with large yellow basal glands. Wasp pollinated.

A coastal species found in sandy, often calcareous soils under low shrubs. As in most of our native orchids the fragrance is much stronger on warm days. No hybrids yet recorded.

Rare in South Australia, due probably to pressures of grazing. Also in south-west Victoria.

The sturdy stems and large flowers make it very popular in cultivation but tubers are sensitive to soil moisture fluctuations and quickly rot if kept too wet.



Caladenia fragrantissima

Distribution and flowering season

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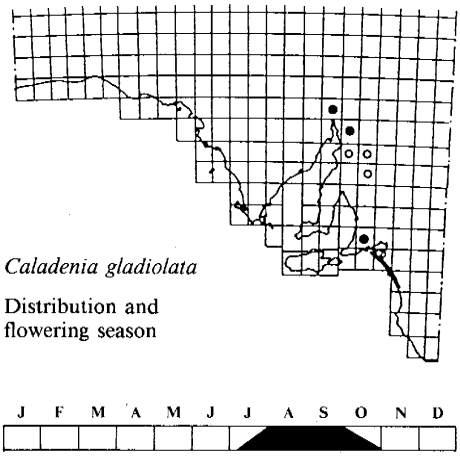


Caladenia gladiolata

Distribution and flowering season

J F M A M J J A S O N D

14. **C. gladiolata**. *Bayonet caladenia.* Plate 46

The name *gladiolata* (like a small sword) refers to the bayonet-shaped clubs on the perianth-segments.

Plant hairy, scape often dwarfed, less than 10 cm high; leaf broadly lanceolate. Flower 1, rarely 2, in shades of red, brown or green, 3–4 cm diam., all segments spreading or drooping, produced into broad, flat and glandular-aromatic clubs (osmophores). Labellum ovate to 1 cm long, margins practically entire, greenish, tip dark-brown to maroon, decurved; calli large, dark red-brown, fleshy, pyriform, in 4 crowded rows not extending to the tip. Flowers strongly scented, spicy or musk-like. In an enclosed space this fragrance can be quite overpowering.

Endemic to South Australia, probably once widespread but now very rare. Occurs in grassland and open grassy forest usually above 500 metres altitude. In these habitats the species has been largely grazed out of existence.

Similar to *C. toxochila* in size and colour but the latter has only small glandular clubs on sepals and petals, a broader labellum and the flowers not scented. Also similar to *C. longiclavata* from Western Australia which has bayonet-shaped clubs but flowers not scented.

Putative hybrids have been reported with *C. patersonii* and *C. dilatata.*

Rarely cultivated but has been raised successfully from seed and a man-made hybrid with *C. ovata* produced. Recently rediscovered near Adelaide after being thought extinct in the Mt Lofty Ranges.

15. **C. gracilis**. *Musky caladenia, musky spider-orchid.* Plate 47

The name *gracilis* (slender) refers to the habit of the plant.

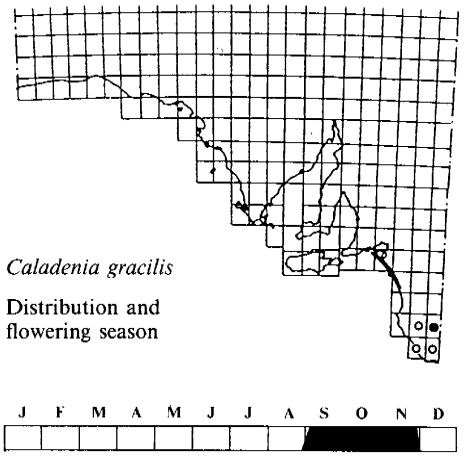
Slightly hairy, usually 15–25 cm high, sometimes attaining 45 cm; leaf linear, about two-thirds the length of the scape. Flowers 1–4 (usually 2) on long pedicels, red or brown outside, white or pinkish inside; segments lanceolate, 9–18 mm long, spreading, except the dorsal sepal

which is incurved and hooded over the column. Labellum ovate, whitish, often spotted red or purple, about 7 mm long, erect at the base against the column, recurved distally; calli usually in 4 rows, from base to the tip, with red, yellow or white heads, stout and short, club-shaped. Flowers with a distinct musky odour produced by glands on the outside of the sepals.

Almost extinct in South Australia. The few collections have been from fertile soils under open forest in well watered areas. Quite common in New South Wales, Victoria and Tasmania.

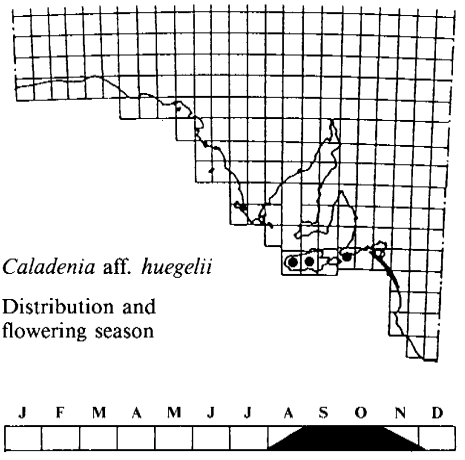
Does poorly in cultivation, usually dying out within 2 years.

Until 1982 better known by its synonym *C. angustata.*



Caladenia gracilis

Distribution and flowering season



Caladenia aff. *huegelii*

Distribution and flowering season

16. **C. aff. huegelii** (? *C. valida*). Plate 48

Caladenia huegelii proper is a Western Australian plant.

Slender, usually 10–30 cm long; leaf 3–6 mm wide, hairy, linear-lanceolate. Flower usually 1, segments spreading, 2–6 cm long, creamy-white; sepals much longer than petals with glandular-clavate tips. Labellum cordate, 10–17 mm long, movable; lamina cream-white and hollowed, tip crimson and strongly decurved, margins deeply fringed; calli in 4–6 indistinct rows, slender, club-shaped with crimson to red and white heads. Flowers not scented. Pollinated by the wasp *Phymatothynnus pygidalis.*

Occurring in small numbers and confined to coastal scrubs and heathlands, often in leached acid sands.

Particularly large forms can be found in Kelly Hill Conservation Park on Kangaroo Island.

Superficially similar to *C. reticulata* which has all segments including labellum veined with red and a narrower base to the sepals.

Previously confused with *C. fitzgeraldii* which has a larger, wider leaf and a flatter labellum, less deeply fringed.

A putative hybrid with *C. patersonii* has been noted.

There are several other apparently different forms closely related to *C. reticulata* on Kangaroo Island and in the South East. One of these with green flowers having dark brown

clubs on the sepals occurs in calcareous sands between Robe and Beachport (see Plate 69). David Jones in 'Native Orchids of Australia' records *C. valida* from Kangaroo Island. This is a species with broad leaf, flowers yellow and red with long clubs on the sepals.

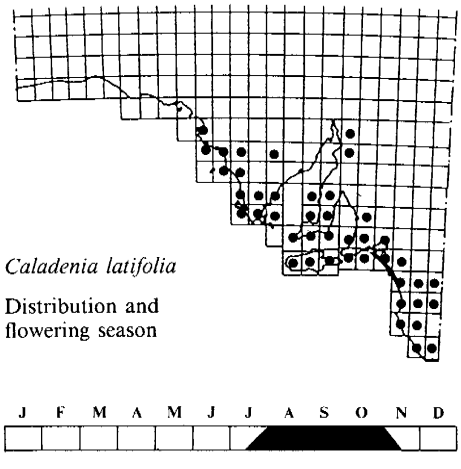
17. **C. latifolia**. *Pink fairies.* Plates 49 and 50

The name *latifolia* (broad-leaved) refers to the wide leaf, which is the largest of the genus in South Australia.

Moderately robust, to 30 cm high; leaf large, softly-hairy, lanceolate, sometimes to 10 cm long and 2 cm or more wide. Flowers 1–4, 1.5–3.5 cm in diam., pale to deep-pink, white, or pink and white; segments lanceolate and spreading. Labellum distinctly 3-lobed; lateral lobes banded with pink; central lobe broadly lanceolate with a prominent pink central blotch and long-toothed margins; calli long, linear, yellow with white heads, converging in a semicircle at the base of the labellum.

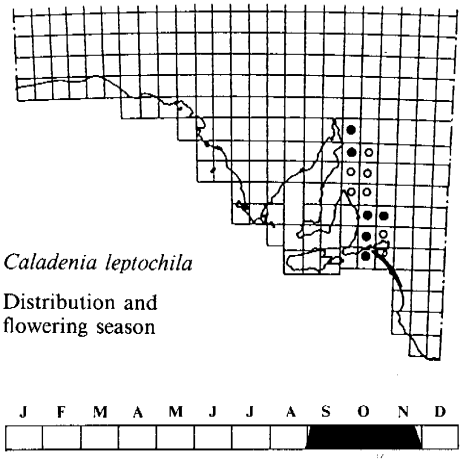
Widespread and common, mainly in coastal sandhills, often from just above high tide level, also inland in rocky places, in gorges, on mountain peaks and limestone outcrops. In smaller numbers may occur in open forest, sandy heathland or elsewhere. Forms large colonies through vegetative reproduction and may flower more profusely after bushfire. Usually only a small proportion of plants will flower. Very fine specimens sometimes occur along creeks in the southern Flinders Ranges. Also occurs in Western Australia, Victoria and Tasmania.

Does well in cultivation. Unlike most *Caladenia* species it produces several tubers per plant and therefore increases vegetatively. Like many vegetatively reproducing orchids however it is shy to flower. Some clones are self pollinating, the flowers hardly opening. Some attractive man-made hybrids have been produced recently and these tend to be more floriferous than *C. latifolia* (with *C. patersonii* (Plate 51), *C. rigida* and *C. flava*).



Caladenia latifolia

Distribution and flowering season



Caladenia leptochila

Distribution and flowering season

18. **C. leptochila**. *Narrow-lipped spider-orchid, queen spider.* Plate 52

The name *leptochila* (thin-lipped) refers to the narrow strap-like labellum.

Slender, 15–45 cm high; leaf long, lanceolate, very hairy. Flowers 1 or 2, red and yellow-green or wholly red, segments 2–3 cm long, curving upwards; sepals ending in small dark-glandular clubs. Labellum oblong or broad-lanceolate, about 12 mm long, and 4 mm wide,

curled under the apex, red, with entire or slightly denticulate margins; calli small, sessile except near the claw, mostly in lower part of the labellum; flowers not scented. Wasp pollinated.

Locally common in the Mt Lofty Ranges. Prefers shallow clay or gravelly soils in light forest, especially on disturbed sites such as old tracks but may occur in dense forest. Flowers well after bushfires and can be seen at its best in the hills overlooking Adelaide (Cleland Conservation Park). Also thought to have occurred in Victoria but is now believed to be extinct there.

In the Mount Lofty Ranges flowers are normally yellow-green with a red labellum and have almost entire margins but in the Flinders Ranges some populations have wholly crimson flowers (Plate 53) with labellum margins finely toothed.

Similar to *C. ovata* which has perianth-segments less up-swept, and a broader labellum with fewer and smaller calli.

In cultivation does well if grown in gravelly clay soil and not repotted.

19. **C. menziesii** (*Leptoceras menziesii*). *Rabbit* or *hare orchid, rabbit ears.* Plates 54 and 55

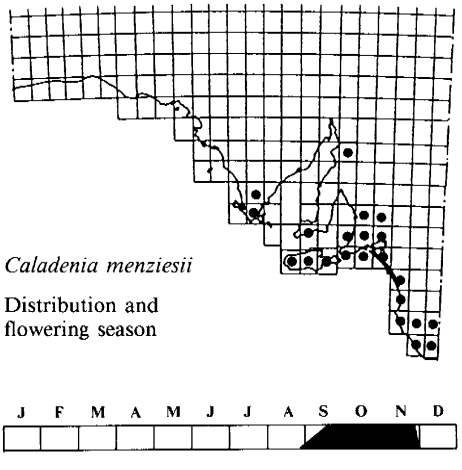
Named by R. Brown (1810) an English explorer and botanist in honour of Archibald Menzies (1754–1842) British physician, zoologist, botanist and gardener who collected the species on Vancouver's Discovery, in King George Sound, Western Australia in 1791.

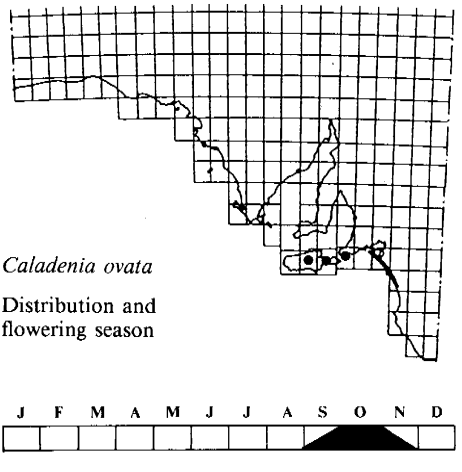
Slender, to 30 cm high; leaf glabrous, ovate-lanceolate, often to 6 or sometimes to 12 cm long. Flowers 1 or 2, sometimes 3; segments 10–15 mm long; dorsal sepal reddish, glandular-hairy on the back, hooded over the column; lateral sepals white or pink, spreading horizontally; petals purplish-red, erect; oblanceolate-clavate and closely-glandular above. Labellum c. 7 mm long, white striped with red; calli usually in 2 rows, yellow, slender, with large rounded heads. Flowers lightly scented or not.

Locally very common. Forms small to large colonies in damp places in forest or heath in sandy or clay soils, and colonises pine forests. Flowering is infrequent except after bushfires when massed displays occur. Near Marion Bay on Yorke Peninsula the species grows on limestone rock under coastal mallee and flowers freely every year. Bee pollinated.

In Cleland Conservation Park there is a form with pure white flowers.

In cultivation it is easy to grow and increases quickly but is difficult to flower unless the tubers are treated with ethylene gas (released by ripening fruit) when dormant. Probably better treated as belonging to the monotypic genus *Leptoceras.*





20. **C. ovata.** *Ovate* or *Kangaroo Island spider-orchid.* Plate 56

The name *ovata* (egg-shaped) refers to the broadly ovate labellum.

Slender, hairy, 10–23 cm high; leaf 3–7 cm long, lanceolate. Flower 1, sometimes 2, mainly red or red and yellow with lanceolate segments 2–3 cm long; sepals ending with small glandular clubs. Labellum to 10 mm long, ovate, nearly as wide as long, reddish-yellow with dark-red tip and dark divergent veins; calli yellow or red, mamillary, very small, variable, mainly near the labellum base, sometimes absent.

An endangered species endemic to South Australia. Found on Kangaroo Island and Fleurieu Peninsula. Occurs in hard yellow duplex soils over laterite in scrubby heath where it is hidden in the tangle of low shrubs amid which it grows and seldom flowers except after bushfires. It was not located on the mainland until the 1980's.

Shows similarities with *C. leptochila* which has a much narrower labellum and perianth-segments abruptly up-swept.

Recently cultivated in gravelly soil and germinating well from seed.

21. **C. patersonii.** *White spider-orchid, common spider-orchid.* Plates 57–59

Named by R. Brown (1810) in honour of William Paterson (1755–1810), British naturalist, traveller and Lt. Governor of New South Wales and Tasmania who collected the species in Tasmania in 1791.

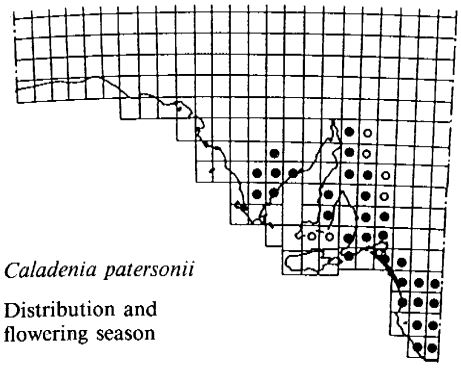
Slender to quite robust, 20–50 cm high, with many forms; leaf, narrow lanceolate, 4–15 cm long. Flower usually 1, sometimes 2 or 3, large, 6–15 cm in diam., creamy, sometimes yellow, pink or varicoloured; perianth-segments similar, spreading or drooping except for the erect dorsal sepal; segments dilated in the lower part, then produced into long glandular filiform points 4–10 cm long but not clavate. Labellum ovate-lanceolate, 1.5–2 cm long, white, yellow-green or with purple or crimson veins, margins toothed or fringed; calli in 4–6 rows, linear, club-shaped, crimson or red and white.

Once common, but becoming rare. Occurs predominantly in fertile soils in open forest or grasslands which are now largely cultivated.

The name "common" spider-orchid is no longer appropriate. Although it could once be found in numbers in the Adelaide Hills it is exceedingly rare now. Also occurs in all States except the Northern Territory.

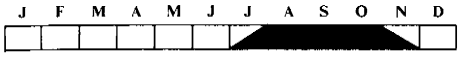
Hybridises with *C. cardiochila, C. dilatata, C. gladiolata, C. latifolia, C. stricta* and *C. toxochila.* Most of the hybrids are fertile and will backcross with *C. patersonii.* Often the progeny of such crosses and backcrosses will have a red tip to the labellum. Apparently most hybrids appear in disturbed areas but as the disturbance settles and the native vegetation re-establishes the hybrids die out. Plants with wholly red flowers have been referred to *C. concolor* while the lemon scented, yellow-green coastal form is now *C. fragrantissima. Caladenia behrii* described from the Barossa Valley by Schlechtendahl in 1848 has until recently been treated as a synonym of *C. patersonii.* It is likely that *C. patersonii* as presently understood is really a complex of several species and subspecies.

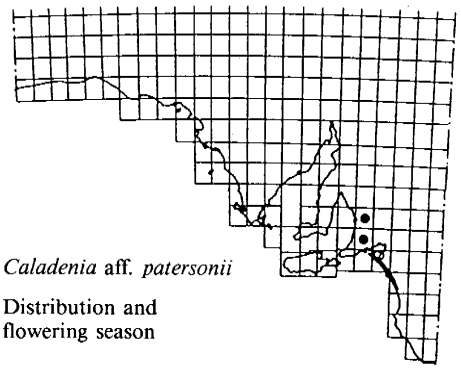
There are many beautiful forms of *C. patersonii* in cultivation, some have proved difficult and soon die out, others gradually increase by vegetative reproduction of tubers and these are the most suitable for pot culture. All forms however resent disturbance and should not be too frequently repotted. A shallow pot, freely draining soil-mix and plenty of light and air movement are required.



Caladenia patersonii

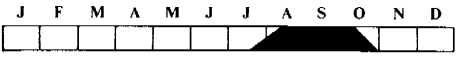
Distribution and flowering season





Caladenia aff. *patersonii*

Distribution and flowering season



22. **C.** aff. **patersonii** (*C. behrii*). Plate 60

Rather slender to 60 cm high; leaf narrow-lanceolate, hairy, 5–10 cm long. Flower usually single, rarely 2, up to 10 cm in diam., creamy-white and red or pink with a strong musky fragrance especially noticeable in warm, conditions; segments 3–6 cm long, similar, first spreading then drooping, tips slender, dark-glandular but not clavate. Labellum ovate-lanceolate, c. 10 mm long, lamina green-white, margins fringed, apex bright-red or pink, prolonged and curled under; calli linear to club-shaped, red, in 4–6 rows, loose and reaching nearly to the tip.

Endemic to South Australia and locally common. Found in gravelly soils on cool south-facing slopes in mixed *Eucalyptus* forests and often associated with grass-trees or yacca (*Xanthorrhoea*).

The freshly opened flowers often have a greenish tinge, the perianth fading to a creamy-white with age; albino specimens have greenish glands on the tips of perianth-segments.

Often confused with *C. patersonii* which does not have a red labellum tip and lacks the musky scent. Where these 2 species occur together, this one flowers much earlier than *C. patersonii*.

This is a popular species in cultivation and easier to grow than most other spider-orchids. Prefers a gravelly, freely draining mixture and cool conditions.

The species can be seen at its best amid *Xanthorrhoea semiplana* in the Para Wirra and Mount Gawler area of the Mount Lofty Ranges. Wasp pollinated.

23. **C. pusilla** (*C. minor*). *Small caladenia, pygmy caladenia.* Plate 61

The name *pusilla* (very small) refers to the diminutive size of the whole plant, including the flower.

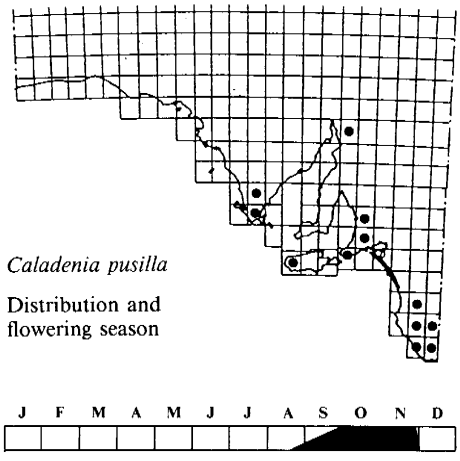
Slender, glandular-pubescent, 3–9 cm high; leaf short, linear, almost glabrous. Flower usually single, pink inside, greenish or reddish outside, hardly 1 cm in diam. and not widely opening; segments similar; dorsal sepal incurved over the column; lateral sepals often joined at the base. Labellum 3-lobed with red bars at the base and with a short yellow decurved apex. Flowers not scented.

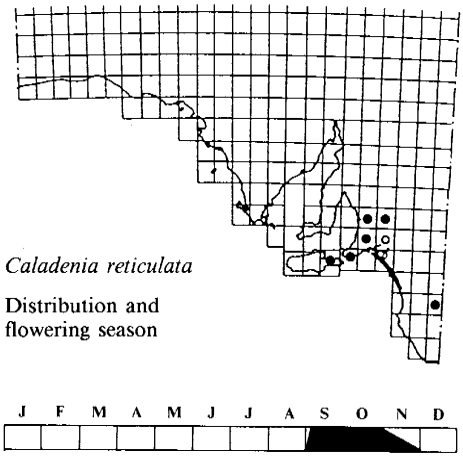
Locally common in the southern Mt Lofty Ranges and lower South-east. Occurs in nitrogen deficient soils which are boggy in winter, usually in scrubby heath and apparently flowering more profusely after bushfires.

Very deep-red flowered forms occur near Glencoe in the lower South-East.

Occurs also in Victoria and Tasmania.

The South Australian plants are now regarded as *Caladenia minor.*





24. **C. reticulata.** *Veined spider-orchid.* Plate 62

The name *reticulata* (like a network) refers to the pattern of red veins on the labellum.

Slender, 10–30 cm high, with numerous fine hairs; leaf hairy, narrow-lanceolate. Flower yellowish with red stripes or almost wholly red, segments 2–3.5 cm long, spreading or drooping except the erect dorsal sepal; sepals ending in dark red-brown glandular clubs. Labellum ovate, about 13 mm long, red or yellowish with crimson veining and a dark decurved apex, margins finely to deeply toothed; calli in 4–6 rows, long-stalked to 3.5 mm high, crimson, narrow club-shaped. Flowers not scented.

Locally common in the southern Mt Lofty Ranges. Occurs in scrubby forest areas, often in rocky or gravelly soils and usually associated with low shrubs. Flowering more freely after bushfires.

Resembles *C. huegelii* which is now considered to be a Western Australian species having larger flowers. Similar in shape and size to *C. rigida* which has white flowers and *C. fitzgeraldii* which has a shortly toothed non-veined labellum, and a broad lanceolate leaf.

Reports of *C. reticulata* from Kangaroo Island, the South-east and Eastern States usually refer to other species such as *C. calcicola, C. fitzgeraldii, C.* aff. *hastata* (c.f. Plate 69), *C.* aff. *huegelii* or *C. valida.*

Has not done well in cultivation, few growers having any real success.

Pollinated by the wasp *Phymatothynnus nitidus.*

25. **C. rigida**. *White spider-orchid.* Plate 63

The name *rigida* refers to the perianth-segments which spread rigidly rather than drooping.

Slender to robust, often to 30 cm high with numerous long soft hairs; leaf narrow-lanceolate, 3–20 cm long. Flowers usually 1 or 2, white, striped with red beneath; segments 2–5 cm long, spreading quite rigidly except for the erect dorsal sepal incurved over the column, narrowing gradually from the dilated base into acute tips, sepal tips dark-glandular clubbed. Labellum ovate, about 1 cm long, creamy white, fringed with red-brown subulate teeth which are white-tipped; calli in 4 rows, basally club-shaped but gradually becoming linear and sessile towards apex, red with white tips.

Rare in light open forest on fertile gravelly soils, its habitat now largely utilised for agriculture.

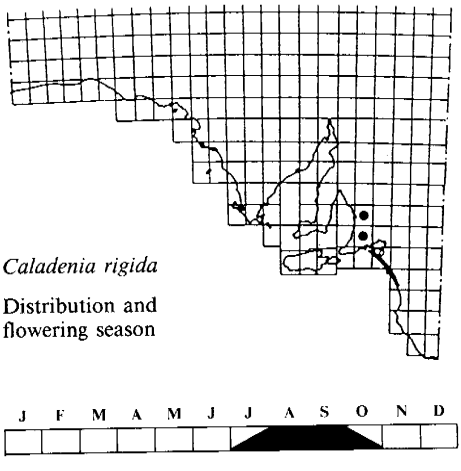
Endemic in the southern Mt Lofty Ranges (from Williamstown to Macclesfield).

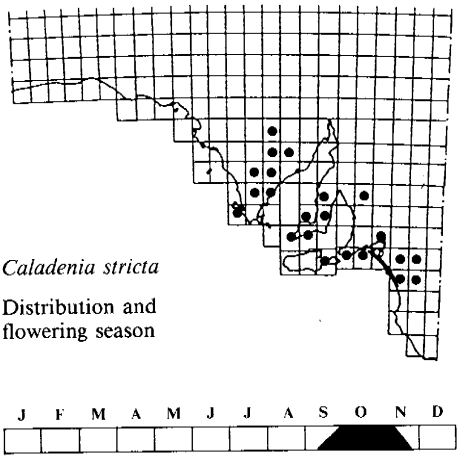
Similar to some forms of *C. patersonii* which has all perianth-segments glandular and drooping never ending in distinct clubs. Also shows similarities with *C. reticulata* which has red flowers with reticulate-veined labellum.

A difficult species in cultivation. It is necessary to sow seed around plants each autumn to replace mature plants which constantly die out.

The species is possibly a floral mimic of *Burchardia umbellata* (milk-maids), and is pollinated by native bees which feed on the white flowers of the milk-maids. No apparent reward is to be found for bees in the orchid flowers.

Until it was described in 1930 it was often considered to be a white form of *C. reticulata.*





26. **C. stricta**. *Rigid combed spider-orchid.* Plate 64

The name *stricta* (rigid) alludes to the short, stiffly spreading floral segments.

Rigidly erect, to 40 cm high; the leaf green with red blotches, especially on the underside. Flower usually single, green, yellow and maroon, the perianth segments rigid, not drooping or falcate, to 3 cm long, yellow-green with red median stripe, sepals acuminate not clubbed.

Labellum yellow-green with decurved, maroon apex, coarsely fringed; calli crowded, red, pyriform to golf club-like, red but often yellow based; column broadly winged with deep yellow basal glands. Pollinated by the wasp *Thynnoides* aff. *pugionatus.*

Favours more fertile soils in mallee-heathland, throughout the wheatbelt but not in the Flinders Ranges. Most often in alkaline soils but rare through loss of habitat. Also in western Victoria.

Rarely cultivated. Hybrids have been recorded with *C. patersonii, C. cardiochila* and perhaps some of the forms of *C. dilatata.*

The short floral segments are not clubbed like the similarly coloured *C. dilatata* under which this species was previously included.

27. **C. tentaculata.** *King spider-orchid.* Plate 65

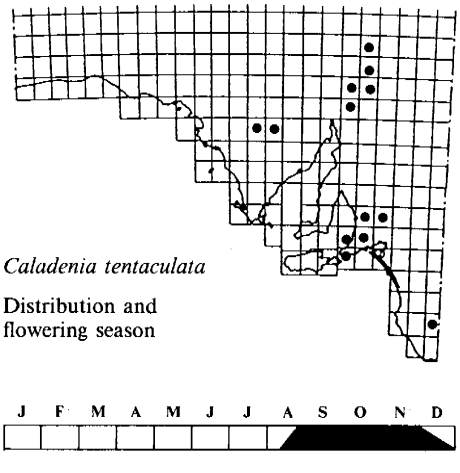
The name *tentaculata* is suggested by the long tentacle-like sepals.

Plants 15–50 cm high; leaf softly hairy, oblong to lanceolate, stem with numerous silky hairs. Flowers 1–3, green, white and maroon; perianth segments linear, to 8 cm long, green with red stripe basally, sepals curved upward then drooping toward the tips which end in narrow yellow-brown clubs. Labellum rhomboid, tremulous, green above, white below with very long basal fringe, the tip curled under and bright maroon; calli in 4 rows, golf club-like, those at the base longest (to 1 cm high), 2 large yellow oval glands at the base of the column. Pollinated by a big black wasp (*Thynnoides*).

Very common in the Adelaide Hills in forest, woodland or rough scrub, often appearing in great numbers along forest tracks. Also in Victoria.

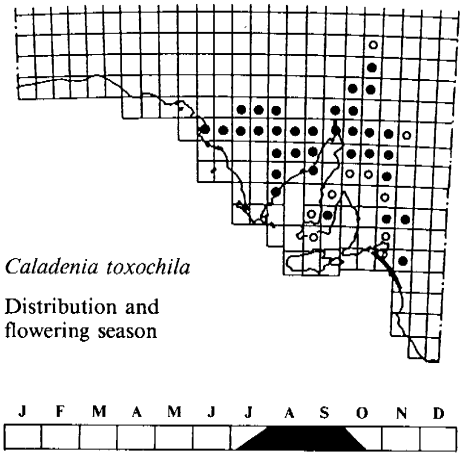
Previously this species was treated as a variety of *C. dilatata.* It was named in 1847 from plants collected near the Barossa Valley by the German botanist Behr. Rarely hybrids occur with *C. patersonii.*

The large flowers make it popular in cultivation but it resents disturbance and once plants are established they should not be repotted. Usually grown from seed.



Caladenia tentaculata

Distribution and flowering season



Caladenia toxochila

Distribution and flowering season

28. **C. toxochila**. *Dryland* or *bow-lipped spider-orchid.* Plate 66

The name *toxochila* (bow-lipped) refers to the broad labellum which is bowed in cross section.

Generally less than 10 cm high; leaf broadly lanceolate, slightly hairy. Flower usually single, in shades of cream, green and rusty-red; segments about 2 cm long, similar, spreading except the erect dorsal sepal, narrowing gradually from dilated bases into acute tips which may have small yellow-glandular clubs. Labellum bow-shaped, about 1 cm long, basally yellow-green, the apex red and strongly decurved, margins smooth to short-denticulate; calli in 4 rows, mostly in lower portion of the labellum, deep-maroon and club or pear-shaped.

Very widespread but more frequent about rocky places inland or in fertile loams under native pines (*Callitris*). Near the coast it occurs in terra-rossa soils over limestone in mallee and heath. Particularly common in parts of the Flinders Range.

There are 2 distinct forms. The inland one is slender, frequently without clubs on segments and the labellum with club-shaped calli which are not very dense. The other is a coastal or southern form which is more dwarfed, normally with clubbed segments and having a broader flat labellum with a dense mass of pear-shaped calli. The inland form is pollinated by the wasp *Asthenothynnus westwoodii.*

Resembles smaller forms of *C. dilatata* which does not have a bow-shaped labellum, has deeply combed labellum margins and longer clubs on sepals.

Has been successfully cultivated but requires a well lit situation, and should not be kept wet.

Putative hybrids have been recorded with *C. filamentosa* var. *tentaculata* and *C. patersonii.*

29. **C. x tutelata**. *Glossadenia* (X *Calassodia tutelata*). Plate 67

The name *tutelata* (under protection) refers to the sentinel calli which appear to guard the entrance to the column.

Slender almost glabrous, to 20 cm high; leaf oblong-lanceolate, very slightly hairy, about half the length of the scape. Flower solitary, blue or purple, paler below, about 3 cm across with similar lanceolate segments neither glandular nor clubbed. Labellum ovate, about 1 cm long and half wide, margins smooth, the same colour as the other perianth-segments; calli in 2 rows club-shaped purple or white with white or yellow heads often with 4 tall sentinel calli about 3 mm long in a semicircle at the base of the labellum.

Rarely seen. Early collections were from disturbed sites in open forest at Blackwood, now an Adelaide suburb. Also found in New South Wales, Victoria and Tasmania.

C. x *tutelata* is a putative intergeneric hybrid between *Caladenia deformis* and *Glossodia major*, apparently variable in the characteristics assumed from the parent species.

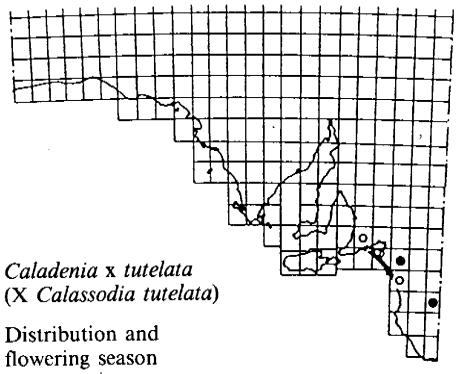
The name *"Caladenia* x *tutelata"* is inappropriate and recently the names *Glossadenia* x *tutelata* and X *Calassodia tutelata* have been used.

Unsuccessful attempts have been made to reproduce this hybrid in cultivation.

30. **C. x variabilis**. *Variable caladenia.* Plate 68

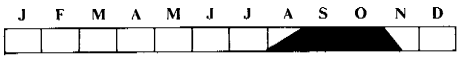
The name refers to the many variable floral features.

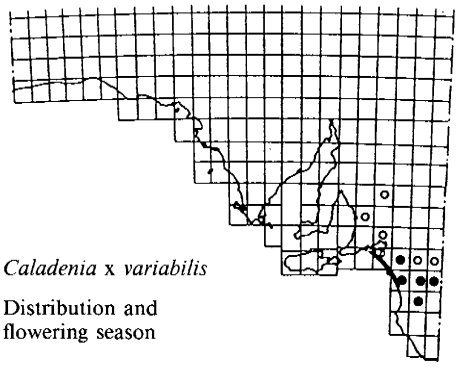
Slender, hairy, often 25 cm high; leaf lanceolate, hairy about half the length of the scape. Flower single, rarely 2, cream-yellow and red-brown; segments 3–5 cm long, lanceolate and



Caladenia x *tutelata*
(X *Calassodia tutelata*)

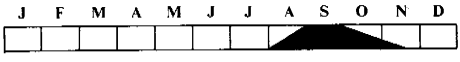
Distribution and
flowering season





Caladenia x *variabilis*

Distribution and
flowering season



attenuated into dark-glandular but not clavate tips, spreading or drooping except for the erect dorsal sepal. Labellum broad-lanceolate, about 1 cm long and wide, margins deeply-denticulate with blunt maroon or red-brown teeth; lamina often with distinct light-brown divergent veins; calli usually in 4 rows but sometimes in 8, stout, imbricate, short in front, pear-shaped or club-like and longer towards labellum base.

C. x *variabilis* is a putative hybrid between *C. patersonii* and *C. cardiochila*. Backcrossing with the parent species does occur and a full range of intermediates may be found.

Occurs mainly in disturbed, sandy soils, in light open forest or mallee-heath.

May be confused with *C. reticulata* which differs in having clubbed sepals.

In the past it was common in the upper South-East and could also be found in the Barossa Valley and near Monarto but rarely seen now. Like most hybrids it seldom occurs in conservation areas as the required disturbed areas are absent.

CALEANA

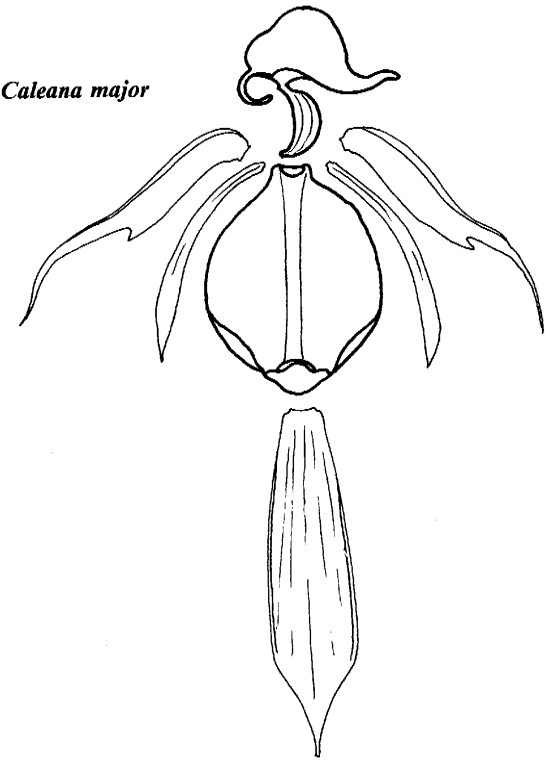
Flying duck-orchid

Commemorating George Caley (1770?–1829), British botanist and collector in New South Wales (1799–1810), curator of the St. Vincent Botanic Garden (1816–1822).

Slender, almost wiry, reddish plants; leaf narrow-lanceolate, arising from ovoid or elongated tubers. Flowers not resupinate, with linear perianth-segments. Labellum articulate on a broad claw, placed above the column; column elongated, appressed to the ovary, broadly winged; anther 2-celled, having 4 granular pollinia.

One species endemic to eastern Australia.

Caleana major has a highly sensitive labellum on a movable claw. When touched the labellum springs back rapidly into the bowl shaped column, into which it fits quite snugly. The pollinator is a male sawfly (*Pterygophorus* sp.) which is probably sexually attracted to the flowers. Flowers may emit an odour similar to the pheromone given off by the female sawfly to attract the male but this hypothesis has not been adequately tested. In any case when a sawfly alights on a labellum in the upright or set position it is swung back into the column.



As it struggles to free itself it removes the pollinia. When these actions are repeated on a second flower the pollinia are transferred. After being sprung the labellum returns to the upright position within about 20 minutes.

Duck orchids are not fragrant to the human nose and provide no nectar. Their dark colours make them somewhat difficult to locate. South Australian populations are rarely pollinated and are maintained largely by vegetative reproduction. It is not implausible that the pollinating insects no longer occur here.

1. **C. major**. *Large duck-orchid, large flying duck.* Plates 70 and 71

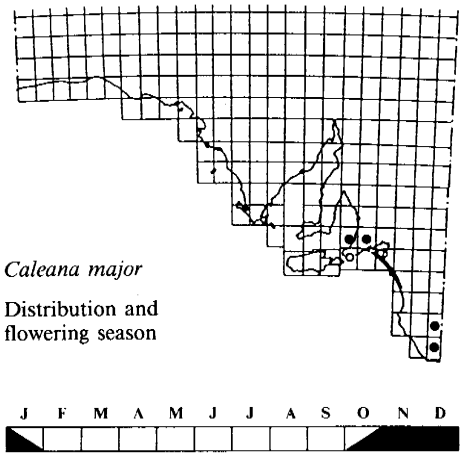
The name *major* (large) refers to flower size and serves as a distinction between this species and the smaller duck-orchids *Paracaleana minor.*

To 30 cm high; leaf grey-green, spotted and streaked red above and below. Flowers 1–3 (sometimes more in other States), deep red or red and green, about 2 cm diam. and with a distinct resemblance to a duck in flight. The broad beaked labellum like a duck's head is extremely sensitive, attached at the base of the column by a long semicircular strap-like claw. The bowl-shaped column with greatly inflated margins resembles a duck's body. The duck's wings are represented by the lateral sepals which may be in the up-stroke or the down-stroke position.

Mainly found in light sandy forest, associated with *Eucalyptus baxteri* and *Banksia ornata* but rare in South Australia. The known remaining populations are mainly in Woods and Forest Department reserves or privately owned land. Also occurs in Queensland, New South Wales, Victoria and Tasmania.

The flowers are exceptionally long lived; if not pollinated they may remain open for up to 12 weeks.

Rarely cultivated successfully.



PARACALEANA

Small duck-orchids

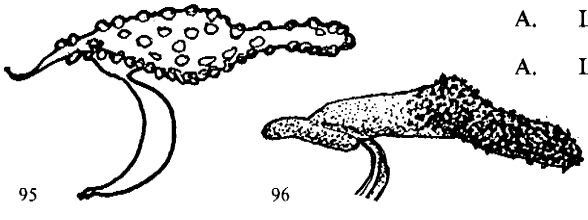
The name *Paracaleana* (resembling *Caleana*) indicates the small duck orchid's resemblance to *Caleana.*

Slender, wiry, glabrous plants with ovoid tubers; leaf solitary, red. Flowers few, not resupinate, with differentiated perianth-segments, the enlarged and widely winged column under the labellum; anther terminal, 2-celled with 4 granular pollinia.

A genus of at least 3 Australian species one of which extends to New Zealand.

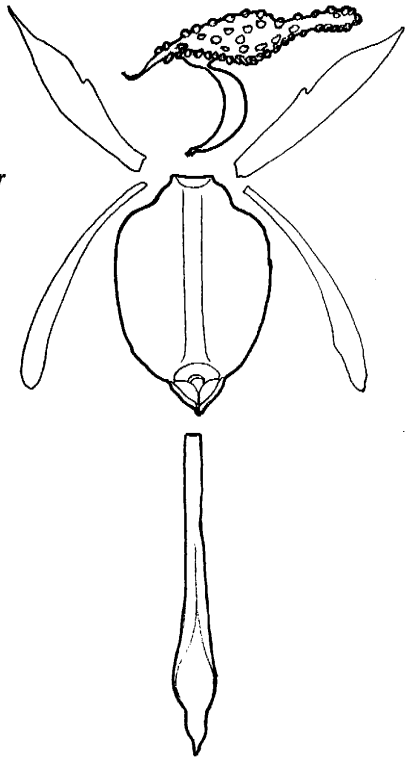
Paracaleana are pollinated by sexually attracted male thynnid wasps which grasp the insectiforme labellum and are tipped back into the inflated column (see Introduction). All South Australian populations of *P. minor* studied have been apomictic, seed being set without transfer of pollinia. Some forms lack pollinia and possess non-functional, degenerate labella. These were once thought to be a separate species [*P. sullivanii*] but may occur randomly in any population of *P. minor* and are no longer regarded as distinct. Accidental insect visitors such as beetles are sometimes found in *Paracaleana* flowers but are not regarded as pollinators.

The Western Australian *P. nigrita* and some populations of *P. minor* in the eastern States are pollinated by sexually attracted male thynnid wasps but wasps have not been observed on flowers in South Australia.


95 96

A. Leaf linear; whole labellum tuberculate (Fig. 95) . . *P. minor* 1.

A. Leaf ovate; base of labellum smooth, only distal half tuberculate (Fig. 96) . . . . . *P.* aff. *nigrita* 2.



Paracaleana minor

1. **P. minor**. *Small duck-orchid.* Plate 72

The name *minor* (smaller), refers to the size of the plant when compared with *Caleana major* (the large Duck-Orchid). (Until 1972 the small Duck-Orchid was known as *Caleana minor*).

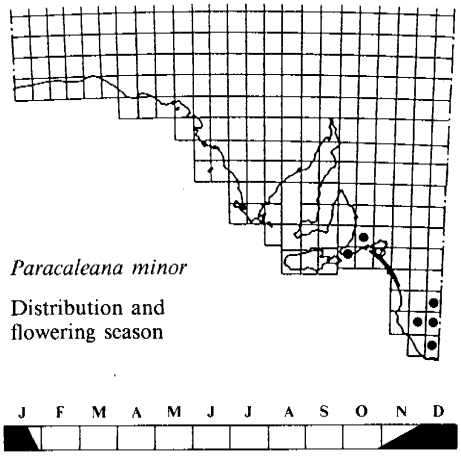
Small, slender, reddish, wiry, less than 20 cm high; leaf reddish, linear-acuminate, about half the height of the scape. Flowers from one to several, red-brown and green with dorsal sepal slightly longer than the petaloid column which is spreading above it and less than 1 cm long; petals narrow-linear, incurved against sides of column, about 1 cm long; lateral sepals wider than petals and directed forwards. Labellum on a broad and curved strap-shaped irritable claw, erect, about 6 mm long, central oval part tapering into a bifid apex, outer surface closely covered with dark-purple tubercles, these larger towards the margins; column with greatly inflated wings open above as a bowl into which the irritable labellum fits when sprung.

Rarely found. Forms small colonies, mostly in white sandy soils in *Eucalyptus baxteri* (brown stringybark) forest in open places. Flowers more freely after bushfires. More common in Queensland, New South Wales, Victoria and Tasmania.

It has not proved amenable to cultivation in Adelaide but there have been reports of success in the eastern States with plants grown in a coarse sandy mix and kept under cover.

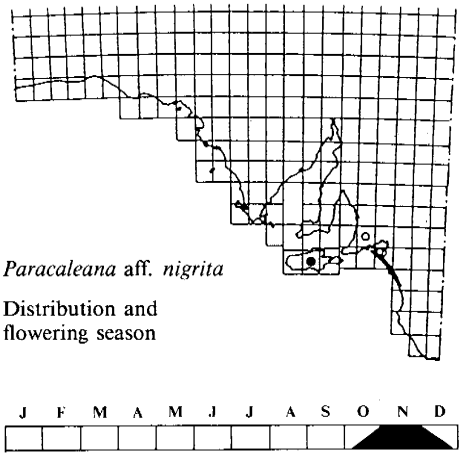
2. **P.** aff. **nigrita.** Plate 73

The name *nigrita* (blackened) refers to the black tip to the labellum of this species. The purplish leaf also dries very dark.



Paracaleana minor

Distribution and flowering season



Paracaleana aff. *nigrita*

Distribution and flowering season

Tiny, slender, purplish, less than 10 cm high; leaf ovate, suberect. Flowers one or two, orange-brown, green and black, the dorsal sepal linear and slightly larger than the bowl-shaped column above it, about 1 cm long; lateral sepals linear, falcate, spreading on either side of the column; petals linear, about as long as the column; labellum on a broad S-shaped irritable claw, erect, flat, orange-brown, smooth basally, the apical one-third black with raised tubercles, the division between the pale base and the dark apex quite distinct.

Very rare, in patches of damp bare sand around swamp margins, associated with stunted stringy bark (*Eucalyptus baxteri*). Collected once near Ashbourne and in 1986 on Kangaroo Island. Also in Western Australia. Differs from *P. nigrita* in its distinctly bicoloured labellum with its flatter surface. *P. nigrita* has tubercules extending over much of the labellum and not just confined to the apex. The two are apparently pollinated by different wasp species.

Not known in cultivation.

CALOCHILUS

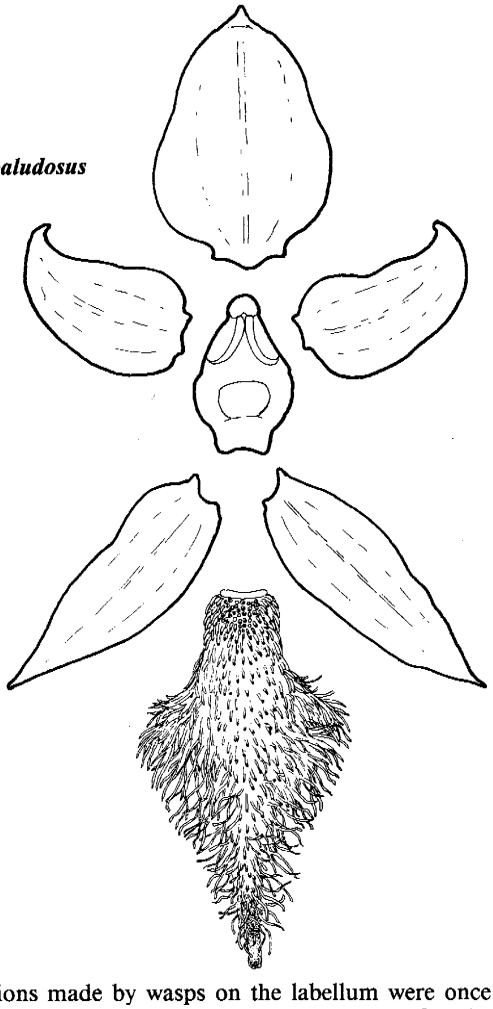
Beardies

The name *Calochilus* is derived from *kalos* (beautiful), *cheilos* (lip) and refers to the conspicuous labellum which is usually ornamented with colourful glands and densely bearded with long hairs having a metallic sheen.

Glabrous plants with narrow ovoid tubers; leaf linear, channelled, erect, sheathing the scape and with a few leaf-like bracts. Flowers few to numerous, resupinate; perianth-segments free; dorsal sepal broad and hooded; lateral sepals and petals broad-lanceolate, somewhat spreading or falcate. Labellum large, sessile, undivided, with an oblong base and triangular lamina usually densely bearded with long hairs. Flowers not scented.

Although principally self-pollinated, flowers may be visited by male scollid wasps (*Campsomeris*) which are apparently sexually attracted to the flowers and attempt to copulate with the hairy labellum. The female scollid wasp is larger and hairier than the male and the orchid labellum could represent a female wasp. The eye-like glands at the base of the column may further enhance the insect like appearance. Wasp visitors transfer only a small part of the pollinia allowing self-pollination to continue and therefore only a small amount of outcrossing is accomplished.

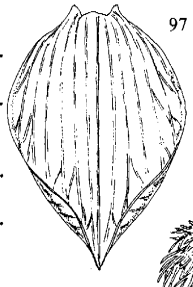
Calochilus paludosus



The probing motions made by wasps on the labellum were once interpreted as stinging movements. The possibility was considered that the wasps were females mistaking the labellum for a hairy caterpillar in which to lay their eggs and therefore pseudo-parasitising it. It is now believed that only stingless males visit the flowers and the probing movements are interpreted as a part of the wasp's sexual behaviour.

A. Labellum bearded (Figs 99–103) . . B.
A. Labellum glabrous (Fig. 97) . . . . . *C. imberbis* 2.

B. Two glands at the base of the column (Figs 102 & 103) . . . . . C.
B. No glands at the base of the column (Fig. 98) . . . . . *C. paludosus* 3.



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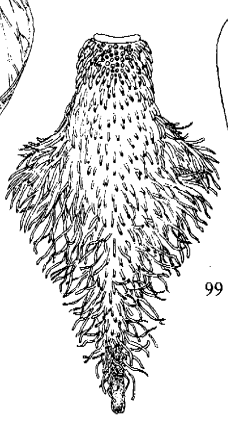
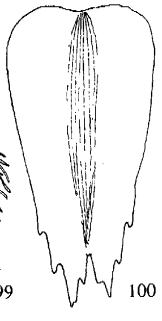
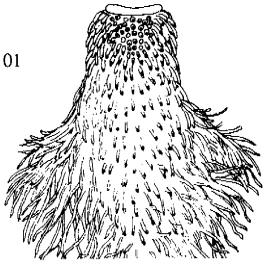




99 100



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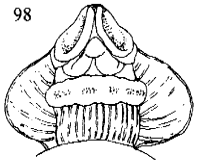

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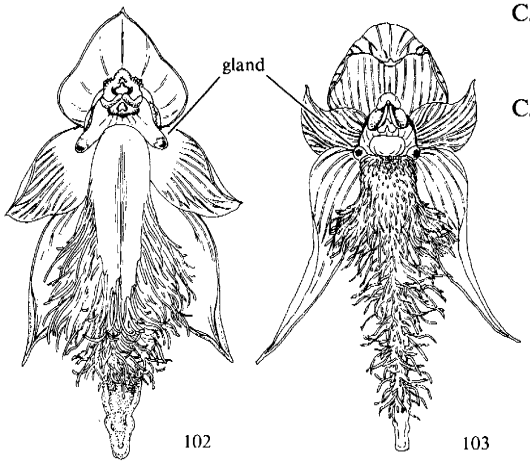


C. Base of the labellum with 2 longitudinal glabrous plates (Fig. 100) ..... *C. campestris* 1. (Fig. 102)

C. Base of the labellum covered with purple callus-like glands (Figs 99 & 101) *C. robertsonii* 4. (Fig. 103)

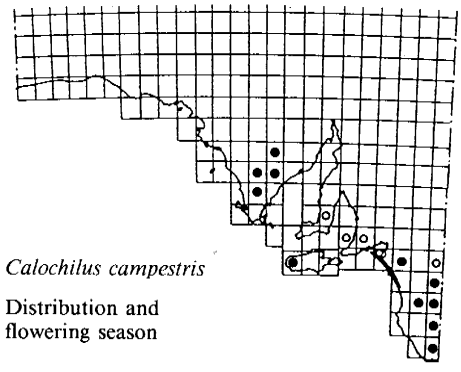
1. **C. campestris** (*C. cupreus*). *Copper beard-orchid.* Plate 74

The name *campestris* (pertaining to plains or flat areas) refers to the habitat of the species.

Small to robust; scape to 60 cm tall; leaf erect, narrow-lanceolate, glaucous or green with a red base to 15 cm long or often reduced to a 2 cm long bract-like leaf. Flowers 1–10, 1–2 cm in diam., yellow-green and red-brown, dorsal sepal broadly hooded over the column; lateral sepals larger than petals and embracing the labellum rather than spreading. Labellum fleshy, rectangular at the base with 2 thick shining-blue raised longitudinal ridges, the triangular golden-yellow lamina of the lower part covered with long reddish-blue or purple hairs and ending in a short strap-like process. At the base of the column are 2 distinct eye-like swellings. Flowers self-pollinated and short lived.

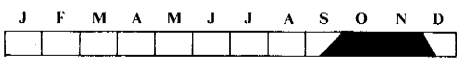
Rare in South Australia. Chiefly found on leached sandy plains amongst low heath. From swamp margins to dry mallee. Also occurs in New South Wales, Victoria and Tasmania.

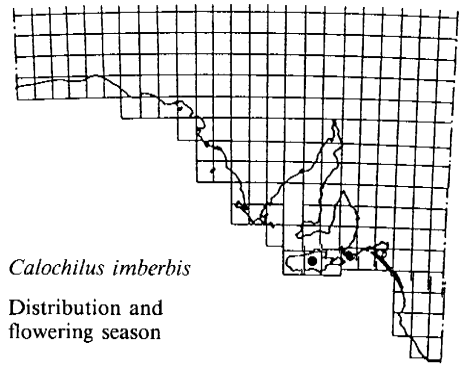
Of variable habit. Some forms have a large basal leaf, other almost leafless forms have swollen rhizome-like roots (the form usually encountered in South Australia) these have been at times referred to by different names (*C. herbaceous* or *C. saprophyticus*). Plants first found in South Australia (near McLaren Vale in 1910) were named as *Calochilus cupreus* by R.S. Rogers.



Calochilus campestris

Distribution and flowering season





Calochilus imberbis

Distribution and flowering season

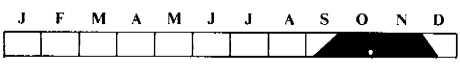
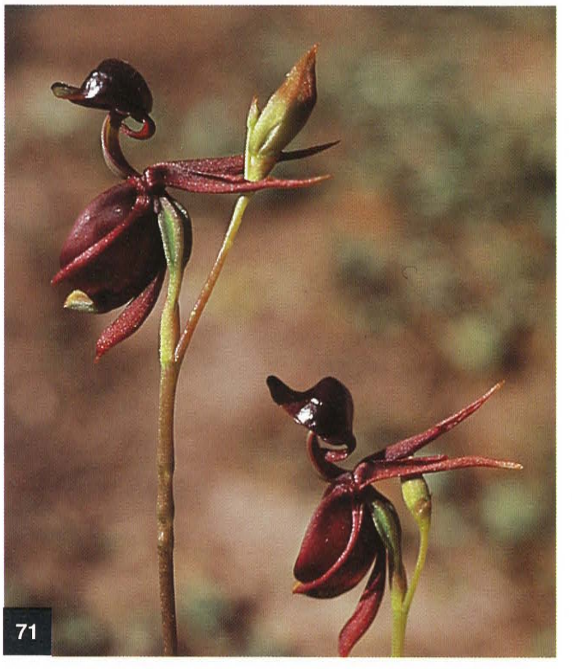


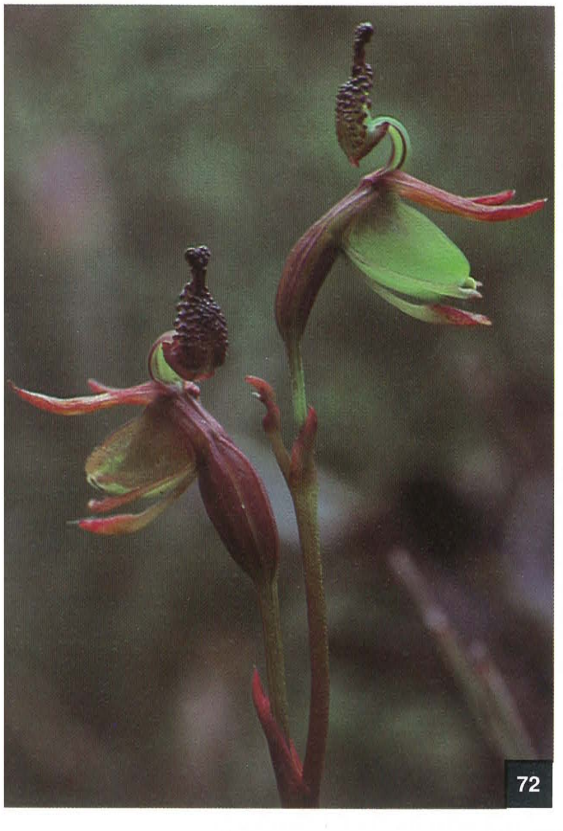
Plate 66. *Caladenia toxochila* on a rocky slope in the Flinders Ranges.

Plate 67. *Caladenia* x *tutelata* photographed near Anglesea in Victoria.

Plate 68. *Caladenia* x *variabilis* from the south-east of South Australia. Several forms of *C. patersonii* cross with *C. cardiochila* to produce variable plants such as these.

Plate 69. An unnamed species of *Caladenia*, similar to *C. hastata*. Photographed in coastal sandhills near Robe.





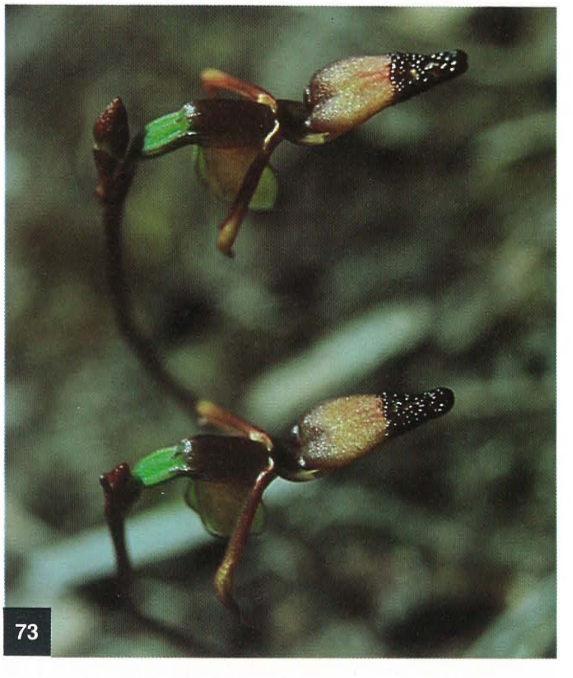
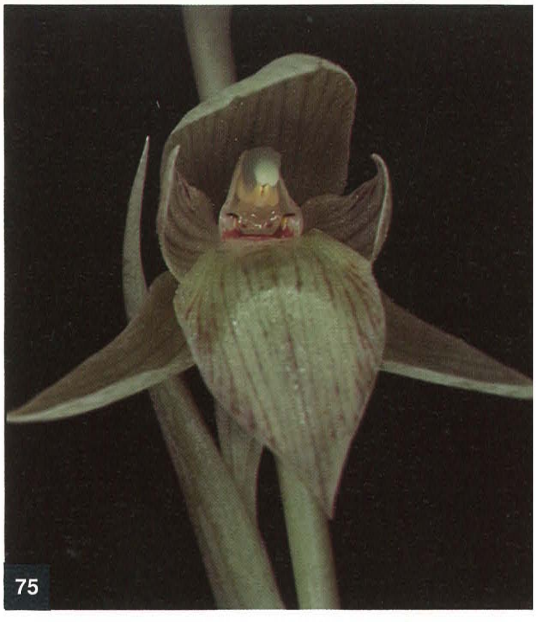


Plate 70. 'Flying Ducks' *Caleana major* growing in sand amidst low bracken, in the Adelaide Hills.

Plate 71. Close up of *Caleana major* flowers. When viewed from the side they do indeed resemble flying ducks.

Plate 72. The lesser flying duck-orchid *Paracaleana minor*. This Adelaide Hills form has larger ovaries than eastern State plants.

Plate 73. This apparently unnamed species of *Paracaleana* from Kangaroo Island closely resembles *P. nigrita* from Western Australia.



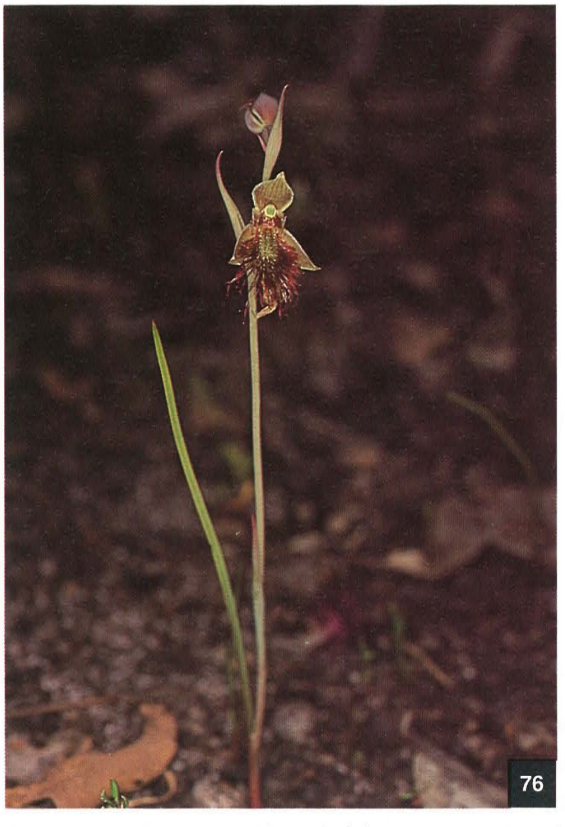


Plate 74. This bearded orchid *Calochilus campestris* was photographed on Kangaroo Island. The eye-like glands at the base of the column enhance the appearance of a bearded face.

Plate 75. *Calochilus imberbis* is generally considered to be a freak form of *C. robertsonii* in which the labellum lacks the usual beard-like glandular processes.

Plate 76. *Calochilus paludosus* the swamp beard-orchid has a much narrower leaf than the other South Australian species. This one grew in peaty sand near Penola in the South-east.

Plate 77. *Calochilus paludosus* has a distinctly coppery sheen to its beard and lacks the eye-like glands at the column base.

Plate 78. *Calochilus robertsonii* is the common beard-orchid of the Adelaide Hills.

Plate 79. *Chiloglottis cornuta* is very rare in South Australia where it usually has wholly green flowers.

Plate 80. *Chiloglottis gunnii* occurs naturally in southern Victoria near the South Australian border.

Plate 81. *Chiloglottis trapeziformis* is rare in South Australia being known only from 1 colony in pine forests in the lower south-east.

Plate 82. *Corybas despectans* is the most widespread helmet orchid in South Australia. It often forms large colonies like this one in the Barossa Valley. This is a very dark coloured form.

Plate 83. The tiny flowers of this *Corybas despectans* from the south-east of South Australia can be seen to hug the leaf.

Plate 84. *Corybas despectans*—the seed pod is up to 30 cm above the leaf. This is a feature of most *Corybas*.

Plate 85. This unnamed species is closely related to *Corybas despectans* but has widely opening flowers and a broader hood. These were in foreshore dune hollows on southern Eyre Peninsula.

Plate 86. A group of *Corybas diemenicus* jostling for light and space on a fallen gum leaf in the Adelaide Hills. The gum leaf highlights the diminutive nature of helmet orchids.

Plate 87. The extremely rare *Corybas fordhamii* photographed in moss under a swamp-grass tussock the southern Mount Lofty Range.

Plate 88. *Corybas incurvus* in a dark gully of the southern Flinders Ranges. It shows the distinctly incurved labellum margins.

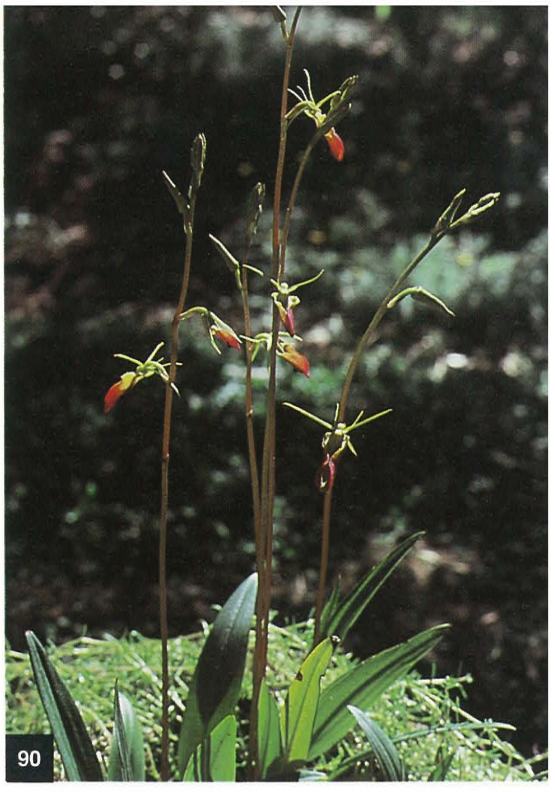
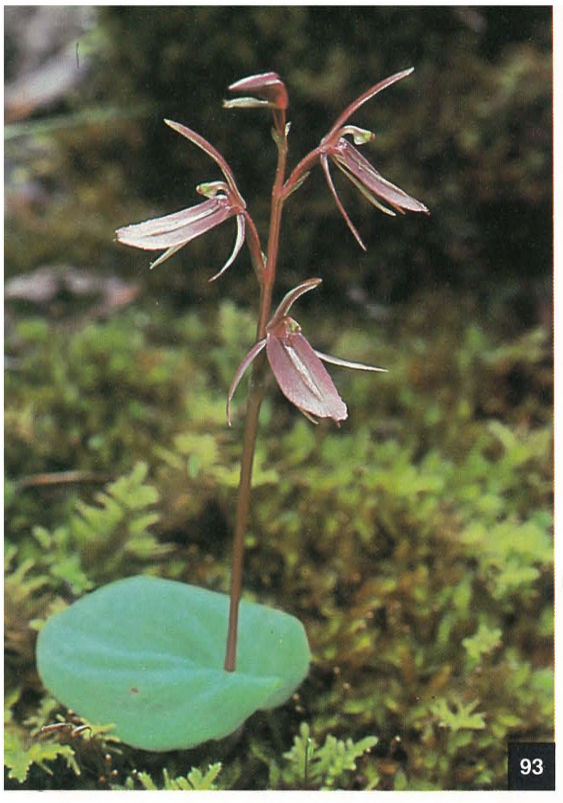


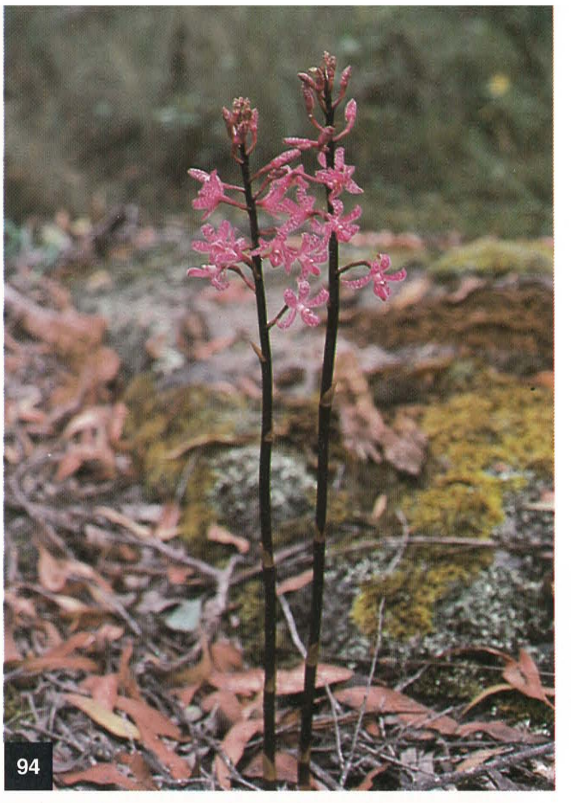
Plate 89. *Corybas unguiculatus* in sandy open woodland of the southern Mt Lofty Ranges.

Plate 90. *Cryptostylis subulata* in a sunny glade on the edge of an Adelaide Hills swamp thicket.

Plate 91. Single flower of *Cryptostylis subulata* showing the inverted labellum with dark red projection below.

Plate 92. Flower of *Cyrtostylis reniformis* showing the ribbon of nectar on the labellum and paired glands at its base.





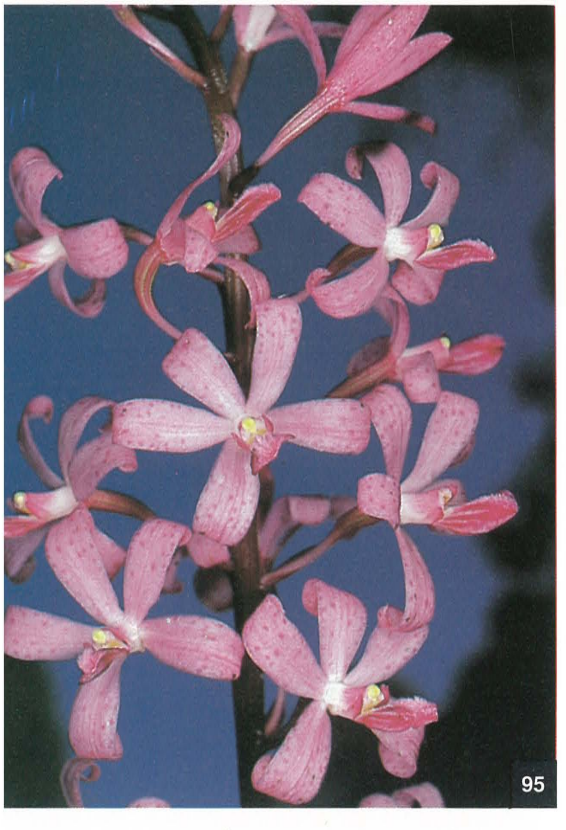
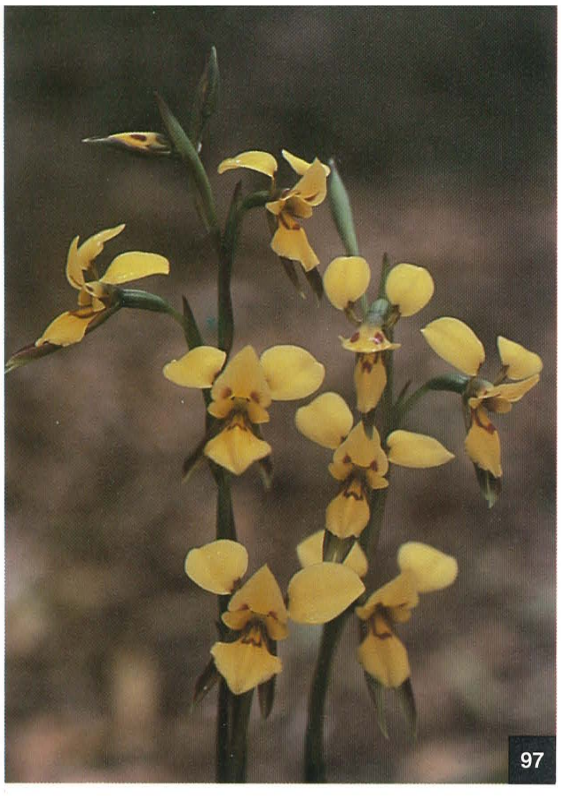


Plate 93. *Cyrtostylis robusta* from southern Yorke Peninsula.

Plate 94. A dark stemmed form of *Dipodium punctatum*, the leafless summer-flowering, hyacinth-orchid from the Adelaide Hills.

Plate 95. Close-up of a spike of *Dipodium punctatum*, showing the faint spotting of flowers in the common form.

Plate 96. An unnamed 'form' of *Dipodium punctatum* from sandy open forest near Naracoorte showing pale flowers with dark spots and a spathulate labellum.



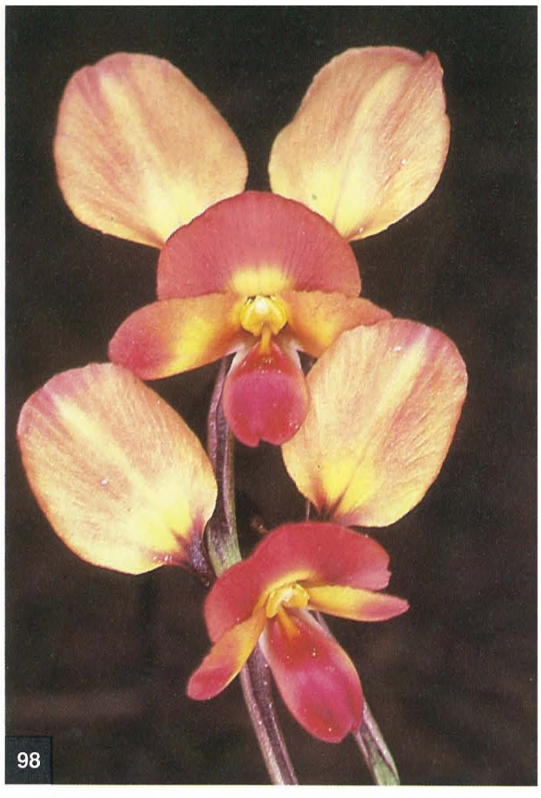


Plate 97. *Diuris brevifolia* a late flowered donkey-orchid endemic to South Australia. This group from the Adelaide Hills shows the typical dark spots at the base of the dorsal sepal.

Plate 98. *Diuris corymbosa* from the Adelaide Hills. The South Australian form has a suffused blend of colour (which suggests the common name 'wallflower diuris').

Plate 99. The rare hybrid *Diuris* x *fastidiosa* was photographed in the Flinders Range. Note the upturned labellum.

Plate 100. *Diuris lanceolata* (*D. behrii*) photographed in the Adelaide Hills. Note the horizontal petals and broad labellum of this species.

Plate 101. This richly coloured hybrid, *Diuris lanceolata* x *corymbosa* in the hills near Adelaide, was first recorded some 60 years ago.

Plate 102. The strongly marked Adelaide Hills form of *Diuris maculata.*

Plate 103. *Diuris maculata* South-east form.

Plate 104. *Diuris* x *palachila* this hybrid from the Adelaide Hills has *D. maculata* as one parent and *D. behrii* (*D. lanceolata*) as the other.

Plate 105. *Diuris palustris* growing in the dry loamy soils which it favours. Note the many wiry leaves and short stems.

Plate 106. Close-up of a *Diuris palustris* flower from the Flinders Range.

Plate 107. *Diuris punctata* has not been collected in South Australia this century. This, the common form of the species was photographed in western Victoria.

Plate 108. *Diuris sulphurea* from near Penola in the south-east. This species with its thick-textured flowers is uncommon in South Australia.

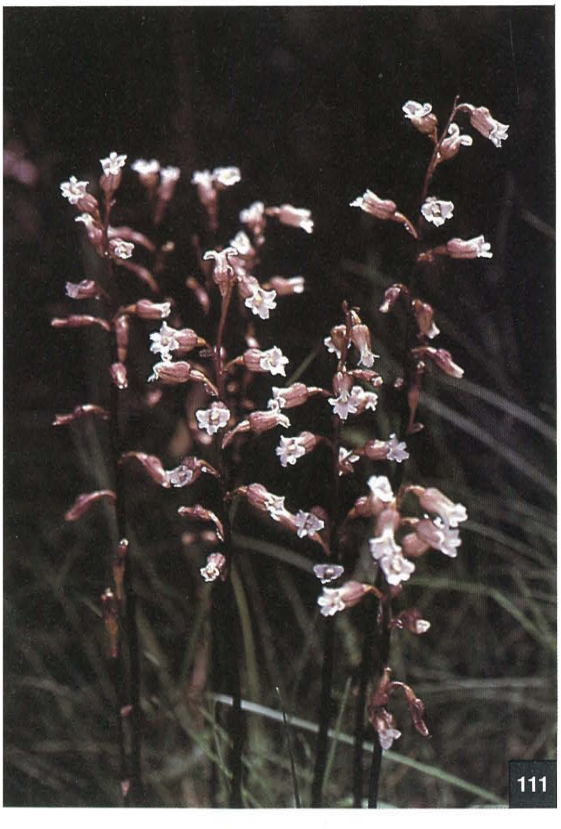


Plate 109. A group of *Eriochilus cucullatus* in the Adelaide Hills. The flowers appear in autumn before the leaves.

Plate 110. *Eriochilus cucullatus* flower from the upper south-east.

Plate 111. *Gastrodia sesamoides* 'cinnamon bells' in a grassy glade in the Adelaide Hills.

Plate 112. *Gastrodia sesamoides* showing the characteristic bend in the scape below the unopened flowers.

Plate 113. *Glossodia major* growing in the shelter afforded by a fallen sheoak branch near Adelaide.

Plate 114. *Glossodia major*. Note the contrasting white boss on the labellum of these flowers and the yellow notched appendage at its base below the hooded column.

Plate 115. *Leporella fimbriata*. These rain splashed flowers show reflections of the photographer's ring-flash in every drop.

Plate 116. After a bushfire *Lyperanthus nigricans* flowers en masse on bare ground in the Adelaide Hills.

Plate 117. *Lyperanthus nigricans* flower showing its contrasting stripes of maroon and white.

Plate 118. A dense colony of *Microtis atrata* flowering on the edge of a small lagoon on Kangaroo Island.

Plate 119. *Microtis atrata* showing the tiny (1 mm wide) flowers on comparatively large (2 mm wide) ovaries.

Plate 120. *Microtis orbicularis* showing two colour forms growing together in a lagoon on Kangaroo Island.

Plate 121. Part of a flower spike of *Microtis parviflora* in a grassy meadow in the Adelaide Hills. Note the tiny labellum.

Plate 122. Section of flower spike of *Microtis rara* in the Adelaide Hills showing the sparse flowers with their very long labella.

Plate 123. Spike of *Microtis unifolia*, the common onion orchid. Note the bilobed labellum of this Flinders Range specimen.

Plate 124. Flowers of *Orthoceras strictum* the horned orchid showing 3 colour forms commonly occurring in the Adelaide Hills.

Plate 125. Close-up of *Orthoceras strictum* with the typical crucifix mark on the fleshy labellum.

Plate 126. *Prasophyllum australe* in a swamp near Mt Compass. A flower spider having adopted the colours of the orchid flower, waits, camouflaged, to dine on visiting insects.

2. **C. imberbis**. *Naked beard-orchid, beardless calochilus.* Plate 75

The name *imberbis* (beardless) refers to the glabrous labellum.

Slender to robust with few to 10 flowers. Flowers to 2 cm in diam., green and purple, segments falcate, spreading except the dorsal sepal which is slightly hooded over the column. The simple, petaloid, sessile, ovate labellum, 10–14 mm long and 6–8 mm wide, has entire margins with a concave and incurved lamina, sometimes with conspicuous purplish nerves. It is glabrous and entirely devoid of glands, papillae or hairs.

Usually found with normal plants of *C. robertsonii* (and is thought to be a semipeloric form of the latter), generally only as single isolated specimens and rare throughout its wide range which includes Victoria and Tasmania.

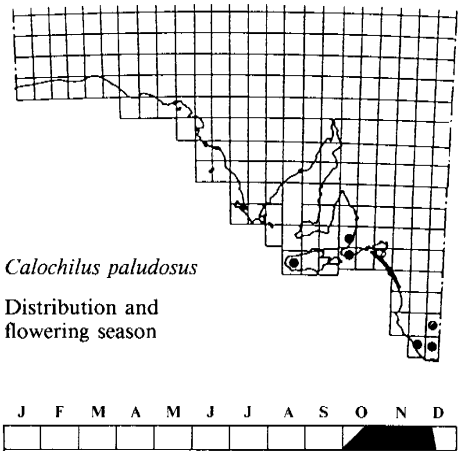
3. **C. paludosus**. *Red beard-orchid.* Plates 76 and 77

The name *paludosus* (marshy or swampy) refers to the favoured habitat of the species.

Slender to 30 cm high; leaf small, linear, green with a red base. Flowers 1–4, rarely more, to 2 cm in diam., yellow-green and marked conspicuously with red veins, greenish outside; segments broad-lanceolate, falcate, spreading except for the incurved and hooded dorsal sepal. Labellum covered with long reddish hairs, which are reduced towards the broad rectangular base into small linear and rounded glands; apex extended into a flexuose strap-like appendage. Column without basal glands. Flowers not scented, self-pollinated.

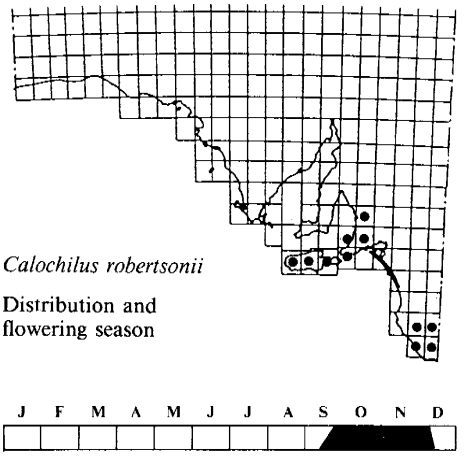
Found around sandy swamp margins and in low heath under *Eucalyptus baxteri* and *E. ovata*, but very rare in South Australia. In the Mt Lofty Ranges it has been collected only twice from Fleurieu Peninsula and collected for the first time on Kangaroo Island in 1986. More common in New South Wales, Victoria and Tasmania.

In cultivation has not been very successful, generally flowering once then dying.



Calochilus paludosus

Distribution and flowering season



Calochilus robertsonii

Distribution and flowering season

4. **C. robertsonii**. *Common beard-orchid.* Plate 78

Named by G. Bentham (1873) in honour of John George Robertson (1803–1862), a Victorian pastoralist, botanist and plant collector.

Usually robust, 10–45 cm high; leaf long, narrow-lanceolate, distinctly channelled and keeled and inclined to be fleshy, often glaucous. Flowers few to several, green and purplish inside, greenish outside, 2–3 cm diam.; segments rather spreading and falcate not enclosing the large labellum, dorsal sepal slightly hooded over the column. Labellum densely bearded with long purple or bronze, glistening glandular hairs which are reduced towards the fleshy rectangular base into purple callus-like glands; the tip extended into a short glabrous ribbon. Column short, widely winged with 2 small eye-like glands at its base. Flowers self-pollinated.

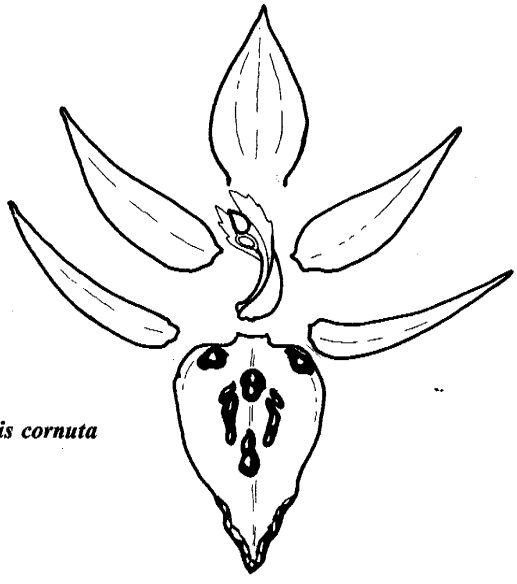
Common throughout its limited South Australian range in a variety of habitats from open forest and heavily timbered ridges and slopes to swampy heath and creek-banks. Occurs in all States except the Northern Territory. Also in New Zealand.

Semi-peloric plants in which the labellum is replaced with a petaloid unadorned segment are sometimes regarded as a separate species *C. imberbis*.

Often tried in cultivation but has generally been short lived.

CHILOGLOTTIS

Bird-orchids



Chiloglottis cornuta

The name is derived from *cheilos* (lip), *glottis* (the opening into the windpipe), alluding to the resemblance of the labellum to the human glottis.

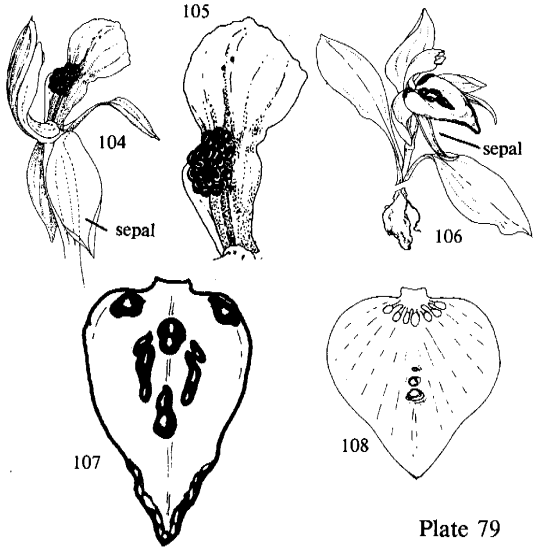
Glabrous, single flowered plants with a pair of opposite radical leaves and small underground tubers; scape short and stout at flowering, but elongating when in fruit. Flower resupinate, relatively large for the plant; segments free and spreading, sepals larger than petals. Labellum differentiated, bearing distinct calli. Column slender with large wings distally and terminating in an anther with 2 cells and 4 granular pollinia.

The ornate glands or calli on the labellum are thought to represent imitation female wasps (*Neozeleboria* spp.) which are wingless and much smaller than the males. It is suggested that the flowers also produce a pseudopheromone (similar to the sex pheromone produced by the

female wasps) to attract the winged male wasps which attempt to fly off with the (decoy) labellum and are tipped against the column to receive the pollinia on their head or thorax. Flowers are not perfumed (as far as human senses can detect) and provide no nectar. *Chiloglottis cornuta* (at least in this State) is self-pollinated. Once seed begins to set, the scape elongates, placing the seed capsule up to 20 cm above the ground. This helps to disperse the fine wind-blown seed.

A. Sepals spreading (Fig. 106); labellum ovate (Fig. 108) ..... B.
A. Sepals reflexed against the ovary (Fig. 104); labellum rhomboid (Fig. 105) ..... *C. trapeziformis* 3.

B. Flowers pale-greenish, not opening wide (Fig. 106); labellum narrowly ovate with variable calli (Fig. 107) ..... *C. cornuta* 1.
B. Flower purplish-brown or tinted with green, opening freely; labellum broadly-ovate (Fig. 108), dark coloured, waxy with a large thick sessile gland near the centre ..... *C. gunnii* 2.



1. **C. cornuta**. *Green bird-orchid.* Plate 79

The name *cornuta* (-horned or horn-shaped), refers to the curved petals.

Wholly green plant to 5 cm tall; leaves paired, ovate-lanceolate, 3–8 cm long, usually half buried in moss or leaf litter. Flower single, usually green marked with red; about 2 cm diam., set just above ground level; dorsal sepal hooded over the column; lateral sepals linear, recurved or reflexed; petals larger, falco-lanceolate, usually spreading or incurved. Labellum ovate, on a claw about 7 mm long, ornamented with variously shaped sessile calli. Flowers are not scented and appear to be self-pollinated.

Very restricted in its South Australian range, forming small colonies in deep moss (especially in *Sphagnum*) or damp leaf litter around bogs, and invading pine forests near Mt Gambier before the devastating bushfires of 1983.

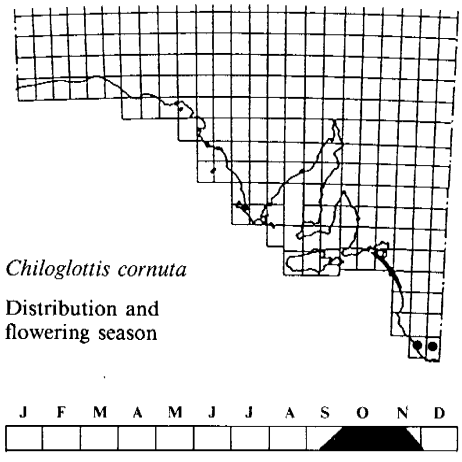
Most South Australian specimens have wholly green, rather small flowers. In the eastern States flowers are larger (to 3 cm diam.) with red tipped labellum and calli.

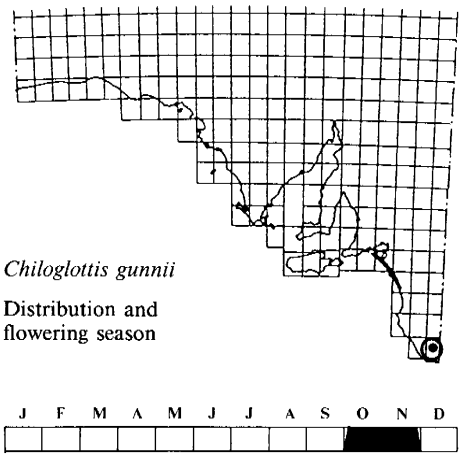
Difficult to cultivate under Adelaide's climatic conditions but has been successfully grown in cooler districts. Requires very cool, moist, constantly shaded conditions such as provided by living sphagnum moss.

2. **C. gunnii**. *Common bird-orchid.* Plate 80

Named (in 1840) by J. Lindley a British botanist, in honour of Ronald Campbell Gunn (1808–1881) a British Army Officer, Australian Parliamentarian, Magistrate, Botanist and collector.

Short but stout, 5–8 cm high; leaves large to 10 cm long, petiolate, ovate, dark blue-green, spreading on the ground. Flower deep reddish-brown and green sometimes wholly purple-





brown, about 3 cm diam.; dorsal sepal broadly lanceolate, erect then incurved over the column; lateral sepals narrow-lanceolate recurved or reflexed; petals larger, lanceolate falcate spreading. Labellum large, broadly ovate more than 1 cm long, on a very short claw, reddish-brown to brown, usually with a long, erect stalked callus near the base and a large sessile one near the centre, sometimes with a few small glands on either side of the lamina.

Occurs in New South Wales, Victoria (as far west as the Glenelg River) and Tasmania and probably introduced in South Australia near Mount Burr, where established in native pine forest. A 1932 collection from Cape Jervis (Mt Lofty Ranges) is of doubtful validity. Favours wooded or forested country from cool shady lowlands to alpine areas.

Commonly cultivated but needs to be kept very cool and slightly moist for some months after flowering (usually October in Adelaide) to ensure formation of new tubers.

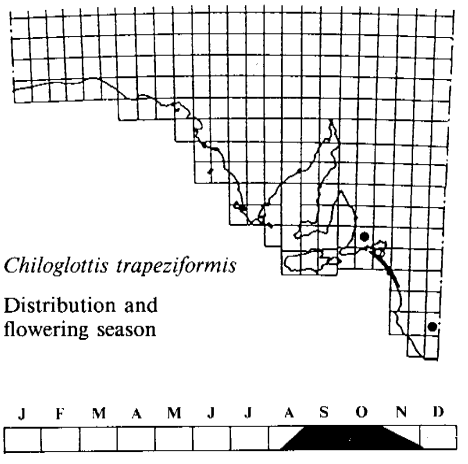
3. **C. trapeziformis**. *Dainty bird-orchid, broad-lip bird-orchid.* Plate 81

The name *trapeziformis* (shaped like a trapezium) refers to the labellum.

Slender, pinkish or red, often to 10 cm high, leaves oblong-lanceolate, 4–6 cm long with undulate and crisped margins held flat on the ground and narrowed at the base into a petiole; flowers reddish, usually about 15 mm across, held well above the leaves; dorsal sepal narrow, incurved over the column; lateral sepals linear, recurved; petals much broader, reflexed against the ovary; labellum on a short claw, trapezoid or rhomboid, 6–8 mm long, red or red and green with several globular, dark coloured calli clustered chiefly in the centre near the base.

Only known from one locality near Comaum in the South-east where it occurs in a mature *Pinus radiata* plantation. Growing in deep leaf litter and possibly introduced. Forms small colonies by vegetative increase. Occurs in Queensland, New South Wales, Victoria and Tasmania.

The species is commonly cultivated and does well in a light soil mix with plenty of organic material. Needs to be kept cool and shaded during the growing period (April–November). Recently introduced to pine forests in the Adelaide Hills.



CORYBAS

Helmet-orchids

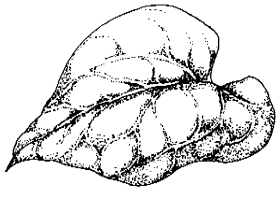
The name is derived from *korybas* (drunken man; one of the dancing priests of Phrygia), and probably refers to the sepals which resemble a veiled drooping head, an allusion possibly to a priest's head-dress or to the stoop of a drunken man.

Dwarfed glabrous plants with a single ovate-cordate or orbicular leaf and small globular tubers. Flowers single, unscented, relatively large in comparison to the plant, purplish, with differentiated perianth-segments, not resupinate; dorsal sepal erect then incurved and hooded over the column; lateral sepals and petals, linear-filiform, insignificant, colourless, ribbon-like. Labellum large, tubular at the base and enclosing the column, lamina often broadly expanded towards the orifice, distal margin smooth, denticulate or fringed, straight, recurved or incurved. Column short, fleshy, terminating in a 2-celled anther with 4 granular pollinia. After flowering the scape elongates rapidly up to 30 cm high, probably to aid in dispersal of the very fine, wind-borne seed. Over 100 species distributed from Japan to the Subantarctic.

Corybas are sapromyophilous (pollinated by fungus flies) the flowers being possible fungus mimics. They look like small purple toadstools, even having the labellum veined in a gill-like effect in some species and usually growing in cool moist places, flowering in winter when most fungi fruit. There is occasionally a fungus-like odour about the flowers. The pollinating flies can sometimes be seen looking like tiny fire-flies, with bright-yellow orchid pollinia attached to them like miniature headlights as they flit about in the dark places where the *Corybas* grow. Fungus flies have been observed to actually lay eggs on the flowers. Pollination is effected in only about 10% of flowers but most species form large colonies by vegetative reproduction.

A. Leaf ovate-cordate (Fig. 109); flowers tubular (Fig. 112)..... B.
A. Leaf orbicular (Fig. 110); flowers not tubular (Figs 117 & 119) ..... C.

109



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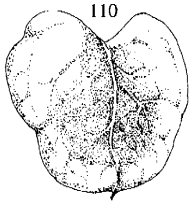

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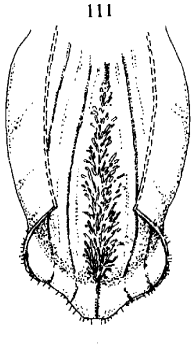

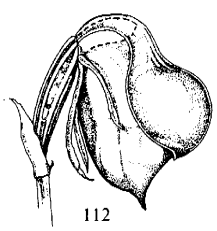

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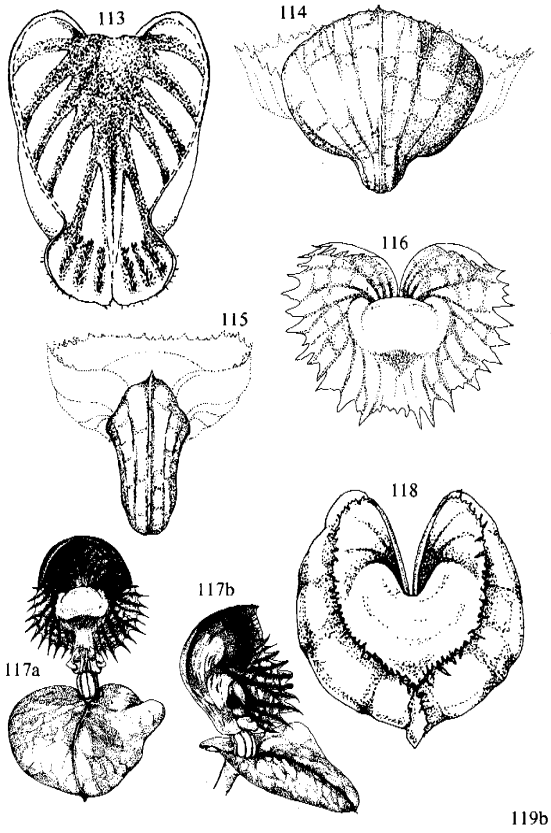


B. Leaf purplish below; labellum wholly purplish with a crest of cilia down the centre towards the base (Fig. 111) ..... *C. unguiculatus* 5. (Fig. 112)

B. Leaf green below; labellum streaked red and white with some cilia at the orifice (Fig. 113) ..... *C. fordhamii* 3.

C. Dorsal sepal 5–15 mm wide (Fig. 114); labellum not trumpet-shaped ..... D.

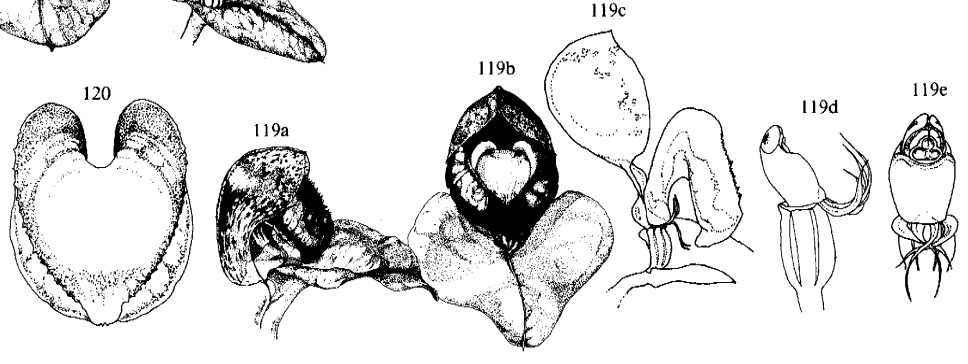
C. Dorsal sepal 2–3 mm wide (Fig. 115); labellum trumpet-shaped ..... *C. despectans* 1.

D. Labellum margins flared (Fig. 116)E.

D. Labellum margins inrolled (Fig. 118) ..... *C. incurvus* 4. (Fig. 119)

E. Labellum margins deeply and regularly dentate (Fig. 116); central boss on the labellum not channelled ..... *C. diemenicus* 2. (Fig. 117)

E. Labellum margins irregularly and slightly crenulate (Fig. 120); central boss on the labellum channelled ..... *Corybas* sp. *B.* 6.



1. **C. despectans**. *Coastal helmet-orchid.* Plates 82–84

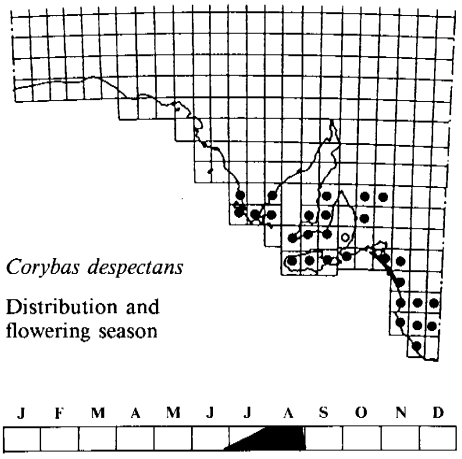
The name *despectans* (looking down upon) refers to the flower which faces into the leaf.

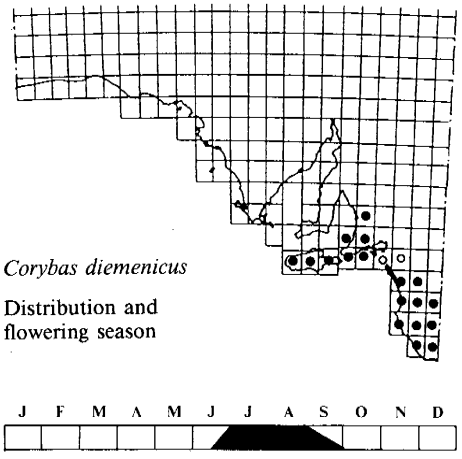
Small plants usually only 1 cm high; leaf orbicular, 1–2 cm long, green and flat on the ground. Flower reddish-purple to maroon and green, 7–12 cm long, squat on the leaf and facing down into it; dorsal sepal narrow, oblong, to 1 cm long but only 2–3 mm wide, greenish-grey with some purple striations, gently incurved over the column, hardly, or not cucullate. Labellum larger, trumpet-shaped, hardly expanding, maroon with a central greenish boss, margins slightly and irregularly denticulate. The flowers are usually self-pollinated and open only briefly.

Widespread and locally common, on travertine limestone and in sand hills near the coast, mainly in the shelter of shrubs and low scrub, rarely inland. Also occurs in Victoria and along the south coast of Western Australia.

Its small size makes it undesirable in cultivation and attempts to grow it have rarely been successful.

Although most *Corybas* in South Australia have a short growing season *C. despectans* has the shortest of all. Leaves appear about mid-June, flowering begins in July and by the time the seed is released at the end of September the leaves have usually senesced. The seed capsule is more strongly ribbed than for other species of *Corybas*.





2. **C. diemenicus**. *Veined helmet-orchid.* Plate 86

The name *diemenicus* is derived from van Diemens Land (now Tasmania) and refers to the location of the type collection.

Dwarf plant to 4 cm high; leaf orbicular-cordate, 15–30 mm long, pale-green above, frosted below, flat on the ground. Flower single, relatively large for the plant, 1–2 cm diam., maroon or reddish-purple, on a short scape so as to be raised just above the leaf and facing slightly upwards; dorsal sepal spathulate-oblanceolate, incurved and broadly hooded over the column. Labellum similarly coloured, lamina broadly expanded, the margins deeply and regularly denticulate, with a large yellowish or white convex, central boss. Very variable in size, colour and width of hood.

Locally common throughout its range and forming small to extensive colonies in sheltered places, often on the southern slopes of hills or in the deep shade of trees or shrubs. Also colonises mature pine plantations. Occurs in New South Wales, Victoria and Tasmania.

Until recently the synonym *C. dilatatus* was commonly used for this species.

This is the easiest and most suitable species for cultivation but like all helmet orchids needs to be kept cool and damp and well shaded, especially at flowering time, the flowers soon desiccating if exposed to drying winds.

3. **C. fordhamii**. *Swamp helmet-orchid.* Plate 87

Named by H.M.R. Rupp (1941) in honour of F. Fordham who collected the types.

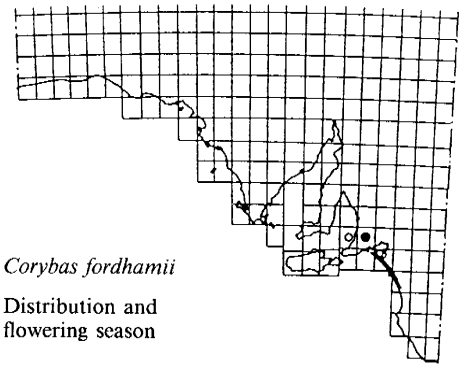
A miniature plant 1–3 cm high; leaf ovate-cordate, to 15 mm long, usually green on both sides with immersed veins. Flower single, reddish-purple on a short pedicel; dorsal sepal to

14 mm long, narrow, obovate, slightly hooded, gradually contracted into a long claw, easily separated from the labellum with which it forms a tube. Labellum purple, shorter than dorsal sepal, on a short claw, lamina with white striations, deeply concave with a tuft of short cilia at the apex; petals and lateral sepals translucent, white, appressed to the labellum.

Very rare in South Australia where it grows in peat bogs hidden under rushes and sedges in permanently damp moss, which is often inundated in winter. More common in the eastern States.

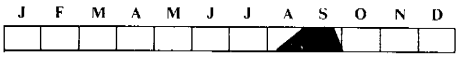
Has not been successfully cultivated in South Australia.

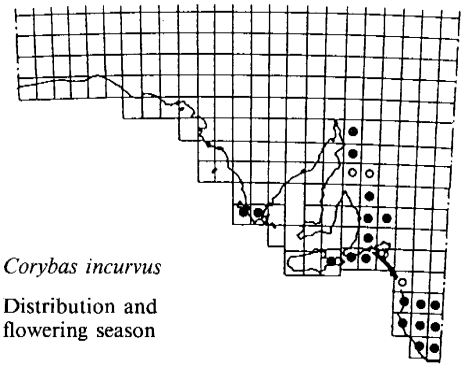
Superficially similar to *C. unguiculatus* which has the leaf red below, and has larger flowers on stouter pedicels and a wholly purple-red labellum bearing a crest of cilia down its centre, inside. *C. unguiculatus* does not inhabit peat bogs. *C. fordhamii* is the latest of the helmet-orchids to flower.



Corybas fordhamii

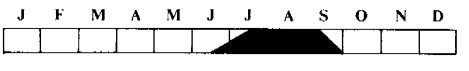
Distribution and flowering season





Corybas incurvus

Distribution and flowering season



4. **C. incurvus**. *Slaty helmet-orchid.* Plate 88

The name *incurvus* refers to the incurved margins of the labellum.

Dwarf plant to 2 cm high; leaf relatively large, orbicular, 3–4 cm across, pale-green above, frosty below. Flower single almost sessile and often facing down into the leaf, red or maroon and greenish, about 2 cm long; dorsal sepal obovate-spathulate, to 1 cm wide, greenish-grey with purple striations or red. Labellum maroon or red, the lamina with serrate margins turned inwards, central boss greenish-white with a U-shaped notch at the top, the lower portion of the labellum attenuated and thrust forward.

Locally common, forming dense colonies in sheltered places, often on southern slopes of rocky hills or in deep shade of trees or shrubs amongst moss. Colonises pine plantations but to a lesser degree than *C. diemenicus*. Also in New South Wales, Victoria and Tasmania.

Most clones do well in cultivation but must be protected from the sun and drying winds. A form from the Adelaide Hills with cherry-red flowers is very popular.

Superficially similar to *C. diemenicus* which often occurs with it but has upright flowers, the labellum margins widely dilated and the central boss on the labellum convex, not channelled. The two species hybridise. Also hybridises with *C. despectans* to produce some interesting self perpetuating forms.

C. incurvus is not as free flowering as *C. diemenicus*.

5. **C. unguiculatus**. *Small helmet-orchid.* Plate 89

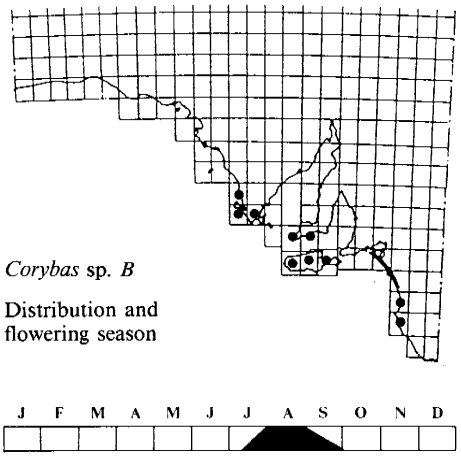
The name *unguiculatus* (clawed) refers to the lower part of the dorsal sepal which is abruptly narrowed into a claw-like base.

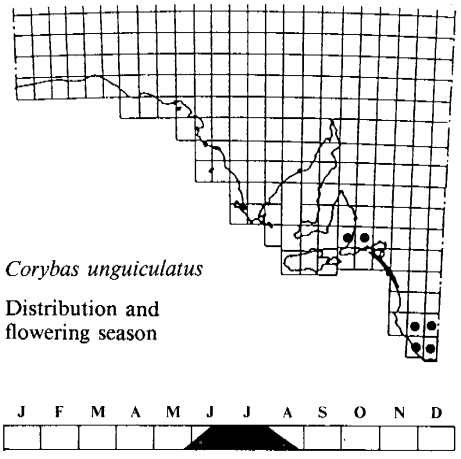
Small plant hardly 3 cm high; leaf ovate-cordate, rather small or to 4 cm long, blue-green above, purplish or greyish streaked with red below, flat on the ground, with immersed veins. Flowers shortly pedicellate to subsessile, wholly deep reddish-purple or rarely pale-pink, 10–15 mm long; dorsal sepal obovate-spathulate, broadly hooded over the column, then abruptly narrowed into a claw and difficult to separate from the labellum with which it forms a tube. Labellum wholly purplish, not streaked, longer than dorsal sepal, tubular, lamina much inflated, ovoid, orifice entire or almost so with a brush-like crest of cilia or linear calli from near the tip down its centre towards the base.

Rare and restricted in the Mount Lofty Ranges but more frequent in the lower South-east. Also occurs in New South Wales, Victoria, Tasmania and possibly Western Australia and New Zealand.

Found in cool, damp, sandy places, usually under bracken in *Eucalyptus baxteri* or *E. obliqua* forest where it forms small scattered colonies. Unlike other helmet-orchids *C. unguiculatus* flowers well after bushfires. This is the first *Corybas* species to flower in South Australia.

Has not proved amenable to cultivation.





6. **C.** sp. **B**. *Dune helmet-orchid.* Plate 85

Miniature plant 1–2 cm high; leaf orbicular, 2–3 cm diam., pale-green both sides but frosted below. Flower 1–1.5 cm in diam., maroon and greenish white, quite erect; dorsal sepal 4–7 mm across, hooded over the labellum, grey-green flecked with red. Labellum conspicuous, widely expanded, the lamina almost flat and roughly circular, pale, greenish-white in the centre, maroon towards the irregularly dentate margins, the centre boss channelled.

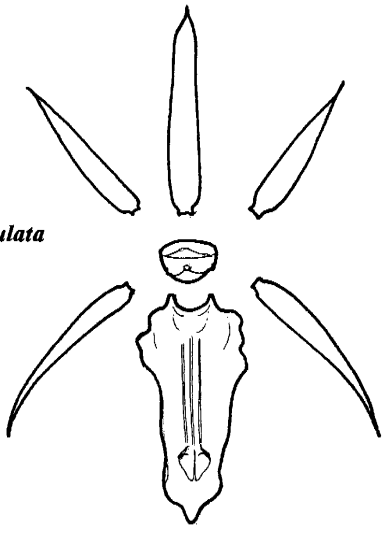
This species was previously thought to be a form of *C. despectans* which has smaller, less colourful flowers nodding down into the leaf and with the labellum lamina hardly expanding. Unlike *C. despectans* this species has insect pollinated flowers.

Forms small, close-packed colonies in sandy soil or in leaf litter on limestone, under the

shelter of low trees and bushes. Probably fairly widespread in sandhills around the coast, usually within 3 kilometres of the sea, often growing with *C. despectans* which generally occupies the harsher, less protected sites. Also along the south coast of Western Australia.

CRYPTOSTYLIS

Tongue-orchids



Cryptostylis subulata

The name is derived from *kryptos* (hidden), *stylos* (column). The column is enclosed in a small chamber formed by the lower part of the labellum.

Glabrous herbs with fleshy root-like rhizomes; leaves usually 2–3, basal and erect on long petioles. Flowers several, not resupinate. Labellum large, variously coloured; sepals and petals similar, rather small and green; column short, wide, winged, with large 2-celled anther and 4 granular pollinia.

About 20 species, most of them occurring in Indo-China, several in the Pacific Islands, 5 in Australia, 1 of these extending to New Zealand.

Male ichneumon wasps (*Lissopimpla semipunctata*) land on the flower and crawl underneath, clasping the labellum with their legs and probing into the column chamber. Wasps may deposit semen as they pseudocopulate with the labellum before collecting the pollinia on the tip of their abdomen. The wasps are common in Adelaide suburbs and it has been observed in cultivation that a single wasp will visit several species without any preference for one over the other. Surprisingly, hybrids are not known to occur in *Cryptostylis* and presumably there exists some internal barrier to prevent cross fertilisation.

1. **C. subulata**. *Moose orchid, (large) tongue-orchid.* Plates 90 and 91

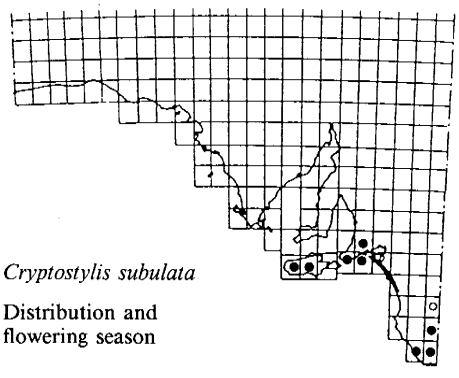
The name *subulata* (awl-shaped) refers to the narrow perianth-segments (excluding the labellum) which taper to a fine point.

Slender, often tall, to 90 cm high; leaves 2 or 3, oblong-lanceolate, to 10 cm long. Flowers 3–8, perianth-segments green, spreading, similar, subulate. Labellum large in comparison, yellow-brown and red, oblong to oblong-ovate, to 2.5 cm long, nodding; margins deeply

reflexed basally forming a swollen pouch around the column; lamina in anterior half with 2 central raised somewhat beaded lines ending in 2 conspicuous reddish-brown glandular processes.

Rare in South Australia and found only near permanent swamps where it forms small colonies. Occurs as far north as Mylor in the Adelaide Hills. Also occurs in Queensland, New South Wales, Victoria, Tasmania and New Zealand.

Unlike most other South Australian orchids *Cryptostylis* are evergreen and need to be kept moist throughout the year.

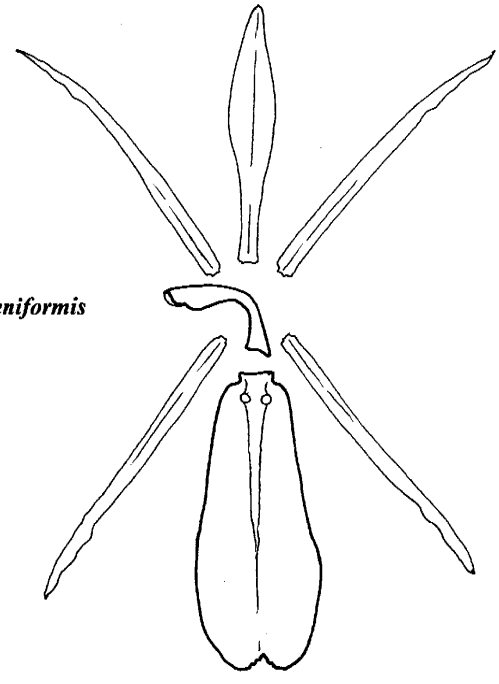


Cryptostylis subulata

Distribution and flowering season

CYRTOSTYLIS

Gnat-orchids



Cyrtostylis reniformis

The name *Cyrtostylis* (swollen column), refers to the fluted enlargement of the column below the stigma.

Small, slender, glabrous; leaf solitary, sessile, orbicular or reniform, green above and below, at the base of the delicate scape which bears an erect raceme of several resupinate flowers. Labellum distinct, immobile, grooved. Column conspicuous, subterete, curved forward and winged near the apex. Pollinia mealy, falcate.

A genus of at least four species one extending to New Zealand.

From the nectary, situated between 2 conical glands at the base of the labellum a sweet liquid runs down a channel almost to the labellum tip. This glistening ribbon of nectar leads visiting insects (usually flies) into position under the projecting arch of the column which curves neatly over the nectary.

A. Plants slender; leaf blue-green; labellum obtuse, spring flowered ..... *C. reniformis* 1.
A. Plants robust; leaf yellow-green; labellum acuminate, winter flowered ..... *C. robusta 2.*

1. **C. reniformis**. *Spring-flowered gnat-* or *mosquito-orchid.* Plate 92

The name *reniformis* (kidney-shaped) refers to the shape of the leaf which is green on both sides and often glistens due to a surface layer of transparent cells, especially below. (Previously known by its synonym *Acianthus reniformis*).

The leaf is blue-green, with raised nerves, quite orbicular and up to 3 cm across, always flat on the ground. Flowers are few, maroon-brown, to 10 mm long and of delicate translucent appearance. The labellum is narrowly oblong, truncate, and almost flat with an obscure longitudinal ridge. Sepals and petals are narrow linear, the dorsal sepal erect behind the fully exposed column which has a pair of small translucent lobes flanking the small but prominent stigma. The flowers are odourless.

Occurs in well forested areas usually on the southern, shaded slopes of hills and also colonising pine plantations. Very common in the Adelaide Hills.

Frequently cultivated but perhaps not as popular as *C. robusta* because of its smaller flowers and habit of blooming in spring when many more showy genera are in bloom. Prefers a cool, well shaded spot.

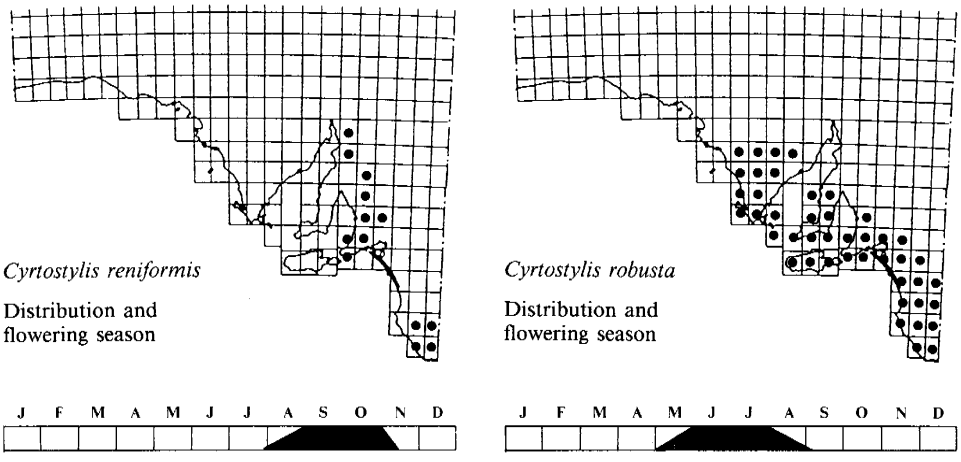
Although at present included under *C. reniformis* it is likely that *C. reniformis* in the strict sense may be confined to the east coast of Australia.

2. **C. robusta**. *Winter-flowered gnat-* or *mosquito-orchid.* Plate 93

The name *robusta* indicates that this is a more robust species than *C. reniformis*, a species under which it was included until 1987.

The leaf is yellow-green, rather flat on the ground, orbicular or somewhat oval-shaped and up to 8 cm long, glistening due to a surface layer of transparent cells especially below. Flowers few to several, red-brown or yellow-green, to 15 mm long with the labellum dominant, oblong, acuminate, with obscure longitudinal ridges and lateral veins, petals and sepals of similar length, linear, acuminate, column semiterete, dilated at each end with globose anther.

Occurs in coastal sandhills, limestone, heathland, mallee-heath, dry rocky places, open woodland or tussock grassland in a variety of soils, often forming large discontinuous colonies. As the name winter mosquito orchid suggests this species blooms well before the other South



Australian *Cyrtostylis*. It tends to favour exposed sites in the Adelaide Hills and is much less common than *C. reniformis*.

Popular in cultivation due to its early flowering; preferring a sheltered spot with some protection from excess rainfall and like *C. reniformis* quickly multiplying to fill a pot when well grown. Also common in coastal Victoria and Western Australia.

DIPODIUM

Hyacinth orchids

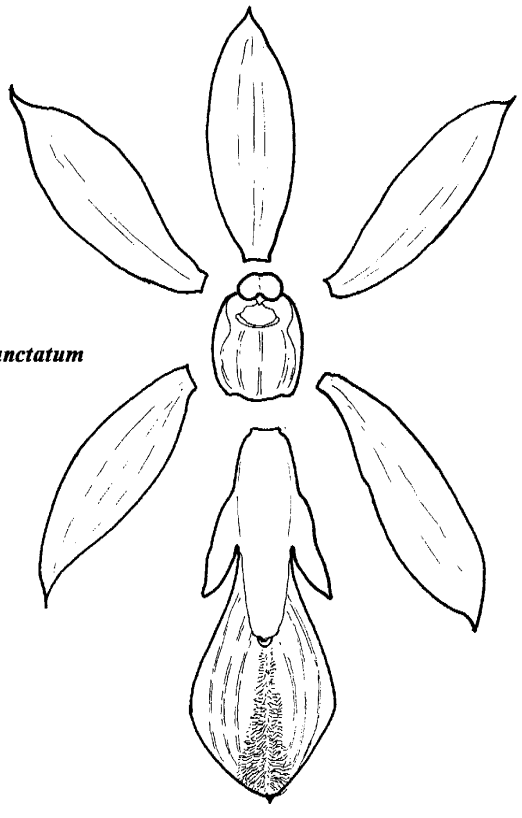
The name is derived from *di-* (double), *podion* (a little foot), and refers to the 2 stipes of the pollinia.

Glabrous, quite robust, the fleshy scape arising from many elongated thick underground rhizomes; leaves scale-like or fully developed. Flowers numerous, not resupinate; perianth-segments free, spreading, similar in form and colouring except for the labellum which is 3-lobed. Column in the horizontal position and terminating in a 2-celled anther with 2 waxy pollen masses, each with 2 spherical lobes, and attached to the rostellum by double stipes; stigma elliptical, below the tip of the rostellum.

At least 20 species; in China, Philippines, Malesia, New Guinea and New Caledonia with about 7 in Australia.

The South Australian species is believed to be a general mimic of nectariferous flowers. Although the flowers themselves provide no nectar there is a shiny yellow patch of tissue on the column which could represent a pseudo-nectary. The flowers also have what could be a vestigial nectar-spur at the base of the labellum. Below each floral bract is a nectariferous gland. Many orchids possess these extra-floral nectaries which are thought to lead ants away from the flowers and thus prevent them from "stealing" the pollinia. Certainly ants are commonly seen feeding on the scape but rarely enter the flowers.

Dipodium punctatum is usually pollinated by native bees, although actual pollination success rates are low, less than 20% of flowers being fertilised. The bees push into the flowers using the furry surface of the labellum to assist them and remove the pollinarium as they withdraw, the sticky viscidium attached to their frons, with the pollinia in a vertical position. The pollinia then fall into a horizontal position where they contact the stigma of the next flower visited and are pulled away.



Dipodium punctatum

1. **D. punctatum.** *Hyacinth orchid, Christmas orchid.* Plates 94 and 95

The name *punctatum* (dotted or spotted) refers to the spotted perianth-segments of some forms.

Robust fleshy plant to 75 cm high; leaves reduced to scales. Scape dark purplish-brown or yellow-green with numerous flowers about 3 cm in diam. or almost white, pale to deep-pink, often dotted with darker spots, at first erect but when mature in a horizontal position, later drooping; segments oblong-lanceolate, recurved or spreading; labellum sessile, erect, about 13 mm long, obovate in outline, 3-lobed, basal part white, lateral lobes narrow and petaloid, the mid-lobe having 2 pubescent ridges then narrowing into a single broad hairy keel with inturned hairs.

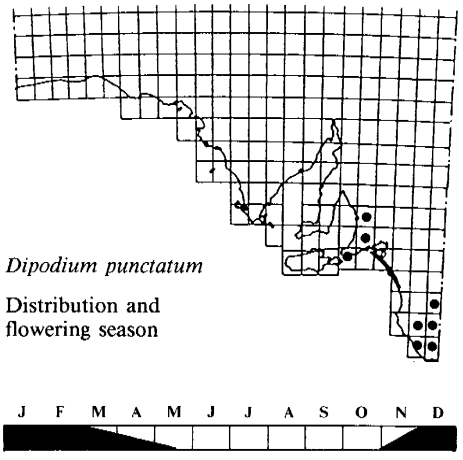
Locally common in the southern Mount Lofty Ranges and lower South-east where associated usually with stringy barks (*Eucalyptus obliqua* and *E. baxteri*) in higher rainfall districts; also in the eastern States. Occurs in Queensland, New South Wales, Victoria and Tasmania.

A form occurring from Naracoorte to Mount Gambier has white flowers, strongly spotted red and an ovate labellum (Plate 96).

Although plants are commonly found in bush gardens in the Adelaide Hills, these are of natural occurrence and soon die out if the stringy barks with which they grow are removed.

The large glossy-green or purple seed capsules may remain on the plants for many months before the thousands of white seeds are released in late autumn.

Very fine specimens can be seen along roadsides near Crafers and Stirling, some with pure-white flowers.

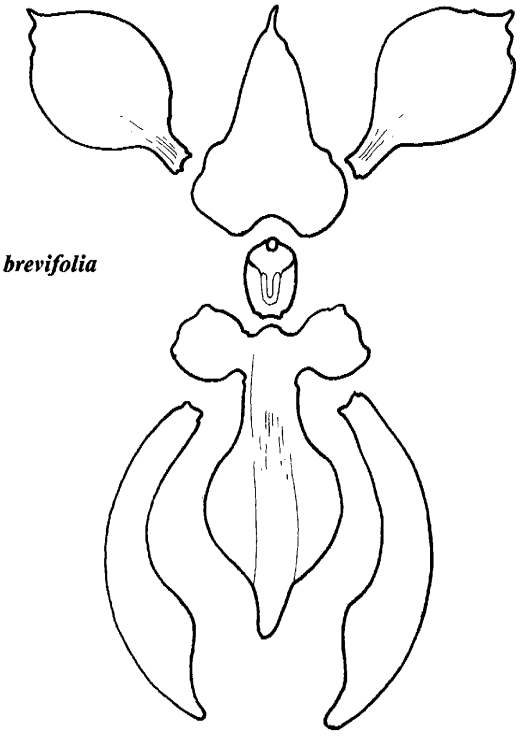


Dipodium punctatum

Distribution and flowering season

DIURIS

Donkey-orchids or Double-tails



Diuris brevifolia

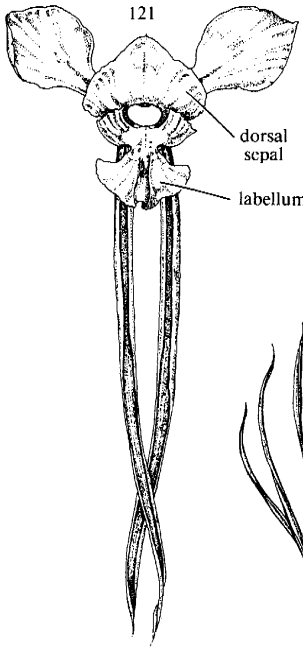
The name, derived from *di* (two), *oura* (tails), refers to the lateral sepals which have the appearance of 2 tails.

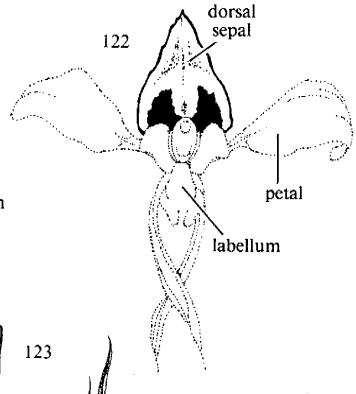
Glabrous plants with tuberoids ranging from ovoid to palmate or snake-like and two to several narrow-linear, radical erect leaves. Scape sometimes with 1, usually several, relatively large resupinate flowers of yellow and brown or purplish, often spotted or blotched particularly on outer surfaces; dorsal sepal erect, base clasping the column; lateral sepals narrow-linear, tail-like, often green or brownish, usually drooping, parallel or crossed; petals longer than dorsal sepal, ear-like; lamina ovate or elliptical on a distinct slender claw. Labellum usually the largest segment, 3-lobed. Column short, stigma and stamen arising separately from the base, the anther behind the stigma, the 2 deeply 2-lobed mealy pollinia attached to the rostellum by a distinct viscidium.

Endemic to Australia with about 45 species (except perhaps for 1 in Indonesia).

Native bees have been observed pollinating the flowers which are brightly coloured, large and sometimes scented. Nectar is not usually available. The similarity of the flowers to bush peas (*Platylobium, Pultenaea* and *Daviesia* of the Fabaceae family) is considered to be an example of floral mimicry. The pea-flowers are a food resource for the bees and the orchid labellum may well be mimicking the keel of the pea-flower while the dorsal sepal makes a good copy of the standard of the pea-flower. Like most floral mimics the orchid blooms are usually conspicuous, larger and brighter than the flowers they emulate.

Pollination usually occurs in less than fifty percent of *Diuris* flowers but the outcrossing achieved more than compensates for this.





A. Flowers yellow or brown; lateral sepals less than twice as long as the flower width (Figs 122, 125 & 129) ..... B.

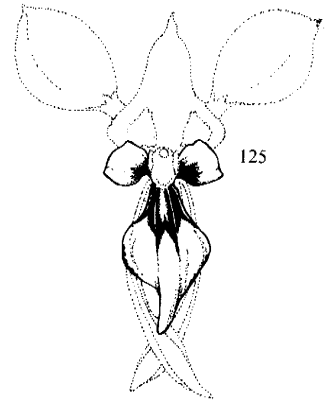
A. Flowers purple; lateral sepals more than twice as long as the flower width (Fig. 121) .... *D. punctata* 8.

B. Dorsal sepal without a pair of dark spots at the base (Fig. 134) ... D.

B. Dorsal sepal with a pair of dark spots at the base (Fig. 122) .... C.

C. Leaves twisted, several, linear (Fig. 123); labellum without transverse blotch towards apex (Fig. 125) ..... *D. brevifolia* 1.

C. Leaves 2, flat, linear-lanceolate (Fig. 124); labellum with a dark transverse blotch near the apex (Fig. 126)*D. sulphurea* 9. (Fig. 122)



D. Labellum side-lobes small, less than one quarter the size of the mid-lobe (Fig. 127) ..... E.

D. Labellum side-lobes large and distinct, at least one third the size of the mid-lobe (Figs 128 & 135) ..... F.

E. Petals marked with brown on the back (Fig. 130) .. *D.* x *fastidiosa* 3.

E. Petals clear yellow not marked (Fig. 131) ..... *D. lanceolata* 4.

F. Petals without dark-brown stripes (Fig. 131); leaves few, not twisted (Figs 124 & 129) ..... G.

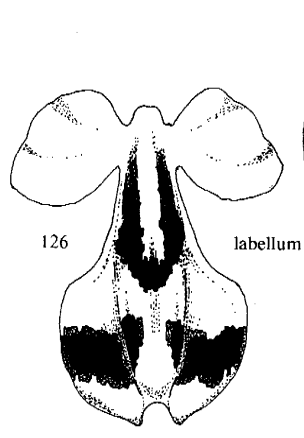
F. Petals with 2 dark-brown vertical stripes on back (Fig. 132); leaves numerous, twisted, linear (Fig. 123) ..... *D. palustris* 7.

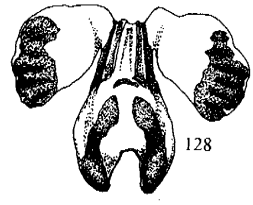
G. Dorsal sepal spotted (Fig. 122) or blotched (especially on back) about as wide as long (Fig. 133) ..... H.

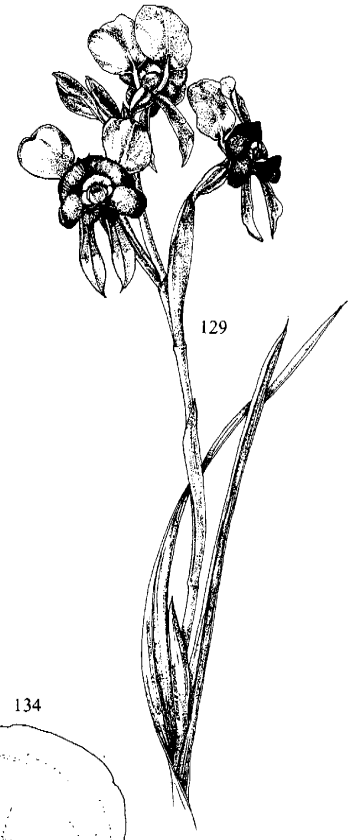
G. Dorsal sepal not spotted nor blotched in dark-brown on back, about twice as wide as long (Fig. 134) ..... *D. corymbosa* 2. (Fig. 129)

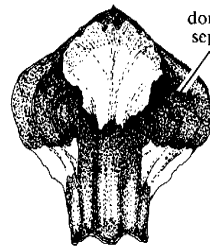
H. Labellum midlobe narrower than a petal (Fig. 136) with conspicuous blotches towards the apex (Fig. 128); leaves 2 (Fig. 124) ..... *D. maculata* 5.

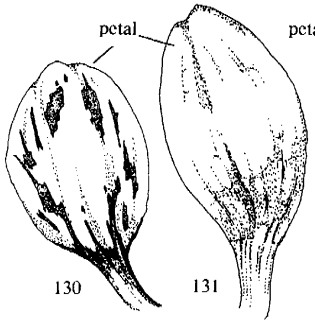
H. Labellum midlobe broader than petals, without a conspicuous blotch towards apex (Fig. 135); leaves more than 2 ..... *D.* x *palachila* 6.

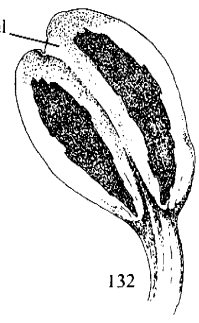


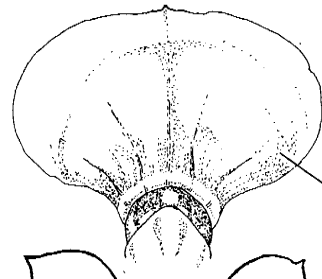


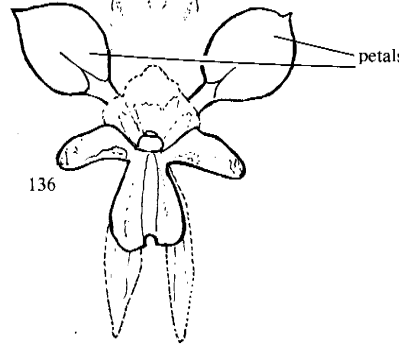


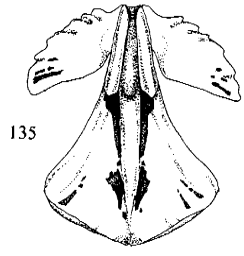












1. **D. brevifolia**. *Late* or *short-leaved donkey-orchid.* Plate 97

The name *brevifolia* (short-leaved) refers to the narrow twisted leaves of this species.

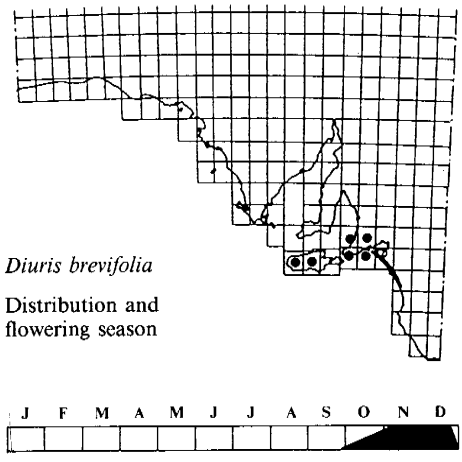
Rather slender, to 40 cm high with long snake-like or comma-shaped tuberoids; leaves 2–8, linear and twisted, strictly erect, 7–12 cm long. Flowers usually 2–5, relatively large, buttercup yellow with 2 brown spots on the back of the dorsal sepal; lateral sepals linear, green to brown, 1.2–2 cm long, often crossed, petals about 15 mm long, on a distinct brown stalk. Labellum side-lobes triangular, less than half as long as the spade-shaped midlobe which is about 15 mm long with 2 parallel raised lines and some brown markings, mostly basally. Flowers hardly scented.

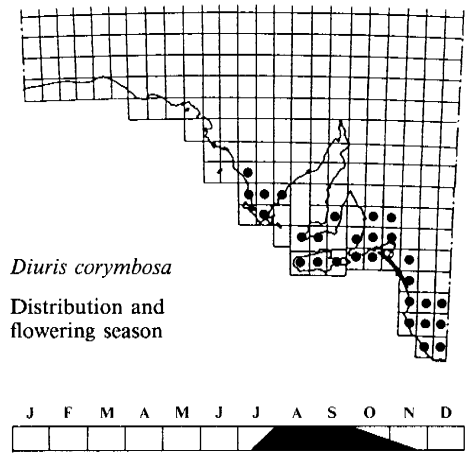
Endemic to South Australia, where it is rather restricted in its range. Forms small to extensive colonies in boggy clay soils under low scrub especially with *Eucalyptus cosmophylla* (cup gum) and in low heath around swamp margins, also persisting in plantations of *Pinus radiata*. Flowers more freely after bushfires. Once locally common in the southern Mount Lofty Ranges.

Has been treated as a variety of *D. sulphurea* which has very similar flowers but wider, less erect and fewer leaves and ovoid tuberoids. Shows similarities with *D. emarginata* from Western Australia which also has twisted leaves but is more robust and lacks the vivid-brown spots on the dorsal sepal.

In cultivation *D. brevifolia* has proved very amenable, flowering freely and multiplying by a factor of 2 - 3 times per year. Its resistance to diseases and its rapid growth have been reasons for using it as a parent in hybridisation with *D. lanceolata, D. punctata, D. sulphurea* and other species.

A natural hybrid with *D. corymbosa* has been collected.





2. **D. corymbosa**. *Bulldogs, wallflower-* or *donkey-orchid.* Plate 98

Until 1988 referred to as *D. longifolia*. The name *corymbosa* means clustered and refers to the short spike of clustered flowers.

Often robust, 10–40 cm high, tuberoids long and thin (snake-like); leaves 2 or 3, stout, linear-lanceolate, 5–20 cm long, channelled but not twisted. Flowers 2–5, large, 3–4 cm in diam., yellow suffused; red-brown dorsal sepal erect, wider than long, usually more than 1 cm

broad; lateral sepals linear, green, to 2 cm long, spreading, rarely crossed; petals ovate, on distinct red-brown stalks, hardly blotched. Labellum side-lobes rather large, oblong, to 1 cm long, blotched, the mid-lobe small and rounded in hues of orange, purple and red.

Locally common and widespread, in a variety of soil types in forest or scrubby country, often forming large, quite dense colonies. Found mainly in high rainfall areas and flowering more profusely after bushfires.

Hybridises quite freely with *D. maculata* and *D. lanceolata*, but more rarely with *D. brevifolia, D.* x *palachila* and *D. palustris*. The man made hybrid with *D. maculata* has been registered as *D.* Pioneer.

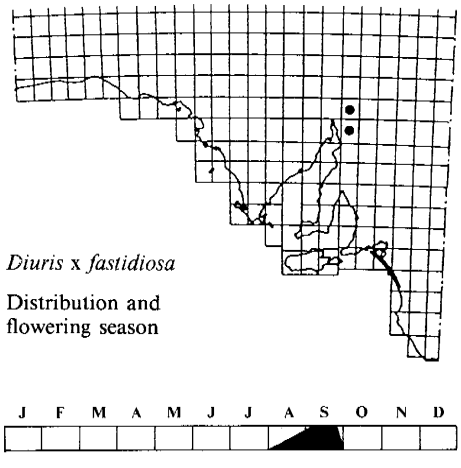
Easily cultivated, increasing quite rapidly by vegetative reproduction. Forms quite attractive clumps, but flowers freely only in a sunny situation and in a well drained light mixture in either terracotta or plastic pots. Most of the South Australian plants are not very floriferous and the more colourful Western Australian forms are preferred. Attractive forms can be found in the Belair Recreation Park near Adelaide. True *D. longifolia* is now considered endemic to Western Australia.

3. **D.** x **fastidiosa.** *Proud donkey-orchid, proud diuris.* Plate 99

The name *fastidiosa* (proud, haughty), refers to the lateral sepals which are more or less directed proudly skyward.

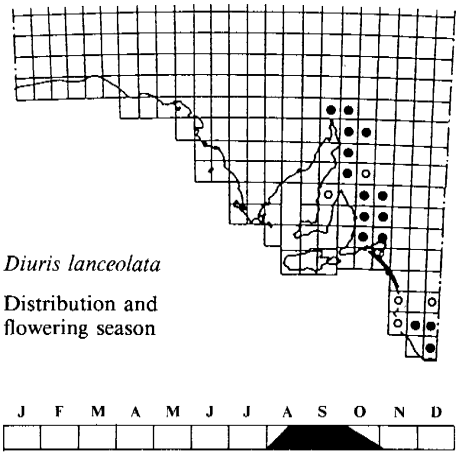
Slender to 20 cm tall; leaves several, setaceous, slightly twisted, about half the height of the scape. Flowers few, often only one, relatively large for the scape, yellow with dark-brown markings; lateral sepals linear, about 17 mm long, parallel, green, petals small, ovate lanceolate on long claws, marked with brown on the back. Labellum side-lobes small hardly one-fifth the length of the spade-shaped midlobe which is about 1 cm long, with irregular brown blotches, entire margins and 2 pubescent raised parallel lines at the base succeeded by a single keel to the apex.

Occurring with its putative parents *D. lanceolata* and *D. palustris* in clay loam in disturbed grassy places but very rarely collected. Also in Victoria, where equally rare.



Diuris x *fastidiosa*

Distribution and flowering season



Diuris lanceolata

Distribution and flowering season

4. **D. lanceolata** (*D. behrii*). *Cowslips, yellow cowslip, golden moths, snake orchid.* Plate 100

Until 1986 referred to as *D. pedunculata.* The name *lanceolata* refers to the lanceolate lateral sepals.

Slender to robust, 20–40 cm high; leaves 5–7, linear, grass-like, about half as long as the scape. Flowers 1 or 2 (rarely more), yellow, 2–3 cm across on long slender pedicels, somewhat drooping; ovate petals on green, slender stalks; lateral sepals linear-lanceolate, green, channelled, 2–2.5 cm long, spreading below labellum, free, not crossed. Labellum large, yellow, 3-lobed, the lateral lobes small, the mid-lobe large, up to 2 cm long, broadly ovate, sometimes toothed on the outer margins, spreading sometimes nearly horizontally, bearing a fleshy, densely papillose ridge ending in a blunt tooth or a line ending at the apex.

Now uncommon in South Australia, found in fertile soils in grassy open forest, mainly in higher rainfall areas. Loss of habitat has caused the demise of most populations.

Also occurs in New South Wales, Victoria and Tasmania.

Colour varies from canary-yellow to pale yellow, some flowers are widely opening others hardly expand at all. Very large flowers occasionally occur and these have been referred to as *D. pedunculata* var. *gigantea* but these may occur at random in any population. The name *Diuris behrii* has been applied to South Australian forms with a long keel on the labellum.

Putative hybrids have been observed with *D. corymbosa* (in a wide range of forms) (see Plate 101 for one form), *D. maculata* and *D. palustris* wherever they occur together.

Not as common in cultivation as its various hybrids which are usually more showy, more floriferous and hardier than *D. lanceolata* itself. Grows easily and increases slowly by vegetative reproduction. Prefers a sunny situation in a well drained soil mix.

Before settlement this species was common in fertile soils of the Adelaide Plains.

5. **D. maculata.** (*D. pardina*) *Common donkey-orchid, donkey ears, leopard orchid.* Plates 102 and 103

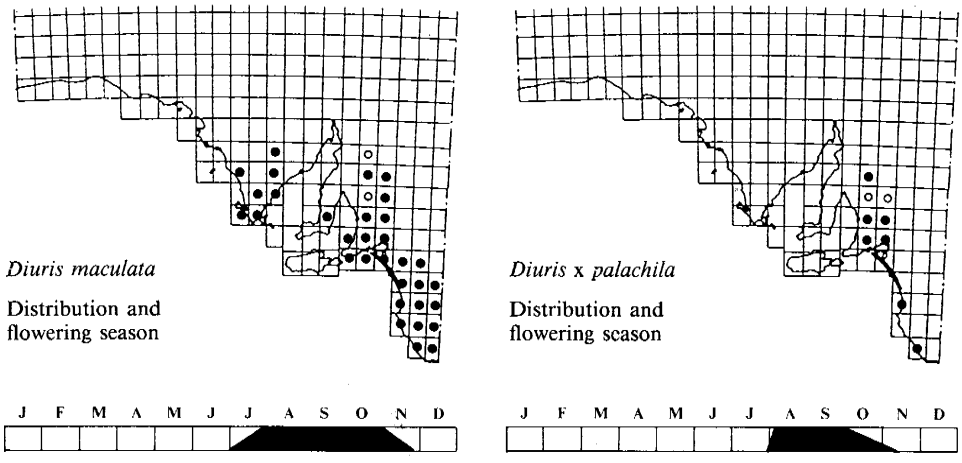
The name *maculata* (spotted) refers to the spotted or blotched flower segments.

Slender, greenish or reddish plant often to 30 cm high arising from conical or finger-like tuberoids; leaves 2, narrow-lanceolate and channelled, usually reaching the lowest flower. Flowers few to 6, yellow or cream with dark-brown or purplish blotches. Dorsal sepal rather small, erect, ovate to reniform, less than 1 cm wide; lateral sepals linear-oblong, 1–2 cm long, concave, green with dark-purplish markings, recurved, parallel or crossed; petals erect or reflexed, lamina ovate, about 1 cm long on distinct dark-brown claws. Labellum shorter than dorsal sepal; side-lobes upturned, as long as the midlobe which usually has a transverse blotch towards its apex.

Widespread and locally common in a variety of habitats and soil types but generally found in light open forest, scrubs and heath. Flowers freely even without bushfires. Also occurs in New South Wales, Victoria and Tasmania.

Commonly forms hybrids with *D. longifolia* (*D. corymbosa*), *D. lanceolata* and *D. palustris* wherever they occur together.

Often in cultivation but not as popular as its hybrids some of which are more than twice the size of *D. maculata* and increase rapidly vegetatively. Prefers a sunny position in a light soil mixture in clay or plastic pots. The Adelaide Hills form with its cream flowers, blotched dark purple-brown is most distinctive. Other forms with smaller brighter yellow flowers occur in the South-east and these are sometimes referred to other species i.e. *D. brevissima.* Some workers place South Australian plants as *Diuris pardina.*



6. **D. x palachila**. *Broad-lip donkey-orchid, broad-lip diuris, hybrid donkey-orchid.* Plate 104

The name *palachila* (spade-shaped lip) refers to the spade-shaped central lobe of the labellum.

Slender to robust, green, to 40 cm high; leaves several, grass-like, narrow-lanceolate, usually more than half the height of the scape. Flowers several, rarely 1, on long slender pedicels, bright-yellow, marked with spots and blotches of brown; dorsal sepal about 1 cm long, blotched and dotted chiefly on the back; lateral sepals linear, usually parallel; petals elliptic-ovate, on a short claw, yellow above, dotted or with short lines below. Labellum about 1 cm long, side-lobes more than half as long as the spade-shaped midlobe.

Widespread but rare, mainly in fertile, well watered, often disturbed sites in open grassy forest wherever the parent species occur.

It is believed to be a hybrid between *D. lanceolata* (*D. behrii*) and *D. maculata*. It differs from *D. lanceolata* in having the flowers more erect, with brown markings and in the labellum being more truncate. From *D. maculata* (*D. pardina*) it differs in having larger more drooping flowers on long pedicels and also has fewer brown markings and a broader labellum.

It is a fertile hybrid and backcrosses with both parents to produce a continuous range of intermediates. Some very large forms occur in the Adelaide Hills.

Commonly cultivated and quite magnificent when well grown. Prefers a very sunny position in a light soil mixture and responds to the use of some organic fertiliser.

7. **D. palustris**. *Little donkey-orchid, cinnamon donkey-orchid, swamp diuris.* Plates 105 and 106

The name *palustris* (swampy or marshy) refers to the swampy habitat in which the species was apparently first found.

Small and slender, usually less than 10 cm sometimes to 15 cm high, arising from conical or finger-like tuberoids; leaves numerous, narrow-linear, grass-like, twisted, erect and at least half as long as the scape. Flowers few, small, yellow and variously striped or blotched with dark-brown; dorsal sepal ovate, less than 1 cm long; lateral sepals relatively long, parallel, narrow-oblong, 1.5–2 cm long, green or greenish-brown, spreading under the labellum; petals erect and reflexed, lamina oval, 5–8 mm long, the lower surface strongly marked with 2 dark-brown vertical stripes, the upper surface more yellow; claws purplish, about as long as the

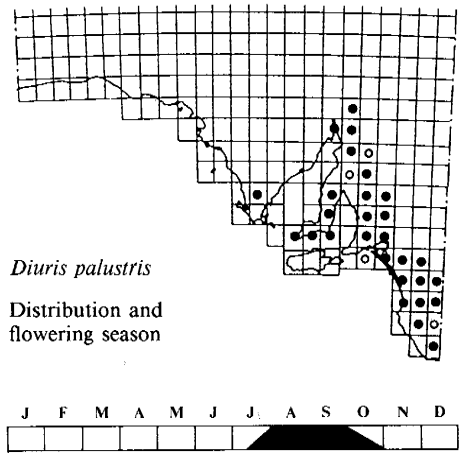
blade. Labellum relatively small, to 1 cm long, deeply 3-lobed; side-lobes narrow, as long as the narrowly spade-shaped mid-lobe. Flowers cinnamon scented.

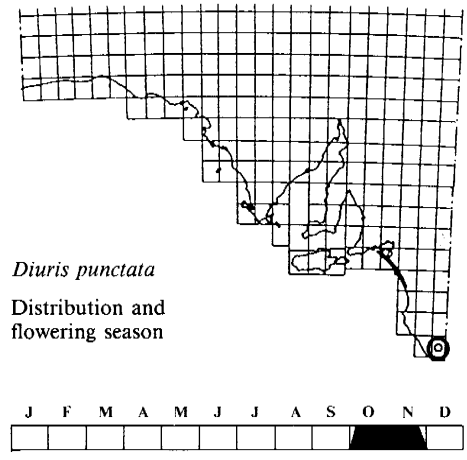
The flowers are sometimes a clear canary-yellow and unmarked.

Once abundant but becoming uncommon due to loss of habitat. Occurs in a variety of soils, often over limestone, in light open forest, grassland or heath, especially with mallee eucalypts and broom-bush (*Melaleuca uncinata*) where it forms small clumps of up to 20 plants together. It is almost never found in swampy situations and the name "Swamp-diuris" is not appropriate in South Australia. Also occurs in Victoria and Tasmania.

Commonly forms hybrids (in the Murray Mallee) with *D. maculata* and in the Flinders Range sporadically with *D. lanceolata* (a hybrid known as *D.* x *fastidiosa*) and very rarely with *D. corymbosa.*

Usually cultivated in bush soil in small pots. If left undisturbed it increases to form attractive clumps which flower freely in sunny situations.





8. **D. punctata**. *Purple donkey-orchid, purple cowslip.* Plate 107

The name *punctata* (marked with dots or spots), refers to the dotted or spotted flower segments of some forms.

Slender to very robust sometimes to 50 cm high; leaves usually 2, linear, channelled, rather lax, often strap-like. Flowers few to several, usually lilac or purple, sometimes white or rarely yellow, occasionally with darker spotting; dorsal sepal rather large, 1.5–2 cm; lateral sepals very long, up to 5 cm, sometimes more, green or brownish, narrow-linear, parallel or spreading; petals on short brown claws, somewhat orbicular. Labellum about 2 cm long, deeply 3-lobed, side-lobes less than half as long as the ovate midlobe.

Thought to have occurred in grassland on fertile basaltic loams in the vicinity of Mount Gambier where it is now apparently extinct. Still widespread in New South Wales and Victoria.

Large flowered forms are popular in cultivation, often forming very robust plants when grown in a sandy soil mix, with added organic fertiliser. Requires a sunny position with plenty of air movement and weekly watering in spring. Vegetative increase is very slow but a clump of several plants in a large pot can provide a brilliant display.

9. **D. sulphurea**. *Tiger orchid, hornet orchid.* Plate 108

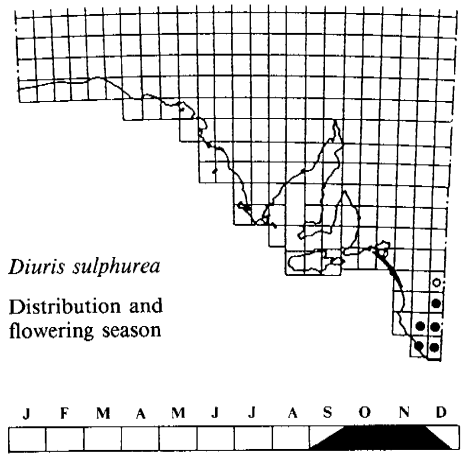
The name *sulphurea* (sulphur coloured), refers to the bright-yellow flowers.

Small to quite robust, sometimes more than 50 cm tall, with large finger-like tuberoids; leaves usually 2, linear-lanceolate, lax, flattened and channelled. Flowers several, yellow with few brown markings, variable in size and sometimes up to 4 cm in diameter; dorsal sepal to 2 cm long, ovate with 2 conspicuous eye-like brown blotches near the base; lateral sepals more than 2 cm long, parallel or sometimes crossed; petals erect on short brown claws, yellow. Labellum shorter than dorsal sepal with side-lobes scarcely half as long as the spade-shaped midlobe which has a distinct, dark, transverse blotch near the apex and a central longitudinal ridge. Flowers usually not scented.

Rather rare and restricted in its distribution in South Australia, found mainly on damp flats in lightly forested areas where it occurs singly or forms small colonies. More common in Queensland, New South Wales, Victoria and Tasmania.

Superficially similar to *D. brevifolia* which has several narrow twisted leaves and a wider labellum but their distributions do not overlap.

In cultivation does better in large pots in a well lit situation, responding positively to fertilisers and increasing vegetatively. The more floriferous forms are being selected. It has been crossed with other species, the man-made hybrids being generally vigorous and floriferous as well as resistant to disease and retaining the long-lived flower characteristics of *D. sulphurea*.

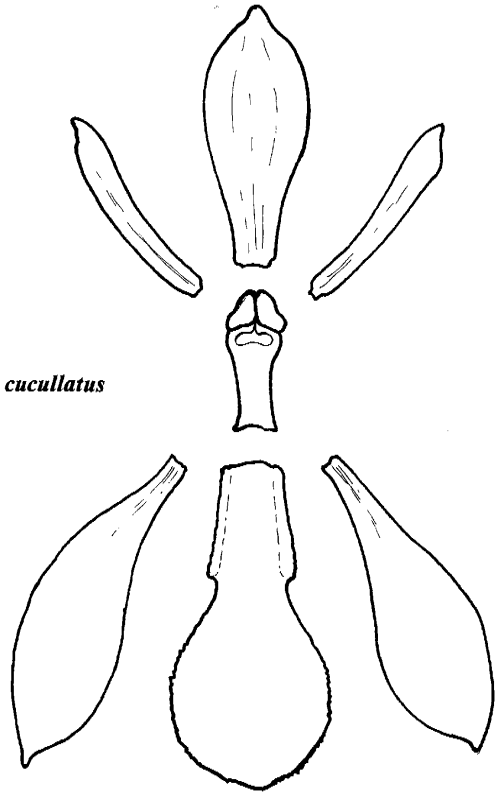


ERIOCHILUS

Bunny orchids

The name is derived from *erion* (wool), *cheilos* (lip) and refers to the glandular-villous surface of the labellum.

Slender, glabrous or glandular-pubescent plants with fleshy, globular tuberoids and a single ovate sheathing leaf. Flowers few, resupinate, with large spreading lateral sepals. Labellum relatively small, recurved, convex, glandular-villous, without calli. Column erect, about 5 mm high, narrowly winged below, with a very broad concave stigma; anther 2-celled with 8 pear-shaped waxy pollinia.



Eriochilus cucullatus

A genus with 6 species endemic to Australia.

Eriochilus is pollinated by native bees which are attracted by flower colour, scent and nectar which is provided in a channel at the base of the labellum. The genus is unusual in having a deeply recessed stigma with a constricted but elastic border. When a bee bearing pollinia pushes into the tube formed by juxtaposition of column and labellum base, its head will force down the elastic (just as if untying the drawstring on a tiny bag) thus exposing the stigma. The pollinia on the bee's head are now in contact with the stigma, and when the bee withdraws, the elastic fringe returns to its former position thus closing the pollinia inside. As the bee withdraws farther it contacts the overhanging anther flap and catches against the twin viscid disks sitting in 2 small notches (the rostellum) in the upper border of the stigma. These stick to the bee's head and are removed with all or half of the pollinia which are soon deflexed from an upright position to a horizontal one. Thus outcrossing is ensured.

1. **E. cucullatus**. *Parson's bands, parson-in-the-pulpit.* Plates 109 and 110

The name *cucullatus* (hooded), apparently refers to the slightly hooded dorsal sepal.

Slender almost filiform to 20 cm high; leaf radical, about 1–4 cm long, ribbed or smooth, ovate, dark-green above and red-tinted below, flat on the ground. Flowers 1–3, white or pink, about 1 cm across; dorsal sepal less than 1 cm long, spathulate and slightly hooded over the column; lateral sepals lanceolate, longer than other segments, white and held in front of the labellum; petals linear-falcate, erect, dotted with a few glandular hairs, greenish-red or red-

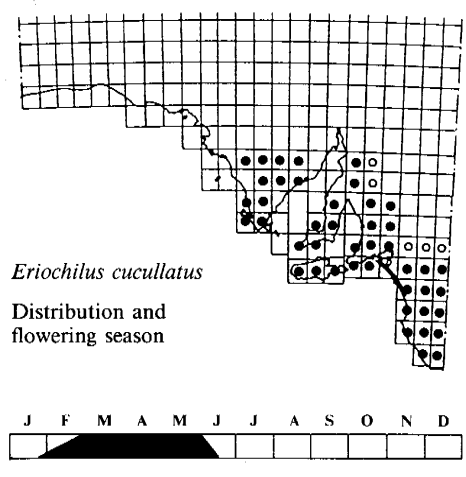
brown, white-tipped. Labellum oval, decurved, upper surface convex, densely hairy. Flowers only lightly scented.

Widespread and common, occurring in most environments inside the 300 mm isohyet, from peat-bogs, coastal limestone, heath and forest, from the coast to well inland, occurring singly or in small clusters.

The flowers generally appear before the leaves. Flowering is usually triggered by autumn rains but in sandy soil flowers may appear even during the worst drought, apparently nourished by the food reserves stored in the tuber formed during the previous year. Three leaf forms have been observed; plants from swampy areas have glabrous mucronate leaves red below while those of dryland forms are purple below and have ribs with stiff antrorse hairs above, and a form from rock outcrops in the South-east has broad, glabrous, shiny leaves, green both sides. *E. cucullatus* is now thought to be a complex of several very similar taxa, including *E. autumnalis* from N.S.W.

Similar to *E. dilatatus* from Western Australia which has multiple flowers and a glabrous leaf, the lamina well above the ground, often half way up the scape.

In cultivation it does well in small pots if left undisturbed. Should not be watered during summer or early autumn, as flowers which appear before April are likely to be destroyed by thrips or other insects.



Eriochilus cucullatus

Distribution and flowering season

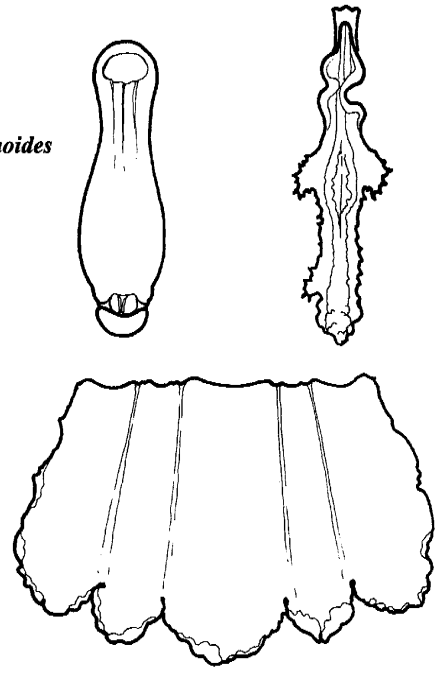
GASTRODIA

Potato orchids

The name is derived from *gastroides* (pot-bellied) and refers to the swollen appearance of the flower.

Saprophytic plants without chlorophyll, scape arising from fleshy rhizomes containing much starch (hence the name Potato orchid), the nodes carrying scale-leaves or their remnants and also slender branches which swell to form apical tubers (a means of vegetative reproduction). Flowers few to many, not resupinate, with fused perianth of 5 fleshy lobes more or less split on upper side between lateral sepals. The labellum is enclosed in the tube which is swollen at the base.

Gastrodia sesamoides



About 16 species through Malesia, India, Japan, New Guinea and New Zealand; 2 species occurring in Australia; 1 of these is endemic.

Several genera of native bees have been observed transferring pollinia. The flowers have an attractive spicy fragrance which becomes most obvious when the temperature is above 20°C. A reward is provided for the bees in the form of a fine, sugary, pseudo-pollen mass, produced from the callus of the labellum. There is no nectar. Each flower lasts for 2 to 3 days and usually only a few are open at one time so that large plants may flower for up to 3 weeks in cooler weather. Pollination success rates are usually close to 100% in larger colonies.

1. **G. sesamoides**. *Cinnamon bells, potato orchid.* Plates 111 and 112

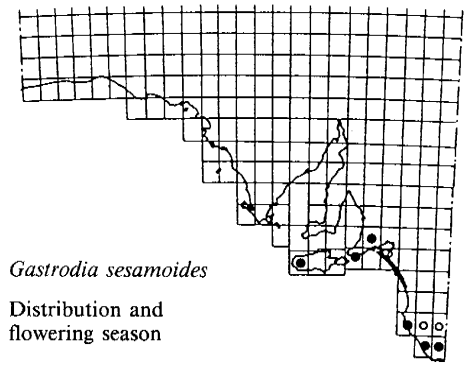
The name *sesamoides* (sesame-like) refers to the tubular corolla which is subgibbous at the base, resembling the flowers of *Sesamum indicum*—the sesame.

Slender to moderately robust, sometimes to 1 m high, dark-brown, leafless, arising from an underground rhizome, the scape usually decurved at the apex before the flowers open, then becoming erect. Flowers few to numerous, brown and white, 1.5–2 cm long, bell-shaped with a basal swelling, fused perianth-segments ending in 5 short lobes which are slightly thickened, with crenulate margins. Labellum white, tinged yellow, ridged, 3-lobed, margins crenate and undulate.

The flowers have a sweet spicy scent resembling cinnamon.

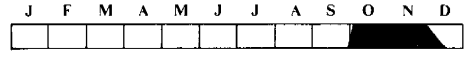
Restricted to shady well forested places in high rainfall areas (more than 800 mm per year), chiefly near old tree stumps, especially along creeks where large clusters of flowering plants may appear in good seasons. Rare in the Adelaide Hills, plants usually depauperate when compared to those from forests in the east. In all States except the Northern Territory and also in New Zealand.

Not cultivated.



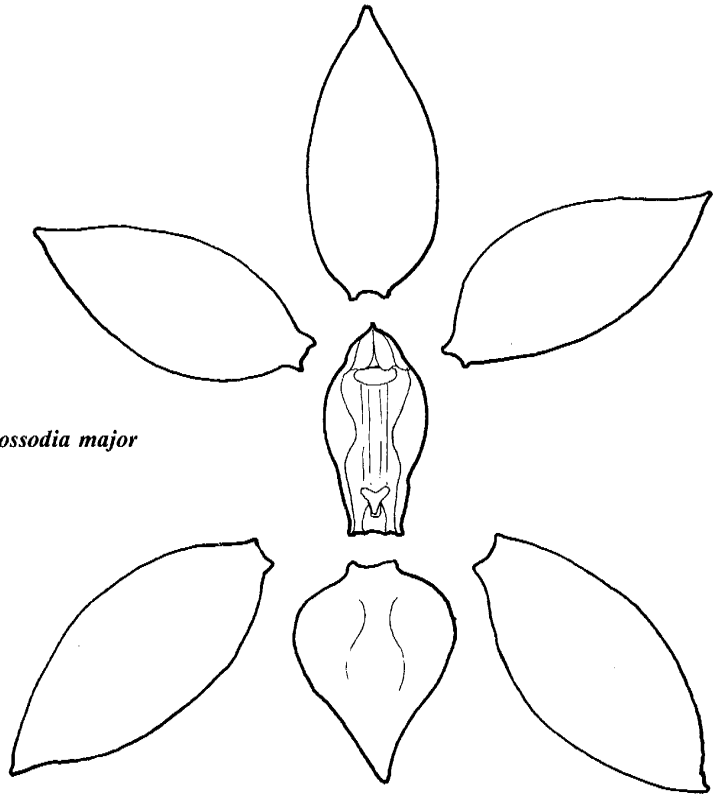
Gastrodia sesamoides

Distribution and
flowering season



GLOSSODIA

Wax-lip orchids



Glossodia major

The name is derived from *glossoides* (tongue-shaped), and refers to the forked tongue-like appendage at the base of the column.

Slender, scape arising from a silken-sheathed, spindle-shaped underground tuberoid, with

the leaf sheathing at the base. Flowers 1 or 2, resupinate, segments similar except for the differentiated labellum. Column curved and winged, terminating in a 2-celled anther with 4 pale granular pollinia.

2 species, both endemic to Australia.

Native bees have been seen transferring pollinia. It is probable that the species is usually bee pollinated, as the bright purple or lilac flowers are lightly scented. The white spots or the pale centre of the flower may guide bees as does the white base of the labellum. These characters and the horizontal position of the flower are features of bee pollinated flowers. The yellow anther-like appendage on the labellum could be interpreted as a pseudo-anther and as this appendage is situated just under the column it also serves to position the pollinating insects.

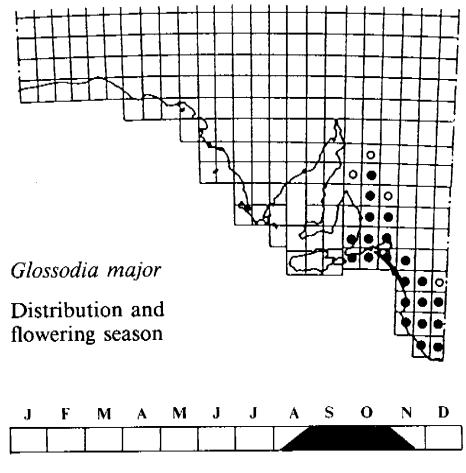
1. **G. major**. *Purple cockatoo, wax-lip orchid, babes-in-the-cradle.* Plates 113 and 114

The name *major* (larger) refers to the size of the plant which is much larger than *G. minor* from the eastern States.

Slender, to 30 cm high; leaf lanceolate, 2–8 cm long, green with black-glandular-tipped hairs. Flowers 1 or 2, rarely 3, relatively large with spreading purple, lilac or white, lanceolate, often glossy segments, sometimes to 5 cm across. Labellum without calli, about half as long as the other segments, ovate-lanceolate, purple and white, the basal part white, pubescent, an erect yellow-tipped sigmoid appendage near the base of the winged column which is similarly coloured to the segments.

Common throughout its range. One of the best known and most abundant orchids in the Adelaide Hills where it can form spectacular displays.

In cultivation it is an impressive sight when well grown. Unfortunately it is not easy to grow as the tuberoids will rot away if kept too wet. These need to be planted close to the surface, the plants given plenty of sunshine, not repotted too often and not watered in summer.

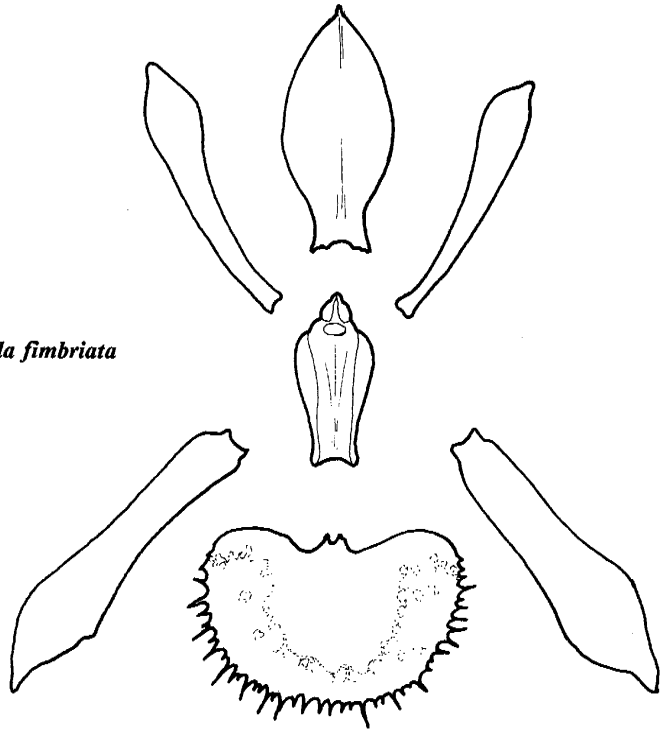


Glossodia major

Distribution and flowering season

LEPORELLA

Hare-orchids



Leporella fimbriata

The name *leporella* (a little hare), indicates the flower's resemblance to a hare.

Slender, glabrous plants with globular tuberoids; leaf single or paired, basal. Flowers 1–3, resupinate with differentiated perianth-segments. Labellum the largest segment, without calli. Column incurved, winged, terminating in a 2-celled anther with 4 pollinia.

A monotypic genus endemic to Australia.

Pollination is effected by winged male ants of the genus *Myrmecia* (jumper ants), which are sexually attracted to the flower by pseudo-sex pheromones produced by glands on the petal tips. The ants fly to the flowers from down-wind, crawling onto the labellum, straddling it longitudinally and probing with their abdomen as if copulating. The very broad, attractively fringed labellum is velvety textured and apparently represents the female ant. While the male ant is on the labellum, the labellum tips back against the column and the ant must twist free to escape, removing part of the pollinia. The ants appear to be sexually active for only a short time each year in late summer or autumn. This coincides with the orchid's flowering season. Seed set varies considerably and in some years it has been noted that no flowers are pollinated in some areas, possibly due to the sexual activity of the ants being completed before the orchids are in flower.

1. **L. fimbriata**. *Fringed hare-orchid.* Plate 115

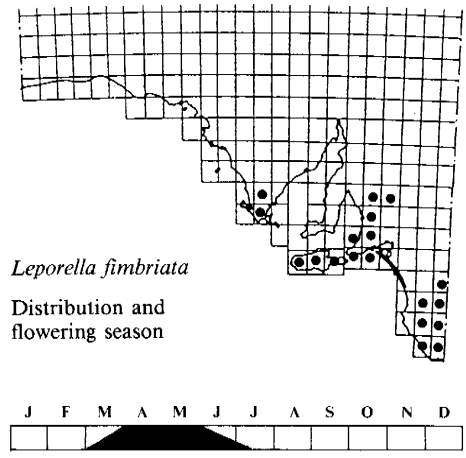
The name *fimbriata* (fringed), refers to the fringed labellum margins.

Slender to 20 cm high; leaves 1 or 2, broadly lanceolate, 1–5 cm long, green with red

stripes, but usually not developing until after the flowers open. Flowers rust-red, green and purple; dorsal sepal ovate, concave, about 1 cm long, slightly incurved over the column; lateral sepals deflexed, narrow, rusty-red as in the dorsal sepal and slightly longer; petals erect, linear-clavate, the clubbed part glandular. Labellum fan-shaped, spreading first horizontally then slightly deflexed, wider than long, yellowish-green with red and purple markings, deeply fringed and combed on the front margin with dark pubescent spots on the domed surface. Flowers not scented.

Locally common in deep acid sands under light scrub cover, often with bracken under stringybark (*Eucalyptus baxteri* or *E. obliqua*). Forms large dense colonies by vegetative increase and often does well on cleared fire-breaks. In open areas flowering frequency is high most years but under denser cover flowering is poor excepting after bushfires. Flowers which are not pollinated retain their shape for up to 12 weeks in mild conditions but are probably receptive to pollination only in the early stages of flowering. Also occurs in Western Australia and Victoria.

Leporella has proved difficult to grow in pots; if the soil becomes saturated plants quickly rot. Would probably do best in a light sandy mixture but needs to be kept under cover.



Leporella fimbriata

Distribution and flowering season

LYPERANTHUS

Red beaks

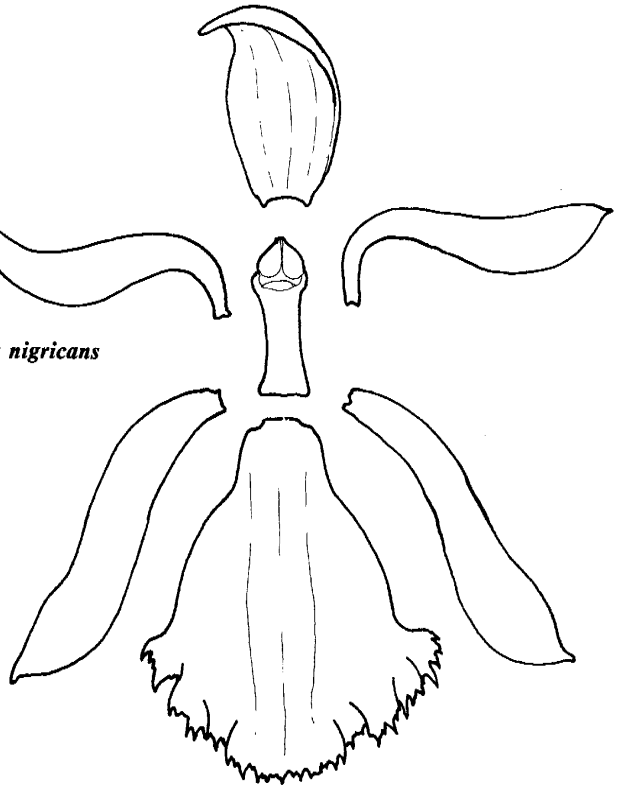
The name is derived from *lyperos* (sad, sorrowful, mournful), and refers to the dark coloured flowers which turn quite black when dried.

Glabrous, arising from ovoid, fleshy tuberoids; leaf single, radical with several fleshy leafy bracts. Flowers few to several, subtended by large, broadly ovate, mucronate bracts that sheath the pedicel, ovary and part of the perianth. Flowers are relatively large, resupinate, the dorsal sepal being the largest, segment gradually incurved over the column, other segments narrow, subequal. Column winged, with the terminal 2-celled anther having 4 granular pollinia.

A genus of 12 species, 7 in New Caledonia, 1 in New Zealand and 4 endemic to Australia.

1. **L. nigricans**. *Red beaks, fire orchid, undertaker orchid.* Plates 116 and 117

The name *nigricans* (blackish) refers to the characteristic blackening of aged or dried plants.



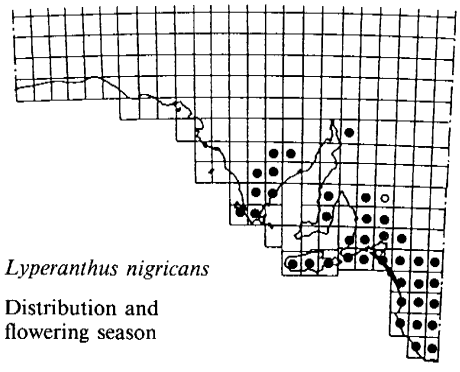
Lyperanthus nigricans

Rather stout, fleshy, to 30 cm high; leaf single, large, variable, cordate to almost orbicular, flat on the ground, often attractively spotted with red, sometimes to 8 cm across and to 15 cm long especially when not flowering. Flower rarely 1, usually few to several, purple-red or maroon and white, rarely wholly cream-coloured, 2–3 cm across, more or less nodding. Dorsal sepal broad-lanceolate, often 2 cm or more long, bent horizontally at about the middle, hooded and covering the column then extended and deflexed beyond it, lateral sepals and petals similar, linear-oblanceolate, spreading or reflexed. Labellum obovate-lanceolate, longer than wide, less than 2 cm long, deeply fringed on the mid-lobe, coloured with crimson veins and purple markings. Flowers not perfumed or faintly scented with a rather sickly-sweet or fox-like odour.

Uncommon on Yorke Peninsula and the Flinders Ranges but plentiful elsewhere in its range, especially in deep sands, from coastal sand-hills through scrubby or well forested country, to heath or mallee-heathland. Usually forming extensive colonies by vegetative increase. In most places flowering is infrequent except after bushfires when quite spectacular displays are produced especially in higher rainfall areas. Also occurs in Western Australia, New South Wales, Victoria and Tasmania.

In dry areas only a single flower may be produced on a short stem but in moist, fertile places the scapes are tall with up to 8 flowers. The seed capsules are rather large and produce a huge amount of seed.

Not very successful in cultivation, plants tending to rot away after 1 or 2 years unless grown under shelter.

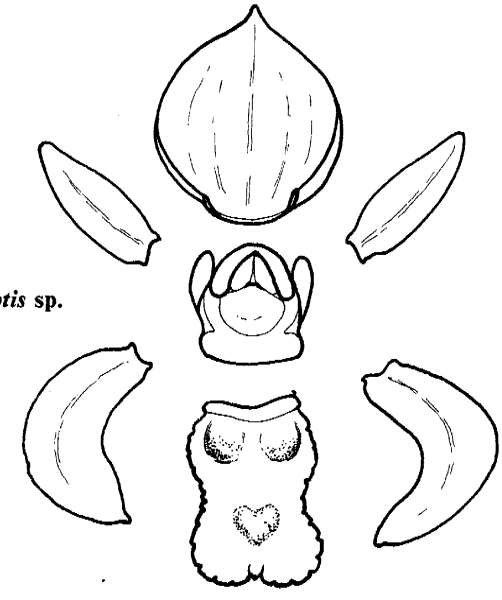


Lyperanthus nigricans

Distribution and flowering season

MICROTIS

Onion-orchids



***Microtis* sp.**

The name *Microtis* is derived from *micros* (small), *otos* (ear), and refers to the small membranous auricles on the column.

Glabrous plants arising from ovoid or spheroid tuberoids; scape emerging from within the single, terete, elongated, hollow, erect leaf. Flowers small, few to numerous, in spikes, resupinate, with differentiated perianth and distinct labellum always less than 5 mm long, often ornamented with calli or granular lines. Column semi-cylindrical, short, anther terminal, 2-celled with 4 granular pollinia.

At least 10 species occur in Australia, with 2 extending to Asia, Indonesia, Polynesia, New Caledonia and New Zealand which has 1 other endemic species.

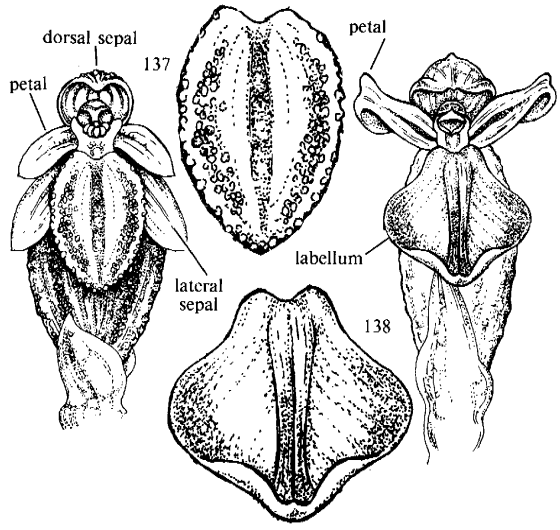
Some species are scented and the flowers offer nectar. Most are visited by a host of small insects such as ants, weevils, flies and miniature wasps. The insects feed on nectar at the base of the labellum. Wasps appear to be the most successful pollen vectors as they effectively transfer pollen from plant to plant ensuring outcrossing. Ants are frequently seen in numbers crawling from flower to flower generally with only 1 pollinarium attached, and the transferance of pollen is normally to other flowers on the same plant. If insect pollination is not effected, most *Microtis* species will self-pollinate or produce seed by apomixis. With this "triple chance" seed production system it is normal for seed to be produced in every capsule. In some species there may be over 100 capsules per spike so that quite large amounts of seed are released.

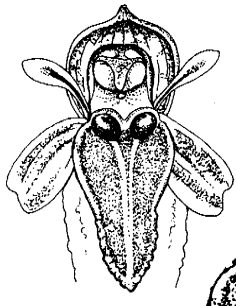
A. Labellum with callosities (Figs 139–141); lateral sepals recurved ..... C.
A. Labellum without callosities (Figs 137 & 138) ..... B.

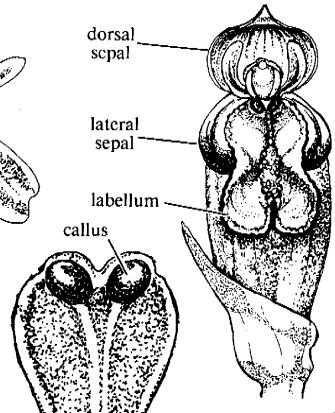
B. Labellum ovate to elliptic, tuberculate (Fig. 137) ..... *M. atrata* 1.
B. Labellum orbicular, smooth (Fig. 138) .....*M. orbicularis* 2.

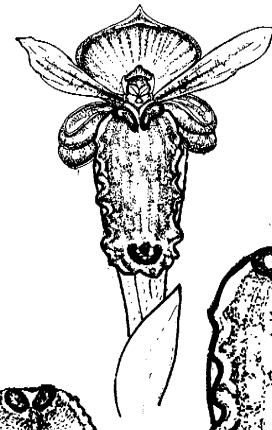
C. Labellum apex truncate, emarginate or bifid (Figs 139 & 140) ..... D.
C. Labellum apex acute or obtuse (Fig. 141) ..... *M. parviflora* 3.

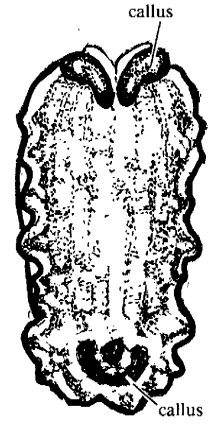
D. Labellum more than twice as long as broad, almost as long as the ovary (Fig. 139); petals conspicuous .....*M. rara* 4.
D. Labellum less than twice as long as broad, less than half as long as the ovary (Fig. 140); petals hidden within dorsal sepal ..... *M. unifolia* 5.











1. **M. atrata**. *Yellow onion-orchid.* Plates 118 and 119

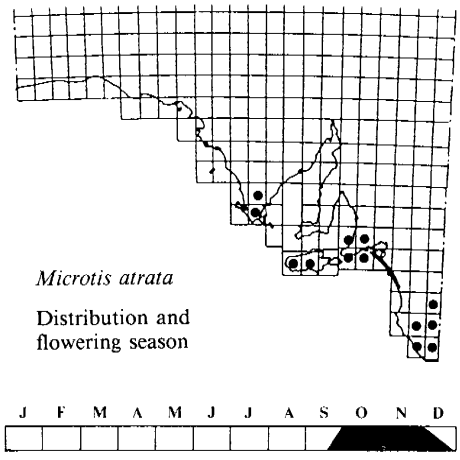
The name *atrata* (blackened, dark), refers to the tendency for senescent plants to turn black. (Plants also dry darker than other *Microtis* species.)

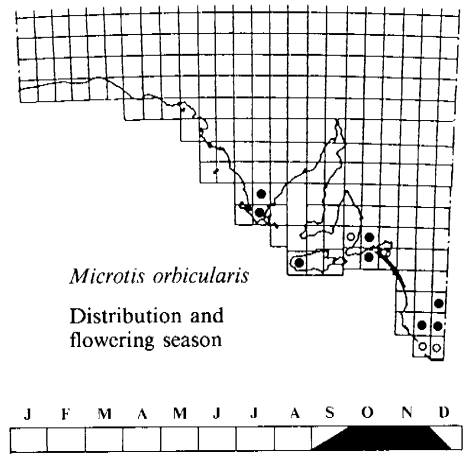
Minute plants less than 10 cm tall, yellowish; leaf with a long leaf-fistula and short rigid apex. Flowers to 40 in a short spike; the smallest of all Australian terrestrial orchids, less than 2 mm in diam. on a comparatively large ovary. Labellum ovate to elliptic, to 1 mm long and more than 0.5 mm wide with 2–6 longitudinal, dark-granular lines appearing as the flowers age. Flowers hardly scented.

Forming small dense colonies around swamp margins or in soil which is boggy in winter or spring but may bake hard in summer. Plants often completely submerged in winter. Flowering is greatly increased following a bushfire.

Also occurs in Western Australia, Victoria and Tasmania.

Not likely to be grown as anything but a curiosity.





2. **M. orbicularis**. *Dark mignonette orchid.* Plate 120

The name *orbicularis* (circular, round) refers to the almost circular lower part of the labellum.

Slender, sometimes to 30 cm high, the scape with a characteristic bend just above the long leaf-fistula which is often just below the flowers. Plant wholly green or tinted with red. Flowers numerous, small, 2–3 mm across, green or reddish-green, sessile in a loose spike, with a short, broad dorsal sepal and nearly orbicular labellum, about 2 mm long, without glands. Flowers not scented.

Rare. Semi-aquatic, growing in waterholes and swamps where it may be covered by a metre or more of water through winter. Flowering usually begins with the spike just above water level. By the time flowering is completed plants may be in mud only. In a wet spring flowering may continue with the spike underwater. Seed may be set by apomixis.

More common in Western Australia, rarely in Victoria and Tasmania.

It has flowered in cultivation but is not a really successful species as it is difficult to simulate its natural habitat without plants rotting.

The species was described by R.S. Rogers in 1906 from plants collected near Myponga, but it has not been seen in that area for many years. It is usually found growing with *M. atrata* but the 2 are not known to hybridise.

3. **M. parviflora**. *Slender* or *green* or *swamp onion-orchid.* Plate 121

The name *parviflora* means small flowered.

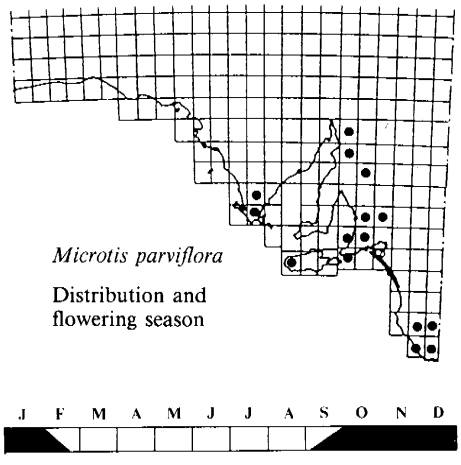
Ranging from short and stocky to tall and slender or even quite robust, wholly green; leaf long, usually with the tip senescent at flowering. Flowers numerous in a loose to very dense spike, deep-green, 2–3 mm across, their small size somewhat exaggerated by comparison with the swollen ovary which is often more than twice as large. Lateral sepals incurved. Labellum heart-shaped, about 1.5 mm long, apex acute or obtuse with a small decurved apiculus, margins undulate, entire, with a pair of dark-green calli at the base. Flowers not scented.

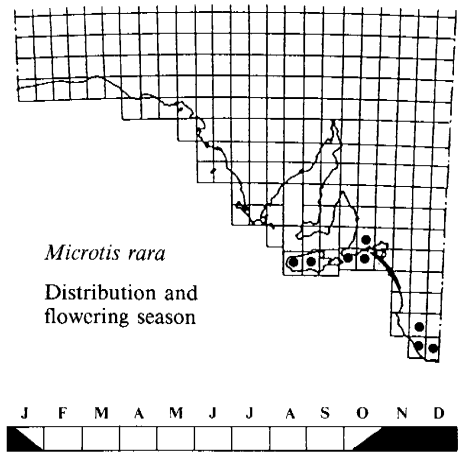
Locally common. Prefers damp forests and grasslands and may occur in swamps or bogland even after such habitat is largely converted to pasture. Forms small colonies by vegetative increase and flowers freely without fire in most areas. Colonises roadsides and firebreaks in damp places, competing well with weeds and grasses.

Occurs in all States except the Northern Territory. Also occurs in New Zealand, Pacific islands and Asia as far north as Japan.

Superficially similar to *M. unifolia* which is larger with yellower flowers, and an oblong labellum with a callus near the bilobed or emarginate apex. The 2 are thought to produce hybrids.

Easily grown in a variety of potting mixes, quickly filling any pot if kept cool and moist. It will grow in a fern house and may spread as a weed if the seed capsules are not removed before they open.





4. **M. rara**. (*M. oblonga*) *Sweet onion-orchid, slender mignonette orchid.* Plate 122

The name *rara* (far apart, sparse) refers to the flowers which are more widely spaced than in other microtis.

Slender, 10–45 cm high; scape emerging from a fistula near the base of the narrow-terete leaf which is long and loose and often overtops the inflorescence. Flowers few to many, widely

spaced, 3–5 mm in diam., pale-green; petals lanceolate, spreading; lateral sepals darker-green, tightly rolled. Labellum oblong, 4–5 mm long, almost as long as the ovary and deflexed against it, with a pair of dark callosities at the base and one near the rounded or emarginate apex; margins crenulate. Flowers sweetly scented.

Rare. Found mainly in swamps or deeply shaded creeksides where it forms small colonies by vegetative increase. In poorer soils it seldom flowers except after bushfires. Confined to high rainfall areas. Occurs in all States except the Northern Territory.

Similar to *M. unifolia* which has the flowers crowded, the leaf-fistula higher up, petals hidden within dorsal sepal and labellum usually less than half as long as the ovary. The 2 are thought to form hybrids.

Although it grows well in pots if kept cool and damp it does not flower freely.

The name *M. oblonga* has been applied to some forms but is now treated as a synonym of *M. rara*.

5. **M. unifolia**. *Common onion-orchid, wild mignonette orchid.* Plate 123

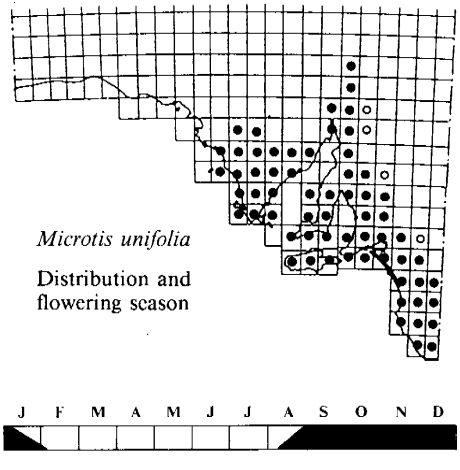
The name *unifolia* (one leaf) refers to the single very long leaf.

Generally rather robust, wholly green or yellow-green; scape often to 80 cm high with the leaf overtopping the spike. Flowers very numerous, to 150, moderately to very densely crowded on the spike, 3–4 mm across, ovary forming a rather large seed-capsule; petals hidden within the hooded dorsal sepal, lateral sepals strongly recurved. Labellum about 2–3 mm long, usually less than half as long as the ovary, with 2 conjoined dark-green glands at the base and 1 near the truncate or bilobed apex; margins undulate and papillose. Flowers rarely with a faint sweet scent.

Common and widespread through its range inside the 250 mm isohyet, from coastal sand hills, open forest, heath, mallee, swamps or creeksides to rocky outcrops far inland even appearing in lawns and gardens. In heavy scrub or dense forest plants may seldom flower except after bushfires. In pine plantations huge colonies may form through vegetative increase but hardly 1% of plants flower most years.

Occurs in all States except the Northern Territory, extending to New Zealand, Pacific islands and Asia.

Very variable with numerous forms even in a single area. The plants from swampy



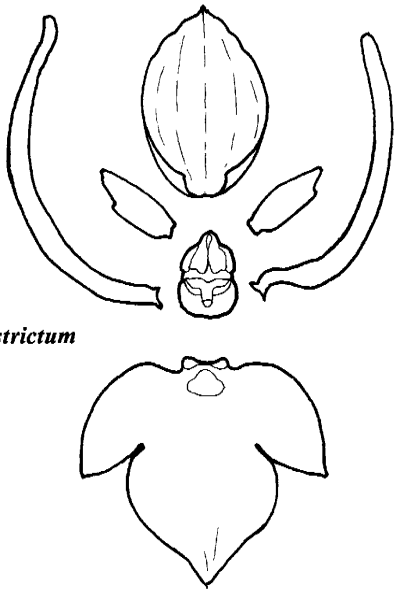
environments are often bright-green with blunt sepals and late-flowering, while plants in dry forest are yellowish and early-flowering (*M. frutetorum*). Plants from coastal sandhills are usually short and robust with a dense spike and pale-green flowers (*M. arenaria*). It is likely that *M. unifolia* as presently understood is really a complex of several taxa. Thought to form hybrids with *M. rara* and *M. parviflora* in disturbed areas.

Easy to grow in cultivation and even tends to become a weed in pots of other orchids, but not really an attractive plant. In a large pot with light soil mixture and if not over-watered it will vegetatively increase to form a dense mass of plants.

Most South Australian populations belong in the strict sense to *Microtis frutetorum* Schltd., a species recognised by its bilobed labellum with decurved apiculus.

ORTHOCERAS

Horned orchids



Orthoceras strictum

The name is derived from *orthos-* (straight, upright), *keras* (horn), and refers to the conspicuously erect horn-like lateral sepals.

Glabrous plants with ovoid tuberoids having a curious terminal elongation; leaves several, radical. Flowers resupinate, almost sessile and subtended by lanceolate-acuminate bracts exceeding the flowers; segments differentiated; petals minute; lateral sepals terete. Labellum 3-lobed. Column short, winged; anther 2-celled with 4 mealy or friable pollinia; stigma in front of the anther.

A genus of two species occurring also in New South Wales, Victoria and Tasmania and extending to New Zealand and New Caledonia.

While in bud the dorsal sepal is closed by the labellum. The stigma is oval in shape with the short diameter horizontal. At its base is a funnel-shaped hollow. The pollinia lie behind the stigma. As the flower matures and opens, the pollen masses drop out of the anther and fall onto a ridge at the back of the stigma, where they begin to germinate, their pollen tubes penetrating the rear of the stigma. The rostellum collapses onto the stigma. The labellum then

closes back into the dorsal sepal and the yellow conical callus of the labellum presses the sticky stigma back against the pollen masses thus ensuring fertilisation by self-pollination.

Surprisingly some plants are scented, but even if an insect does enter the flower it is unlikely to remove the pollen as the pollinarium is only loosely attached to the viscid disk.

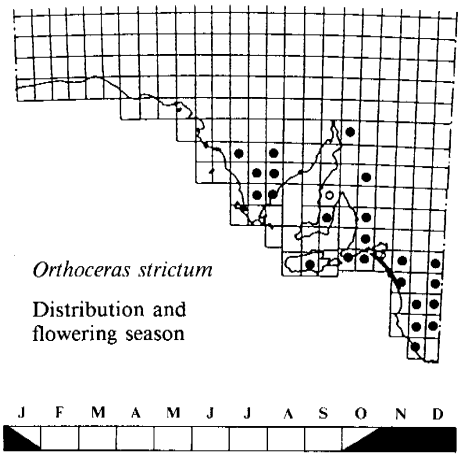
1. **O. strictum**. *Horned* or *crucifix orchid.* Plates 124 and 125

The name *strictum* (very upright, very straight), refers to the narrow upright lateral sepals.

Rigidly erect, 20–45 cm tall, brownish or green; leaves several, grass-like, erect. Flowers few to several, deep-maroon, brown and green, or wholly greenish, thick textured. Dorsal sepal large, cordate, about 1 cm long and hooded over column; lateral sepals, narrow-linear almost terete, the inner surface channelled, 2–3 cm long, erect or spreading somewhat like horns, hence the common name. Labellum spreading or reflexed, about as long as the dorsal sepal, 3-lobed, often with a yellow crucifix mark near the base. Flowers usually not scented but rarely sweet and spicy.

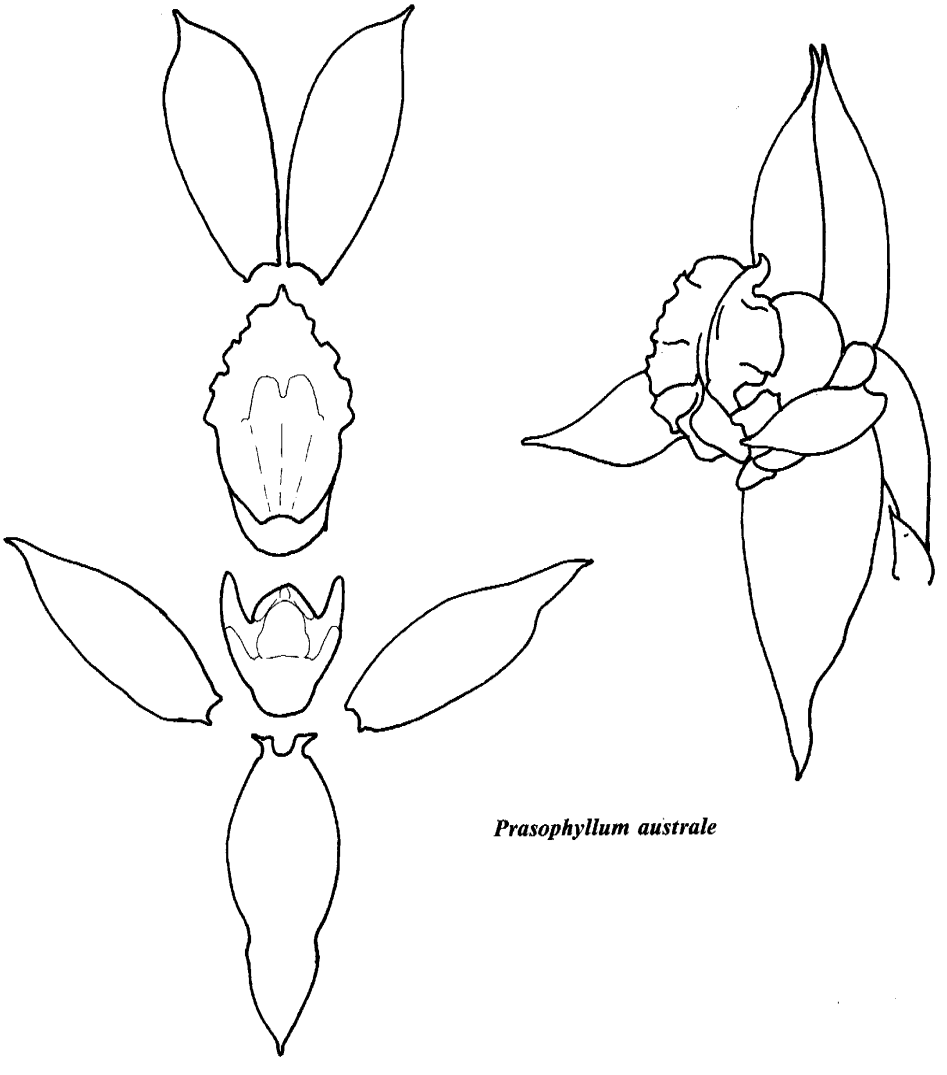
Widespread but uncommon. Occurs mainly in open places, especially in nitrogen deficient soils either in clay, sand or rocky places in forest, scrub or heath or occasionally in swamp. It is one of the last orchids to flower (extending into January), at which time the soil can be very dry and the leaves withered. In some areas the green flowered form blooms before the dark flowered one, yet in other areas this pattern is reversed. Where both forms occur and flower together intermediates may be noted which indicates that some outcrossing may occur. In good seasons magnificent specimens 45 cm tall and with up to a dozen flowers may be found on the swampy flats near Mount Crawford in the Adelaide Hills.

In cultivation needs to be grown in fairly infertile soil and not allowed to get wet in summer as tubers will quickly rot away. Usually grown as a botanical curiosity.



PRASOPHYLLUM

Leek-orchids and Midge-orchids



Prasophyllum australe

The name *Prasophyllum* is derived from *prason* (leek), *phyllon* (leaf), and refers to the leek-like, sheathing leaf.

Glabrous plants with ovoid or globose tuberoids; leaf single, cylindrical, closely sheathing the scape sometimes even to the base of the inflorescence, blade terete; scape erect with several to many small brownish, purple or greenish flowers, not resupinate. Labellum above the column with a single callus plate; dorsal sepal concave; lateral sepals usually as long as the dorsal, narrower, lanceolate, free or connate or spreading; petals shorter and narrower. Column very short, a stigmatic plate carrying stigma and rostellum standing erect in front, anther 2-celled with 2 pollinia, the pollen sectile (in numerous small oblong masses).

In Australia 80–90 species, a few in New Zealand and 1 in New Caledonia.

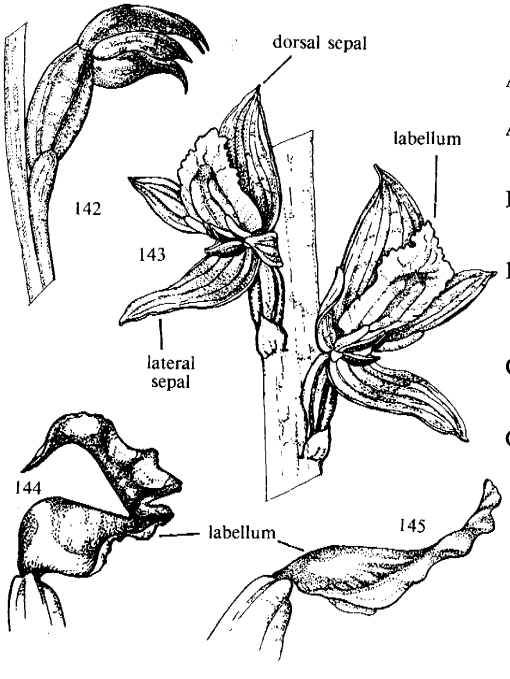
Prasophyllum is a genus of two distinct sections, now considered to be different genera.

I. Leaf clasping the scape, with its fistula usually well below the inflorescence; labellum not on a movable claw (Figs 144 & 145). Spring-flowering plants . . . . . Sect. I. *Prasophyllum*— Leek-Orchids

II. Leaf clasping the scape with its fistula high up near the base of the inflorescence; labellum on a movable claw (Figs 164, 166 & 167). Autumn-flowering plants . . . Sect. II. *Genoplesium*— Midge-Orchids

Section I. ***Prasophyllum***—Leek-orchids

The flowers are often delightfully scented, many offering nectar, either free on the labellum or in cells within the callus plate which must be punctured by visiting insects. Visitors include many nectar seeking insects but the most effective pollinators are wasps and bees which are able to puncture the nectar cells and are also the insects which place themselves correctly to receive pollinia by crawling into the flower in the upside down position. In cool weather wasps are less active and the flowers are frequently visited by beetles and flies which may also transfer pollinia. The flowers are very successful in attracting pollinators and pollination success rates are very high, usually close to 100%. At least one species in South Australia appears to be apomictic (*P. goldsackii*), its flowers do not effectively open but regularly set seed.



A. Ovary slender and appressed to the stem (Fig. 143) . . . . . B.

A. Ovary turgid and standing out from the stem (Fig. 142) . . . . . C.

B. Labellum base swollen, lamina acutely recurved about the middle (Fig. 144) . . . . . *P. australe* 1.

B. Labellum base not swollen, lamina slightly recurved (Fig. 145) . . . . . *P. elatum* 2.

C. Flowers freely expanding (Fig. 143); perianth-segments green to reddish . . . . . D.

C. Flowers not expanding (Fig. 142); perianth-segments very dark and parchment-like . . . . *P. goldsackii* 8.

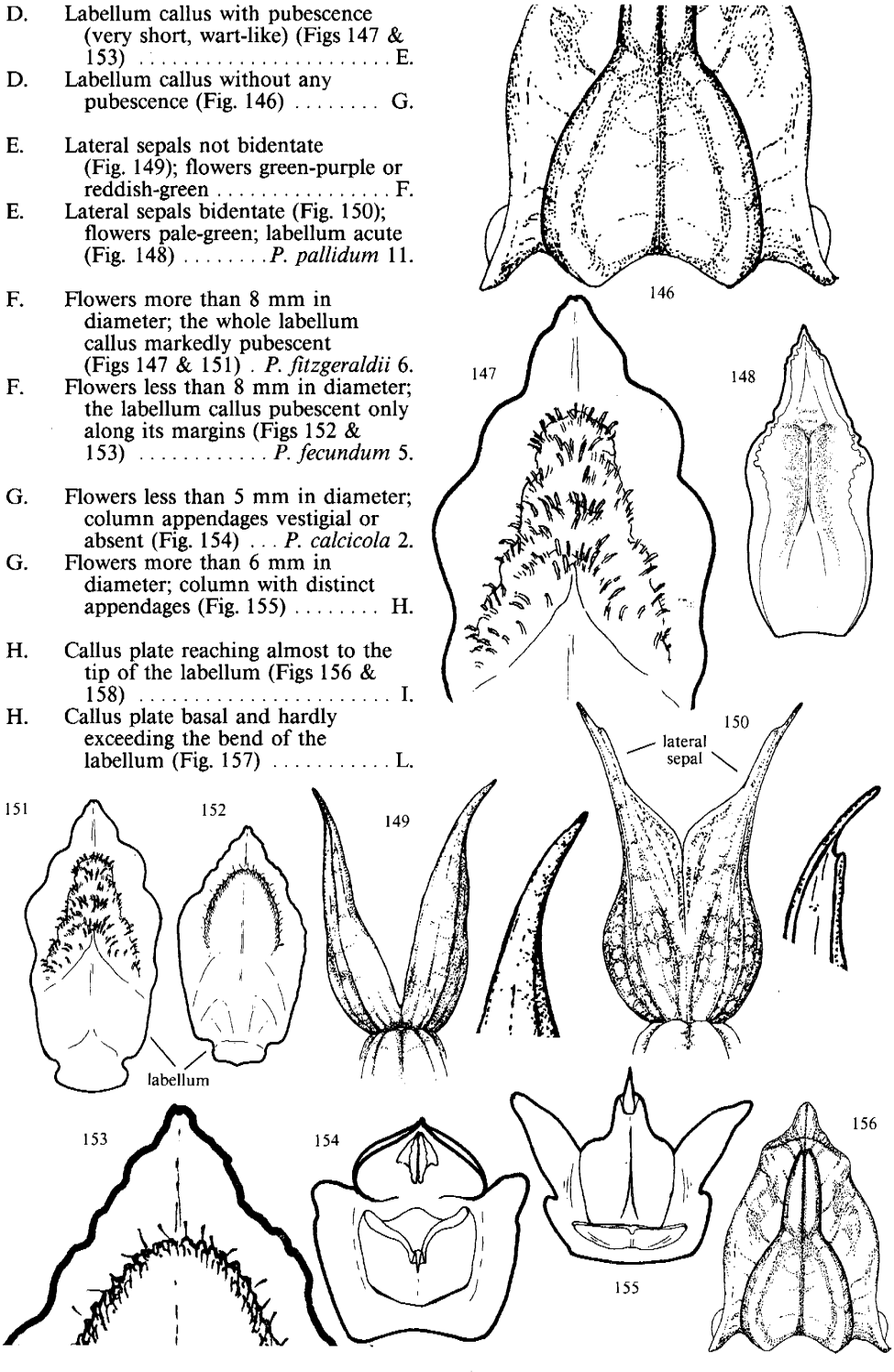
D. Labellum callus with pubescence (very short, wart-like) (Figs 147 & 153) ..... E.
D. Labellum callus without any pubescence (Fig. 146) ..... G.

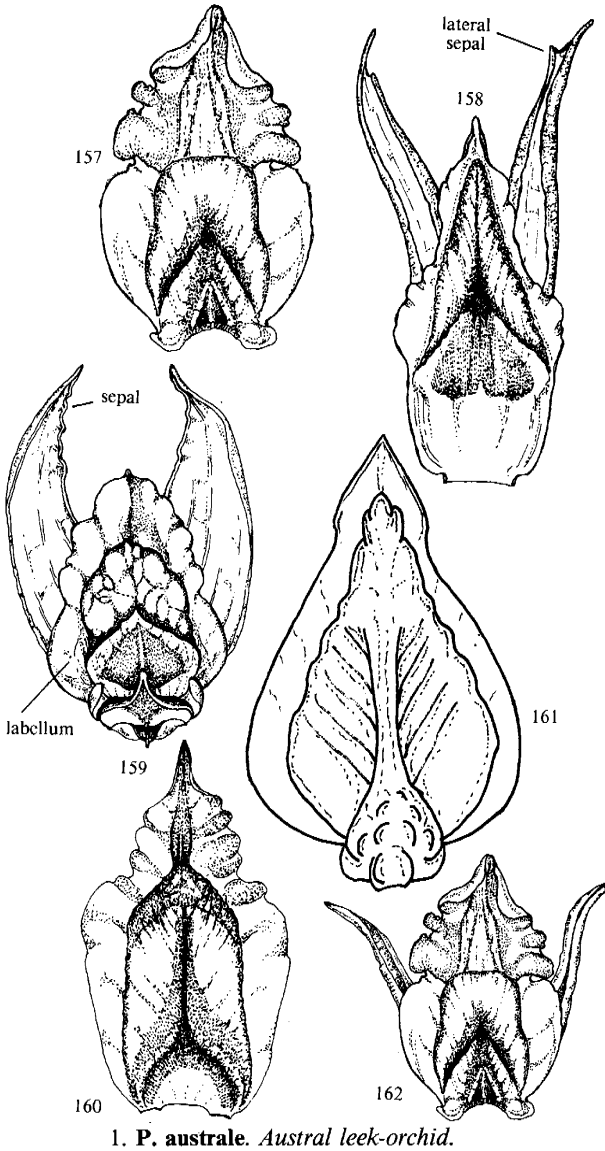
E. Lateral sepals not bidentate (Fig. 149); flowers green-purple or reddish-green ..... F.
E. Lateral sepals bidentate (Fig. 150); flowers pale-green; labellum acute (Fig. 148) ..... *P. pallidum* 11.

F. Flowers more than 8 mm in diameter; the whole labellum callus markedly pubescent (Figs 147 & 151) . *P. fitzgeraldii* 6.
F. Flowers less than 8 mm in diameter; the labellum callus pubescent only along its margins (Figs 152 & 153) ..... *P. fecundum* 5.

G. Flowers less than 5 mm in diameter; column appendages vestigial or absent (Fig. 154) ... *P. calcicola* 2.
G. Flowers more than 6 mm in diameter; column with distinct appendages (Fig. 155) ..... H.

H. Callus plate reaching almost to the tip of the labellum (Figs 156 & 158) ..... I.
H. Callus plate basal and hardly exceeding the bend of the labellum (Fig. 157) ..... L.





I. Callus plate not raised ..... *P. occultans* 10.
I. Callus plate distinctly raised (Figs 158 & 160) ..... J.

J. Lateral sepals shorter than 8 mm; labellum callus more prominent in basal than in distal part (Fig. 160) ..... *P. occidentale* 9.
J. Lateral sepals longer than 8 mm; labellum callus not prominent in basal section but much raised in distal part (Fig. 158) ..... K.

K. Lateral sepals free in older flowers (Fig. 149); callus plate nearly as wide as the labellum and lamina usually constricted distally (Fig. 158) ..... *P. constrictum* 3.
K. Lateral sepals connate in the older flowers (Fig. 150); callus plate narrower than the labellum (Fig. 161) ..... *P. validum* 14.

L. Callus plate much raised, verrucose or tuberculate (Fig. 159) ..... *P. frenchii* 7.
L. Callus plate hardly raised, smooth (Fig. 146) ..... M.

M. Lateral sepals widely divergent (Fig. 162); labellum voluminous (Fig. 157), acutely reflexed up to 180° (Fig. 144)..... *P. patens* 12.
M. Lateral sepals more or less parallel (Figs 158 & 159); labellum narrow and gradually reflexed to 90° (Fig. 145) ..... *P. pruinosum* 13.

1. **P. australe**. *Austral leek-orchid.* Plate 126

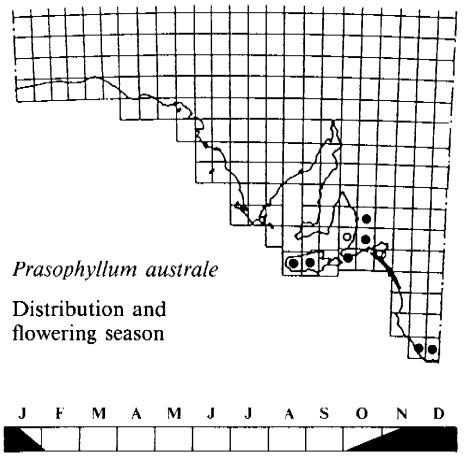
The name *australe* (southern), refers to the distribution of the species which was first collected in southern Tasmania.

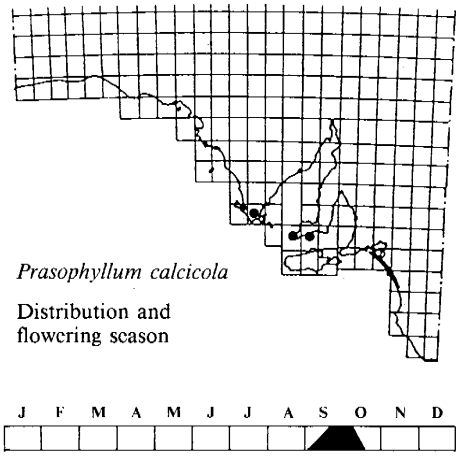
Slender to robust but less than 1 m high; leaf base with vertical red stripes, its apex rigidly erect. Flowers numerous in a loose spike, green, brown and white, up to 1 cm in diameter on a narrow elongated ovary appressed to the scape; sepals ovate-lanceolate, about 8 mm long, lateral sepals erect, connate at the base or joined for nearly the whole of their length. Labellum sessile, less than 1 cm long, conspicuously white, standing more or less horizontally from an erect, very inflated base, sharply recurved from about the middle, recurved portion broadly oblong, crisped, with undulate margins and a blunt apex; callus green with 2 much raised ridges at the base abruptly ending near the bend. Flowers strongly and sweetly scented.

Widespread but never common, forms small colonies in swampy or boggy places but

seldom flowering unless disturbed by burning, mowing or grazing. Also occurs in the eastern States.

Pollinated by wasps but the flowers often harbour colourful jewel beetles and small spiders which match the colour and pattern of the flowers. (Plate).





2. **P. calcicola.** Plate 127

The name refers to plants which thrive in soils rich in calcium carbonate (limestone).

Dwarfed, to 10 cm high (the smallest leek-orchid); leaf red-based, filiform above the dilated fistula. Flowers few to 20, 3–4 mm diam., green with red edges, in a loose raceme, standing well out from the reddish scape on comparatively large ovaries; sepals lanceolate, to 3 mm long, lateral sepals connate for at least half their length; petals to 2 mm long. Labellum fleshy, green with maroon tints, recurved at right angles near the middle, smooth; callus plate dark-green and triangular. Column appendages absent or vestigial. Flowers with a faint sweet scent.

Rare throughout its range, found only near the coast on travertine limestone or in calcareous sand under mallee-heath and flowering without fire stimulation.

Not suitable for cultivation.

Previously included with *P. macrostachyum*, this coastal limestone lover is now treated as a distinct species. Also in Western Australia.

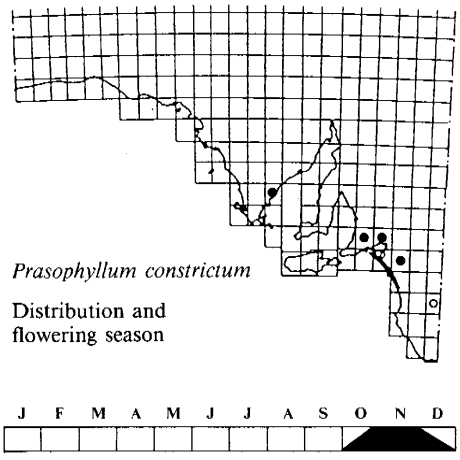
3. **P. constrictum**. *Tawny* or *graceful leek-orchids.* Plate 128

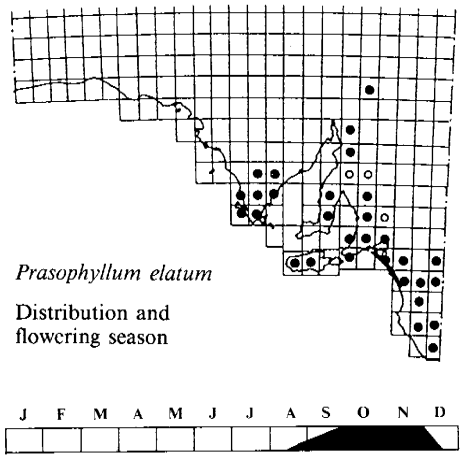
The name refers to the constricted labellum near the tip.

Slender to very robust plants 10–60 cm high; leaf greenish, usually with a red base, its apex long and lax. Flowers numerous in a moderately dense raceme on slender obovoid ovaries standing out from the scape, ranging from 5–10 mm in diam., in various shades of red-brown, purple and green, or wholly greenish; sepals lanceolate, lateral sepals suberect with upper parts often recurved, free or connate, apices acute and more or less bidentate. Labellum shortly clawed or sessile, lamina oblong-cuneate, flat, basal portion suberect, distal one-third recurved at right angles, often constricted past the bend; callus glistening, green, viscid, more or less raised, broad at the base, extending as a narrow band towards the apex. Column appendages blunt, lobed at the base. Very variable.

Flowers scented, often with a strong sweet or honey-like odour.

Found in a variety of habitats but most frequent in poor forest in higher parts of the Adelaide Hills where it flowers only after bushfires. Previously known in South Australia as *P. fuscum* but *P. fuscum* in the narrow sense is endemic to New South Wales. *P. gracile* is another name previously applied to these plants but is illegitimate. The name *P. constrictum* is the earliest name available for South Australian plants but the type collection was made near Tailem Bend on the River Murray and it is possible that the Adelaide Hills plants do not represent the same taxon, and should be referred to *P. pyriforme.*





4. **P. elatum**. *Tall leek-orchid.* Plates 129 and 130

The name *elatum* (tall), refers to the habit of the plant.

Often very robust to 1.5 m tall, but commonly between 50–120 cm; leaf wholly dark purple or green, the apex rigidly erect. Flowers numerous, sessile, crowded, in a spike to 50 cm long, in shades of dark-purple and brown or yellow-green and cream or white, 1–2 cm in diameter, on a narrow ovary appressed to the scape; sepals about 1 cm long, lanceolate; lateral sepals flat, often connate from about the middle to the apex. Labellum sessile, ovate, to 1 cm long, almost erect, slightly and gently recurved in the upper third where it is crenulate, white and crisped; callus plate green, ovate, and ending well before the tip of the labellum. Flowers very faintly honey scented.

Widespread within the 300 mm isohyet. Found singly or in small groups in a wide variety of soils from coastal sand hills to heath, mallee-heath, scrubs, swamp margins and heavy forest but in most places flowering only after disturbance or bushfires. In some places the plants may not flower for many years, then following a fire appear in thousands. It has been reported flowering in cereal crops planted on recently cleared land with the flowering spikes raised above the heads of grain. Common in the Adelaide Hills after bushfires. Occurs in all States except the Northern Territory.

In cultivation it is easy to grow but does not flower freely without some stimulation (ethylene gas has been used).

Leaves on non-flowering plants are usually small and spindly and although they may contain some dark pigment are basically green. These same plants after a bushfire may produce completely deep-maroon leaves (sometimes 5 times their normal diameter). This colour makes the plants look like dead sticks and probably gives them some protective camouflage. *P. elatum* is the tallest of the South Australian orchids.

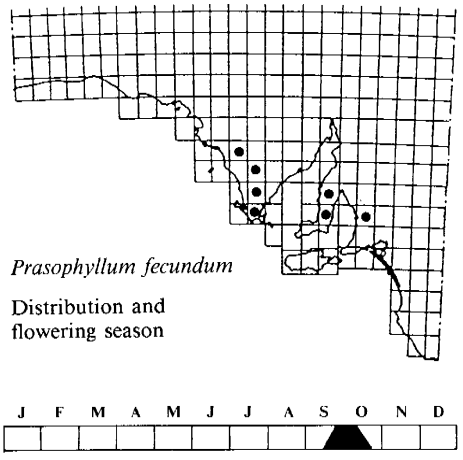
5. **P. fecundum.** Plate 131

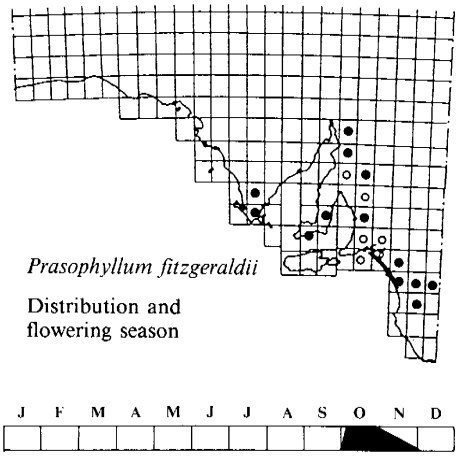
The name *fecundum* (fruitful) refers to the ovaries which swell rapidly and are soon larger than the flower.

Rather slender to 25 cm high; leaf with red base, about as high as the inflorescence. Flowers few, in a loose spike, on turgid ovaries standing out from the scape, green and red-brown, less than 1 cm across. Dorsal sepal lanceolate, hardly 6 mm long, flat, recurved; lateral sepals narrower, free in mature flower and slightly divergent, petals shorter and bluntly linear. Labellum sessile, ovate, less than 5 mm long, usually purple, recurved almost at right angles at the middle with crisped anterior margins; callus shiny, inconspicuous in the basal half, raised at the bend, abruptly ending at the tip and pubescent only along its margins. Flowers strongly scented.

Widespread but localised. Endemic to South Australia. Grows in sandy scrubland, heath and limestone country or rocky places inland. This species sometimes occurs with *P. fitzgeraldii*, flowering earlier than that species however and not forming intermediates with it.

Not suitable for cultivation as the flowers are insignificant. It is self-pollinated or apomictic, the flowers short lived.





6. **P. fitzgeraldii.** *Fitzgerald's leek-orchid.* Plate 132

R.S. Rogers (1909) named this species in honour after R.D. Fitzgerald (1830–1892), an Australian botanical artist of Irish birth.

Slender plant, rarely robust, 10–45 cm tall; leaf reddish basally, the apex long and lax. Flowers several to many in a sparse to moderately dense spike, on turgid ovaries standing out from the scape; purple, green and red-brown usually about 1 cm across; sepals lanceolate, to 8 mm long, lateral sepals free in mature flower, slightly divergent, petals bluntly linear, shorter. Labellum sessile, ovate, c. 5 mm long, usually purple, recurved almost at right angles near the middle, with crisped anterior margins. Callus usually prune coloured, triangular, raised and shortly pubescent all over. Flowers sweetly scented, in some forms very strongly so.

Very variable species, the grassland form (with which Rogers was familiar) is quite a stout plant with strongly coloured flowers in a rather dense spike, the more common form from stunted forest and heathland is slender, pale coloured with fewer flowers. Other forms include a green flowered one with strongly divergent sepals from the south-east and a narrow-segmented form with deep purple flowers from the Flinders Ranges. Apparently endemic to South Australia. Rare in the Adelaide Hills.

Has potential in cultivation as the combination of colour and fragrance makes it attractive. It does not appear difficult to grow but is a shy flowerer. Prefers a rich soil mixture and light shade.

7. **P. frenchii**. *Maroon leek-orchid.* Plate 133

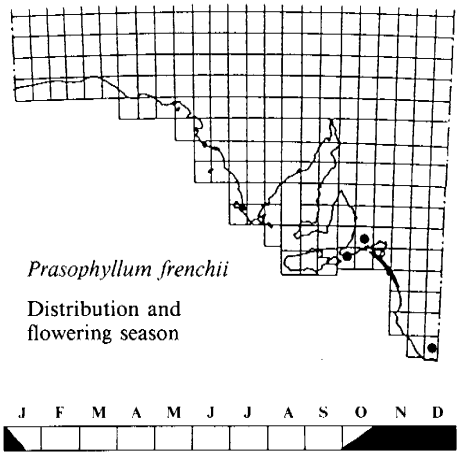
Ferdinand Mueller (1889) named this species in honour of G. French who collected the type specimen near Melbourne.

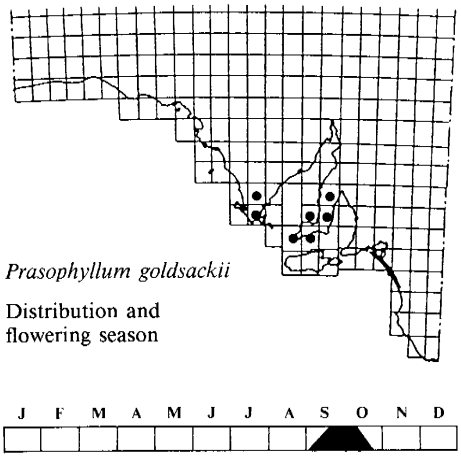
Slender to quite robust, wholly greenish or with a red base to the leaf, 10–60 cm high; apex long and lax. Flowers numerous in a loose to quite dense spike, pink, red-brown, yellow and green, to 1 cm diam.; sepals lanceolate, dorsal sepal broader than the free divergent lateral sepals, petals rather blunt, spreading. Labellum sessile, ovate-cuneate to 7 mm long, with a broad inflated base, shorter than the sepals, recurved near the middle with pinkish or purplish, sometimes white margins, relatively thick, slightly undulate towards the small recurved tip; callus greenish, semi-circular, thick and verrucose, not extending far beyond the bend. Flowers sweetly scented.

Rare and restricted to a few permanent swamps and marshy meadows; flowering freely without disturbance or fire. Also in Victoria.

Until recently more commonly known by its synonym *P. hartii*.

Has been cultivated in Adelaide but needs to be kept damp at flowering time. Some quite attractive forms exist.





8. **P. goldsackii**. Plate 134

The name honours Harold Goldsack, an authority on South Australian orchids and collector of the type specimens.

This quaint plant is rather slender, to 30 cm high; leaf lax, red or green basally, longer than the inflorescence. Flowers few to several in a loose raceme on turgid ovaries inclined from the scape at an acute angle; flower segments very dark-brown, parchment-like, dorsal sepal ovate, to 4 mm long, lateral sepals longer, broad-lanceolate, partly free; petals much shorter. Labellum triangular, less than 5 mm long, green with pale-prune coloured edges; callus plate green, brownish or purple, concave at the base extending into 2 ridges just beyond the bend.

Occurs mainly in areas of travertine limestone, in terra rosa soils or calcareous sands, under mallee or in open scrublands. Flowering freely without disturbance or fire, the flowers hardly opening, self-pollinated. Endemic to South Australia and locally common, although suffering considerable loss of its habitat due to expansion of agricultural activities. Often overlooked as the flowers appear to be either in bud or past flowering.

Not suitable for cultivation except as a curiosity.

Quite common on southern Yorke Peninsula.

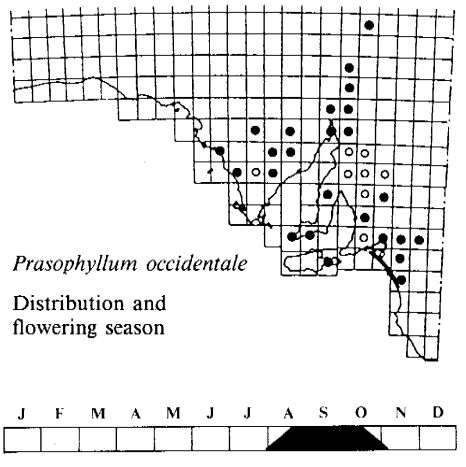
9. **P. occidentale**. *Plains leek-orchid.* Plate 135

The name *occidentale* (western) refers to the first collection of the species on the west coast of South Australia (Streaky Bay).

Slender, 10–30 cm high. Flowers small, generally pale yellow-green but sometimes with purplish tints; sepals 5–7 mm long, commonly conjoined. Labellum with a triangular, pale-coloured lamina, margins crenulate, the callus plate broad before the bend but narrow and slightly more raised beyond, usually terminating well before the apex.

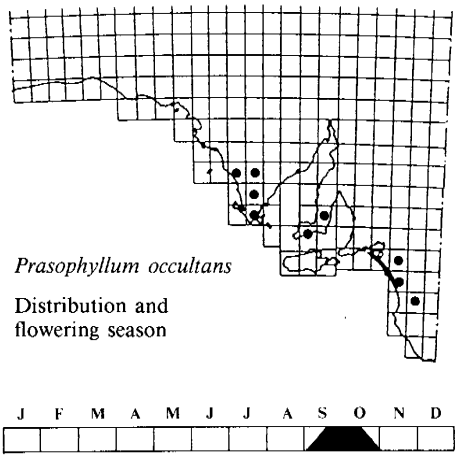
Occurs in grassy open woodland usually in fertile soils especially in the wheat belt and flowering freely without fire. Extends into very dry country in the Gawler and northern Flinders Ranges. Population sizes increase dramatically after a series of good years and the species has even been found recolonising previously cultivated farmland but most of its habitat has been put under the plough. Also in western Victoria.

Has previously been treated as a variety of *P. fuscum* but its smaller paler flowers, less raised callus, crenulate labellum margins and earlier flowering serve to set it apart.



Prasophyllum occidentale

Distribution and flowering season



Prasophyllum occultans

Distribution and flowering season

10. **P. occultans.** Plate 136

The name *occultans* (hidden) refers to the dull coloured flowers. The plants are usually well hidden under shrubs and are not easily found.

Slender, often dwarfed, 10–20 cm high; leaf base green or red. Flowers few to 15 in a loose spike, greenish, about 6 mm in diam.; lateral sepals free, divergent. Labellum sessile, oblong-cuneate, margins crenulate; callus plate triangular, hardly raised, dull green, with some minor pubescence about its lower border.

Found on calcareous soils in mallee-heath. Flowering freely.

In the past it has been confused with *P. occidentale* which has a longer and narrower labellum with a glistening green callus plate and without any pubescence on the lamina.

Has done well in cultivation, flowering earlier than other prasophyllums (leek orchids).

11. **P. pallidum**. *Pale leek-orchid.* Plate 137

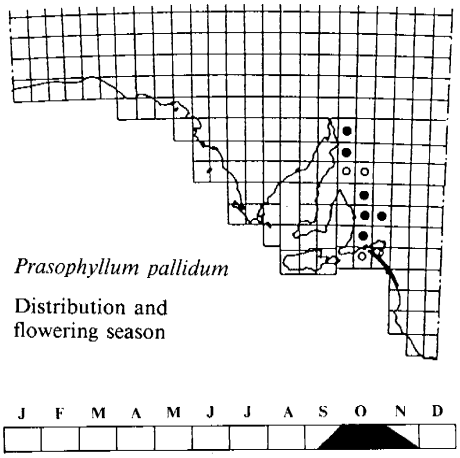
The name *pallidum* (pale), refers to the colour of the plant.

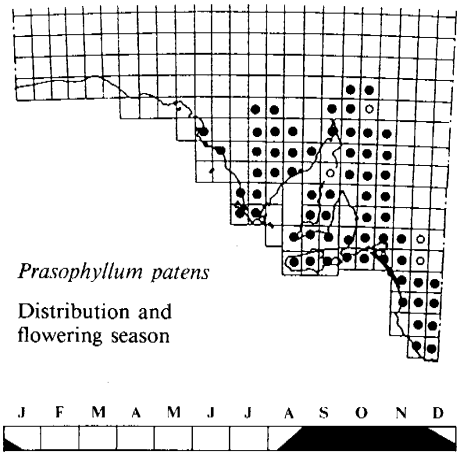
Slender, almost wholly green or yellowish-green to 30 cm high; leaf long, lax and nearly exceeding the inflorescence. Flowers many, in loose spikes on turgid ovaries standing out from the scape, uniformly pale-green, 6–8 mm in diam.; sepals lanceolate, lateral sepals about 7 mm long, connate at base or free, parallel, with bidentate points; petals smaller and bluntly linear. Labellum ovate-cuneate about 5 mm long, recurved abruptly about the middle with crenulate and shortly ciliate margins; callus plate green, not conspicuously raised, reaching nearly to the tip with a dense but short wart-like pubescence. At the base of the column there is often a conical or claw-like appendage. Flowers sweet scented but apparently self-pollinated or even apomictic (agamospermus).

Apparently endemic to South Australia, rather restricted in its range, mainly in fertile soils in grassy open forest in areas of greater than 750 mm annual rainfall. Does not normally require a fire to stimulate flowering, however among dense vegetation flowering is improved after fires. Once reported from Victoria (Grampians).

Similar to the normally purple flowered *P. fitzgeraldii* which does have some pale coloured forms [but these are never wholly greenish nor do they have such a broad callus plate or the spur at the base of the labellum].

Does fairly well in cultivation if placed in an open sunny position.





12. **P. patens**. *Scented leek-orchid, broad-lip leek-orchid.* Plate 139

The name *patens* (spreading, outspread), refers to the free and spreading lateral sepals.

Slender to robust, 10–60 cm high; leaf red at base. Flowers numerous in a loose to quite dense spike, on turgid ovaries standing out from the stem; predominantly white and green but often with pink or red tints. Sepals widely divergent; labellum clear white (rarely pink)

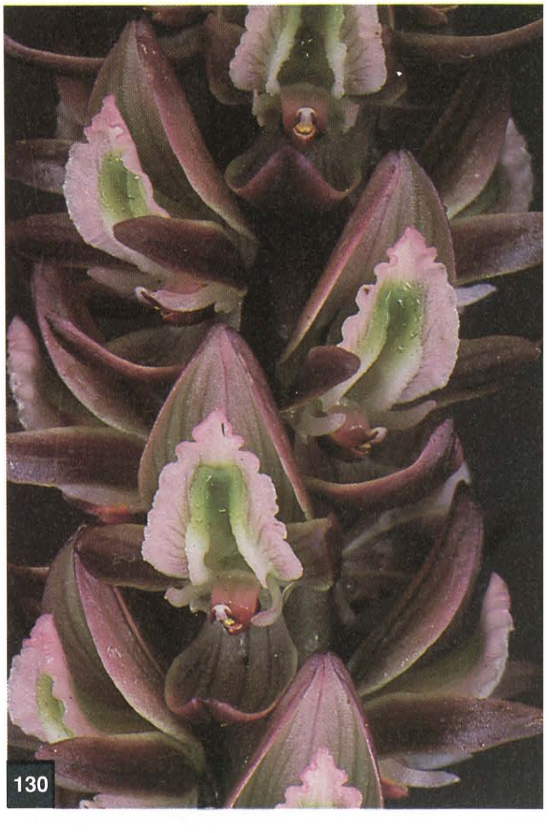


Plate 127. The tiny flowered *Prasophyllum calcicola* from southern Yorke Peninsula.

Plate 128. This form of *Prasophyllum constrictum* from near Adelaide, flowers only after bushfires.

Plate 129. Tall spikes of *Prasophyllum elatum*, resembling the *Xanthorrhoea* spikes amongst which they flower in burnt woodland.

Plate 130. Colourful form of *Prasophyllum elatum* from the Adelaide Hills.

Plate 131. *Prasophyllum fecundum*, flower spike from near Minlaton, Yorke Peninsula.

Plate 132. This form of *Prasophyllum fitzgeraldii* from the Barossa Valley has a pale purple labellum of a velvety texture.

Plate 133. This colourful form of *Prasophyllum frenchii* from swamps near Victor Harbor is beautifully scented.

Plate 134. *Prasophyllum goldsackii* is a dark flowered South Australian endemic with non-opening flowers.

Plate 135. *Prasophyllum occidentale* from grassy woodland near Moonta. Flowers are normally dull coloured but brightly hued flowers occur in some populations.

Plate 136. *Prasophyllum occultans*, flower spike from southern Yorke Peninsula. Note the swollen ovaries even on unopened flowers.

Plate 137. This South Australian endemic, *Prasophyllum pallidum* photographed in the Adelaide Hills, has a pale, velvety labellum.

Plate 138. This the coastal form of *Prasophyllum patens* (*P. odoratum*) from southern Yorke Peninsula

Plate 139. *Prasophyllum patens* includes colourful forms such as this one from the Adelaide Hills. Also known as *P. odoratum*.

Plate 140. *Prasophyllum pruinosum* is endemic to the Mt Lofty Ranges. (This specimen from an Adelaide suburb has an attendant spider).

Plate 141. A large stand of the rare *Prasophyllum validum* in open woodland near Melrose.

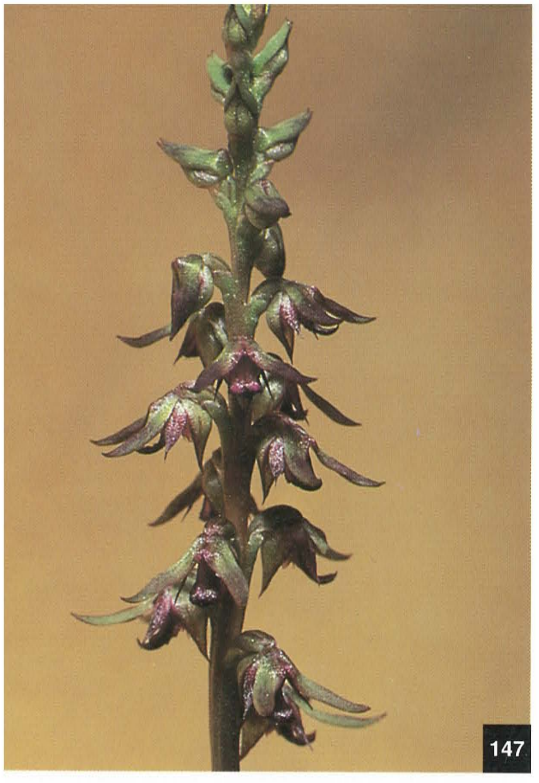
Plate 142. The large flowers of *Prasophyllum validum* are always greenish with strongly connate lateral sepals.

Plate 143. The tiny *(Prasophyllum) Genoplesium archeri* from near Mt Gambier in the lower south-east has densely ciliated labellum margins.

Plate 144. *(Prasophyllum) Genoplesium despectans* with all segments needle-pointed is extremely difficult to locate in its heathland environment near Mt Gambier in the lower south-east.

Plate 145. *(Prasophyllum) Genoplesium morrisii* has been found in southern Victoria near the South Australian border.

Plate 146. *(Prasophyllum) Genoplesium nigricans* is the most common midge orchid in South Australia. This is the common form with contrasting maroon labellum from near Port Lincoln.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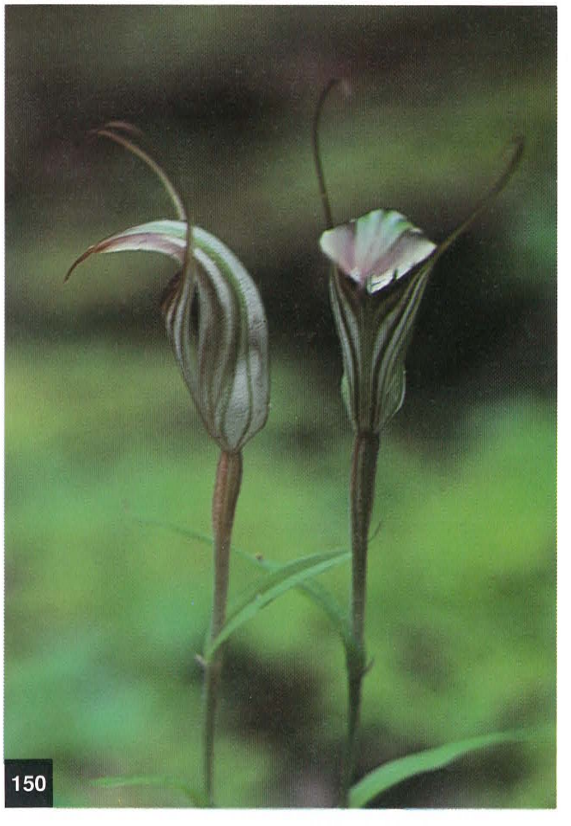
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Plate 147. *(Prasophyllum) Genoplesium rufum*. This spike from the Adelaide Hills exhibits the usual colours of purple-brown and green suffused.

Plate 148. A colony of *Pterostylis alata* near Penola. Note the non-flowering leaf rosettes separate from flowering plants.

Plate 149. The Adelaide Hills form of *Pterostylis alata* showing the very short front to the hood.

Plate 150. A form of *Pterostylis alata* from the lower South-east showing the long acuminate hood.

Plate 151. *Pterostylis* aff. *aphylla* from a swamp in the Adelaide Hills. The flowers face into the scape and each other.

Plate 152. *Pterostylis arenicola* from red sands under native pine (*Callitris*) forest along the River Murray.

Plate 153. A long sepalled form of *Pterostylis biseta* from near Murray Bridge.

Plate 154. *Pterostylis biseta* flower showing the distinctive pair of whiskers or setae. Note also the very broad transparent petals on the hood.

Plate 155. A hairy Sikh's whiskers *Pterostylis boormanii* from the northern Flinders Range.

Plate 156. *Pterostylis concinna* with the notched tip of the labellum protruding from the flower.

Plate 157. A large colony of the tall, forest-form of *Pterostylis cucullata* in the Adelaide Hills.

Plate 158. *Pterostylis cucullata* flower showing the rich velvety-brown sepals.

Plate 159. *Pterostylis nutans* (left), *P. cucullata* (right) and their natural hybrid (centre flower).

Plate 160. *Pterostylis curta* massed in the Adelaide Hills.

Plate 161. *Pterostylis curta* flower from the Adelaide Hills showing the characteristic twisted labellum.

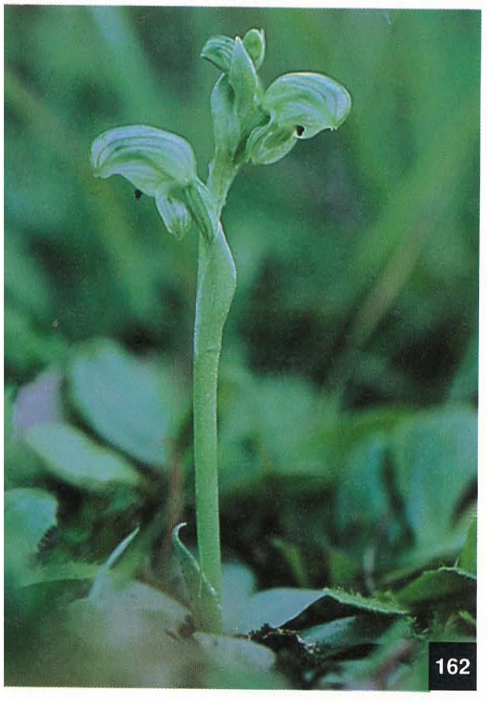


Plate 162. The tall stemmed mountain variant of *Pterostylis cycnocephala* in the Adelaide Hills.

Plate 163. A bizarre form of *Pterostylis* aff. *despectans* photographed in the northern Mt Lofty Range. The very long pedicels place the flowers on the ground.

Plate 164. A summer flowered form of *Pterostylis despectans* from Eyre Peninsula.

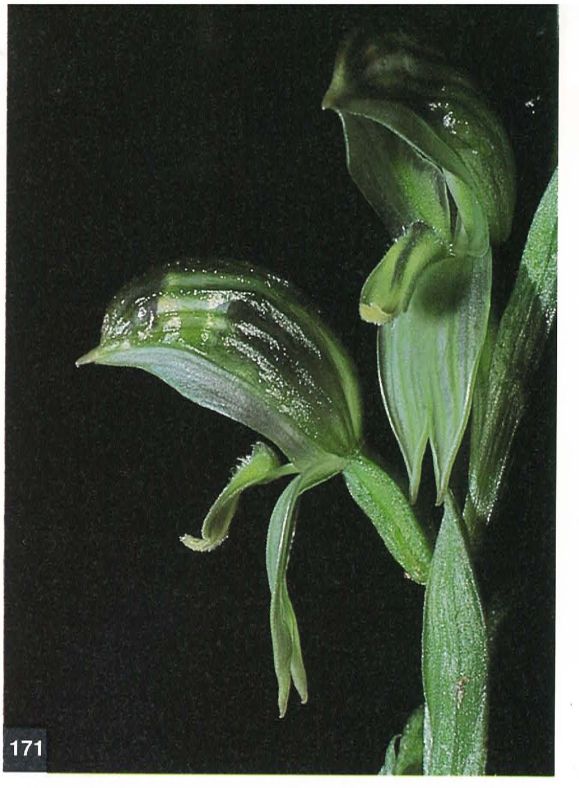
Plate 165. *Pterostylis dolichochila* in a shady native pine grove near the River Murray. Note the red and white flowers and the long narrow labellum.

Plate 166. The tricoloured *Pterostylis erythroconcha* from Yorke Peninsula has a thick labellum protruding from the hood.

Plate 167. The tall dryland species *Pterostylis excelsa* from Eyre Peninsula has narrow segments and a fleshy labellum.

Plate 168. *Pterostylis foliata* from near Adelaide. Note the upright leaves and protruding labellum.

Plate 169. *Pterostylis furcata* in deep shade of closed forest near Millicent.



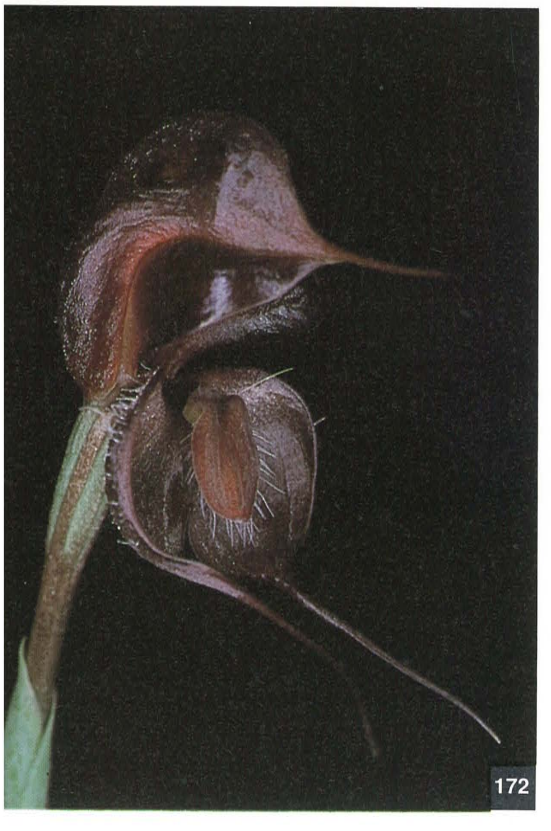


Plate 170. *Pterostylis* x *ingens*. A cultivated plant.

Plate 171. *Pterostylis longifolia* with deep green flowers of the tall forest form in the Adelaide Hills.

Plate 172. *Pterostylis maxima*, deep red flowered form from near the Victorian border.

Plate 173. *Pterostylis mutica*, a lover of dry places. Shown here in a gorge of the northern Flinders Ranges.

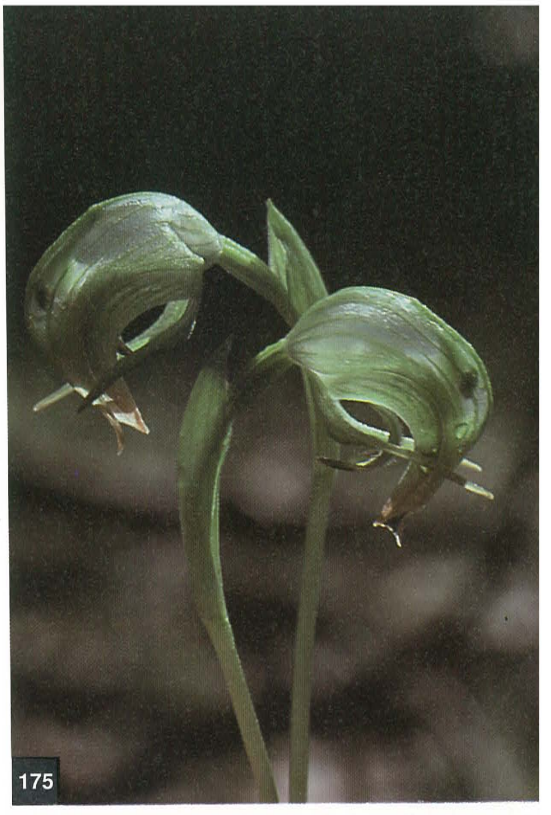


Plate 174. A long sepalled form of *Pterostylis nana* photographed in the Adelaide Hills.

Plate 175. *Pterostylis nutans* the nodding green-hood in southern Yorke Peninsula. In a sunlit glade the top of the column can clearly be seen within the translucent hood.

Plate 176. *Pterostylis obtusa* near Hindmarsh Falls.

Plate 177. *Pterostylis ovata* on a granite outcrop in northern Eyre Peninsula showing the large flowers on a short scape.

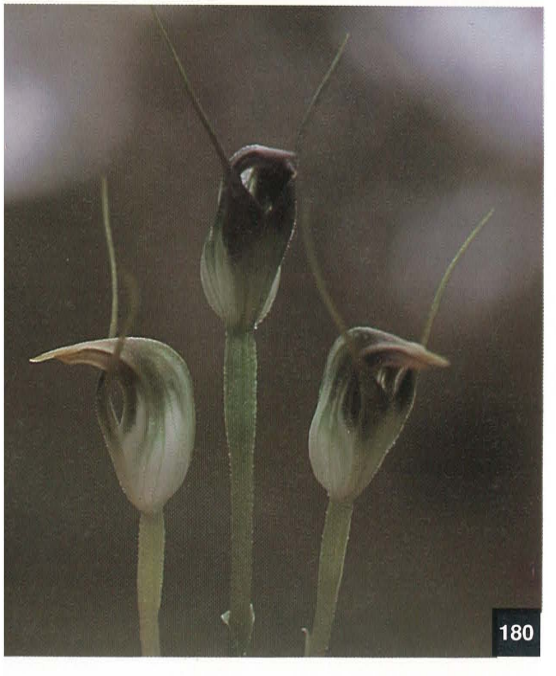
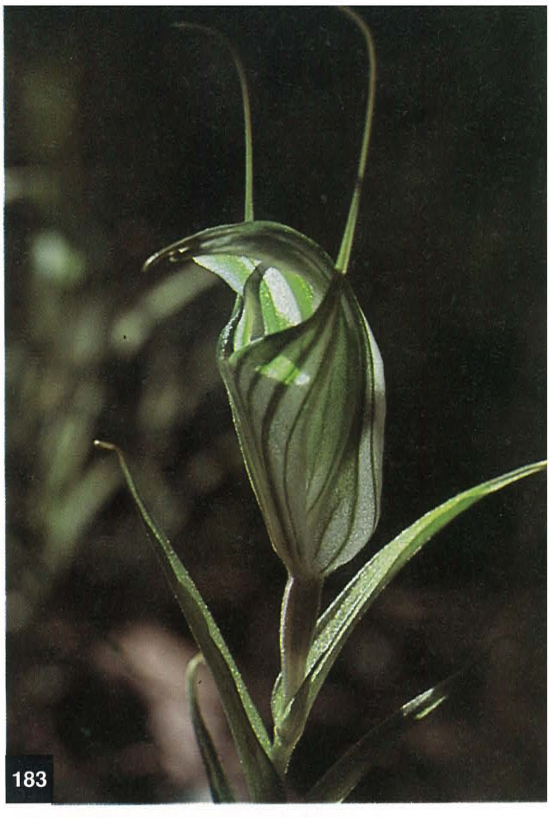


Plate 178. *Pterostylis* aff. *parviflora* on a fire break, north of Mt Gambier. Flower spikes emerge in autumn before the leaf rosettes appear.

Plate 179. *Pterostylis* aff. *parviflora* flower spike showing the tricoloured flowers.

Plate 180. *Pterostylis pedunculata* from near Victor Harbor with its dark coloured hood.

Plate 181. *Pterostylis plumosa* from Eyre Peninsula is showing the hairy, yellow plumed labellum which shivers in the breeze.



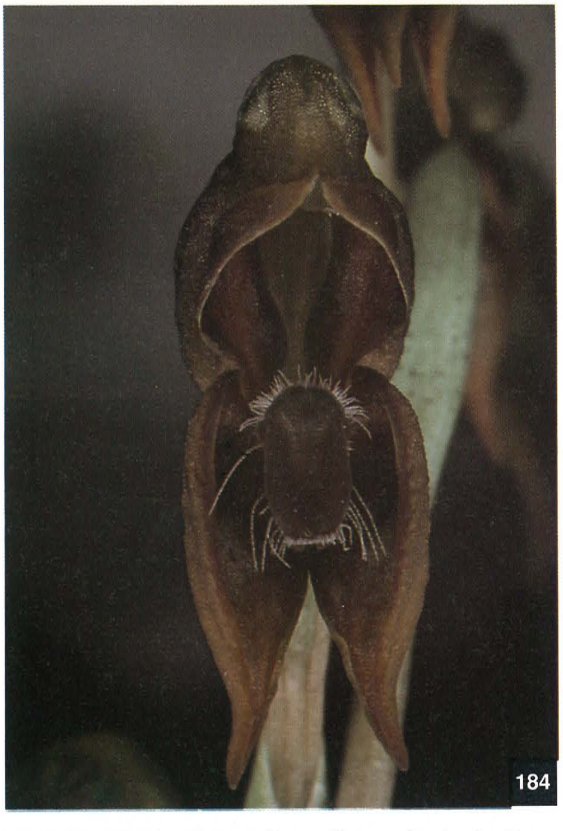


Plate 182. The tiny *Pterostylis pusilla* growing in the Barossa Valley.

Plate 183. The large green and white flower of *Pterostylis robusta* sits on a short scape.

Plate 184. *Pterostylis* aff. *rufa*, this form from the South-east is showing very short perianth segments and hairy irritable labellum.

Plate 185. *Pterostylis* aff. *aciculiformis* narrow labellum form from the Adelaide Hills.

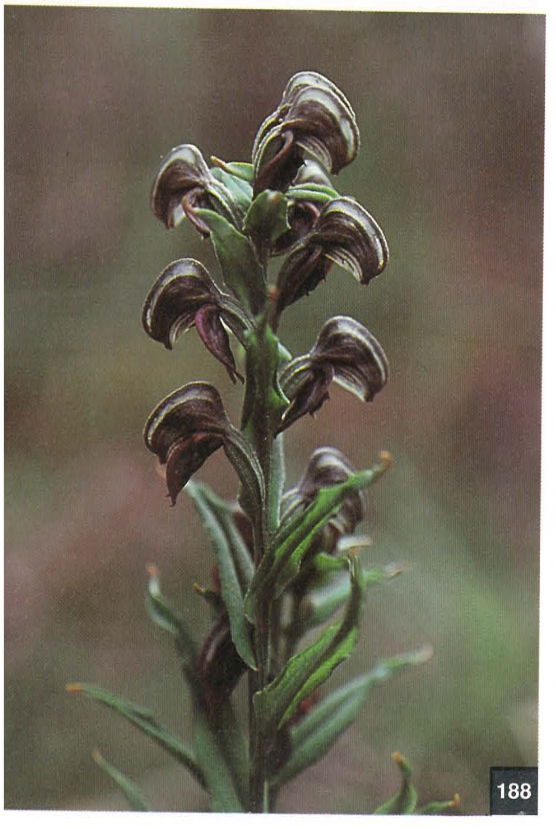


Plate 186. *Pterostylis setifera* a rare species photographed in red sand-hills north of the River Murray.

Plate 187. *Pterostylis tenuissima* in alkaline mud in lower south-east where it grows under tea tree thickets.

Plate 188. A large multiflowered spike of *Pterostylis sanguinea* on a rocky ridge in the Adelaide Hills.

Plate 189. A single flowered mallee form of *Pterostylis sanguinea* from western Murray Plains showing the rich sanguine colours.

voluminous, crisped and crenulate, often reflexed back upon itself, callus plate not prominent and terminating just after the band, tip of labellum often protruding between the sepals. Very fragrant.

Common and widespread in such diverse habitats as coastal sandhills, waterholes up to 2 metres deep in Winter, powdery alkaline soils in dry mallee or rocky outcrops far inland. Also found in grassland, heath, open forest or thick bush and flowering more freely after fires. Extends to all states except the Northern Territory and also in New Zealand and therefore the most widespread species of the genus.

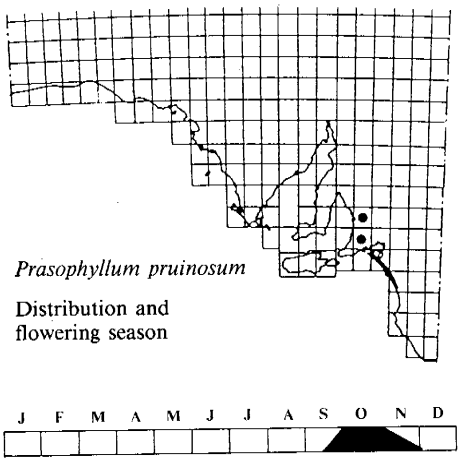
The name *P. odoratum* may be applied to most South Australian plants and refers particularly to large flowered forms with greatly reflexed labella. Some coastal forms have short stems with dense spikes and flowers with short segments, the labellum not much reflexed and not extending between the lateral sepals. This form was described as *P. truncatum*, but there are intermediate forms.

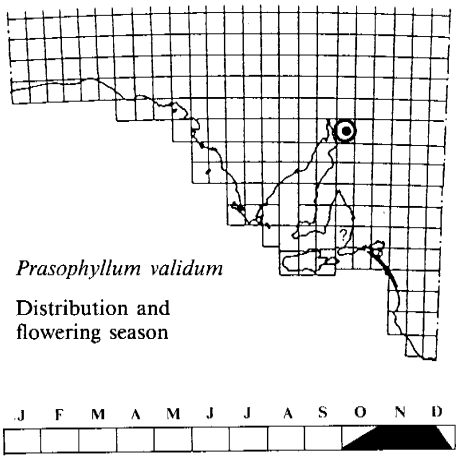
13. **P. pruinosum**. *Plum* or *dull leek-orchid.* Plate 140

The name *pruinosum* refers to the light purple-plum colour of some forms. (Also referred to as *P. patens* var. *pruinosum*).

Slender to 40 cm high. Flowers crowded and close to the stem in a rather long spike, dull white and greenish-brown but sometimes with more attractive purplish tints on the labellum. Lateral sepals free and more or less parallel, upright; labellum narrow, bent at about 90°, crenulate; callus plate green, yellow or purple, often stained red around its borders, not much raised but tongue-like and ending just past the bend. Flowers lightly scented, sweet, mint-like or musty.

Endemic to the Mt Lofty Ranges, once common in the Adelaide area but now restricted and rare. Occurs in fertile soils of open woodland and flowers freely without fire. The variation in floral fragrance is interesting, sweet smelling populations attract bees and wasps but mint or musty scented forms are visited by flies and ants.





14. **P. validum**. *Mt Remarkable leek-orchid.* Plates 141 and 142

The name *validum* (strong, robust) refers to the plants' stature.

Robust 30–60 cm high, with large yellow-green flowers to 1.5 cm diam.; sepals thick

textured to 14 mm long, lateral sepals joined. Labellum glabrous, to 12 mm long, reflexed at right angles, not usually constricted, the callus plate shiny, moderately raised, ending well before the labellum apex, well channelled near its base. Strongly scented.

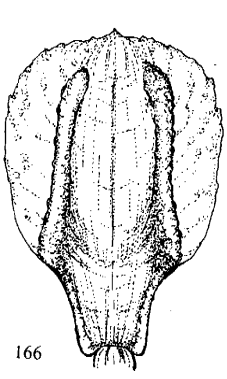
Known only from the Mt Remarkable area of the Flinders Ranges but very similar plants occur in Victoria. Occurs in rich loamy soils in light sugar-gum forest and often growing in tussocks of desert spinifex (*Triodia*). Flowering freely without fire.

Previously treated also as a variety of *P. fuscum* but differs in being more robust, with larger greenish flowers and the callus plate deeply channelled near the base. Near Mt Remarkable it grows with the similar but much smaller *P. occidentale* which has finished flowering before *P. validum* even begins blooming.

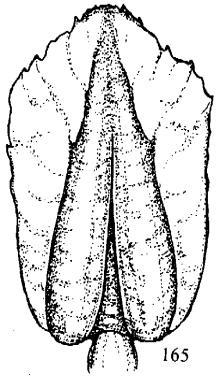
Has done well in cultivation without assuming the majestic size of wild plants. Roots of *P. validum* have been measured at 60 cm in length which is certainly much longer than the roots of most South Australian orchids.

Section II. ***Genoplesium***—Midge-orchids

The flowers are generally pollinated by small "fruit flies" or chironimid flies such as *Conioscinella*. On warm days these flies may be seen roving the plants often in numbers. The attractant has not been documented but some light fruity scent has been noted in most species. Flowers are purple-green and maroon (the common colours of myophilous flowers). The movable labellum which vibrates in the wind in some species may be a further attractant. Pollination success rates are usually high.



166



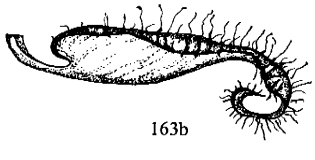
165

A. Labellum long-ciliate (Fig. 163) . . . B.
A. Labellum not ciliate nor bearded (Figs 164–166) . . . . . C.

B. Labellum ovate-lanceolate, ciliate on margins (Fig. 163b). *P. archeri* 1a.
B. Labellum obovate, bearded distally on upper side (Fig. 163a) . . . . . *P. morrisii* 3a.

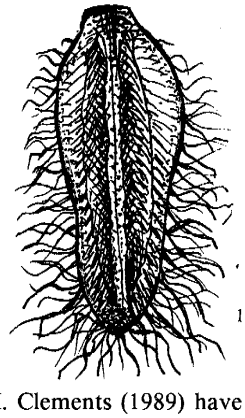
C. Labellum ovate-lanceolate, acuminate (Fig. 164) . . . . . *P. despectans* 2a.
C. Labellum obovate (Fig. 166) or oblong (Fig. 165) . . . . . D.

D. Labellum obovate (Fig. 166); petals greenish . . . . . *P. nigricans* 4a.
D. Labellum oblong (Fig. 165); petals reddish . . . . . *P. rufum* 5a.



163b

164



163a

D. Jones and M. Clements (1989) have recently proposed that Section Genoplesium be treated as a distinct genus, *Genoplesium*.

1a. **P. archeri**. *Swamp midge-orchid.* Plate 143

Named by English botanist J.D. Hooker (1858) in honour of William Archer (1830–1897) an early Australian botanist.

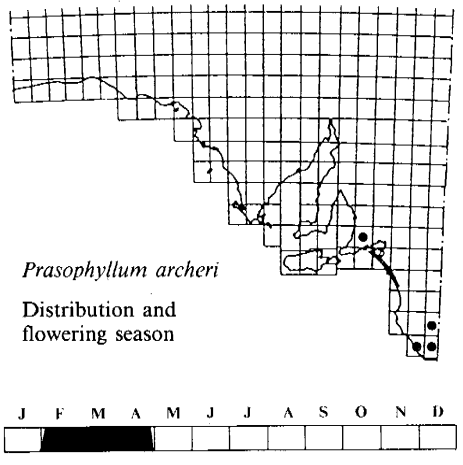
Slender, dwarfed, usually less than 10 cm high; leaf and scape red and green. Flowers few to many in a short congested spike, usually facing downwards, in shades of green and red or purple, to 5 mm diam.; dorsal sepal ovate, hooded, under the column, shorter than the lanceolate, falcate lateral sepals; petals narrow-ovate, acuminate and spreading widely. Labellum on a short mobile claw, lamina oblong-obovate, to 5 mm long; margins irregularly fringed with short cilia.

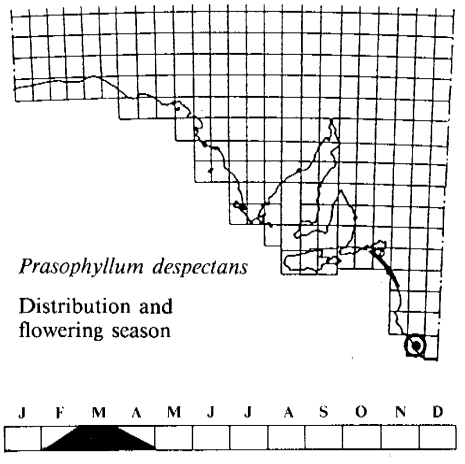
Very rare. Found in damp sandy soils around swamp margins amid rushes and sedges, often under *Leptospermum* and *Melaleuca* species, or on firebreaks cut through swamps. Also occurs in Queensland, New South Wales, Victoria and Tasmania.

Plants from the South-east are more robust, with longer and denser cilia on the labellum than specimens from near Mt Compass in the Mt Lofty Ranges. The similar *P. morrisii* from eastern States occurs close to our border in the Glenelg River National Park. It has the labellum with twisted margins and more numerous, longer, hair-like cilia and with further cilia on the dorsal sepal and petals. A putative hybrid between *P. archeri* and *P. despectans* has been collected in the South-east.

In cultivation does better than most midge-orchids. Can be kept growing for many years if not allowed to become too soggy but grown mainly as a botanical curiosity. In cultivation in Adelaide the plants attract a variety of tiny vinegar flies.

Prasophyllum archeri has been recently renamed *Genoplesium archeri.*





2a. **P. despectans**. *Sharp midge-orchid.* Plate 144

The name *despectans* (looking down), refers to the downward facing flowers.

Very slender, almost filiform in South Australia, usually less than 10 cm tall; scape green to reddish sheathed by the leaf almost to the flower spike. Flowers few to many in an almost pyramidal spike, nodding, purplish or green and maroon, about 3 mm in diam. All flower segments with apices long-acute; dorsal sepal broadest, under the column; lateral sepals narrow, 3–4 mm long, petals shorter. Labellum on a slender curved purple claw, lanceolate acuminate about 3 mm long, with a central dark-purple callus, raised and minutely papillose. Flowers not scented.

Known only from Honan Scrub in the South-east. Also occurs in New South Wales, Victoria and Tasmania. Found in sandy soil around swamp margins under *Xanthorrhoea australis* (grass trees) and *Eucalyptus baxteri* (brown stringy-bark) but very difficult to locate except after fires remove most of the undergrowth.

Eastern State specimens tend to be larger. A putative hybrid with *P. archeri* has been noted from Honan Scrub.

Like most species of midge-orchid, plants soon die out in cultivation.

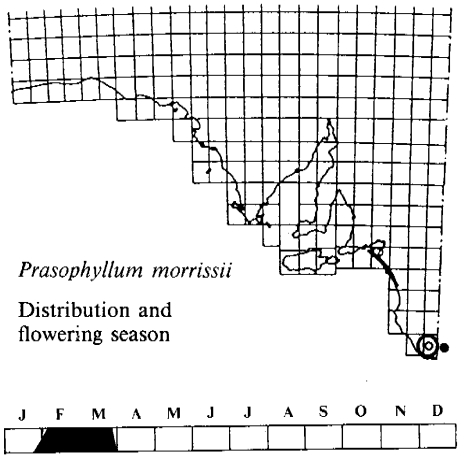
Prasophyllum despectans has been recently renamed *Genoplesium despectans.*

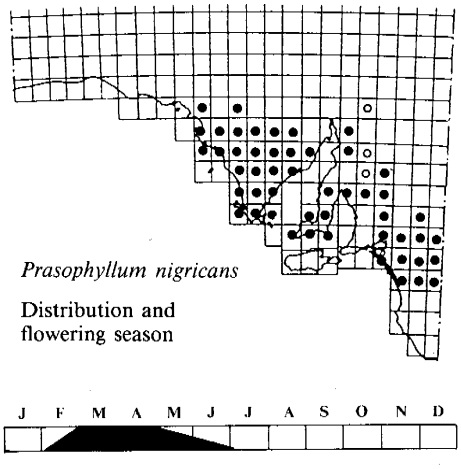
3a. **P. morrisii.** Plate 145

Named by W.H. Nicholls 1931 in honour of Mr P.F. Morris, of the National Herbarium, Melbourne.

This species has been collected in the Glenelg River National Park in Victoria less than 1 km from the South Australian border. It has been reported from the South-east growing on damp clay in open forest and flowering in March but no collections exist. It can be recognised by its very hairy, irritable labellum, which vibrates in the slightest breeze.

Prasophyllum morrisii has been recently renamed *Genoplesium morrisii.*





4a. **P. nigricans.** *Mallee midge-orchid.* Plate 146

The name *nigricans* (blackish or dark), refers to the deep purple or red-brown labellum.

Usually less than 10 cm high; scape reddish-brown, sheathed by the leaf which has the fistula just below the dense, pyramidal flower spike. Flowers usually many, spreading and opening widely, to 2 or 3 mm diam.; segments bright green with a contrasting deep-maroon or brown labellum; dorsal sepal ovate, lateral sepals to 4 mm long, joined at the base then widely divergent. Labellum obovate, less than 3 mm long, rather flat, obtuse, with entire margins.

Very similar to *P. rufum* which has all segments with brown or maroon marking and the labellum with an acute apex and slightly denticulate margins. Flowers not scented.

Common and widely distributed. Mainly in mallee areas, often on "non-wettable" calcareous sand and extending into very dry areas subject to long rainless periods. The large

tuber placed close to the surface is quite flaccid during drought but swells rapidly even after only a few millimetres of rain. Often flowers independently of rain but late summer showers do cause plants to flower earlier. Occurs in all mainland States except the Northern Territory.

In cultivation tubers kept in a cool dry place will sprout and flower without watering. Requires a freely draining soil mix.

Prasophyllum nigricans has been recently renamed *Genoplesium nigricans.*

5a. **P. rufum.** *Red midge-orchid.* Plate 147

The name *rufum* (reddish), refers to the reddish colour of the flowers in many forms.

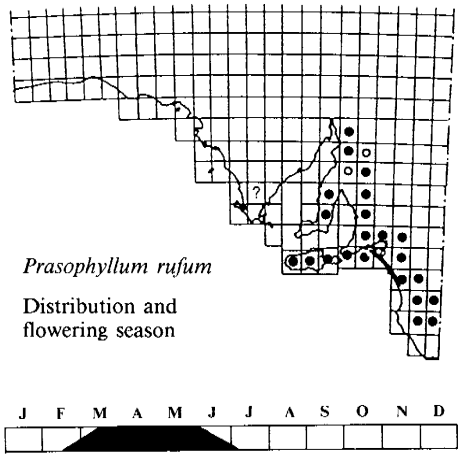
Less than 10 cm high; scape green to reddish, enclosed in the tubular green leaf; inflorescence oblong, short. Flowers few to several, horizontal to deflexed, wholly red-brown, maroon or yellow-green and brown, about 3 mm across; dorsal sepal ovate, about 3 mm long, parallel to ovary under the column, lateral sepals longer, broadly lanceolate, free or joined at the base, spreading or somewhat deflexed, petals reddish. Labellum on a broad curved claw, oblong, about 2 mm long with an acute upturned apex, anterior margins denticulate or shortly serrate, central callus dark, raised and V-shaped. Flowers hardly scented.

Common in the Mount Lofty Ranges and upper South-east, elsewhere rare. Prefers higher rainfall areas, chiefly in open places in light forest in sandy or gravely soils, rare in calcareous soils. Begins to flower some 2 to 4 weeks after autumn rains and plants may continue to flower for up to 8 weeks, starting as early as February or as late as June. Also occurs in Queensland, New South Wales, Victoria and Tasmania.

Similar to *P. nigricans* which has a pyramidal inflorescence, greenish segments and a less acute labellum. *P. rufum* in the strict sense may prove to be restricted to New South Wales.

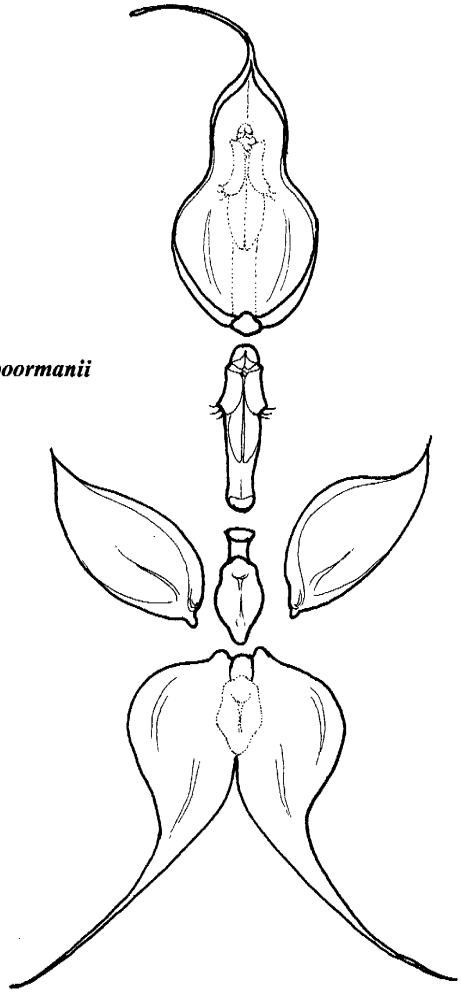
Like most midge-orchid plants in cultivation soon dies out unless kept relatively dry.

Prasophyllum rufum has been recently renamed *Genoplesium rufum.*



PTEROSTYLIS

Green-hoods



Pterostylis boormanii

The name *Pterostylis* derived from *pteron* (winged), *stylis* (style or column), refers to the hatchet-shaped wings on either side of the column (Figs 190, 192).

Usually glabrous, with small globose tuberoids; leaves often broad and in a radical rosette which may be separate from the flowering scape and not developed at the time of flowering, sometimes grading into bracts or bract-like leaves. In some species there are leaves (or leaf bracts) on the flowering scape and these are referred to as cauline or stem leaves. Flowers resupinate, solitary, single, few or many, green, sometimes toned with red or brown, segments differentiated, and with translucent white striations; dorsal sepal deeply concave and interlocking with grooves in the median line of the petals to form a chamber-like galea or hood over the column, this structure gives the genus its vernacular name "green-hoods". Lateral sepals are joined basally for varying lengths with a narrow or wide sinus between the free lobes which may be acuminate or end in filiform tips. The joined portion of the sepals is often called the "lower lip" and this may be either erect in front of the column and more or

less overlapping the hood or reflexed down towards the ovary. Labellum with a curved, penicillate appendage. Column elongated, following the curve of the hood, the upper part with translucent more or less hatched-shaped wings, overtopped by a 2-celled anther, each cell with 2 powdery pollinia. Stigma 2-lobed, prominent and near the middle of the column; rostellum immediately below the anther and connected to the apex of the stigma by a narrow groove. Over 100 species in Australasia.

Most *Pterostylis* are myophilous i.e. they attract flies or mosquito-like fungus gnats (mycetophilids). Exactly what attracts the insect to the flower is unknown as the flowers are dull, mainly green, rarely scented and offer no nectar. Some workers believe that only male flies visit and that these are sexually attracted.

A species-group with lateral sepals (lower lip) reflexed, has the labellum fully exposed in front of the flower and often adorned with hair-like projections (setae or bristles) and some callosities, and may serve as a decoy, imitating long-legged fungus flies. Once the insect visitor lands on the labellum it rapidly swings upward, throwing the insect into the hollow of the hood and sealing the lower entrance. The insect is practically trapped within the hood from which there is only one escape route, upward along the column. Attracted toward the light which shines through translucent areas on top of the hood, the insect passes through the column wings and from there will collect the pollinia on its thorax. The insect then emerges from the flower carrying the pollinia and if the visit is repeated to another flower pollination is ensured.

Another species-group with long filiform labellum as in *P. plumosa*, has the labellum protruding from the flower and beset with hairs. During breezes the labellum shivers and shakes like a large hovering gnat. Strangely the hairs are pointing outwards from the narrow entrance to the flower-hood making it difficult for any insect to enter the hood. (So far no observations have been reported on the pollination of this group of species).

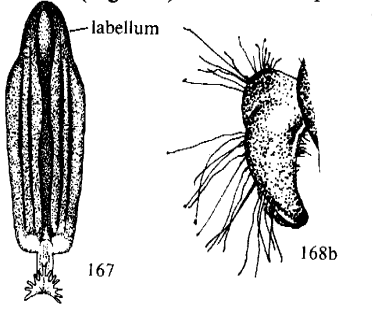
The largest group of *Pterostylis* has the lateral sepals erect against the hood and enclosing it in the lower half. The labellum, attached inside the hood, is often rather small, unadorned and smooth, hidden from view. Certainly it plays no part in attracting insects. An insect visitor enters the flower and disturbs the labellum or the sensitive appendage at its base. The labellum tips back, trapping the visitor at the base of the column, and as in the other greenhood groups the insect is forced to exit upwards through the column wings, meanwhile collecting the pollinia.

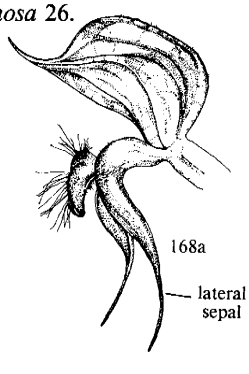
In South Australia only one species, *P.* aff. *parviflora,* has distinctly scented flowers and is pollinated by short-bodied flies rather than fungus gnats. Two South Australian species *P.* aff. *aphylla* and *P. foliata* are believed to be self-pollinated.

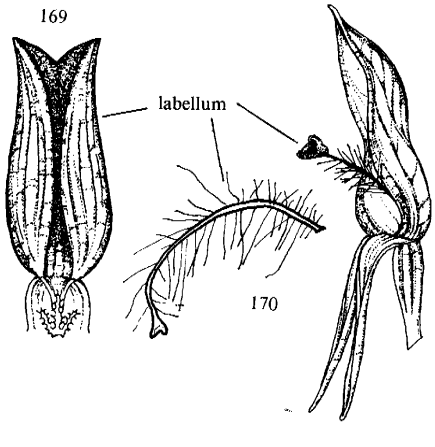
The pollination success rate varies from less than 10% in some dryland, multiple flowered species like *P. biseta* to nearly 80% in *P. nana* and 100% in the self-pollinated species.

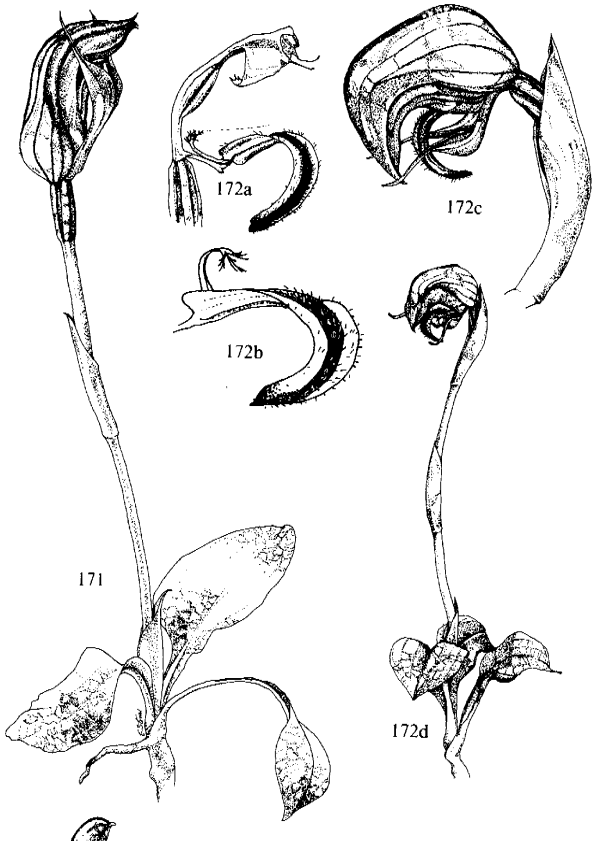
A mainly Australian genus of over 75 species, also in New Caledonia, New Guinea and New Zealand.

A. Labellum flattened (Fig. 167), fleshy (Fig. 168) or leathery (Fig. 169) B.
A. Labellum filiform, plumose (Fig. 170) ..... *P. plumosa* 26.









B. Lateral sepals reflexed against the ovary, their filiform tips spreading or recurved (Figs 168 & 170) ... S.
B. Lateral sepals erect, their filiform tips embracing the galea (Figs 171, 174, 177 & 179) ..... C.

C. Leaves cauline or reduced to bracts (Fig. 173) ..... K.
C. Leaves crowded in a basal rosette (Figs 171 & 172) ..... D.

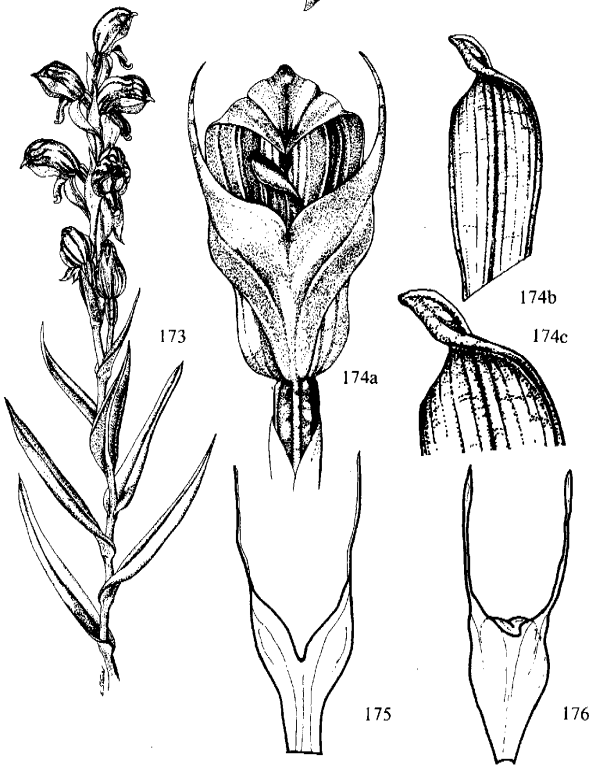
D. Labellum tip entire (Figs 167 & 168) ..... E.
D. Labellum tip notched (Fig. 169) ..... *P. concinna* 6.

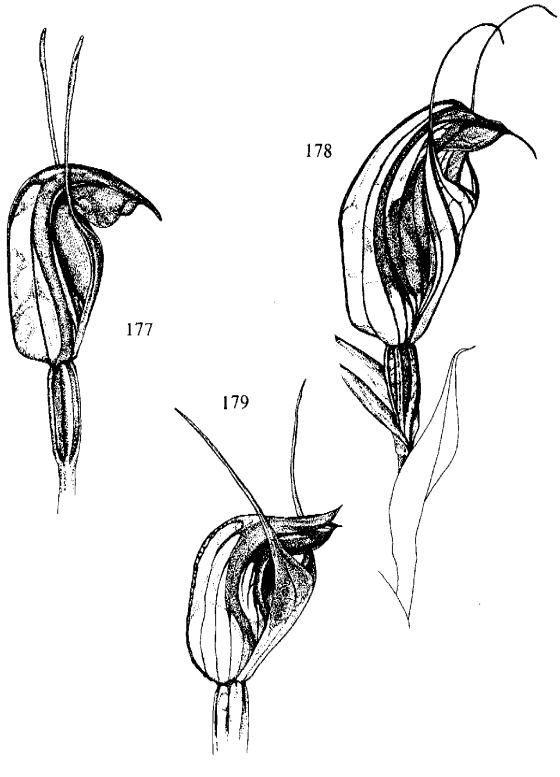
E. Flower erect (Figs 171 & 180)... F.
E. Flower nodding (Fig. 172) ..... *P. nutans* 21.

F. Labellum straight or curved but not twisted (Figs 168 & 172) ..... G.
F. Labellum twisted at the tip (Fig. 174) ..... *P. curta* 8.

G. No inflexed tooth in the sinus between the lateral sepals (Fig. 175) ..... H.
G. Inflexed flap-like tooth in the sinus between lateral sepals (Fig. 176) ..... *P. nana* 20.

H. Galea 3–5 cm long (Fig. 178) .... J.
H. Galea 1–2.5 cm long (Fig. 179) ... I.





I. Stem bracts leafy (Fig. 180) ..... *P. foliata* 14.
I. Stem bracts 1 or 2 and small (Figs 181 & 185) ..... *P. pedunculata* 25. Fig. 179

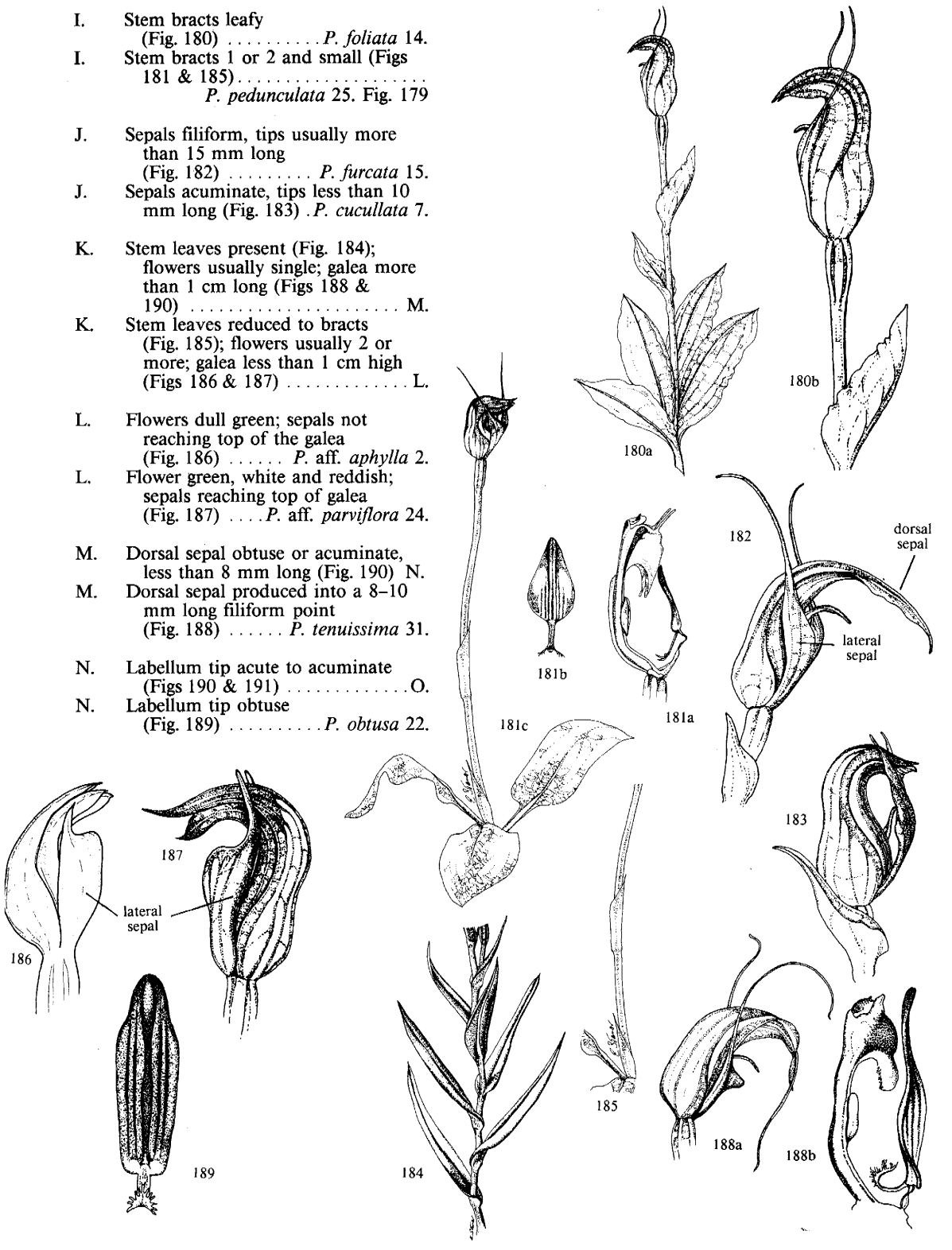
J. Sepals filiform, tips usually more than 15 mm long (Fig. 182) ..... *P. furcata* 15.
J. Sepals acuminate, tips less than 10 mm long (Fig. 183) .*P. cucullata* 7.

K. Stem leaves present (Fig. 184); flowers usually single; galea more than 1 cm long (Figs 188 & 190) ..... M.
K. Stem leaves reduced to bracts (Fig. 185); flowers usually 2 or more; galea less than 1 cm high (Figs 186 & 187) ..... L.

L. Flowers dull green; sepals not reaching top of the galea (Fig. 186) ..... *P.* aff. *aphylla* 2.
L. Flower green, white and reddish; sepals reaching top of galea (Fig. 187) ....*P.* aff. *parviflora* 24.

M. Dorsal sepal obtuse or acuminate, less than 8 mm long (Fig. 190) N.
M. Dorsal sepal produced into a 8–10 mm long filiform point (Fig. 188) ..... *P. tenuissima* 31.

N. Labellum tip acute to acuminate (Figs 190 & 191) .....O.
N. Labellum tip obtuse (Fig. 189) .....*P. obtusa* 22.



O. Labellum much longer than the column and protruding through the sinus between the lateral sepals (Fig. 192) ..... R.

O. Labellum as short as the column and not protruding through the sinus between lateral sepals (Figs 190 & 191) ..... P.

P. Plant usually less than 10 cm tall, stem robust; galea 3–5 cm long (Figs 191 & 193) ... *P. robusta* 28.

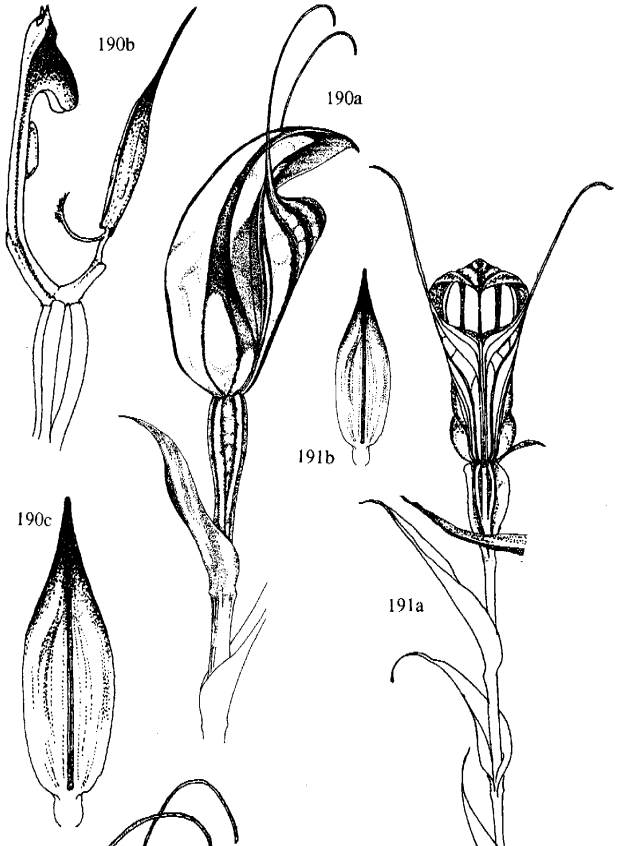
P. Plant 8–25 cm tall; stem slender; galea 2–3 cm long ..... *P. alata* 1.

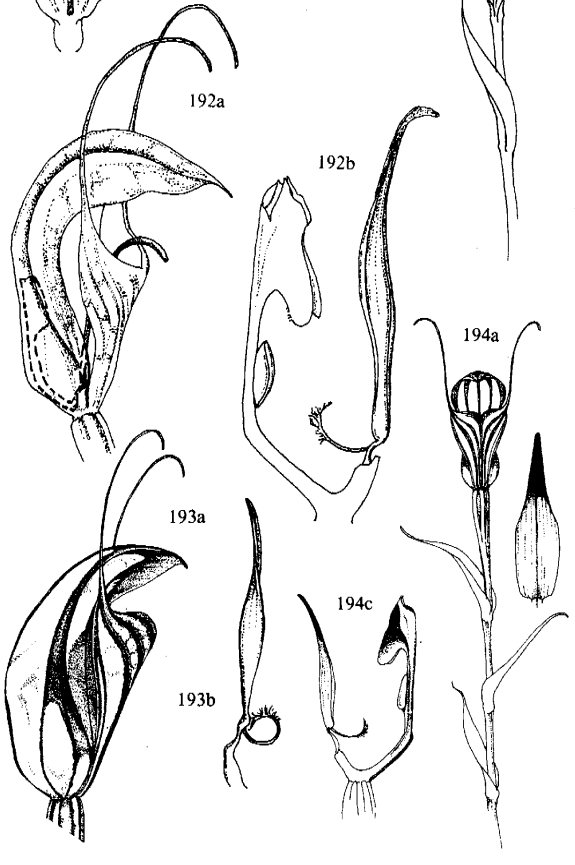
R. Labellum more than 10 mm long, thick-textured (Fig. 192) ... *P. erythroconcha* 12.

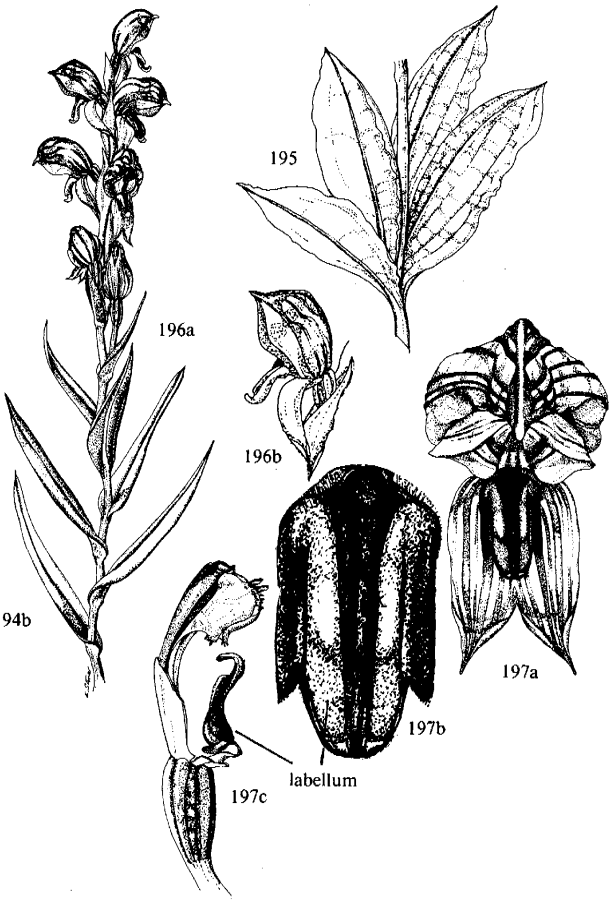
R. Labellum less than 9 mm long, thin-textured (Fig. 194) ..... *P. dolichochila* 11.

S. Leaves mostly crowded at the base of scape into a rosette (Fig. 195) ..... U.

S. Leaves cauline, leaf rosette not present on flowering plants (Fig. 196) ..... T.







T. Labellum green, tip trifid (Fig. 197b); lateral sepals to 8 mm wide (Fig. 197a)*P. longifolia* 17. (Fig. 196)
T. Labellum purple, tip bifid (Fig. 198c) lateral sepals 10–12 mm wide (Fig. 198b) ..... *P. sanguinea* 32.

U. Labellum beset with setae or hairs (Figs 202 & 204) ..... W.
U. Labellum glabrous (Figs 199 & 200) ..... V.

V. Basal appendage of the labellum bent forwards (as the letter C) (Fig. 199) ..... *P. cycnocephala* 9.
V. Basal appendage of the labellum bent backwards (as the letter S) (Fig. 200) ..... *P. mutica* 19.

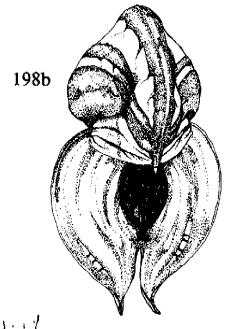
W. Labellum fleshy (Fig. 207) ..... AA.
W. Labellum almost membranous (Figs 202 & 204) ..... X.

X. Basal appendage of the labellum glabrous, a pair of elongated setae near the base of the lamina (Fig. 201) ..... Y.
X. Basal appendage of the labellum beset with setae (Fig. 202) ..... *P. ovata* 23.

Y. Tall plants (Fig. 196); flowers more or less erect on straight pedicels ..... Z.
Y. Dwarf plants (Fig. 172); flowers often nodding on curved pedicels or placed near the ground on depressed pedicels..... *P.* aff. *despectans* 10.

Z. Flowers blood-red; labellum fleshy (Fig. 207); lateral sepals hooked forward (Fig. 208) . *P. maxima* 18.
Z. Flowers greenish and brownish; labellum membranous (or almost so) (Fig. 201); lateral sepals drooping..... *P. biseta* 4.


198a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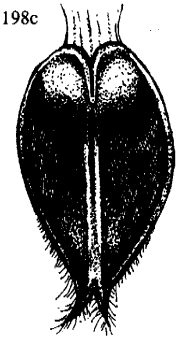
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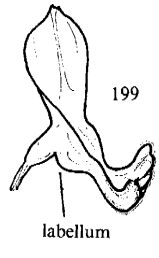
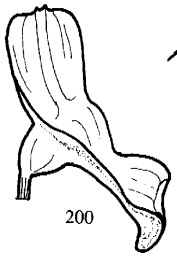
198d

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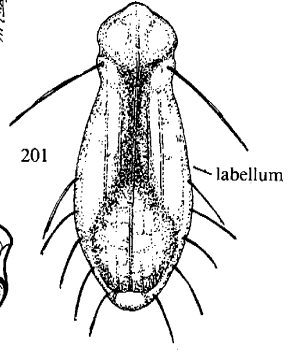

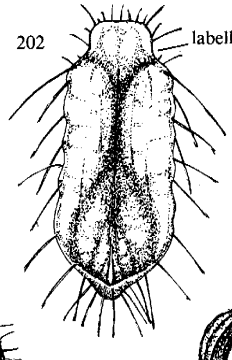

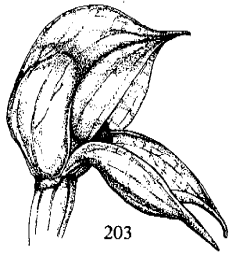
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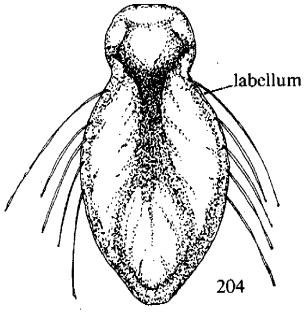

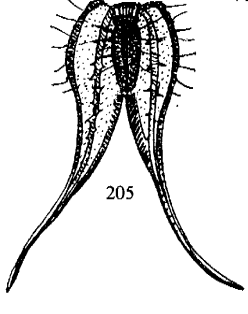
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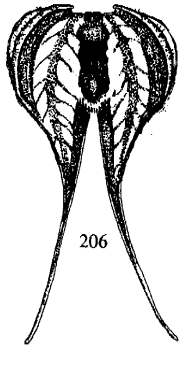
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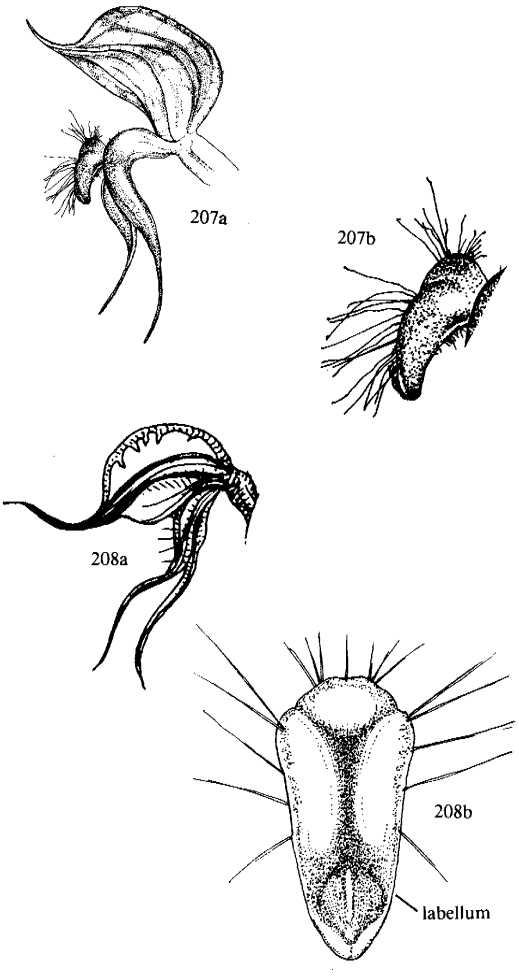


AA. Lateral sepals produced into long filiform tips (Figs 205 & 208). CC.
AA. Lateral sepals shortly acuminate (Fig. 203) ..... BB.

BB. Galea less than 10 mm long, green and maroon or purplish ..... *P.* aff. *pusilla* 27.
BB. Galea more than 11 mm long, green, red and brown (Fig. 203) ..... *P.* aff. *rufa* 29.

CC. Labellum less than 2 mm broad, deeply channelled below (Fig. 205) ..... DD.
CC. Labellum more than 2 mm broad, shallowly channelled below (Fig. 206) ..... *P. xerophila* 33.

DD. Lateral sepals less than 9 mm wide at the base (Fig. 205) ..... FF.
DD. Lateral sepals c. 10 mm wide at the base (Fig. 206) ..... EE.

EE. Labellum narrow-ovate (Fig. 208b) with sharp decurved apex (Fig. 198d); lateral sepals almost flat, the tips less than 2 cm long (Fig. 208a) ..... *P. boormanii* 5.
EE. Labellum obovate (Fig. 202) with blunt apex not recurved; lateral sepals with incurved margins, the tips more than 2 cm long ..... *P. arenicola* 3.

FF. Galea less than 15 mm long; labellum setae yellowish, numerous (Fig. 207)...*P. setifera* 30.
FF. Galea more than 16 mm long; labellum setae white, usually sparse (Fig. 208) ... *P. excelsa* 13.

1. **P. alata**. *Striped green-hood.* Plates 148–150

The name *alata* (winged) apparently refers to the winged column of the genus.

Slender to 25 cm high; leaves cauline, clasping, lanceolate, often only 1–2 cm long, non-flowering rosettes small with petiolate ovate leaves. Flower single, erect, the hood narrow, 2–3 cm high, translucent-white with broad, green and sometimes also brown stripes, the apices suffused brown; dorsal sepal blunt or acuminate; lateral sepals erect, margins slightly inrolled, the lobes extended into long filiform points reaching well above the hood. Labellum short, brownish or green, lanceolate, acute, the tip straight and not protruding from the flower.

Locally common; forms small, often compact colonies in sandy woodland in the South-east or in gravelly soils or rocky places in the Mt Lofty Ranges and Kangaroo Island.

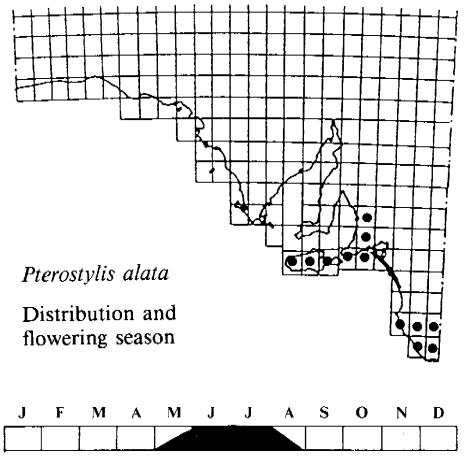
The delicate flowers soon collapse if exposed to strong drying winds.

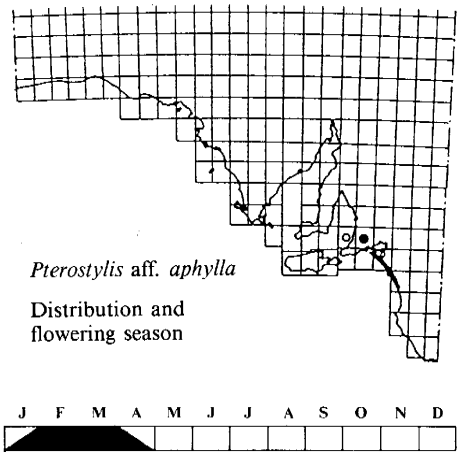
P. alata as treated here is a species complex of at least 3 taxa in South Australia. Plants

from the lower South-east have flowers about 2 cm high, very narrow and suffused with brown. A coastal form has broad reddish petals and a long dorsal sepal, the rosette leaves crenulate. Plants from the Mount Lofty Ranges have flowers about 3 cm high, wholly green and white and with a short dorsal sepal and a distinct high sinus to the lateral sepals. This last form is superficially similar to *P. robusta*, which has much larger flowers on a shorter more robust scape. *P. robusta* also has much larger leaf rosettes. Where the 2 are sympatric, *P. robusta* normally flowers later but flowering times do overlap and possible intermediates have been noted, presumably hybrids.

Although widely grown the various forms of *P. alata* are shy to flower. Plants must be kept cool and sheltered.

Pterostylis x *toveyana*, a cross between *P. alata* and *P. concinna* occurs in Victoria but has not yet been collected in South Australia. *P.* x *toveyana* is commonly cultivated in Adelaide.





2. **P.** aff. **aphylla**. *Leafless green-hood.* Plate 151

The name *aphylla* (without a leaf) refers to the absence of leaves on flowering plants. (*P. aphylla* in the strict sense may prove to be a purely eastern state species.)

Slender to robust, less than 20 cm tall, leafless at flowering; rosettes appear 2 to 3 months after flowering. Flowers 1 to many, often 2, with a tendency to face each other, green; hood 8–15 mm high, the segments rather fleshy, glabrous or puberulent, the apex blunt; lateral sepals erect, sinus wide, the lobes abruptly contracted into short points not exceeding the hood. Labellum shorter than column, elliptical. Ovary rapidly swelling to 2 or 3 times the size of the flower. Flowers not scented, self-pollinated.

Rare and confined to a few peaty bogs near Mount Compass in the Mount Lofty Ranges but more widespread in the eastern States. The flowers are very short lived and the scape often elongates considerably after flowering. The time elapsed from emergence of plant to the release of seeds is usually somewhere between 6–8 weeks.

Similar to *P. parviflora* which has cauline leaves and scented, insect pollinated flowers on a slender scape.

The species has been grown from seed but is not considered suitable for cultivation.

The species has previously been treated under *P. parviflora* in South Australia.

3. **P. arenicola**. *Sandhill green-hood.* Plate 152

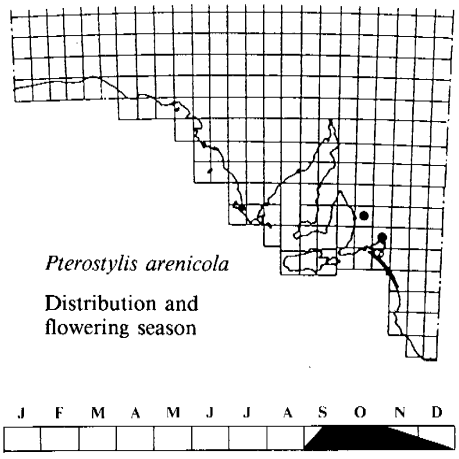
The name *arenicola* means growing on sandhills.

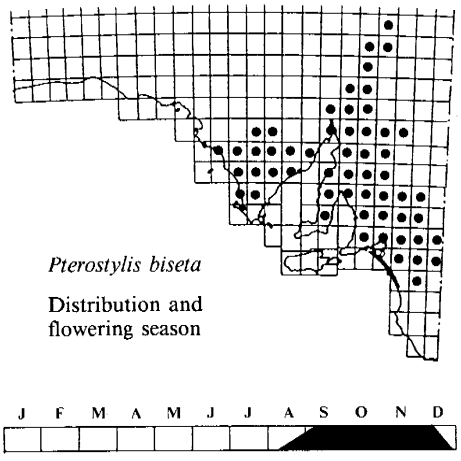
Leaves in a basal rosette, scape stout to 20 cm high, with closely sheathing stem bracts. Flowers 1–10 on slender pedicels, the hood brown or red-brown with white markings, erect. Lateral sepals wider than the hood, upper margins broad and thick, with few cilia, free points to 17 mm long, divergent; labellum about 4.5 mm long, red-brown, oblong to narrow-ovate, thick, constricted near the base, margins with 8–10 spreading white setae to 3 mm long, the basal lobe with shorter hairs.

South Australian endemic. Occurs in small populations in fertile sands under native pines, (*Callitris* species) but very rare due to loss of habitat. First described and named in 1988.

Previously included under *P. boormanii* but the longer sepals, less hairy margins to lateral sepal bases, longer labellum and more bristly labellum basal lobe all set it apart.

In cultivation in Adelaide produces up to 15 flowers on 30 cm tall stems.





4. **P. biseta**. *Rusty hood, veined green-hood.* Plate 153

The name *biseta* (2 bristles) refers to the 2 prominent bristle-like hairs near the labellum base.

Scape 5–40 cm high, usually robust, with up to 20, often very large, subsessile leaves in a basal rosette which lies flat on the ground but is often withered at flowering time. Flowers few to several, rarely 1, green or greyish to deep red-brown; hood about 1.5 cm high with long acuminate dorsal sepal; lateral sepals reflexed, sinus narrow, lobes ending in acuminate filiform tips like tails up to 5 cm long. Labellum narrow-oblong, often almost membranous, with a fringe of hairs along the margins and 2 long bristles set in eye-like swellings near the base.

Widespread and common throughout its range, mainly in dry or exposed sites in sandy areas, or rocky places, especially inland and commonly associated with *Callitris* sp. (native pines). As treated here probably a complex of several species. In a single area there may be 2 or 3 races flowering progressively, the late flowering races usually with fleshy scapes which presumably store food. If the flower-spike is picked buds may still open, flower and set seed even after several weeks in a press. Also occurs in New South Wales and Victoria.

P. biseta forms putative hybrids with *P. excelsa*.

5. **P. boormanii**. *Sikh's whiskers, Boorman's green-hood.* Plate 155

The species was named by H.M.R. Rupp (1943) in honour of J.L. Boorman (1864?–1938) an English born collector for the Sydney Botanic Garden from (1901–1930).

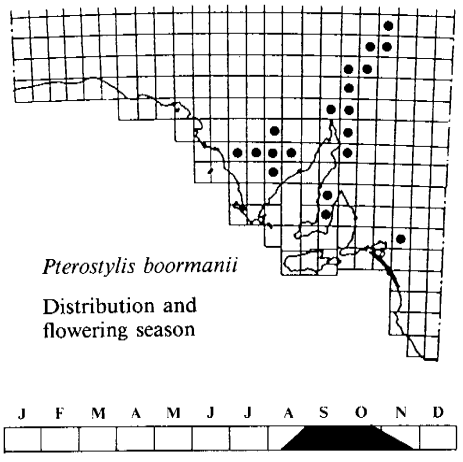
Dwarfed or rather slender on a tall stem to 30 cm high; leaves many, in a basal rosette, subsessile and flat on the ground, often withered at flowering. Flowers from 1 to many, deep-red-brown, the hood to 1.5 cm high, apex produced into a fine, recurved 1 cm long point; lateral sepals deflexed, the basal part very broad and rounded usually with numerous cilia on the back and along the margins, the lobes filiform, divergent and often curved upwards. Labellum fleshy on a short claw, linear-oblong, slightly gibbous at the base, channelled above and below, the margins beset with short or long bristles.

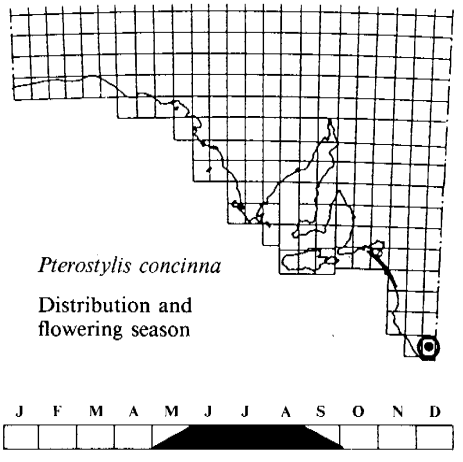
Widespread and locally common, mainly in fertile red loams in open forest, or rocky scrubland in areas receiving 250–500 rainfall per annum, often associated with *Callitris* sp. (native pine). Also occurs in Queensland, New South Wales and Victoria.

Under dry conditions the stem may be very short, the flower-spike almost sitting on the ground but in good seasons the scape is long and rather slender. A form from the plains north of Adelaide has smaller flowers with some characteristics of *P. pusilla* and is perhaps an established hybrid. Intermediates between this form and *P. pusilla* have been noted near Halbury, north of Adelaide.

Putative hybrids with *P. excelsa* have been reported from the Gammon Ranges and Eyre Peninsula. Very large, colourful forms occur in the northern Flinders Ranges.

It does rather well in cultivation if kept in a light, airy position. Should not be allowed to get too damp as tubers rot easily. Forms with tall stems and deep-red flowers make a most attractive display.





6. **P. concinna**. *Trim green-hood.* Plate 156

The name *concinna* (neat or pretty) refers to the trim appearance of the plant.

Slender to 15 cm high; leaves few, petiolate in a basal rosette. Flower erect, solitary, the hood about 15 mm high, translucent-white or light-green with darker green stripes and some brown markings especially near the apex; lateral sepals erect with a sinus which projects slightly outwards, their filiform tips embracing the galea. Labellum as long as the column, dark-green to brown, oblong, tip notched, slightly protruding through the wide sinus.

Restricted to 2 localities in South Australia in fertile soils in well watered open forest of *Eucalyptus* sp. and *Acacia mearnsii*. More common in the eastern States.

Superficially similar to *P. nana* which does not have the labellum notched.

A popular species in cultivation, easily grown in a well drained soil mixture. Tolerates plenty of shade and multiplies rapidly.

7. **P. cucullata**. *Leafy green-hood.* Plates 157 and 158

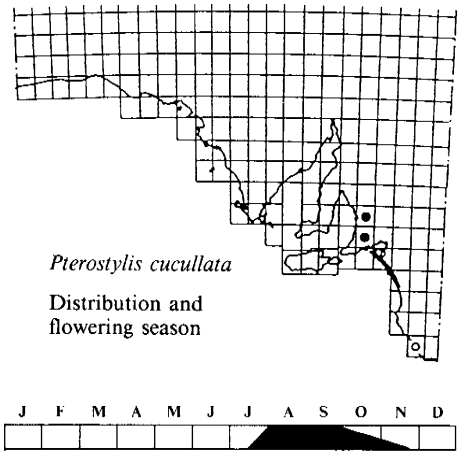
The name *cucullata* (hooded) refers to the large flower hood which is often partly enclosed in the upper leaf bract.

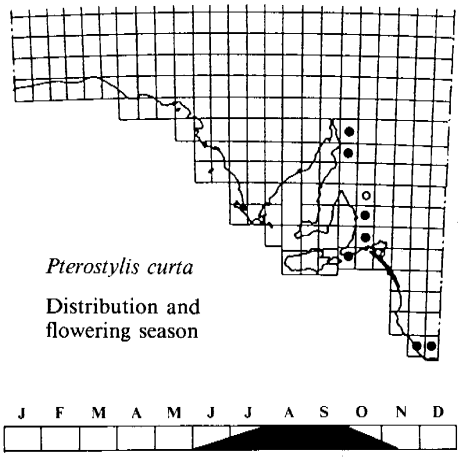
Stout but often dwarfed, 5–25 cm high; leaves several, large, crowded near the base or ascending the stem in taller plants. Flower erect, solitary; hood 2–3 cm high, translucent-white striped with green and brown, the brown colour predominant in the apex of the galea, especially the petals and in the erect lateral sepals which have a dense velvet-like covering of short papillose hairs; dorsal sepal very short, acute; lateral sepals erect, falcate lobes acuminate with tips less than 1 cm long, these embracing the hood. Labellum shorter than the column, dark reddish-brown, narrow-elliptical, the apex obtuse, very shortly recurved and just reaching the sinus.

A tall forest form occurs only in fertile loams, especially on damp south facing slopes amongst maiden-hair fern (*Adiantum aethiopicum*). It is restricted to the Adelaide Hills where it is now rare due to loss of habitat. The short coastal form grew in damp sandy soils under the shelter of dense shrubbery. It has been recorded from coastal sand hills in the South-east and at Fairview Park and McLaren Vale near Adelaide.

A putative hybrid has been reported with *P. nutans* (from the Adelaide Hills) (Plate 159).

In cultivation the forest form grows well in cool, shaded conditions and responds to the use of organic fertiliser, gradually increasing vegetatively. It flowers quite freely.





8. **P. curta**. *Blunt green-hood.* Plates 160 and 161

The name *curta* (shortened), refers to the short acuminate lobes of the lateral sepals.

Moderately robust to 20 cm high; leaves large, petiolate, in a basal rosette. Flower erect, single; hood, 2–3 cm high, green with pale brownish markings mainly at the acute apex; lateral

sepals erect with a very wide sinus and short acuminate lobes which do not much exceed the hood. Labellum longer than column, almost oblong but wider and darker towards the distinctly twisted, bluntly acute apex which protrudes through the sinus of the lateral sepals.

Locally common. Forms small to extensive colonies in forest and shady mountain gullies especially along creeks where it flowers freely. Also occurs in the eastern States and New Caledonia. Some very large forms occur in the Adelaide Hills where a putative hybrid has been reported with *P. pedunculata.*

This is one of the easiest of our native orchids to grow, it does well in any potting mix and rapidly increases by vegetative means. It prefers a cool shaded situation and can be grown under shrubs in a garden if slugs and snails are controlled. There are many man-made hybrids available.

9. **P. cycnocephala**. *Swan-headed green-hood.* Plate 162

The name *cycnocephala* (swan-headed), refers to the appendage of the labellum which resembles the head of a swan.

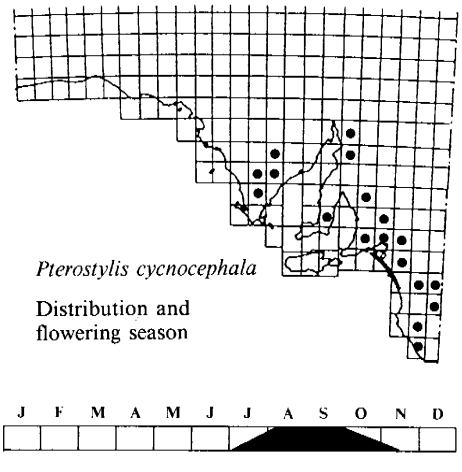
Slender to moderately robust, to 15 cm high, tubers often large, up to 3 cm diam.; leaves shortly petiolate, crowded in a basal rosette. Flowers few to several, crowded or distant; hood less than 1 cm high, green with narrow paler-green or translucent-white stripes; lateral sepals reflexed against the ovary, connate for more than half of their length, the lobes blunt, incurved and enclosing the deflexed labellum. Labellum shorter than column, oblong to rhomboid, green, basal appendage dark-green, erect, with a short papillose knob directed forward.

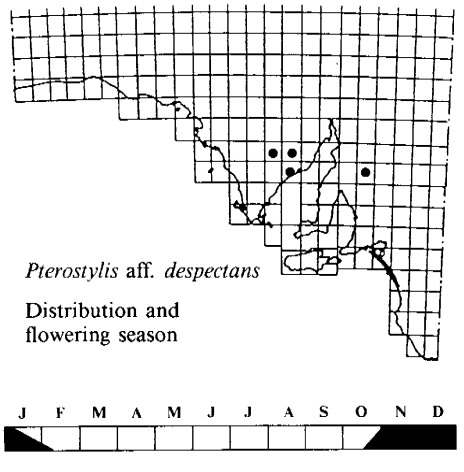
There are two distinct forms, one with very short thick scapes and the flowers crowded together, the other a tall, slender plant with well spaced flowers.

Widely but sparsely distributed. Occurs in open grasslands on limestone or other rocky areas or in open forest country especially with *Allocasuarina verticillata*, in areas receiving not less than 300 mm annual rainfall. Also occurs in Western Australia, New South Wales, Victoria, Tasmania and New Zealand.

Similar to *P. mutica* which has the labellum appendage turned backwards and directed into the flower.

In cultivation susceptible to damping off if kept too wet.





10. **P. aff. despectans.** Plates 163 and 164

The name *despectans* (lowly or looked down upon) refers to the species habit of placing its flowers close to the ground.

Dwarf species up to 10 cm high; leaves in a basal rosette quite withered at flowering, stem with scaly appressed bracts. Flowers 1–6 on long to very long decurved pedicels, small, dull green or brown with large transparent areas, hood to 10 mm long, narrow sloping down toward the about 2 cm long filiform point, lateral sepals wider than hood, upper margins narrow, conjoined part flat the margins ciliate, suddenly tapered into filiform trailing tips which in one form trail on the ground in another hang vertically; labellum obovate, about 4.5 x 2.5 mm, dark brown or green, thin-textured, basal lobe not developed, constricted near the base, fine marginal setae and 2 erect longer setae set in basal swellings.

Pterostylis despectans in the narrow sense is thought to be endemic to Victoria but the two very similar forms from South Australia include one with flowers set on the ground. This from Mt Bryan north of Adelaide where it grew in hard soil under *Acacia paradoxa* in open woodland. A second form with green flowers set off the ground is widespread in central Eyre Peninsula in rocky soil of mallee-heathland. Both forms flower remarkably late considering their dry habitat, both may still be in flower in mid-summer, months after all other orchids nearby have finished.

In cultivation does better in a warm glasshouse where flowering is brought forward into spring.

11. **P. dolichochila.** *Mallee shell-orchid.* Plate 165

The name *dolichochila* (long lipped), refers to the long narrow labellum which protrudes from the flower.

Slender, to 20 cm high; leaves in a basal rosette, absent from flowering plants which have several lanceolate, cauline leaves which clasp the scape. Flower erect, single; hood 2–3 cm high with a blunt apex, translucent-white, striped with maroon or reddish-green and grey; lateral sepals erect with a notched sinus, the lobes gradually attenuated and prolonged into erect, filiform points much exceeding the hood. Labellum longer than the column, green-brown, thin-textured, lanceolate, less than 1 cm long, the acuminate apex recurved and protruding through the sinus of lateral sepals.

Locally common in poor calcareous sands or on limestone under mallee or mallee-heath. Commonly associated with mallee and broom-bush (*Melaleuca uncinata*). Forms small to large, discontinuous colonies but in most years only a small percentage of plants will flower. If heavy autumn rains fall, following a wet year flowering can be quite spectacular. Very brightly coloured forms occur on southern Eyre Peninsula.

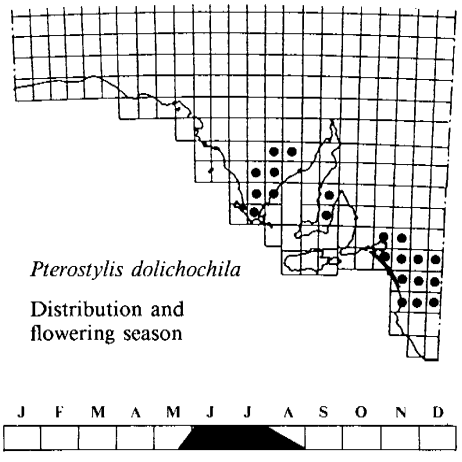
Previously included in *P. alata.* Superficially similar to *P. alata* and *P. robusta* but these species have a short, straight labellum not protruding from the flower. Putative hybrids with *P. robusta* are occasionally found.

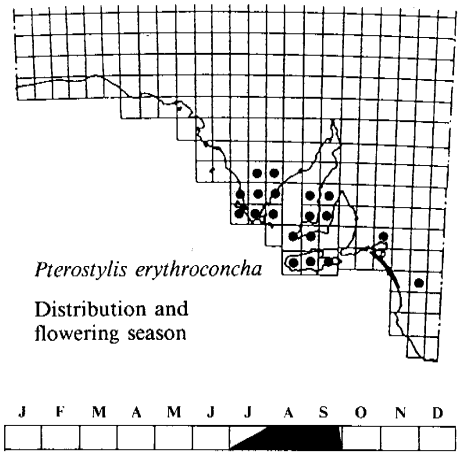
In cultivation does well in small pots if kept in a cool sheltered location but should not be allowed to get too wet. Increases quite rapidly when grown well.

12. **P. erythroconcha.** *Red shell-orchid.* Plate 166

The name *erythroconcha* (red shell) refers to the colour of the shell-like hood.

Slender to robust, generally less than 10 cm high; leaves cauline, lanceolate, often red tipped. Flower erect, one, 2–3 cm high, translucent-white with maroon or red-brown stripes;





dorsal sepal shortly acute or with an acuminate tip less than 4 mm long; lateral sepals erect, joined in the basal one-third, lobes separated by a wide sinus, gradually attenuated into prolonged erect, filiform points with drooping tips. Labellum longer than column, fleshy, deep maroon, lanceolate, about 1 cm long, recurved near the apex and protruding through the sinus of the lateral sepals.

Endemic to South Australia and locally common on travertine limestone or in calcareous sands under mallee near the coast where it forms large discontinuous colonies. Flowering is sparse excepting in good seasons.

The species was previously treated under *P. hamiltonii* which is now considered to be a purely Western Australian plant.

In cultivation it can grow exceptionally well in cool, shaded, dry locations but is susceptible to sudden damping off and tuber rot if kept wet in hot weather.

13. **P. excelsa**. *Dryland green-hood.* Plate 167

The name *excelsa* (lofty or high) refers to the tall, elegant flower scape.

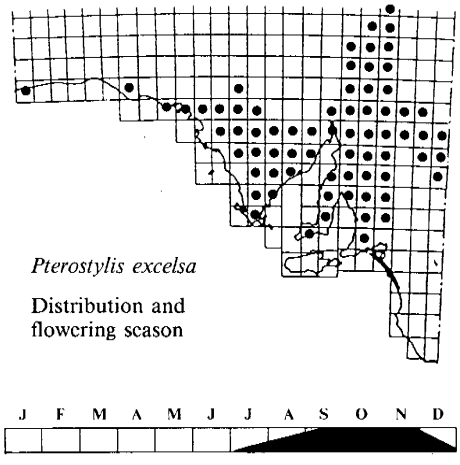
Tall, slender, sometimes attaining 80 cm in height; leaves large, lanceolate, in a basal rosette which is normally withered at flowering; scape with numerous sheathing bracts. Flowers few to several, on long pedicels, erect or nodding; hood about 2 cm high, with pale translucent areas between green or brown stripes, sometimes wholly green or maroon and white, with the apex produced into filiform points 3–12 mm long; lateral sepals about as long as the hood, reflexed, upper lobes less than 1 cm wide, gradually attenuated and produced into fine more or less parallel points 1–3 cm long. Labellum very irritable, shorter than the column, fleshy, maroon-brown or green, ovate-lanceolate, tip straight, less than 2 mm broad and deeply channelled below, a crest of cilia on the basal swelling and with longer bristle-like setae along the anterior margins.

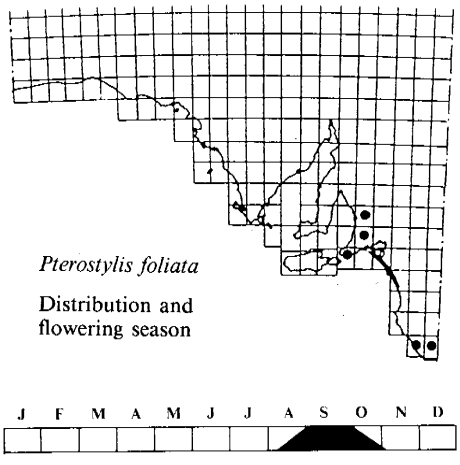
Endemic to South Australia, predominantly an inland species and collected further north (in the Flinders Ranges) than any other orchid. Common and widespread in dry rocky places, on sand dunes, under mallee or on *Maireana sedifolia* (blue bush) plains. Often with *Callitris* (native pine).

Occurring singly or in extensive colonies, seldom more than 2 flowers are open at one time so that flowering may last up to ten weeks. Very colourful specimens occur in the Gawler Ranges on granite outcrops, but the species can be seen at its best in the northern Flinders.

There are several forms of *P. excelsa.* One in the Gawler Ranges has much fleshier flowers, another which occurs towards the N.S.W. border is much smaller and very similar to *P. cobarensis* a recently named species from New South Wales.

In cultivation it does reasonably well although like most of the "*P. rufa* group" it does not increase vegetatively and is prone to tuber rot if kept too wet, especially in summer.





14. **P. foliata** (*P. vereenae*). *Slender green-hood.* Plate 168

The name *foliata* (leafy) refers to the large leaves.

Slender to 30 cm high; leaves peltate, varying in size and shape, but usually ovate-lanceolate, either crowded near the base of the scape or ascending it. Flower single, erect; hood 2 cm high, translucent-white with broad green stripes, apex sometimes suffused with brown, shortly acuminate; lateral sepals erect, sinus narrow with margins shortly inrolled, lobes acuminate with long filiform points which are erect, embracing the hood and exceeding it, often by as much as 1 cm. Labellum slightly longer than column, green-brown, oblong with a recurved blunt tip just protruding through the sinus. The flowers are rather short lived and exhibit some degree of self-pollination.

Uncommon in the Mt Lofty Ranges and very rare elsewhere, in light scrub, often under *Eucalyptus fasciculosa* (pink gum) but invading pine plantations in high rainfall areas. Also in New South Wales, Victoria, Tasmania and New Zealand.

Resembles the ubiquitous *P. nana* which has flowers only half as large and leaves in a distinct basal rosette. In many plants there is a filiform floral rudiment on the scape just below the flower which sometimes develops into a second flower.

Not commonly cultivated. Does not increase much vegetatively and has an unusually short growing season, the leaves appearing in June–July and the plant dying down about mid-spring.

Plants from Cherry Gardens sent by a school girl Verena Jacobs to R.S. Rogers in 1917 had leaves in a distinct basal rosette. Rogers considered them distinct from *P. foliata* and named them *P. vereenae.* However plants of this form transplanted to very shady locations soon alter their habit and extend the leaves upward along the stem.

15. **P. furcata**. *Sickle green-hood, forked green-hood.* Plate 169

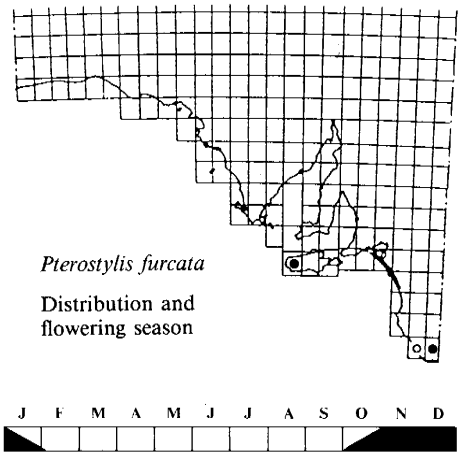
The name *furcata* (forked) refers to the curved prong-like lateral sepals. (Previously known as *P. falcata*).

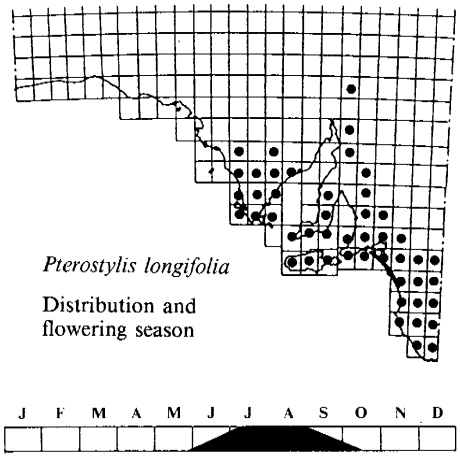
Slender to 30 cm high; leaves few, shortly petiolate, somewhat upright and frequently passing gradually into the stem bracts. Flower single, almost erect, pale-green and white; hood rather large, 4–6 cm long; dorsal sepal with a long, often upturned apex, often upturned; lateral sepals erect, sinus narrow, lobes narrow-acute, filiform tips more than 15 mm long, directed backwards along the sides of the hood and slightly exceeding it. Labellum longer than column, greenish-brown, lanceolate, gradually tapering into an acute apex curved forward and protruding through the sinus.

Rare on Kangaroo Island and probably extinct in the Mt Lofty Ranges and South-East. Restricted to very damp shady places in more fertile soils along creeks in high rainfall areas. In very shady places the leaves ascend the stem rather than forming a basal rosette. Widespread in New South Wales, Victoria, Tasmania and New Zealand.

The putative hybrid with *P. nutans* (*P.* x *ingens*) is found as far west in Victoria as the Glenelg River National Park adjacent the South Australian border.

Not difficult to cultivate but requires constant humidity and temperature to flower well. Does best if kept in a heated glasshouse during winter.





16. **P. x ingens**. *Pointed green-hood.* Plate 170

Single flower erect or with the ovary arched forward and the flower more or less nodding, greenish-white with apical parts pale reddish-brown. Lower lip erect and diverging from the galea at a narrow angle, lobes lanceolate with filiform points embracing and over-topping the hood.

This hybrid is commonly grown in Adelaide and is one of the most vigorous of all native terrestrial orchids. It has been introduced to some areas of the Adelaide Hills.

17. **P. longifolia**. *Tall green-hood.* Plate 171

The name *longifolia* (long leaved) refers to the long lanceolate, cauline leaves.

Slender to moderately robust, 10–80 cm high; leaves several, cauline, up to 8 cm long,

usually lanceolate and sheathing at the base. Flowers few to several, rarely 1, often rather large, held more or less erect or inclined forward; hood to 2 cm high, translucent-green. Dorsal sepal with short point; lateral sepals reflexed, rather narrow, to 5 mm wide, connate for more than half of their length; lobes short with acuminate tips and margins inrolled. Labellum very irritable, shorter than column, fleshy, green, papillose-glandular, oblong, apex 3-lobed, the central lobe longest, bifid, upturned, often light-brownish.

Common throughout most parts of the State which receive more than 400 mm annual rainfall. Found in a wide variety of habitats from open forest and rocky outcrops to mallee-heath, in soils ranging from leached sands to bare limestone and auriferous clays. Mallee plants or those on limestone are invariably smaller than the hills or forest forms and are often only 10 cm high with a single flower. *P. longifolia* in the strict sense is probably confined to the eastern states. Also occurs in Queensland, New South Wales, Victoria and Tasmania.

Difficult to grow in cultivation as the tubers are very susceptible to rot. Does not increase vegetatively. A beautiful species and a favourite with children who delight in triggering the sensitive labellum and watching it flip back against the hood.

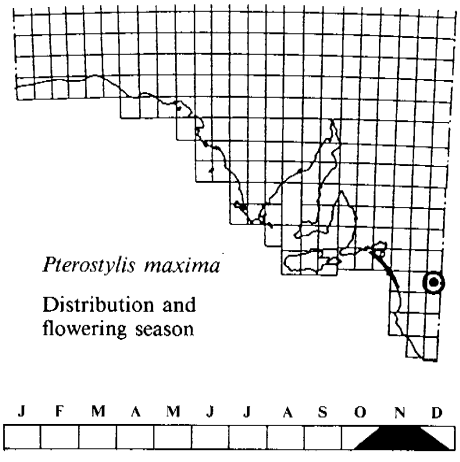
18. **P. maxima**. *Large rufous green-hood.* Plate 172

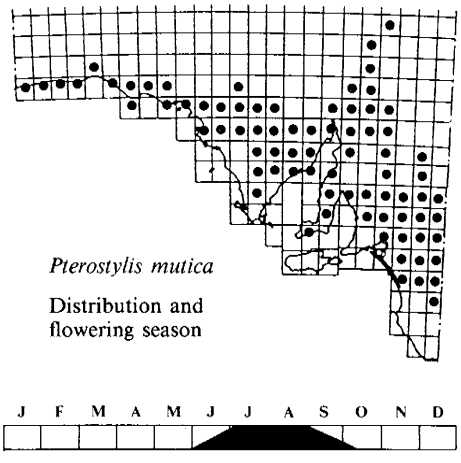
The name *maxima* meaning the greatest or longest is a reference to the large fleshy flowers of this species.

Scape sturdy to 40 cm high with several closely sheathing bracts. Leaves in a basal rosette, usually more than 10 but withered at flowering. Flowers 1–8, on slender pedicels, red-brown with some translucent patches, the hood to 20 mm long, oblique. Lateral sepals wider than galea, their tips to 16 mm long, usually somewhat hooked forward; labellum fleshy, ovoid, about 7 x 4 mm broad, flat textured, margins with about 20 coarse white oblique hairs, with two prominent larger, forward projecting setae near the base.

Rare species once found on the fertile flats and rises near Bordertown but still present in central and western Victoria and southern slopes of New South Wales. Previously included under *P. biseta* but differing in its deep-red, thick-textured flowers, and less membranous labellum without basal lobe.

Cultivation as for other "rufa group" species.





19. **P. mutica**. *Midget green-hood.* Plate 173

The name *mutica* (blunt) refers to the short, blunt floral segments (including the labellum).

Slender to moderately robust, to 15 cm high but usually less than 10 cm, with 3 to many shortly petiolate leaves in a basal rosette. Flowers few to several, crowded or loose; hood less than 1 cm high, pale- or yellowish-green, tip blunt to subacute; lateral sepals reflexed, broad, connate for more than half their length, the lobes blunt, incurved and partly enclosing the reflexed labellum. Labellum broadly elliptical to nearly orbicular with a raised central ridge, on a very irritable claw, with a relatively broad basal appendage which is club-shaped, dark-green, the tip turned backwards (as in the letter S) facing into the flower.

Very widespread in dry parts of the State. Common under mallee, also in *Maireana sedifolia* (blue-bush) associations and in rocky, dry places, especially the Flinders Range. It is often the only orchid encountered over wide areas of poor calcareous soils on the inland edge of the wheat belt. In drought years it has been noted as flowering after as little as 50 mm rainfall, apparently assisted by moisture from winter dews. Also in Western Australia, New South Wales, Victoria and Tasmania.

In mallee areas plants are small and slender with few leaves and well spaced flowers only 6–8 mm high but in the Flinders Range and other rocky places they may be more robust, with larger and more numerous leaves and crowded flowers nearly 10 mm high.

Superficially similar to *P. cycnocephala* which differs in having the labellum appendage shaped like a swan's head and facing outward.

Not really suitable for cultivation as the rather insignificant plants are very susceptible to bacterial rot.

20. **P. nana**. *Dwarf green-hood.* Plate 174

The name *nana* (dwarf) refers to the small size of the plant including flowers.

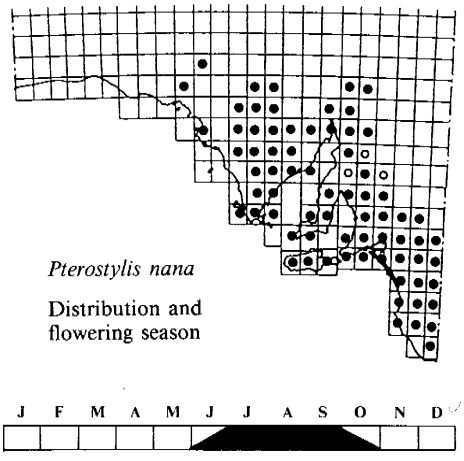
Usually a small plant, less than 10 cm high; leaves several, petiolate in a basal rosette. Flower single, erect; hood 1.5 cm high, translucent-white or pale yellowish-green with darker green stripes, sometimes the apices reddish-brown, the apex usually broad and obtuse, occasionally acute; lateral sepals erect, sinus with a tooth-like lobe inflexed in the centre and resting against the inner surface of the sepals, the lobes linear to filiform, often with clavate tips, 1.5–2 cm long, embracing the hood and standing high above it. Labellum shorter than column, pale greenish-brown, oblong, apex blunt and shortly recurved, not protruding.

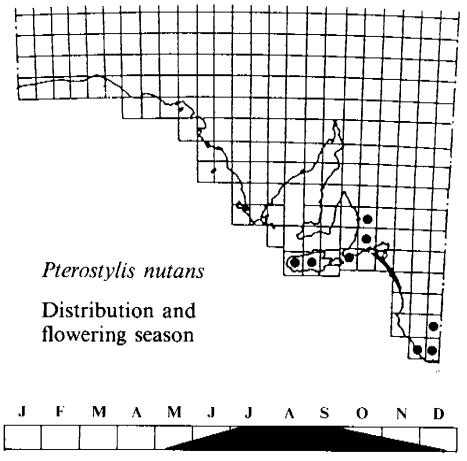
Very widespread. Forms small colonies in a diverse range of habitats from dense forest to dry sand dunes and rocky outcrops inland, on limestone, sand or clay, colonising roadsides, disused quarries etc. Has been found growing in guttering around roofs and on moss in forks of trees. Occurs in all States except the Northern Territory.

P. nana as treated here is probably a complex of several similar taxa. The common form in the mallee is a true dwarf with tiny rosettes of leaves flat on the ground and flowers less than 1 cm high. The Adelaide Hills form is considerably larger, with the rosette of leaves suberect and flowers 1.5 cm high. These two forms sometimes occur together without intermediates. Another form from coastal sandhills and limestone has narrow rusty-tinged flowers to 2 cm high on rather short stems.

P. nana does well in cultivation, quickly increasing vegetatively and freely producing seed capsules, which if not removed can release seeds over other pots. The species has the reputation of becoming a weed in many orchid houses.

The tiny flies which pollinate the flowers are so small that as they flit about they are often detected only by the bright-golden pollinia they bear. These then look rather like fire-flies.





21. **P. nutans**. *Nodding green-hood.* Plate 175

The name *nutans* (nodding) refers to the flowers which nod shyly forward.

Usually slender, to 20 cm high; leaves several, petiolate, ovate, in a basal rosette. Flower single, green, with tips sometimes reddish-brown; hood about 2 cm high, curved almost in a semi-circle so that the opening faces the ground; lateral sepals erect with slightly inrolled margins, the lobes crossing the tip of the hood and slightly exceeding it. Labellum as long as the column, narrow-lanceolate with an obtuse apex, recurved and protruding beyond the sinus, green with a reddish-brown ridge, densely covered with short hairs pointing backward.

Locally common in wetter districts where it forms small to extensive colonies especially in deeply shaded gullies but also in open woodland. Also in the eastern States.

A putative hybrid has been reported with *P. cucullata* (Adelaide Hills).

Easily cultivated; in cool, shaded conditions it increases rapidly and will flower freely even when quite overcrowded.

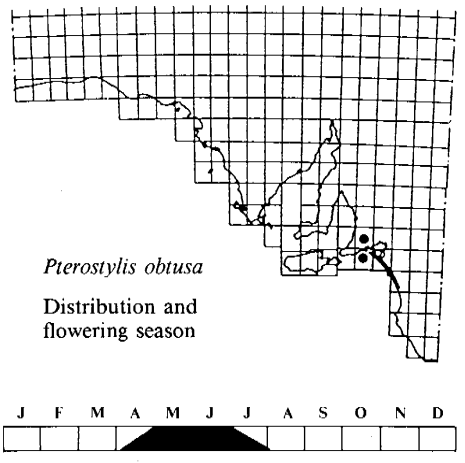
22. **P. obtusa**. *Blunt-tongue green-hood.* Plate 176

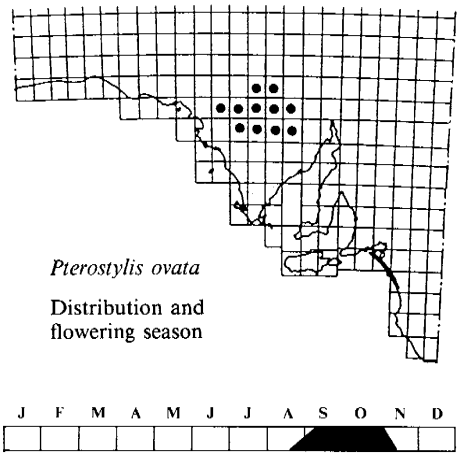
The name *obtusa* (blunt) refers to the obtuse apex of the labellum.

Slender, to 20 cm high with several lanceolate cauline leaves. Flower erect, single; hood about 2 cm high, translucent-white with green stripes, an acuminate apex up to 5 mm long, lateral sepals erect in the lower half then thrust forward to form a prominent gibbous lip, the lobes abruptly contracted into long filiform points standing 1 cm or more above the hood. Labellum about as long as the column, narrow-oblong, red-brown and protruding from the flower.

Rare species in S.Aust. found in open grassy woodland, usually on steep slopes and restricted to the Hindmarsh Valley near Victor Harbor. Common in the eastern States. The South Australian plants differ somewhat from *P. obtusa* of the eastern states and may in fact be closer to *P. alveata.*

Easily grown if kept cool and shaded throughout the year. Must be kept dry in summer however. Free flowering and multiplies rapidly in a light soil mix.





23. **P. ovata**. *Gawler Range green-hood.* Plate 177

The name refers to the ovate labellum and lower lip of the lateral sepals.

Short but stout, usually less than 10 cm high with several lanceolate leaves in a basal rosette which is normally shrivelled at flowering. Flowers few to several, rarely 1, on curved pedicels so the flowers are more or less horizontal or nodding; hood about 3 cm high, translucent-white striped with red, pink or brown, with large transparent petals, apex shortly acuminate, recurved; lateral sepals recurved and reflexed against the ovary, ovate, conjoined in lower third, the sinus narrow, lobes gradually attenuated and produced into fine parallel acuminate points to 2 cm long. Labellum almost membranous, ovate, red or pink with darker stripes, almost flat with short setae or bristles at the gibbous base and with longer ones all around the margins.

Endemic to South Australia where locally common in the Gawler Ranges between the 200 and 300 mm isohyets on outcrops of granite porphyry or quartzite.

The very large tubers are produced just below the soil surface to take advantage of the occasional rainfall (which often falls as light showers and wets only the top few cm of soil). The tubers absorb this moisture and swell rapidly and as it is often 4–8 weeks until follow up rains fall the soil about the plants may be completely dessicated, yet the plants apparently do not suffer stress.

Like most species of the *Pterostylis "rufa"* group, *P. ovata* is difficult to cultivate unless kept protected from excess rainfall.

Pterostylis "rufa" group species. Plates 191 and 192

There are several as yet unnamed species belonging to this group of dryland green-hoods in South Australia. All have the leaves in a basal rosette placed flat on the ground but normally withered at flowering time, the several flowers with lateral sepals deflexed, the dorsal sepal with a curved needle-like tip, the sensitive labellum with a fringe of diverse bristles or setae, (as in *Pterostylis rufa* the first of the group to be named). All require further study to determine their distribution, variation and status. This has proved difficult as many are orchids of the wheat belt and their habitat has been largely destroyed. Most of the species flower quite late in the spring and their dull colours of green and brown make them difficult to locate in their semi-arid environment and all are rare.

Some are found in rocky places inland especially with native pines (*Callitris* species) while others are found in sand hill country often among the prickly porcupine grass (*Triodia* species).

24. **P. aff. parviflora**. *Tiny green-hood.* Plates 178 and 179

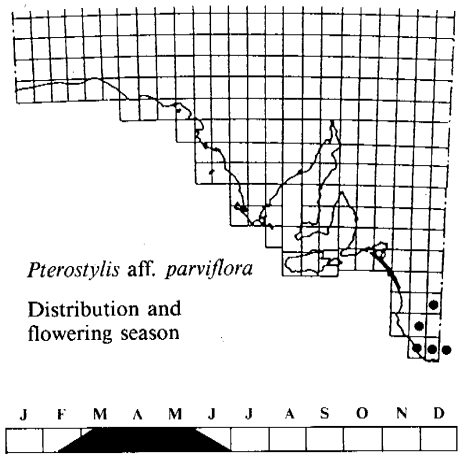
The name *parviflora* (little flowers) refers to the tiny green and red blooms.

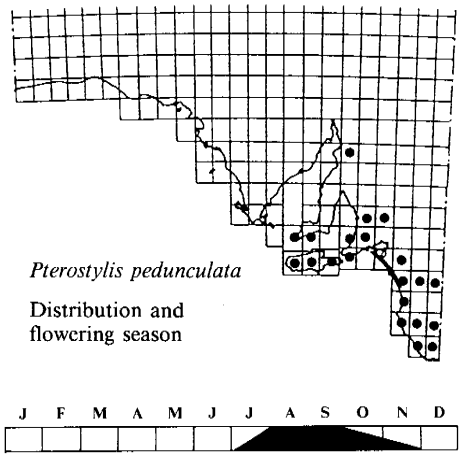
Very slender, almost wiry, to 30 cm high, leafless apart from appressed bracts on the scape. Flowers 1 to several with the hood less than 1 cm high, translucent white with green stripes, often flushed brown especially towards the apex; lateral sepals erect, the sinus slightly protruding, the lobes shortly acuminate, embracing the hood and just exceeding it. Flowers semen or spice-scented and insect pollinated.

Uncommon and confined to damp sandy soils in scrubby heath mostly near swamp margins but not strictly a swamp dweller. *P. parviflora* in the narrow sense is a smaller more delicate plant with cauline leaves and is confined to the eastern states.

Rather similar to *P.* aff. *aphylla* which is a shorter plant with dull-green, unscented flowers and self-pollinated so that the ovary is larger than the flowers in mature blooms.

A difficult species in cultivation, the tubers rot quickly in damp conditions.





25. **P. pedunculata**. *Maroon-hood.* Plate 180

The name *pedunculata* refers to the long slender flower peduncle.

Slender to 25 cm high with few to several, distinctly petiolate leaves. Petioles often as long as the ovate, 2–3 cm long blade. Flower erect, usually solitary; hood less than 2 cm high, green but shading to a deep umber, reddish-brown or orange toward the apex. Dorsal sepal acute; lateral sepals erect, green-brown to reddish or almost purple, diverging slightly from the hood, sinus acute, lobes subulate, rising high above the hood and more or less divergent. Labellum much shorter than column, ovate, dark red-brown with a longitudinal central ridge, apex blunt and not protruding.

Locally common, forming small, often very dense colonies, usually in well forested country but also in coastal heath, in areas receiving more than 500 mm rainfall per year. Seen at its best in shaded gullies of the Adelaide Hills where it occasionally hybridises with *P. curta*. Also occurs in New South Wales, Victoria and Tasmania.

This is one of the easiest orchids to cultivate as the plants multiply quickly and flower freely even when left very crowded in a pot. Prefers cool, shaded conditions. Sometimes colonising old gardens in the Adelaide Hills.

26. **P. plumosa**. *Bearded green-hood.* Plate 181

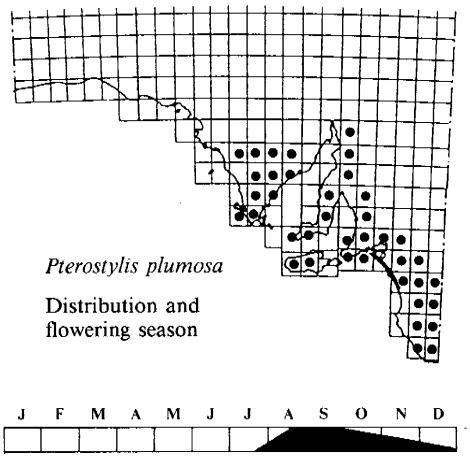
The name *plumosa* refers to the plumose or feather-like labellum.

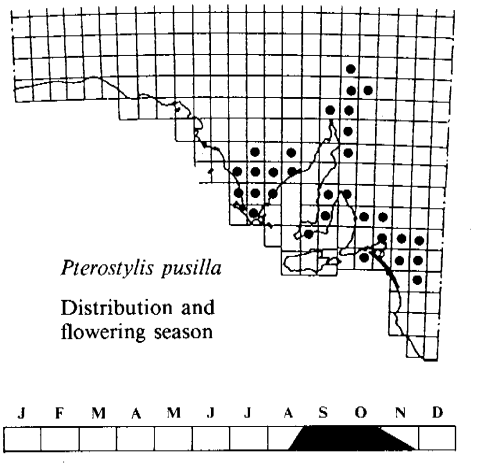
Slender to robust, to 30 cm high with many leaves crowded at the base and often extending some distance up the scape and looking like the top of a miniature pineapple. Flower usually 1, erect; hood green, about 3 cm high with an acute or shortly apiculate apex; lateral sepals recurved, the lobes linear, almost parallel, joined only at the base. Labellum protruding, about 2 cm long, slightly swollen at the base, filiform distally, closely covered with long spreading golden-yellow hairs, ending in a dark-brown or green papillose knob. This yellow-plumed labellum sways from side to side in the breeze.

Very widespread and locally common in a variety of habitats from woodland to open forest, heath and mallee-heath in sandy, clay or rocky soils. Occurs in New South Wales, Victoria, Tasmania and Western Australia. Also occurs in New Zealand.

Previously treated as *P. barbata*, a species now considered endemic to Western Australia.

In cultivation it resents disturbance and is susceptible to tuber rot but it has been successfully grown in a fairly dry, well-lit situation. Does not increase vegetatively.





27. **P. pusilla**. *Diminutive green-hood.* Plate 182

The name *pusilla* (very small) refers to the diminutive size of the plant including flowers.

Small, slender species, usually less than 10 cm high with a few ovate sessile leaves in a basal rosette, becoming senescent as flowering progresses. Flowers 1 to few; hood less than 1 cm high, greenish with maroon or brownish to purplish tints; dorsal sepal with short recurved point and dark-green stripes, lateral sepals about as long as the hood, recurved, narrow and connate in basal half, the lobes contracted into acute but not caudate points. Labellum shorter than column, fleshy, reddish-green, oblong-ovate, concave with a straight tip and a few hairs on the lateral margins.

Widespread, most common in mallee vegetation, often in limestone areas but also in dry

rocky places. In the mallee it is always a tiny plant but in the Flinders Ranges the scape may reach to 15 cm in height. Also occurs in Western Australia, New South Wales and Victoria.

Similar to *P. rufa* which has a later flowering season and larger flowers with wider sepals and shorter acuminate points.

This is one of the most difficult green-hoods to cultivate, generally dying off within 1 or 2 seasons.

28. **P. robusta**. *Larger striped green-hood.* Plate 183

The name *robusta* refers to the comparatively large or robust flower.

Rather short, usually less than 10 cm high with several lanceolate stem-leaves increasing in size from below upwards. Flower single, erect; hood to 4 cm high, greenish-white with deeper-green longitudinal stripes, the tip ending in a long fine point; lateral sepals erect, having a very wide sinus, the lobes prolonged into filiform points, which are erect, crossing the hood and standing well above it. Labellum oblong, lanceolate, as long as the column but not protruding from the flower.

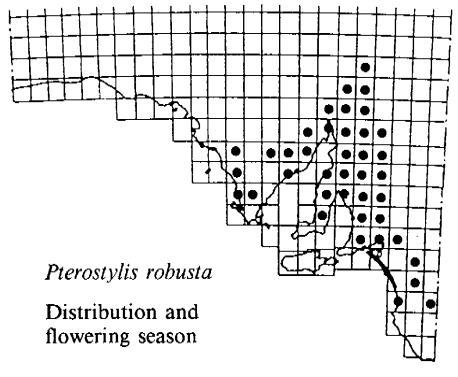
Common and widespread, forming scattered often extensive colonies, especially in rocky or sandy places or on limestone; under forest, scrub or heath, from coast to far inland, often in low rainfall areas. Generally only about 5% of plants will flower. In deeply shaded places it may reach to 20 cm high. Individual blooms last up to 8 weeks in sheltered places. Also occurs in New South Wales and Victoria.

Superficially similar to *P. alata* which is smaller, more slender and with a narrower hood. *P. scabra* from Western Australia also looks similar but has red-tinted flowers and a long maroon labellum protruding from the flower, its shortly petiolate and acute rosette leaves are quite distinct from the long-petiolate and obtuse leaves of *P. robusta.*

P. robusta has at times been known as *P. alata* var. *robusta* or *P. scabra* var. *robusta*; both names must now be considered inappropriate.

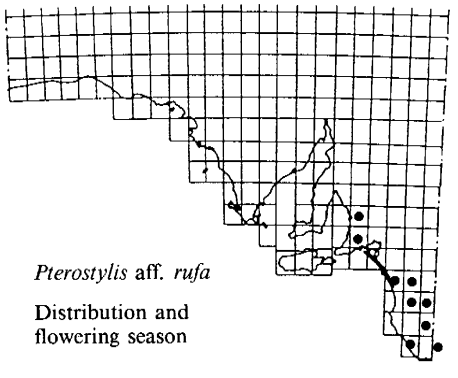
Putative hybrids have been reported with *P. dolichochila* and probably with *P. alata* but such hybrids are difficult to recognise due to the similar appearance of the parent species.

In cultivation it is very popular as it responds to good culture by flowering freely and increasing rapidly by vegetative reproduction. Does best if kept in a cool shaded position.



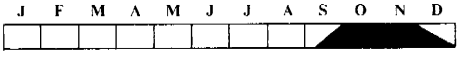
Pterostylis robusta

Distribution and flowering season



Pterostylis aff. *rufa*

Distribution and flowering season



29. **P.** aff. **rufa.** *Rusty-hood, ruddy green-hood.* Plate 184

The name *rufa* (reddish) refers to the rusty colour of the flowers.

Small to moderately robust, 10–30 cm high, with shortly petiolate or quite sessile leaves in a basal rosette which usually withers as the flowers open. Flowers few to several, sometimes 1, erect or nodding; hood 1–1.5 cm high, often deep red-brown with pale translucent areas between the markings, sometimes greenish suffused with grey or red-brown or bright rusty-red, and with a short recurved subulate point; lateral sepals about as long as the hood, the lobes contracted into shortly acuminate points, margins inrolled. Labellum shorter than column, fleshy, very irritable, oblong, green and brown or red-brown, concave with lateral margins bearing several long hairs, and with a crest of shorter hairs at the base.

Mainly in dry, rocky, exposed sites, less often in sandy open forest but restricted to areas of higher rainfall. Uncommon. Also in the eastern States.

Specimens from our South-east are very similar to plants from the eastern States, having numerous red-brown flowers. The plants from the Mt Lofty Ranges (Plate 185) usually have fewer pale-coloured almost greenish flowers on short stems, with contrasting red labellum and with the sepals having longer needle-like points. The name *P. aciculiformis* has been applied to this form.

In cultivation this is the easiest of the "rufa group" to grow. It flowers freely, but any vegetative increase is slow.

Note *P. rufa* in the narrow sense is endemic to the eastern states. It has somewhat nodding flowers.

30. **P. setifera.** *Bristly green-hood.* Plate 186

The name *setifera* (beset with bristles) refers to the numerous prominent bristles or setae on the labellum.

Slender to 30 cm high with several ovate leaves in a basal rosette which is usually senescent at flowering. Flowers few to several, more or less nodding; hood to 1 cm high, green or light-brown with white translucent stripes and dark-brown markings; dorsal sepal tapering to a fine point and curved upwards, lateral sepals sharply recurved, ovate, deeply fused in lower half with setae along the margins, lobes gradually tapering in two divergent points. Labellum fleshy, highly irritable, narrow-triangular, brown, with numerous long, pale-yellowish hairs like bristles along the margins.

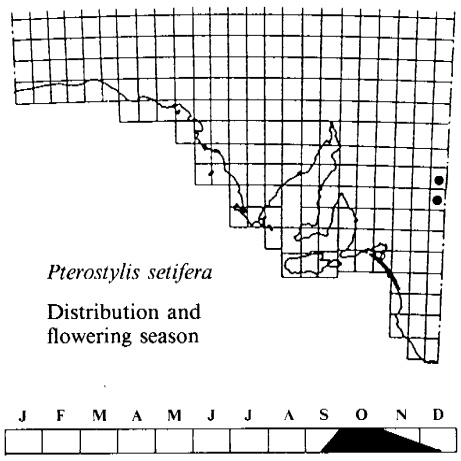
Rare in South Australia where it is confined to eastern border districts. Known only from fertile sandy loams under *Callitris* (native pine) and slender mallee in sand-ridge country. Also occurs in Victoria but is more common in south-east Queensland and New South Wales.

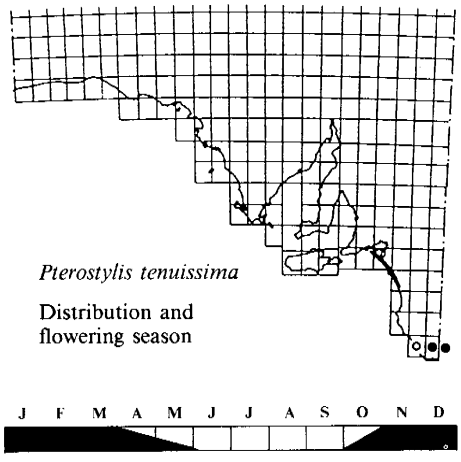
Has done well in cultivation but susceptible to tuber rot, and does not increase vegetatively.

31. **P. tenuissima.** *Swamp green-hood.* Plate 187

The name *tenuissima* (the thinnest, the finest), refers to the attenuated habit of the plant.

Very slender, attenuated, sometimes to 20 cm high with a few sessile lanceolate cauline leaves. Flowers erect, single; hood 1.5–2 cm high, translucent-white with pale-green stripes, the dorsal sepal with a long decurved filiform apex; lateral sepals erect, gradually attenuated into very long filiform points held well above the hood, their tips divergent. Labellum lanceolate, longer than column, green or brown and protruding through the sinus of the lateral sepals.





Very rare and restricted to near-coastal *Leptospermum lanigerum* (tea-tree) swamps where it thrives in alkaline mud among rushes and sedges or in moss on the lower trunks of the tea-tree. Plants flower most freely on the edges of tracks made through the reeds by small animals. Flowering seems to depend on rainfall and flowers have been seen almost any month of the year but in South Australia mainly from November to March. Can be seen at its best in the Piccaninnie Ponds Conservation Park near the mouth of the Glenelg River.

Has rarely been successfully grown or flowered in Adelaide as it is rather difficult to duplicate its natural environment.

32. **P. sanguinea.** *Banded green-hood.* Plate 188

The name *sanguinea*, refers to the reddish flowers; this species was previously referred to *P. vittata* which has green flowers.

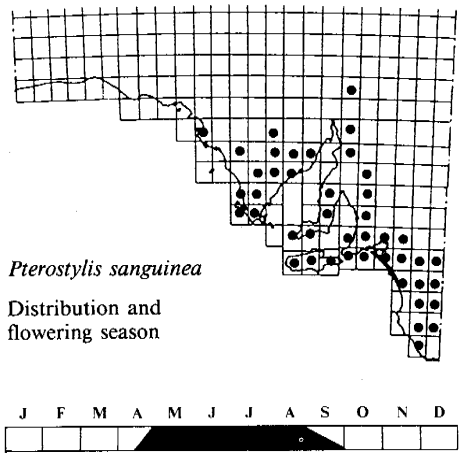
Dwarf to quite robust plant to 40 cm high with several lanceolate and clasping cauline leaves, the largest in the middle of the scape. Flowers one to several, the ovary inclined away from the axis and the flowers nodding; hood about 1.5 cm high, translucent-green with bold red-brown stripes or wholly reddish, orange or deep purple-green, apex of dorsal sepal with short point, lateral sepals 10–12 mm wide, sharply reflexed against the ovary, shorter and wider than the hood, connate for most of their length, sinus small, lobes with short acuminate tips. Labellum fleshy, reflexed, very irritable, ovate-oblong with bifid tip, red-brown to purple, concave and papillose-glandular with margins ciliate.

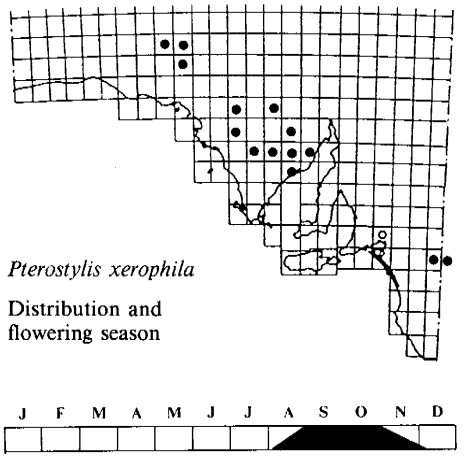
Widespread, found in a wide variety of soils and habitats from coastal sand hills, heath, swamp margins on dry rocky places in the hills. Very fine specimens can be found in sheltered gullies of the Adelaide Hills where the plants may be 40 cm high with a dozen or more flowers. Also occurs in Western Australia, Victoria and Tasmania.

In limestone or mallee areas small single-flowered plants are frequent but in high rainfall areas the large multi-flowered specimens are more abundant. Our specimens appear to be distinct from the Western Australian type form which has smaller flowers strongly banded with green and white. The South Australian plants are likely to be named as a new species.

The flowers are very long lived; if not pollinated each may last up to 12 weeks.

Some forms do well in cultivation especially if grown in a freely draining soil mix and kept shaded but fairly dry. Does not increase vegetatively.





33. **P. xerophila**. *Desert green-hood.* Plate 190

The name *xerophila* (loving dry places) refers to the arid habitat of the plants.

Slender but usually less than 20 cm high with few to several subsessile, lanceolate leaves in a rosette, flat on the ground. Flowers few to several, on long pedicels, more or less nodding; hood less than 2 cm high, often deep red-brown with pale translucent areas, the apex produced into a fine point, 3–8 mm long, lateral sepals reflexed and conjoined with a wide rounded basal portion, lobes gradually produced into long, filiform, divergent points. labellum broad, ovate, fleshy, very irritable, concave or convex and minutely tuberculate above, shallowly channelled below.

Probably widespread before settlement, in fertile red loamy soils in dry woodland but almost extinct due to conversion of this environment to farm land. Largely restricted now to rocky outcrops, especially on northern Eyre Peninsula and extending into sub-250 mm rainfall country on the edge of the Great Victoria Desert.

Seldom cultivated and not suited to cool damp areas.

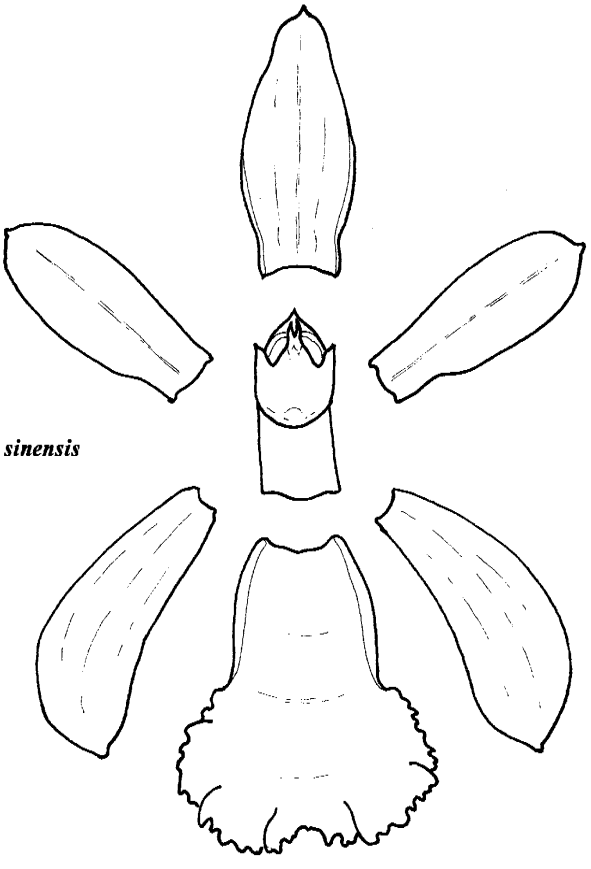
SPIRANTHES

Ladies tresses

The name is derived from *speira* (coil, spiral), *anthos* (flower), and refers to the spirally arranged inflorescence.

Glabrous or slightly pubescent plants with several elongate-tuberous roots; leaves several, basal, linear-lanceolate with a few leafy stem bracts. Flowers small, sessile, in a long spirally twisted raceme, resupinate. Floral segments differentiated, usually lanceolate except for the labellum. Column short, fleshy; stigma broad, with a very small median tooth, no rostellum, the 2-celled anther with 2 pairs of granular pollinia.

A cosmopolitan genus of about 60 species principally in the northern hemisphere and found mainly in temperate regions, with only 1 species extending to Australia.



Spiranthes sinensis

1. **S. sinensis.** *(Austral) Ladies tresses.* Plate 193

The name *sinensis* (pertaining to China), refers to the species' type location; *australis* meaning southern or Australian indicates the distribution of the subspecies.

Slender to robust, to 40 cm high; leaves 3–8, lanceolate. Flowers numerous, spirally arranged, sessile with a short glandular-pubescent ovary; dorsal sepal and petals together forming a hood over the column, pink or white; lateral sepals free, 4–6 mm long. Labellum crenulate, white and crystalline, more or less rectangular, the margins fringed, partly overlapped by the petals and so completing a tube around the column.

Rare plant from swampy places, grows amongst reeds and often completely submerged in winter and spring. Does well on lightly grazed pasture but will die out if grazing is too severe. Very fine specimens are sometimes found on mown firebreaks in forest reserves of the South-east. *Spiranthes sinensis* also occurs in the eastern States and New Zealand, spreading through New Guinea and Malaysia to Asia and Siberia and extending to 2500 m altitude in the Himalayas. As often happens with such a widespread orchid species *Spiranthes sinensis* has collected a large number of synonyms during its nomenclatural history. In this case the number is close to fifty.

Does well in cultivation if watered throughout summer and kept fairly dry in winter.

Two forms have been noted in South Australia. One of these has widely opening pink and white flowers which are faintly scented and visited by a variety of insects, especially bees.

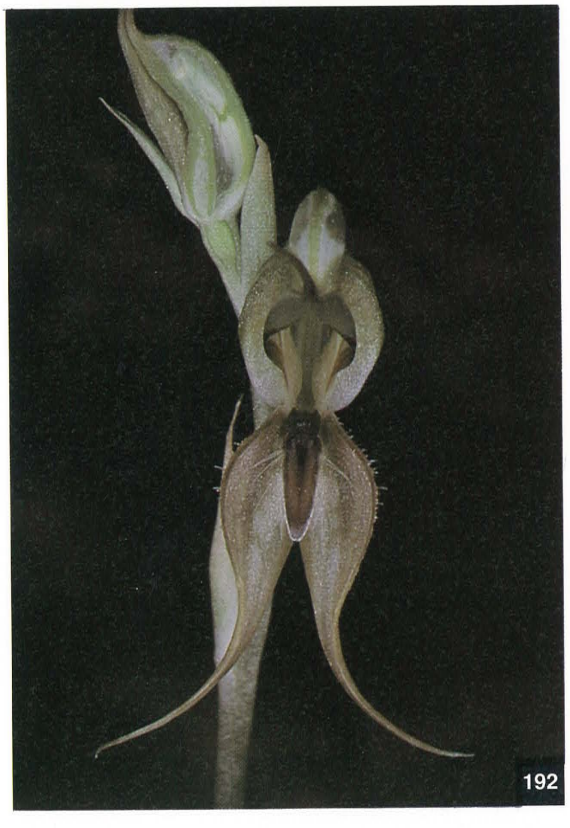


Plate 190. *Pterostylis xerophila* from the Gawler Ranges shows the broad, fleshy labellum.

Plate 191. *Pterostylis* sp.—this unnamed species from Eyre Peninsula has a most distinctive labellum.

Plate 192. *Pterostylis* sp.—an unnamed 'rufa group' species from dry rocky hills between Hawker and Broken Hill.

Plate 193. *Spiranthes sinensis* in a swampy meadow near Mt Compass. This, an insect-pollinated form, has colourful flowers.

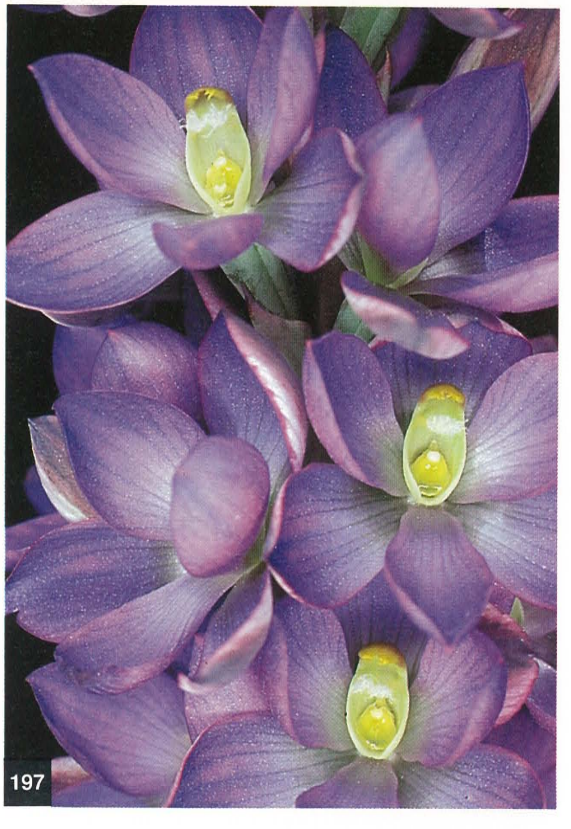
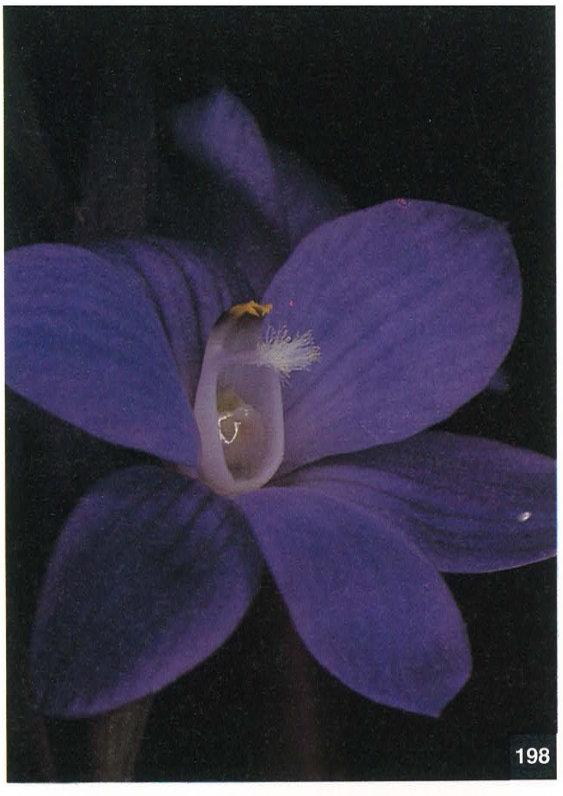


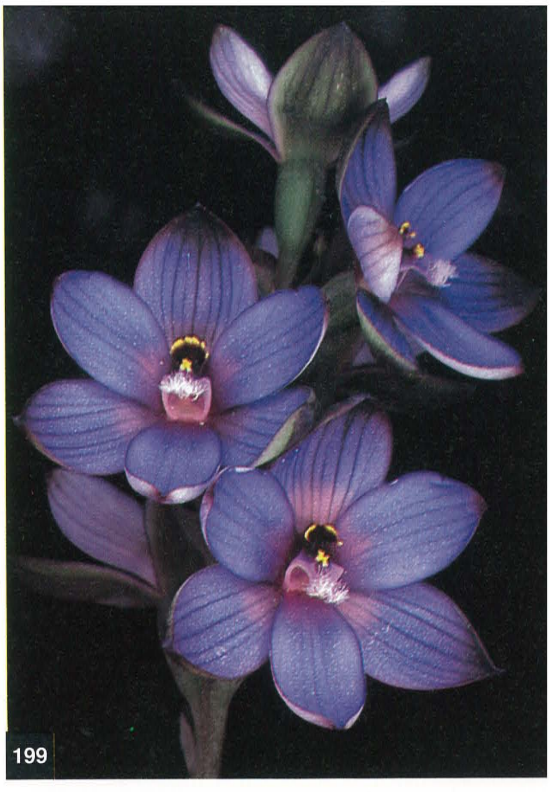
Plate 194. This strongly self-pollinated form of *Spiranthes sinensis* from Fleurieu Peninsula has pallid, narrowly tubular, short-lived flowers.

Plate 195. A clump of *Thelymitra antennifera* from Adelaide Hills showing the slender grass like leaves.

Plate 196. *Thelymitra antennifera* flowers showing the red-brown 'antennae' of the column, the stout yellow anther-point.

Plate 197. *Thelymitra aristata* (Adelaide Hills) flower spike. Note the broad column hood and the lilac-blue flowers.





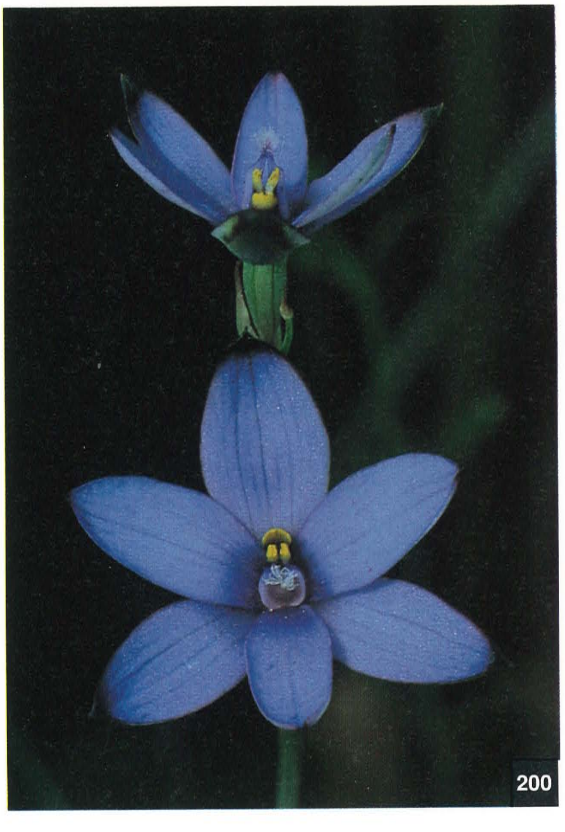


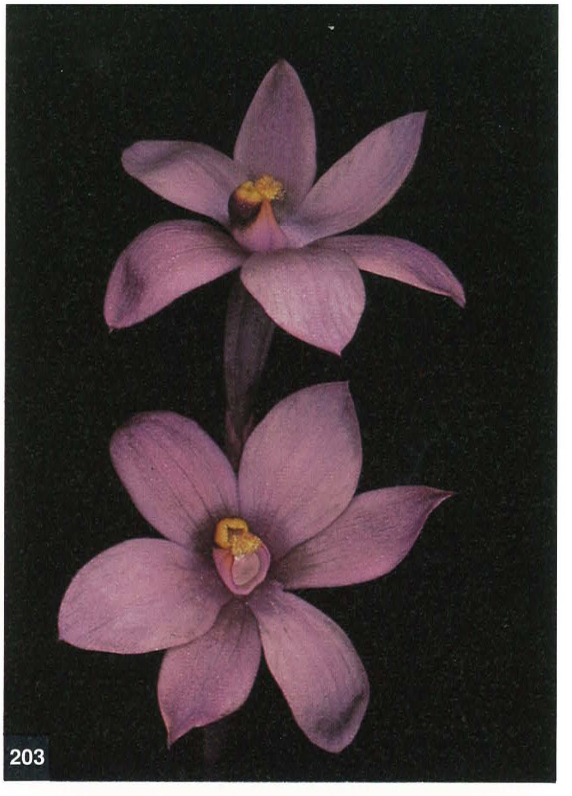
Plate 198. Single flower of *Thelymitra aristata* from the lower south-east, near Mt Burr. Note the narrow bright yellow column hood and deep blue flowers.

Plate 199. *Thelymitra azurea* from Eyre Peninsula. This is the common form from sandplain and heathland. Note the red tints.

Plate 200. *Thelymitra azurea* from Adelaide Hills. This form is now very rare.

Plate 201. *Thelymitra benthamiana* found in the Adelaide Hills, a strongly spotted form of the leopard sun-orchid.


202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204


205

Plate 202. *Thelymitra carnea* from Mylor. This pink form is rarely seen as the flowers open infrequently.

Plate 203. *Thelymitra* x *chasmogama* from Clare shows the unusual slate-pink flower colour. Note the yellow hair tufts.

Plate 204. *Thelymitra* x *chasmogama* clump of a pink flowered form from the Adelaide Hills. (*T. nuda* x *T. rubra*)

Plate 205. *Thelymitra circumsepta* in a peat bog in the Mt Lofty Range. This species is almost extinct in South Australia.

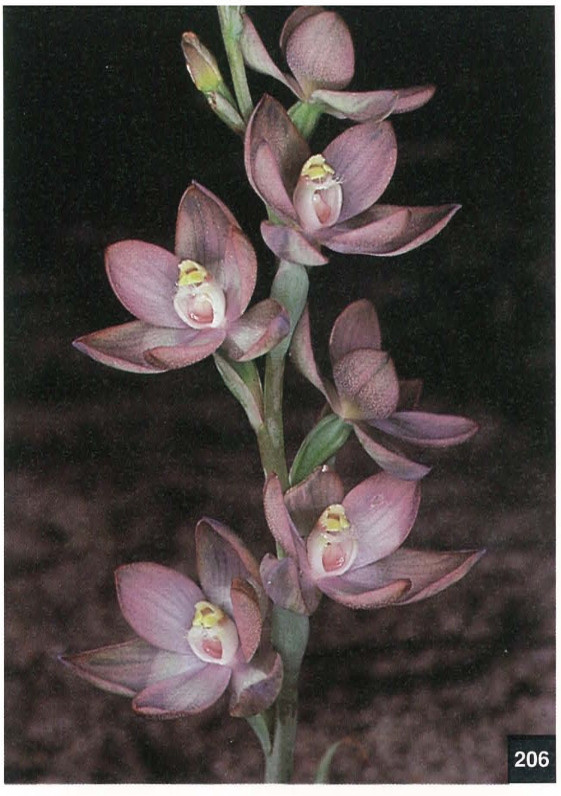
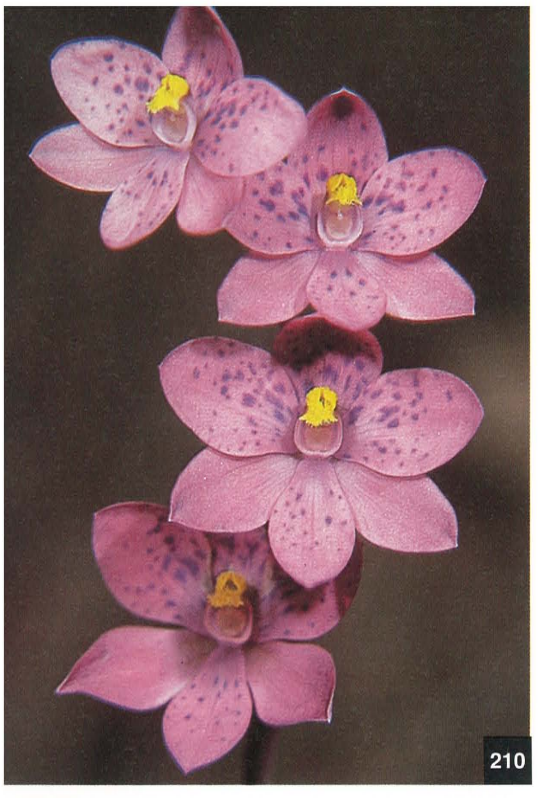


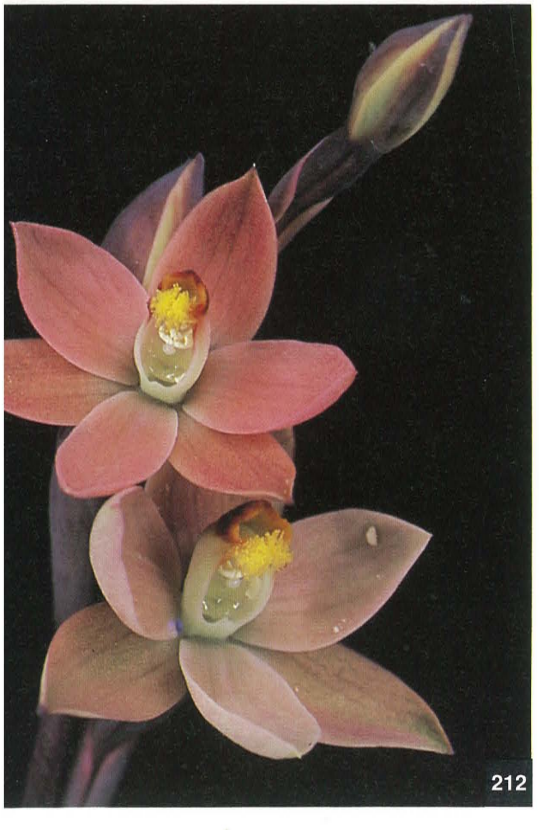
Plate 206. *Thelymitra epipactoides* from upper south-east where flower colour ranges from pink and orange through to iridescent green.

Plate 207. *Thelymitra epipactoides* flowers of metallic grey (which suggests the common name Metallic sun-orchid).

Plate 208. *Thelymitra flexuosa* from Kangaroo Island. Flowers open this wide only on hot humid days.

Plate 209. *Thelymitra holmesii* from a swamp in the Adelaide Hills. Note the inflated front to the bright yellow and black column hood.





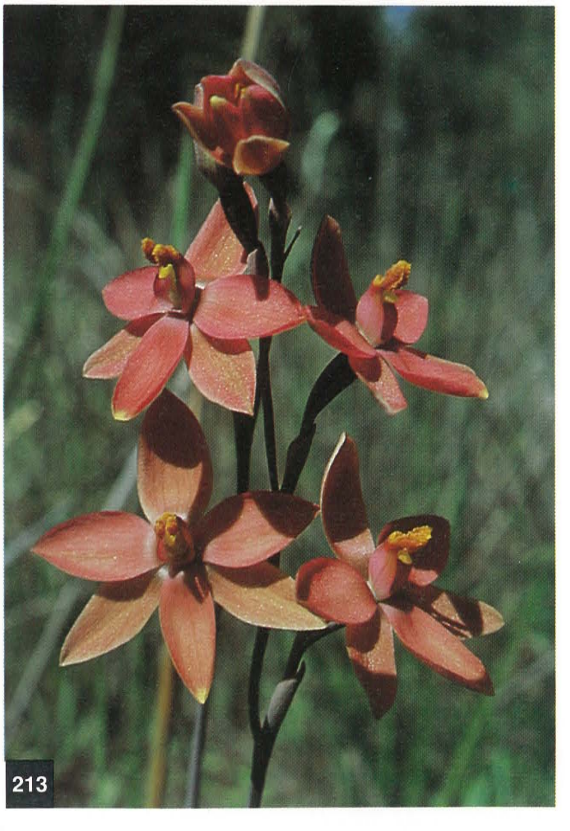


Plate 210. *Thelymitra* x *irregularis* is a very rare hybrid.

Plate 211. The self-pollinating *Thelymitra ixioides* from the Mt Lofty Ranges is a small flowered form.

Plate 212. *Thelymitra luteocilium* common form from Eyre Peninsula.

Plate 213. *Thelymitra* x *macmillanii*. (Probably a cross between *T. antennifera* and *T. luteocilium*).

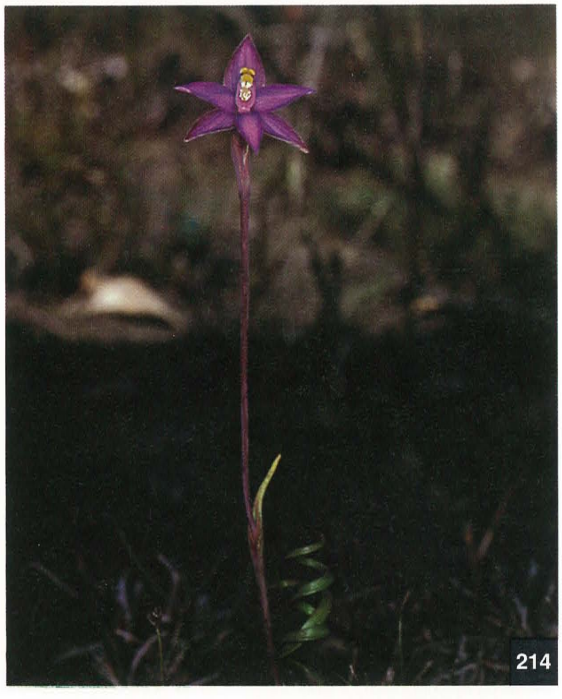


Plate 214. A plant of *Thelymitra matthewsii* on Kangaroo Island showing the characteristic spiral leaf.

Plate 215. *Thelymitra matthewsii* flower.

Plate 216. *Thelymitra* x *merranae* is a rare plant. These flowers from near Myponga had spots and stripes.

Plate 217. *Thelymitra mucida* from the Adelaide Hills showing the shiny bloom on the column.

Plate 218. *Thelymitra nuda* from Flinders Range with deep-blue coloured flowers.

Plate 219. *Thelymitra nuda* from southern Flinders Range with white flowers.

Plate 220. *Thelymitra pauciflora* near Williamstown. The flowers are small, unscented and self-pollinated.

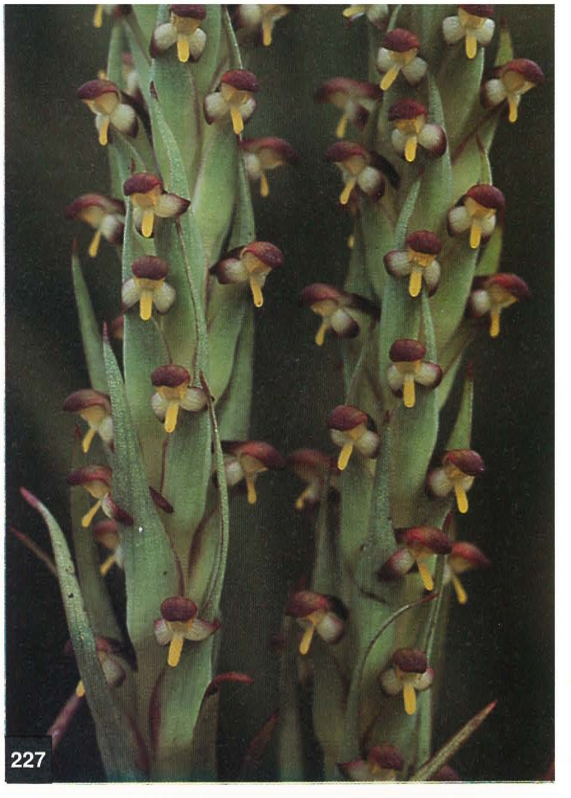
Plate 221. White flowered forms are common in *Thelymitra pauciflora.*

Plate 222. Another of the many forms of *Thelymitra pauciflora.* This form with red column mid-lobe and flat, red leaf is common in the Adelaide Hills.

Plate 223. A clump of *Thelymitra rubra* amongst bushes in an Adelaide suburban reserve.

Plate 224. *Thelymitra rubra* flowers showing the short, broad, column side-lobes and lack of hair tufts.

Plate 225. *Thelymitra* x *truncata* in the Adelaide Hills.



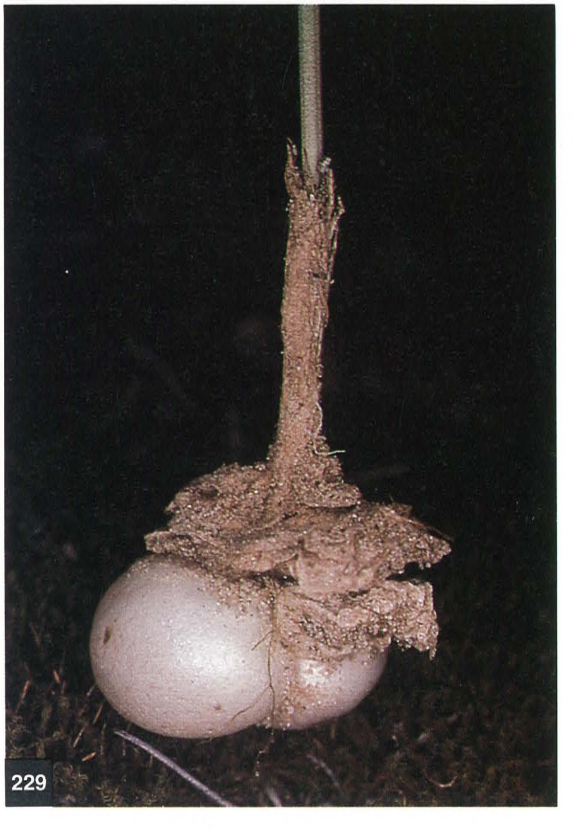


Plate 226. *Thelymitra venosa* (*T. cyanea*) from a peat bog in the Adelaide Hills. Often has the labellum longer and more ornate than the other floral segments.

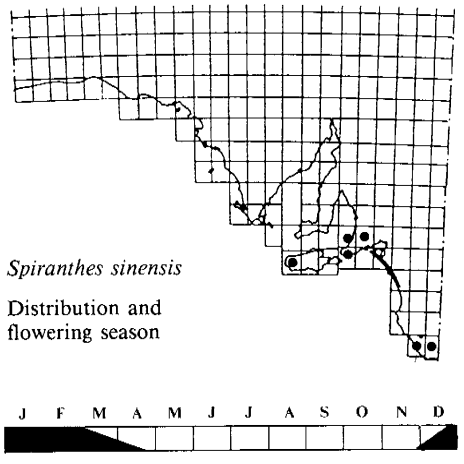
Plate 227. The South African *Monadenia bracteata* now naturalised in the Adelaide Hills.

Plate 228. Tuberoids of *Diuris punctata.*

Plate 229. Tuberoid and base of plant of *Prasophyllum nigricans.*

This insect pollinated form has protrandrous flowers (anthers maturing before the stigma) and this ensures outcrossing.

The second form has white or pale greenish flowers with the floral segments forming a collapsed tube. This form has a poorly formed rostellum, allowing pollinia to press directly onto the stigma and is thus self-pollinated. It occurs in peaty bogs on Fleurieu Peninsula (Plate 194).



Spiranthes sinensis

Distribution and flowering season

THELYMITRA

Sun-orchids

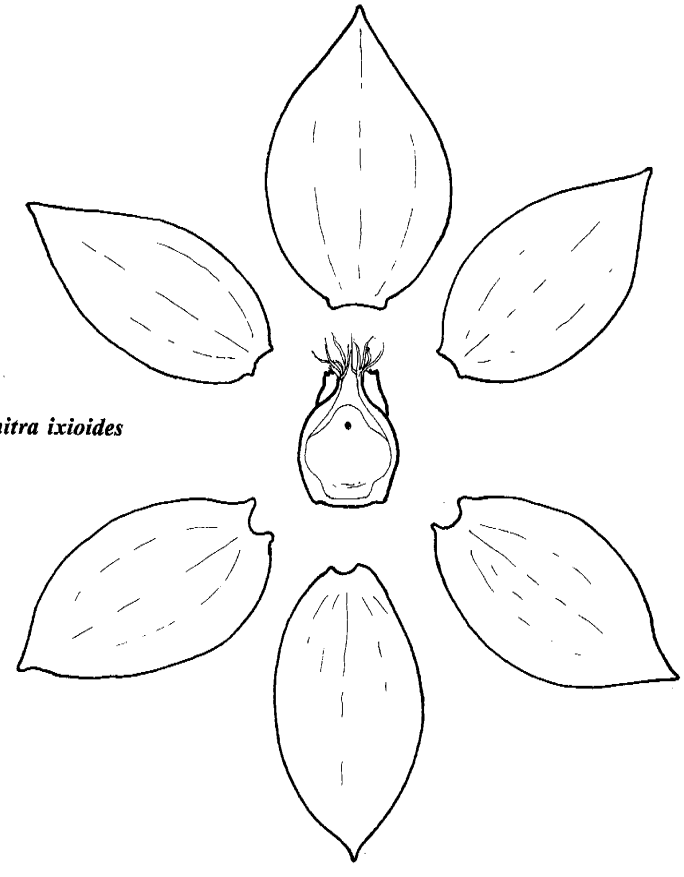
The name is derived from *thelys-* (female), *mitra* (headwear, hat—hence bishop's mitre), and refers to the sometimes plumed or decorated wings of the column, which is usually produced behind and over the anther into a hood-like appendage.

Glabrous plants with ovoid tuberoids; leaf solitary, rather long, linear to lanceolate, erect. Flowers usually several, resupinate with an almost regular perianth. Labellum similar to petals. Column fairly short, stout, erect, expanded into prominent, rather thick wings, usually joined at the base below the stigma and extended upward on each side of the anther and often behind and over it, so as to form a more or less complete often 2-lobed hood which is entire, or plumed or decorated with various excrescences. The extension behind the anther is termed the mid-lobe or post-anther lobe, the two extensions beside it the side-lobules. These often have lateral outgrowths termed column-arms at the side and about the level of the anther. The column arms may be tuberculate, fimbriate or terminated by conspicuous hair-tufts. The anther is erect or inclined forward, the connective often produced into a short or even a long point, 2-celled with 4 mealy or powdery pollinia. Stigma broad, flat, sticky.

About 40 species in Australia, several in New Zealand and 1 extending to New Guinea, New Caledonia, Philippines and Indonesia; totalling about 50.

Pollinated chiefly by small native bees. These are attracted by the bright colours and sometimes sweet scent of the flowers. Sun-orchid flowers open only in warm, generally sunny conditions when the bees are active. The conditions required for expansion of flowers vary greatly from one species to another and even within different forms of the same species.

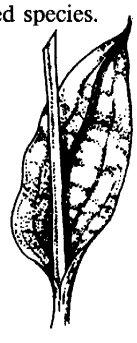
The sun-orchid flowers are thought to mimic the food flowers of the bees especially small bush lilies, the sun-orchid having a symmetrical perianth like the lilies.



Thelymitra ixioides

Thelymitra flowers generally provide no food for the bees but the yellow column appendages of most species resemble stamens. The visiting bees do not often land on the perianth but fly straight to the column, grasp it and appear to chew the yellow parts of it or in those species with hair-tufts shake them vigorously (buzz pollination) meanwhile collecting the mealy or powdery pollen on their hairy undersides. The labellum of a *Thelymitra* flower has no particular significance as an attractant, attention holder, insect positioner or landing platform and is therefore un-modified. It is the column structure and not the labellum which serves to identify each sun-orchid species.

Sun-orchid species with small, unscented, seldom expanding flowers tend to be strongly self-pollinated, while exclusively bee pollinated forms have larger more colourful, often scented, freely expanding flowers. Nevertheless bees do visit both kinds so that for the self pollinated species their autogamy is a back up system rather than a replacement one. Because bees are such indiscriminate pollinators hybrids are numerous in the genus even between largely self pollinated species.



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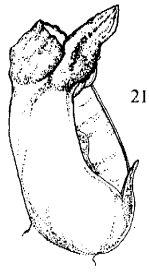


211

A. Leaf straight (Fig. 209a) . . . . . B.
A. Leaf flexuose or spirally twisted (Fig. 209b) . . . . . *T. matthewsii* 15.

B. Leaf more than 5 times as long as wide (Fig. 208) . . . . . C.
B. Leaf less than 4 times as long as wide (Fig. 210) . *T. benthamiana* 4.

C. Column-arms absent or without hair-tufts (Fig. 211) ..... S.
C. Column arms with hair-tufts present (Figs 212, 213, 216 & 217).... D.

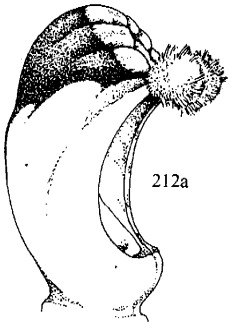
D. Hair-tufts white or pink ..... K.
D. Hair-tufts yellow or cream coloured ..... E.

E. Mid-lobe not produced over the anther into a fleshy hood (Figs 219 & 239)..... G.
E. Mid-lobe produced over the anther into a fleshy hood (Figs 212 & 213) ..... F.

F. Flower slate pink; mid-lobe shallowly cleft with smooth entire margins (Fig. 212) ... *T.* x *chasmogama* 6.
F. Flower bright-blue; mid-lobe with deeply cleft involute margins (Fig. 213) ..... *T. holmesii* 10.

G. Perianth-segments spotted (Fig. 215) ..... H.
G. Perianth-segments not spotted (Fig. 214) ..... I.

H. Flowers rose-pink; mid-lobe warted and denticulate (Fig. 216); hair-tufts yellow ... *T.* x *irregularis* 11.
H. Flowers lilac-blue; mid-lobe entire (Fig. 217); hair-tufts cream-coloured with red tints ..... *T.* x *merranae* 16.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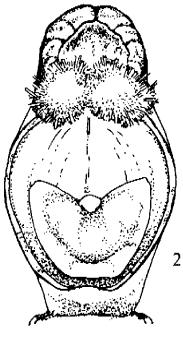
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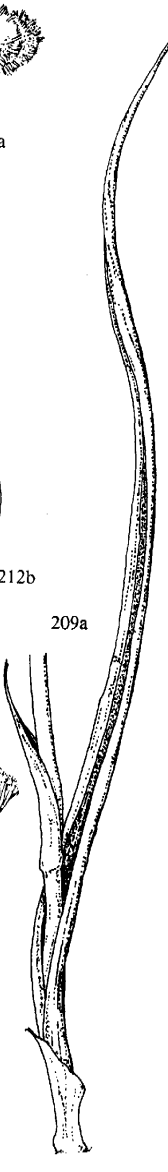
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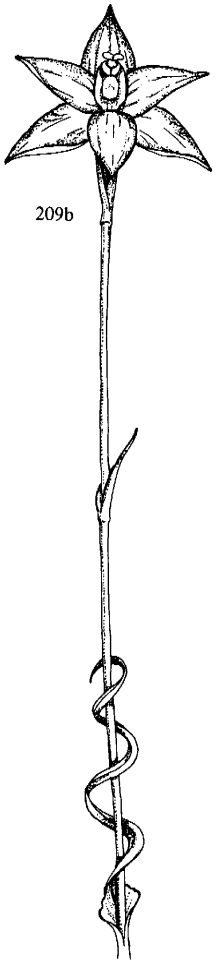
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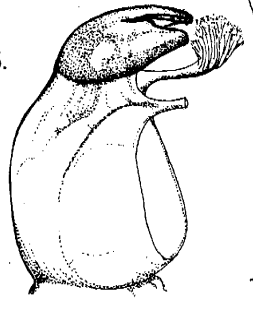
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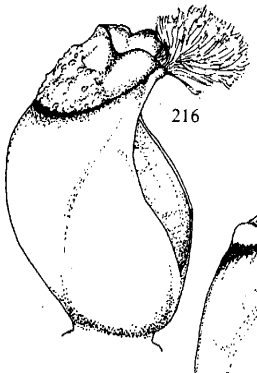
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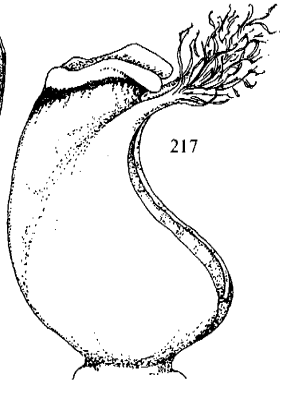
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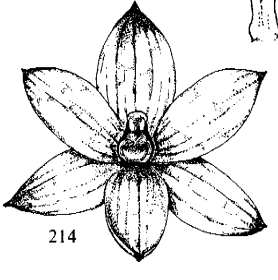
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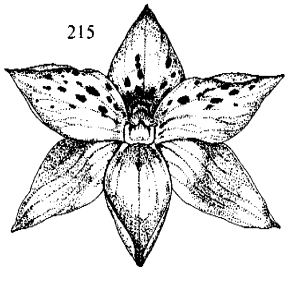
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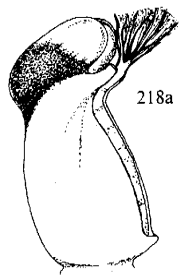
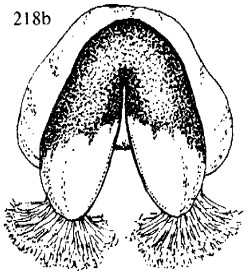
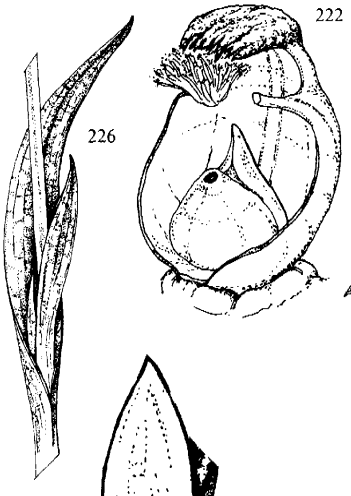
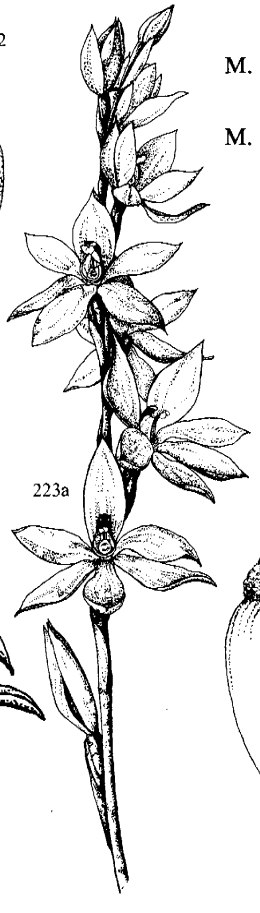
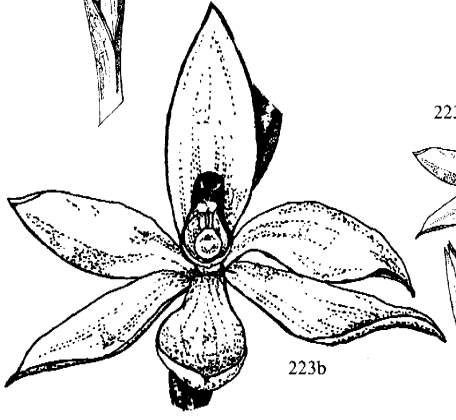










I. Mid-lobe crested or dentate not expanded over the anther (Figs 219–221) ..... J.

I. Mid-lobe smooth, cleft, V-like, expanded over the anther (Fig. 218) ..... *T. mucida* 17.

J. Flower blue; the side-lobules oblong and higher than the mid-lobe (Fig. 219) ..... *T. circumsepta* 7.

J. Flower pinkish or light-red, rarely yellow; mid-lobe higher than minute side-lobes (Fig. 220) ..... *T. luteocilium* 13.

K. Column consisting of a mid-lobe, 2 lateral-lobules and 2 column arms (Fig. 228) ..... P.

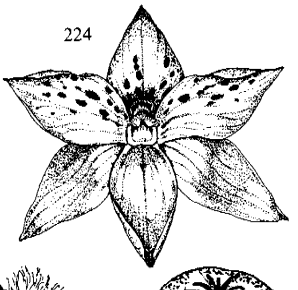
K. Column with mid-lobe and 2 column arms (Fig. 222) ..... L.

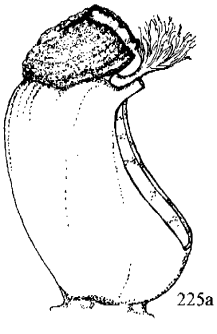
L. Perianth-segments not spotted (Fig. 223); mid-lobe usually swollen, not truncate, margin notched or denticulate (Figs 222, 229 & 230) ..... M.

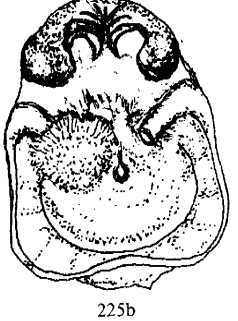
L. Perianth-segments spotted (Fig. 224); mid-lobe truncate (Fig. 225) ..... *T.* x *truncata* 21.

M. Apex of mid-lobe entire (Fig. 229) or notched (Fig. 230); leaf lanceolate ..... N.

M. Apex of mid-lobe denticulate or fimbriate (Fig. 222); leaf widely lanceolate with a fleshy leaf-like bract above (Fig. 226) ..... *T. aristata* 2. (Fig. 223)



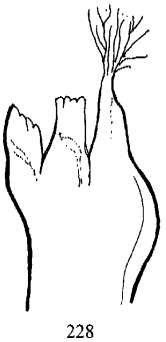


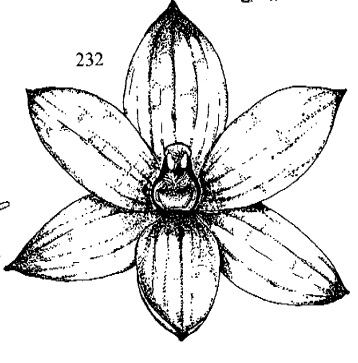


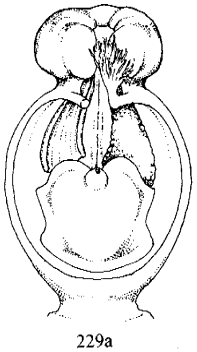
N. Mid-lobe notched or almost entire; leaf shallowly channelled ..... O.
N. Mid-lobe bifid with involute margins (Fig. 230); leaf deeply channelled (Fig. 227) ..... *T. holmesii* 10.

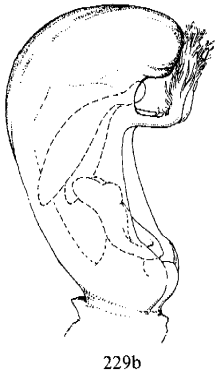
O. Flowers usually more than 15 mm diam.; mid-lobe inflated forward; the hair-tufts often dense, somewhat horizontal then reflexed, angled out vertically in front of the column (Fig. 229); pollinia remaining intact, with a large viscidium (the flowers opening freely in warm and sunny weather) ..... *T. nuda* 18.
O. Flowers usually less than 15 mm diam.; mid-lobe not inflated forward; the hair-tufts usually not very dense and held oblique straight not vertically (Fig. 230); pollinia collapsed onto the stigma (the flower opening only in very hot and humid weather) ..... *T. pauciflora* 19.

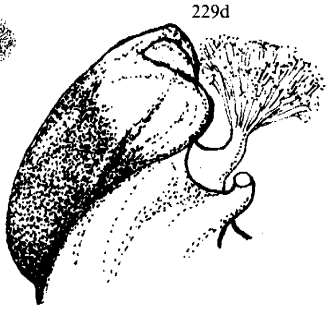
P. Leaf less than 10 mm wide (Fig. 227) ..... R.
P. Leaf more than 15 mm wide (Fig. 234) ..... *T. epipactoides* 8.

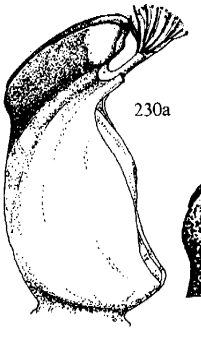


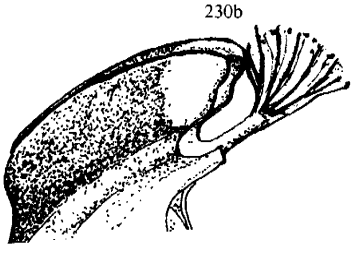


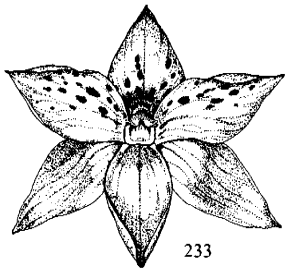








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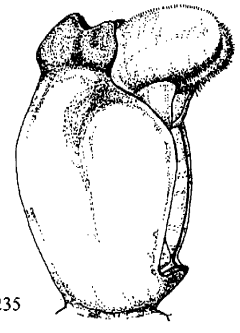
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R. Perianth-segments not spotted (Fig. 232) ..... *T. azurea* 3.
R. Perianth-segments spotted (Fig. 233)*T. ixioides* 12. (Fig. 231)

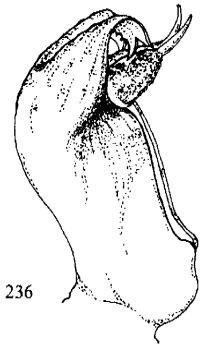
S. Lateral lobes produced into distinct appendages (Figs 236–240); anther-point various ..... T.
S. Lateral lobes rudimentary or absent (Fig. 235); anther-point oblong large and protruding*T. flexuosa* 9.

T. Lateral lobes fleshy, suberect; anther-point obtuse (Figs 237–240)... U.
T. Lateral lobes ribbon-like, spirally twisted (Fig. 236); anther-point ending in 2 horn-like points ..... *T. venosa* 22.

U. Lateral lobes or column-arms more than 3 mm long, held above column (Figs 239 & 240); mid-lobe lacking ..... W.
U. Column-arms less than 3 mm long, fleshy, held in front of the column (Figs 237 & 238); mid-lobe prominent ..... V.

V. Column-arms and the anther-point higher than mid-lobe; column-arms oblong, oblique, longer than wide, slightly toothed on margins (Fig. 237) ..... *T. carnea* 5.
V. Mid-lobe higher than column-arms and anther-point; column-arms flat, protruding forward, quadrangular with finger-like papillae outside (Fig. 238) ..... *T. rubra* 20.

W. Flowers yellow; lateral lobes red-brown, smooth (like rabbit-ears) (Fig. 239) ..... *T. antennifera* 1.
W. Flowers salmon-pink or reddish; column-arms yellow to pink, crenulate to rugose (Fig. 240) ... *T.* x *macmillanii* 14.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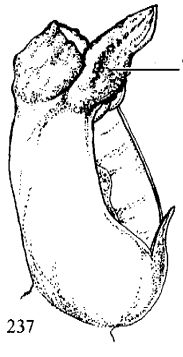

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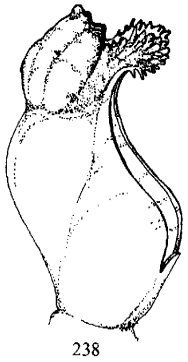
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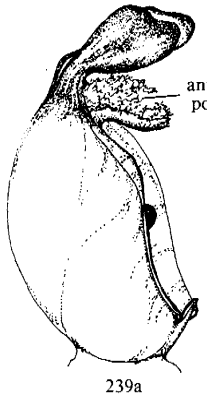

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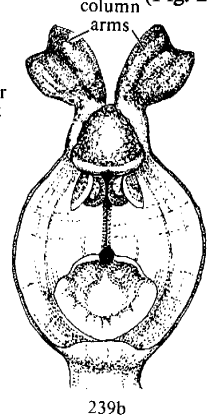

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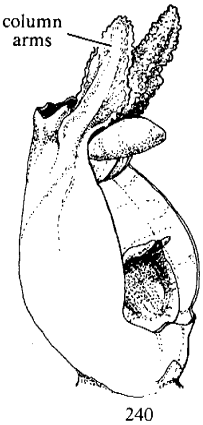

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1. **T. antennifera**. *Rabbit ears, lemon orchid.* Plates 195 and 196

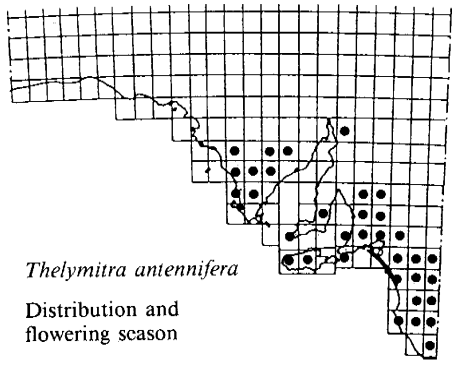
The name *antennifera* (with insect-like antennae) refers to the erect column-arms which resemble antennae.

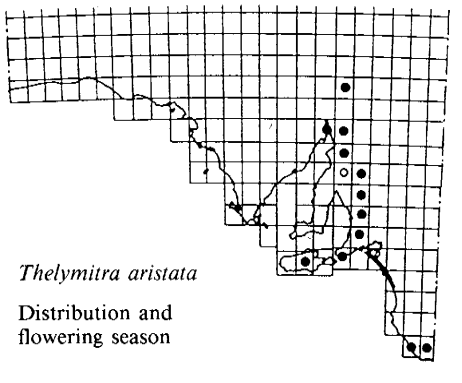
Slender, to 20 cm high, the scape wiry and flexuose (zig-zag) with 2 sheathing stem-bracts at the points of flexion; leaf red-striped at the base, narrow-linear, terete. Flowers 1–4, 2–3 cm in diam., bright-yellow; column erect, about 5 mm high, stout, with 2, erect dark-red-brown smooth or minutely papillose, somewhat 2-lobed, spathulate appendages more than 3 mm long, resembling minute rabbit ears. Flowers faintly but sweetly scented, remarkably large for the size of the plant.

Widespread and locally common, in sand or clay soils which become water-logged in winter and around rock outcrops, in forest, heath, mallee-heath or around swamp margins. The species is insect pollinated and individual flowers may last as long as 8 weeks. Also occurs in Western Australia, New South Wales, Victoria and Tasmania.

It is suspected of hybridising fairly freely with several other species, notably with *T. luteocilium, T. nuda, T. rubra* and perhaps with *T. pauciflora, T. ixioides* and *T. mucida.* All these hybrids have flowers brilliant-red to purple-red and generally with yellow column appendages. *T.* x *macmillanii* is believed to be a putative hybrid with *T. antennifera* as one parent species.

In cultivation it has proved difficult to grow as the leaf tends to turn black from its tip in wet weather, but will increase vegetatively to form attractive clumps especially if sheltered from excessive rainfall.





2. **T. aristata**. *Giant* or *great* or *tall sun-orchid.* Plates 197 and 198

The name *aristata* (awned) refers to the floral bracts which are abruptly contracted into long acuminate points.

Tall and robust, sometimes to 1 m high; leaf thick, broadly lanceolate with 1 or 2 large, fleshy, sheathing stem bracts. Flowers usually numerous, 3–4 cm in diam., pale to deep-blue, lavender or pinkish-mauve with the outer surface of the sepals often green or brownish; column more than 5 mm high, the mid-lobe arched forward, the sides parallel or tapering, apex shortly bifid, denticulate or fimbriate, green-brown or yellow; column-arms suberect, with hair-tufts of sparse white cilia reaching to about the level of the mid-lobe. Flowers insect-pollinated, sweet-scented and opening freely in warm weather.

Locally common in the Mount Lofty and Flinders Ranges but rare on Kangaroo Island and in the South-east. Occurs on hard clay or gravelly soils in open forest and scrubland especially in rocky places, but also in sandy soils around swamp margins in the South-east. Plants from the South-east have deep-blue flowers and a yellow fimbriate top to the column, elsewhere the flowers are paler with more purple tints, the top of the column green-brown, with denticulate margins, often the whole plant with a glaucous bloom. Flowering more freely after bush fires. Also in New South Wales, Victoria and Tasmania.

In cultivation it is a magnificent plant if well grown. It requires a large pot and well drained gravelly soil but leaf tips turning black is a problem.

T. grandiflora is a commonly used synonym for this species and refers to the Adelaide Hills form which should perhaps be regarded as distinct from true *T. aristata.*

3. **T. azurea.** *Azure sun-orchid.* Plates 199 and 200

The name *azurea* (sky blue), refers to the beautiful flower colour.

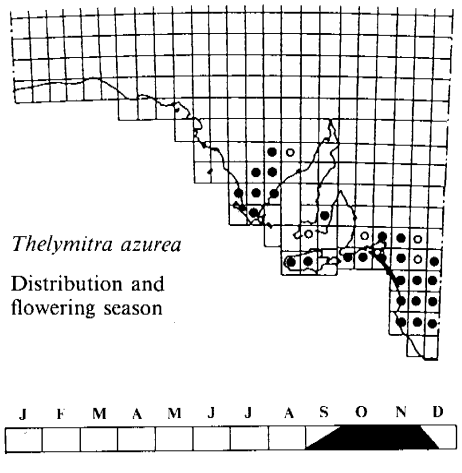
Usually rather dwarfed but occasionally up to 50 cm tall with a slightly flexuose (zig-zag) scape; leaf narrow-linear, red in the lower section. Flowers few to several, 1–2 cm across, segments deep sky-blue or azure with darker veins, usually with red tints inside and steely grey outside; column about 5 mm tall, pink or purple with the trifid mid-lobe more or less cleft or emarginate; central lobe shorter than side-lobules, each with a yellow denticulate apex; column-arms sub-erect purplish, hair-tufts often tinted yellow-red near the base. Flowers usually self-pollinated and opening only in hot sunny weather, hardly scented.

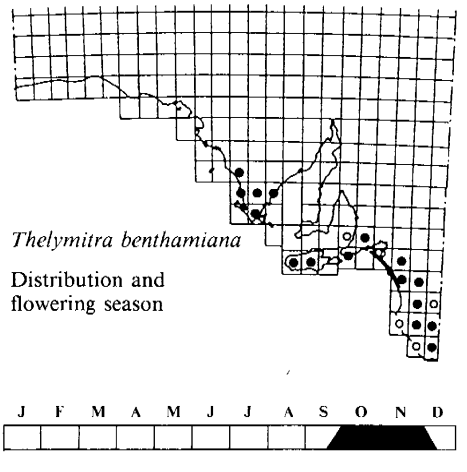
Widespread but never common, mostly occurring as single plants. Rare in the Mount Lofty Ranges and not found in the Adelaide Hills. Mainly in sandy heathland but also in terra rossa soil over limestone or rarely in lateritic gravels under light scrub cover. Usually in 250–500 mm rainfall. Also in Western Australia, Victoria and Tasmania.

Previously known as *T. canaliculata.* Our plants are generally shorter than the type form of *T. canaliculata* from Western Australia which has a more distinctly channelled leaf, compressed column appendages and is a swamp dwelling plant.

Putative hybrids sometimes occur with *T. nuda* and *T. ixioides* on disturbed sites.

Very difficult in cultivation as the tubers frequently rot.





4. **T. benthamiana**. *Leopard* or *blotched sun-orchid.* Plate 201

The name honours George Bentham, British botanist and author of Flora Australiensis. (*T. benthamiana* was previously known as *T. fuscolutea*).

Robust, 15–40 cm tall; leaf large, ribbed, ovate-lanceolate, to 9 cm long and 4 cm wide. Flowers 1 to several, rather large, 2–3 cm diam., yellow or yellowish-green with dark-brown blotches or spots. Column 7–8 mm long, yellowish-green blotched brown, the column-wings forming a broad mantle with ill-defined lobes, the margins with a long, irregularly dentate fringe, subtending a dense mass of papillate glands which form a short crest. Column-arms absent, anther with a long finger-like process, erect or slightly recurved. Flowers not scented, self-pollinated in the South Australian form and opening only in hot weather.

Uncommon, occurring singly or in small clumps, predominantly in hard clay soils under light scrub or low forest and seldom flowering well except after wild fires. Common in Western Australia, rarely in Victoria.

Difficult to cultivate and susceptible to rotting of leaves and tubers.

The large, characteristically yellow-green, strongly-ribbed leaf makes identification easy even when plants are not in flower. Very large plants with up to 10 flowers can sometimes be found on rocky ridges in the Adelaide Hills after bushfires.

T. fuscolutea is an insect-pollinated summer-flowering species with streaks of colour not spots, and white column appendages. It is endemic to Western Australia

5. **T. carnea**. *Small pink* or *tiny sun-orchid.* Plate 202

The name *carnea* (fleshy coloured), refers to the pink flowers.

Slender, wiry, usually less than 20 cm high, the scape flexuose with 2 bracts at the points of flexion; leaf narrow-linear, almost terete with a green to dark-green channelled lamina and red base. Flowers 1–3, rarely more, less than 1 cm diam., pale to bright-pink, rarely cream. Column less than 5 mm high, greenish; mid-lobe short, somewhat fleshy, yellow, entire or more or less toothed; column-arms suberect, yellow, oblong, fleshy, crenulate, more than twice as long as wide, standing high above and in front of the column, hair-tuft absent. Flowers not scented, self pollinating and opening only briefly in hot conditions.

Rare, occurring singly or in small colonies in heavy soils, in disturbed forest, open heath or swamp margins. Also in New South Wales, Victoria, Tasmania and New Zealand.

Similar to *T. rubra* which has more freely opening flowers, relatively shorter and broader column-arms and a less acute anther-point.

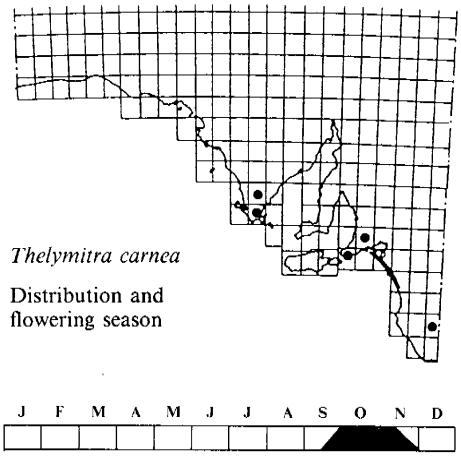
It is believed to form a putative hybrid with *T. ixioides*, this has been described as *T.* x *irregularis*. Perhaps also crossing with *T. rubra* but because of the similar appearance of the two species it would be difficult to recognise such hybrids.

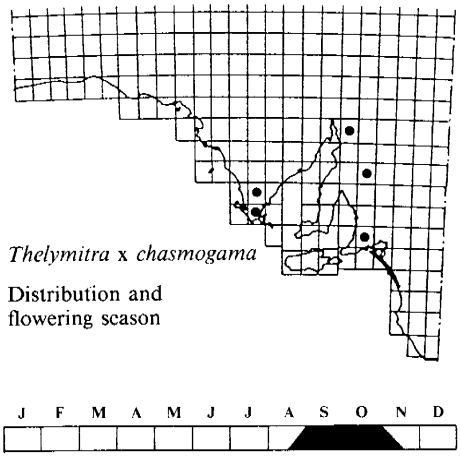
Does fairly well in cultivation but as the tiny flowers open only infrequently it is seldom grown.

6. **T.** x **chasmogama**. *Globe-hood sun-orchid.* Plates 203 and 204

The name *chasmogama* (opening for marriage) refers to the outcrossing flowers.

Slender to robust, 20–30 cm high; leaf rigid, linear. Flowers 2 to several, 1–2 cm diam., slaty-pink. Column more than 5 mm high, mauve or pinkish, the mid-lobe directed forward and forming a dilated more or less globose hood with entire and shortly inrolled margins,





apex sometimes bluntly pointed, yellow with a dark triangular band at the level of the column-arms, which are suberect and bear relatively stout, pale-yellow hair-tufts. Flowers faintly but sweetly scented.

It is believed to be a hybrid between *T. luteocilium* and *T. nuda*. The slaty-pink colour is a combination of the pink of *T. luteocilium* and the blue of *T. nuda*. The column is similar to that of *T. luteocilium*, but the mid-lobe is longer and not truncate and the pollinarium is of *T. nuda* that is the pollinia are situated behind the stigma, do not crumble onto it and the viscid disk is large.

Found mainly at locations disturbed by grazing, quarrying or roadworks, wherever the putative parent species grow and flower together. Often forms clumps of several close-packed plants by vegetative reproduction. Flowers open freely in warm weather and last 2–3 weeks. Also occurs in Victoria and Tasmania.

Does well in cultivation, soon increasing to form a colourful clump. Best kept in a sunny position and not allowed to stay too damp.

The species was described from Golden Grove (now an Adelaide suburb). It was collected there 60 years ago, when the area was a favourite location for wildflower gathering.

7. **T. circumsepta** (*T. retecta*). *Naked sun-orchid.* Plate 205

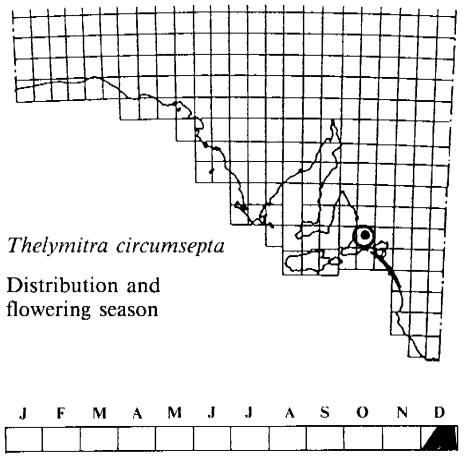
The name *circumsepta* (enclosed in a circle) refers to the tufted peloric staminode which encloses the front of the column in some forms.

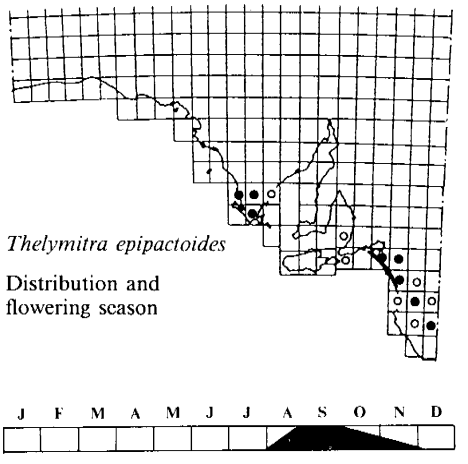
Slender to robust, 20–50 cm high; leaf linear-lanceolate, thick, deeply channelled. Flowers few to several, sometimes one, 1.5–2.5 cm diam., often pale-blue, sometimes darker-blue, mauve or pale-pink with sepals often greenish inside and even darker-green outside, the mid-lobe notched, column rather short, less than 5 mm high, shortly yellow-toothed, side-lobules 1.5 mm long, with yellow or orange apices finely toothed or fringed, the outer surface of the column with a narrow band of darker colour just below the lobes. Column-arms erect, flat; hair-tufts pale-yellow. Flowers not scented, self-pollinated.

Very rare in South Australia where known only from a single locality near the summit of Mt Lofty and restricted to peaty swamps. This is the last of the sun-orchids to bloom. Flowers remain tightly closed in all but the hottest weather. Also in New South Wales, Victoria and Tasmania where it is widespread.

Rarely cultivated.

T. circumsepta often produces forms with freak columns bearing a staminode topped with hairs in front. The first *T. circumsepta* collected was of this form. The name *T. retecta* refers to the more common form without this staminode, but normal and freak flowers may occur on the same flower spike!





8. **T. epipactoides**. *Metallic sun-orchid.* Plates 206 and 207

The name *epipactoides* (Epipactis-like) refers to the supposed similarity of the plants to some European *Epipactis* (orchids).

Robust, to 50 cm high; leaf long, fleshy, lanceolate, more than 15 mm wide; 1 or 2 large fleshy leaf-like stem bracts. Flowers few to many, rather large, up to 4 cm in diam., pinkish, grey-green, blue-grey, orange, white or brown, shot with darker iridescent tints. Column about 8 mm high; mid-lobe 3-partite, irregularly denticulate and yellow at the top, the lateral portions inturned and often interlocking. Column-arms horizontal with white hair-tufts. Flowers faintly scented and insect pollinated.

Rare. Occurring singly or in small clumps. Mainly in fertile loams in scrubby heath, often near swampy depressions. Most of its habitat has been converted to agricultural land. An unusual feature of many flowers is the sticky red stigma which looks like a blob of raspberry jam. Also occurs in Victoria.

In cultivation it has done well in large pots, flowering freely and increasing slowly by vegetative reproduction.

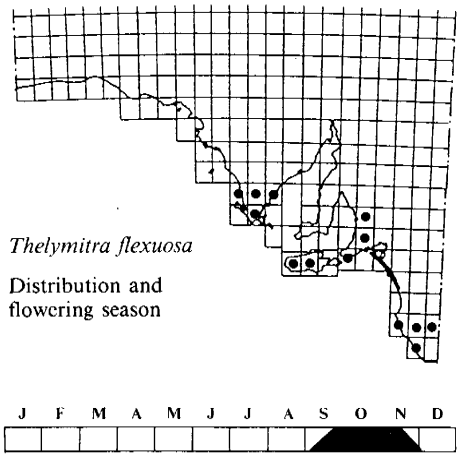
9. **T. flexuosa**. *Twisted sun-orchid.* Plate 208

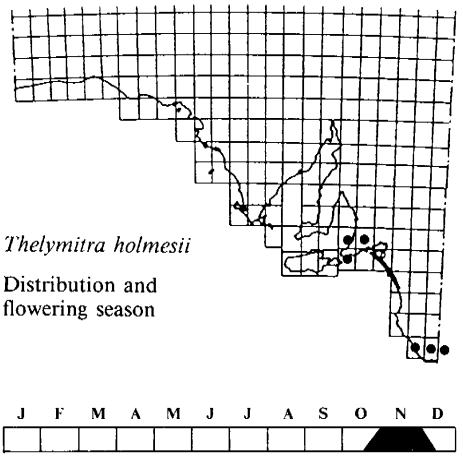
The name *flexuosa* (zig-zag or bent alternately in opposite directions), refers to the distinctly flexuose scape.

Slender, wiry, 10–20 cm high, scape flexuose with 1 or 2 stem-bracts at the points of flexion; leaf green, narrow-linear. Flower 1 or 2, rarely 3, about 1 cm diam., yellow. Column 3–5 mm high, yellow, mid-lobe swollen, with a rounded gently denticulate apex with brown markings. Column-arms rudimentary or absent, anther-point large, ovoid, protruding forward, yellow, fleshy and densely covered with short papillose hairs. Flowers self-pollinated, not scented.

Uncommon, found in wetter areas, in soil which is boggy in winter, especially on exposed clay in scrubby places or open forest. Also in Western Australia, Victoria and Tasmania. Very fine specimens can be seen in Flinders Chase on Kangaroo Island.

The small, seldom opening flowers make it unsuitable for cultivation and it has proved difficult to grow.





10. **T. holmesii**. *Slender blue swamp-orchid.* Plate 209

The species was named by W.H. Nicholls (1933) in honour of Murray Holmes, "a youthful and energetic orchidologist" who collected the type specimen from near Portland in Victoria.

Rather slender, the scape straight, to 50 cm high; leaf linear-lanceolate, rather thick, fleshy and deeply channelled. Flowers 1–6, 1–1.5 cm diam., deep-blue or violet, sometimes with darker veins, slate-coloured outside. Column about 5 mm high; mid-lobe forming a large hood which is directed forward and is more or less deeply notched with a dilated yellow apex and incurved margins; column-arms sub-erect, terete, the hair-tufts pale yellowish or white with a few red and yellow cilia. Flowers not scented, self-pollinated and opening only in hot weather.

Rare, confined to swamp margins, marshes or waterholes and often submerged during the winter. Also occurs in Victoria and Tasmania.

Easily confused with the very variable *T. pauciflora* and has been regarded as a variety of it, but differs in the deeply channelled leaves, darker flower colour, the slightly veined petals and the deeply cleft and inflated column apex with its inturned margins and the presence of yellow and red cilia in the hair tufts. Usually flowers 2–4 weeks later than *T. pauciflora* growing at the same locations. Very fine specimens 40–50 cm tall can be found around swamps near Nangkita in the southern Mount Lofty Ranges.

Forms putative hybrids with *T. ixioides* and possibly also with *T. mucida* and *T. pauciflora* but the latter crosses would not be easily recognised.

Not cultivated.

T. holmesii is now regarded as a synonym of *T. longifolia*.

11. *T.* x **irregularis**. *Crested sun-orchid.* Plate 210

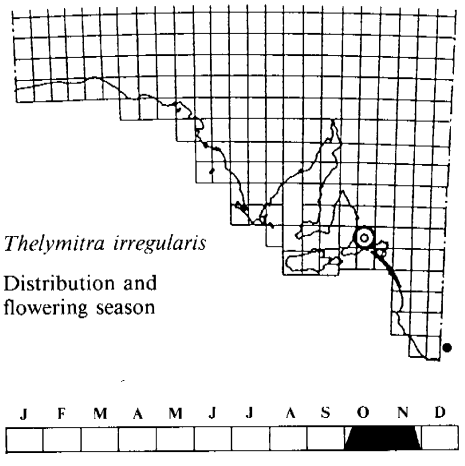
The name refers to the broken and very irregularly toothed mid-lobe of the column.

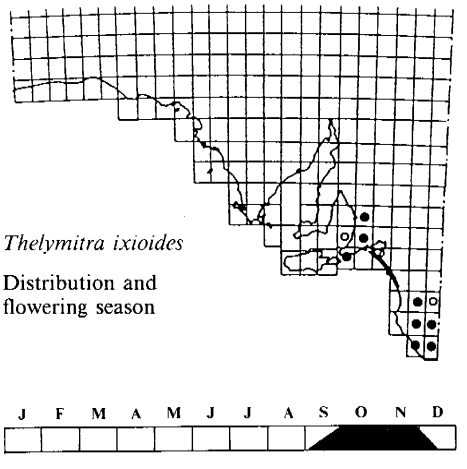
Rather slender, wiry sometimes more or less flexuose (zig-zag), to 40 cm high; leaf greenish,

narrow-linear, channelled, red at the base. Flowers few to 2.5 cm diam., bright rose-pink with fine darker veins and purple spots. Column about 5 mm high; mid-lobe short, usually 3-lobed with side lobules about as long as the central lobe, all apices yellow and irregularly toothed, forming a crest with 1 or 2 ill-defined rows of short, yellow calli below it; column-arms with yellow hair-tufts. Flowers scented.

A very rare hybrid, known only from one location in the Adelaide Hills and perhaps in the South-East. The South Australian plants are probably crosses between *T. rubra* and *T. ixioides* but true *T.* x *irregularis* may be a cross between *T. carnea* and *T. ixioides.*

Cultivated plants in Adelaide have not thrived but in Victoria have flowered well and even multiplied under shade-house conditions.





12. **T. ixioides**. *Spotted* or *dotted sun orchid.* Plate 211

The name *ixioides* (Ixia-like) refers to the supposed similarity to flowers of the genus *Ixia* (family Iridaceae).

Slender to moderately robust, 20–60 cm high; leaf linear often fleshy, channelled and less than 1 cm wide, the whole plant often with a purplish tinge. Flowers few to several, usually small in the South Australian forms, 1–2 cm diam., bright-blue, deep purplish-blue, mauve or pale-pink inside with fine darker spots especially on the petals; sepals darker and purple-red outside. Column 5 mm high, usually bluish, the mid-lobe trifid, the central lobe crested, having several closely packed rows of calli, the side-lobules longer, flat or lobed, denticulate; column-arms with hair-tuft of white cilia reaching above the side-lobules. Flowers faintly scented, or unscented.

Occurs in high rainfall areas in a variety of soils, usually on forested slopes and damp gullies. Most of our forms are self-pollinated and flowers expand only on hot days. Sometimes the flowers are unspotted. Also occurs in Queensland, New South Wales, Victoria, Tasmania and New Zealand.

Forms putative hybrids with *T. antennifera, T. azurea, T. carnea, T. mucida, T. nuda, T. pauciflora,* and *T. rubra,* the hybrids usually with blue or purple-spotted flowers.

The large flowered type form from the eastern states is often scented, its flowers open freely and are very attractive. These are more suited to cultivation than South Australian plants which are self pollinated and may be more correctly referred to *T. juncifolia. T. ixioides* in the narrow sense is probably confined to the eastern States. Does well in a light sandy mix if given plenty of sunshine.

13. **T. luteocilium.** *(Early) Pink sun-orchid.* Plate 212

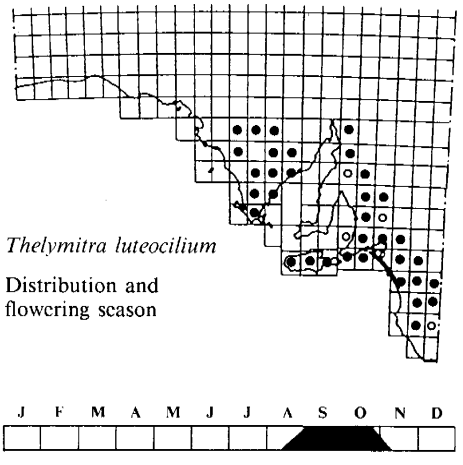
The name *luteocilium* (yellow cilia) refers to the yellow hair-tufts on the column-arms.

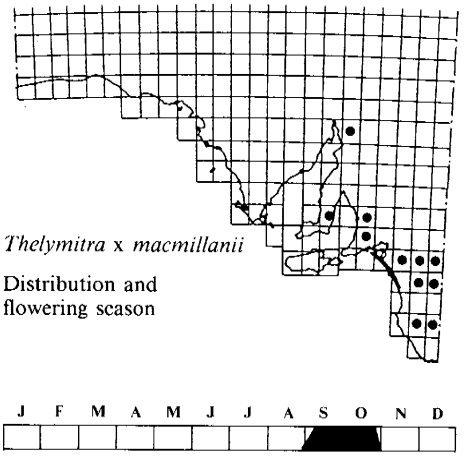
Slender, to 35 cm high, scape reddish; leaf greenish, narrow to broad-linear, fleshy, slightly channelled, with a reddish base. Flowers few, 1–2 cm in diam., pale-pink to reddish or pale-yellow. Column about 5 mm high, reddish; mid-lobe erect and short, entire or shortly bifid with yellow toothed margins, the side-lobules minute. Column-arms suberect, bearing relatively stout, yellow, dense hair-tufts reaching above the mid-lobe. Flowers not scented, self-pollinated and opening only in warm weather.

Widespread and locally common, in a variety of soils, chiefly clays or gravels, in light open forest, scrub or mallee-heath and often on rock outcrops, from the coast to well inland in areas receiving more than 300 mm annual rainfall. Flowers well before most other sun-orchids. Also occurs in New South Wales, Victoria and Tasmania.

The putative hybrid with *T. nuda* is *T.* x *chasmogama* while crosses with *T. antennifera* are usually referred to *T.* x *macmillanii.*

Has been cultivated, but not really a suitable plant, being susceptible to leaf rot and with seldom-opening flowers.





14. **T.** x **macmillanii.** *Crimson* or *salmon sun-orchid.* Plate 213

Named by F. von Mueller (1865) in honour of Thomas McMillan, a Melbourne gardener in the 1860's.

A slender, rather short plant, 10–20 cm high, scape greenish, wiry, more or less flexuose (zig-zag), with 1 or 2 bracts at the points of flexion; leaf rather short, narrow-linear. Flowers few to several, rarely 1, large, 2–4 cm in diam., deep-red, crimson or bright salmon-pink often edged and streaked with gold. Column 7 mm high, usually bright red; mid-lobe with a short, narrow, notched yellow apex; column-arms erect or suberect, produced into oblong-lanceolate lobes, which are yellow or red, irregularly crenulate to rugulose mainly towards the margins, often standing to 5 mm above the mid-lobe. Flowers sometimes sweetly scented.

It is believed that plants are hybrids with *T. antennifera* as one parent, while the other parental plant involved is uncertain but could be *T. luteocilium, T. rubra* or *T. nuda.* Most of the South Australian *T.* x *macmillanii* are believed to have *T. luteocilium* as the second parent.

Widely distributed but rare, found singly or in scattered colonies in a wide variety of habitats wherever *T. antennifera* occurs with *T. luteocilium*. The flowers open freely even in mild sunny conditions, seed is not often produced but backcrossing can occur and hybrid swarms are not uncommon.

A very attractive plant which has done well in cultivation and flowers freely if kept in a sunny position.

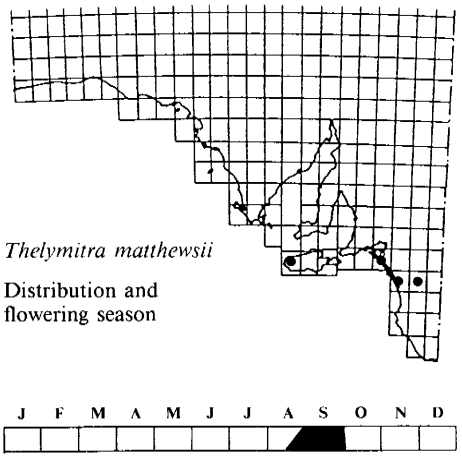
15. **T. matthewsii**. *Spiral-leaved sun-orchid.* Plates 214 and 215

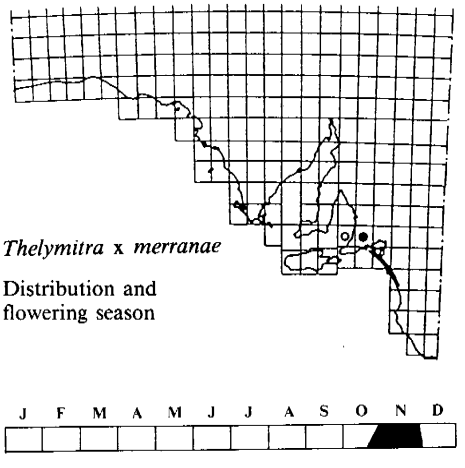
The species was described from New Zealand by T.F. Cheeseman (1911) in honour of Richard Henry Matthews (1835–1913) a New Zealand amateur botanist who specialised in orchids and ferns.

Slender, less than 20 cm high; leaf spiral or twisted around the stem, with a much dilated sheathing base which is finely and closely puberulous. Flower usually 1, purple with darker veins, about 1.5 cm diam. Column purplish, almost 5 mm high, rather stout; mid-lobe short without any crest, but with grape-like crowded greenish papillae; lateral lobes yellow, more or less oblong, thick and fleshy. The flower is not scented, self-pollinated, and opens only in hot weather.

A very rare species. Collected only 3 times in South Australia under low scrub and heath on lateritic gravel or in limestone areas and not found recently. Also occurs in Western Australia, Victoria and New Zealand. The species is apparently on the brink of extinction throughout most of its range. Very similar to *T. spiralis* of Western Australia.

Not cultivated.





16. **T. x merranae.** Plate 216

Named by W.H. Nicholls (1929) in honour of Merran Sutherland who collected the type specimen near Aireys Inlet, Victoria in 1927.

Slender to 30 cm high; leaf linear-lanceolate, green with a red base. Flowers 1 to several, less than 2 cm diam., mauve-blue with darker veins and spots, mainly on petals; sepals slightly darker, red outside. Column hardly 5 mm high, usually bluish-purple; mid-lobe short, trifid, yellow crested, the side-lobes longer and projecting forward, usually flat, thick and yellow,

fleshy; column-arms suberect, flattened, the hair-tufts white, tinged with yellow. Flowers faintly scented.

Rare plant known only from Mount Compass to Myponga amongst low heathy vegetation around swamp margins but also in Victoria and Tasmania, with similar hybrids in New South Wales.

In some areas growing as a sporadic plant with *T. ixioides* suggesting its hybrid origin. In other locations it is apparently self perpetuating as it may outnumber the putative parents. Some authors consider it to be a putative hybrid between *T. ixioides* and *T.* x *truncata* while it has been suggested that some South Australian plants are putative hybrids between *T. ixioides* x *T. holmesii.*

Rarely cultivated.

17. **T. mucida**. *Plum orchid.* Plate 217

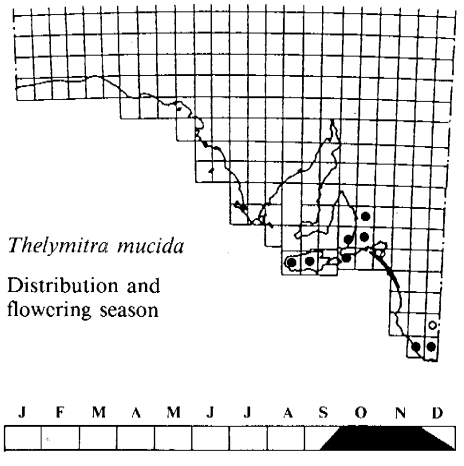
The name *mucida* (mucus), refers to the shining viscid secretion or bloom on the column hood.

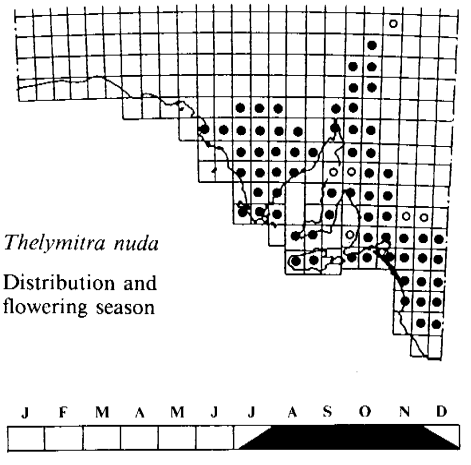
Slender, sometimes to 50 cm tall, greenish; leaf narrow to broad-linear, dull-green, fleshy, deeply channelled. Flowers 1–3, rarely more, 1–2 cm diam., bright-blue inside, grey outside. Column about 5 mm high, dark slate-blue, the hood dotted with a white, hoary, thickly viscid secretion, mould-like and shining, which may be rubbed off (the vernacular name is probably due to the similarity of this to the white bloom found on ripe plums). Mid-lobe erect then arched forward over the anther, deeply cleft, the lobules flat, entire, smooth, apices yellow; column-arms horizontal to suberect, each bearing hair-tufts of cream or yellow fimbria with some red tints. Flowers sometimes sweetly scented but usually self-pollinated and opening only in hot weather.

Uncommon but widespread in high rainfall areas, in heavy loams or clays which become very boggy or inundated in winter. Sometimes grows in waterholes, which may be 2 m deep in winter, plants flowering while the leaf is still submerged. It is in this habitat that plants reach their largest size. Also occurs in Western Australia, Victoria and Tasmania.

T. holmesii may resemble this species but lacks the hoary bloom on the column. Putative hybrids have been reported with *T. ixioides, T. nuda, T. pauciflora* and possibly with *T. antennifera.*

Has flowered in cultivation but not really a suitable species for pot culture.





18. **T. nuda**. *Scented* or *plain sun-orchid.* Plates 218 and 219

The name *nuda* (naked, devoid of), refers to the smooth or naked and inflated mid-lobe of the column.

Moderately slender to robust, sometimes more than 50 cm high; leaf long, linear-lanceolate or strap-shaped, shallowly channelled with longitudinal ribs. Flowers few to many, 2–4 cm diam., blue, mauve or white, rarely pink; reddish or green outside. Column about 5 mm high, white or bluish; mid-lobe expanded, directed forward and forming a more or less dilated smooth hood, usually notched, with entire or rounded margins, apex brown, reddish, grey-black or yellowish; column-arms suberect or horizontal and then bent upward with a tuft of fine hairs, usually white but sometimes pale-mauve, reaching as high as the hood; pollinia remaining intact, not collapsing onto the stigma. Flowers sweetly and often strongly scented, opening freely in warm weather and pollinated by insects.

Widespread inside the 250 mm isohyet and locally common. Found in a wide variety of habitats from coastal dunes, heath, open forest, heath and mallee to rocky places as far inland as the northern Flinders. Occurs singly or forms clumps of up to a dozen plants. Occurs in all States except the Northern Territory.

This is one of several South Australian orchids which has successively flowering races in the same area. One set of plants may flower in August, another in late September and a third in November. This appears to be a feature of many insect pollinated orchids which flower over a 3 or 4 month period, while many self-pollinated species may complete their flowering in a week or two.

The plants in some areas are quite glaucous with a powdery bloom, in other areas they are dark-green with a red leaf base. Blue is the most common flower colour but in parts of the southern Flinders Ranges white flowered plants outnumber the blue. A form with a greatly swollen column mid-lobe was named *T. megcalyptra* but this feature is a very variable one. Similar to *T. pauciflora* which has smaller, seldom opening flowers, with the column hood hardly expanded, friable pollinia which collapse onto the stigma and unscented flowers. Both *T. nuda* and *T. pauciflora* are indistinguishable from *T. longifolia* and they might well be included under the latter.

Forms putative hybrids with *T. antennifera* (Adelaide Hills), *T. aristata* (southern Flinders), *T. canaliculata* (Eyre and Yorke Peninsula, Murray), *T. mucida* (Adelaide Hills), *T. pauciflora* (Adelaide Hills) *T. rubra* and with *T. luteocilium.* This last hybrid is called *T.* x *chasmogama*

In cultivation does well in a large pot if kept in a sunny position and not allowed to stay too damp. Has good potential as a parent for hybridisation.

This species is often observed being visited by various native bees which grasp the hair tufts on the column and shake them vigorously as if trying to remove pollen. This is termed "buzz pollination" and is the method whereby the bees collect pollen from bush lilies (*Arthropodium* etc.) which the sun-orchids may mimic. The hair-tufts of the orchids resemble the woolly anthers of the lilies.

19. **T. pauciflora**. *Slender sun-orchid.* Plates 220–222

The name *pauciflora* (few flowered) refers to the few flowered racemes of some forms.

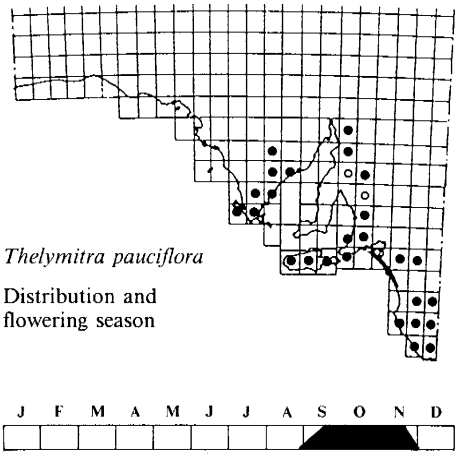
The most variable sun-orchid in South Australia, 10–50 cm high, slender to moderately robust; leaf from narrow-linear to broad strap-like, wholly green or red and green. Flowers of some forms less than 5, or in other forms as many as 20, varying from less than 1–2 cm diam., from sky-blue, through pale-pink to clear-white or even greenish. The column is erect, to 5 mm high, deep-red or brown to yellow, yellow and black or even wholly blue or dark

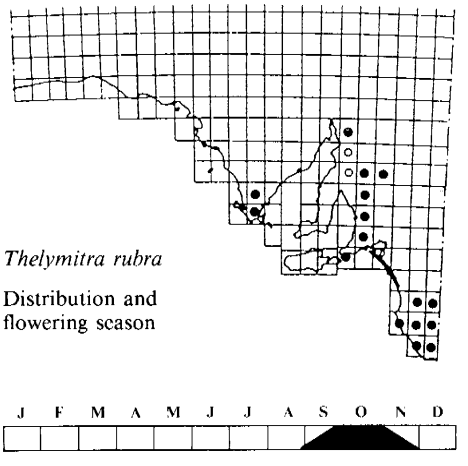
grey. The mid-lobe is directed forward and forming a hood which is hardly less dilated and may be deeply notched or rounded and entire, the sides incurved and usually meeting in the mid-line, often with a yellow apex; column-arms are suberect or horizontal, then bent upward, hair-tufts usually white but sometimes pale-mauve, cilia from dense woolly to almost absent and reaching about as high as the hood; pollinia loose and friable, usually collapsing onto the stigma in the bud. Flowers not scented, self-pollinated, opening only in hot humid weather.

In a wide variety of habitats, from heavy forest, heath, to open forest, grassland and swamps but uncommon in calcareous soils. Especially favours damp sites and occurs in shadier situations than most other sun-orchids even colonising pine plantations and overgrown gardens. In some parts of the Adelaide Hills as many as 5 different forms can be found growing on a single hillside. Occurs in all States except the Northern Territory.

Similar to *T. nuda*, which has bigger flowers that open freely, and are scented, column arms oblique, its pollinia remaining intact and with a large viscidium. Both *T. nuda* and *T. pauciflora* are very variable species and are indistinguishable from earlier described New Zealand species of *T. longifolia*. Although the flowers seldom open, putative hybrids with *T. holmesii, T. ixioides, T. mucida, T. nuda* and *T. rubra* have been observed.

One of the easiest sun-orchids to grow but its unattractive habit of keeping its flowers closed does not make it an interesting subject for cultivation.





20. **T. rubra**. *Common pink* or *pink* or *salmon sun-orchid.* Plates 223 and 224

The name *rubra* (red) refers to the colour of the flowers.

Rather slender, to 40 cm high; scape usually reddish, rather wiry and often flexuose, with 2 stem bracts at the points of flexion; leaf narrow-linear, channelled, the base reddish. Flowers 1–4, to 2 cm across, pink (in various shades from pale to salmon or deep reddish, rarely cream-yellow). Column about 5 mm high, usually pink or mauve, the mid-lobe short, broad, truncate with a yellow faintly toothed apex; column-arms horizontal or slightly inclined upward, oblong, yellow-orange, covered with rugulose glands, the margins toothed no hair-tufts. Flowers not scented, self-pollinated but opening fairly freely in warm humid weather.

Locally common, occurring singly or in small groups, in open forest, woodland or heath in areas receiving greater than 500 mm mean annual rainfall. Can be seen at its best in open woodland of the Adelaide Hills where it forms a delightful display on sunny days in mid-spring. Occurs in Victoria and Tasmania.

Superficially similar to *T. carnea* which differs in its seldom expanding flowers having longer smoother column-arms and a more acute anther point. *T. rubra* has at times been treated as a variety of *T. carnea.*

Forms putative hybrids with *T. ixioides* (*T.* x *irregularis*) with *T. antennifera, T. pauciflora, T. nuda* and possibly with *T. carnea.*

Does not do well in cultivation; seldom grown despite its attractive appearance.

Thelymitra urnalis named by R.D. Fitzgerald in 1882 from plants collected near Adelaide is considered to be based on immature flowers of *T. rubra.* Fitzgerald noted that *T. urnalis* differed in having flowers "brownish outside yellow inside" but this is the colour scheme of *T. rubra* flowers several days before they are ready to open. The staminode in front of the column which gave it the urn-shape (hence the name "*urnalis*") is sometimes found in Adelaide Hills populations of *T. rubra.*

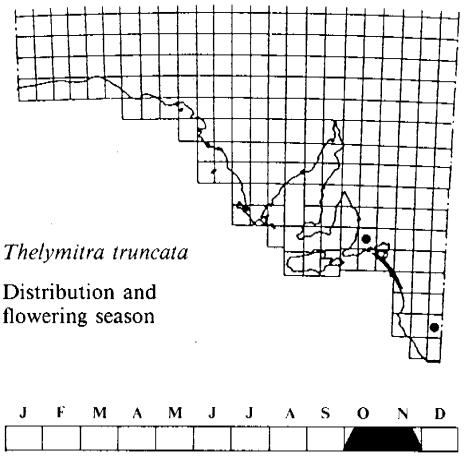
21. **T.** x **truncata.** Plate 225

The name *truncata* refers to the truncate or straight-topped mid-lobe of the column hood.

Quite slender, to 40 cm high; leaf lanceolate, lamina channelled above, keeled below, with red-brown base and reddish bracts. Flowers few to several, 1–2 cm diam., lavender-blue or mauve with darker spots mainly on dorsal sepal and petals. Column is 4–5 mm tall, the mid-lobe narrow, short, erect or curved forward near the top, entire with a truncate yellow apex which is more or less finely toothed, the outer surface below the crest is sometimes coloured with low ridges of tubercles; column-arms suberect, hair-tufts white reaching as high as the crest. Flowers not scented.

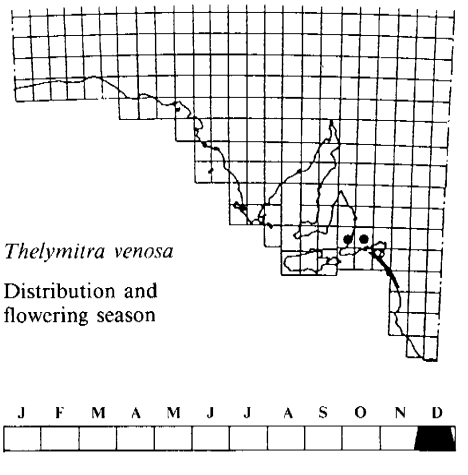
Widespread but rare and scattered in high rainfall districts mostly occuring as a single plant or small clump in open forests and coastal heaths especially in disturbed areas. Usually found growing with *T. ixioides* and *T. pauciflora* and considered to be a putative hybrid between them. Crosses between *T. ixioides* and *T. mucida* or *T. ixioides* and *T. nuda* are all very similar, as is *T. decora* a species from New Zealand recently recorded from the eastern States and probably also in South Australia. The names *T. decora* and *T. juncifolia* have at times been used instead of *T.* x *truncata. T.* x *truncata* also occurs in the eastern States.

Not known in cultivation.



Thelymitra truncata

Distribution and flowering season



Thelymitra venosa

Distribution and flowering season

22. **T. venosa** (*T. cyanea*). *Veined sun-orchid.* Plate 226

The name *venosa* (veined), refers to the conspicuous dark-blue venation of the flowers.

Slender, 20–50 cm high, yellow-green, scape more or less sinuous; leaf thick, narrow-linear, channelled with rounded margins. Flowers few to several, rarely 1, 2–3 cm diam., usually blue but rarely pink or white, with darker veins. Labellum larger than the other segments, with its anterior margins more or less crisped. Column 4–5 mm high, light-green, the mid-lobe not developed but with a short row of small, crowded, blister-like calli between the base of the column-arms, which are suberect, flat, yellow, each twisted inwards into a loose ribbon-like spiral, without hair-tufts, anther-point ending in 2 horn-like points, protruding below and beyond the column-arms. Flowers not scented.

Uncommon in South Australia and found only near Mt Compass and Myponga, where confined to peaty bogs growing amongst rushes and sedges, often in the tussocks that remain in heavily grazed swamps. Flowering season short, usually only 2 weeks at the beginning of summer. The flowers are self-pollinated and open only on hot days, usually only for a few hours in the morning. Occurs in New South Wales, Victoria and Tasmania where it is widespread and more common. Also in New Zealand and New Caledonia.

In cultivation the species is not easy to grow in Adelaide as it must be kept damp in summer when most other species are dormant, under such conditions it is subject to thrip attack and damping off.

The name *T. cyanea* is applied to smaller self pollinated plants (the South Australian form), and *T. venosa* to large-flowered insect-pollinated plants from the Sydney sandstones.

7. CONSERVATION STATUS OF ORCHIDS IN SOUTH AUSTRALIA

Explanation of symbols used.

These are ranked in order of decreasing conservation significance.

X: Presumed extinct. Not found in recent years despite thorough searching of suitable habitat.

E: Endangered. Very rare and in serious risk of disappearing in the wild within fifty years if present land use and other causal factors continue. Usually known only from very few populations or several non viable ones.

V: Vulnerable. Rare and at risk over a longer period of time through continued loss and degradation of habitat.

R: Under no present threat but known only from a restricted area and therefore vulnerable to local disasters.

U: Maybe widespread but known only from small populations which are often not in the favoured habitat of the species.

N: Common and generally well represented by large populations in reserves or conservation parks.

Further notes. Asterisked species* are those which are vulnerable or endangered only as far as South Australia is concerned and may be common in other states. Doubtful taxa are not treated, and data on hybrids is necessarily sketchy.

Species likely to have occurred in South Australia before settlement but never collected here include *Burnettia cuneata, Chiloglottis reflexa, Prasophyllum brevilabre* and *P. morrissii.* All occur relatively close to the border and suitable habitat existed in the lower South-east.

An introduced orchid, the South African *Monadenia bracteata* has recently become established in the Adelaide Hills in disturbed areas such as roadside verges and old quarries. It is unlikely to compete with native species.

Where a species is known to occur in viable populations in a conservation park or reserve the status is followed by the lower case letter 'c'. This is followed by an estimate of the percentage of pre-settlement habitat still remaining for each species ie. < 10% indicates that over 90% of the species' original habitat has been destroyed or modified to such a degree as to make the habitat unsuitable for that particular species.

A rating of Vc < 5% indicates that a species is vulnerable to extinction at present rates of loss even though viable populations occur in a reserve and indicates that one of the main threats to the orchid's survival is loss of habitat.

It should be emphasised that all ratings are estimated and that additional knowledge may see the rating altered.

Acianthus caudatus Uc < 10%
A. exsertus Nc < 20%

Caladenia bicalliata Uc < 20%
C. calcicola Unknown, possibly extinct
C. cardiochila Nc < 10%
C. carnea var. *carnea* Nc < 10%
C. carnea var. *B* Uc < 20%
C. carnea var. *C* Nc < 50%
C. carnea var. *A* E unknown

C. clavigera Ec < 5%*
C. concolor E < 1%
C. congesta Ec < 5%*
C. cucullata Vc < 10%*
C. deformis Nc < 10%
C. dilatata Nc < 10%
C. filamentosa var. *filamentosa* Uc < 20%
C. filamentosa var. *tentaculata* Nc < 20%
C. fitzgeraldii Nc < 25%
C. fragrantissima E < 5%
C. gladiolata Ec < 1%
C. gracilis X < 5%*
C. aff. *hastata* E unknown
C. aff. *huegelii* Uc < 10%
C. latifolia Nc < 25%
C. leptochila Nc < 10%
C. menziesii Nc < 10%
C. ovata Ec < 20%
C. patersonii Uc < 5% [includes several endangered & extinct forms]
C. aff. *patersonii* Vc < 5%
C. pusilla Uc < 10%
C. reticulata Uc < 10%
C. rigida Vc < 5%
C. stricta Uc < 5%
C. toxochila Nc < 20%
C. tentaculata Nc < 10%
C. x *tutelata* E
C. x *variabilis* unknown

Caleana major Vc < 10%*
C. minor Rc < 10%
C. aff. *nigrita* E unknown*

Calochilus campestris R < 10%
C. paludosus Ec < 10%*
C. robertsonii Uc < 10%

Chiloglottis cornuta X < 5%*
C. trapeziformis E unknown*

Corybas despectans Nc < 40%
C. diemenicus Nc < 20%
C. fordhamii E < 5%*
C. incurvus Nc < 10%
C. unguiculatus Rc < 10%
C. sp. *B* Nc < 50%

Cryptostylis subulata Vc < 5%*

Cyrtostylis reniformis Nc < 10%
C. robusta Nc < 5%

Dipodium punctatum Nc < 10%

Diuris brevifolia Rc < 10%
D. corymbosa Nc < 20%
D. x *fastidiosa* unknown
D. lanceolata Uc < 1%
D. maculata Nc < 10%
D. x *palachila* E < 5%
D. palustris Nc < 5%
D. punctata X
D. sulphurea Rc < 5%

Eriochilus cucullatus Nc < 10%

Gastrodia sesamoides Rc < 5%

Glossodia major Nc < 5%

Leporella fimbriata Nc < 10%

Lyperanthus nigricans Nc < 10%

Microtis atrata Rc < 5%
M. orbicularis Ec < 1%*
M. parviflora Nc < 10%
M. rara Rc < 5%
M. unifolia Nc < 10% [includes some endangered forms]

Orthoceras strictum Uc < 1%

Prasophyllum archeri Ec < 5%
P. australe Uc < 5%
P. calcicola Ec < 10%
P. constrictum Uc < 10% [includes endangered forms]
P. despectans Ec < 5%
P. elatum Nc < 10%
P. fecundum Vc < 5%
P. fitzgeraldii Uc < 1% [includes endangered forms]
P. frenchii Ec < 1%
P. goldsackii Uc < 5%
P. nigricans Nc < 10%
P. occidentale Uc < 1%
P. occultans Uc < 5%
P. pallidum Vc < 1%
P. patens Nc < 5%
P. pruinosum Vc < 1%
P. rufum Nc < 10%
P. validum Vc unknown

Pterostylis alata Nc < 10% [includes some endangered forms]
P. aff. *aphylla* E < 1%
P. arenicola Ec < 1%
P. biseta Nc < 10%
P. boormanii Nc < 5%
P. concinna E unknown*
P. cucullata Ec < 5%
P. curta Nc < 5%
P. cycnocephala Uc < 1%
P. aff. *despectans* E < 1%
P. dolichochila Nc < 10%

P. erythroconcha Nc < 20%
P. excelsa Nc < 10%
P. foliata Rc < 10%
P. furcata E unknown*
P. longifolia Nc < 10% [includes an endangered form]
P. maxima X < 1%
P. mutica Nc < 20%
P. nana Nc < 10% [includes an endangered form]
P. nutans Nc < 10%
P. obtusa E < 5%*
P. ovata U not conserved < 50%
P. aff. *parviflora* Ec < 10%
P. pedunculata Nc < 20%
P. plumosa Nc < 2%
P. pusilla Nc < 10%
P. robusta Nc < 5%
P. aff. *rufa* Ec < 10%*
Pterostylis rufa group undescribed includes some endangered forms
P. setifera E unknown*
P. tenuissima Ec < 1%
P. aff. *vittata* Nc < 10%
P. xerophila Uc < 1%

Spiranthes sinensis Vc < 5%* [includes an endangered form]

Thelymitra antennifera Nc < 1%
T. aristata Uc < 10%
T. azurea Uc < 5% [includes an endangered form]
T. benthamiana Rc < 5%
T. carnea Rc unknown
T. x *chasmogama* E unknown
T. circumsepta Ec unknown*
T. epipactoides Ec < 1%
T. flexuosa Uc < 5%
T. holmesii Vc < 1%
T. x *irregularis* E unknown
T. ixioides E unknown*
T. juncifolia Uc < 10%
T. luteocilium Nc < 5%
T. x *macmillanii* E unknown
T. matthewsii E unknown
T. x *merranae* E < 1%
T. mucida Rc < 1%
T. nuda Nc < 1%
T. pauciflora Nc < 10%
T. rubra Nc < 10%
T. x *truncata* E unknown
T. venosa (*cyanea*) E < 5%*

GLOSSARY

In this glossary we have tried to list those botanical and biological terms that have been used in the book, and some special terms which apply to orchids, whether we have used them or not.

abaxial, the side away from the stem, normally the lower surface.
acuminate, tapering into a narrow point, gradually or more or less abruptly, from sides that are somewhat concave.
adaxial, the side toward the stem, normally the upper surface.
adnate, attached along the whole length.
aerial, in or having to do with air, as aerial roots.
angiosperm, any member of the flowering plants; that is, plants with seeds, more or less closed ovaries, and flowers, class Angiospermae.
anther, that part of the flower which produces pollen.
anthesis, flowering, the period when the flowers are open, or the opening of the flowers.
apiculate, ending abruptly in a short point; nearly the same as mucronate.
apomixis, a process by which flowers produce seeds without any sexual union of cells; the embryo is derived from maternal tissues and is genetically identical to the mother plant.
appendage, a part added to another; a special outgrowth.
articulate, -d, jointed.
auricle, an ear-shaped appendage or lobe, hence **auriculate**.
autogamy, self-pollination without the aid of insects or other agents.
autophyte, any green plant which manufactures its own food, as contrasted with saprophyte.

basidiomycetes, a large class of fungi which includes mushrooms and toadstools.
beak, a long, prominent and substantial point; a pointed projection.
bidentate, with two tooth-like lobes.
bifid, divided by a deep cleft into two parts for about half its length.
bilateral, (zygomorphic or bilaterally symmetrical) flowers divisible into similar halves in 1 plane only.
bilobate, having two lobes.
bisexual (flowers), having both the male and female elements in the one individual flower.
boss, a rounded protuberance or swelling.
bract, a small leaf-like structure in orchids on scapes or at the base of peduncle or pedicels often closely embracing the stem.
bracteate, furnished with several or many bracts.
bristle, a straight stiff hair, whether smooth or scabrous with minute teeth.
bulb, a short thick rootstock in which the bud or buds are covered with fleshy leaf-scales not found in orchids.

caducous, falling off very early.
callus, a thickening, pl. **calli**. In orchids: little structures, variable in form, found on the labellum in many species. They are harder than the surrounding surface, and are usually prominent. In *Microtis* they are rather obscure, and are often termed **callosities**. In *Prasophyllum* and some other genera they take the form of a smooth plate, often called the **callous plate**. In *Caladenia* they are very prominent and numerous, and are generally stalked, with thick and variously shaped heads.
capillary, hair-like.
capsule, a dry fruit (consisting of tri-carpels in orchids), splitting into pieces called valves when ripe.
carpel, a leaf-like structure which bears ovules and seeds; in the orchids, the three carpels are so united and modified as to be nearly unrecognisable.
cauda, a tail or tail-like appendage, hence **caudate**; dimin. **caudicle**.

caudicle, a slender, mealy, or elastic extension of the pollinium, or a mealy portion at one end of the pollinium; the structure is part of the pollen mass, and is produced within the anther.
cauline, appertaining to the stem.
channelled, hollowed out longitudinally as in a gutter (or canaliculate).
chloroplast, granule within the cell which contains chlorophyll, the site of photosynthesis.
chromosomes, rod-like bodies of definite number, which became visible during cell division and are made up of genetic material; an individual receives one set of chromosomes from each parent, and these are duplicated.
cilia, fine, hair-like structures, usually forming a dense fringe, found along the margins of various parts of the flower in many orchids.
ciliate, bordered by hairs like eye-lashes.
clavate, club-shaped, thickened towards the apex.
claw, the narrowed, stalk-like base of a petal, sepal or bract; in orchids particularly of the labellum.
cleistogamous, refers to flowers which automatically self-pollinate without opening; a form of autogamy.
clinandrium, the anther bed; that portion of the column under, or surrounding, the anther.
clone, the aggregate of individuals derived by vegetative division or asexual reproduction from a single organism; all members of a clone are genetically identical.
column or **gynostemium**, the central structure in an orchid flower, formed by the union of stamens, style and stigmas.
column foot, a ventral extension of the base of the column which has the lip attached at its tip.
column wing, a wing- or arm-like appendage of the column, usually lateral.
compound, made up of several elements.
compressed, flattened lengthwise, either from the side to side (*laterally*) or from the front to back (*dorsally*).
connate, so closely united that the parts cannot be separated without laceration.
cordate, cordiform, heart-shaped.
cortex, (cortical) in the root or stem, the tissues between stele and epidermis.
cotyledon, see **embryo**.
crenate, dimin. **crenulate**, scalloped, with rounded or blunt incisions along the margins.
cucullate, arched into a hood.
cuneate, wedge-shaped.
cuspidate, abruptly acuminate, tapered into an elongated, sharply pointed tip.

decurrent, when the base of the leaf is prolonged downwards along the stem.
decurved, curved downwards.
deflexed, suddenly bent downwards.
dentate, dim. **denticulate**, with sharp tooth-like incisions along the margins.
depressed, more or less flattened from above; sunk down.
dichotomous, forking into more or less equal pairs of branches.
distal, remote from the place of attachment as opposed to the proximal.
distichous, regularly arranged in two opposite rows.
divaricate, widely diverging.
dorsal, refers to the upper side of the flower; in most orchids, technically the abaxial side of the flower, because of resupination.
dropper, see root-stem tuberoid.

elastoviscin, a clear, very elastic substance found in pollinia and especially in caudicles; this substance has not been chemically identified.
emarginate, minutely notched at or near the summit.

embryo, the young plant while still enclosed in the seed, consisting of the radicle or base of the future root, usually of one or two cotyledons or future seed-leaves, and the plumula or future bud.
endemic, term used in connection with the distribution of genera or species to denote those restricted to one particular area; thus *Caladenia rigida* so far as is known, is endemic in Southern Lofty in South Australia.
entire, with smooth continuous margins, not lobed or incised.
epiphyte, a plant living with its roots or rhizomes attached to the outer surface of the trunk or branches of another plant, but not penetrating, as a parasite does, into the living tissues of its host.

falcate, curved more or less in the form of a sickle.
family, a group of genera (see **genus**) which resemble each other.
fertile, (of flowers) producing seeds; (of anthers) containing pollen.
filiform, thread-like.
fimbriate, fringed, but the fringe not hair-like as in **ciliate**.
fused, completely united.

galea, a perianth-segment or group of segments forming a helmet-shaped hood.
genus (pl. **genera**), a taxonomic category above the species; the generic name forms the first part of the species name.
gibbous, when an organ is swollen at the base or at any other part.
glabrescent, becoming glabrous gradually.
glabrous, without hairs or scales.
gland, a wart-like excrescence on or near the surface of an organ and usually secreting a fluid.
glaucous, bluish-green, usually a pale tint.
glutinous, sticky.
granular, covered with small rounded protuberances.
gynoecium see **pistil**.
gynostemium see **column**.

habit, the general external appearance of a plant.
herb, a plant which does not develop a woody stem.
herbarium, a botanical museum; a collection of pressed and dried plant specimens.
hispid, with rough hairs or bristles.
humus, decomposing vegetation, leaf mould, or the soil formed by the decomposition of vegetation.
hyaline, glass-like, translucent.
hyphae, individual filaments of a fungal body.

imbricate, with overlapping margins like tiles.
immobile, (immovable) refers to the labellum (ant. irritable).
incised, deeply and unequally cut into lobes or teeth.
incurved, bent inwards.
inferior, describing the ovary when it is situated beneath the perianth, as in all orchids.
inflated, swollen like a bladder.
inflorescence, arrangement of the flowers on a plant, the term also including the flowers themselves.
invalid, (with accent on the second syllable), broadly speaking, a term applied to a name which in some way transgresses the International Rules of Nomenclature. In the strict sense it is applied to a name which has not been validly published according to the requirements of the Rules.
involute (inrolled), with the edges rolled inward, as in the leaf blades of many grasses but not overlapping one another.
irritable, (movable) refers to the labellum's ability to move in response to external contact e.g. by an insect.

labellum or **lip**, one of the three petals which is usually larger and different in shape from the other two; the median petal.
lamina, the blade of a leaf, or the broad middle part of a labellum. Adj. **laminate**, blade-like.
lanceolate, like the head of a lance; at least three times as long as broad; with the widest part below the middle, and tapering towards both ends.
lateral, situated at the side (left or right from the column in an orchid flower).
linear, long and very narrow, with more or less parallel sides; many times longer than broad.
lip see **labellum**.
lithophyte any plant growing on rocks.
lobe, division of a labellum reaching about half-way to the midrib, or of some other organ which is only divided for about half its length.
lobed, cut about half-way.
lobule, a small lobe.
locule, a chamber in a closed structure, as in anther or fruit.

mallee, one of the several-stemmed species of *Eucalyptus*, or the vegetation characterised by such species.
massula (pl. massulae), a packet of pollen in those genera in which the pollinium is subdivided into small packets; see **sectile**.
mealy (farinose), covered with a scurfy powder like flour.
median, on the midline of a bilaterally symmetrical organ, as opposed to lateral.
-merous, the number of parts per floral whorl; e.g. orchid flowers are 3-merous.
midrib, the central nerve of a leaf or similar organ.
mobile (movable), refers to the labellum (see **irritable**).
monandrous, having a single anther, said of all orchid subfamilies except Apostasioideae and Cypripedioideae.
monocotyledon, any member of the angiosperm subclass Monocotyledonae, plants usually characterised by parallel venation and a single seed leaf (none in orchids).
monotypic, having only one representative (in genus or family).
mucronate, terminating abruptly in a short stiff point called a mucro.
mucronulate, minutely mucronate.
mycelium, the plant body of a fungus, a tangle of threads.
mycorrhiza, a symbiotic relationship between vascular plant roots and fungi.

naked, of pollinia, without any caudicles or other appendages.
nectary, a nectar-producing structure or gland.
nerves (veins), the vascular bundles which start from the petiole and traverse the blade of the leaf, the smaller ones often forming a network.

oblique, slanting; (of a leaf) unequal-sided.
oblong, much longer than broad, and rounded at both ends.
obovate, ovate with the broadest part above the middle.
obtuse, blunt.
orbicular, flat, circular or almost so.
order, a group of families resembling each other.
osmophore, a scent-producing gland.
oval, elliptic (usually broadly so).
ovary, the lower part of the carpel or pistil, containing the ovules, and finally becoming the fruit.
ovate, when a flat surface, such as that of a **labellum** is egg-shaped and broader below the middle.
ovoid, egg-shaped (of solid organs such as tubers).
ovule, an embryonic seed. It consists of the **embryo-sac**, containing the future embryo, completely surrounded by the **nucellus**, which is in its turn surrounded (except at the

micropyle) by an outer covering, usually consisting of two coats, an inner and an outer. On the ovule are a spot called the **chalaza**, where nourishment enters from the placenta through the funicle, and a small opening through the outer covering, which is called the **micropyle**.

panicle, an inflorescence where the axis is divided into branches bearing several flowers, a compound raceme.
paniculate (panicled), arranged in a panicle.
papillose, covered with minute protuberances called papillae.
pathogen, (pathogenic) disease-producing organism.
pedicel, stalklet of a flower, when the peduncle bears two or more pedicellate flowers.
pedicellate, growing on a pedicel.
peduncle, stalk of a solitary flower, or common stalk (floral axis or rhachis) of several pedicellate or sessile flowers.
pedunculate, growing on a peduncle.
peloria, the condition of abnormal regularity as in an irregular flower which has become regular by multiplication or by suppression of parts; adj. **peloric**.
perianth, the segments of the flower which (whether free or united into a tube) surround the stamens and pistil. A collective term for sepals and petals, together.
petal, commonly a coloured (rarely green) flower part, borne within the sepals; in orchids, two of the three inner perianth parts, the third being called the labellum or lip.
petaloid, like a petal.
petiole, the stalk of a leaf. A stalked leaf is said to be petiolate.
pheromone (also see sex pheromone), discharge from osmophores which attracts certain insects.
pilose, with soft hairs.
pistil, the female, or seed-bearing, element in a flower; the ovary, style and stigma; **gynoecium**.
placenta, pl. **placentae**, the part or parts of the ovary to which the ovule or ovules are attached.
pollen, one-celled spores borne in the anther; these develop the male gametes, or sperm nuclei.
pollinarium, the complete set of pollinia from an anther, with associated parts, viscidium or viscidia and stipe.
pollinate, the act of placing pollen or pollinia in a stigma.
pollinium (pl. pollinia, a more or less compact and coherent mass of pollen; usually the contents of an anther cell, or of one half of an anther cell and transported as a unit in pollination.
protocorm, a germinating orchid seed, the body from which a shoot and roots are formed.
proximal, see **distal**.
pruinose, covered with a powdery waxy material.
pseudocopulation, a special type of mimicry, in which flowers resemble female insects and are pollinated by the males when these attempt to copulate with the flowers.
puberulent (puberulous), downy.
pubescent, downy, covered with short soft hairs.

raceme, an inflorescence with all the flowers attached to the main axis by pedicels of equal length, the youngest flowers at the top.
racemose, arranged in a raceme.
rachis, the axis of an inflorescence to which the pedicels are attached, above the peduncle.
radical, at or near the root.
radicle, see **embryo**.
recurved, curved backward or upward.
reflexed, bent abruptly backwards.
reniform, kidney-shaped.
resupinate (reversed), when a flower is inverted by a twisting of the pedicel through 180 degrees so that the parts usually uppermost become the lowest. The flower having the labellum, or lip on the lower side.
reticulate, net-like, e.g. with net-like veins.

retrorse, recurving or pointing backward or toward the tip.
retuse, with a shallow notch at the rounded apex.
revolute, when the edges of leaves or perianth are rolled backwards from the apex or margin towards the midrib.
rhizome, an elongated rootstock bearing roots and leaves, typically subterranean and more or less horizontal; in terrestrial orchids usually succulent or fleshy.
rhizophore, a naked branch which grows down into soil and develops roots from the apex.
rhomboid, lozenge-shaped; mathematically an oblique equilateral parallelogram.
root, the descending axis of the plant, developed from the radicle and imbibing water and nourishment through its surface.
root-stem tuberoid, a storage organ (characteristic of the tribes Diseae, Diurideae, and Orchideae), primarily a swollen root, but with a bud and some stem structure at the base; this organ may push down into the soil to place the plant lower in the soil; the resting phase of the plant.
rosette, a densely clustered spiral of leaves, usually borne near the ground.
rostellum (0), a portion of the stigma which aids in gluing the pollinia to the pollinating agent; the tissue which separates the anther from the fertile stigma; sometimes beak-like. In some orchids it is almost abortive, but in others it plays a very important part in connection with pollination.
rostrate, beaked.
rugose, covered with wrinkles.

saprophyte, any plant that does not manufacture its own food, but depends on organic matter in the soil; in vascular plants always in conjunction with fungi.
scale, (1) a reduced leaf; (2) any small scale-like organ.
scape, a stalk from the base of the plant bearing flowers but not leaves.
scarious, almost the same as **membranous**, but rather stiffer.
scattered, when the hairs are irregularly arranged.
sectile, the condition in which soft, granular pollinia are subdivided into small packets, which are usually connected by elastic threads.
seed, a ripened ovule, consisting usually of two coats, within which is the embryo, with or without albumen.
segment, each division of a perianth reaching to the base.
sepal, usually the outer, green, perianth-segments of a flower; in orchids the outer three perianth-segments, usually coloured.
serrate, toothed like a saw.
serrulate, when the teeth are very small.
sessile, without any stalk; e.g. sessile glands.
seta, a bristle or stiff hair.
sex pheromone, discharged chemical produced by the female insect to attract the male insect.
sheath, a leaf-like structure which enfolds a stem.
shoot, a growth, especially a new growth arising from the base of an older one.
simple, when a organ is not divided, the opposite of **compound**.
sinuate, wavy-edged; with inward and outward bends along the margins.
sinus, a recess or angular cavity between two lobes.
spathulate, spoon-shaped.
species, a division of the genus. A population or group of populations which share a common pool of genetic and morphological features, which are interconnected by actual or potential gene exchange, and are separated from other such populations by barriers to gene exchange and by resultant gaps in morphological features; the basic unit in biological classification. Each species bears two names, e.g. *Caladenia carnea*, the first being the generic name, the second the specific one.
spike, an undivided floral axis (**rhachis, peduncle**) bearing sessile flowers.
spreading, standing out horizontally.

stamen, the male, or pollen-bearing, element in a flower, made up of filament and anther. The latter consists of one or two pouches, or **cells**, containing the minute **pollen-grains**, by means of which the pistil is fertilised.
staminodium (staminode), an abortive or rudimentary sterile stamen.
stigma, the sticky, receptive part of the pistil, produces a viscid, sugary material which receives the pollinia and permits the pollen grains to germinate.
stigmatic plate, the front part of the column in certain genera of orchids, bearing the female elements, and composed of a pedicel (or expanded style), carrying a vertical plate on the face of which are the stigma, the rostellum, and the viscid disk.
stipe, a non-viscid band or strap of columnar tissue which connects the pollinia to the viscidium.
style, the slender part of the pistil, which connects the ovary with the stigma; forms a part of the column in orchids.
striate, with fine parallel lines (**striae**).
subulate, pointed like an awl.
synonym, a name which refers to the same group as another name, especially the younger (incorrect) synonym.

taxon (pl. **taxa**), a taxonomic group of any rank.
taxonomy, the science of classification and naming; the laws and principles of classification and nomenclature.
terete, slender-cylindrical, but not so slender as **filiform**.
ternate, arranged in or divided into threes.
terrestrial, growing on the ground.
testa, the outer seed-coat.
tetrad, a unit of four pollen grains; pollen grains are produced in groups of four, and in some orchids they do not separate.
tomentose, densely covered with short soft matted hairs (**tomentum**).
toothed (dentate), notched so as to resemble a row of sharp teeth.
trapezoid, trapeziform, of asymmetrical four-sided shape.
trifid (3-fid), cut about half-way into three parts by clefts or notches.
trilobate, with three lobes.
truncate, terminating abruptly as if cut off squarely.
tuber, a thickened, underground stem, as in potato; not found in orchids.
tuberculate, beset with little tubercles or knobby projections.
tuberoid, a thickened, tuber-like root.
turgid, swollen.

undulate (crisped), wavy on the edges.
urceolate, like an urn or pitcher.

valvate, petals and sepals whose edges, in bud, meet without overlapping; opening by valves.
valve, one of the pieces formed by the vertical splitting of the pericarp of certain fruits when ripe. The valves usually consist of the backs of the carpels.
variety, subdivision of a species.
vascular, pertaining to or with vessels or water-conducting tissue.
vegetative, those parts and aspects of the plant not directly involved in flowering or fruiting; that is, roots, stems and leaves.
velamen, one or more layers of spongy cells on the outside of a root; related to the epidermis in origin.
ventral, on the lower side.
villous, beset with long soft hairs.
viscid disk, see **viscidium**.
viscidium (pl. **viscidia**), a viscid part of the rostellum which is clearly defined and removed with the pollinia as a unit, and serves to attach the pollinia to an insect or other agent.

viscin, see **elastoviscin**.
viscus, the viscid glue produced by the rostellum, especially in flowers which do not have a viscidum; the term is rarely used.

whorl, an arrangement of flowers, leaves or floral parts in a circle round an axis at the same level.
wing, any kind of flat membranous expansion.
wings, column-, in some genera (e.g. *Pterostylis*), the lateral lobes of the column are modified into the semblance of some kind of wings, and are so termed. In others (e.g. *Caladenia*) the margins of the column itself, which in such genera is not lobed, are expanded into membranes variable in width, and the column is then said to be winged.

zygomorphic, bilaterally symmetrical.

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APPENDIX

Addenda: recent and forthcoming name changes from M.A. Clements "Catalogue of Australian Orchidaceae" in Volume 1 of Australian Orchid Research 1989.

Caladenia behrii Schldl. has been determined as the name applying to one of the Adelaide Hills spider orchids possibly the species treated as *C.* aff. *patersonii* on page 53 (Plate 60).

Caladenia filamentosa R.Br. and *C. fitzgeraldii* Rupp: Clements does not accept that either of these species occurs in South Australia. D.L. Jones (pers. comm.) will describe the South Australian plants as new species in a forthcoming paper.

Caladenia minor Hook.f. this name is now applied to plants previously referred to *C. pusilla* (or *C. carnea* var. *pygmaea*). It is yet to be determined if *C. pusilla* in the strict sense occurs in South Australia.

Caladenia patersonii R.Br.: Clements states that *C. patersonii* occurs only in our South-east. The names *Caladenia behrii, C. concolor* and *C. fragrantissima* serve in part to replace '*C. patersonii*' elsewhere and D.L. Jones (pers. comm.) is to erect several new species in this complex in a forthcoming paper.

Caladenia valida (Nicholls)M. Clements & D. Jones (*C. reticulata* var. *valida* Nicholls) is determined by Clements as occurring on Kangaroo Island and the South-east, possibly it is the species treated in this book as *C.* aff. *huegelii* (Plate 48).

Caladenia x *variabilis* Nicholls: Clements states that this is a rare hybrid between *C. cardiochila* and an unnamed species of the *C. patersonii* complex restricted to Victoria. The South Australian plants determined as *C.* x *variabilis* are crosses between *C. cardiochila* and other as yet unnamed species of the *C. patersonii* complex. Morphologically it would hardly be possible to distinguish these from true *C.* x *variabilis.*

Caleana minor R.Br.: Clements gives preference to this name over the more recent *Paracaleana minor* (R.Br.)Blaxell. Both names are given equal credence in this book.

x *Calassodia tutelata*: This name replaces *Caladenia* x *tutelata. Calassodia* is a name coined from *Caladenia* and *Glossodia* the parents of this intergeneric hybrid.

Diuris behrii Schldl.: This name applies to most of the South Australian plants previously referred to *D. lanceolata* or *D. pedunculata. D. behrii* was first collected at 'Kowimanilla', South Australia by Hans Herman Behr about 1847.

Diuris x *fastidiosa* R.Rogers: In the strict sense this species is a cross between *D. lanceolata* and *D. palustris* and may not occur in S.A. but morphologically it would be almost impossible to distinguish it from *D. behrii* x *D. palustris.*

Diuris pardina Lindley: This name replaces *Diuris maculata* Smith but the two species are very similar and Clements accepts that *D. maculata* occurs in Western Victoria and it must be reasonable to expect that it also occurs in our South-east.

Genoplesium: see end of Appendix.

Microtis oblonga R. Rogers: Clements separates this species from *M. rara* but much further research is required and until this is done the name *M. rara* will be retained for South Australian plants.

Prasophyllum album R. Rogers: Clements reinstates this species but it would seem best to retain it under *Prasophyllum odoratum* R. Rogers (*P. patens* sensu lato).

Prasophyllum truncatum Lindley: Clements records this species from our South-east. There appear to be two forms of it in South Australia—a small flowered one from swampy heath in the South-east and a large flowered one from coastal sandhills on Yorke and Eyre Peninsula.

Pterostylis: Clements excludes the following species from having a South Australian distribution: *P. aciculiformis, P. alveata, P. aphylla, P.* x *ingens, P. obtusa, P. parviflora* and *P. rufa* but he does accept *Pterostylis despectans* (Nicholls)M. Clements & D. Jones (*Pterostylis rufa* var. *despectans* Nicholls) as occurring here. D.L. Jones (pers. comm.) is to describe several new South Australian *Pterostylis* to cover species previously included within *P. aphylla, P. rufa, P. nana, P. longifolia, P. alata, P. alveata, P. obtusa* and *P. parviflora.*

Thelymitra cyanea (Lindley)Benth. Clements uses this name for South Australian plants previously referred to *T. venosa* but a proper revision is required to assess the status of *T. cyanea.*

Thelymitra juncifolia Lindley. Clements uses this name for the self pollinated forms of *T. ixioides* in most of the South Australian populations but further research is required.

Genoplesium: D.L. Jones and M.A. Clements *Lindleyana* 4(3): 139—145 (1989) have re-interpreted the genus *Genoplesium* to cover all the midge orchids, previously *Prasophyllum* section *Genoplesium* or section *Micranthum.* So that *Prasophyllum archeri* J.D. Hook., *P. despectans* J.D. Hook, *P. morrisii* Nicholls, *P. nigricans* R.Br. and *P. rufum* R.Br. now become *Genoplesium archeri* (J.D. Hook.)D. Jones & M. Clements, *G. despectans* (J.D. Hook.)D. Jones & M. Clements, *G. morrisii* (Nicholls)D. Jones & M. Clements, *G. nigricans* (R.Br.)D. Jones & M. Clements and *G. rufum* (R.Br.)D. Jones & M. Clements.

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