



**THE FLORA OF
MURDOCH UNIVERSITY**
A Guide to the Native Plants on Campus

BERNARD DELL & IAN J. BENNETT

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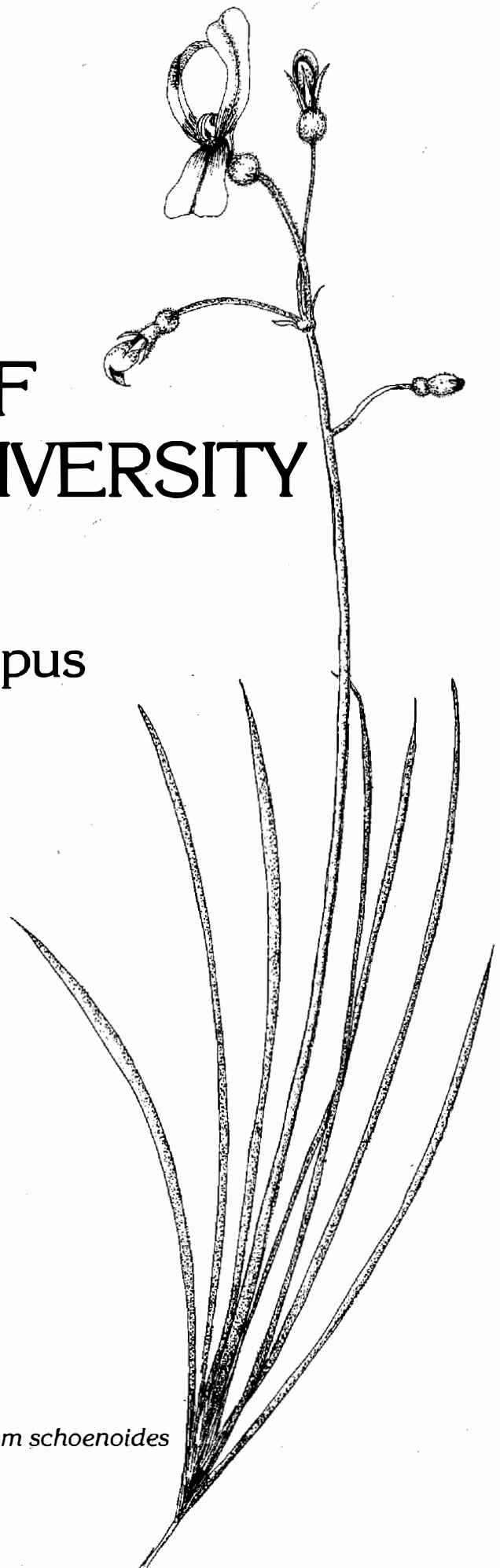
Cover photograph: *Banksia menziesii* (firewood banksia)

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Native Plants on Campus

BERNARD DELL
IAN J. BENNETT

Stylidium schoenoides





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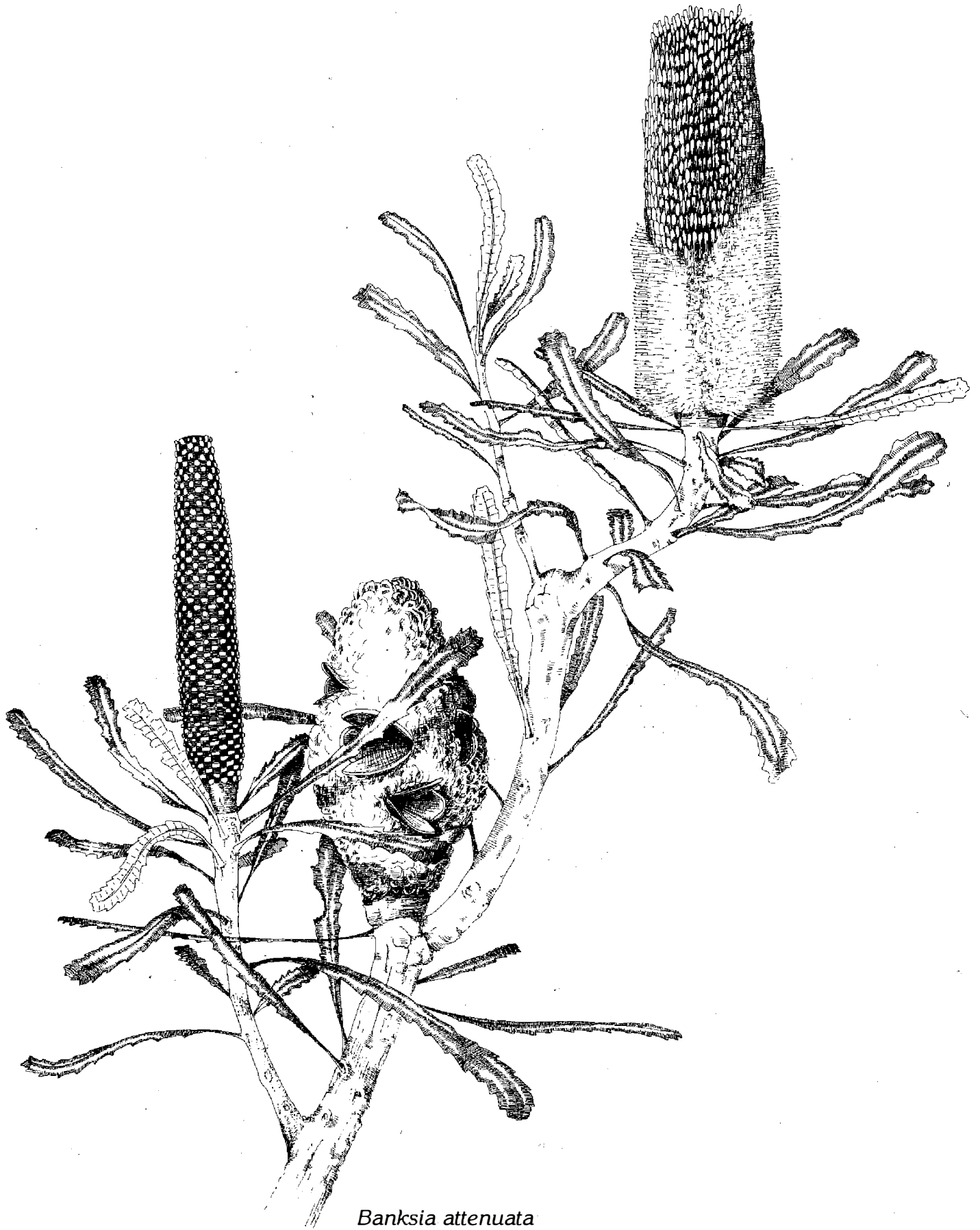
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Banksia attenuata

FOREWORD

Western Australia's wildflowers are recognized throughout the world for their colour, form and uniqueness. Many can be observed in the metropolitan area close to the city of Perth. Despite this, there has been very little scholarly documentation of them. This book provides an account of the flora of Murdoch University. Though the campus was disturbed first by farming and later by arboriculture, small but significant areas of the original bush remain. This scholarly account provides a valuable record of those native species that enrich the Murdoch campus after the first ten years of its operation. It should prove useful as a data base for future conservation and planning strategies, as well as providing a valuable reference source for staff and students. It should also have strong appeal to local residents who are curious about the plants which characterize the white and yellow sands of their surrounds and as a guide for visitors to the campus. The work, though written for the amateur naturalist, is scientifically sound and attempts to simplify the identification of plants using ink drawings and colour photographs in combination with keys.

The Murdoch University community is grateful to those of its members whose enthusiasm and skill have made possible this lasting contribution to the celebration of our tenth anniversary. I congratulate them.

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Chancellor, Murdoch University

March 1986

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Much of the value of a booklet dealing with identification of the flora lies in its illustrations. Credit for these is as follows:

Line Drawings

Michael Bamford	Figs. 13, 63, 69, 76, Frontispiece (<i>Banksia attenuata</i>)
Lorna Charlton	Fig. 74
Helga Mellor	Figs. 19-24
Joanne Robinson	Figs. 7, 16, 26, 27, 32, 33, 40, 51, 57, 58, 60, 66, 70, 72; pages 21, 95, 114, 122, Title Page (<i>Stylidium schoenoides</i>)
Anitra Wendon	Figs. 6, 8-12, 14, 15, 17, 18, 31, 34-39, 41-50, 52-57, 61, 64, 65, 68, 71, 73; page 89

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Dr S.D. Hopper	Cover (<i>Banksia menziesii</i>)
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Other figures and plates by the authors.

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INTRODUCTION TO THE VEGETATION

Background

Murdoch University lies at the interface of two dune systems on the western third of the Swan Coastal Plain. To the west lie the tall Spearwood Dunes, mainly yellow sands over limestone. The older and highly leached white sands of the Bassendean Dune system lie to the east. Separating the two systems is a chain of freshwater lakes and wetlands, the closest to Murdoch being North Lake.

Murdoch is part of the once extensive eucalypt/banksia woodland that clothed the well-drained ridges of much of the metropolitan area. Quite subtle changes in elevation, slope, drainage and soil chemistry provide a range of habitats resulting in a rich and diverse flora. As a result the Murdoch flora contains not only elements of the Kwongan sandplain vegetation (heathlands on infertile soils, e.g. *Calectasia cyanea*, *Daviesia triflora*), but units or species characteristic of the jarrah forest (e.g. *Banksia grandis*, *Eucalyptus marginata*), coastal woodlands on calcareous soils (e.g. *Eucalyptus gomphocephala*, *Olearia axillaris*) and freshwater wetlands (e.g. *Astartea fascicularis*, *Melaleuca preissiana*).

Trees form the dominant and most familiar components in the region. Of the 200 indigenous species now on campus it is perhaps surprising that only fifteen reach the stature of trees (defined as plants with a single woody trunk and over 4 metres in height). There are four species of eucalypts, two paperbarks, five banksias, and one she-oak, Christmas tree, woody pear and acacia. Clearly, therefore, most diversity is to be found in the shrub and herbaceous communities and much of this book is devoted to these groups. The number of species and their present distributions have been strongly affected by agriculture and forestry pursuits.

Recent History

Parts of the southern half of Murdoch were used to graze cattle, horses and sheep until the mid 1970s. The grazing must, however, have been light in the existing Banksia Woodland because the under-storey is quite intact and there is little weed growth. Limited cropping was also undertaken. Earlier, Chinese market gardeners established vegetable plots near the south-east corner of Melaleuca Swamp. Part of the market garden now has *Melaleuca* regrowth and the raised beds can still be seen in aerial photographs. Just to the west of the old gardens lies a narrow raised track lined on the eastern side by a single row of *Pinus* trees. This track once passed north, up the main campus ridge and onto where Riseley Street is today. These and other tracks in the area were probably once used to haul jarrah logs and billets to small local saw-pits or further afield on the limestone track (now Leach Highway) to mills in Fremantle. A few large

jarrah stumps remain on campus, e.g. below Bush Court. In addition to jarrah, tuart was also felled for timber. This species is at the eastern edge of its range, and there are a few remaining trees in Bush Court.

The northern half of Murdoch was part of the University of Western Australia Endowment Land (Cockburn Sound Location 549). In March 1926 an agreement was made between the University of Western Australia and the Conservator of Forests whereby the Forests Department undertook to establish a pine plantation. The area was to be cleared and planted at the rate of 100 acres per annum and the lease period was fifty years. The scheme was inaugurated at a time when there was a strong movement to get parliamentary permission to sell Endowment Lands, and was a challenge by members of the University of Western Australia Senate to find a way to use them profitably. The following description of the Somerville plantation is from *The West Australian* (31 May 1938) — 'The plantation was divided into areas of about 25 acres, each of which was surrounded by a firebreak 15 feet wide. Each group of four such areas was surrounded by a firebreak one chain wide and each 300 acre lot was surrounded by a two-chain firebreak. The trees were planted about 7 feet apart'.

Wildfires in the Somerville area were small and frequent, for example there were sixty-one in the 1973-74 season. In the early 1960s a lookout tower was erected west of Kardinya to replace the treetop lookout on the edge of South Street.

Most of the Murdoch section was planted from 1937 to 1940 with *Pinus pinaster*. A small area of *P. radiata* was planted near South Street in 1955. Later, the beginning of the construction programme for Murdoch University was symbolically marked by the felling of one tree on 7 February 1973.

Vegetation Units

For practical purposes, the vegetation of Murdoch University is subdivided into five regions (A to E, see map). Except for the Upper Swamp, these are not separated by natural boundaries but reflect past and current land uses. However, each region is distinct both structurally and floristically. Two regions, the Banksia Woodland and Melaleuca Swamp, retain much of their original composition. By contrast, areas of the pine plantation contain only sporadic components of the original flora. Areas where all or nearly all of the indigenous flora has been removed (e.g. farm, irrigated campus grounds) are not considered.

Banksia Woodland (Map area A)

This small remnant of the once extensive woodland in the region lies at the southern end of campus. Here, the tree canopy is quite open allowing light



Fig. 1: Banksia Woodland (Map area A) dominated by small trees of *Banksia attenuata* and *B. menziesii* with *Allocasuarina humilis*, *Hibbertia* spp. and sedges as ground cover.

to penetrate to the floristically diverse shrub layer. A few large jarrah (*Eucalyptus marginata*) trees remain. Most of the small tree canopy, which is about 4 metres high, contains a mixture of *Banksia attenuata*, *B. ilicifolia* and *B. menziesii* with patches of *Allocasuarina fraseriana* (sheoak) and *Banksia grandis* (Fig. 1). The shrub layer provides a splash of yellow, white and blue in spring. Common species are *Hibbertia hypericoides* (yellow flowers), *Hovea trisperma* (blue), *Eremaea pauciflora* (orange), *Hakea prostrata* (white), *Hypocalymma robustum* (pink), *Melaleuca thymoides* (yellow), *Petrophile linearis* (pink), *P. macrostachya* (yellow) and *Stirlingia latifolia*. Sundews (*Drosera*) and orchids are locally common in spring.

Upper Swamp (Map area B)

This important wetland lies near the centre of campus. Though many of the trees were removed, the area was not planted to *Pinus pinaster* because it is waterlogged in winter. The waterbody, which is an outcrop of the water table, has been artificially deepened and now contains numerous long-necked tortoises. Main features of the area include (a) the fringing

paperbark trees (*Melaleuca raphiophylla*, *M. preissiana*) and large swamp banksias (*Banksia littoralis*) with an understorey of mixed sedge species (Cyperaceae, Restionaceae) (Fig. 2); (b) the dense tree-less shrub community consisting largely of *Astartea fascicularis*, *Euchilopsis linearis*, *Hypocalymma angustifolium*, *Platytheca galioides* and *Acacia pulchella*; and (c) on drier soil, a fringing belt of flooded gum (*Eucalyptus rudis*) associated with tall shrubs (*Kunzea ericifolia* and *Melaleuca teretifolia*). Smaller shrubs include two aromatic species of *Boronia*, *Hovea pungens*, *Lechenaultia floribunda* and *Jacksonia furcellata*. The common wattle, *Acacia saligna*, forms dense stands after fire.

Eucalypt Woodland (Map area C)

Though much of this area was once planted to pines considerable regrowth of *Eucalyptus rudis*, *E. marginata* and *E. calophylla* has occurred (Fig. 3). A small clump of *Melaleuca preissiana* at the eastern end once was part of the wetland opposite Murdoch Drive. Blackboys (*Xanthorrhoea preissii*) and zamia palms (*Macrozamia reidleyi*) are frequent with several species of *Daviesia*. The groundlayer is locally



Fig.2: Upper Swamp (Map area B) with reflections of *Eucalyptus rudis*, *Banksia littoralis*, *Melaleuca preissiana* and *M. raphiophylla*. The water-body is an outcrop of the water-table and supports numerous long-necked tortoises.



Fig.3: Eucalypt Woodland (Map area C) with *Macrozamia reidleyi*, *Xanthorrhoea preissii*, *Jacksonia furcellata*, *Dianella divaricata* and *Conostylis* in the foreground, and *Eucalyptus rudis* regenerating in the distance.

diverse with yellow *Conostylis*, blue *Dampiera* and a number of orchids. Perennial veldt grass is invading the more open parts.

Melaleuca Swamp (Map area D)

Melaleuca Swamp forms part of a natural drainage line that extends to North Lake. Its boundaries are Farrington Road and the University's farm paddocks. Two species of paperbarks, *Melaleuca raphiophylla* and *M. preissiana*, together with the swamp banksia (*Banksia littoralis*) form a nearly closed canopy up to 6 metres high. Taller flooded gums line the flanks. Because of the dense overstorey and saturated soils in winter the understorey is dominated by a sedge growing to 2 metres high. This community provided shelter for long-nosed bandicoots in the past and is easily destroyed by trampling. Understorey shrubs include *Agonis linearifolia*, *Aotus cordifolia*, *Leucopogon australis*, *Oxylobium lineare*, *Sphaerolobium vimineum* and *Viminaria juncea* which occur nowhere else on campus. Several weeds have become established, e.g. pampas grass (*Cortaderia selloana*), arum lily (*Zantedeschia aethiopica*) and the red-ink plant (*Phytolacca octandra*).

The southern edge of *Melaleuca* Swamp had a drainage channel cut through in 1975. A number of aquatic weeds have since invaded, chiefly

Callitriche stagnalis, *Lemna minor* (duckweed), *Polygonum minus* and *Typha domingensis* (bulrush).

Scattered Pine (Map area E)

Much of the campus has remnants of the *Pinus pinaster* Somerville plantation. The most common plants are weeds, e.g. perennial veldt grass (*Ehrharta calycina*), pink gladiolus (*Gladiolus caryophyllaceus*). Little of the indigenous flora remains except for legumes such as *Daviesia*, *Jacksonia*, *Oxylobium capitatum* (bacon and eggs) and *Hardenbergia comptoniana* (native wisteria); monocots including *Conostylis* and *Dianella*; and scattered clumps of woollybush (*Adenanthos cygnorum*), Christmas trees (*Nuytsia floribunda*), marri and, towards North Lake, the woody pear (*Xylomelum occidentale*). A single specimen of *Exocarpos* in the Sandalwood family occurs south of the library. Several introduced natives have become established, e.g. *Chamelaucium uncinatum*, *Leptospermum laevigatum* and *Pelargonium capitatum*.

Future Developments

Few universities in Australia are fortunate enough to have remnants of native vegetation on campus. Not only are these an asset to the campus appearance but can also be valuable as an educational resource. For example, several courses within the School of Environmental and Life Sciences at Murdoch University use areas of campus bushland for field exercises and sources of biological material for laboratory classes. Because map areas A, B, C and D harbour the greatest diversity of species they have the greatest potential for teaching and research. Consequently, adequate provision should be given to maintaining the integrity of these areas by incorporating them permanently into the University landscape.

This will require the development of strategies to minimize current disturbance as well as a commitment to long term management. The most severe threat is continued weed invasion. Weeds create an aesthetically undesirable effect and displace native species and hence reduce diversity.

Weed invasion can be reduced by keeping disturbances, such as some human activities, fire and grazing, to a minimum and selectively planting surrounding areas with species which inhibit weed invasion, thus forming a buffer zone.

Human disturbances such as vehicular movement, minor road construction and indiscriminate trampling will be of major concern as the campus population grows.

Already native vegetation has been run down after re-establishing itself on old tracks both in the Upper Swamp (B) and the Banksia Woodland (A). Future road construction should not dissect areas of high conservation

value (e.g. A, B and C). Whilst it was unfortunate that the Murdoch University ring-road was constructed through the Eucalypt Woodland (C), it was gratifying to see that care was taken to protect the area as much as possible. All too often excessive areas are cleared for road construction and wide, sandy strips result, as occurs on Murdoch Drive.

Much of the Murdoch flora is well adapted to fire but weed establishment is increased in situations where fires occur. Firebreaks should be well planned with the intention of protecting bushland as well as other property and buildings.

Rabbit control will need to be considered when formulating management plans. Rabbits not only graze on the vegetation but spread seeds in droppings and cause serious disturbance through digging burrows.

The establishment of buffer zones around the Eucalypt Woodland, Upper Swamp and Banksia Woodland would increase the viability of these areas as reserves. Fringing areas could, for example, be selectively replanted and managed to encourage the growth of desirable species. Such planting programmes should not be preceded by slashing as this only increases weed growth and dispersal and hinders the progress of native species that are re-establishing. This approach will be particularly useful in the Eucalypt Woodland.

Murdoch University has, in some areas, an opportunity to incorporate native bushland with a planned landscape. We hope that this opportunity is fully recognized and a programme is implemented to produce an effect which is aesthetically, environmentally and educationally desirable.

HOW TO USE THIS BOOK

This book has been prepared for use by the Murdoch University community to identify native plants on campus and will also be useful in *Banksia* woodlands of surrounding suburbs. Plants have been described using easily identifiable characters which require the minimum use of equipment or scientific knowledge. A hand lens or magnifying glass may be necessary to see the finer plant structures, and unfamiliar terminology is explained in a glossary.

The book covers vascular plants and hence excludes the mosses, liverworts, lichens and algae. Only two species of non-flowering vascular plants occur on the campus, the zamia palm and bracken fern, and these are described on page 19.

For the flowering plants, there are three ways to use this book. Firstly, if you know nothing about the particular specimen you will need to use the family key on page 14 to find out which family it belongs to. Then you would consult the more detailed family and species descriptions. Secondly,

if you know the family of the specimen you will go directly to the family (list on page ix) and species descriptions. Thirdly, it is possible to compare the specimen with the figures and plates to find its likely identity.

Introduced native horticultural species and exotic weeds are not given full descriptions but are listed in Appendices 2 and 3. A few introduced plants which may be mistaken as natives and which occur in bush areas are included in the main text.

1. *The Family Key*

To use this key you need to choose one of two characters which best describes the specimen in question. The appropriate description is followed by a number which directs you to another two questions.

e.g. 1. Plants woody, stems not green 2
Plants herbaceous, stems green 19

In this case if the first choice is correct you go to question 2; if the second choice is correct you go to question 19.

This procedure is followed until eventually a family name is given, followed by the page number of the family description. Other information such as the common name of the family, generic names and even species may be given at this stage depending on how many genera and species occur on campus.

The key has been designed so that in areas where mistakes are likely to be made it is still possible to get the right family name although strictly speaking the description may be botanically incorrect. The two most difficult parts of the key are in determining whether flowers have a distinct calyx and corolla and whether the ovary is superior or inferior (Fig. 4). If these characteristics are not immediately obvious, it may be necessary to remove a single flower to obtain a closer look and cut a longitudinal section to expose the ovary.

2. *The Family and Species Descriptions*

Once the family is determined, or if it is already known, the process of identification is fairly straightforward using the family and species descriptions. In families where only one to three species are present it is possible to determine the species by looking at the descriptions and appropriate figures and plates. When more than three species are present, a table is provided which distinguishes them using easily identifiable characters. These tables may not necessarily give a specific answer but will at least indicate the descriptions you should read to find out which best matches your specimen.

3. *The Scanning Approach*

This involves comparing plates and figures throughout the book with the plant being identified. The method, although it may be tiresome, can be

effective and used to identify plants to any level, i.e. family, genus or species. It is most useful when only an incomplete specimen is available (e.g. plants not in flower) or by people who prefer looking at pictures to reading text.

An Explanation of Botanical Names

For those who are unfamiliar with botanical nomenclature an explanation of the names given in this text is appropriate. The family represents a group of morphologically similar plants which are also meant to be phylogenetically related, i.e. they have developed from the same ancestral lines. Each family is divided into smaller groups called genera and in turn these are divided into species. Species names are represented by a combination of the generic name plus a specific epithet (name), together called a binomial. For example, for *Drosera macrantha* Endl., *Drosera* is the generic name, *macrantha* is the specific epithet. The binomial is followed by the name of the author who published the original species description. For *Drosera macrantha*, S.L. Endlicher is the author and his name is abbreviated to Endl. (see Appendix 1 for author abbreviations).

Variations of this format exist when the species is re-described or given a more correct status (e.g. changing a variety to a species). Here the original author's name is written in parenthesis. For example, *Allocasuarina fraseriana* (Miq.) L. Johnson, this plant has recently been placed in the new genus *Allocasuarina* by L. Johnson, it was formerly *Casuarina fraseriana* Miq.. Another variation occurs when the two authors' names appear with the Latin preposition *ex* in between, e.g. *Eucalyptus marginata* Donn *ex* Sm. where J. Donn proposed the name and J.E. Smith published the description.

This system of nomenclature is very important for consistent identification and effective communication for botanists. Common or vernacular names are more convenient for many people and where these are known they are given after the binomial.

Collecting Specimens

It must be remembered that all native flora is protected by law and, hence, any collection on crown land requires a 'Flora Collecting Permit'.

GLOSSARY

achene: a dry, indehiscent fruit formed from a superior ovary of one carpel containing one seed

acuminate: tapering gradually to a long point (Fig.5)

acute: terminating in a short point (Fig.5)

adpressed: pressed against, in close contact with

alternate: leaves when borne singly at different heights on the stem

annual: a plant whose life span ends within one year of germination

aril: growth from the funicle forming a covering over the seed coat

attenuate: tapering gradually

awn: a bristle-like appendage

axillary: a flower or inflorescence in the axil of a leaf

berry: a succulent indehiscent fruit with seeds immersed in a pulp

bract: a leaf-like structure associated with an inflorescence or flower

bracteole: a small bract-like structure on the pedicel or calyx

bipinnate: a compound leaf that is twice divided (Fig.5)

calyx: the sepals of a flower collectively

capsule: a dry fruit formed from two or more united carpels and dehiscing at maturity to release the seeds

carpel: a modified leaf-like structure folded to enclose the ovule(s) in an ovary

ciliate: fringed with hairs

column: stamens and style combined as in Orchidaceae and Stylidiaceae

cordate: heart-shaped

corolla: the petals of a flower collectively

corymb: an inflorescence in which the pedicels of the lower flowers are longer than those of the flowers above, bringing all flowers to about the same level

cuneate: wedge-shaped (Fig.5)

cyme: a one-sided raceme

decumbent: spreading horizontally but then growing upwards

decurrent: the blade or petiole of a leaf extended down the stem

dehiscent: opening at maturity to release the contents

dentate: toothed

dichotomous: dividing into two

dioecious: having the male and female reproductive structures on separate plants

disc floret: a flower in the central part of a head of a daisy

divaricate: widely spreading

drupe: a succulent fruit formed from one carpel, having the seed(s) enclosed in a stony layer

elliptic: oval in outline, widest at the centre (Fig.5)

entire: having a smooth margin

epiphyte: a plant growing on another plant for support only

filiform: threadlike, slender

flexuose: bent from side to side in a zig-zag form

follicle: a dry, dehiscent fruit formed from one carpel and dehiscing along the line of fusion of its edges

funicle: the stalk of an ovule

glabrous: without hairs

glume: a bract in the inflorescence of a grass or sedge

haustorium: absorbing organ through which a parasite obtains materials from its host

inferior ovary: sepals, petals and stamens rising from the top of the ovary (Fig.4)

inflorescence: the arrangement of flowers on a plant

irregular flower: a flower that is bilaterally symmetrical (Fig.4)

keel: a boat-shaped structure formed by the two anterior petals of a flower in Fabaceae

labellum: the landing platform formed by a petal e.g. in the Orchidaceae

lanceolate: lance-shaped, about four times as long as it is broad, broadest in the lower half and tapering towards the tip (Fig.5)

legume: a pod-like fruit formed from one carpel characteristic of the Mimosaceae and Fabaceae

lemma: the lower of the two bracts enclosing the grass flower

ligule: an appendage from the top of a leaf e.g. from the leaf sheath of grasses

linear: long and narrow with sides parallel (Fig.5)

merous: number of parts making up a particular structure within a flower

mucron: a sharp, abrupt terminal point

mycorrhiza: symbiotic union between a fungus and a plant root

oblanceolate: similar in shape to lanceolate but attached at the narrower end (Fig.5)

oblong: having the length greater than the width, but not many times greater, and the sides parallel (Fig.5)

obovate: similar in shape to ovate but attached at the narrower end (Fig.5)

obtuse: blunt or rounded at the apex

operculum: in *Eucalyptus* a cap covering the bud

orbicular: circular or nearly so (Fig.5)

ovary: the basal portion of a carpel or group of fused carpels enclosing the ovule(s)

ovate: shaped like a section through the long axis of an egg, attached by the wider end (Fig.5)

ovoid: egg-shaped in three dimensions

ovule: structure which develops into the seed after fertilization

palea: the upper and innermost of the two bracts enclosing the grass flower

palmate: leaves divided into several leaflets with the leaflets arising from the same point

panicle: a compound raceme in which the flowers are pedicellate

pedicel: the stalk of a flower

peduncle: the stalk of an inflorescence

pendulous: drooping

perennial: a plant whose life span extends over more than two growing seasons

perianth: the calyx and corolla of a flower, usually where the two are similar

petiole: the stalk of a leaf

phylode: a leaf whose blade is absent and whose petiole has assumed the functions of the whole leaf

plumose: like a feather

prostrate: lying flat on the ground

pubescent: covered with short soft erect hairs

pungent: ending in a stiff sharp point

raceme: an indeterminate inflorescence in which a main axis produces a series of flowers on lateral stalks, the oldest at the base and the youngest at the top

ray floret: the irregular, ligulate flowers in the head of a daisy

recurved: curved backwards

regular flower: a flower that is symmetrical about more than one vertical plane (Fig.4)

reniform: kidney-shaped

reticulate: forming a network

revolute: rolled downwards, of a leaf where the margins are rolled towards the midrib

rhizome: a horizontal underground stem

scape: the stem-like, flowering stalk

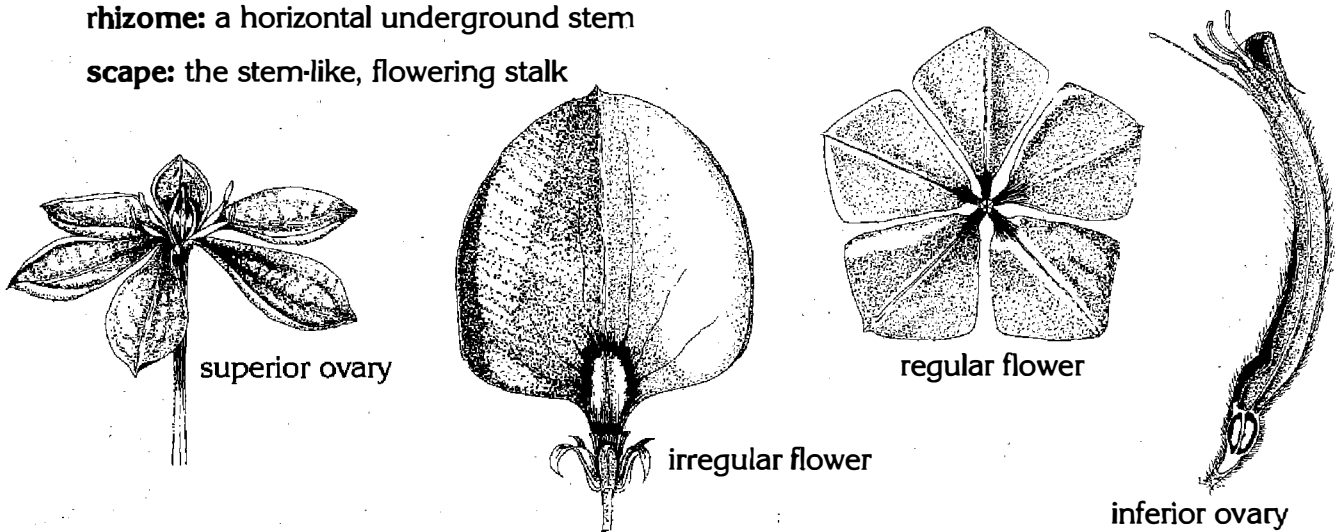


Fig. 4 Flower morphology

- serrate:** toothed, with asymmetrical teeth pointing forward
- sessile:** without a stalk
- setaceous:** bristle-like
- spathulate:** spoon-shaped, broadest at the outer end and gradually narrowing towards the base (Fig.5)
- spike:** an unbranched, indefinite inflorescence of sessile flowers
- spikelet:** a unit of the inflorescence in grasses and sedges
- stamen:** the male organ of a flower consisting of a filament and anther
- staminode:** sterile stamen
- standard:** the posterior petal in the flower of the Fabaceae
- stigma:** the pollen-receptive surface of a carpel
- stipella:** a small stipule found at the base of leaflets
- stipitate:** shortly stalked
- stipule:** one of a pair of appendages at the bases of leaves in many dicotyledons
- stolon:** horizontal stem rooting at the nodes forming new plants
- superior ovary:** petals, sepals and stamens arising at the base of the ovary (Fig.4)
- tepals:** perianth segments of a flower in which all perianth segments are similar
- terete:** cylindrical, or nearly so; circular in cross-section
- triquetrous:** triangular in cross-section and acutely angled
- truncate:** with an abrupt end
- tuber:** underground storage organ formed by the swelling of a stem or root
- umbel:** an inflorescence in which all the flower stalks arise in a cluster at the top of the peduncle and are of about equal length
- unisexual:** bearing only male or female reproductive organs
- wing:** a lateral petal of a flower in the Fabaceae

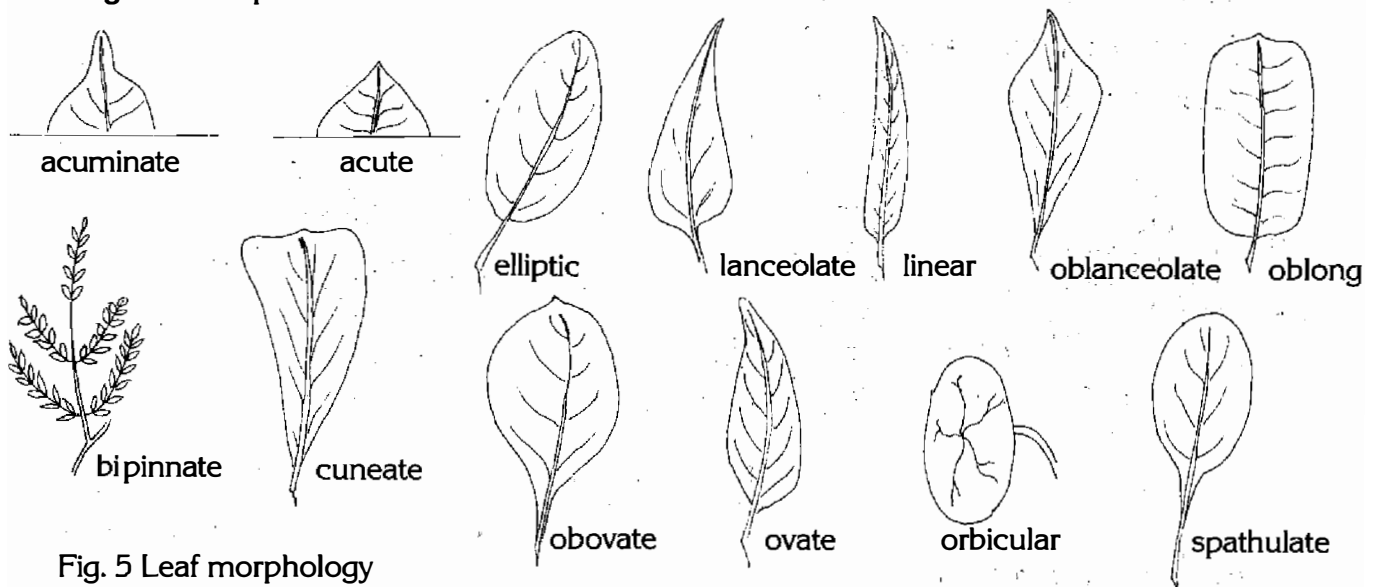


Fig. 5 Leaf morphology

KEY TO FAMILIES OF FLOWERING PLANTS

Note: to use this key you need to choose one of two characters which best describes the specimen in question. The appropriate description is followed by a number which directs you to another two questions

- e.g. 1 Plants woody, stems not green 2
 Plants herbaceous, stems green 19

In this case, if the first choice is correct you go to question 2; if the second choice is correct you go to question 19. For further information about using the key to families refer to page 7.

Plants having leaves with reticulate (branching) veins, flower parts in multiples of 4 or 5, seeds with 2 cotyledons. Herbaceous or woody. **(Dicotyledons)** p.21

Plants having leaves with parallel veins, flower parts in multiples of 3, seeds with 1 cotyledon. Mainly herbaceous. **(Monocotyledons)** p.89

Dicotyledons

- | | | | |
|----|---|--|------|
| 1 | Plants woody, stems not green ('crack' when broken) | | 2 |
| | Plants herbaceous, stems green | | 19 |
| 2 | Leaves reduced to dry scales on needle-like green stems | Casuarinaceae
(<i>Allocasuarina</i> sp.) | p.25 |
| | Leaves not reduced | | 3 |
| 3 | Flowers with distinct calyx and corolla | | 4 |
| | Flowers without distinct calyx and corolla | | 14 |
| 4 | Flowers irregular | | 5 |
| | Flowers regular | | 7 |
| 5 | Flowers pea-shaped | | 6 |
| | Flowers not pea-shaped | | 7 |
| 6 | Stamens 10, flowers yellow, purple red or orange | Fabaceae (pea family) | p.41 |
| | Stamens less than 10, flowers pink, purple or blue, some yellow on keel | Polygalaceae
(<i>Comesperma</i> sp.) | p.71 |
| 7 | Ovary superior | | 8 |
| | Ovary inferior | | 13 |
| 8 | Crushed leaves scented | | 9 |
| | Crushed leaves not scented | | 10 |
| 9 | Petals obvious, stamens shorter than petals | Rutaceae | p.72 |
| | Petals reduced, stamens longer than petals | Myrtaceae | p.60 |
| 10 | (i) Flowers white, cream or red | Epacridaceae | p.34 |
| | (ii) Flowers blue-purple | | 11 |
| | (iii) Flowers yellow | | 12 |

11	Plants slender shrubs	Tremandraceae (<i>Platytheca galioides</i>)	p.70
	Plants twiners	Pittosporaceae (<i>Pronaya fraseri</i>)	p.37
12	Flowers solitary, large petals more than 5mm long	Dilleniaceae (<i>Hibbertia</i> sp.)	p.28
	Flowers in globular heads, petals less than 5mm long	Mimosaceae (<i>Acacia</i> sp.)	p.38
13	Crushed leaves scented	Myrtaceae	p.60
	Crushed leaves not scented	Loranthaceae (<i>Nuytsia floribunda</i>)	p.68
14	Flowers irregular		15
	Flowers regular		16
15	Ovary superior	Proteaceae	p.54
	Ovary inferior	Goodeniaceae	p.82
16	Ovary inferior, flowers white or cream, perianth forming an operculum	Myrtaceae (<i>Eucalyptus</i> sp.)	p.60
	Ovary superior, perianth not forming an operculum		17
17	(i) Flowers yellow in globular heads, perianth segments less than 5mm long, small shrub	Mimosaceae (<i>Acacia huegii</i>)	p.38
	(ii) Flowers very small, greenish yellow, in depression along condensed spikes	Santalaceae (<i>Exocarpos sparteus</i>)	p.67
	(iii) Flowers pink, white or yellow not in globular heads, perianth fused to form a tube at base. Perianth segments less than 5mm long		18
18	Staminal filaments fused along the length of the perianth, anthers at end of perianth lobes, tall shrubs	Proteaceae	p.54
	Staminal filaments not fused along whole length of perianth, small shrubs	Thymelaeaceae (<i>Pimelea</i> sp.)	p.59
19	Plants with very fleshy leaves	Aizoaceae (<i>Carpobrotus edulis</i>)	p.26
	Plants not fleshy		20
20	Flowers with distinct calyx and corolla		21
	Flowers without distinct calyx and corolla		38
21	Flowers irregular		22
	Flowers regular		32
22	Flowers pea-shaped		23
	Flowers not pea-shaped		24
23	Stamens 10	Fabaceae (pea family)	p.41
	Stamens less than 10	Polygalaceae (<i>Comesperma</i> sp.)	p.71

24	Ovary superior		25
	Ovary inferior		30
25	(i) Flowers yellow or red	Scrophulariaceae	p.77
	(ii) Flowers cream-white		26
	(iii) Flowers blue-purple or pink		27
26	Plants with green leaves	Euphorbiaceae	p.69
	Plants without green leaves	Orobanchaceae (<i>Orobanche minor</i>)	p.78
27	Plants densely hairy	Geraniaceae (<i>Pelargonium capitatum</i>)	p.73
	Plants not densely hairy		28
28	Leaves pungent	Lamiaceae (<i>Hemiandra pungens</i>)	p.76
	Leaves not pungent		29
29	Flowers sticky, red to purple	Scrophulariaceae (<i>Parentucellia latifolia</i>)	p.77
	Flowers not sticky, blue-purple	Violaceae (<i>Hybanthus calycinus</i>)	p.33
30	Stamens fused to style to form a column	Stylidiaceae (trigger plants)	p.80
	Stamens not fused to style		31
31	Petals ribbed	Goodeniaceae	p.82
	Petals not ribbed	Lobeliaceae (<i>Lobelia alata</i>)	p.79
32	Ovary superior		33
	Ovary inferior		36
33	Leaves sticky with glandular hairs	Droseraceae (<i>Drosera</i> sp.)	p.30
	Leaves not sticky, without glandular hairs		34
34	Flowers yellow in globular heads, petals less than 5mm long	Mimosaceae (<i>Acacia</i> sp.)	p.38
	Flowers white or pink		35
35	Plants hairy with white to pink terminal flowers	Caryophyllaceae (<i>Silene gallica</i>)	p.122
	Plants not hairy, foliage dark green or purplish green, flowers white with yellow stamens. Berries black or purplish-black when mature	Solanaceae (<i>Solanum nigrum</i>)	p.122
36	Plants with branched tendrils, flowers yellow, large melon fruits	Cucurbitaceae (<i>Citrullus lanatus</i>)	p.121
	Plants without tendrils, flowers cream-white in compound head		37
37	Leaves giving offensive odour when crushed	Rubiaceae (<i>Opercularia vaginata</i>)	p.84
	Leaves odourless when crushed	Apiaceae	p.74

38	Flowers irregular		39
	Flowers regular		40
39	Flowers in compound head	Asteraceae (everlastings, daisies)	p.85
	Flowers solitary	Goodeniaceae	p.82
40	Ovary superior		42
	Ovary inferior		41
41	Flower morphology variable throughout flower head	Asteraceae (everlastings, daisies)	p.85
	Flower morphology not variable	Apiaceae	p.74
42	Twining plants		43
	Non-twining plants		44
43	Flowers small (less than 5mm), bisexual and cream-white. Leaves absent or very reduced	Lauraceae (<i>Cassytha</i> sp.)	p.23
	Flowers large (more than 5mm), unisexual and white. Leaves large (more than 20mm), petiolate and divided into 3	Ranunculaceae (<i>Clematis pubescens</i>)	p.24
44	(i) Flowers in cylindrical head, perianth greenish-yellow	Amaranthaceae (<i>Ptilotus polystachyus</i>)	p.27
	(ii) Flowers bright yellow	Ranunculaceae (<i>Ranunculus muricatus</i>)	p.24
	(iii) Perianth white or cream		45
45	Male and female plants separate, stamens less than 10 on male plant	Euphorbiaceae	p.69
	Flowers bisexual, stamens 10, mature berries, purple-black	Phytolaccaceae (<i>Phytolacca octandra</i>)	p.122

Monocotyledons

1	Plants growing in freshwater habitat. Roots in soil, foliage emerging from water. Flowers with distinct perianth, carpels separate and distinct	Juncaginaceae (<i>Triglochin procera</i>)	p.91
	Land plants, may grow near freshwater		2
2	Plants grass-like. Petals and sepals (perianth) not obvious, stamens and ovary surrounded by glumes or membranous perianth segments		3
	Plants not grass-like, perianth obvious and often brightly coloured		6
3	Perianth absent, stamens and ovary surrounded by glumes		4
	Perianth present		5

4	Stems hollow, nodes present, leaf sheaths which surround nodes are split	Poaceae (grass family)	p.104
	Stems solid, nodes absent, leaf sheath not split	Cyperaceae	pp.95, 101
5	Leaves mostly basal	Juncaceae	
		(<i>Juncus pallidus</i>)	pp.95, 100
	Leaves reduced to sheathing bracts	Restionaceae	pp.95, 98
6	Ovary superior		7
	Ovary inferior		9
7	Calyx and corolla similar in shape and colour, forming perianth	Liliaceae	p.108
	Calyx and corolla distinct, perianth whorls dissimilar		8
8	Plants small (less than 0.5m) and herbaceous, flowers blue	Commelinaceae	
		(<i>Cartonema philydroides</i>)	p.94
	Plants large (more than 0.5m), with tough leaves, long flowering spike and when present, black stem	Xanthorrhoeaceae	
		(<i>Xanthorrhoea preissii</i>)	p.114
9	Stamens and style fused to form a column. Petals 3, sepals 3, may be brightly coloured or green, sometimes difficult to distinguish. Plants often only having one leaf	Orchidaceae	p.115
	Stamens and style not fused		10
10	Stamens 6	Haemodoraceae	
		(kangaroo paw family)	p.105
	Stamens 3		11
11	Perianth brightly coloured, pink, purple or lilac	Iridaceae	p.113
	Perianth not brightly coloured	Haemodoraceae	
		(<i>Haemodorum paniculatum</i>)	p.105

NON-FLOWERING VASCULAR PLANTS

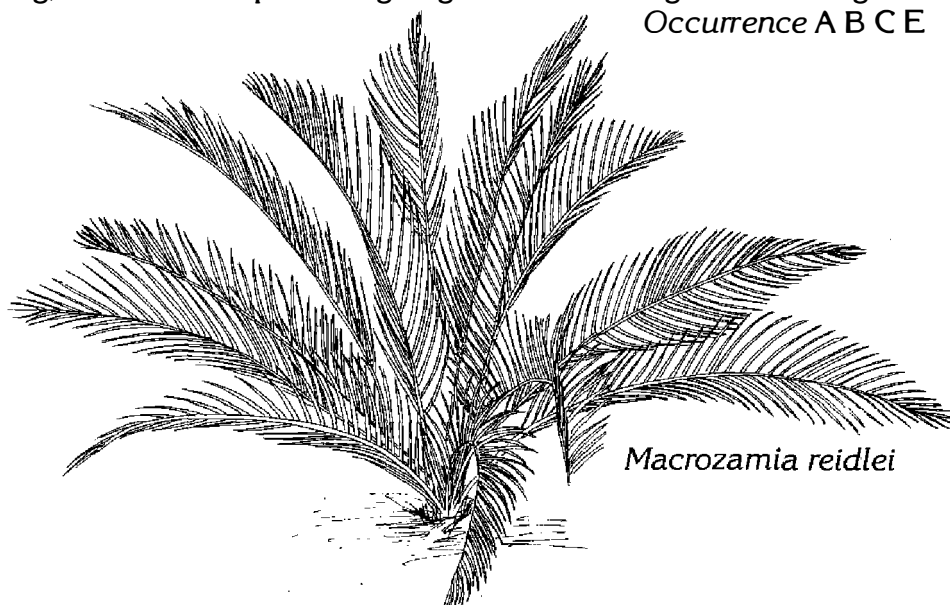
Two species on campus, a fern (*Pteridium esculentum*) and the other, a cycad (*Macrozamia reidleyi*), belong in this category. Ferns typically have leaves which unroll as they develop and reproduce by spores. The spores are produced in sacs or sporangia on the undersurface of the leaf giving it a brown appearance. Sporangia are clustered together in a structure called a sorus and the shape and distribution of these are important in identifying species. The sporangia may be covered by a layer of tissue called the indusium. *Pteridium esculentum* is one of the commonest plants in Australia. It spreads rapidly by means of a horizontal underground stem or rhizome. Cycads, unlike ferns, reproduce by seed. The plants are dioecious and have large strobili (cones) on both the male and female plants. These strobili and a palm-like leaf make the Murdoch species easy to recognize. These plants are poisonous but the Aborigines had methods of preparation and cooking that made the seed edible.

Pteridium esculentum (G. Forster) Cockayne; bracken fern (family Polypodiaceae)

Shrub to 1.5m, perennial, rhizomatous. *Leaves* arising from underground rhizome; blade bipinnate glabrous on upper surface, hairy underneath, stiff; petiole with short stiff hairs. *Sori* marginal and continuous along underside of leaf; indusium opening towards midrib of leaf. Occurrence A D

Macrozamia reidleyi (Fischer ex Gaudich.) C.A. Gardner; zamia palm (family Zamiaceae)

Shrub to 2m, perennial, subterranean stem. *Leaves* tough and almost leathery, pinnate, to 2m long; leaf bases woolly, persistent, sometimes forming an obvious bole at the base of the plant. *Cones* stalked to 0.5m long; female cones producing large seeds with bright red coating. Occurrence A B C E

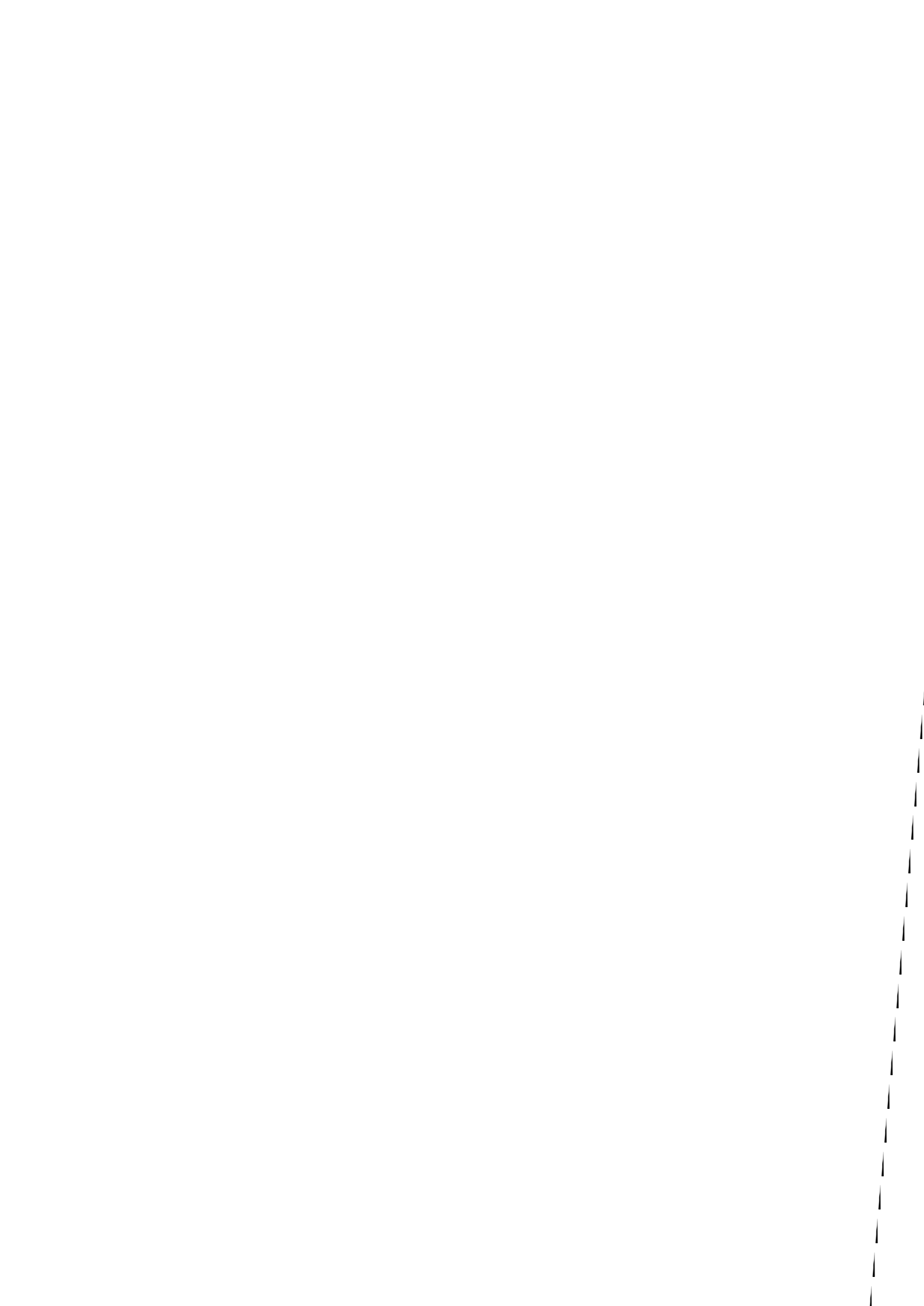


Macrozamia reidleyi



Dicotyledons

Dampiera linearis



LAURACEAE

The two species from this family that occur on campus belong to the genus *Cassytha* which is placed by some authors in the separate family Cassythaceae. *Cassytha* species are parasitic climbers which are distributed throughout tropical and subtropical regions but the greatest number of species occur in southwestern Australia. Because of their very reduced vegetative and floral structures they are difficult to tell apart and are also commonly confused with the dodders (*Cuscuta* species; family Cuscutaceae. However, dodders have a yellow-brown appearance rather than green as in *Cassytha*). The most distinguishing feature of the two Murdoch campus species is the presence or absence of hairs over the surface of the plant.

Cassytha glabella R.Br.; tangled dodder laurel

Twiner, herbaceous, green, perennial, glabrous stems, elliptic haustoria. *Leaves* triangular to ovate, very small. *Inflorescence* of solitary or paired heads on peduncle 7-8mm long. *Flowers* very small; corolla white; calyx yellowish green with yellow or white; stamens 9 fertile in 3 whorls, 3 staminodes.

Flowering period all year round

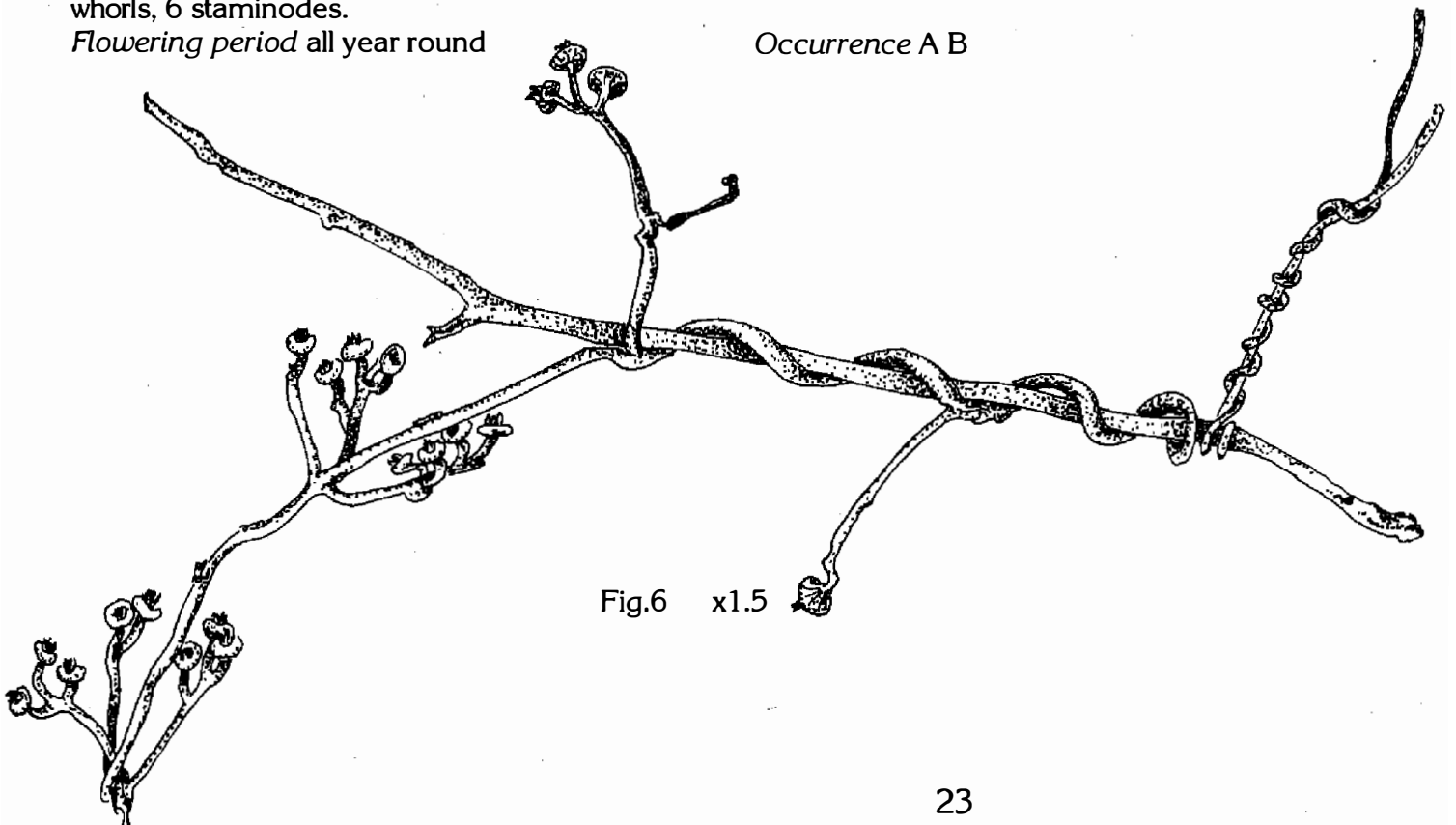
Occurrence A B

Cassytha racemosa Nees; dodder laurel (Fig.6)

Twiner, herbaceous, green, perennial, hairy, elliptic haustoria. *Leaves* narrowly ovate, very small. *Inflorescence* a raceme of 4-8 flowers. *Flowers* very small, white to yellowish green; stamens 6 fertile in 2 whorls, 6 staminodes.

Flowering period all year round

Occurrence A B



RANUNCULACEAE

The buttercup (*Ranunculus*) family with about 1,800 species is common in the northern temperate zone. Only about forty-five species are Australian. In southwestern Australia occur three bright yellow species of *Ranunculus* and two species of *Clematis* with white flowers. Diagnostic features are the divided leaves, free floral parts, numerous stamens, few to many free carpels and endospermic seeds. Like the Dilleniaceae this is a very old family. *Clematis* is a prominent woody climber which produces large heads of dry one-seeded fruits with long plumed tails which are dispersed in the wind.

Clematis pubescens Huegel ex. Endl.; white clematis (Fig.7)

Climber, young stems with short hairs. *Leaves* opposite, seedling leaves entire, adult leaves divided into 3 leaflets, main petiole 40-50mm long; leaflets ovate, 50-60mm long, 20-30mm wide, twining. *Flowers* in axillary racemes, pedicels 30-40mm long, hairy; perianth one whorl of 4 segments, elliptic, c. 30mm long, 5mm wide, white; male flowers with numerous stamens; female flowers with 4 or more staminodes. *Fruit* achene with plumose awn.

Flowering period July-October

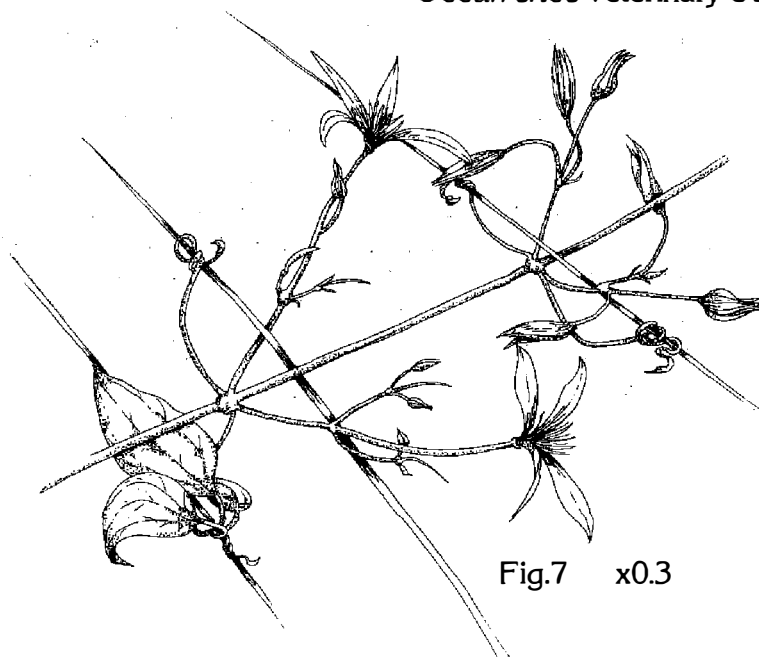
Occurrence A C E

Ranunculus muricatus L.

Herb to 0.3m, soft, glabrous. *Leaves* near base large, alternate, petiole terete, hollow, up to 150mm long, stem-clasping at base, lamina semicircular, c. 50mm across, lobed; flowering leaves small, opposite or alternate, lanceolate, 20-25mm long, 8-10mm wide. *Flowers* axillary, c. 15mm across; pedicels to 25mm long; corolla five free petals, yellow, shining; carpels 15-20, free. *Achenes* rough. *Introduced*.

Flowering period September-November

Occurrence Veterinary School farm



CASUARINACEAE

This family has only five genera which are distributed throughout Australia, parts of Asia and Oceania. The Australian genera are *Casuarina*, *Allocasuarina* (formerly included in *Casuarina*) and *Gymnostoma*.

The plants are woody trees or shrubs and their most distinctive feature is having reduced scale-like leaves on needle-like branchlets. The leaves are produced in whorls around the branchlet and the number present in each whorl is useful in identifying individual species. Sexually the plants may be monoecious or dioecious and female flowers develop into woody cones.

Several species in this group are planted extensively outside their native range for the production of firewood and charcoal. They have also been used in dune stabilization programmes in such places as Senegal.

Interesting symbiotic relationships exist in species of *Casuarina* and *Allocasuarina*. In association with soil micro-organisms (e.g. *Frankia* sp.) atmospheric nitrogen fixation can be achieved, and ectotrophic mycorrhizal fungi (e.g. *Pisolithus tinctorius*) can assist in nutrient absorption. This allows the plants to be grown on soils with poor nutrient status.

Allocasuarina humilis (Otto and Dietr.) L. Johnson; dwarf sheoak (Fig.8)

Shrub 1-2m; dioecious. *Branchlets* with numerous internodes; internodes 3-4mm long. *Leaves* scale-like, whorled, 5-7 per whorl, pressed close to stem. *Inflorescence* male spike with peduncle, cylindrical, 3-20mm long; female spike ovoid. *Cone* grey, prominent tip, cylindrical.

Flowering period May-November

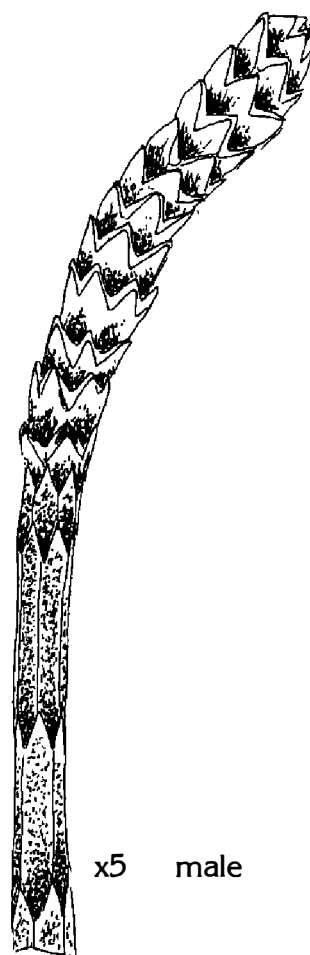
Occurrence A E

Allocasuarina fraseriana (Miq.) L. Johnson; sheoak

Tree to 15m; dioecious, thick fibrous bark. *Branchlets* with numerous internodes; internodes 5-15mm long. *Leaves* scale-like, whorled, 6-8 per whorl, not pressed close to stem, reflexed. *Inflorescence* male spike with peduncle, cylindrical, to 120mm long; female spike ovoid. *Cone* reddish brown to grey, globular to ovoid.

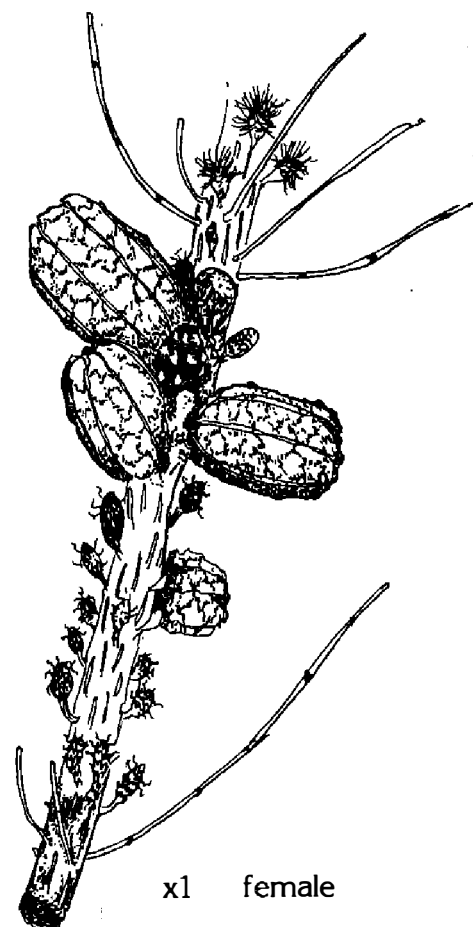
Flowering period May-October

Occurrence A C



x5 male

Fig.8



x1 female

AIZOACEAE

The pigface family consists of succulent shrubs and herbs in which the leaves store considerable amounts of water. The bisexual flowers have a 4 to 5-lobed perianth; there are 4-5 or numerous stamens, the outer whorls changed into petaloid staminodes; the ovary is inferior or superior with one to many chambers containing numerous ovules; and the fruits may be dry or fleshy.

There are nearly sixty species in Australia with about twenty in Western Australia. The genus *Carpobrotus*, with large and showy flowers and succulent triquetrous leaves, is a common sight on the coast often growing on exposed sand. The name comes from the Greek meaning edible fruit. Both the fruit and leaves were used in Aboriginal diets. Though two species of *Carpobrotus* occur in the metropolitan area, only the South African *C. edulis*, occurs on the Murdoch campus. The fruit of this plant is called the 'Hottentot fig' in its native country.

Carpobrotus edulis (L.) Bolus; pigface (Fig.9).

Herb with stout prostrate stems. *Leaves* opposite, fused at the base, smooth, fleshy, triquetrous, 40-80mm long, acute. *Flowers* solitary, terminal, large, 70-100mm across, shades of yellow to pink. *Fruit* juicy, red, edible.

Flowering period September-December

Occurrence A B C E

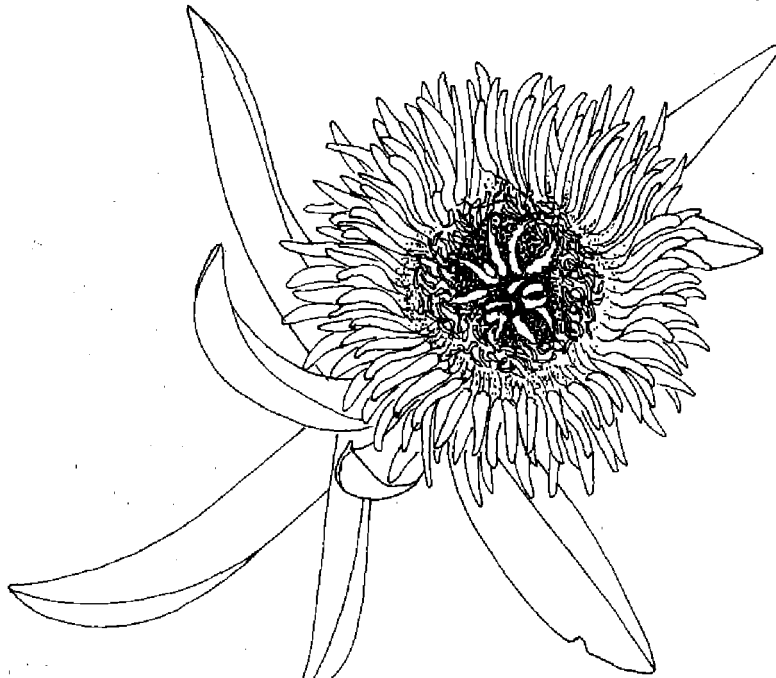


Fig.9 x0.5

AMARANTHACEAE

The Amaranthaceae is a cosmopolitan family with about 900 species of herbs and shrubs. The family includes the cockscombs, important weeds e.g. fat-hen, and the native mulla-mullas which are common in the northern and interior regions of Western Australia. Diagnostic features are the flowers with only one whorl of 5 (rarely 4), often brightly coloured, membraneous segments and the one-chambered superior ovary. Flowers are borne in terminal or axillary spikes. Leaves are entire and stipules are absent. The family is close to the Chenopodiaceae (bluebushes, saltbushes, samphires). *Ptilotus polystachyus* is widespread throughout mainland Australia. The succulent, green-flowered plant may be mistaken as a weed.

Ptilotus polystachyus (Gaudich.) F. Muell.; (Fig.10)

Herb 0.5-1.2m, annual or perennial, sparsely hairy, stems striate. *Leaves* linear to ovate, alternate, margins undulate, 20-60mm long (larger towards the base). *Flowers* crowded in a terminal raceme, greenish-yellow; bracts translucent; sepals 10-15mm long, greenish yellow towards apex, hairy towards base; filaments yellow, fused at the base into a red staminal cup.

Flowering period July-November

Occurrence C E

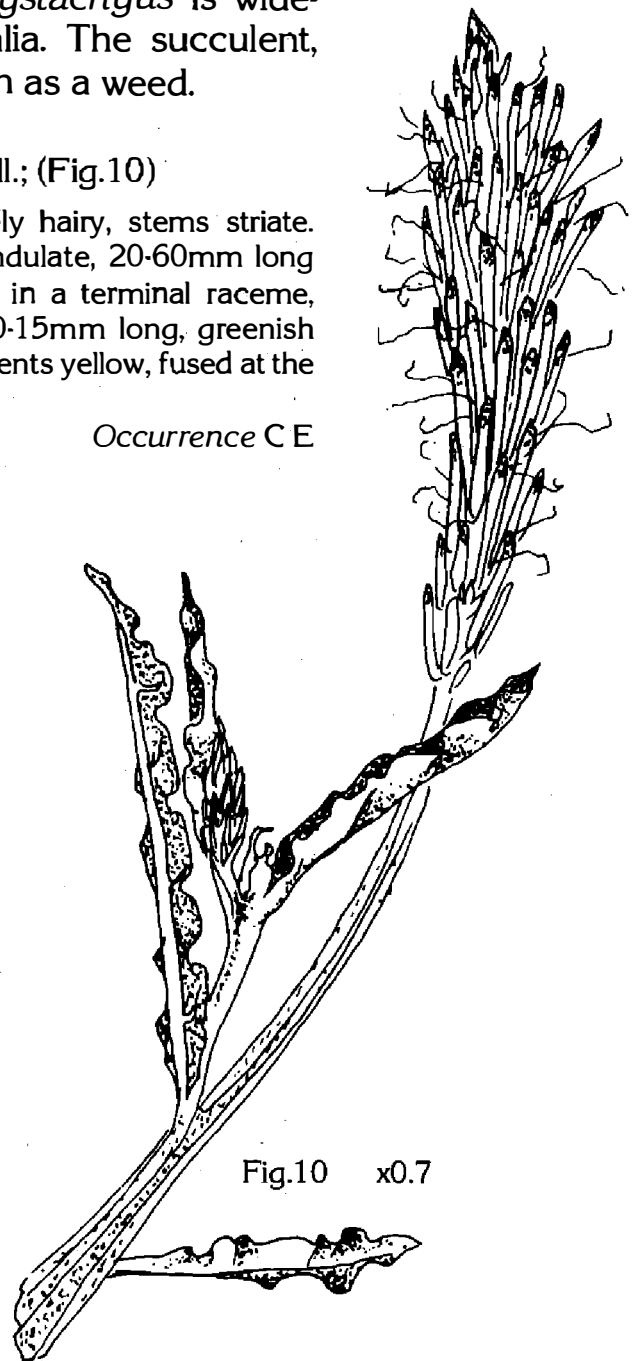


Fig.10 x0.7

DILLENIACEAE

The *Hibbertia* family is a prominent understorey component of the Banksia Woodland and is conspicuous from June to November. The five species of *Hibbertia* are easily recognized by their regular flowers with 5 free, bright yellow petals and 5 persistent sepals. Numerous stamens surround the almost free carpels. Most species are pollinated by beetles. Seeds, which are few, may be dispersed by ants.



Fig.11 x0.3

Species	Leaf base stem clasp	Carpel number	Pedice	Stamens
<i>Hibbertia hypericoides</i>	no	2	1-5cm	free
<i>H. huegelii</i>	no	5	sessile	in bundles
<i>H. racemosa</i>	slightly	3	1.5-2cm	in bundles
<i>H. stellaris</i>	no	3	2-2.5cm	free
<i>H.subvaginata</i>	yes	3	2-3mm	in bundles

Hibbertia hypericoides (DC.) Benth.; (Fig.11)

Shrub 0.3-0.7m, spreading, branchlets minutely hairy. *Leaves* linear to narrow oblong, 10-15mm long, c. 1 mm wide, margins revolute, with short stellate hairs. *Flowers* axillary, solitary; sepals elliptic, broad, hairy; petals yellow; stamens 10-15 grouped on one side of carpels; carpels 2, hairy.

Flowering period May-November

Occurrence A C E

Hibbertia huegelii (Endl.) F. Muell.; (Fig.12)

Shrub semi-prostrate to 0.5m. *Leaves* densely clustered, linear to terete, 30-50mm long, c. 1 mm wide. *Flowers* 1-2 in terminal axillary shoots, almost sessile in clusters of floral leaves; sepals ovate to elliptic, outer ones narrow; petals yellow; stamens in bundles of 4-5 plus 1 free; carpels 5, glabrous.

Flowering period August-November

Occurrence A

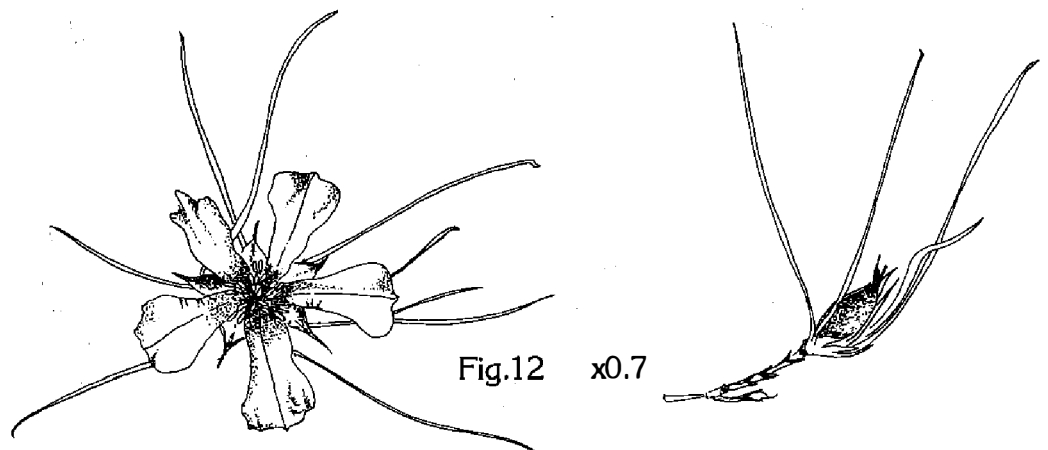


Fig.12 x0.7

Hibbertia racemosa (Endl.) Gilg.; stalked guinea flower

Shrub low, spreading to 0.3m, glabrous. *Leaves* narrow oblong to linear, 20-25mm long, 2-3mm wide, truncate, midrib and marginal veins often extended to form 3 small points. *Flowers* axillary, 8-15mm across, peduncles 10-30mm long; sepals ovate to oblong, outer ones narrow; petals yellow; stamens 10-12 in 3 bundles with additional 1 or 2 free; carpels 3, glabrous.

Flowering period July-November

Occurrence A

Hibbertia stellaris Endl.; star guinea flower; (Fig.13)

Shrub 0.15-0.2m with spreading filiform branchlets. *Leaves* linear, narrower at the base, 15-40mm long, 1-3mm wide. *Flowers* axillary, solitary, 5-15mm across, peduncles 12-25mm long; sepals 3-4mm long, inner sepals membranous; petals orange, twice as long as sepals; stamens 10-15 free around the 3 glabrous carpels.

Flowering period September-January

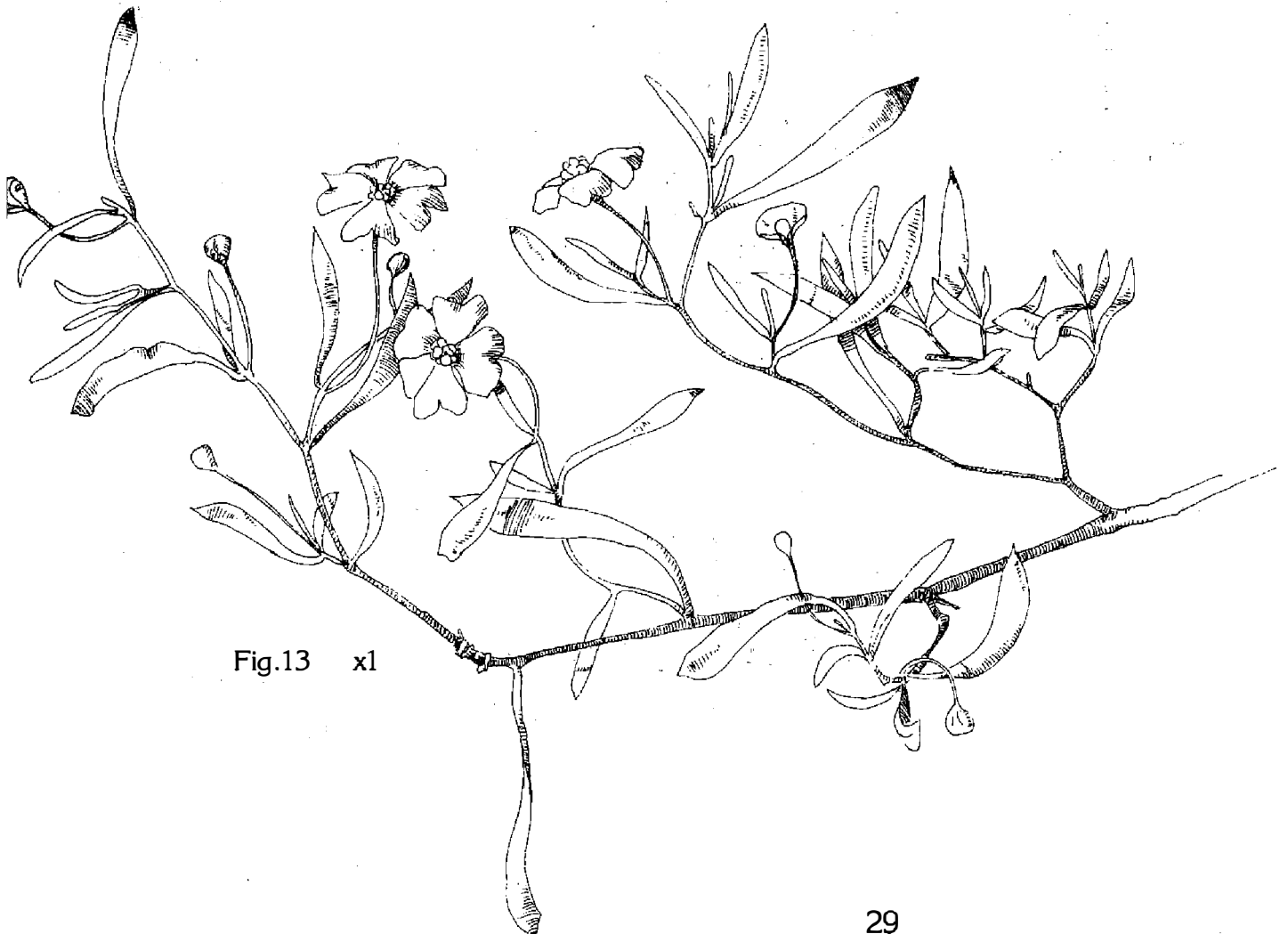
Occurrence B

Hibbertia subvaginata (Steudel) F. Muell.

Shrub 0.3-0.4m, spreading, much branched. *Leaves* linear to oblong, 25-50mm long, 3-5mm wide, flat, apex truncate, base greatly dilated and stem-clasping. *Flowers* axillary, solitary or clustered, 15-25mm across, shortly pedunculate; bracts small and dry; sepals as long as or longer than petals; petals yellow, stamens 8-12, fused in 3 bundles with additional 1 or 2 free, staminodes absent; carpels 3, glabrous.

Flowering period July-November

Occurrence A B C E



DROSERACEAE

A cosmopolitan family of insectivorous plants with four genera and about 100 species. The two most well-known genera are *Dionaea* or Venus' fly-trap, in which the leaf blade closes trapping insects inside the interlocking marginal hairs, and *Drosera* (sundews). Sundews have long and short glandular hairs on their leaves. The long hairs are sensitive to touch and move to enclose their prey. The short hairs secrete enzymes which digest the insect allowing small molecules such as amino acids to diffuse into the leaf. In this way sundews can supplement their nutrients taken up from soil.

The genus *Drosera* contains both annual and perennial species with rhizomes, fibrous roots or underground tubers; stems are dwarf, erect and climbing or free-standing; leaves are basal rosettes, or all cauline, or a mixture of the two. Flowers are bisexual, regular, with usually 5 (rarely 4 or 8) petals; ovary is superior and has one chamber; styles 2 to 5, often divided.

The seven species of *Drosera* on the Murdoch campus include the pygmy, free-standing and climbing forms. *D. erythrorhiza* forms large mats and the flowers may appear before the leaves. The three climbing species may be distinguished as follows: *D. pallida* has simple styles and its leaves and flowers are smaller than *D. macrantha*. Both *D. pallida* and *D. macrantha* have white flowers, whereas *D. menziesii* usually has pink.

Species	Stem habit	Leaves	Flower colour
<i>Drosera erythrorhiza</i>	dwarf	large basal rosette	white
<i>D. glanduligera</i>	dwarf	small basal rosette	red or orange
<i>D. macrantha</i>	climbing	cauline	white
<i>D. menziesii</i>	climbing	cauline	pink
<i>D. paleacea</i>	dwarf	small basal rosette	white
<i>D. pallida</i>	climbing	cauline	white
<i>D. stolonifera</i>	erect	basal rosette and cauline	white

Drosera erythrorhiza Lindley; red ink sundew

Herb with flat, leafy rosette connected to underground tuber; often in dense colonies 1-3m across. *Leaves* spatulate, green to red, sticky, 20-50mm long, 15-25mm wide. *Flowers* 10-30 in a single inflorescence 40-50mm high; calyx divided almost to the base; petals obovate, 6-10mm long, white; styles 3.

Flowering period March-July

Occurrence A B E

Drosera glanduligera Lehm.; scarlet sundew, pimpernel sundew

Herb with small, flat rosette of leaves and fibrous roots; stem 5-10mm high. *Leaves* 10-20, yellow-green, petiolate, lamina suborbicular, 5-8mm across, glandular. *Flowers* in racemes 15-30mm high, scapes glandular hairy; calyx with shaggy hairs; petals obovate, red or orange; styles 3, divided near apex.

Flowering period August-October

Occurrence B C E

Drosera macrantha Endl.; bridal rainbow sundew

Herb climbing to 1.2m, tuberous, stem hairy in upper part. *Leaves* in groups of three, petioles 10-50mm long, lamina orbicular, concave, 4-8mm across, glandular. *Flowers* 5-30 in loosely branched terminal clusters; sepals densely hairy; petals obovate, 6-12mm long, white; styles 3, very densely branched.

Flowering period July-October

Occurrence A

Drosera menziesii R.Br. ex DC.; pink rainbow sundew (Plate 1)

Herb climbing to 50cm, tuberous, stem without hairs. *Leaves* in groups of three, petioles 6-40mm long, lamina orbicular to slightly reniform, 2-4mm across, glandular. *Flowers* 2-6 in spreading terminal clusters; sepals hairy; obovate, 8-12mm long, usually red, sometimes pink or white; styles 3, divided towards base, branches not simple.

Flowering period August-October

Occurrence A

Drosera paleacea DC.; dwarf sundew

Herb with small, convex rosette of leaves and fibrous roots; stem 10-25mm high. *Leaves* 20-30, yellow-green to dark red, petiolate, lamina suborbicular, 2-3mm across, glandular; stipules 3-lobed. *Flowers* numerous on one side of a scape, scape 15-40mm long; calyx with or without hairs; petals obovate, 3-4mm long, white; styles 3-5, simple.

Flowering period September-November

Occurrence A

Drosera pallida Lindley; pale rainbow sundew

Herb climbing to 1.5m, tuberous, stem glabrous. *Leaves* in groups of three, petioles 10-50mm long, lamina orbicular to slightly reniform, concave, 3-4mm across (i.e. smaller than *D. macrantha*). *Flowers* numerous in terminal cluster, sepals glandular hairy; petals obovate, 8-10mm long, white; styles divided at base in numerous simple branches.

Flowering period August-October

Occurrence A B E

Drosera stolonifera Endl.

Herb 10-20cm high with basal rosette and several stems arising from cauline rosette. Basal *leaves* spatulate, 10-20mm long, petiolate; cauline leaves whorled, obovate/reniform. *Flowers* in terminal panicle; sepals glabrous; petals 5-10mm long, white; styles of numerous simple segments.

Flowering period September-October

Occurrence A

VIOLACEAE

The violet family has about 900 species, most of which occur outside Australia. *Hybanthus* is the only genus that occurs in Western Australia. Members of the family are herbs or shrubs with alternate leaves, 5 free sepals and 5 petals. The lower petal is often greatly expanded. The 5 stamens form a ring around the superior ovary which contains a single chamber formed by 3 fused carpels. The ovules are attached to the ovary wall. *H. calycinus* is common on coastal sands overlying limestone. The generic name refers to the pouch at the base of the large, lower petal.

Hybanthus calycinus (DC. ex Ging.) F. Muell.; native violet (Fig.14)

Herb to 0.5m, perennial. *Leaves* soft, alternate, linear, 20-25mm long, sessile. *Flowers* 3-5 in a raceme; sepals 5, blue and white; petals 5, blue with purple striations, lower petal broadly spatulate with yellow tongue and pouched at the base, other petals small and obliquely ovate; anthers purple and orange surrounding the style; nectary green.

Flowering period July-October

Occurrence A C E

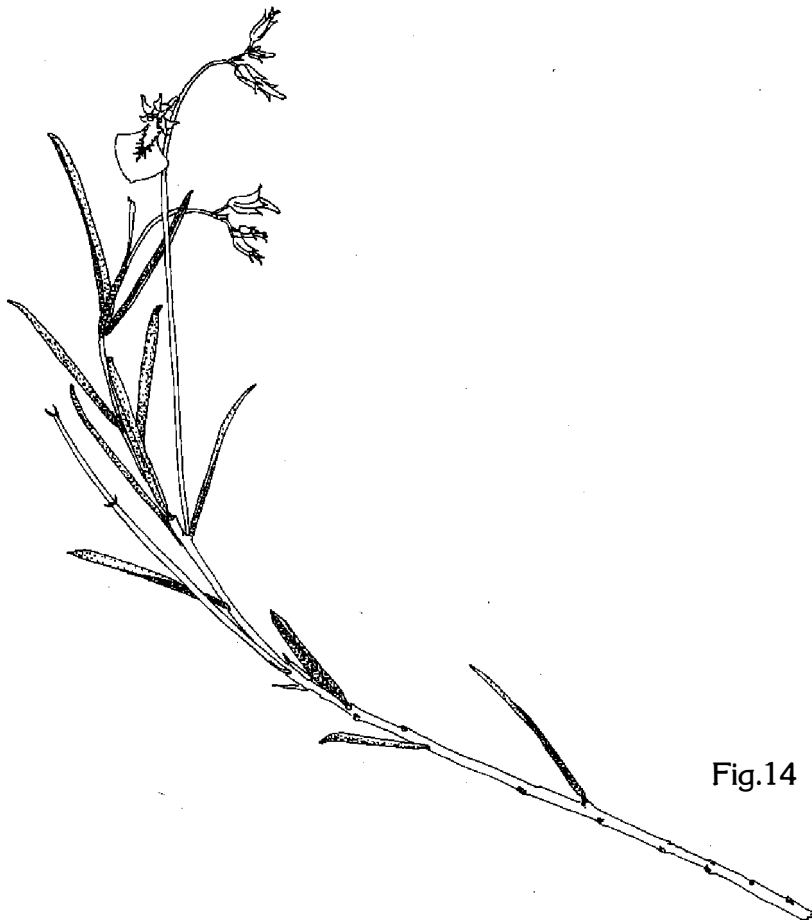


Fig.14 x0.7

EPACRIDACEAE

Members of this mainly Australian family of over 400 species are commonly known as heaths. In Western Australia they are almost restricted to the sandy and lateritic soils of the south-west. They form small woody shrubs usually with stiff pungent leaves. Flowers are usually small, mostly white and the corolla is tubular at the base with 4 or 5 lobes. Stamens may be fused to the corolla tube. The ovary is superior.

The largest genus in Western Australia is *Leucopogon* with about 100 species and ten of these are found on the Murdoch campus. These are difficult to tell apart because the flowers are small and many have similar leaves, i.e. in size, shape and colour. Four other genera, *Astroloma*, *Brachyloma*, *Conostephium*, *Lysinema*, each represented by a single species, are more easily separated due to their distinctive flower shapes. The drupes of some species were eaten raw by Aborigines.

Species	Leaf width	Inflorescence	Flower colour/length
<i>Astroloma pallidum</i>	2mm	flowers single	white to pink/ 15-20mm
<i>Brachyloma preissii</i>	4-5mm	flowers single	red/4-5mm
<i>Conostephium pendulum</i>	4-5mm	flowers single	white and purple/ 12-18mm
<i>Leucopogon australis</i>	5-8mm	flowers 15-20 in long spikes	white/ 3-4mm
<i>L. conostephioides</i>	2mm	flowers 1-3 in short racemes	white/ 3-4mm
<i>L. parviflorus</i>	4-5mm	flowers 10-15 in long spikes	white/ 2-3mm
<i>L. propinquus</i>	2-3mm	flowers 2-5 in short spikes	white/ 5-6mm
<i>L. racemosus</i>	1mm	flowers 2-5 in short racemes	white/ 5-6mm
<i>Lysinema ciliatum</i>	1-2mm	flowers single	cream/ 15-20mm

Astroloma pallidum R. Br.

Shrub semi-prostrate, 10-20cm, dense branches erect. *Leaves* lanceolate, concave, striate beneath, margins denticulate, 10-20mm long, c. 2mm wide; apex pungent. *Flowers* solitary, axillary, vertical, pedicel c. 1mm long, corolla tube overtwice length of sepals, white to pale pink, inside bearded at top of throat and five tufts of hairs towards the base; ovary 5-celled. *Fruit* globular.

Flowering period July-November

Occurrence A C

Brachyloma preissii Sonder.; globe heath (Figs. 15, 16)

Shrub to 1 m, minutely hairy branches densely clothed with dark green leaves. *Leaves* narrowly oblong, obtuse with short mucron, 15-20mm long, 4-5mm wide. *Flowers* sessile, axillary, deep pink or red; corolla tube shorter than sepals, lobes as long as tube. *Fruit* depressed, globular, furrowed.

Flowering period May-June

Occurrence A B C

Conostephium pendulum Benth.; pearl flower (Plate 2)

Shrub to 0.5m, erect and much branched. *Leaves* narrowly oblong, 15-25mm long, 4-5mm wide, apex acute and pungent. *Flowers* pendulous on long recurved pedicels, axillary, flower base enclosed by numerous pale overlapping bracts; sepals nearly circular, white; corolla tube dilated above middle and conical towards the apex, base of tube white, apex purple.

Flowering period June-September

Occurrence A C E

Leucopogon australis R.Br.; spiked beard-heath

Shrub to 3m. *Leaves* linear, shortly petiolate, 30-50mm long, 5-8mm wide, prominent longitudinal veins; apex acute or obtuse. *Flowers* in terminal or axillary spikes, sweetly scented, 20-40mm long, dense; corolla white, lobes bearded, tube slightly shorter than sepals; ovary 5-celled. *Fruit* depressed, globular, yellowish.

Flowering period July-December

Occurrence D

Leucopogon conostephioides DC. (Fig.17)

Shrub to 0.3m. *Leaves* erect, overlapping, shortly petiolate, lanceolate, concave, shiny green above, pale striate below, 8-10mm long, 2mm wide; apex pungent. *Flowers* in short axillary racemes, pendulous, peduncles 1 to 3-flowered; corolla white, tube nearly as long as sepals; ovary 2 to 3-celled.

Flowering period April-August

Occurrence A B C



Fig.15 x2

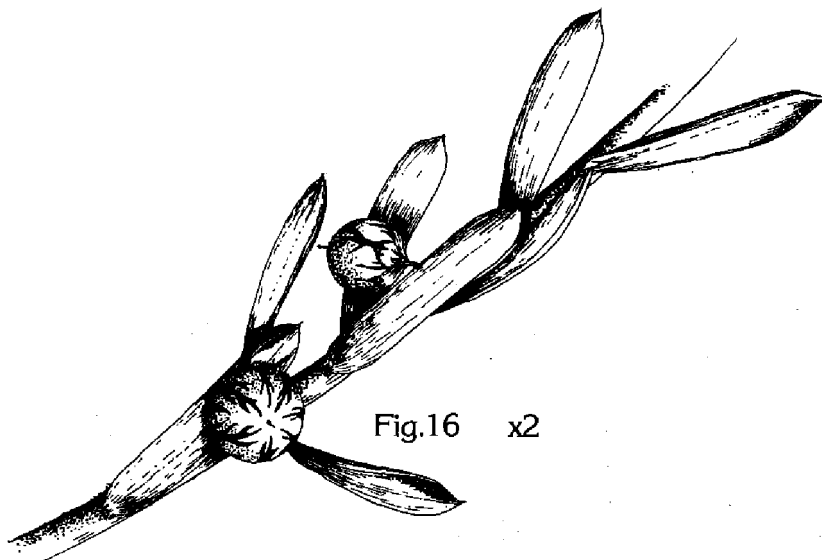


Fig.16 x2

Leucopogon parviflorus (Andrews) Lindley; coast beard-heath

Shrub to 1m. Leaves scattered, elliptic, pale green, 15-20mm long, 4-5mm wide, flat; apex acute. Flowers in axillary and terminal spikes 10-15mm long, racemes dense; corolla white, lobes bearded, corolla tube longer than calyx; ovary 5- or 4-celled. Fruit globular.

Flowering period July-October

Occurrence A C



Fig.17 x1.5

Leucopogon propinquus R. Br. (Fig.18)

Shrub to 1m, rigid. Leaves broad-linear, rigid, convex, slightly twisted, 15-25mm long, 2-3mm wide; apex pungent. Flowers 2 to 5 in short axillary spikes, erect, 5-6mm long; corolla white, tube shorter than sepals, lobes woolly; ovary 5-celled. Fruit globular to shortly cylindrical.

Flowering period February-June

Occurrence A C

Leucopogon racemosus DC.

Shrub to 1m, rigid, sparsely branched. Leaves linear, narrow, near horizontal, margins revolute, 15-25mm long, c. 1mm wide; apex pungent. Flowers 2-5 in short axillary raceme, pendulous; corolla white, lobes bearded, corolla tube much longer than calyx; ovary 5-celled. Fruit globular.

Flowering period April-July

Occurrence A

Lysinema ciliatum R.Br.; curry flower

Shrub to 0.6m, young branches hairy. Leaves alternate, ovate, 4-7mm long, 1-2mm wide, erect, stem clasping, concave; apex obtuse. Flowers single, axillary, terminal, curry scented; corolla tube c. 15mm long enclosed by brown bracts and sepals with ciliate margins; corolla lobes 5, cream, star-like, 5-6 mm long, leathery, at right angles to corolla tube.

Flowering period July-December

Occurrence E

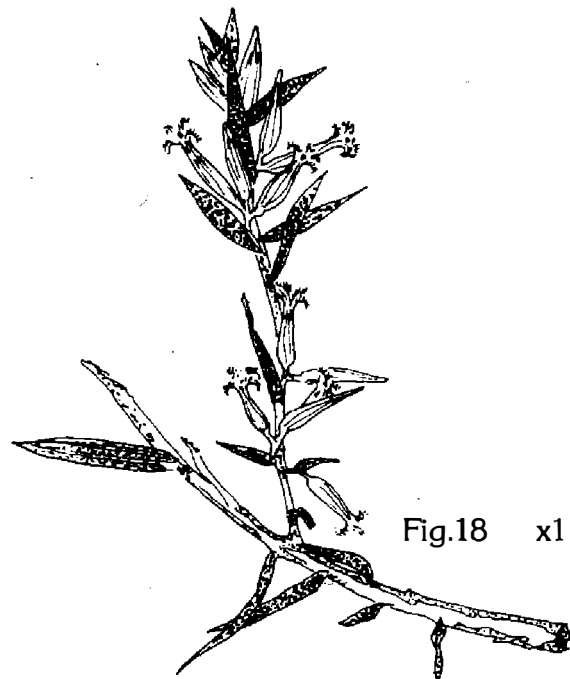


Fig.18 x1.2

PITTOSPORACEAE

The native frangipanni or pittosporum family is mainly Australian in origin. Seven out of the nine genera occur in Western Australia. These range in habit from small trees in arid areas of the State to low shrubs and woody climbers in the more moist southwest. Many have showy flowers, either white, yellow, red or blue, borne in compound inflorescences. The 5 petals may be united into a tube at the base. The ovary is superior and contains from 2 to 5 chambers. Fruits are either dry and dehiscent e.g. the capsules of *Pittosporum*, or succulent and indehiscent e.g. the berries of *Billardiera* and *Pronaya*. Leaves and stems have internal resin ducts.

A number of Australian species are widely cultivated including the weeping *Pittosporum*, the blue-flowered *Sollya* and the cream, blue, orange and red-flowered species of *Billardiera*. The fruits of some species are edible.

Pronaya fraseri (J.D. Hook.) E.M. Bennett

Twining shrub, young shoots silky hairy. *Leaves* lanceolate or linear-lanceolate, 2-4cm long, firm, margins recurved, entire; lower leaves often coarsely toothed or lobed. *Flowers* in dense terminal clusters among the last leaves; petals c. 1 cm long, pale blue, sometimes nearly white; ovary hairy. *Fruit* an oblong, cylindrical berry.

Flowering period January-April

Occurrence A

MIMOSACEAE

Members of this family are widely distributed throughout the tropics, subtropics and warm temperate regions. There are about fifty genera and over 2,000 species but over half of these belong to the genus *Acacia*. In Australia these are the familiar wattles which are popular garden plants and easily recognized because of their distinctive yellow flowers. Other genera in this family include *Albizia*, *Mimosa* and *Adenantha*.

The plants are perennial trees or shrubs (rarely herbs) having leaves which are bipinnate or reduced to phyllodes. Often they are stipulate and many species produce prickly spines on leaves, stems or branches. The flowers are produced in dense cylindrical spikes, racemes or globular heads. Individually the flowers are regular, usually bisexual with 4 or 5 small petals and sepals. The stamens number at least as many as the sepals but in *Acacia* they are very numerous and are the most conspicuous part of the open flower. A superior ovary which has numerous ovules produces a fruit called a legume which also characterizes two other families, Caesalpiniaceae and Fabaceae.

These plants are important contributors to the nitrogen cycle because symbiotic associations of *Rhizobium* bacteria in root nodules convert atmospheric nitrogen to organic nitrogen. This can be used for plant growth and can also indirectly increase soil nitrogen content.

Many *Acacia* species are considered weeds in some situations. *Acacia cyclops* and *Acacia saligna*, two Australian species introduced into South Africa to aid dune stabilization, are considered weeds in this area because they are rapidly dispersed and form dense stands which overshadow native plants. Their success is attributed to atmospheric nitrogen fixation and their ability to produce phytotoxic substances which inhibit other plants.

The abundance of acacias in particular areas is often determined by the fire history of that area. Many acacias, e.g. *A. pulchella*, have high germination after fires and seeds survive even hot burns because they are deep in the soil having been buried by ants.



Fig.19 x0.3

Species	Habit	Leaves	Prickly leaves or branches	Flower heads
<i>Acacia cyclops</i>	tall shrub 3-7m	phyllodinous	no	short raceme
<i>A. huegelii</i>	shrub to 0.5m	phyllodinous	yes	solitary, axillary
<i>A. pulchella</i>	shrub to 2m	bipinnate	yes	short raceme
<i>A. saligna</i>	small tree 2-6m	phyllodinous	no	axillary racemes
<i>A. stenoptera</i>	shrub	phyllodinous, decurrent	c.	axillary clusters
<i>A. willdenowiana</i>	shrub to 0.5m	phyllodinous, decurrent	no	clusters of one or two per node



Fig.20 x1

Fig.21 x1

Acacia cyclops Cunn. ex Don; coastal wattle (Fig.19)

Shrub or small tree 1-7m; bark smooth, grey. *Leaves* phyllodinous, narrow oblong or narrow obovate, straight or slightly curved, 3 to 5 distinct veins. *Flower heads* 2 to 3 in short raceme, globular; c. 40 flowers per head, yellow. *Pods* persistent on plant, compressed narrowly oblong, not constricted between seeds, often twisted. *Seeds* dark brown or black surrounded by bright red or orange funicle.

Flowering period September-January *Occurrence* A C E

Acacia huegelii Benth.; (Fig.20)

Shrub 0.3-1m, semi-prostrate, multi-stemmed. *Leaves* phyllodinous almost triangular, mid-rib prominent, pungent pointed. *Flower heads* solitary, axillary, globular; 20-35 flowers per head, white to cream. *Pods* compressed, linear, not constricted between seeds. *Seeds* black with pale aril.

Flowering period October-December and July-August *Occurrence* C

Acacia pulchella R.Br.; prickly moses (Fig.21)

Shrub 0.5-2m, erect; axillary spines 1 or 2 per node. *Leaves* bipinnate. *Flower heads* in condensed raceme, globular; 20-40 flowers per head, yellow. *Pod* brown, very compressed. *Seeds* greyish brown, longitudinal in pod.

Flowering period June-October *Occurrence* A B C E

Acacia saligna (Labill.) Wendl.; orange wattle (Fig.22)

Shrub or small tree 2-6m; bark smooth, dark grey. *Leaves* phyllodinous, very variable, linear to narrowly ovate but much larger at base of tree. *Flower heads* in axillary racemes, globular; 20-55 flowers per head, yellow. *Pod* light brown, compressed linear, slightly constricted between seeds. *Seeds* dark brown to black.

Flowering period August-September *Occurrence* A B C E

Acacia stenoptera Benth.; (Fig.23) (Plate 3)

Shrub 0.3-1m, sometimes spreading. *Leaves* phyllodinous, decurrent with thick prominent marginal veins, c. pungent. *Flower* heads in axillary clusters, globular; 6-10 flowers per head, cream to yellow. *Pods* light brown to black, tapered at each end, not constricted between seeds. *Seeds* black with pale prominent aril.

Flowering period May-September

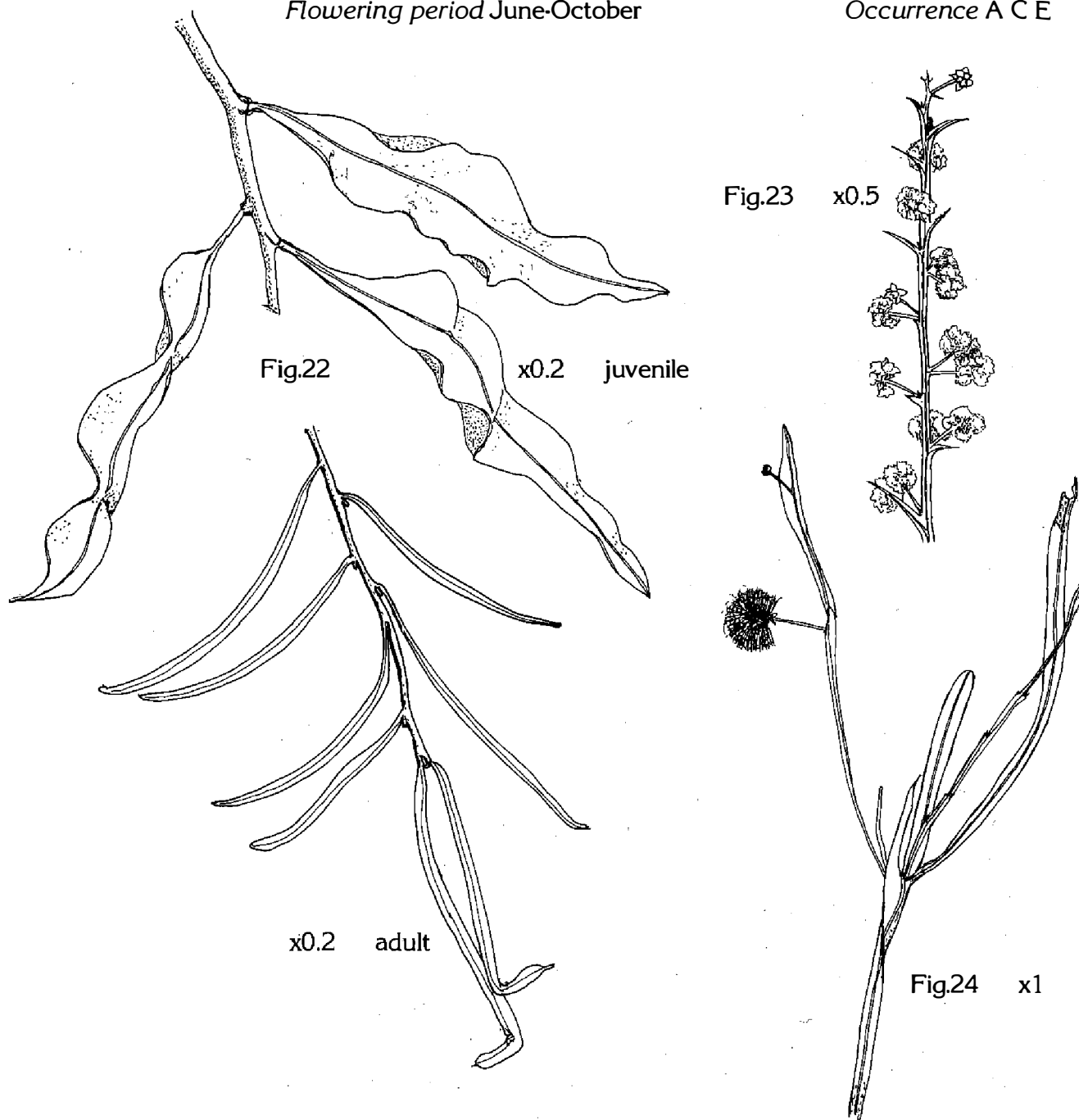
Occurrence A B C E

Acacia willdenowiana Wendl.; grass wattle (Fig.24)

Shrub to 0.5m, prostrate to erect. *Leaves* phyllodinous, decurrent forming 2 wings, apex of stem and wings rounded. *Flower* heads clustered 1 or 2 per node, globular, white to yellow. *Pod* brown, tapering towards base, not constricted between seeds. *Seeds* black, funicle pale.

Flowering period June-October

Occurrence A C E



FABACEAE

This cosmopolitan family of herbs, shrubs, climbers and trees has 12,000 species of which 1,100 are in Australia. About twenty-five genera are endemic to Australia, e.g. *Bossiaea*, *Daviesia*, *Pultenaea*, and many have their centre of diversity in southwestern Australia. The most prominent feature is the 'pea' flower composed of 5 petals: a large dorsal, often orbicular, standard; 2 lateral wings; and a ventral keel of 2 partly fused petals. Leaves may be entire, divided or reduced to minute scales e.g. *Jacksonia*. The 10 stamens are free or fused into a sheath. The ovary is superior and contains one chamber. The fruit is a pod or legume which becomes dry and usually dehisces to release the seeds. In many species the seeds have hard seed coats which require fire to stimulate germination. Some workers classify the peas, together with the acacias and cassias into a larger family, the Leguminosae, because they share the same fruit type. Flowers of *Comesperma* (Polygalaceae) superficially resemble pea flowers.

The family is important economically for food, fodder, medicines, timber, oils, gums and resins and, as in the Mimosaceae, pea-plants also fix atmospheric nitrogen. In Western Australia several genera e.g. *Gastrolobium*, *Oxylobium*, have members containing fluoroacetate (1080 rabbit poison) which are toxic to introduced grazing animals. Some forms of lamb poison, *Isotropis cuneifolia*, are toxic to sheep but the toxic principle is unknown. The variety on the Murdoch campus is thought to be non-toxic.

The Fabaceae occur in all habitats on campus. In areas cleared for pines several species of *Daviesia*, *Oxylobium capitatum* (bacon-and-eggs) and *Hardenbergia comptoniana* (native wisteria) are prominent. Other species, e.g. *Aotus cordifolia* and *Euchilopsis linearis*, are confined to sites which are moist in summer.

Viminaria juncea (swish bush) is another swamp species. This plant is unusual because it has three types of specialized roots: pneumatophores which enable gaseous exchange to occur with roots which are flooded in winter, nodules which fix nitrogen, and proteoid-roots (see Proteaceae). Further, true leaves only occur in young plants and the petioles become elongated and take over

the photosynthetic function usually performed by the leaf blade. Similar structures, phyllodes, also occur in *Daviesia*. *Daviesia* and *Jacksonia* flower buds are food sources for a number of small lycaenid butterflies e.g. *Neolucia agricola occidens*, *Lampides boeticus*. The eggs are laid on young buds and the caterpillar feeds inside the bud and pupates before the flower is mature.

Twenty-five native species of peas occur on campus. In the tables that follow they are first broken into groups by flower colour and the twenty species with yellow-orange flowers are further subdivided on leaf morphology.

FLOWERS WHITE

Cytisus proliferus

FLOWERS BLUE/PURPLE

Species	Habit	Leaf	Fruit
<i>Burtonia conferta</i>	shrub	narrow, small	globular
<i>Hardenbergia comptoniana</i>	climber	divided, large	elongated pod
<i>Hovea pungens</i>	shrub	narrow, pungent	globular

FLOWERS PREDOMINANTLY RED

Species	Habit	Leaf	Stamens
<i>Kennedia prostrata</i>	creeper	tri-foliolate	9 fused, 1 free
<i>Oxylobium lineare</i>	tall shrub	long, linear	all free

Note: see also *Aotus procumbens*, *Bossiaea eriocarpa*, *Isotropis cuneifolia*, *Sphaerolobium vimineum*

FLOWERS PREDOMINANTLY YELLOW TO ORANGE

Species	Leaf Morphology
<i>Aotus cordifolia</i>	Leaves in whorls of three, ovate to cordate (Fig.25 A)
<i>A. gracillima</i>	Leaves alternate, linear (Fig.25 B)
<i>A. procumbens</i>	Leaves alternate, linear (Fig.25 C)
<i>Bossiaea eriocarpa</i>	Leaves alternate, oblong (Fig.25 D)
<i>Daviesia decurrens</i>	Leaves absent, phyllodes flattened vertically (Fig.25 E)
<i>D. divaricata</i>	Leaves and phyllodes absent, branches smooth (Fig.25 F)
<i>D. nudiflora</i>	Leaves absent, phyllodes elliptic, blue-green, pungent (Fig.25 G)
<i>D. physodes</i>	Leaves absent, phyllodes flattened vertically (Fig.25 H)
<i>D. triflora</i>	Leaves and phyllodes absent, branches smooth (Fig.25 I)
<i>Euchilopsis linearis</i>	Leaves alternate, scattered, linear (Fig.25 J)
<i>Eutaxia virgata</i>	Leaves opposite, narrowly linear (Fig.25 K)

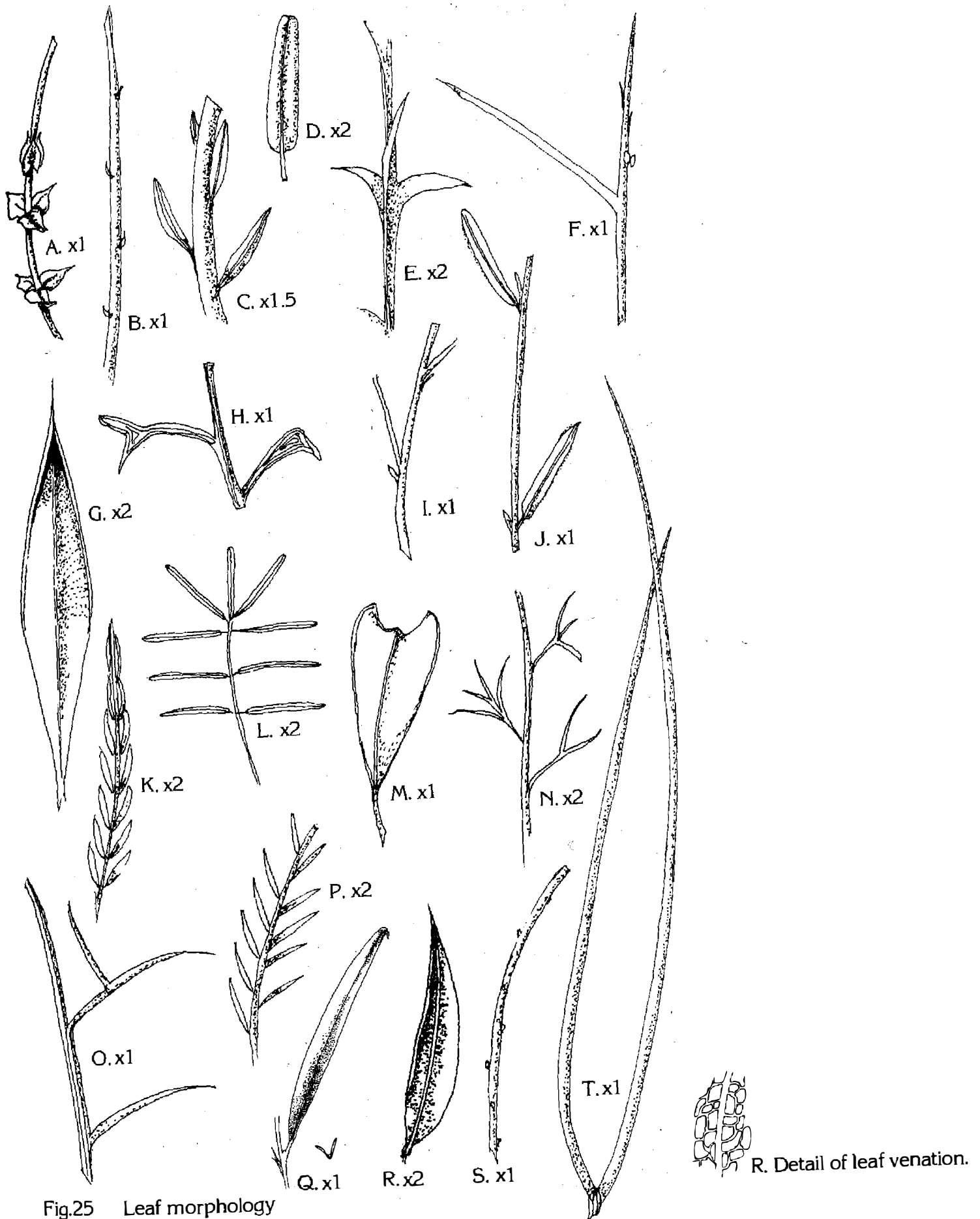


Fig.25 Leaf morphology

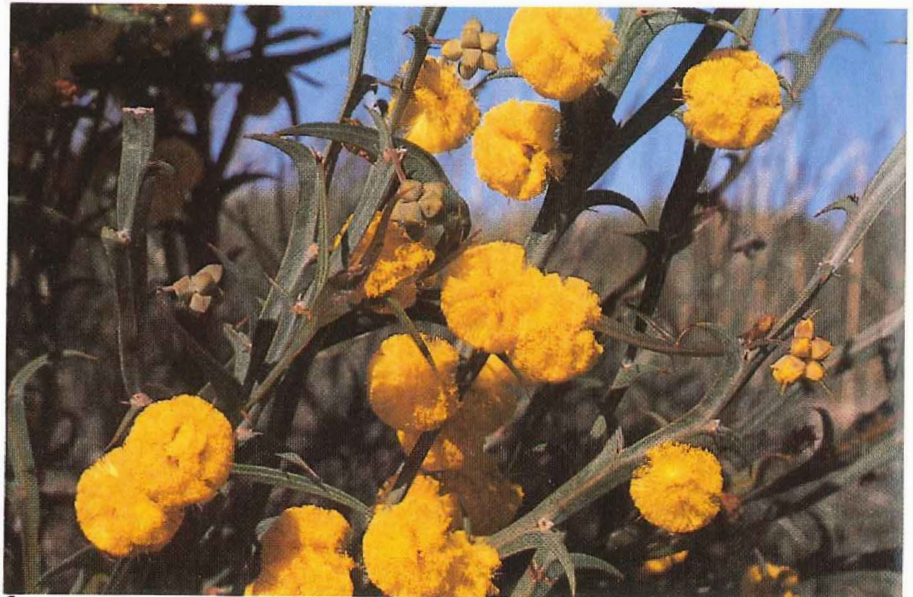
1. *Drosera menziesii*
2. *Conostephium pendulum*
3. *Acacia stenoptera*



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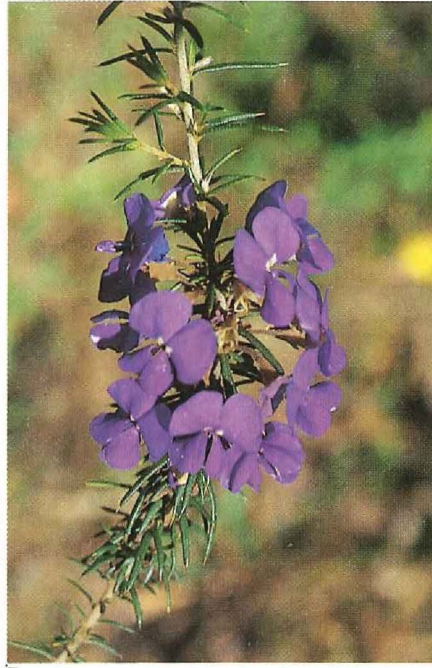
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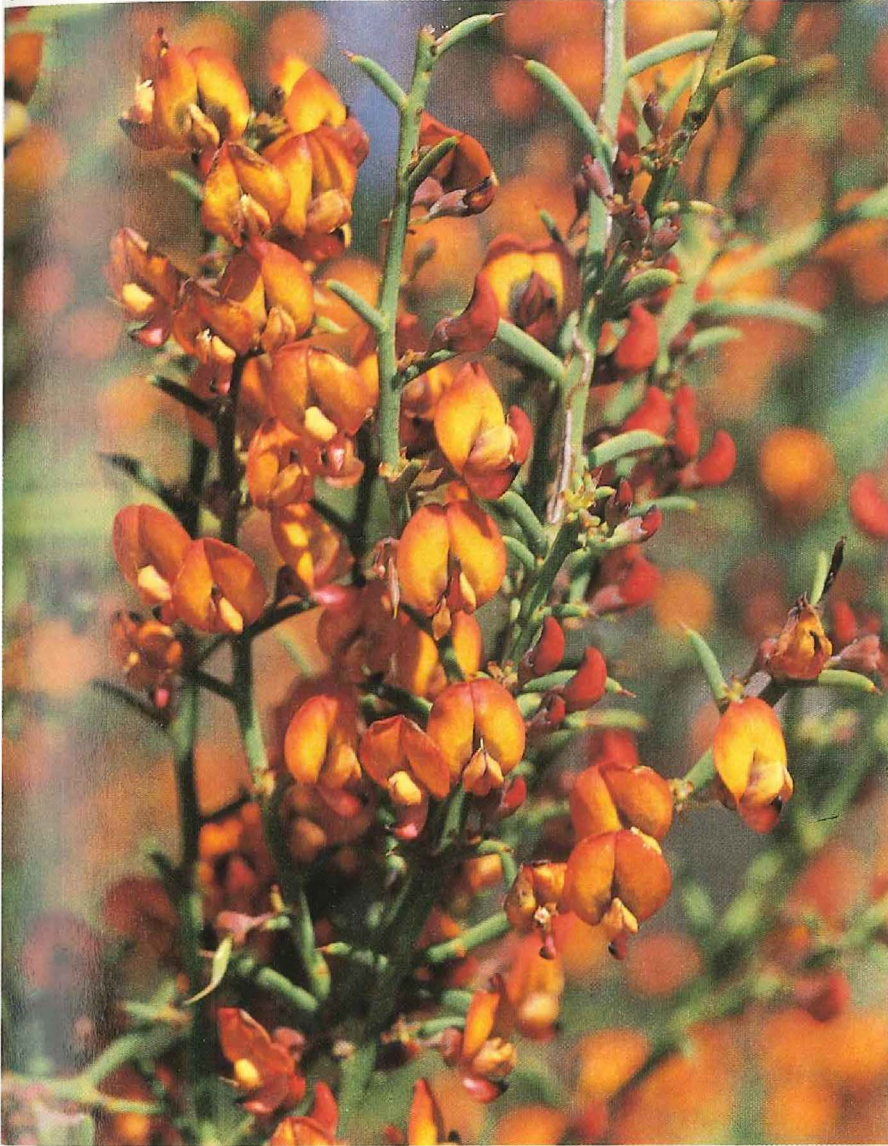
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4



5



6

- 4. *Aotus procumbens*
- 5. *Hovea pungens*
- 6. *Daviesia physodes*

Flowers predominantly Yellow to Orange, *continued*

Species	Leaf Morphology
<i>Gompholobium tomentosum</i>	Leaves alternate, divided into 5-9 linear leaflets (Fig.25 L)
<i>Isotropis cuneifolia</i>	Leaves alternate, linear to cuneate, apex two-lobed (Fig.25 M)
<i>Jacksonia furcellata</i>	Leaves reduced to minute scales, branchlets terete, divided (Fig.25 N)
<i>J. sternbergiana</i>	Leaves reduced to minute scales, branches angular (Fig.25 O)
<i>Latrobea tenella</i>	Leaves alternate, narrow-linear (Fig.25 P)
<i>Oxylobium capitatum</i>	Leaves opposite (or alternate), narrow, lanceolate (Fig.25 Q)
<i>Pultenaea reticulata</i>	Leaves alternate, lanceolate (Fig.25 R)
<i>Sphaerolobium vimineum</i>	Leaves alternate, old branches leafless, terete (Fig.25 S)
<i>Viminaria juncea</i>	Leaves mostly reduced to long terete phyllodes (Fig.25 T)

Aotus cordifolia Benth.; (Fig.26)

Shrub to 1.5m, sparsely hairy. *Leaves* in whorls of 3, petioles short, ovate, cordate at base, margin dentate, 5-10mm long, 4-7mm wide, apex acute. *Flowers* 2 to 5 in axillary clusters, bracts small; calyx slightly hairy, lobes acute, upper 2 lobes fused for more than half their length; corolla mostly yellow; anthers free; ovary stipitate, hairy. *Fruit* compressed, round.

Flowering period August-January

Occurrence D

Aotus gracillima Meissner

Shrub to 1m. *Leaves* alternate, scattered towards the base, petiole short, linear, 5-10mm long, c. 0.5mm wide, margins revolute; apex recurved. *Flowers* in terminal axillary clusters, bracteate; calyx with few hairs, shortly tubular at base, 2-lipped, upper lip of 2 lobes fused for more than half their length; corolla yellow with some red; anthers free; ovary sessile, densely hairy. *Fruit* obovoid, hairy.

Flowering period October-November

Occurrence B

Aotus procumbens Meissner; (Plate 4)

Shrub to 0.5m, branches hairy. *Leaves* alternate, scattered towards the base, shortly petiolate, linear, margins revolute, 10-15mm long, 1-1.5mm wide; apex blunt. *Flowers* 1-3 in axillary clusters, bracts and bracteoles hairy; calyx densely hairy, grey, tubular at the base, 2-lipped, upper lip of 2 lobes fused for more than half their length; corolla yellow and red; anthers free; ovary stipitate, densely hairy.

Flowering period August-September

Occurrence B C E



Fig.26 x2

Bossiaea eriocarpa Benth.; (Fig.27)

Shrub to 0.5m, sparsely hairy. *Stipules* prominent, narrow, 4-5mm long. *Leaves* alternate, shortly petiolate, oblong, margins recurved and sometimes undulate, 10-20mm long, 1.5-5mm wide; apex obtuse, mucronate. *Flowers* solitary, axillary, pedicel 8-10mm, bracts and bracteoles present; calyx tubular at base, 2-lipped, upper lip of 2 broad lobes fused to above the middle; corolla brown and yellow; filaments fused into sheath open on one side; ovary stipitate, hairy. *Fruit* flat, oblong.

Flowering period July-October

Occurrence A B C E

Burtonia conferta DC.

Shrub to 1 m. *Leaves* crowded, petiolate, linear, 10-20 mm long, c. 0.5mm wide, margins revolute. *Flowers* in short axillary racemes, pedicels c. 20mm long, bracts and bracteoles small; calyx 5-lobed, glabrous; corolla blue to purple; stamens free; ovary stipitate, glabrous. *Fruit* globular, with 2 seeds.

Flowering period September-December

Occurrence A B

Cytisus proliferus L.; tree lucerne, tagasaste

Shrub or small tree to 4m with pendulous hairy branches. *Leaves* alternate, petiolate, trifoliate; leaflets elliptical, 15-30mm long, 5-10mm wide, hairy below. *Flowers* in terminal umbels, pedicellate, bracteate, bracteolate; calyx 2-lipped, 2 upper lobes fused over half their length, lower lip 3-lobed; corolla cream to white; filaments fused into a closed tube; ovary sessile, hairy. *Fruit* flat, oblong. *Introduced* native of the Canary Islands.

Flowering period June-September

Occurrence E

Daviesia decurrens Meissner

Shrub to 0.5m, much branched, branchlets 3-angled with decurrent phyllode (leaf) bases. *Phyllodes* vertically flattened, awl-shaped, 20-30mm long, 4-6mm wide; apex recurved, pungent. *Flowers* in short axillary racemes, bracteate, pedicels short; corolla orange and red; stamens free, ovary glabrous. *Fruit* a triangular compressed pod with 2 seeds.

Flowering period June-August

Occurrence A E

Daviesia divaricata Benth.

Shrub to 1.5m, branches terete, divaricate, spiny, ribbed. *Phyllodes* absent. *Flowers* in short axillary racemes, pedicels 3-5mm long; corolla orange and red; stamens free; ovary glabrous. *Fruit* a triangular compressed pod with 2 seeds.

Flowering period July-November

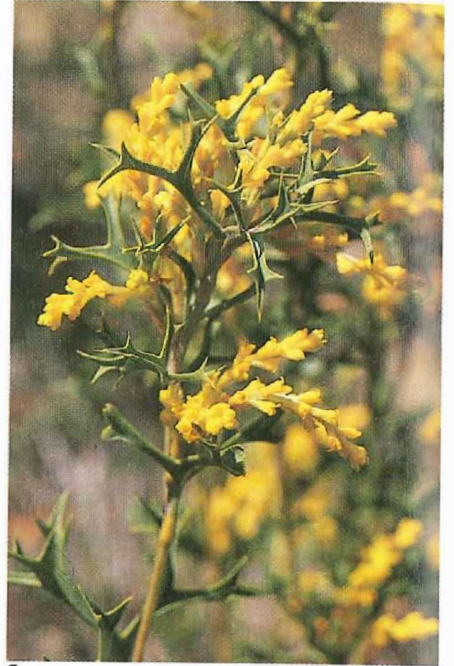
Occurrence A C E



- 7. *Banksia ilicifolia*
- 8. *Synphaea spinulosa*
- 9. *Petrophile linearis*
- 10. *Petrophile macrostachya*
- 11. *Persoonia saccata*



7



8



9



10



11



12

- 12. *Pimelea sulphurea*
- 13. *Nuytsia floribunda*
- 14. *Stylidium schoenoides*



13



14

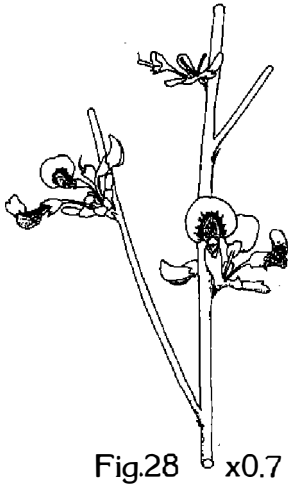


Fig.28 x0.7

Daviesia nudiflora Meissner

Shrub to 1m with angular, ribbed branches. *Phyllodes* ascending, elliptic, blue-green, leathery, veins prominent, 30-40mm long, 6-15mm wide; apex tapered, pungent. *Flowers* axillary, sticky at the base, flowering nodes often leafless; pedicels 4-5mm long; corolla yellowish, orange and red; stamens free; ovary glabrous. *Fruit* a triangular compressed pod with 2 seeds.

Flowering period July-August

Occurrence A C E

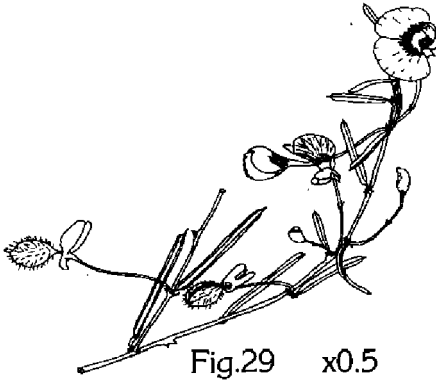


Fig.29 x0.5

Daviesia physodes Cunn. ex Don; (Plate 6)

Shrub to 1.5m with terete branches. *Phyllodes* dimorphic, vertically flattened, pungent, 15-30mm long; lower phyllodes with 2-lobed apex; upper phyllodes entire. *Flowers* in short axillary racemes, pedicels short; corolla yellow and red; stamens free; ovary glabrous. *Fruit* triangular, swollen, with 2 seeds.

Flowering period July-October

Occurrence A B C E

Daviesia triflora Crisp; (Fig.28)

Shrub to 0.5m with smooth, terete branches. *Phyllodes* absent. *Flowers* in short axillary racemes, bracts prominent, pedicels longer than the calyx; corolla yellow and red; stamens free; ovary glabrous. *Fruit* triangular, slightly swollen, with 2 seeds.

Flowering period June-August

Occurrence C E



Fig.30 x0.5

Euchilopsis linearis (Benth.) F. Muell.; (Fig.29)

Shrub semi-prostrate to 0.5m, multi-stemmed. *Leaves* linear, scattered, 8-30mm long, 0.5-2mm wide, margins revolute; apex shortly pointed. *Flowers* axillary, pedicels 10-20mm long with minute bracts and bracteoles; calyx shortly tubular, 2-lipped, upper 2 lobes large, orbicular, 4mm long, lower lobes small; corolla orange to red; stamens free; ovary stipitate, hairy. *Fruit* ovoid, with 2 seeds.

Flowering period June-January

Occurrence B C

Eutaxia virgata Benth.; (Fig.30)

Shrub to 1m, slender. *Leaves* opposite, narrow, 5-10mm long, c. 1mm wide. *Flowers* axillary, solitary, pedicels 4-5mm long with 2 prominent bracteoles; calyx tubular at base, 2-lipped, 2 upper lobes fused more than half their length; corolla yellow to orange; stamens free; ovary slightly hairy, nearly sessile. *Fruit* flattened, with 2 seeds.

Flowering period August-November

Occurrence B

Gompholobium tomentosum Labill.

Shrub to 0.8m, branches hairy. *Stipules* bristle-like, 2-3mm long. *Leaves* alternate, divided into 5-9 leaflets, leaflets linear to terete, c. 10mm long, margins revolute. *Flowers* terminal, pedicels short with bristle-like bracts and bracteoles; calyx deeply divided, hairy; corolla yellow; stamens free; ovary shortly stipitate, glabrous. *Fruit* globular, with 4 or more seeds.

Flowering period August-December

Occurrence A B C E

Hardenbergia comptoniana (Andrews) Benth.; native wisteria (Fig.31)

Climber. *Stipules* ovate, 4-5mm long. *Leaves* divided into 3 to 5 leaflets with small stipellae at the base; leaflets ovate 40-80mm long, 10-30mm wide. *Flowers* in large pendulous racemes, pedicellate; corolla blue to purple; 9 filaments fused, 1 free; ovary sessile, glabrous. *Fruit* a swollen, elongated pod with 4 or more seeds.

Flowering period June-September

Occurrence A B C E

Hovea pungens Benth.; devils pins (Plate 5)

Shrub to 1m, pungent, stems hairy. *Stipules* spiny. *Leaves* alternate, sessile, linear, reticulate, margins revolute, 10-25mm long, c. 2mm wide; apex pungent. *Flowers* in axillary clusters, bracteolate; grey, hairy; calyx 2-lipped, upper lip with 2 fused lobes; corolla blue to purple; filaments all fused, sheath open on upper side; ovary glabrous; *Fruit* ellipsoid, with 2 seeds.

Flowering period August-November

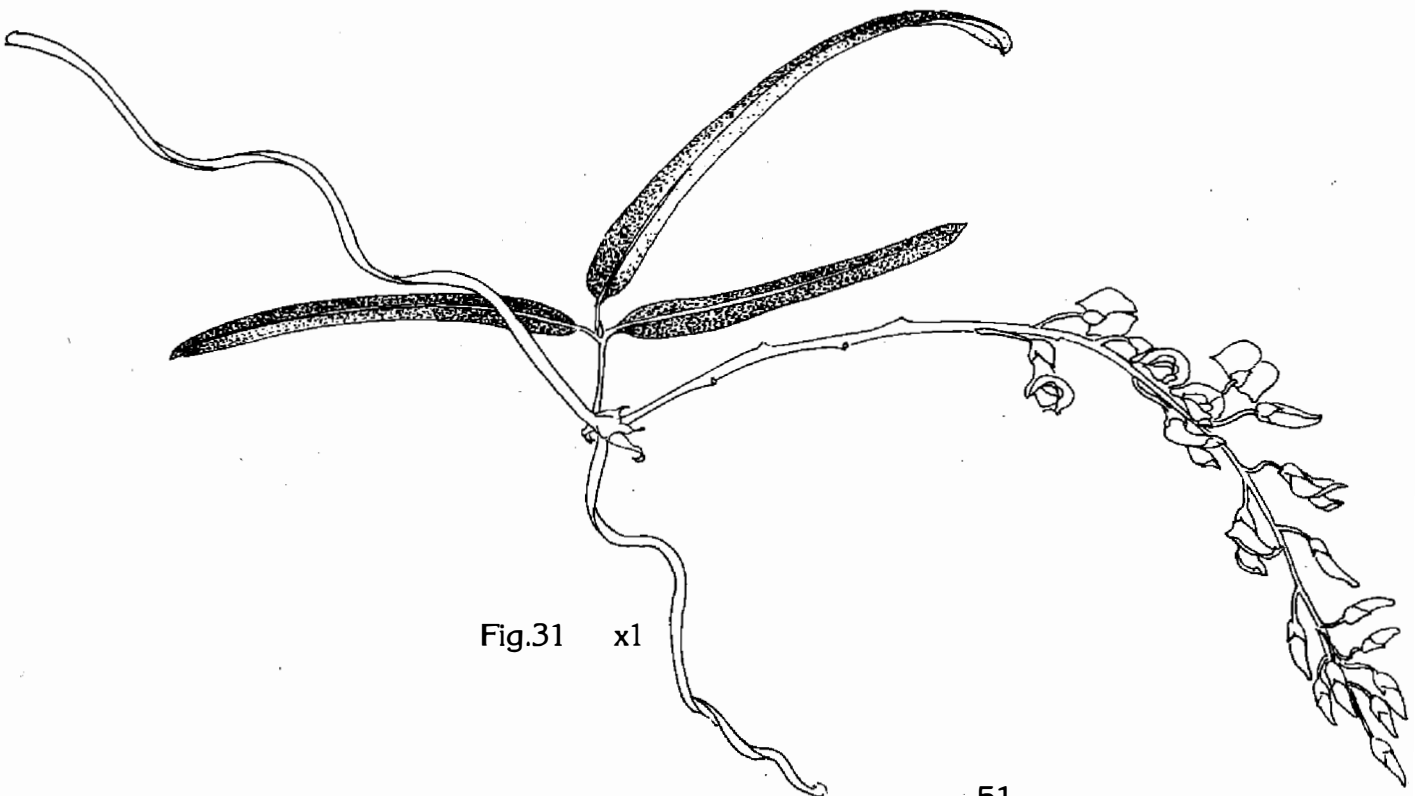
Occurrence A B C

Hovea trisperma Benth.; common hovea

Shrub to 0.4m, stipulate. *Leaves* linear or lanceolate, 30-70mm long, 5-15mm wide. *Flowers* axillary; calyx hairy; corolla blue.

Flowering period May-July

Occurrence A B C



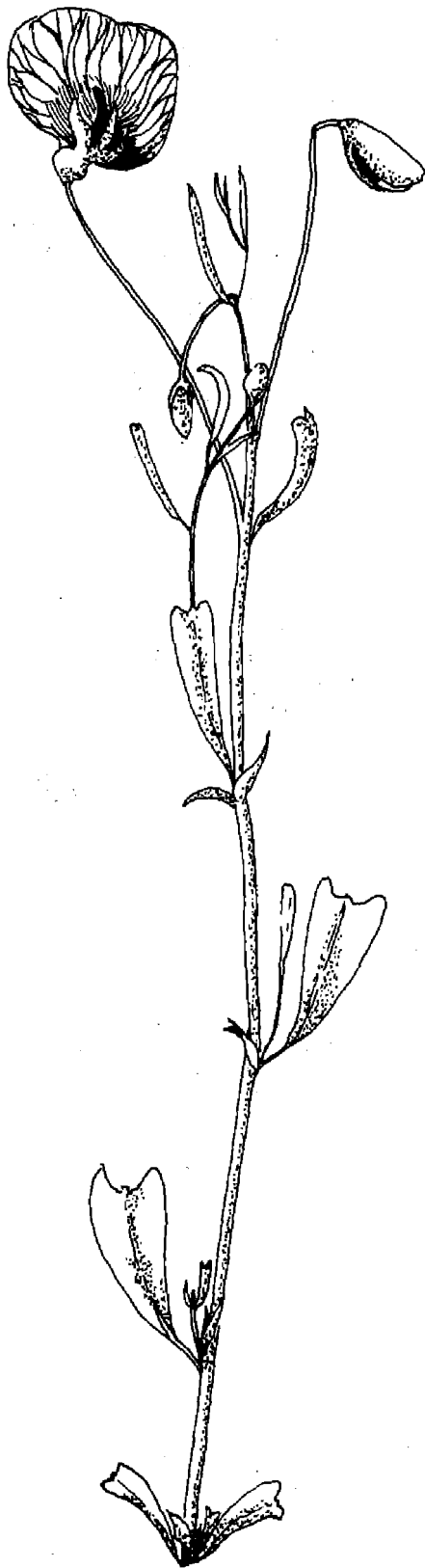


Fig.32 xl

Isotropis cuneifolia (Smith) Benth. ex B.D. Jackson; granny bonnets, lamb poison (Fig.32)

Shrub or perennial herb to 0.3m, with long hairs. *Stipules* herbaceous, 8-10mm long. *Leaves* alternate, variable in shape from linear to cuneate, 10-40mm long, 5-15mm wide; apex 2-lobed. *Flowers* solitary in terminal axils, pedicels 40-60mm long, bracteolate; calyx hairy, 2-lipped, the tube shorter than the lobes; corolla yellow and red, standard reverse with red striations; stamens free; ovary sessile, hairy. *Fruit* a flattened pod.

Flowering period August-December

Occurrence A C

Jacksonia furcellata (Bonpl.) DC.

Shrub to 3m, branches grey-green, terete, striate, hairy, pungent. *Leaves* reduced to minute scales. *Flowers* in terminal racemes, shortly pedicellate; calyx deeply divided, lobes reflexed, hairy; corolla yellow and orange; stamens free; ovary stipitate, hairy. *Fruit* ovoid, dehiscent at apex.

Flowering period August-March

Occurrence A B C D E

Jacksonia sternbergiana Huegel; (Fig.33)

Shrub to 4m with pendulous, angular branches. *Leaves* absent. *Flowers* scattered or in a loose raceme, pedicellate, glabrous; calyx deeply divided, lobes much longer than the tube, lobes reflexed; corolla yellow to orange; stamens free; ovary stipitate, slightly hairy. *Fruit* oblong, dehiscent at apex.

Flowering period throughout the year

Occurrence A C E

Kennedia prostrata R.Br.; running postman, scarlet runner

Prostrate twining shrub. *Stipules* leaf-like, cordate. *Leaves* trifoliate, stipellate, leaflets nearly circular, 15-40mm across, hairy below, margins undulate. *Flowers* in axillary pairs, pedunculate, bracteate; calyx 2-lipped, upper lip shortly 2-lobed, lower lip deeply 3-lobed, lobes acute; corolla red with 2 yellow eyes; 9 filaments fused, 1 free; ovary glabrous. *Fruit* cylindrical, with 2 seeds.

Flowering period July-November

Occurrence A B C E

Latrobea tenella (Meissner) Benth.

Shrub to 0.5m, diffuse. *Leaves* alternate, narrow, linear, 3-8mm long, c. 0.5mm wide, apex acute. *Flowers* in terminal inflorescence, pedicels 3-4mm long, bracteate, bracteolate; calyx glabrous, of 5 equal lobes; corolla yellow; stamens free; ovary stipitate, hairy. *Fruit* compressed, ovate, with 2 seeds.

Flowering period November-February

Occurrence B

Oxylobium capitatum Benth.; bacon and eggs

Shrub to 0.5m, semi-prostrate to erect. *Leaves* opposite or alternate, linear to lanceolate, flat or concave, 20-40mm long, 3-6mm wide; apex with recurved mucron. *Flowers* in short axillary and terminal clusters, pedicellate, bracteate; calyx grey, hairy, 2-lipped and 5-lobed, lobes of upper lip fused to above the middle; corolla yellow with red and orange; stamens free; ovary shortly stipitate. *Fruit* ovoid.

Flowering period June-September

Occurrence A B C E

Oxylobium lineare (Benth.) Benth.; narrow-leaved oxylobium

Shrub to 3m with slender branches. *Leaves* scattered, linear to linear-lanceolate, 50-100mm long, 4-6mm wide, reticulate above; apex with short mucron. *Flowers* in loose terminal racemes, pedicellate, bracteate; calyx hairy, 2-lipped and 5-lobed, lobes of upper lip fused to above the middle; corolla red; stamens free; ovary stipitate. *Fruit* ovoid.

Flowering period September-January

Occurrence B D

Pultenaea reticulata (Smith) Benth.

Shrub to 2m. *Stipules* minute, dry. *Leaves* alternate, shortly petiolate, narrowly lanceolate, 5-15mm long, 3-5mm wide, reticulate, pungent. *Flowers* axillary, solitary, terminal, shortly pedicellate, bracts and bracteoles dry and brown; calyx hairy, 2-lipped, upper lip of 2 lobes fused to the middle, lobes pungent; corolla yellowish orange; stamens free; ovary sessile, densely hairy. *Fruit* ellipsoid, with 2 seeds.

Flowering period August-November

Occurrence A D E

Sphaerolobium vimineum Smith; leafless globe pea

Shrub to 0.6m, with slender rush-like, apparently leafless, terete, glabrous stems. *Leaves* mostly alternate, on juvenile branches, linear, 2-5mm long, c. 0.5mm wide. *Flowers* in pairs in loose terminal racemes, shortly pedicellate, bracteate, bracteolate; calyx glabrous, 2-lipped, upper lip truncate and of 2 fused lobes; corolla orange to red; stamens free; style with membranous wing towards apex. *Fruit* ellipsoid, with 1 or 2 seeds.

Flowering period October-November

Occurrence B D

Viminaria juncea (Schrader & Wendl.) Hoffogg.; swish bush

Shrub to 4m with pendulous, glabrous, rush-like branches. *Leaves* nearly all reduced to phyllodes, phyllodes terete, 150-300mm long. *Flowers* in terminal inflorescences, pedicellate, bracteate; calyx of 5 equal lobes; corolla predominantly yellow; stamens free; ovary sessile, glabrous. *Fruit* ovoid, with 2 seeds.

Flowering period October-December

Occurrence B D



Fig.33 x1

PROTEACEAE

The Proteaceae is a moderately sized family of about 1,500 species which are mainly confined to the southern hemisphere. The major areas of diversification are southwestern Australia, eastern Australia and southern Africa. It contains many familiar garden plants such as *Grevillea* and *Hakea* and includes the Murdoch University emblem *Banksia grandis*.

The plants are perennial trees or shrubs and often have leathery or hard foliage (xeromorphic) which can, particularly in the Australian species, be very prickly. The flowers have a perianth which is sepaloid (some authors believe they are petaloid) and often have 2 to 4 bracts at the base. There are 4 stamens in each flower, the filaments are fused to the perianth and the anthers are often cupped by the perianth lobes (e.g. *Grevillea*, *Hakea* and *Banksia*). The ovary is superior (sometimes stalked) and the style is long with a small stigma.

Many of these plants are pollinated by birds. While birds feed on the nectar at the base of the flower, pollen which has been shed onto the end of the style (pollen presenter) is transferred to the bird's crown. The bird then visits a flower with a receptive style and cross-fertilization occurs. The anthers are protandrous (i.e. they develop and shed pollen before the stigma is receptive) and so self-fertilization is prevented.

Another interesting feature of these plants is the presence of proteoid roots which form nutrient trapping mats beneath the soil organic layer. These occur in most members of the Proteaceae except for native plums (*Persoonia*).

Proteaceous plants are very important in the cut-flower industry in Western Australia. Most flowers are collected from wild populations (over three million stems from seven genera in 1980/81) but progressively more are being produced in commercial plantations for both local and export markets.

The trees that were most prominent on campus before it was cleared for pine production belong to this family, in particular *Banksia attenuata* and *B. menziesii*. Remnants of the type of woodland which forms with these trees still remain at the southern boundary of the Murdoch campus, now interrupted by Farrington Road.

Species	Habit	Leaves prickly	Flower colour
<i>Adenanthos cygnorum</i>	shrub to 4m	no	green to white
<i>Banksia attenuata</i>	tree to 10m	c.	bright yellow
<i>B. grandis</i>	tree to 10m	c.	pale yellow
<i>B. ilicifolia</i>	tree to 10m	yes	cream to deep pink-red
<i>B. littoralis</i>	tree to 12m	c.	yellow
<i>B. menziesii</i>	tree to 10m	c.	pink-red and orange-yellow
<i>Dryandra sessilis</i>	shrub to 4m	yes	pale yellow
<i>Hakea prostrata</i>	shrub to 6m	yes	white to pale yellow
<i>Persoonia saccata</i>	shrub to 1.5m	no	yellow
<i>Petrophile linearis</i>	shrub to 0.7m	no	pink or mauve
<i>P. macrostachya</i>	shrub to 1m	yes	yellow
<i>Stirlingia latifolia</i>	shrub to 1.5m	no	red-brown or yellowish
<i>Synaphaea spinulosa</i>	shrub to 0.6m	yes	yellow
<i>Xylomelum occidentale</i>	tree to 8m	yes	creamy white

Adenanthos cygnorum Diels; woolly bush (Fig.34)

Shrub to 4m, hairy, grey-green. Leaves petiolate; blade 3-branched, each branch terete, hairy. Flowers solitary on end of branchlets; calyx greenish to white, hairy inside, bearded behind each anther.

Flowering period September-February Occurrence A B C E

Banksia attenuata R.Br.; slender banksia (Fig.35)
(Frontispiece)

Tree to 10m; bark thick, rough, red-brown underneath. Leaves broadly linear 40-270 x 5-16mm, truncate, serrate except at base, prickly toothed. Flowers in cylindric cone; calyx bright yellow when mature, green when young; style bright yellow. Fruiting cone quite persistent.

Flowering period September-February Occurrence A B C E

Banksia grandis Willd.; bull banksia (Fig.36)

Tree to 10m; bark thick, rough. Leaves broadly linear 100-450 x 30-110mm, divided to mid-rib forming triangular lobes, prickly toothed. Flowers in cylindric cone 100-400mm long; calyx pale yellow; style cream. Fruiting cone with numerous follicles, early deciduous.

Flowering period September-December Occurrence A

Banksia ilicifolia R.Br.; (Fig.37) (Plate 7)

Tree to 10m; bark grey, thick fibrous. Leaves 30-90mm long; blade obovate to elliptic, teeth distinct almost triangular, pungent; petiole short. Flowers in ovoid-globular heads; calyx initially pink near base and cream above, becoming completely pink or dull red. Fruiting cone small with only 1-3 follicles.

Flowering period all year round, peak in summer Occurrence A

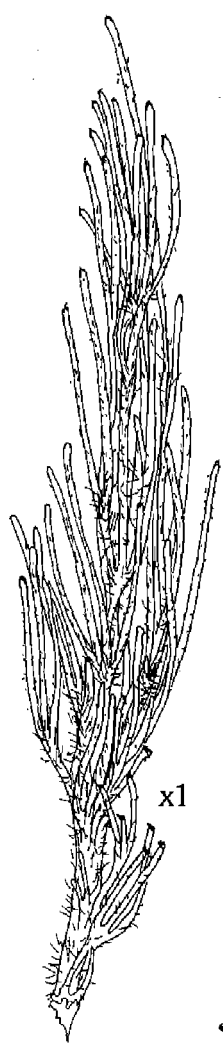
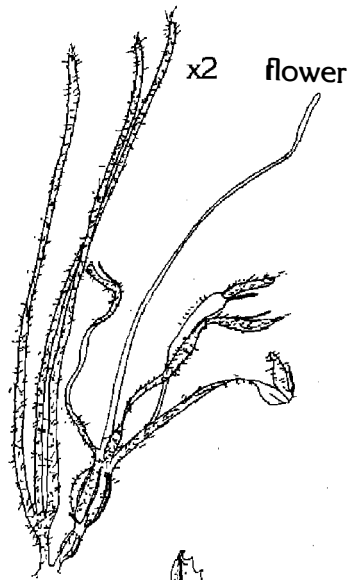


Fig.34



x2 flower

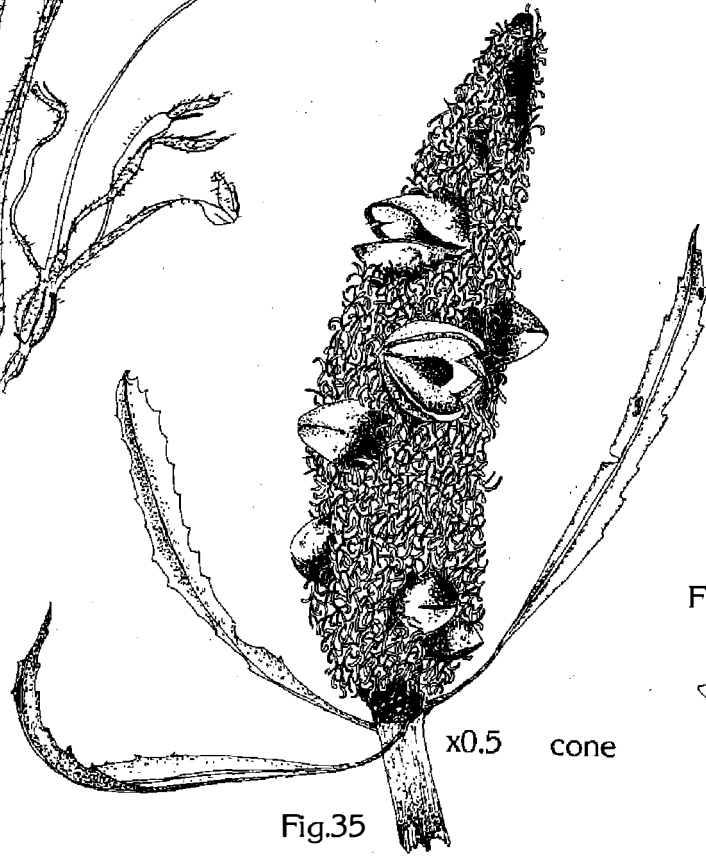


Fig.35

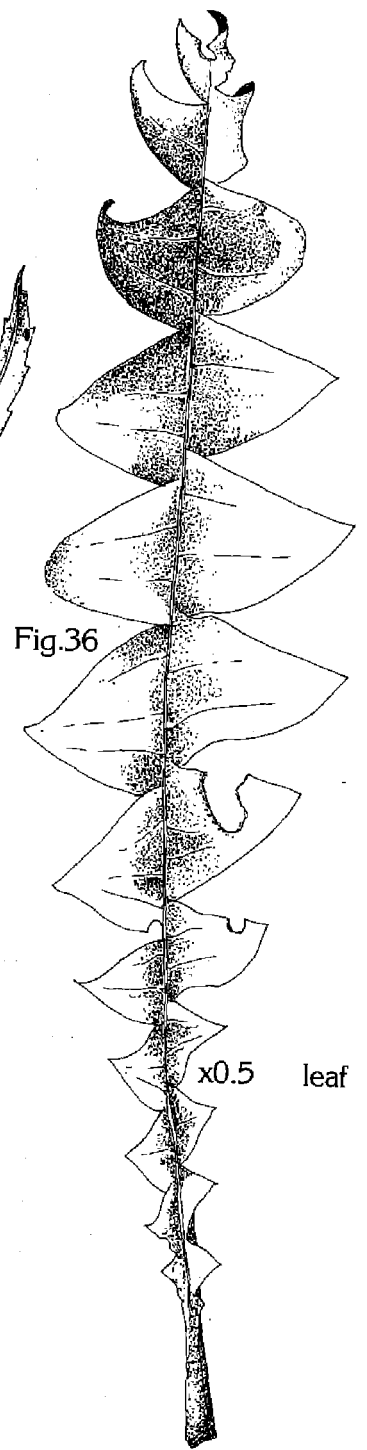


Fig.36

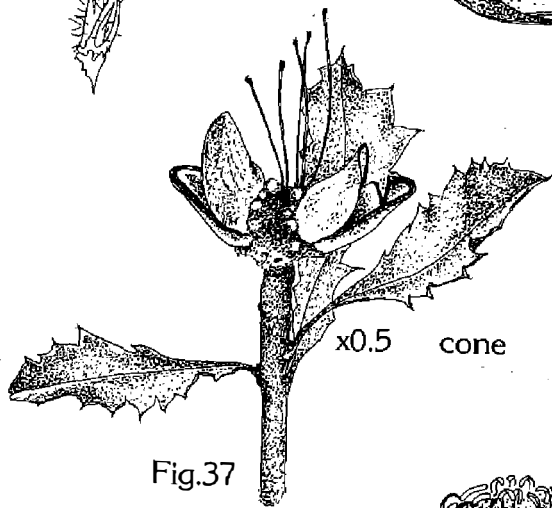
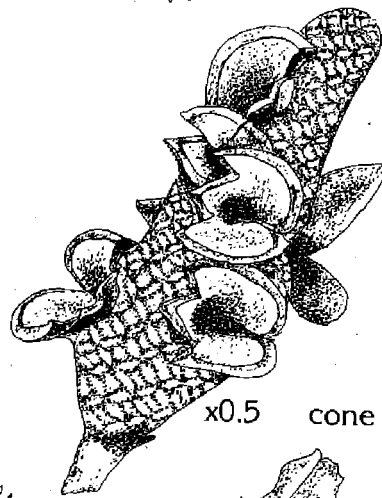


Fig.37



x0.5 cone

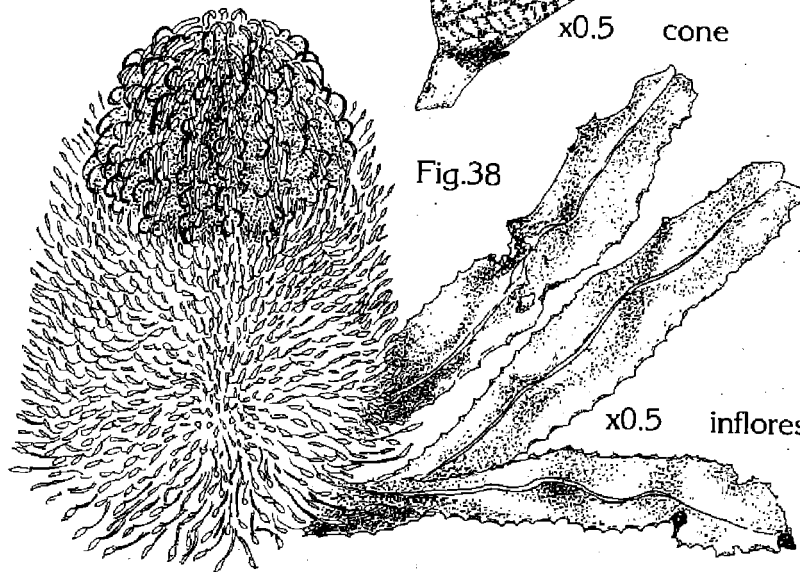


Fig.38

x0.5 inflorescence

Banksia littoralis R.Br.; swamp banksia

Tree to 12m; bark warty, rather friable. *Leaves* broadly linear 100-230 x 4-10mm, serrate mainly towards apex, prickly toothed. *Flowers* in cylindrical cone 70-200mm long; calyx yellow; style cream and yellow. *Flowering period* March-July *Occurrence* B D

Banksia menziesii R.Br.; firewood banksia (Fig.38)

Tree to 10m; bark greyish pink or brown, rough. *Leaves* broadly linear 80-250 x 10-40mm, serrate throughout, prickly toothed. *Flowers* in ovoid cylindrical cone, 40-120mm long; calyx variable, usually pink or red often with silvery appearance; styles yellow-orange; flower cones with two tone appearance. *Fruiting cone* with prominent spiral pattern; follicles numerous. *Flowering period* February-August *Occurrence* A C

Dryandra sessilis (R.Br.) Druce; parrot bush

Tree to 4m, may have several stems. *Leaves* c. sessile, not divided to midrib, prickly toothed, 3-4cm long. *Flowers* densely clustered into heads, not much longer than leaves; calyx pale yellow; styles prominent. *Flowering period* July-October *Occurrence* E

Hakea prostrata R.Br.; (Fig.39)

Shrub to small tree to 6m, sometimes quite prostrate; young stems ribbed. *Leaves* sessile, bases wrapping stem, prickly toothed. *Flowers* in axillary clusters; calyx white to pale yellow, prominent pink gland in centre of flower. *Flowering period* August-November *Occurrence* A B E

Persoonia saccata R.Br.; pouched persoonia (Plate 11)

Shrub to 0.2-1.5m, sometimes spreading. *Leaves* linear, terete to slightly flattened. *Flowers* in variable inflorescence of 1-90; calyx yellow, hairy outside. *Fruit* drupe. *Flowering period* July-January *Occurrence* A C E

Petrophile linearis R.Br.; pixie mops (Plate 9)

Shrub to 0.7m, grey-green. *Leaves* linear to narrowly obovate, thick, curved. *Flowers* in terminal or axillary spheric heads, surrounded by numerous bracts; calyx pink or mauve sometimes light grey, hairy; stigma colour varying with age, yellow to red. *Fruiting cone* ovoid. *Flowering period* September-November *Occurrence* A C E

Petrophile macrostachya R.Br.; (Plate 10)

Shrub to 1m, spreading. *Leaves* divided, primarily 3-branched each branch subdivided into 3 or more lobes, pungent. *Flowers* numerous in 60mm long cylindrical cone; calyx pale yellow, glabrous; stigma colour varying with age, yellow to red. *Fruiting cone* persistent after flowering, 60mm long. *Flowering period* August-November *Occurrence* A

Stirlingia latifolia (R.Br.) Steudel; blue-boy

Shrub to 1.5m, branching, leafy at base. *Leaves* with broad flat petioles; blade erect, flat with small apical point. *Flowers* in heads arranged in a panicle; peduncle much longer than leaves; calyx red-brown or yellowish.

Flowering period August-October

Occurrence A C E

Synaphaea spinulosa (Burm) Merr.; (Plate 8)

Shrub to 0.6m; stem erect, leafy. *Leaves* petiole longer in basal leaves; blades divided into 3 lobes which can be further divided, pungent. *Flowers* in axillary spike 10-50mm long, several from one node; calyx yellow.

Flowering period July-November

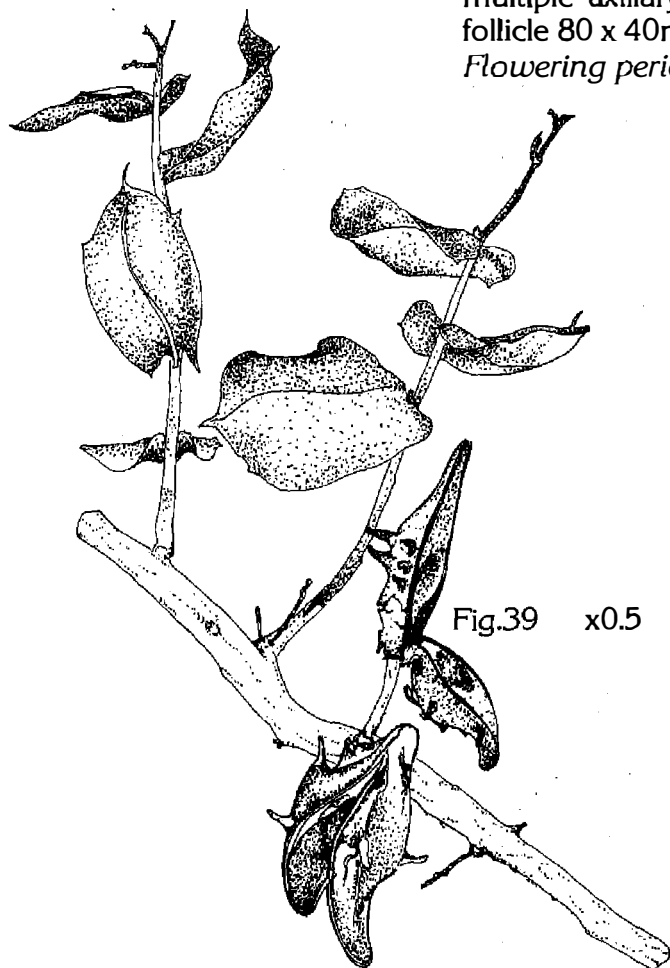
Occurrence A

Xylomelum occidentale R.Br.; woody pear (Fig.40)

Shrub or small tree to 8m; bark fibrous. *Leaves* petiolate; blade elliptic to obovate, undulate margins, usually prickly toothed. *Flowers* in multiple axillary spikes to 120mm long; calyx creamy white. *Fruit* follicle 80 x 40mm, pear shaped, woody, persistent.

Flowering period December-February

Occurrence E



THYMELAEACEAE

A small family of 500 species worldwide and nearly 100 in Australia; includes *Daphne* and *Pimelea* which are widely cultivated. *Pimelea* is the more common genus in Western Australia. It is readily recognised because the flowers, which have a tubular 4-lobed perianth, are in heads surrounded by petal-like bracts. In a few species the bracts enclose the flowers and the heads are bell-like e.g. *P. physodes*, the Qualup bell. Either the corolla or calyx is absent and stamens are reduced to 2 in *Pimelea*.

Three species of *Pimelea* occur on the Murdoch campus including *P. rosea* which is cultivated. They may be distinguished by flower colour: *P. angustifolia* white; *P. rosea* pink; *P. sulphurea* yellow.

Pimelea angustifolia R.Br.; narrow-leaved pimelea

Shrub to 0.75m, single-stemmed at base. *Leaves* opposite, linear, concave, 15-20mm long, 1.5-3mm wide. *Flowers* in terminal head, erect; 4 bracts surrounding head, ovate, green, much broader than stem leaves, glabrous outside, with scattered hairs inside; perianth tubular with 4 short lobes, with long hairs at base and short hairs higher up, white.

Flowering period October-November

Occurrence A

Pimelea rosea R.Br.; rose banjine

Shrub to 1m, single-stemmed at base. *Leaves* opposite, linear, 20-25mm long, 3-4 mm wide; apex acute, recurved. *Flowers* in terminal head, 30-35mm across, erect; 4 bracts surrounding head ovate, green except for white area near base, 15-18mm long, 8-10mm wide, ciliate on margins; perianth tubular with 4 short lobes with rigid spreading hairs in lower part and adpressed hairs in upper part, pink.

Flowering period August-November

Occurrence A B C E

Pimelea sulphurea Meissner; yellow-flowered pimelea (Plate 12)

Shrub to 0.5m, multi-stemmed at base. *Leaves* opposite, elliptic, 7-9mm long, 4-5mm wide, flat. *Flowers* in terminal head, c. 15mm across, pendulous; bracts 6, surrounding head, longer and narrower than leaves, glabrous; perianth tubular with 4 short lobes, shortly hairy, yellow.

Flowering period September-October

Occurrence A

MYRTACEAE

This is mainly a southern hemisphere family consisting of about 3,000 species in 147 genera. In Australia there are about 1,280 species in seventy-five genera and its members are important components of a wide range of vegetation types. In many, the dominant tree species are myrtaceous (e.g. the eucalypt forests and woodlands). Fifty-five genera are endemic to Australia and many of these (eighteen to twenty) are only found in Western Australia.

Morphologically the family is quite variable. All are woody plants but may range from small shrubs to the tallest flowering plants in the world, *Eucalyptus regnans*. The leaves and other structures usually have glands which contain aromatic oils. Leaves may be opposite or alternate and this may vary not only between species but with the age of an individual. In many cases juvenile foliage is very different from mature foliage, and this is particularly pronounced in the eucalypts. Flowers are mainly regular, but some (e.g. *Calothamnus*) are irregular, and the ovary is inferior. The fruits are dry and woody and often persistent on the plants as in *Melaleuca*, *Eremaea* and *Eucalyptus*.

Members of this group are the most economically important of the Australian native flora. Eucalypts are the most valuable as they provide timber and pulpwood in Australia, and overseas they are grown in large plantations for timber, oil, pulpwood and firewood production. Other uses of myrtaceous plants include cut-flower production, ornamental plants, oil and food. In Western Australia alone, over 3.5 million stems were cut from just seven species in 1980/81, making a considerable contribution to an expanding industry. Many plants grown in local gardens belong to this group; these include *Callistemon* (bottlebrushes), *Melaleuca* (paper barks), *Chamelaucium* (Geraldton wax), *Verticordia* (feather flowers) and many more.

There are sixteen genera represented on the Murdoch campus, many of which are endemic to the southwest of Western Australia (*Scholtzia*, *Astartea*, *Hypocalymma*, *Agonis*, *Beaufortia*, *Regelia*, *Eremaea*, *Chamelaucium*). Two species, *Chamelaucium uncinatum* and *Leptospermum laevigatum*, have been introduced and are now well established in parts of the old pine plantation.

SHRUBS UP TO 2 METRES

Species	Flower colour	Stamens longer than petals	Leaves
<i>Beaufortia elegans</i>	mauve to reddish-purple	yes	opposite
<i>Calytrix fraseri</i>	pink to pink-purple	no	alternate
<i>C. flavescens</i>	yellow	no	alternate
<i>Eremaea pauciflora</i>	orange	yes	alternate
<i>Hypocalymma angustifolium</i>	white, pink-red centre	no	opposite
<i>H. robustum</i>	deep pink	no	opposite
<i>Kunzea ericifolia</i>	greenish yellow	yes	alternate
<i>Melaleuca lateritia</i>	scarlet to crimson	yes	alternate
<i>M. seriata</i>	pink-purple	yes	alternate
<i>M. thymoides</i>	yellow	yes	alternate
<i>Pericalymma ellipticum</i>	white to pink, pink or red centre	no	alternate
<i>Regelia inops</i>	pink-mauve	yes	opposite
<i>Scholtzia involucrata</i>	white to pale pink	no	opposite

SHRUBS 2 TO 5 METRES

Species	Flower colour	Stamens longer than petals	Leaves
<i>Agonis linearifolia</i>	white	no	alternate
<i>Astartea fascicularis</i>	white to pink	no	opposite
<i>Chamelaucium uncinatum</i>	white to pink	no	opposite
<i>Kunzea ericifolia</i>	greenish yellow	yes	alternate
<i>Leptospermum laevigatum</i>	white	no	alternate
<i>Melaleuca teretifolia</i>	white, pale yellow or pink	yes	alternate
<i>Regelia inops</i>	pink-mauve	yes	opposite

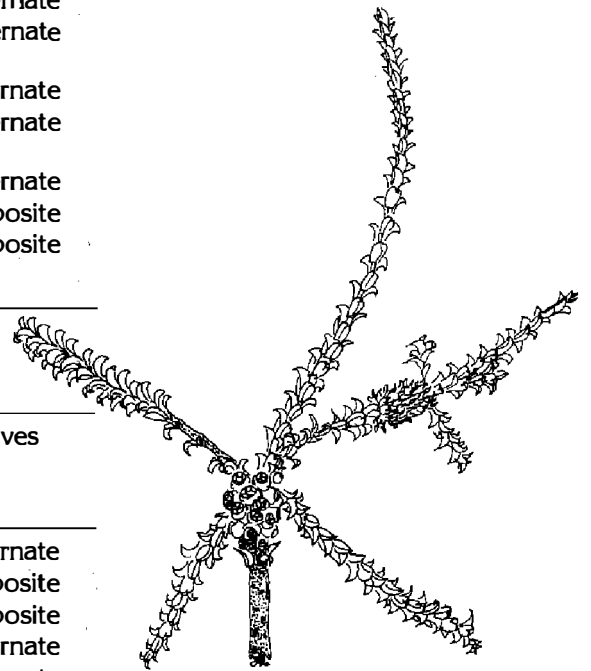


Fig.41 x0.5

TREES OVER 5 METRES

Species	Flower colour	Stamens longer than petals	Leaves
<i>Eucalyptus calophylla</i>	white to cream	petals absent in eucalypts	alternate
<i>E. gomphocephala</i>	white to yellow	petals absent in eucalypts	alternate
<i>E. marginata</i>	white to cream	petals absent in eucalypts	alternate
<i>E. rudis</i>	cream to pale yellow	petals absent in eucalypts	alternate
<i>Melaleuca preissiana</i>	white to yellow	yes	alternate
<i>M. raphiophylla</i>	white to cream	yes	alternate

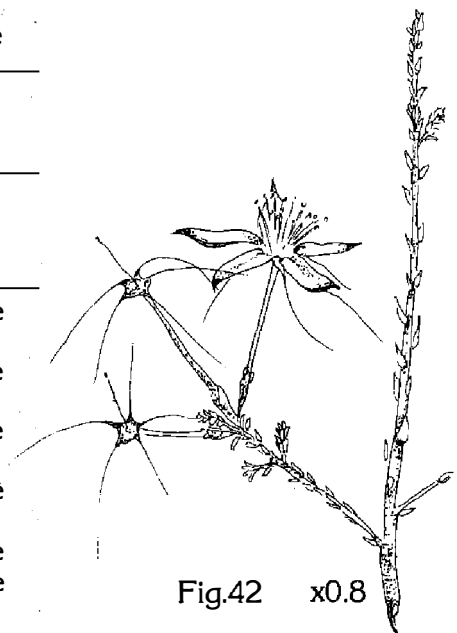


Fig.42 x0.8

Agonis linearifolia (DC.) Schauer

Shrub to 4m, young shoots softly hairy. Leaves alternate, entire, narrowly ovate to narrowly obovate. Flowers in globular heads on short branchlets; petals white.

Flowering period most of the year

Occurrence B D

Astartea fascicularis (Labill.) DC.

Shrub 1-2m. Leaves opposite, clustered on lateral branchlets, blades linear. Flowers solitary, axillary; petals white; sepals green.

Flowering period October-February

Occurrence B C

Beaufortia elegans Schauer; (Fig.41, Plate 18)

Shrub to 1m. Leaves opposite, ends curved. Flowers in terminal heads; stamens conspicuous, mauve to reddish purple; petals with hairy margins.

Flowering period October-January

Occurrence C

Calytrix flavescens Cunn.; summer starflower

Shrub to 0.3m; regenerates from underground stock. Leaves alternate, petiolate, entire. Flowers solitary, denser on branch ends; petals yellow; sepals yellow, narrow elongate lobes, often persistent after flowering.

Flowering period November-January

Occurrence A

Calytrix fraseri Cunn.; pink summer calytrix (Fig.42)

Shrub to 1.5m. Leaves alternate, short petioles, curved ends, 3-angled. Flowers solitary, diffuse; petals pink to pink-purple; sepals pink, narrow elongate lobes, often persistent after flowering.

Flowering period year round, mainly November-May

Occurrence AC

Chamelaucium uncinatum Schauer; Geraldton wax

Shrub to 3m. Leaves opposite, shortly petiolate, 3-angled. Flowers in a corymb; petals white to pink; sepals green, fused; pink nectary at centre. Introduced.

Flowering period August-November

Occurrence C E

Eremaea pauciflora (Endl.) Druce; (Fig.43, Plate 17)

Shrub to 1.5m, sometimes spreading; young shoots hairy. Leaves alternate, linear. Flowers solitary, terminal; stamens conspicuous, orange; petals orange.

Flowering period September-December

Occurrence A C

Eucalyptus calophylla Lindley; marri (Fig.44A)

Tree 15-40m; bark grey, flaky. Leaves juvenile, opposite, stiff hairs; mature, alternate, glabrous. Flowers 3-7 in terminal inflorescence; stamens conspicuous, white-cream; operculum rounded. Fruit large, 30-40mm in diameter, valves not exerted. Fruits are commonly called 'honkey nuts' and are used by Scouts as woggles.

Flowering period January-May

Occurrence A B C E



Fig.43 x0.8

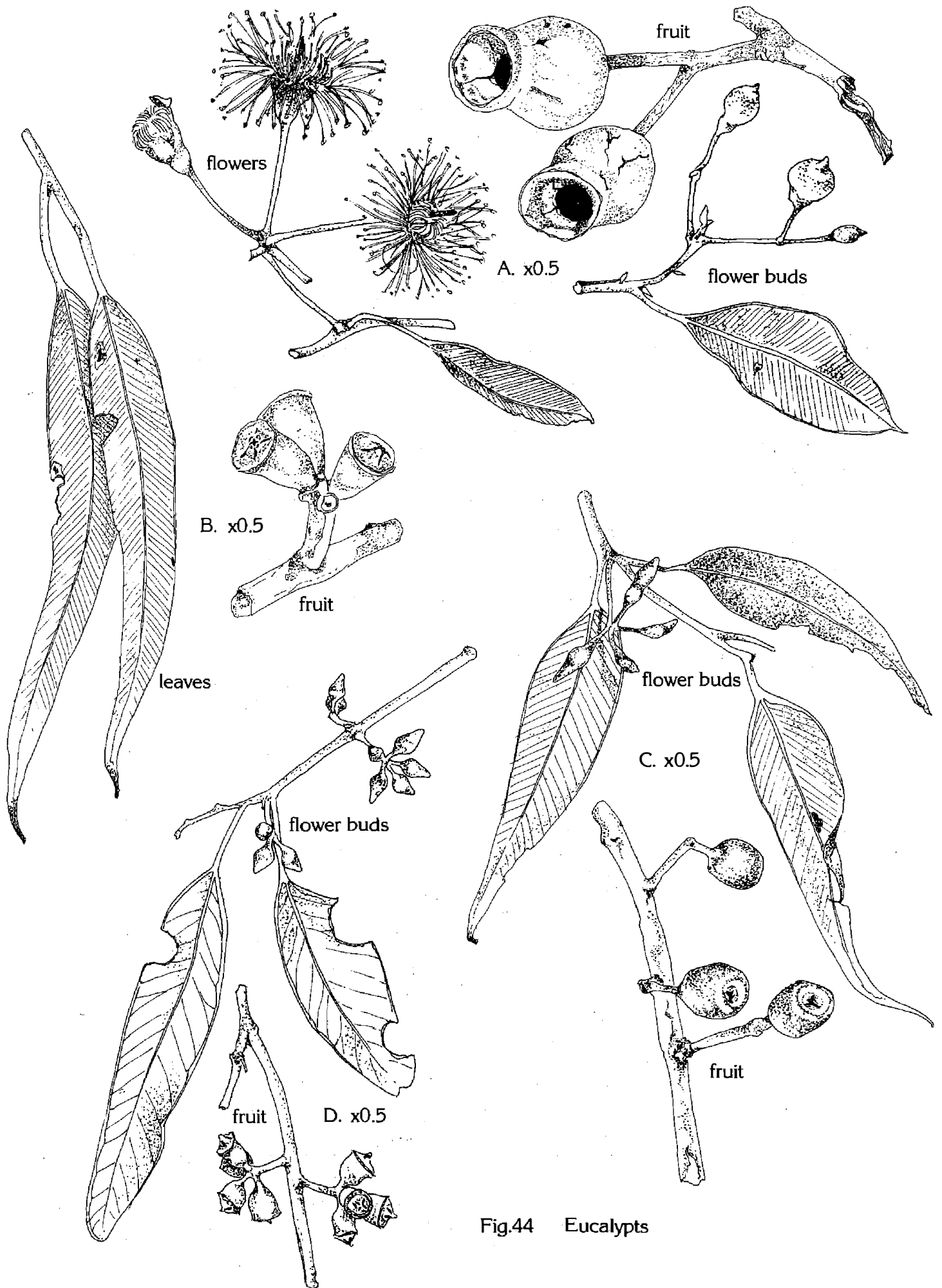


Fig.44 Eucalypts



Fig.45 x0.8

Eucalyptus gomphocephala DC.; tuart (Fig.44B)

Tree to 40m, bark pale grey, rough, partly fibrous. Leaves petiolate, alternate, grey-green. Flowers 3-7 in umbels; operculum rounded, broader than top of calyx tube; peduncle flattened. Fruit 20mm long. Flowering period December-February Occurrence Bush Court

Eucalyptus marginata Donn ex Sm.; jarrah (Fig.44C)

Tree 15-50m, bark grey-brown, fibrous. Leaves juvenile, sessile, opposite; mature, petiolate, alternate. Flowers 5-10 in axillary umbels; stamens conspicuous, white to cream, operculum elongate. Fruit 10-20mm diameter, valves not exerted. Flowering period October-November Occurrence A B C E

Eucalyptus rudis Endl.; flooded gum (Fig.44D)

Tree 9-15m, spreading trunk; bark grey and rough on lower trunk, smooth and grey-white on upper branches. Leaves alternate, grey-green. Flowers axillary 4-10 in umbels; stamens conspicuous, cream to pale yellow; conical operculum. Fruit 8-10mm diameter, exerted valves. Flowering period April-November Occurrence B C D

Hypocalymma angustifolium Endl.; white myrtle

Shrub to 1.5m; multi-stemmed. Leaves opposite, linear, 3-angled, often curved, mucronate, 10-30cm. Flowers 2-3, axillary, sessile, pink to red in centre; petals white. Flowering period July-October Occurrence B D

Hypocalymma robustum Endl.; Swan River myrtle (Plate 16)

Shrub to 1m. Leaves opposite, linear to narrowly ovate, 10-25mm. Flowers 2-3, axillary, sessile; petals pale to deep pink, scented. Flowering period July-October Occurrence A B C E

Kunzea ericifolia (Sm.) Heynh.; (Fig.45)

Shrub to 3m, young shoots hairy. Leaves alternate, linear. Flowers in terminal globular heads; stamens conspicuous, yellow; petals yellow; sepals green. Flowering period September-November Occurrence A B C E

Leptospermum laevigatum (Gaertner) F. Muell.; coastal teatree (Fig.46)

Shrub to 3m. Leaves alternate. Flowers axillary, solitary; petals white; sepals green, hairy inside, glabrous outside. Flowering period September-October Occurrence B C E

Melaleuca lateritia Dietr.; robin redbreast bush (Fig.47)

Shrub to 2m. Leaves alternate, flat or slightly concave. Flowers 10-20 in cylindrical spikes on lateral branches; stamens conspicuous, scarlet to crimson, in bundles of 5. Flowering period September-April Occurrence D

Melaleuca preissiana Schauer; (Fig.48A)

Tree to 10m, paper-like bark. Leaves alternate, shortly petiolate, flat. Flowers 1-3 axillary, clustered along stem; stamens conspicuous, white to pale yellow.

Flowering period November-January

Occurrence B C D E

Melaleuca raphiophylla Schauer; swamp paperbark (Fig.48B)

Tree to 10m, paper-like bark. Leaves alternate, terete, pointed and curved ends. Flowers 15-30 in dense spikes; stamens conspicuous, white to cream.

Flowering period September-January

Occurrence B D

Melaleuca seriata Lindley

Shrub to 1m. Leaves alternate, flat. Flowers in globular terminal heads; stamens conspicuous, pink to purple; petals pink-mauve; floral tube hairy at base.

Flowering period October-December

Occurrence C

Melaleuca teretifolia Endl.; (Fig.48C)

Shrub or small tree to 5m. Leaves alternate, terete. Flowers 5-30 in sessile axillary clusters; stamens conspicuous, white to pale yellow.

Flowering period October-January

Occurrence B

Melaleuca thymoides Labill.; (Fig.48D)

Shrub to 1m, branches spinescent. Leaves alternate, flat. Flowers 20-30 in terminal heads; stamens conspicuous, yellow; petals light brown.

Flowering period October-January

Occurrence A C

Pericalymma ellipticum (Endl.) Schauer; swamp teatree

Shrub to 2m. Leaves alternate, flat and tough. Flowers solitary, terminal; petals white to pink; sepals green, hairy.

Flowering period September-December

Occurrence C

Regelia inops (Schauer) Schauer

Shrub to 2.5m, young stems with white hairs. Leaves opposite, almost triangular, wrapping the stem. Flowers in terminal dense heads; stamens conspicuous, pink mauve.

Flowering period October-January

Occurrence C E

Scholtzia involucrata (Endl.) Druce; spiked scholtzia (Plate 15)

Shrub to 1m, spreading. Leaves opposite, almost round. Flowers 3-5 axillary along stem; petals white to pale pink.

Flowering period December-March

Occurrence A B C E

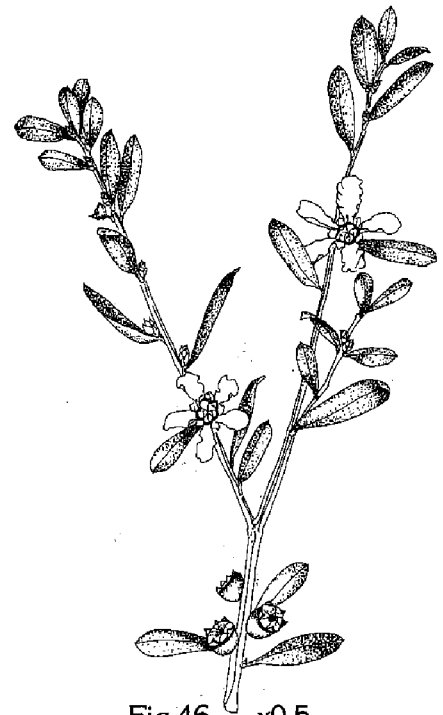


Fig.46 x0.5

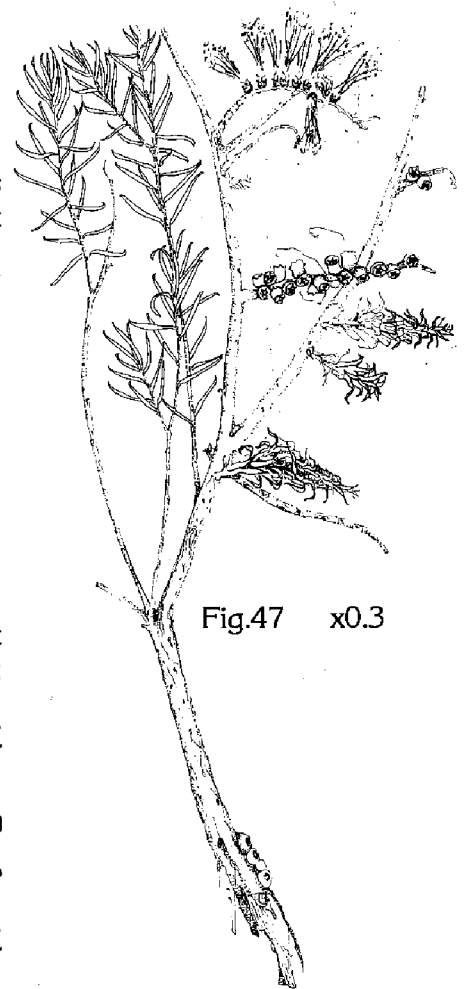


Fig.47 x0.3

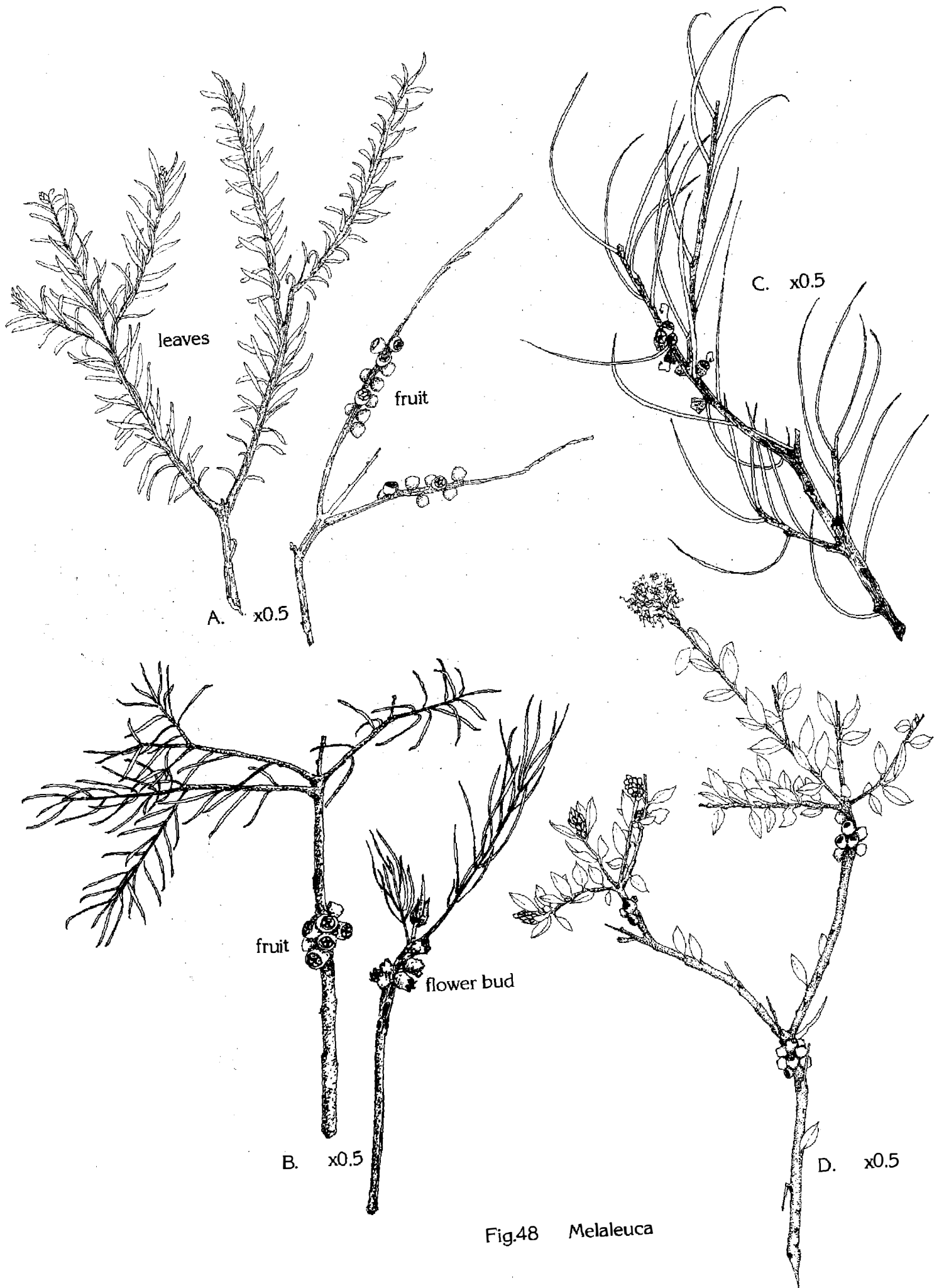


Fig.48 Melaleuca

SANTALACEAE

Woody shrubs and small trees characterize this group. Plants are mainly root hemiparasites and are distributed throughout the tropical and temperate zones (c. 400 species worldwide). The genus *Santalum* is well known in Western Australia where Sandalwood has been pulled for over 100 years and exported for use in the production of incense, carvings and perfumes. Like the Western Australian Christmas tree (*Nuytsia*), the parasite derives some of its nourishment from the roots of other plants. This is achieved through root to root contact via suckers or haustoria which are produced by the parasite. The small and inconspicuous flowers consist of a single whorl of 3 to 5-fused perianth segments with attached stamens. The fruit may be a nut (e.g. *Santalum*) or drupe (e.g. *Exocarpos*) and contains food storage as endosperm (the testa is absent). The leafless, green, striated stems readily identify *Exocarpos sparteus* in the field. The generic name (exo = outside, karpos = fruit) refers to the fruit being borne at the end of a berry-like receptacle.

Exocarpos sparteus R.Br.; broom ballart (Fig.49)

Shrub to 4m with ends of branches weeping, yellowish green, striate. *Leaves* narrow linear, triquetrous, hooked, less than 1cm long, deciduous. *Flowers* in depressions along condensed spikes c. 1.5cm long; perianth a single whorl of 5 triangular segments, greenish yellow. *Fruit* a red to brown drupe, 3-5mm long. *Flowering period* most of the year

Occurrence E

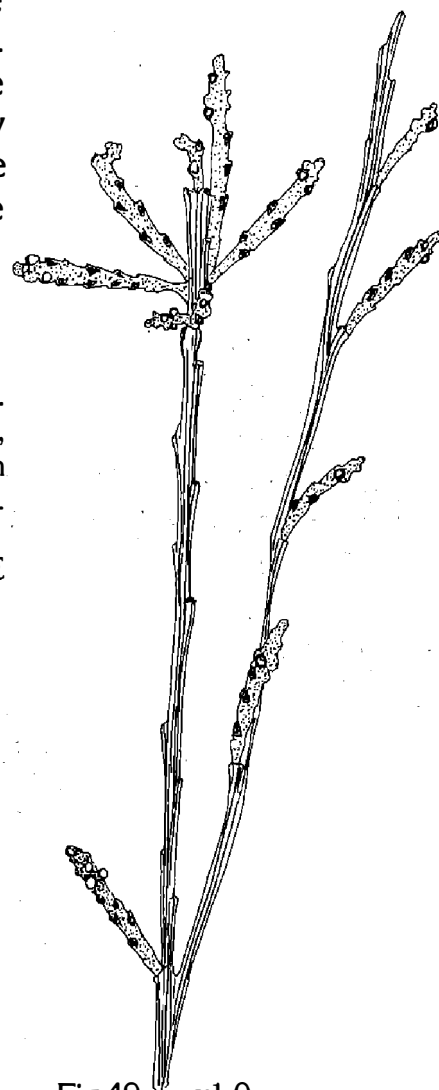


Fig.49 x1.0

LORANTHACEAE

The Loranthaceae (c. 900 species worldwide) include the stem-parasites known as mistletoes as well as a few root-parasites, e.g. *Nuytsia floribunda*, the Western Australian Christmas tree. The woody stems are brittle, leaves are simple and slightly succulent, flowers are clustered into showy inflorescences, and the ovary is inferior. In *Nuytsia* the fruit is dry and winged. *Nuytsia* seedling roots develop haustorial contacts with roots of a wide range of native and introduced plants. There are also reports of telephone cables being crushed by encircling haustoria. Little is known about the chemicals which are exchanged between host and parasite. The name *Nuytsia* is in memory of Pieter Nuyts from the Dutch vessel 't *Gulden Zeepaerdt* which visited the Great Australian Bight in 1626. Though mistletoes (mainly *Amyema* spp.) occur in Western Australia they are rare on the Swan Coastal Plain. In *Amyema* the fruit is a berry containing a sticky seed. The latter is dispersed by mistletoe birds and the sticky layer adheres the seed to host branches so germination can take place.

Nuytsia floribunda (Labill.) R.Br.; Christmas tree (Plate 13)

Tree to 6m, glabrous. *Leaves* lanceolate, 30-80mm long, attenuate at base, sessile. *Flowers* in large terminal fascicles of up to 150 flowers, sessile, central flowers bisexual, lateral flowers male; bracts one under each flower, triangular, expanding to 20mm long; calyx minute; corolla 10-15 mm long, cadmium orange. *Fruit* dry, 3-winged. Flowering is more prolific after fire.

Flowering period November-January

Occurrence A B C E

EUPHORBIACEAE

The spurge or euphorbia family has most of its species in the tropics. There are about 5,000 species overall with over 200 in Australia. It includes the castor-oil plant *Ricinus communis*; *Ricinocarpos*, cultivated for its flowers; and *Euphorbia*, a diverse genus containing some toxic and leafless plants with cactus-like stems. Most species have small, inconspicuous flowers. The stems in some species have laticifers which produce a white latex. Flowers are mostly unisexual and may be borne on separate plants. The ovary is superior, usually with 1 to 3 chambers. Twelve genera occur in southwestern Australia. The two species on the Murdoch campus can be separated on flower and leaf size.

Monotaxis grandiflora Endl.

Shrub to 0.2m, low spreading. *Stipules* narrow, setaceous, c. 2mm long. *Leaves* crowded near ends of branches, linear, 7-12mm long, c. 1mm wide, margins revolute; apex with short mucron. *Flowers* unisexual, clustered at ends of short branches, cream, c. 2mm across, pedicels c. 2mm long; male flowers with 5 oblong petals; petals of female flowers spatulate. *Fruit capsule* c. 3mm across.

Flowering period August-December

Occurrence A

Phyllanthus calycinus Labill.; false boronia (Fig.50)

Shrub to 0.6m, glabrous. *Leaves* alternate, narrowly obovate, 8-18mm long, 3-4mm wide, nearly flat; deciduous in summer. *Flowers* axillary, pedicels c. 10mm long, cream with green or rarely pink; male flowers 2 or 3 together, c. 2mm across; female flowers solitary, c. 5mm across. *Fruit capsule* c. 5mm across.

Flowering period June-November

Occurrence A C E

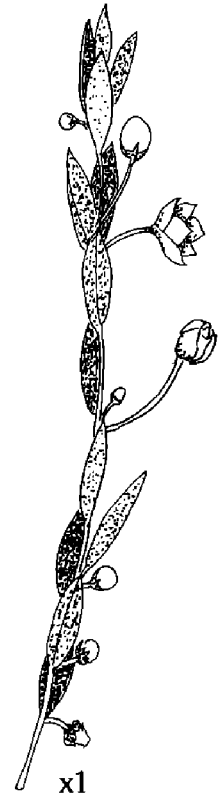
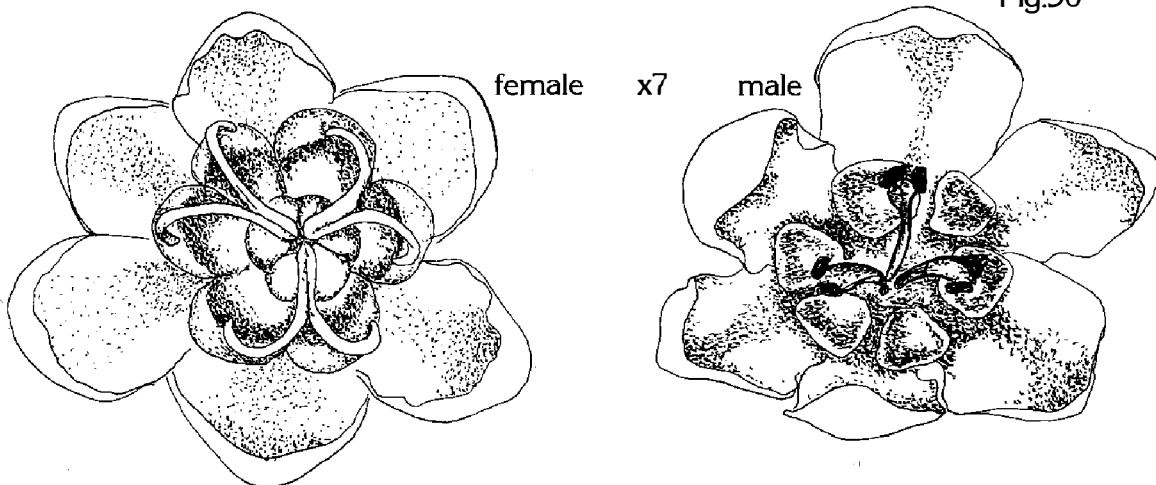


Fig.50

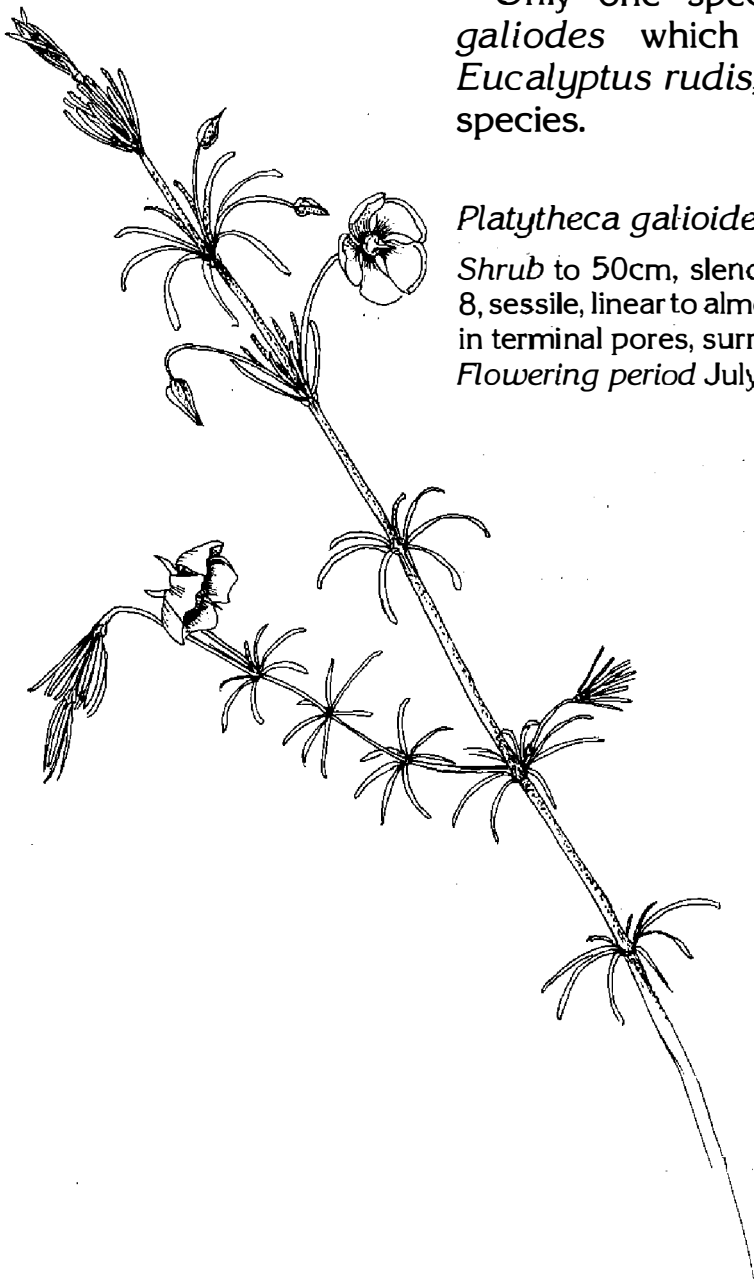


TREMANDRACEAE

This is a family of three genera which are endemic to Australia. Two genera, *Tremandra* and *Platytheca*, occur only in the southwest of Western Australia and the third genus, *Tetratheca*, occurs in all southern states.

The plants are characteristically small shrubs with simple leaves which may be alternate, opposite or whorled (as in the species on campus) and have pink, purple or white flowers. The anthers number twice as many as the petals and open by an apical pore which may be produced at the end of an elongated tube.

Only one species occurs on campus, *Platytheca galioides* which grows in wetter areas amongst *Eucalyptus rudis*, *Astartea fascicularis* and *Melaleuca* species.



Platytheca galioides Steetz; (Fig.51)

Shrub to 50cm, slender branches, hairy nodes. Leaves in whorls of 8, sessile, linear to almost terete. Flowers blue; anthers purple, opening in terminal pores, surround green ovary.

Flowering period July-November

Occurrence B C

Fig.51 xl

POLYGALACEAE

This family receives its name from the type genus *Polygala*. There are four Australian genera and these are shrubs, herbs or climbers but species from other countries are more usually trees. The flowers are similar in appearance to pea flowers but lack the large obvious standard, have fewer stamens (5-8) and have 2 carpels in their ovary. Some of the foreign species are used as ornamentals but the Australian species generally have small flowers and are not cultivated. The two species on campus occur in the Banksia Woodland at the University's southern boundary. They may be distinguished by flower colour, leaf shape and habit.

Comesperma calymega Labill.; blue-spike milkwort

Herb to 0.3m, perennial, erect, almost glabrous. *Leaves* sessile, narrowly ovate. *Flowers* in slender racemes, small, blue; keel petal blue and yellow, posterior petal blue and white; sepals pale blue; wings not much longer than outer sepals.

Flowering period September-December

Occurrence A C

Comesperma virgatum Labill.

Shrub to 1.6m, perennial, erect, glabrous, slender. *Leaves* sessile, almost linear. *Flowers* in elongated racemes, pink or purple; keel petal partly yellow; wings 3-4 times longer than outer sepals.

Flowering period September-March

Occurrence A

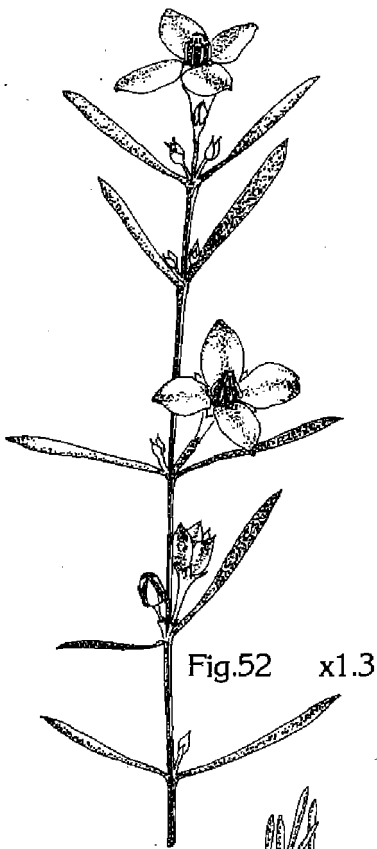


Fig.52 x1.3

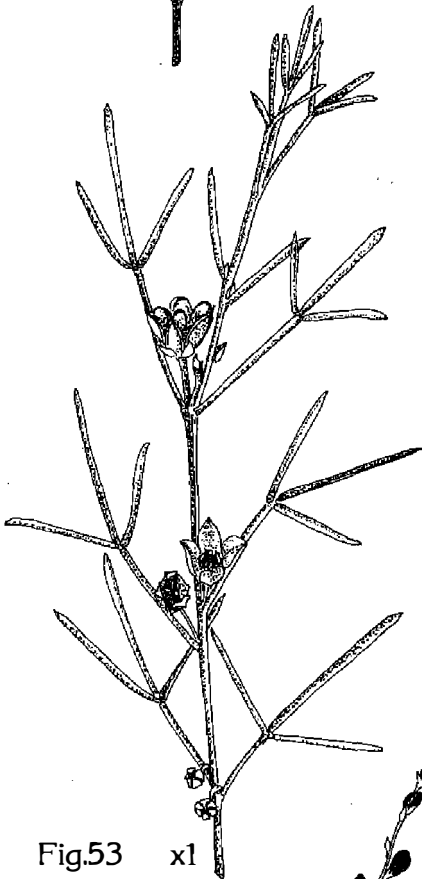


Fig.53 x1

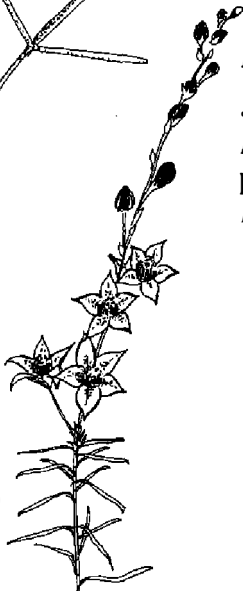


Fig.54 x0.6

RUTACEAE

The Rutaceae is a large family of woody shrubs and trees (c. 1,800 species). The leaves and stems contain essential oil cavities and, like the Myrtaceae, are strongly aromatic when crushed. Diagnostic features include the superior ovary composed of free or fused carpels, the arrangement of stamens on a raised nectar-producing disc, and the 4 or 5 free (sometimes fused) petals. The family has many species of commercial importance including *Citrus* (oranges, lemons) and the strongly perfumed *Boronia megastigma* (brown boronia) which is sold for cut-flowers and perfume manufacture. Two genera occur on campus and these can readily be identified by the regular small flowers with 4 or 5 blue or pink petals and aromatic leaves.

Species	Leaves	Petals
<i>Boronia crenulata</i>	opposite, entire	4, pink
<i>B. ramosa</i>	opposite, divided	4, blue
<i>Eriostemon spicatus</i>	alternate, entire	5, mauve

Boronia crenulata Sm.; aniseed boronia (Fig.52)

Shrub 60-90cm. *Leaves* sessile, obovate; margins with small teeth. *Flowers* in axillary and terminal clusters; corolla pink. Crushed leaves have odour of aniseed.

Flowering period August-October

Occurrence B

Boronia ramosa (Lindley) Benth.; (Fig.53)

Herb 20-30cm. *Leaves* divided into 3-5 leaflets, nearly terete. *Flowers* axillary; corolla pale blue.

Flowering period July-October

Occurrence B C

Eriostemon spicatus A. Rich; pepper and salt (Fig.54)

Shrub 50-70cm with erect slender stems. *Leaves* sessile, linear. *Flowers* in elongated terminal racemes; corolla mauve, rarely white or pink.

Flowering period June-October

Occurrence A B C E

GERANIACEAE

The Geraniaceae is a cosmopolitan family easily recognized by the fruit bearing the enlarged style, hence the common names storksills, cranesbills. At maturity the fruit separates into 5 segments. The leaves are opposite and usually aromatic. The 5 sepals, 5 petals and usually 10 stamens are inserted beneath a 5-chambered ovary. Both introduced and indigenous species of *Geranium*, *Pelargonium* and *Erodium* occur in Western Australia. *Pelargonium capitatum* is an aggressive species in disturbed habitats on the Swan Coastal Plain. It is similar in appearance to an indigenous species which occurs on coastal limestone.

Pelargonium capitatum (L.) L'Her.; rose geranium (Fig.55)

Shrub low, spreading to 1m high, densely hairy. *Stipules* brown, ovate, acuminate. *Leaves* nearly circular, 20-50mm across, 3-7 lobed. *Flowers* 8-10 in compact heads 25-40mm across; bracts densely hairy; spur 2-5mm long; petals pink or white, clawed at the base. *Introduced* from South Africa.

Flowering period July-October

Occurrence C E

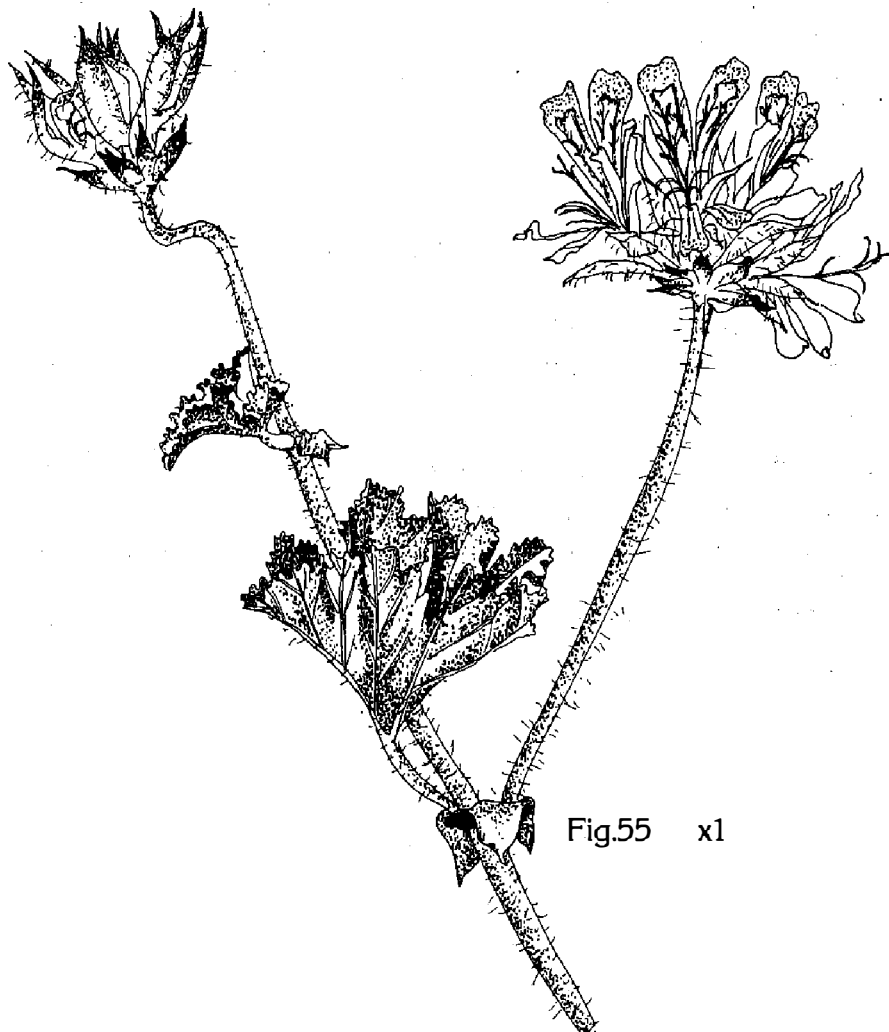


Fig.55 x1

APIACEAE

The Apiaceae, after the genus *Apium* e.g. sea celery, can be easily recognized because of the parsley-like inflorescence in which the flowers are arranged in regular umbrella-like umbels (the family was once known as the Umbelliferae). It has a worldwide distribution and contains many culinary herbs, e.g. celery, parsley, dill. Well known native species include the flannel flower (*Actinotus leucocephalus*) and the Rottneest Island daisy (*Trachymene caerulea*). Individual flowers are small and contain 5 inconspicuous petals and sepals. The inferior ovary forms a 2-chambered dry fruit. The five species which occur on campus are very distinct: *Platysace* has flat photosynthetic stems and reduced leaves; *Xanthosia* has prominent hairy leaves; *Centella* is a swamp plant with roundish leaves; *Eryngium* resembles a thistle; *Trachymene* has green, flattened fruits.

Species	Leaf	Habit	Flower colour
<i>Centella cordifolia</i>	reniform to circular	stoloniferous herb	pink or white
<i>Eryngium rostratum</i>	divided, pungent	erect herb	blue or purple
<i>Platysace compressa</i>	divided, basal	erect herb with winged stems	cream
<i>Trachymene pilosa</i>	divided, hairy	hairy herb	white
<i>Xanthosia huegelii</i>	divided, hairy	hairy herb	greenish yellow

Centella cordifolia (J.D. Hook.) Nannf.

Herb with horizontal stems rooting at the nodes, glabrous. *Stipules* membranous, fused to the petiole. *Leaves* with long petioles, lamina reniform to near circular, 20-50mm across. *Flowers* in 3 to 4-flowered umbels; bracts obovate, c. 2mm long; petals pink or white, c. 1mm long. *Fruit* 3-4mm across.

Flowering period throughout year (infrequent)

Occurrence D

Eryngium rostratum Cav.

Herb to 40cm, erect perennial. *Leaves* divided, sometimes to midrib, lobes pungent; basal leaves longer than main stem leaves, stem leaves 30-150mm long. *Flowers* in compact, thistle-like, pedunculate heads; involucral bracts 6-10, blue to purple; calyx lobes blue to purple, 3-4mm long. *Fruit* clothed in vesicles. *Note* white flowers may occur.

Flowering period September-November

Occurrence A

Platysace compressa (Labill.) Norman; tapeworm plant

Herb to 70cm, perennial, erect or spreading, stems flattened, winged. *Leaves* at base of plant divided, short lived; stem leaves small, 1-3mm long. *Flowers* in terminal umbels, small; calyx lobes minute; petals 1mm long, cream.

Flowering period January-May

Occurrence A

Trachymene pilosa Sm. in Rees; native parsnip

Herb to 12cm, annual, hairy. *Leaves* palmately divided into 3-lobed segments; petioles c. 20mm long. *Flowers* in simple umbels, perianth of 1 whorl of 5 parts, white. *Fruits* bi-carpellate, flattened vertically, inner carpel smooth, outer carpel with bristles.

Flowering period August-December

Occurrence A B C

Xanthosia huegelii (Benth.) Steudel

Herb 10-30cm, hairy perennial. *Leaves* with enlarged petioles, blades divided into 3 segments, segments 10-25mm long. *Flowers* in umbels, greenish yellow; calyx lobes 1-3mm long.

Flowering period August-November

Occurrence A

LAMIACEAE

The mint family is cosmopolitan and easily recognized by the mint-like flowers. The corolla is 2-lipped and the 5 petals are fused at the base into a tube. The elongated lower lip is used as a landing platform by insects and rows of spots act as guides to the nectar at the base of the tube. The style arises near the base of the 2 carpels that make up the superior ovary. The 2 or 4 stamens are inserted on the inside of the corolla tube. In some species the stamens are modified: one anther lobe may be sterile in each stamen and the filament may end in an appendage. The sepals may enlarge during fruit formation. Leaves are usually simple, opposite on the stem and may produce essential oils, e.g. lavender, thyme, peppermint. Superficially the Lamiaceae (= Labiatae) resemble the Scrophulariaceae (foxgloves), Myoporaceae (emu bushes, poverty bushes) and Chloanthaceae (lambs' tails, woolly foxgloves).

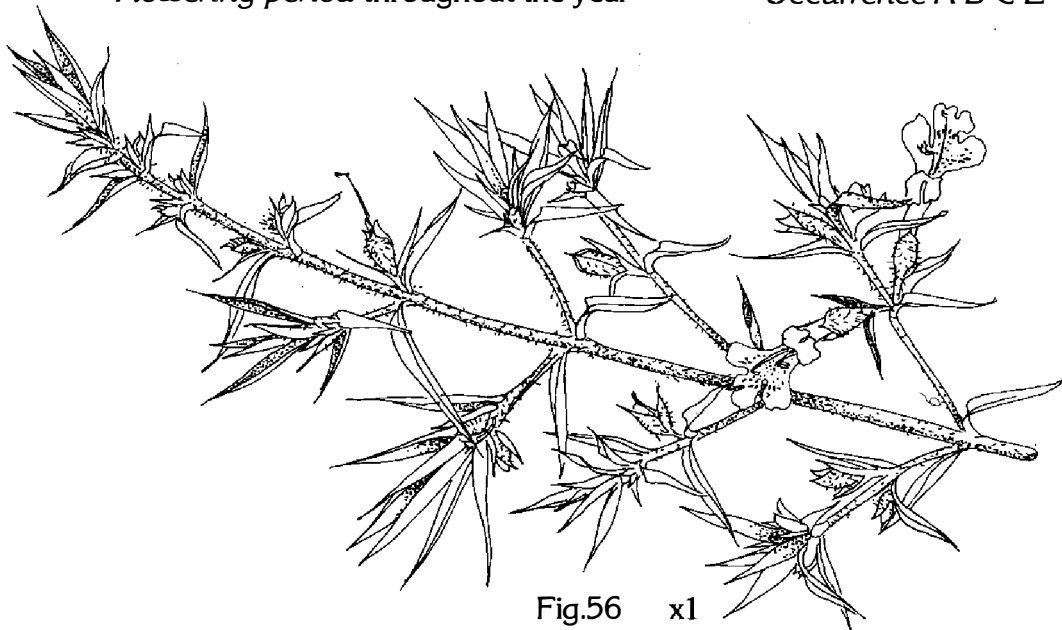
Only one species (*Hemiandra pungens*) occurs naturally on campus. A more compact, prostrate cultivar may be seen on garden embankments at the University.

Hemiandra pungens R.Br.; snake bush (Fig.56)

Shrub 20-60cm, prostrate to erect. *Leaves* sessile, linear to triangular, apextapered into a pungent point. *Flowers* axillary, clustered towards the shoottip; corolla white, pink or lilac, tubular towards the base, upper lobe recurved and bifid, lower lobe flat and tripartite.

Flowering period throughout the year

Occurrence A B C E



SCROPHULARIACEAE

The cosmopolitan foxglove or snapdragon family is represented on the Murdoch campus by two small herbaceous species. Though introduced, they are included here because they are often mistaken as native plants. The family exhibits a wide range of floral diversity. In the basic type seen here, the corolla has 2 lips with 2 lobes in the upper and 3 in the lower. The ovary is superior and there are 2 pairs of stamens. A nectary is located at the bottom of the corolla tube. Coloured patches and lines lead pollinating insects such as bees into the throat of the flower. The two species can be distinguished most easily by flower colour.

Parentucellia latifolia (L.) Caruel; common bartsia

Herb 10-30cm, annual with erect hairy stems. *Leaves* sessile, opposite, ovate, deeply toothed, 10-13mm long. *Flowers* axillary near apex of stem, sticky; calyx with 4 short lobes; corolla red to purple, 2-lipped, lower lip with 3 small lobes, united into a tube at the base. *Introduced*, common on moist sites in spring.

Flowering period September-October

Occurrence C E

Verbascum virgatum Stokes; twiggy mullein

Herb 1-3m, hairy, biennial, one main stem, sometimes branched at the base. *Leaves* shortly petiolate, oblanceolate, toothed, 50-100mm long, alternate. *Flowers* in long terminal raceme; calyx with 5 lobes; corolla pale yellow, large (30mm across), tubular at the base expanding into 5 lobes. *Introduced*, prefers moist, peaty sites.

Flowering period June-November

Occurrence C

OROBANCHACEAE

Broomrapes occur mainly in the northern hemisphere. Only two species of *Orobanche* occur in Australia and one of these is introduced. These small herbs are root parasites which appear pink because they lack chlorophyll and are thus unable to manufacture their own food. The introduced *O. minor* parasitizes capeweed and clover. The erect stems join a large underground food storage tuber whose sucker-like organ, the haustorium, invades the host root. Each capsule produces nearly 100,000 minute seeds to be dispersed in currents of air. The only species on the Swan Coastal Plain is *O. minor*.

Orobanche minor Sm.; lesser broomrape (Fig.57)

Herb 0.1-0.3m, stems erect and swollen at the base, yellowish brown, glandular hairy; parasitic. *Leaves* scale-like, brown, ovate to triangular, 15-20 mm long. *Flowers* in a bracteate spike; calyx of 2 divided sepals; corolla yellowish purple, 10-20 mm long, tubular at the base, upper lip with 2 small lobes, lower lip 3-lobed. *Introduced*.

Flowering period August-November

Occurrence C E

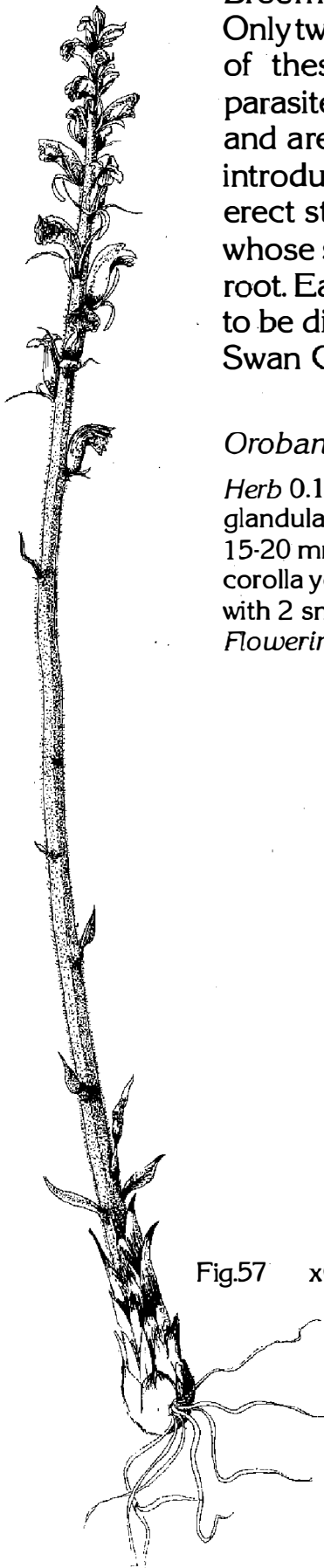


Fig.57 x0.7

LOBELIACEAE

This family consists of herbs with milky sap. It has a world-wide distribution (c.1,100 species) and many species are known as cultivated plants. These include the genus *Lobelia* which commonly has blue flowers. The flowers are irregular with 5 petals joined at the base into a tube. The stamens are also fused together and join the petals at their base. The inferior ovary contains large numbers of minute seeds. In *Lobelia* the flower is like a fleur-de-lis. Plants flower from the base upwards and many species continue to flower for long periods under dry conditions. Three species of *Lobelia* are common on the Swan Coastal Plain but only the smaller flowered *L. alata* is recorded at Murdoch University.

Lobelia alata Labill.

Herb 30-50cm, perennial, prostrate to ascending; stems triangular at the base. *Leaves* obovate, becoming linear higher up, denticulate.

Flowers blue, arranged in a loose terminal raceme.

Flowering period November-April

Occurrence B

STYLIDIACEAE

Members of this family are known as trigger plants because the style and anthers are combined into a column which is sensitive to touch and is called the trigger. When an insect of the right size alights on the labellum, the set trigger moves through an arc, in a fraction of a second, mechanically shedding pollen like a hammer on to the insect's back or picking up pollen from a previous flower visit. After firing, the trigger slowly resets. There are c. 180 species that occur in Australia and over 100 are endemic to southwestern Australia. Each flower is divided into 5 lobes, 4 are prominent and the fifth is small and modified as the insect's landing platform (labellum). The labellum thus serves the same function as in the Orchidaceae. In *Levenhookia* the flowers are very small, the column is short and stout, the labellum is hood-shaped and, unlike many species of *Stylidium*, *Levenhookia* species are annuals.

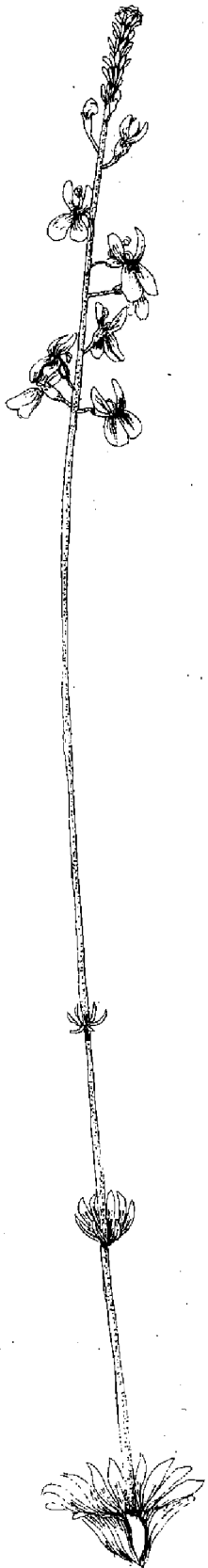


Fig.58A x0.3

Species	Habit	Leaves	Flower colour
<i>Levenhookia stipitata</i>	erect	few, scattered	pink
<i>Stylidium brunonianum</i>	erect	basal rosette c. 3 whorls on scape	pink to purple
<i>S. calcaratum</i>	erect	small basal rosette	white to pink
<i>S. piliferum</i>	erect	basal rosette only	pale yellow
<i>S. repens</i>	creeping	clusters along stem	white to pink
<i>S. schoenoides</i>	erect	basal rosette only, grass and scale-like	cream

Levenhookia stipitata (Sonder) F. Muell.; common stylewort

Herb 3-8cm, slender annual, glandular hairy. *Leaves* few scattered along stem, oblong to linear, 5-10mm long. *Flowers* in umbels or short racemes, pedicels long, slender, glandular hairy; calyx tube and lobes glandular hairy; corolla pink, labellum hood-shaped covering column and anthers.

Flowering period October-December

Occurrence B C

Stylidium brunonianum Benth.; pink fountain trigger plant (Fig.58A)

Herb 20-50cm, erect perennial. *Leaves* in basal rosette, linear or slightly broadened at the apex, greyish green, 20-50mm long; c. 3 whorls of narrow leaf-like bracts along the scape. *Flowers* in a loose raceme; calyx glabrous; petals paired vertically, pink or purple.

Flowering period September-November

Occurrence A B C E

Stylidium calcaratum R.Br.; book trigger plant

Herb 7-10cm, slender annual. *Leaves* in small basal rosette, 5-8mm long. *Flowers* 1-3 (rarely more), terminal, petals paired vertically, 2 petals apically notched, white or pale pink with red markings near centre; nectary spur prominent.

Flowering period September-December

Occurrence A

Stylidium piliferum R. Br.; common butterfly trigger plant (Fig.58B)

Herb 20-50cm, erect perennial. *Leaves* compact, basal rosette, linear or broad towards the apex, up to 3cm long; apex with hair-like point. *Flowers* in a loose raceme or panicle at the end of 30-40 mm scape; calyx glandular hairy; petals paired vertically, pale yellow; sometimes white to pink.

Flowering period September-October

Occurrence A C E

Stylidium repens R.Br.; matted trigger plant

Herb 8-10cm, creeping perennial, stoloniferous with aerial roots at nodes. *Leaves* apical, in terminal rosettes, triangulate, fleshy; apex acute. *Flowers* solitary among apical leaves; pedicels glandular, hairy, red; petals white to pink with red spots at base.

Flowering period October-February

Occurrence A B

Stylidium schoenoides DC.; cow kicks (Plate 14)

Herb 20-40cm, erect perennial. *Leaves* grass-like, in basal tufts, linear, glabrous, 200-300mm long; pink scale leaves located between bases of green leaves. *Flowers* 2-6 in a loose corymb, 60-80mm across; petals white to cream.

Flowering period August-October

Occurrence A

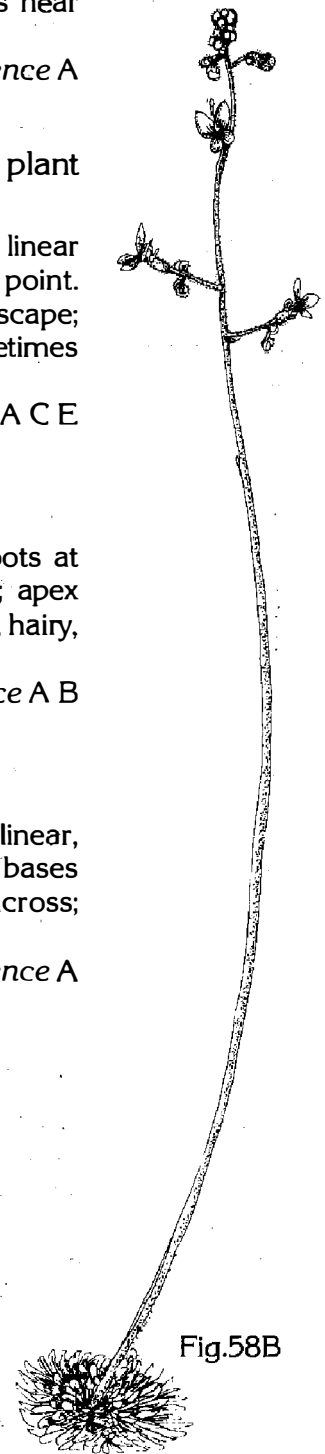




Fig.59 x0.3

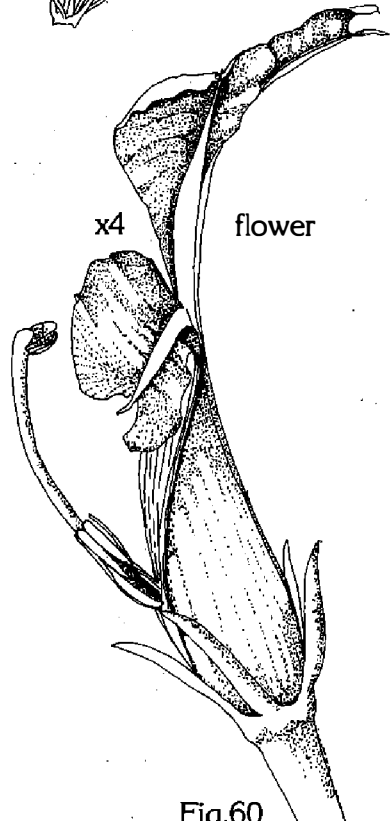


Fig.60



x0.5

GOODENIACEAE

The intense blue of *Lechenaultia biloba* is a distinctive feature of the bush in late winter and spring. Like other members of the family (c. 410 species, mostly in Australia) this species has irregular flowers and the 5 petals are joined at the base. The petals are thickened longitudinally in the middle and are usually winged. The style is modified at the tip into an indusium or pollen cup. Leaves are spirally arranged. This is mainly an Australian family of herbaceous plants or small woody shrubs. Four genera occur on the Murdoch campus where they are mainly restricted to undisturbed sites. The names commemorate four people: Jean-Baptiste Leschenault de la Tour, a French botanist who came on an expedition to Australia from 1800 to 1804; William Dampier who visited Western Australia in 1688; the Reverend Samuel Goodenough, a Bishop who studied sedges; and Scaevola, a hero of ancient Rome.

Species	Leaf LxW(mm)	Leaves hairy	Flower colour	Anthers fused
<i>Dampiera linearis</i>	20-40x 5-10	no	blue with grey hairs	yes
<i>D. triloba</i>	20-25x 10-20	slightly	blue with brown hairs	yes
<i>Goodenia filiformis</i>	40-80x 2-5	no	yellow	no
<i>Lechenaultia biloba</i>	5-12 x1	no	dark blue	yes
<i>L.floribunda</i>	8x1	no	pale blue	yes
<i>Scaevola canescens</i>	30-40x 5-8	densely	dirty white with grey hairs	no
<i>S.globulifera</i>	30-40x 5-8	no	blue	no
<i>S. paludosa</i>	20-30x 5-8	slightly	white with white hairs	no

Dampiera linearis R.Br.; common dampiera (page 21)

Herb 0.2-0.3m, perennial with spreading or erect stems. Leaves linear to linear spathulate, tapered at the base, entire or toothed. Flowers pedunculate in leafy cymes; calyx covered in dense grey hairs; corolla blue. A polymorphic species with very variable leaf shapes.

Flowering period July-November

Occurrence A B C E

Dampiera triloba Lindley

Herb 0.2-0.3m, perennial with numerous erect triangular stems. *Leaves* nearly sessile, leathery, 3-lobed at the apex. *Flowers* pedunculate in cymes; peduncles and flowers covered in rust-coloured hairs; corolla blue.

Flowering period August-December

Occurrence A

Goodenia filiformis R. Br.; narrow-leafed goodenia (Fig.59)

Herb 0.1-0.2m, perennial with several slender stems arising from a common tap-root. *Leaves* at base of stem linear, petiolate; on stem scattered, filiform. *Flowers* pedunculate in loose racemes or umbels; corolla yellow. This species prefers moist sites.

Flowering period September-January

Occurrence B

Lechenaultia biloba Lindley; blue lechenaultia (Plate 19)

Shrub 0.3-0.5m with open stems. *Leaves* slender, triangular in section, fleshy. *Flower* pedicellate in terminal axillary clusters; corolla intense clear blue, 25mm across, woolly inside throat; petals with broad wings.

Flowering period August-October

Occurrence B C E

Lechenaultia floribunda Benth. (Fig.60)

Shrub 0.2-0.3m, dense, branched near the base. *Leaves* small, fleshy, crowded. *Flowers* sessile, axillary in small terminal clusters; corolla bluish-white, 10-15 mm across; petals with narrow wings. This species flowers after *L. biloba* and forms small dense stands. Day-flying moths forage extensively and may act as pollinators.

Flowering period October-May

Occurrence B C

Scaevola canescens Benth.; grey scaevola (Fig.61)

Shrub prostrate or decumbent, densely covered in woolly hairs, grey. *Leaves* linear to oblanceolate, fleshy, margins recurved. *Flowers* in short spikes or axillary clusters, hairy; corolla white or purplish-white, sometimes streaked with brown, divided in 5 lobes on one side.

Flowering period June-November

Occurrence B C E

Scaevola globulifera Labill. (Fig.62)

Herb 0.2-0.4m with weak erect triangular stems. *Leaves* linear to narrow elliptic, toothed. *Flowers* sessile in terminal spike; corolla blue, divided into 5 lobes on one side. Favours swamps.

Flowering period September-March

Occurrence B

Scaevola paludosa R. Br.

Shrub 0.2-0.4m, decumbent or erect, sparsely hairy. *Leaves* narrowly obovate to narrowly elliptic, fleshy. *Flowers* sessile in short axillary spikes; corolla white, throat white to brownish purple, hairy on the back, divided into 5 lobes on one side.

Flowering period September-January

Occurrence C E

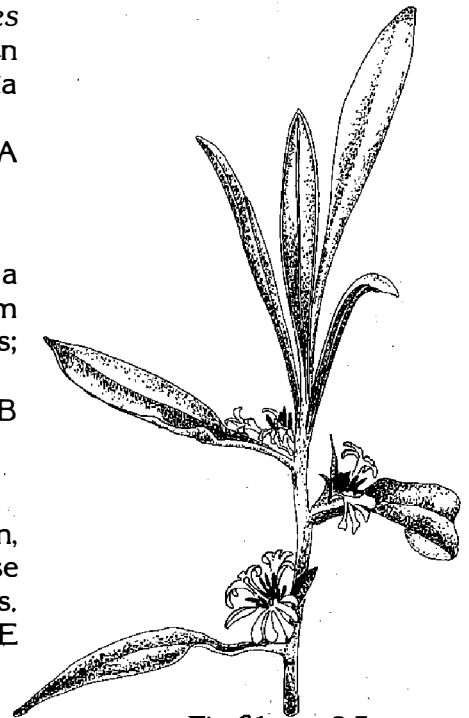


Fig.61 x0.5

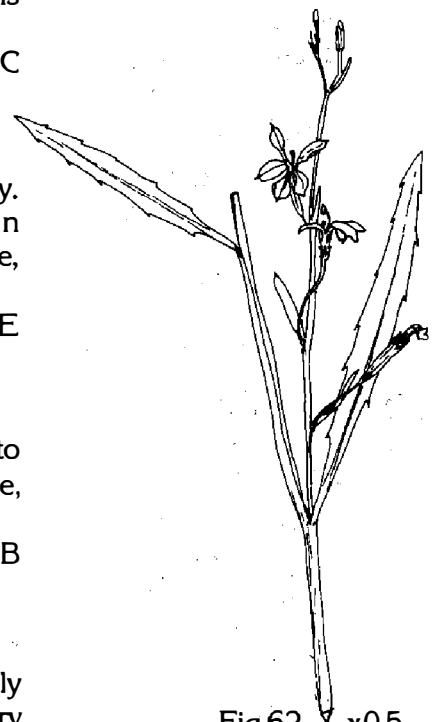


Fig.62 x0.5

RUBIACEAE

The Rubiaceae is a large family with about 7,000 species including coffee (*Coffea arabica*), *Gardenia* and quinine (*Cinchona*). Leaves are opposite or in whorls, stipules may be prominent, and the regular flowers with 4 or 5 petals occur in terminal heads or axillary clusters. The ovary is located below a disc bearing the corolla tube and attached stamens. Fruits are very variable ranging from dry capsules to fleshy berries. In northern Australia the family was extensively used by Aborigines, e.g. fruit for eating, extracts for poisoning fish, trunks for making canoes. The single species on the Murdoch campus is an inconspicuous plant with an unpleasant odour when crushed.

Opercularia vaginata Labill.; dog weed

Shrub 0.25-0.3m, sparsely hairy. *Stipules* 2-4mm long, hairy. *Leaves* opposite, sessile, linear to obovate, 10-60mm long, unpleasantly aromatic when crushed. *Flowers* in a globular head 10-15mm across; corolla funnel shaped, 3-4mm long with 4 or 5 lobes, c. 1 mm long; style divided into 2 branches.

Flowering period August-October

Occurrence A B

ASTERACEAE

The family Asteraceae (previously Compositae) or daisy family is easily recognized because the flowers are grouped into a compact head on a common receptacle. Each head may also be surrounded by involucre bracts which are especially prominent in the everlastings. In Australia this is the family with the most species. Worldwide there are over 20,000 species, and over 200 occur in Western Australia. Members range from short-lived annuals to woody trees. Considerable variation exists in the appearance of the inflorescence. There may be two types of flowers in the one head, e.g. disc florets, and ray florets. Florets may be bisexual, unisexual or sterile. In ray (ligulate) florets the corolla is fused and strap-like. The corolla of disc florets is 5-merous, the anthers are fused around the style, and the calyx is reduced to a pappus of bristles or plumed hairs. These aid in fruit dispersal, acting as a parasol in some species, e.g. thistles. The inferior ovary is unicelled and contains a single basal ovule. These form at maturity the one-seeded dry achene which in some groups has barbs to aid dispersal in animal fur. Daisy flowers are mostly cross-pollinated by insects including bees, wasps and butterflies.

There are seven native composites on campus. The introduced species include *Dittrichia graveolens* (stinkweed), *Osteospermum clandestinum* (stinking roger), *Arctotheca calendula* (capeweed), *Conyza bonariensis* (tall fleabane), *Vellereophyton dealbatum* (white cudweed), *Taraxicum officinale* (dandelion), *Ursinia anthemoides* (ursinia) and *Sonchus* spp. (thistles). These are listed in Appendix 2.

Species	Habit/height	Leaves	Flower colour
<i>Brachycome iberidifolia</i>	herb/to 0.4m	divided	white or violet
<i>Helichrysum cordatum</i>	herb/to 1m	entire, woolly	white
<i>Olearia axillaris</i>	woody shrub/to 2m	entire, woolly	white
<i>Podolepis gracilis</i>	herb/to 0.1m	entire, hairy, stem clasping	white or pale pink
<i>Podotrochea chrysantha</i>	herb/to 0.5m	entire, glandular	yellow
<i>Senecio lautus</i>	herb/to 0.5m	divided or lobed	yellow
<i>Siloxerus humifusus</i>	herb/to 0.1m	entire, not hairy	white or pink

Brachycome iberidifolia Benth.; Swan River daisy (Plate 20)

Herb to 0.45m, annual, glandular hairy. *Leaves* mostly divided to the midrib, rarely entire, 5-80mm long. *Flowers* in heads, involucre 5-7mm in diameter; bracts 2-4mm long; ray florets 10-20, ligule 6-16mm long, white or violet.

Flowering period August-May

Occurrence C C

Helichrysum cordatum DC.; tangle daisy (Fig.63)

Herb to 1m, weakly erect or spreading woolly perennial. *Leaves* alternate, cordate, 20-70mm long, 15-20mm wide, upper surface green, lower surface densely cottony-woolly. *Flowers* 15-20 florets in heads in large, open, terminal panicles; outer disc florets female, remainder bisexual, white.

Flowering period October-April

Occurrence C E

Olearia axillaris (DC.) F. Muell. ex Benth.; coast daisy-bush

Shrub to 2m, much branched, branches ashen grey with close, woolly hairs. *Leaves* alternate, ovate or obovate, 10-18mm long, 2-3mm wide, white or grey hairs on both surfaces. *Flowers* 8-15 florets in sessile heads at ends of short shoots or axillary; ray florets 2-6, ligule short, white; disc florets 6-10, exceeding the involucre.

Flowering period March-August

Occurrence C E

Podolepis gracilis (Lehm.) Grah.; slender podolepis (Plate 21)

Herb to 0.3m, hairy annual. *Leaves* alternate, entire, narrowly ovate, stem-clasping at the base, cottony hairy, 30-45mm long. *Flowers* in heads on long peduncles, involucre 20-25mm across; ray florets 20-25, bilobed at the apex, pale pink to white; disc florets numerous.

Flowering period September-December

Occurrence A A

Podotheca chrysantha (Steetz) Benth.; yellow podotheca

Herb to 0.5m, annual. *Leaves* linear or narrowly elliptic, 10-100mm long, 1-5 mm wide, glandular pubescent. *Flowers* in terminal heads, involucre 10-20mm long, 10-40mm in diameter; disc florets numerous, exceeding the involucre, yellow.

Flowering period August-November

Occurrence A E

Senecio lautus G. Forster ex. Willd.

Herb to 0.6m, erect annual, stems pink near base. *Leaves* alternate, very variable, to 100mm long, margins dissected. *Flowers* in loosely branched terminal inflorescence, 23-35mm across, yellow; ray florets 7-9, separated at the base, 5-10mm long; disc florets numerous, bisexual. *Fruit* achene with pappus of long hairs. *Note* material from the Perth region comprises two subspecies, *S.l. maritimus* described here and *S.l. dissectifolius* with finely dissected leaves.

Flowering period August-January

Occurrence D E

Siloxerus humifusus Labill.

Herb to 0.1m, diffuse branching annual. Leaves opposite at base, alternate higher up, linear to narrowly obovate, 10-30mm long, 1-2mm wide. Flowers 4-5 florets in partial heads surrounded by 10-13 white or pale pink bracts; compound heads, ovoid 6-29mm long, 5-13mm in diameter, surrounded by floral leaves; tube of disc florets swollen in lower half.

Flowering period October-January

Occurrence A B

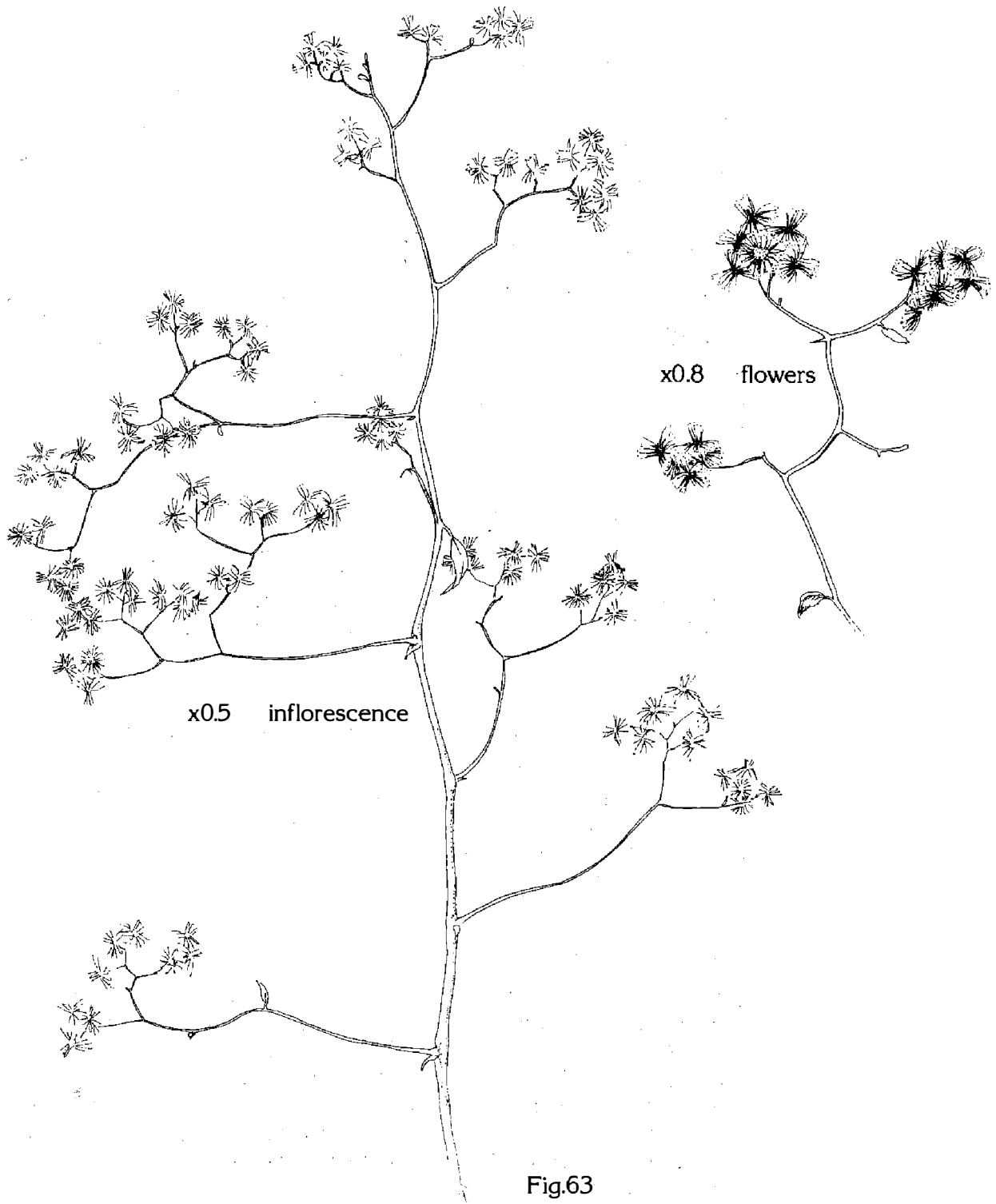
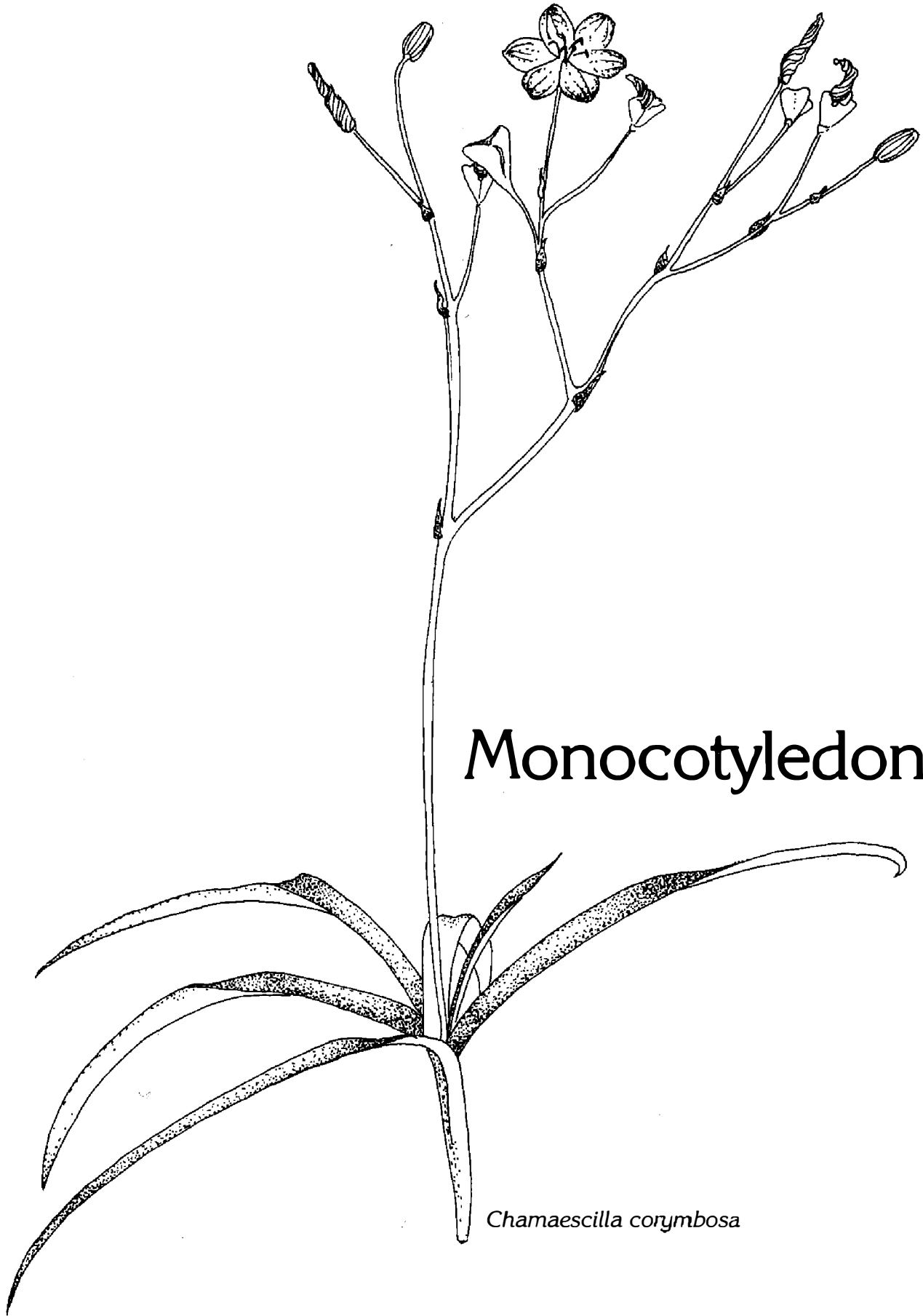


Fig.63



Monocotyledons

Chamaescilla corymbosa

JUNCAGINACEAE

This is a small family, commonly called water ribbons, with three genera that occupy marshy and coastal habitats. Two genera occur in Australia — *Triglochin*, which is represented on campus and *Maudinia*, which is native to Queensland and New South Wales.

The plants produce a rhizome which gives rise to either fibrous or tuberous roots. The leaves also arise from this rhizome, sheath each other at the base and may be erect or floating. The flowers have 4 or 6 perianth segments which form 2 whorls. The ovaries are superior, may be composed of 2 or 6 unfused or partly fused carpels and the styles are short frequently with a feathery stigma.

Triglochin procera is the only species found on campus. It produces tuberous roots which the Aborigines used as a source of food.

Triglochin procera R.Br.; arrowgrass

Herb to 2m, perennial, thick rhizome with roots terminating in a tuber. *Leaves* emergent from still water, to 2m long. *Inflorescence* raceme with numerous flowers; perianth segments 6 in two whorls, green, reddish at the tip.

Flowering period June-November

Occurrence D

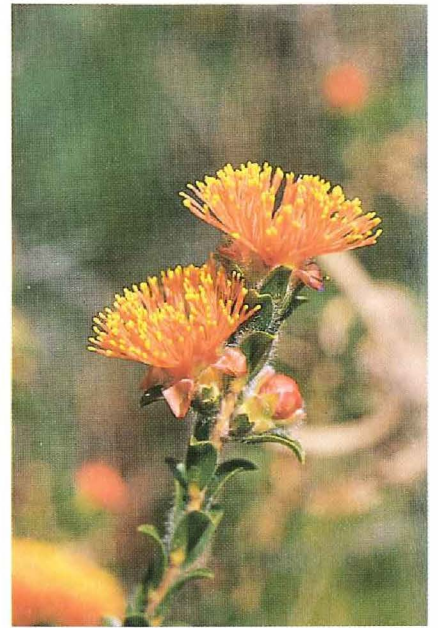
- 15. *Scholtzia involucrata*
- 16. *Hypocalymma robustum*
- 17. *Eremaea pauciflora*
- 18. *Beaufortia elegans*



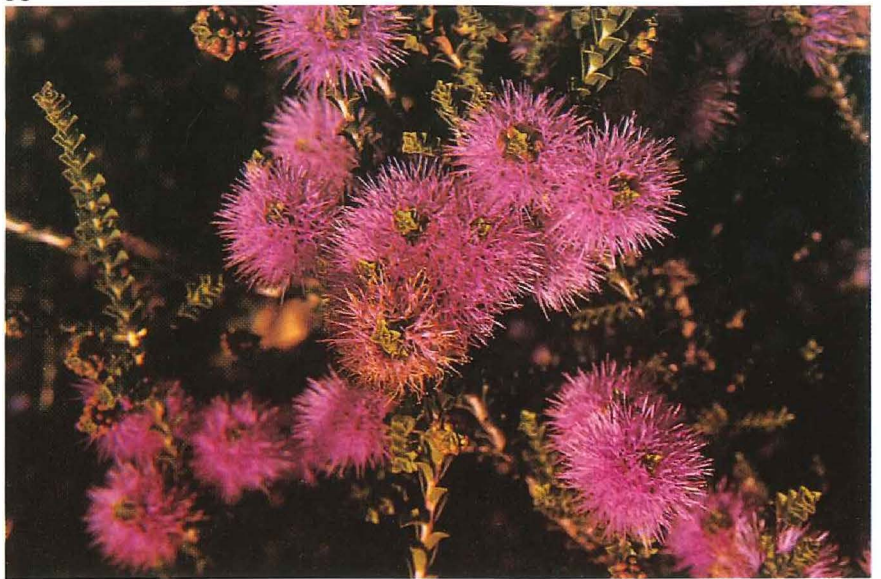
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17



18



19

- 19. *Lechenaultia biloba*
- 20. *Brachycome iberidifolia*
- 21. *Podolepis gracilis*



20



21

COMMELINACEAE

This is a fairly small family with 700 species worldwide and twenty-nine in Australia. As in the Liliaceae, these plants have flowers with a superior ovary and 6 stamens but differ in that the perianth segments are clearly divided into a calyx (3 sepals) and corolla (3 petals). Only one species occurs on campus (*Cartonema philydroides*) which is in a genus that is placed in a separate family (Cartonemaceae) by some authors. Aborigines are known to have eaten fleshy tubers in this genus.

Cartonema philydroides F.Muell.

Herb to 0.3m, perennial, glandular hairs on stems, leaves, and sepals. *Leaves* wrapping at base. *Flowers* in a dense raceme, may have short branches at base; sepals green; petals obovate, yellow.

Flowering period October-November

Occurrence A

RUSHES, REEDS AND SEDGES

Rushes, reeds and sedges are often difficult to distinguish at the family, genus and species level. Listed below are characteristics of these families which should enable you to determine your specimen's family. The features which distinguish species in these groups are often difficult to see and simple descriptions are not possible. For these reasons identification tables are not included. Instead, compare your specimen with the figures provided. The overall inflorescence shape and stem cross-section are the most obvious distinguishing features.

Restionaceae (p.98)

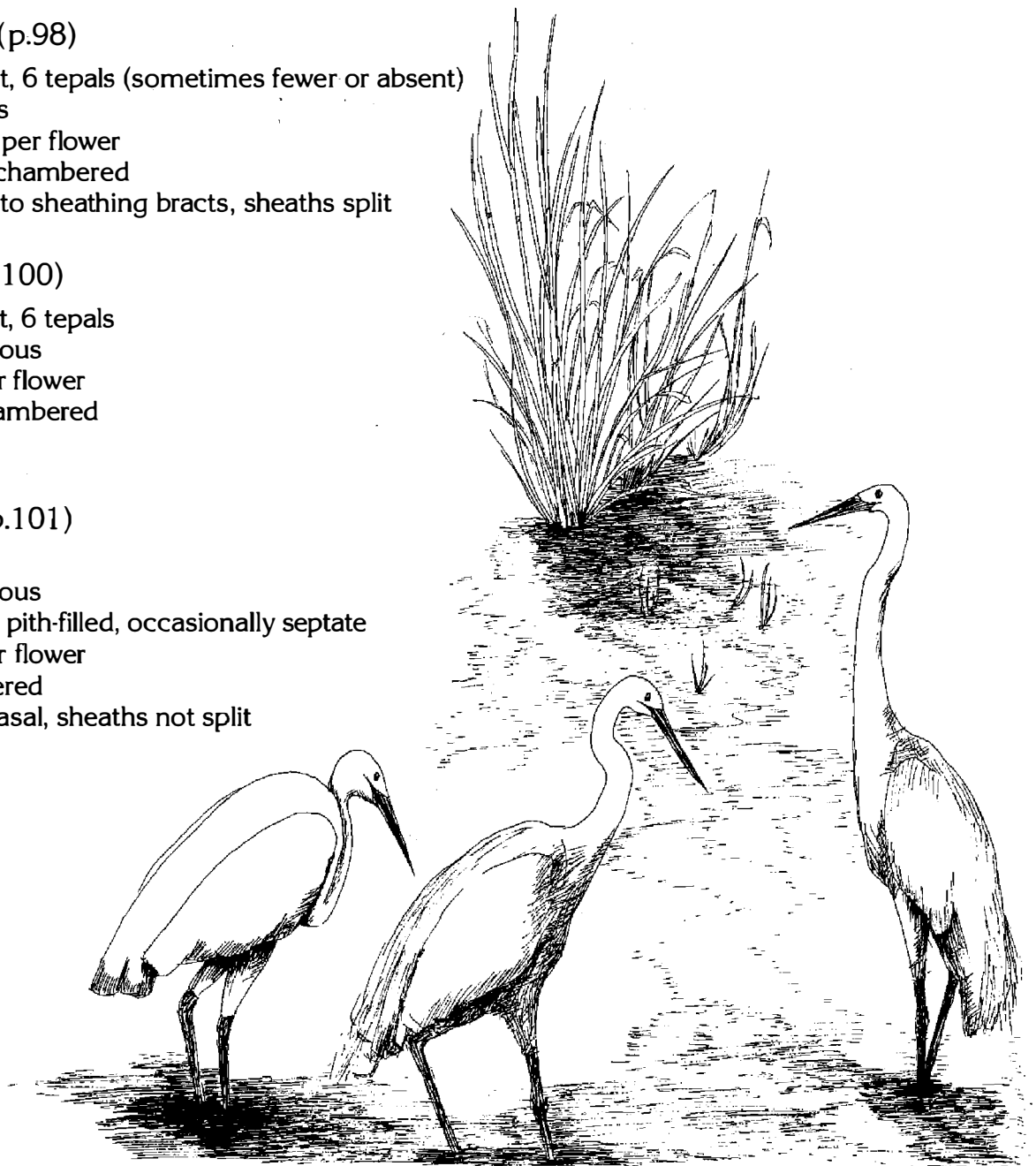
perianth present, 6 tepals (sometimes fewer or absent)
plants dioecious
stamens 3 or 6 per flower
ovary 1, 2 or 3-chambered
leaves reduced to sheathing bracts, sheaths split

Juncaceae (p.100)

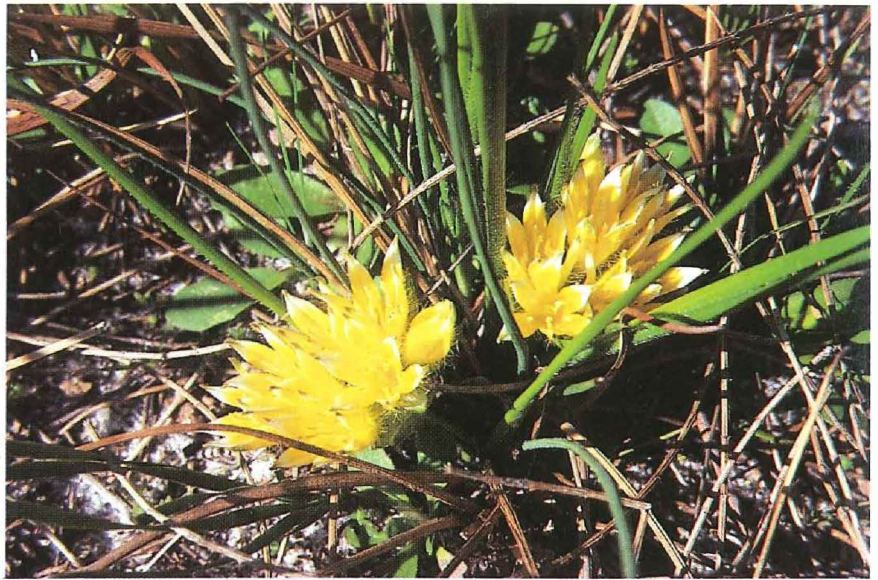
perianth present, 6 tepals
plants monoecious
stamens 3-6 per flower
ovary 1 or 3-chambered
leaves basal

Cyperaceae (p.101)

perianth absent
plants monoecious
stems generally pith-filled, occasionally septate
stamens 1-3 per flower
ovary 1-chambered
leaves mainly basal, sheaths not split



- 22. *Conostylis juncea*
- 23. *Conostylis aculeata*
- 24. *Burchardia umbellata*
- 25. *Thysanotus multiflorus*



22



23



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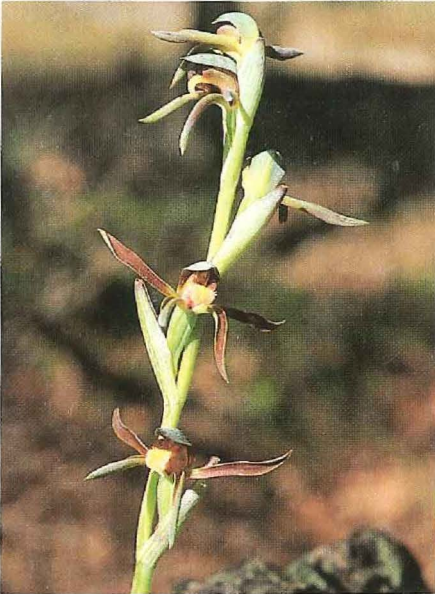


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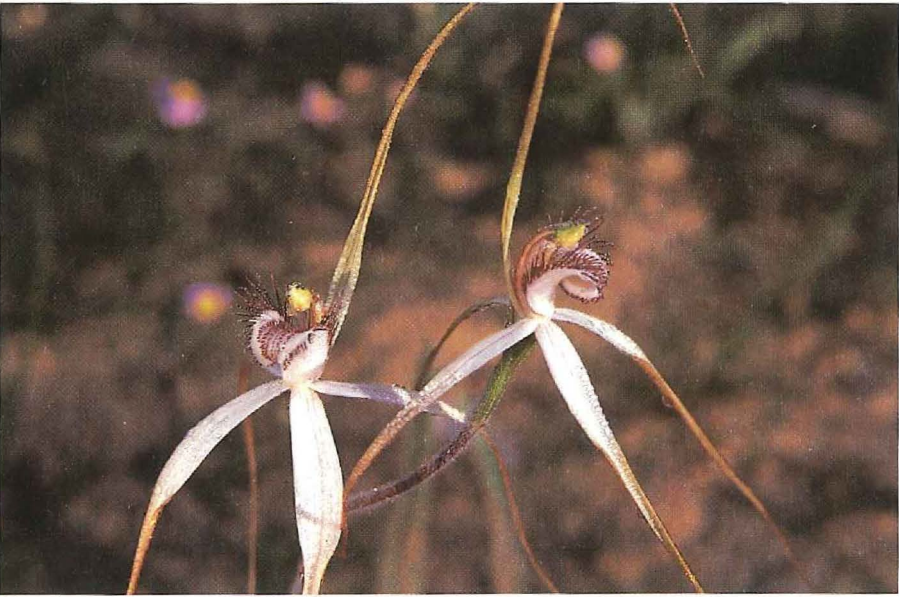
- 26. *Patersonia occidentalis*
- 27. *Lyperanthus serratus*
- 28. *Elythranthera brunonis*
- 29. *Caladenia patersonii*



27



28



29

RESTIONACEAE

This is a southern hemisphere family of sedge-like plants which has its greatest diversity in southwestern Australia. Thirteen genera are endemic to Western Australia but only one of these is represented among the five species on campus.

The plants are typically herbs with creeping rhizomes which produce compact clumps. The stems are erect, may be branched or unbranched and the leaves are usually reduced with sheaths which are split. Many genera are dioecious and the male and female plants may look very different. The flowers are borne in compact spikelets which may be solitary or on a branched inflorescence. Six or fewer tepals are present in each flower, the males having 3 or sometimes 6 stamens while the females have ovaries with 1, 2, or 3 style branches. Vestigial stamens or ovaries may be present in the female and male flowers.

Empodisma gracillimum (F. Muell.) L.A.S. Johnson and Cutler (Fig.64A)

Herb to 0.7m, perennial, rhizomatous; stems branched, flexuose, 0.5-1mm wide. Leaves, lower leaves to 15mm long; upper leaves and bracts shorter with upper half widely spreading with reflexed points; bracts awned. Inflorescence dioecious; male of 2-12 spikelets, 3-4mm long, contained within bracts; female of 1 or 2 spikelets on long peduncle, protruding from bracts; perianth segments 6; male 2.5mm long, stamens 3; female 1mm long.

Flowering period September-February

Occurrence B D

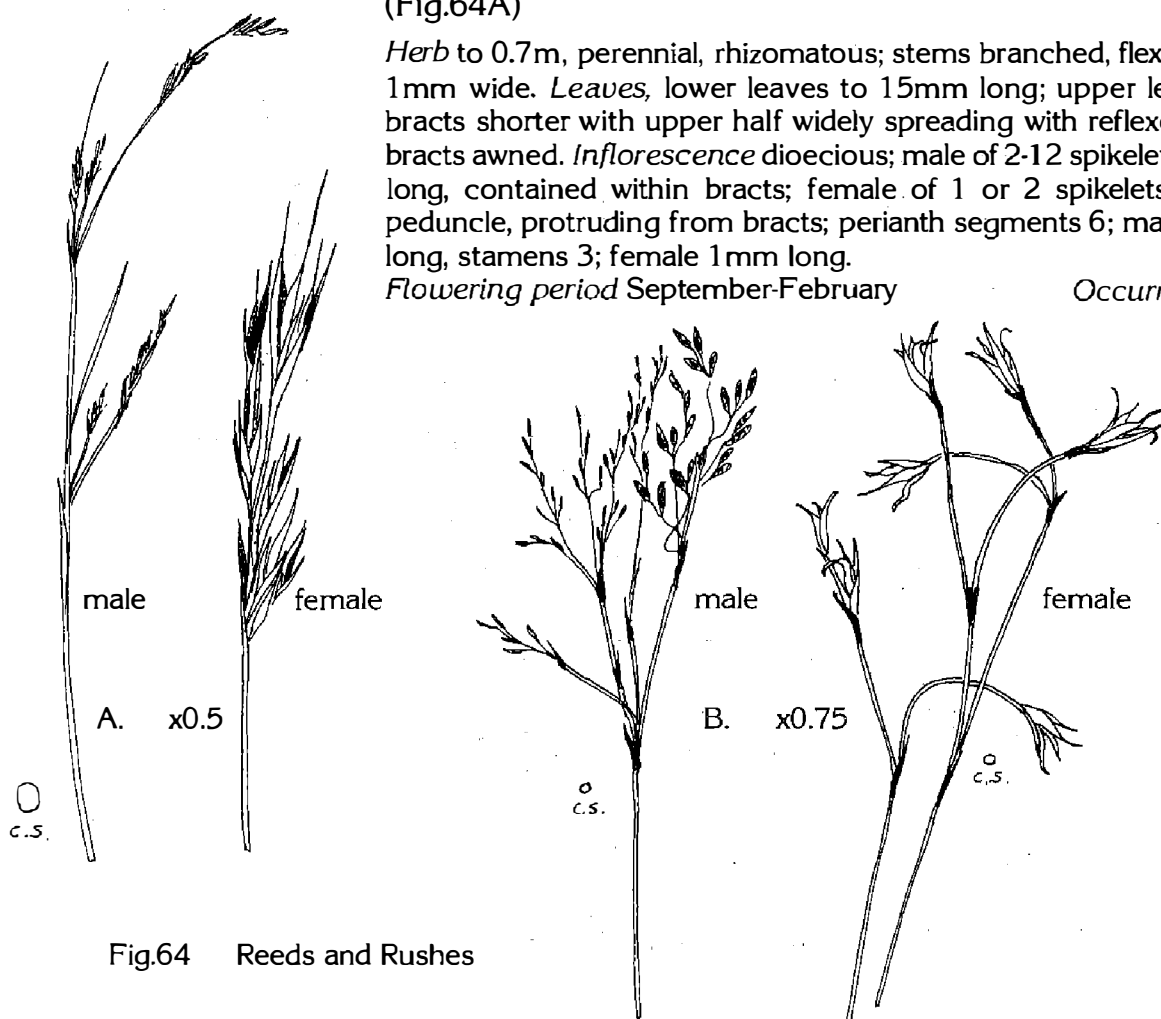


Fig.64 Reeds and Rushes

Hypolaena exsulca R.Br.; (Fig.64B)

Herb to 0.75m, perennial, erect; stems branched, scaly white lines alternating with green bands. Leaves pressed close to stem except when basal. Inflorescence dioecious; male of 10-40 spikelets in most bracts; female 1 or 2 flowers together, many empty bracts.

Flowering period September-December Occurrence A B C

Leptocarpus aristatus R.Br.; bearded twine rush (Fig.64C)

Herb to 0.8m, perennial, densely tufted. Leaves somewhat translucent, marked with several lines. Inflorescence dioecious; male spikelets clustered in each node, many flowers without bracteoles; female spikelets sessile, solitary or in terminal clusters of 2 or 3, more erect and compact than male inflorescence.

Flowering period July-September Occurrence B C E

Loxocarya flexuosa (R.Br.) Benth.; (Fig.64D)

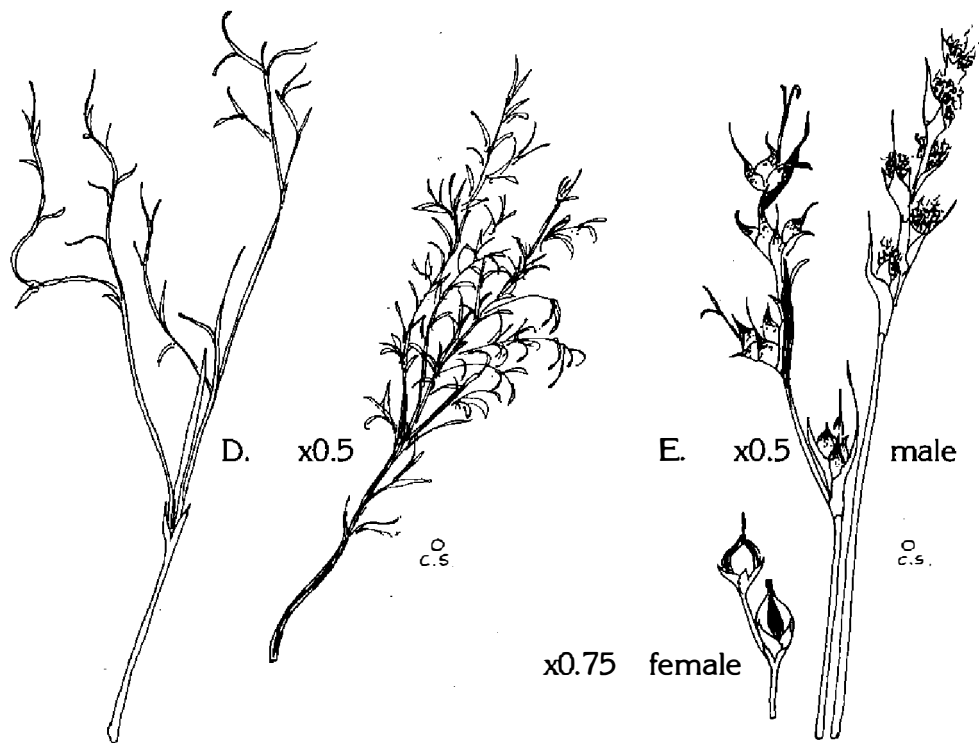
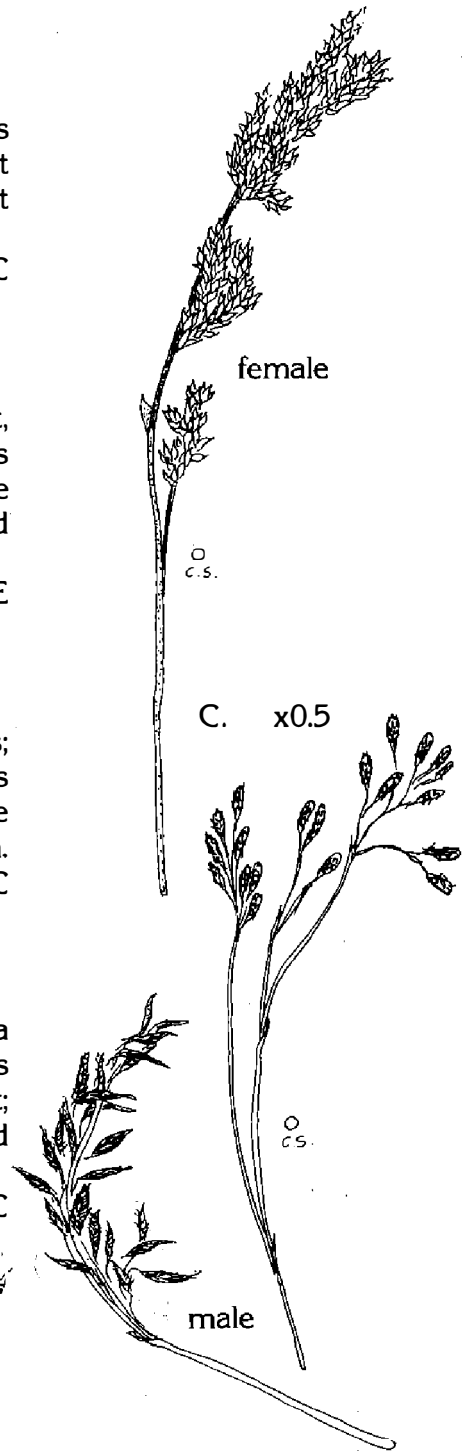
Herb to 0.3m, perennial, tufted, forms a mat, usually hairy on branches; stem branched, prostrate. Two growth forms. Leaves and bracts longitudinally ribbed often with fringe of long hairs at the top of the sheath. Inflorescence dioecious; sessile spikelet at end of each branch.

Flowering period September-October Occurrence A B C

Lyginea barbata R.Br. (Fig.64E)

Herb to 0.7m, perennial, rhizomatous, stem erect. Leaves tapering to a long fine point. Inflorescence dioecious; male 3-14 clustered spikelets towards end of branches, each cluster surrounded by a broad bract; female 1-3 spikelets towards end of branches, surrounded by a broad bract.

Flowering period August-February Occurrence A B C



JUNCAEAE

The rushes form a small but widespread family closely related to the Restionaceae. There are only eight genera worldwide, two of which occur in Australia, *Juncus* and *Luzula*.

These plants are generally herbaceous perennials (sometimes annuals) which are tufted or rhizomatous. The leaves are usually basal and flat, channelled, terete or reduced to sheaths. Some stems and leaves may have diaphragms of partitioning tissue (i.e. septate). The flowers are bisexual, have 6 tepals, 3 to 6 stamens and a superior ovary with a single style but 3 stigmas.

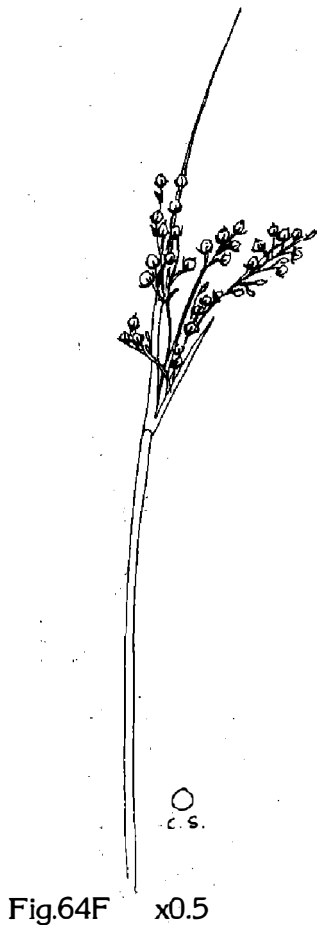
There are few economic uses of these plants and they can cause weed problems in irrigation areas and pasture where there is a high water table.

Juncus pallidus R.Br.; pale rush (Fig.64F)

Herb to 2m, perennial; stems terete, finely lined, arising from a creeping rhizome. *Leaves* basal, usually reduced to a scale-like sheath, many have a pointed blade, dark brown at base paler above. *Inflorescence* erect panicle; flowers numerous; perianth segments acute, straw coloured.

Flowering period October-November

Occurrence B



CYPERACEAE

The sedge family consists of large grass-like herbs which occupy most habitats containing flowering plants. There are approximately 4,000 species worldwide, 650 of these occurring in Australia.

The plants are characteristically perennial or annual herbs which are tufted, rhizomatous or produce stolons. The stems are usually terete or variously angled, pith-filled and have transverse septa. The leaves are mainly basal and the sheath around the stem is not split (one feature which distinguishes these plants from the Restionaceae), and the blades may be grass-like, terete or reduced. The flowers are similar to grass florets with superior ovaries, no perianth and associated with dry bracts (glumes). They contain 1 to 3 stamens with basifixed anthers. Styles may be undivided but more usually 2 to 4-branched. There may be leaf-like bracts at the base of each inflorescence and these are often longer than the inflorescence.

Members of this group have a long history in human affairs. The plants have been used for such purposes as food, weaving, thatching, medicine, perfume and paper making (*Cyperus papyrus*).

Baumea articulata (R.Br.) S.T. Blake; (Fig.65A)

Herb to 2.5m, perennial; stem terete, c. 13mm diameter, hollow, articulate. *Leaves* basal, erect, more articulate than stems. *Inflorescence* 20-40cm long, basal bracts leaf-like but with shorter blade; spikelets numerous, 3-4.5mm long; glumes denticulate; anthers c. 2.5mm long; style prominent. *Nut* whitish.

Flowering period September-December

Occurrence B

Cyperus tenuiflorus Rottb.; scaly sedge (Fig.65B)

Herb to 0.9m, perennial, tufted; stem flat or 3-angled, 1.5-3mm wide, ribbed. *Leaves* shorter than stem, 3-4mm wide. *Inflorescence* with clustered, many flowered spikelets; spikelets 7-20mm long; glumes 2-2.5mm long, 2-veined; stamens 3, anthers 1-1.5mm long; style 3-branched. *Nut* 3-angled.

Flowering period October-April

Occurrence B

Fimbristylis velata R.Br.; (Fig.65C)

Herb to 0.15m, annual, tufted; stems ribbed. *Leaves* shorter than stem, tapering to a point. *Inflorescence* umbel of spikelets; spikelets 5-7mm long, hairy; stamens 1; style hairy, stigma 2-branched; ovary hairy.

Flowering period December-March

Occurrence B



Fig.65A. x0.3

Lepidosperma angustatum R.Br.; (Fig.65D)

Herb to 0.8m, perennial; stem compressed, 1-3mm wide, smooth. Leaves shorter than stem, blades stem-like but more compressed. Inflorescence dense, cylindric or conical, 20-60mm long; spikelets 5-7mm long, narrowly ovoid; anthers 2.5-3mm long. Nut shortly cylindric or ellipsoid, 2.5-3 mm long.

Flowering period March-July, October-November Occurrence A B

Lepidosperma drummondii Benth.; (Fig.65E)

Herb to 0.8m, perennial, in clumps up to 1m in diameter; stems 4-9mm wide, almost flat, edges acute. Leaves shorter, more compressed and wider than stem, dark apices. Inflorescence erect, to 170mm long, narrow, 3-angled axis; spikelets 6-8mm long, 2-flowered; anthers 3-3.5mm long. Nut ovoid, 3-4mm long.

Flowering period May-July Occurrence C E

Lepidosperma longitudinale Labill.; pithy sword-sedge (Fig.65F)

Herb to 2m, perennial; stems 4-7mm wide, convex, edges often compressed, smooth. Leaves shorter and more compressed than stem but wider, yellowish at base, dark at apex. Inflorescence 90-300mm long, narrow, 3-angled axis; panicles 5-7mm long, 2 or 3-flowered, anthers 3-3.5mm long. Nut ovoid, 3-4mm long.

Flowering period May-June and October Occurrence B E

Lepidosperma tenue Benth.; (Fig.65G)

Herb to 0.5m, perennial; stems slender, smooth, terete with furrow on one side. Leaves shorter than stems, slender. Inflorescence compound, 2.5-8cm long; spikelets clustered or single, sessile along stem; outside glumes obtuse, inner glumes acute.

Flowering period March-July Occurrence B

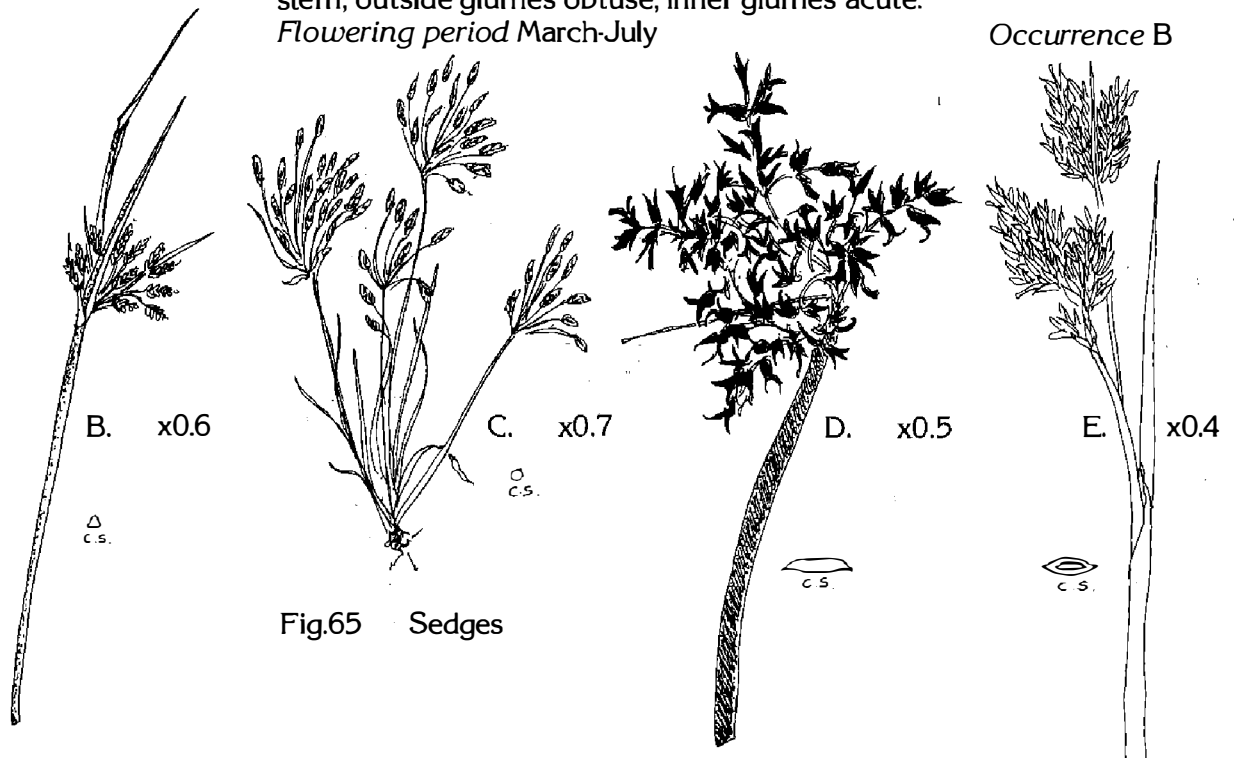


Fig.65 Sedges

Mesomelaena stygia (R.Br.) Nees; (Fig.65H)

Herb to 0.35m, perennial, erect; stems terete, 0.7-1.5mm diameter, finely ridged. Leaves sheath yellow-brown, blades membranous to 30mm long. Inflorescence 5-12mm diameter, sometimes with only one spikelet; spikelets 5.5-7mm long; glumes 5-10 with awn; anthers 3mm long with apical appendage 1-1.5mm long. Nut 3-3.5mm long. Flowering period March-July Occurrence A B C E

Schoenus curvifolius (R.Br.) Benth.; (Fig.65 I)

Herb to 0.4m, perennial; stems terete or slightly compressed, 0.5-1.5mm wide, arising from underground cluster of bases. Leaves basal, much shorter than stems, curved, ends tapering to a point. Inflorescence compact head 8-15mm long; spikelets 5-7mm long, 1 or 2-flowered; stamens 3, anthers c. 3mm long. Nut 1-1.75mm long, ends hairy.

Flowering period July-September

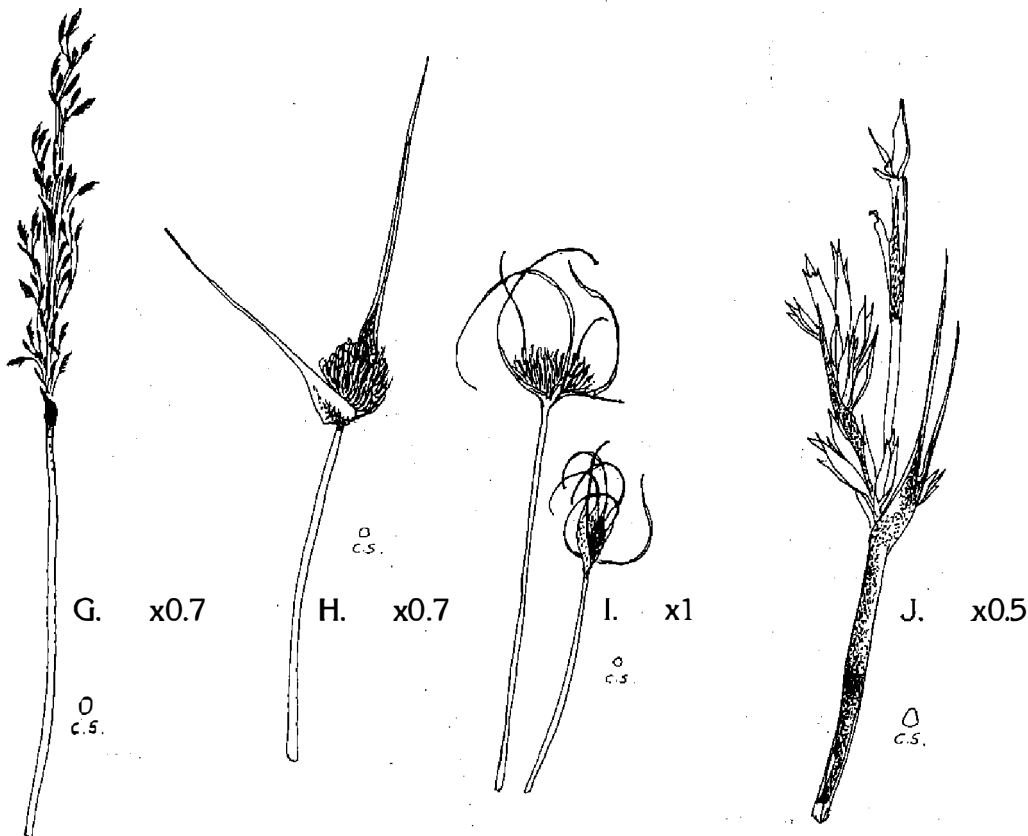
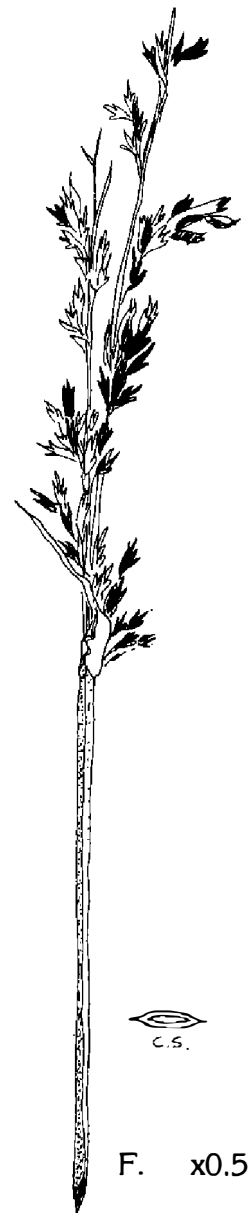
Occurrence A E

Tetraria octandra (Nees) Kuek.; (Fig.65J)

Herb to 1.2m, perennial; stem terete, 3-angled below inflorescence, 1-3mm diameter, leaf-like bracts present. Leaves mainly basal, blade 2-4mm wide, often twisted or curved. Inflorescence to 25mm long; spikelets clustered in stem bracts, 10-15mm long; stamens 6-8 rarely 4, anthers c. 6 mm long; style 4 or 5-branched. Nut c. 5mm long, 4-ribbed.

Flowering period June-November

Occurrence A C E



POACEAE

The grasses are probably the most cosmopolitan family of flowering plants. There are about 9,000 species worldwide and they occur in habitats ranging from sub-polar to tropical, and from saline, wind-blown coastlines to alpine regions. The group is very important economically as it includes the world's major food crops — wheat, rice, maize and sugarcane.

Individual flowers of a grass are called florets. These are unusual because there is no perianth (the flowers are wind pollinated) and the sexual structures are surrounded by two dry bracts called the palea and the lemma. The palea partially envelopes the stamens and ovary while the lemma is opposite the palea and is usually larger. There may be a long bristle or awn on the lemma and sometimes the palea. One or more florets are contained in spikelets at the base of which are two bracts called glumes. Spikelets may be arranged in spikes, heads, tassels or panicles on the flowering branch. The growing point (meristem) in grasses is in a very low position on the plant. This has enabled these plants to occupy such a wide range of habitats as the meristem is protected from adverse climatic conditions such as grazing and fire.

There are over ten species on campus but only two of these are native. The introduced species are most obvious in the disturbed areas where perennial veldt grass (*Ehrharta calycina*) forms a dominant component of the vegetation. This weed is very difficult to control, except by grazing, and the yellow-brown appearance of the dead foliage is a common sight in many metropolitan reserves.

Amphipogon laguroides R. Br.

Herb to 0.3m, perennial, erect, tufted, rhizomatous. Leaves 0.5-2mm wide, 30-200mm long, apex pungent. Spikelets clustered into dense panicle 10-15mm long, yellow when dry; glumes 5-6mm long; lemma 7-11mm long, hairy.

Flowering period November-February

Occurrence A

Amphipogon turbinatus R. Br.(Fig.66)

Herb to 0.35m, perennial, tufted, rhizomatous. Leaves 0.5-1mm wide, 30-130mm long, curled, surface may have hairs up to 1mm long. Spikelets clustered into dense panicle 15-30mm long, blue-grey; glumes 12-13mm long, hairy; lemma 14-17mm long, hairy.

Flowering period September-November

Occurrence A

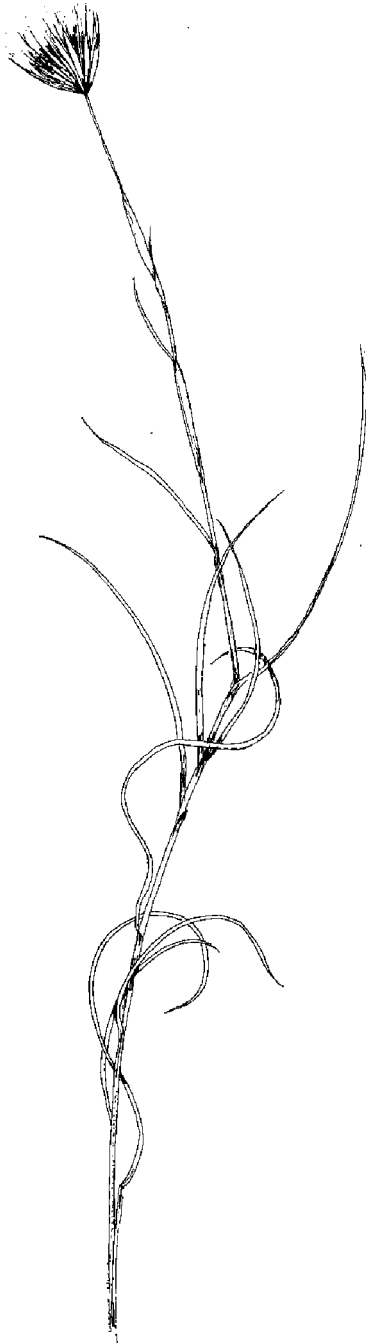


Fig.66 x0.5

HAEMODORACEAE

The Kangaroo paw family, with its family name taken from *Haemodorum*, consists of thirteen genera, seven of which occur in Australia. The Australian genera are characterized by having an inferior ovary and 3 or 6 stamens which are often fused to the perianth. Six genera are endemic to the southwest of Western Australia. These are *Anigozanthos*, *Blancoa*, *Conostylis*, *Macropidia*, *Phlebocarya* and *Tribonanthes*. *Anigozanthos* species and their hybrids are grown in Australia and overseas as ornamentals (many are grown in Murdoch University gardens) and for cut-flower production. Four genera are native to the Murdoch campus, *Anigozanthos*, *Conostylis*, *Haemodorum* and *Phlebocarya*. The tufted clumps of *Conostylis* and *Phlebocarya* can readily be distinguished when not in flower by the dead, glabrous, stick-like inflorescence structure in *Phlebocarya* compared with the clusters of old hairy flowers in *Conostylis*. *Anigozanthos* species are generally bird pollinated while *Conostylis*, *Haemodorum* and *Phlebocarya* are insect pollinated.

Species	Flower colour	Flowers hairy or glabrous	Number of stamens	Leaves
<i>Anigozanthos humilis</i>	yellow-red	hairy	6	flat, margins hairy
<i>A. manglesii</i>	green + red	hairy	6	flat, glabrous
<i>Conostylis aculeata</i>	yellow	hairy	6	flat, glabrous
<i>C. candicans</i>	yellow	hairy	6	flat, pale grey hairs
<i>C. juncea</i>	yellow	hairy	6	terete, hairy
<i>C. setigera</i>	yellow	hairy	6	flat, soft white spines on margins
<i>Haemodorum paniculatum</i>	brown	glabrous	3	c. wrapping stem, glabrous
<i>Phlebocarya ciliata</i>	white or cream	glabrous	6	flat c. hairy on margins

Anigozanthos manglesii D. Don; kangaroo paw

Herb to 1.25m, perennial. Leaves flattened, glabrous. Flowers on one side of a raceme or spike on unbranched scape; perianth green with red base, lobes reflexed, densely hairy outside; stamens protruding.

Flowering period September-November Occurrence A B C E

Anigozanthos humilis Lindley; cat's paw (Fig.67)

Herb to 0.5m, perennial. Leaves flattened, usually hairy on margins. Flowers on one side of raceme or spike on an unbranched scape; perianth yellow-red, lobes straight, densely hairy outside; stamens not protruding.

Flowering period August-October

Occurrence A B C E

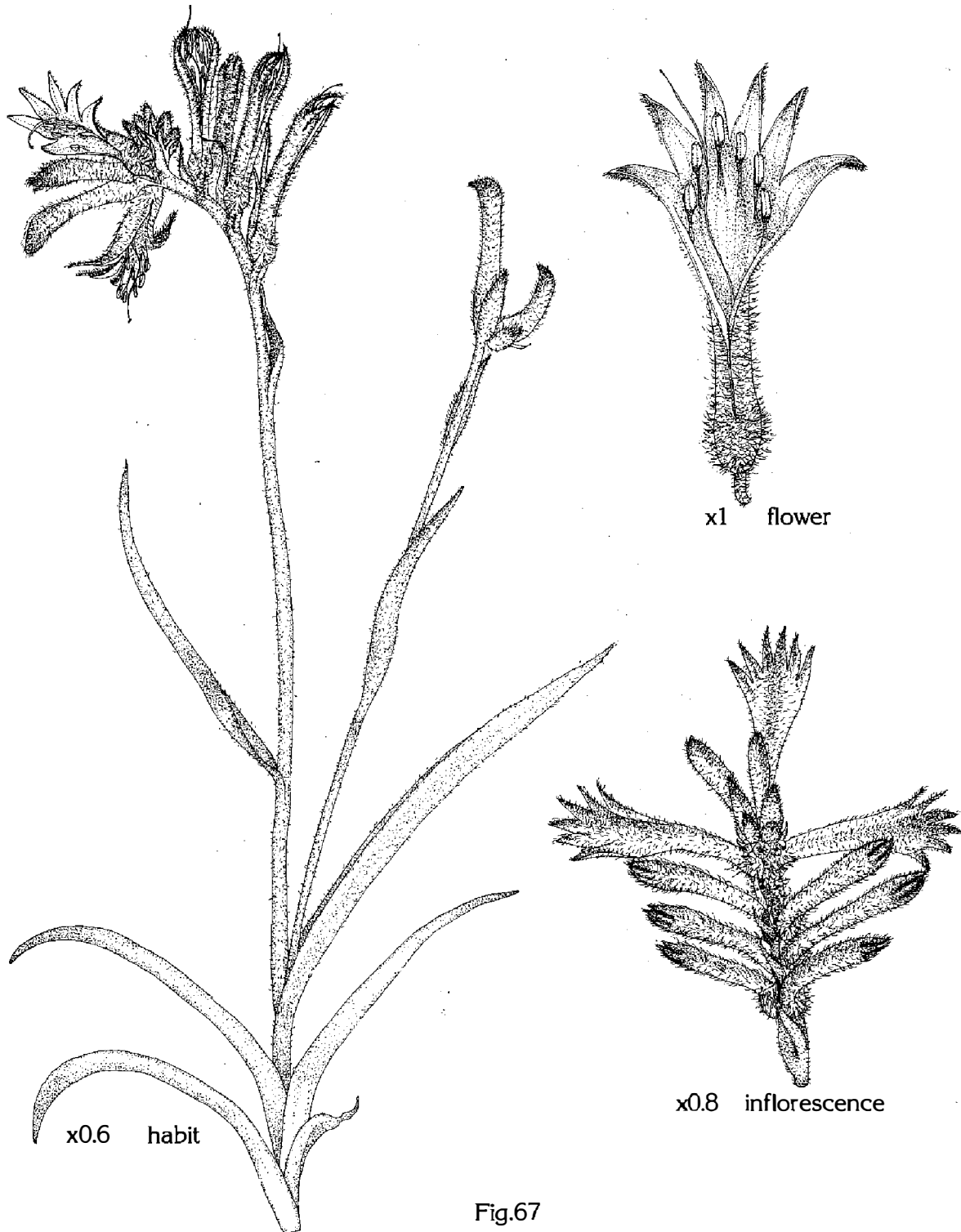


Fig.67

Conostylis aculeata R.Br.; (Plate 23)

Herb to 0.4m, perennial, forms distinct tufts. *Leaves* flat, glabrous or striate, stiff spines may be present on margins. *Flowers* in a loose cyme or panicle or compacted into a head, scape may be shorter or longer than leaves; perianth yellow outside, creamy-yellow inside, densely hairy outside.

Flowering period September-October

Occurrence A B C E

Conostylis candicans Endl.

Herb to 0.5m, perennial, distinct tufts or elongated stems. *Leaves* flat, covered by pale green hairs. *Flowers* on scape which may branch; perianth yellow outside, golden yellow inside, hairy.

Flowering period August-September

Occurrence B C E

Conostylis juncea Endl.; (Plate 22)

Herb to 0.4m, perennial, distinct clumps. *Leaves* terete or flattened but thick, hairy. *Flowers* in dense head-like clusters, scape hairy, much shorter than leaves; perianth bright yellow or greenish-yellow, outside covered with long rigid hairs.

Flowering period September-October

Occurrence A B C E

Conostylis setigera R. Br.

Herb to 0.25m, perennial, distinct tufts, stem short. *Leaves* flat, variable, margins with soft white spines. *Flowers* in a loose head, scape shorter than or same length as leaves; perianth yellow or yellow with red, hairy outside.

Flowering period September-October

Occurrence A C E

Haemodorum paniculatum Lindley

Herb to 0.8m, perennial. *Leaves* bases wrapping stem, glabrous. *Flowers* in loose panicle; scape longer than leaves, persistent after flowering; perianth brown to black, bracts at base c. length of perianth tube; anthers large, yellow.

Flowering period October

Occurrence A B C E

Phlebocarya ciliata R.Br.

Herb to 0.4m, perennial, tufted. *Leaves* basal, sheath margins and/or mid-line of back hairy, blades flat, hairy on margins. *Flowers* in a much branched inflorescence, small, scape usually glabrous; perianth with 6 equal length, free segments in 2 whorls, white or cream.

Flowering period September-November

Occurrence A B C E

LILIACEAE

The lily family has a large number of species (3,500 worldwide) and contains well known garden plants such as tulips, liliiums and hyacinths. The flowers are characterized by having 6 stamens, a superior ovary and 6 perianth segments which are often brightly coloured. There are forty-one genera of Australian lilies.

The attractive fringe lilies of the genus *Thysanotus* are the most familiar native species and are most diverse in southwestern Australia. Other genera such as *Stawellia*, *Hensmannia*, *Johnsonia* and *Annocrinum* are endemic to this region.

Eighteen species in twelve genera are present on campus. Flower colours range from white to yellow, blue and purple and are impressive when in full bloom during the spring. A number of the species on campus have underground tuberous roots or stems, including *Caesia parviflora*, *Chamaescilla corymbosa*, *Sowerbea laxiflora*, *Thysanotus patersonii*, *Tricoryne elatior* and *Burchardia umbellata*. *Thysanotus patersonii* roots were eaten by Aborigines.

The family has recently been divided into a number of smaller units. The new family names are given below with the species descriptions.

Species	Flower colour	Inflorescence	Perianth segments	Leaves
<i>Asphodelus fistulosus</i>	white with brown or purple stripes	loose	soft, entire	basal
<i>Burchardia umbellata</i>	white	compact	soft, entire	basal and on stem
<i>Caesia parviflora</i>	white outside, purple or blue inside	loose	soft, entire	basal
<i>Calectasia cyanea</i>	blue to purple	terminal, solitary	stiff, entire	on stem
<i>Chamaescilla corymbosa</i>	bright blue	loose	soft, entire	basal
<i>Corynotheca micrantha</i>	white to purplish-white	loose, solitary or paired	soft, entire	basal
<i>Dasypogon bromeliifolius</i>	yellow-brown	compact	stiff, entire	basal and on stem

continued

<i>Dianella divaricata</i>	blue	loose	soft, entire	mainly basal, some on stem
<i>Laxmannia grandiflora</i>	white	compact	soft, entire	basal
<i>Lomandra integra</i>	white with purple markings	compact to loose	soft, entire	basal
<i>L. suaveolens</i>	purple or yellow	compact	soft, entire	basal
<i>Sowerbaea laxiflora</i>	purple	compact	soft, entire	basal
<i>Thysanotus asper</i>	purple to blue	c. solitary	soft, fringed	basal
<i>T. multiflorus</i>	purple to blue	compact	soft, fringed	basal
<i>T. patersonii</i>	purple, blue to white	solitary to loose	soft, fringed	usually absent
<i>T. triandrus</i>	purple to blue	compact	soft, fringed	basal
<i>Tricoryne elatior</i>	yellow	loose to compact	soft, entire	on stem

Asphodelus fistulosus L.; onion weed
(Asphodeleaceae)

Herb to 0.8m, annual or short lived perennial. *Leaves* basal, terete or nearly terete, 1-3mm wide. *Flowers* loose on branched scape; perianth segments white with brown or purple central stripe, soft, entire. *Introduced.*

Flowering period June-October

Occurrence C E

Burchardia umbellata R.Br.; milk maid (Plate 24)
(Colchicaceae)

Herb to 0.6m, perennial, roots tuberous. *Leaves* basal and on stem, 5mm wide. *Flowers* 2-7 in compact head, perianth segments white, soft, entire; anthers conspicuous, yellow to red.

Flowering period August-September

Occurrence A B C E

Caesia parviflora R. Br.; pale grass lily
(Antheriaceae)

Herb to 0.45m, perennial, roots tuberous. *Leaves* basal, linear, may be flat or folded, crowded near base, fine nerved, 5mm wide. *Flowers* on loose panicle of racemes, scapes as long or longer than leaves; perianth segments white inside, blue or purple outside, soft, entire.

Flowering period September-November

Occurrence C

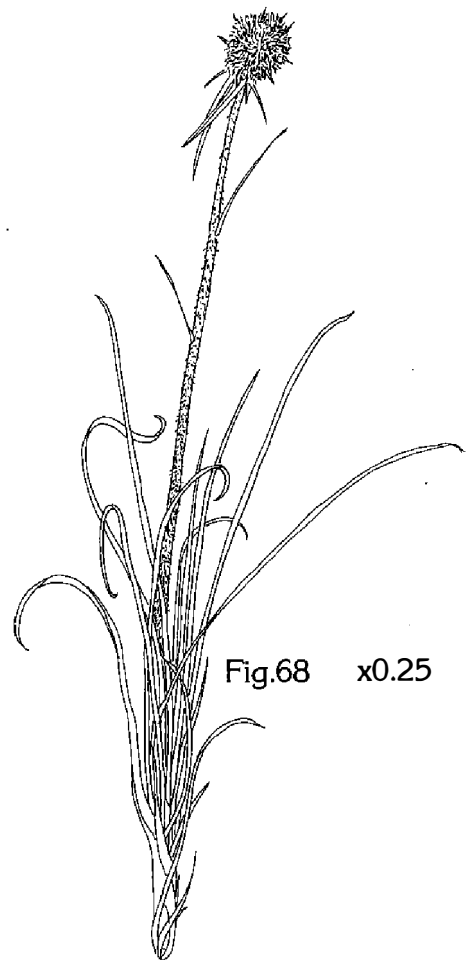


Fig.68 x0.25

Calactasia cyanea R. Br.; blue tinsel lily
(Dasygogonaceae)

Shrub to 1 m, perennial. Leaves on stem, covered with fine hairs, 1-3 mm wide. Flowers terminal, solitary; perianth segments blue, stiff, entire; anthers conspicuous, yellow or orange.

Flowering period June-September

Occurrence A C

Chamaescilla corymbosa (R.Br.) F.Meull. ex Benth.; blue squill
(Antheriaceae) (page 89)

Herb to 0.3 m, perennial, roots tuberous. Leaves basal, flat, broad (5 mm wide), round ended. Flowers loose on hairy scape as long as or longer than leaves; perianth segments bright blue, soft, entire.

Flowering period August-October

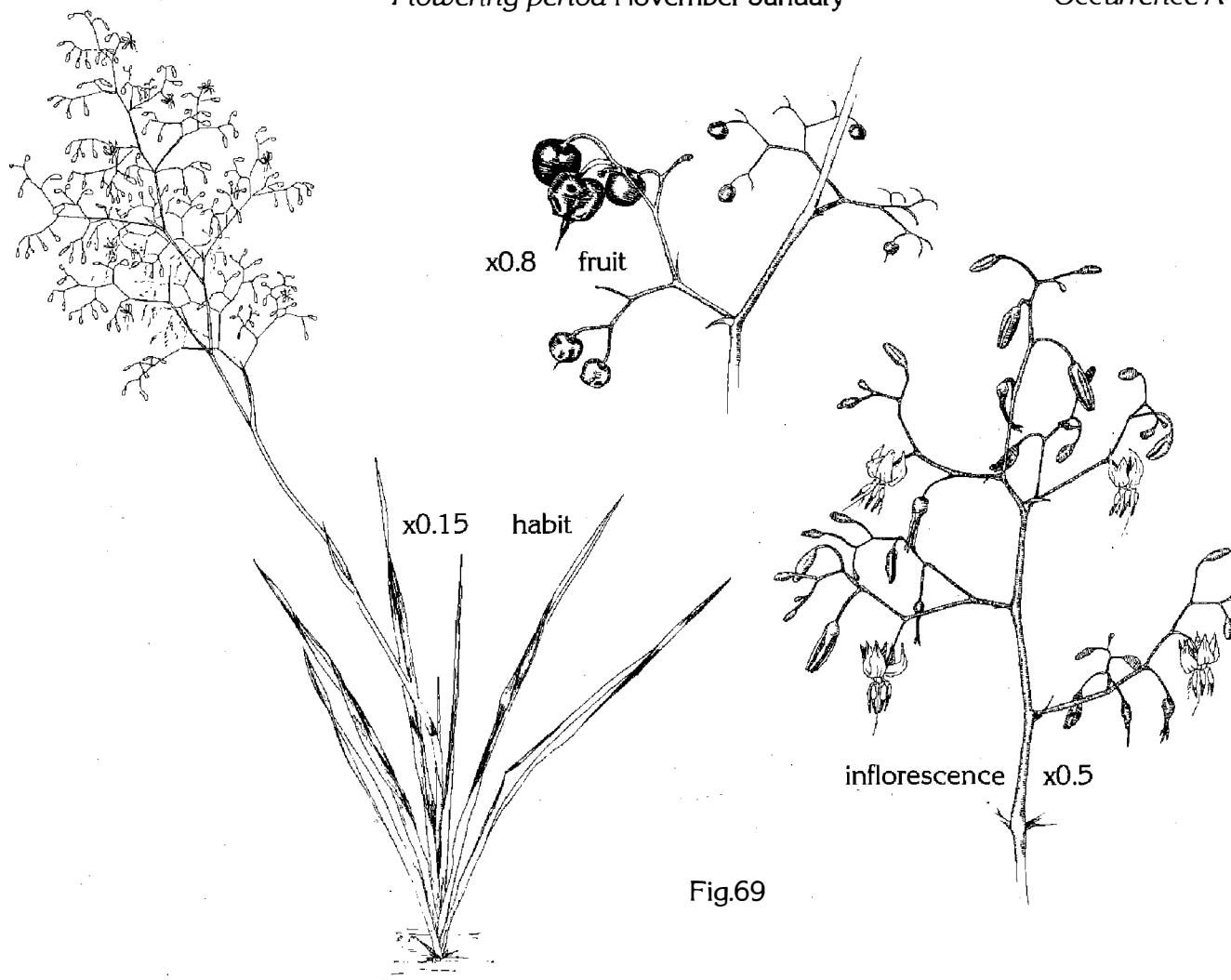
Occurrence A B C E

Corynotheca micrantha (Lindley) J.F. MacBride
(Antheriaceae)

Shrub to 0.4 m, perennial, branches dichotomous. Leaves absent in mature plants, leaf-like bracts on lower branches. Flowers loose, single or paired, pedicellate; perianth segments white or purplish white, soft, entire.

Flowering period November-January

Occurrence A



Dasypogon bromeliifolius R. Br.; pineapple bush (Fig.68)
(Dasypogonaceae)

Herb to 0.8m, perennial. *Leaves* basal and on stem, coarse spines on margins, 10-15mm wide. *Flowers* compact in spherical head, on hairy scapes which are longer than leaves, often persistent after flowering; perianth segments yellow brown, stiff, entire; anthers conspicuous, yellow-cream.

Flowering period September-January

Occurrence A B C E

Dianella divaricata R.Br.; (Fig.69)
(Phormiaceae)

Herb to 1m, perennial. *Leaves* mainly basal, 20-35mm wide, some on stem. *Flowers* in loose panicle, branching almost dichotomously, branches persistent after flowering; perianth segments blue, soft, entire. *Fruit* blue, fleshy.

Flowering period October-December

Occurrence A B C E

Laxmania grandiflora Lindley
(Antheriaceae)

Herb to 0.3m, perennial. *Leaves* in basal tufts, ending in short point, 1 mm wide. *Flowers* in compact head on scape which is much longer than leaves; perianth segments white, inner whorl shorter than outer whorl, soft, entire.

Flowering period July-October

Occurrence A C E

Lomandra integra T.D. MacFarlane; (Fig.70)
(Dasypogonaceae)

Herb to 0.8m, perennial, dioecious. *Leaves* basal, coarse. *Flowers* in compact raceme on end of scape; perianth segments white with some purple, soft, entire; scented.

Flowering period August-November

Occurrence A

Lomandra suaveolens (Endl.) Ewart
(Dasypogonaceae)

Herb to 0.4m, perennial, dioecious. *Leaves* basal, soft to stiff, splitting into fibres. *Flowers* in compact raceme on end of scape; perianth segments purple or yellow, soft, entire.

Flowering period April-July

Occurrence A

Sowerbaea laxiflora Lindley; purple tassels (Fig.71)
(Antheriaceae)

Herb to 0.45m, perennial, roots tuberous. *Leaves* basal, linear, 2mm wide. *Flowers* compact on end of scapes which are much longer than leaves; perianth segments purple, soft, entire; stamens conspicuous, yellow.

Flowering period August-October

Occurrence A B C E

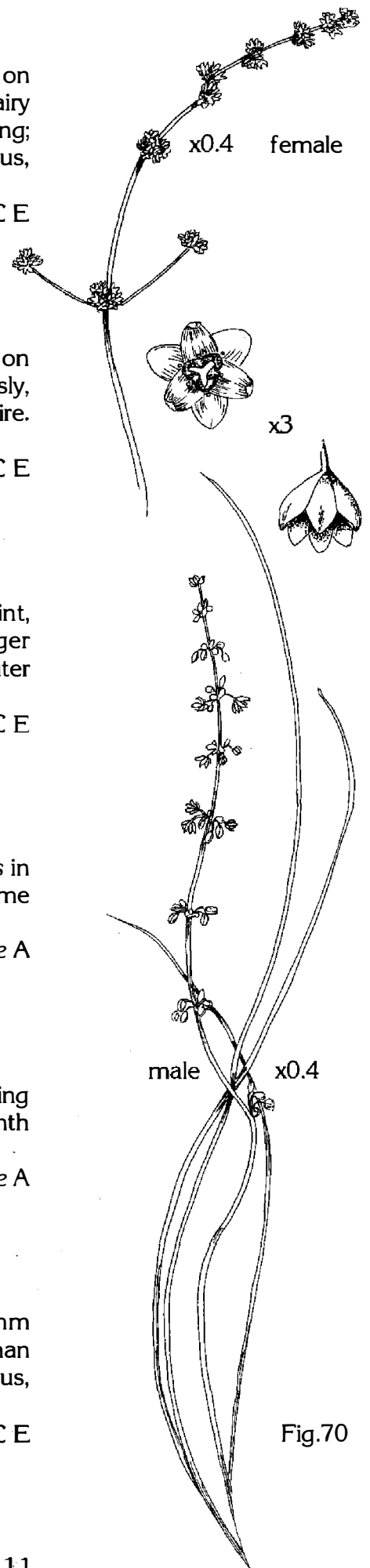
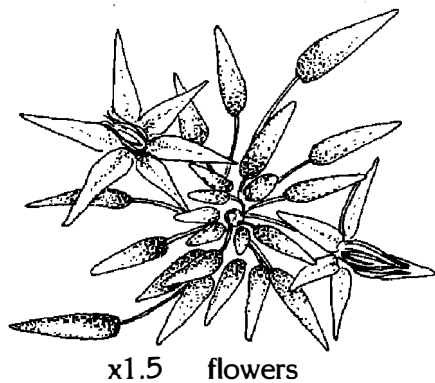


Fig.70



Thysanotus asper Lindley; hairy fringe lily
(Antheriaceae)

Herb to 0.35m, perennial, often more than one stem. *Leaves* basal, densely hairy, 2-3mm wide. *Flowers* several on end of unbranched scape which is much longer than leaves; perianth segments purple or blue, soft, inner whorl fringed; 3 anthers purple, 3 anthers yellow.

Flowering period October-January

Occurrence A

Thysanotus multiflorus R.Br.; many-flowered fringe lily
(Antheriaceae) (Plate 25)

Herb to 0.5m, perennial, can regenerate from rootstock. *Leaves* basal, flat or channelled, 2mm wide. *Flowers* compact on scape which is same length as leaves; perianth segments purple or blue, soft, inner whorl fringed.

Flowering period September-January

Occurrence A B E

Thysanotus patersonii R. Br.; twining fringe lily
(Antheriaceae)

Herb twining perennial, tuberous roots. *Leaves* usually absent. *Flowers* solitary; perianth segments white to purple or blue, soft, inner whorl fringed.

Flowering period August-November

Occurrence A B C E

Thysanotus triandrus (Labill.) R. Br.
(Antheriaceae)

Herb to 0.4m, perennial, can regenerate from rootstock. *Leaves* basal, covered with short stiff hairs, 2-3mm wide. *Flowers* compact on end of a scape which is the same length as leaves; perianth segments purple or blue, soft, inner whorl fringed.

Flowering period September-November

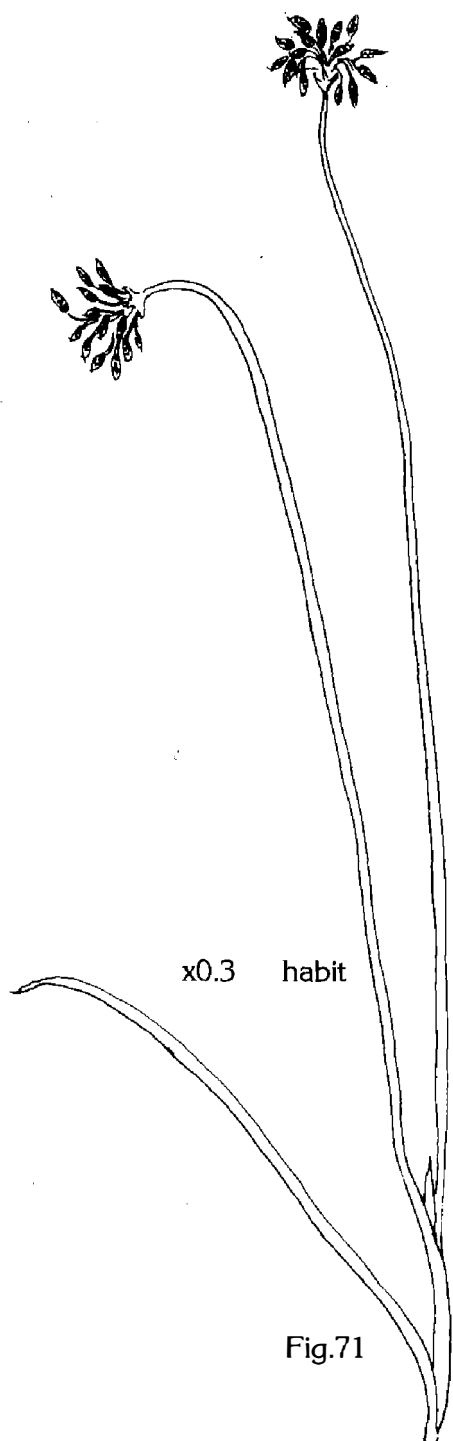
Occurrence A C

Tricoryne elatior R. Br.; yellow autumn lily.
(Antheriaceae)

Herb to 0.6m, perennial, swollen underground stem. *Leaves* on stem, brown and dry at flowering time, 3mm wide at base. *Flowers* 8-11 in compact to loose heads, perianth segments yellow, soft, entire.

Flowering period September-February

Occurrence A B C



x0.3 habit

Fig.71

IRIDACEAE

Members of this family are similar to the Liliaceae but differ by having an inferior ovary and only 3 stamens in each flower. Asexual reproduction is common in this group, new individuals developing from corms or rhizomes. The most familiar native genus is *Patersonia* but several other genera have become naturalized in Australia. These include *Homeria*, *Watsonia* and *Gladiolus*. Of the three species which occur on campus, two are introduced and one of these is very obvious from August to October when its pink flowers are in full bloom.

Patersonia occidentalis R.Br.; purple flag (Plate 26)

Herb forms clumps, perennial. *Leaves* several to many, crowded near base of stem and overlapping, sessile; flat, slightly ribbed, glabrous with short stiff hairs on margins. *Flowers* terminal, several enclosed in 2 rigid bracts; bracts green to dull brown; perianth three outer segments large, purple, lasting one day only.

Flowering period September-December *Occurrence* A B C E

Gladiolus caryophyllaceus (Burm.) Poiret

Herb to 0.8m. *Leaves* basal 4-6, blades sword-shaped sometimes spirally twisted, sparsely hairy; sheath hairy. *Flowers* 2-11 in a loose spike; floral bracts green; perianth bilaterally symmetrical, pink, strongly scented. *Introduced* from South Africa.

Flowering period August-October *Occurrence* A B C E

Romulea rosea var. *australis* (L.) Ecklon; Guildford grass

Herb to 0.5m, perennial, short stem covered by leaf bases. *Leaves* several, basal, compressed, cylindric. *Flowers* short lived; perianth funnel-shaped, lilac to pink, outer lobes yellowish green with 3 dark longitudinal stripes. *Introduced*.

Flowering period August-October *Occurrence* C E

XANTHORRHOACEAE

These plants were formerly in the Liliaceae and considered to be closely related to the genera *Dasypogon*, *Calectasia*, *Lomandra* and *Kingia*. However, Xanthorrhoeaceae has now been designated as a family with one genus, *Xanthorrhoea*, the familiar grass trees.

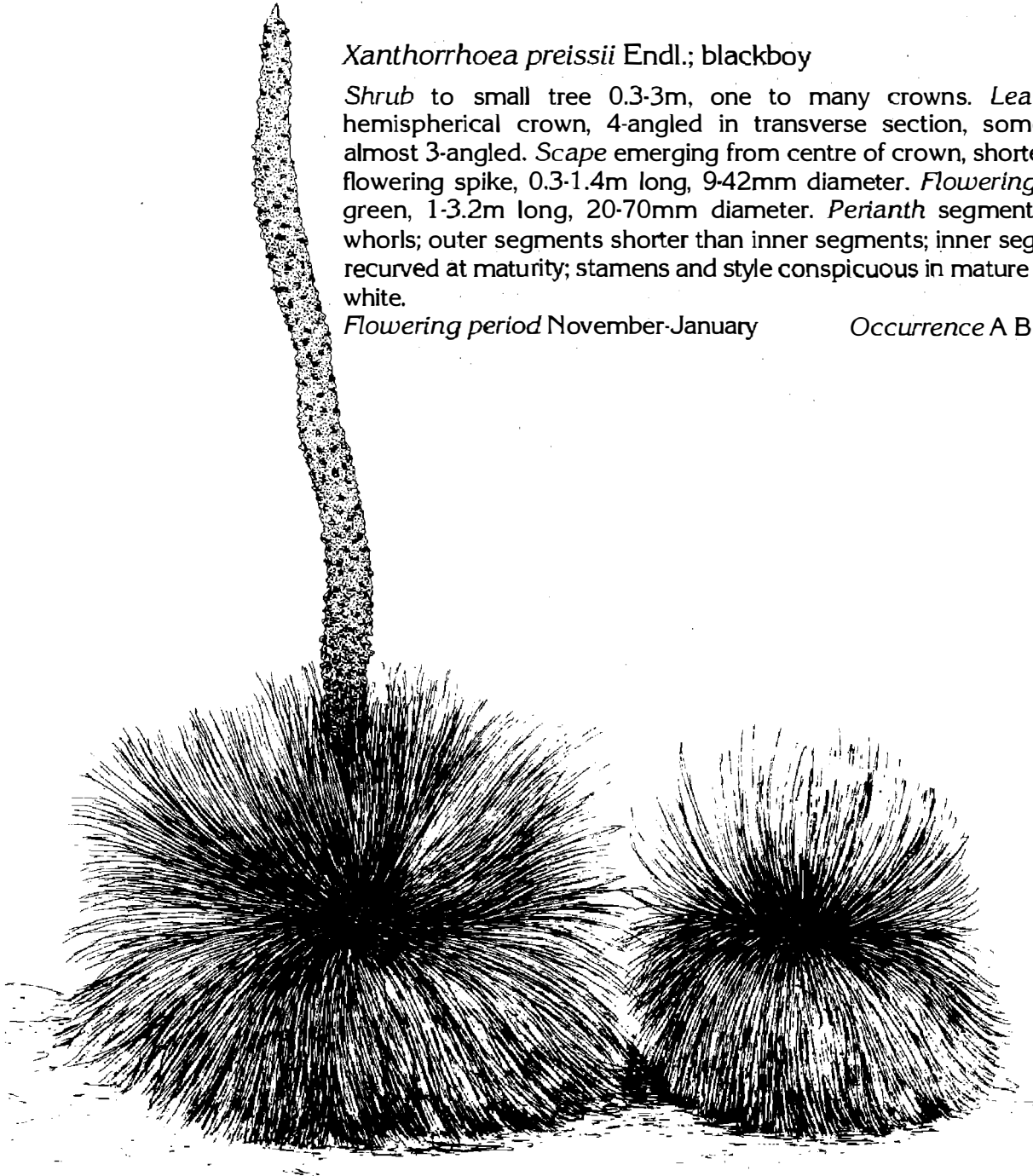
Although several species are found in Western Australia only one is found on campus, *Xanthorrhoea preissii*, which is readily recognized by its hard, long leaves, long flowering spikes and, when present, its black trunk.

Xanthorrhoea preissii Endl.; blackboy

Shrub to small tree 0.3-3m, one to many crowns. *Leaves* in hemispherical crown, 4-angled in transverse section, sometimes almost 3-angled. *Scape* emerging from centre of crown, shorter than flowering spike, 0.3-1.4m long, 9-42mm diameter. *Flowering spike* green, 1-3.2m long, 20-70mm diameter. *Perianth* segments in 2 whorls; outer segments shorter than inner segments; inner segments recurved at maturity; stamens and style conspicuous in mature flower, white.

Flowering period November-January

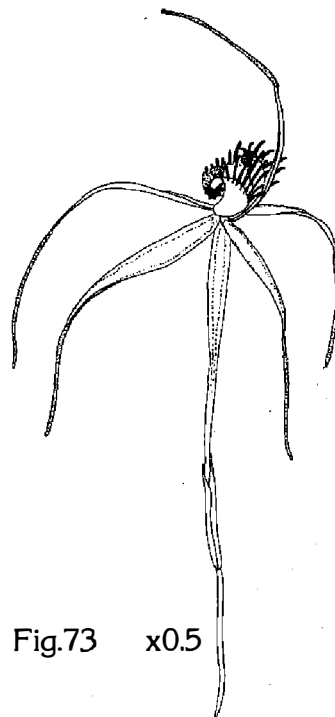
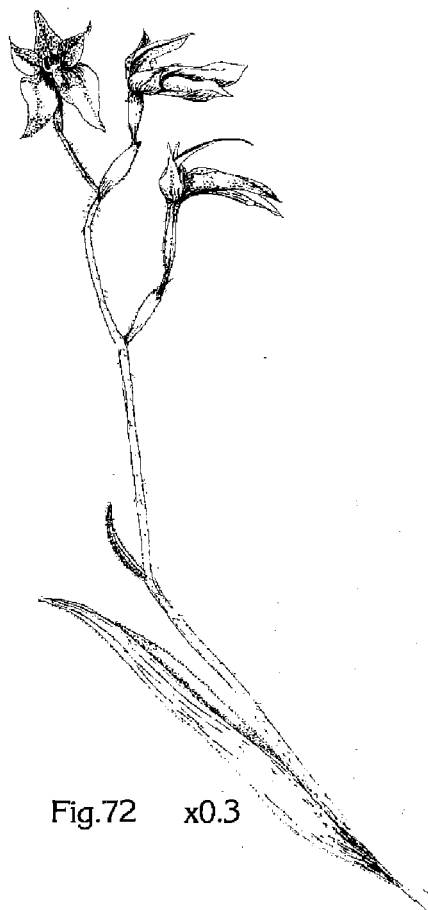
Occurrence A B C D E



ORCHIDACEAE

Orchids make up the largest flowering plant family with over 30,000 species worldwide and approximately 575 native to Australia. The plants may be terrestrial or epiphytic and most, if not all, have some mycorrhizal association in their roots. Two important structures used in identifying orchids are the column and the labellum of the flowers. The column is formed by the fusion of the stamens and the style while the labellum is the petal opposite this structure and is often highly modified. The flowers are usually insect pollinated and various floral characters, both structural and chemical (pheromone production), have evolved to attract potential pollinators. For example, *Cryptostylis* species attract male *Lisso-pimpla semipunctata* wasps by having a labellum which resembles a female wasp as well as producing female pheromones.

The family is very important to the horticultural and cut-flower industries. Unfortunately it is very difficult to propagate the terrestrial orchids which predominate in the southwest of Western Australia, probably because little is known about the orchid/mycorrhizal associations.



Species	Number of leaves	Leaves and stems hairy	Flower colour
<i>Caladenia flava</i>	1	yes	yellow
<i>C. huegelii</i>	1	yes	white to dark red
<i>C. patersonii</i>	1	yes	white, red apex on labellum
<i>Diuris longifolia</i>	2-3	no	yellow, red-brown and some purple
<i>Elythranthera brunonis</i>	1	yes (glandular)	purple
<i>E. marginata</i>	1	yes (glandular)	pink
<i>Leporella fimbriata</i>	1	no	brown-green
<i>Lyperanthus nigricans</i>	1	no	crimson and white
<i>L. serratus</i>	1	no	green, yellow and red-brown
<i>Microtus unifolia</i>	1	no	green
<i>Pterostylis nana</i>	many	no	green, some white
<i>P. scabra</i>	several	no	green-brown and white
<i>P. vittata</i>	several	no	green and white, some red-brown
<i>Thelymitra campanulata</i>	1	no	blue-purple (striped)
<i>T. crinita</i>	1	no	blue

Caladenia flava R. Br.; cowslip orchid (Fig.72)

Herb to 0.3m; perennial, hairy. *Leaves* one, hairy. *Flowers* in clusters of 1-5 on curving stem; labellum with short claws, 3-lobed, middle lobe twice as long as others; sepals and lateral petals yellow with red markings.

Flowering period August-October

Occurrence A B C E

Caladenia huegelii (R.Br.) Reichb.; rusty spider orchid (Fig.73)

Herb to 0.45m, perennial, hairy. *Leaves* one, hairy. *Flowers* 1-4; labellum lobes fringed, middle lobe blotched with maroon; elongated sepals and lateral petals, white to red with some yellow.

Flowering period September-October

Occurrence A B C

Caladenia patersonii R.Br. var. *longicauda* R.S. Rogers; white spider orchid (Plate 29)

Herb to 0.4m, perennial, hairy. *Leaves* one, hairy, *Flowers* 1-3; lateral lobes of labellum deeply fringed; sepals and lateral petals very elongate, white.

Flowering period August-October

Occurrence A B C

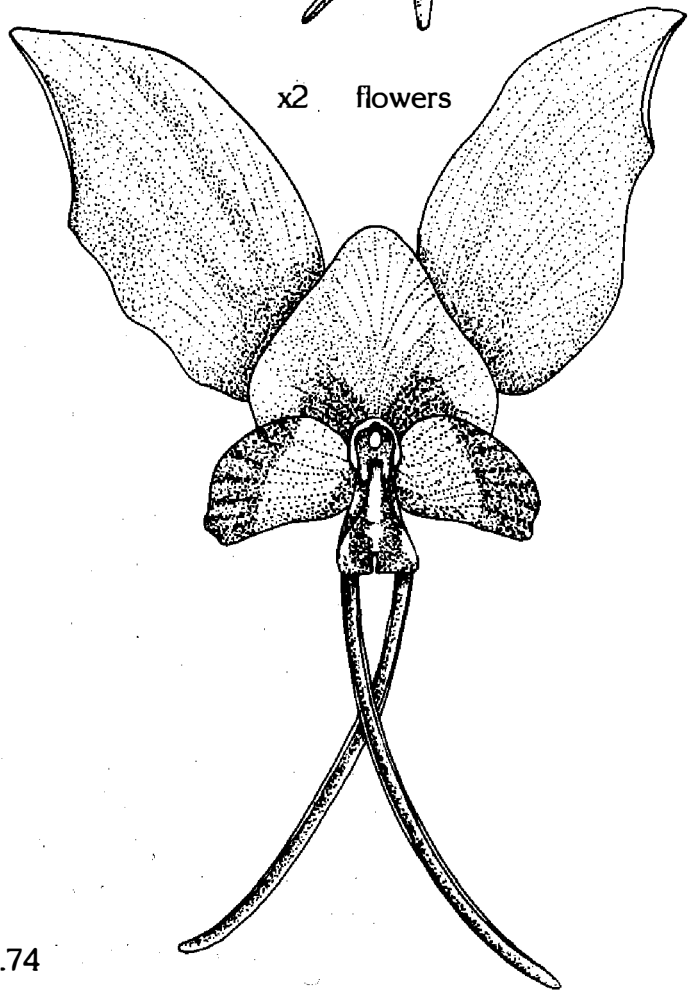
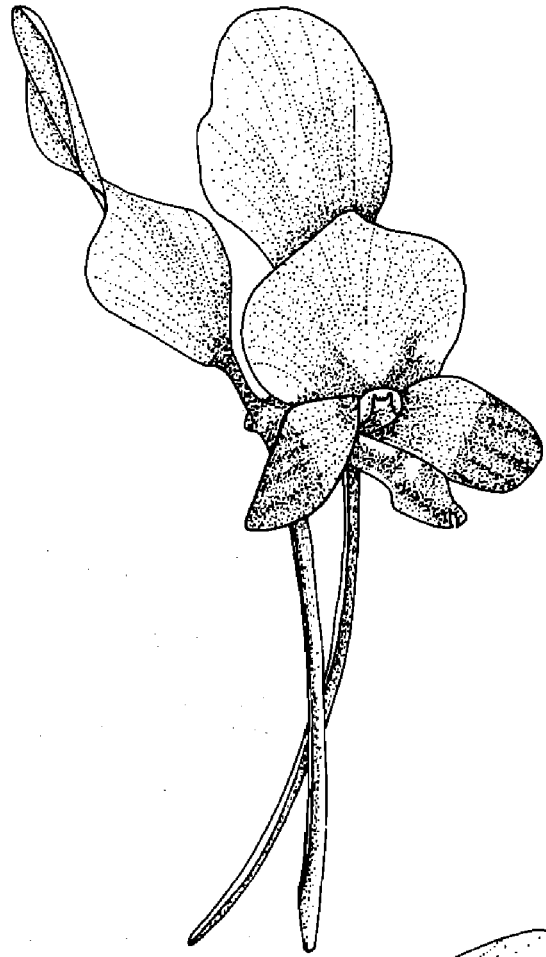
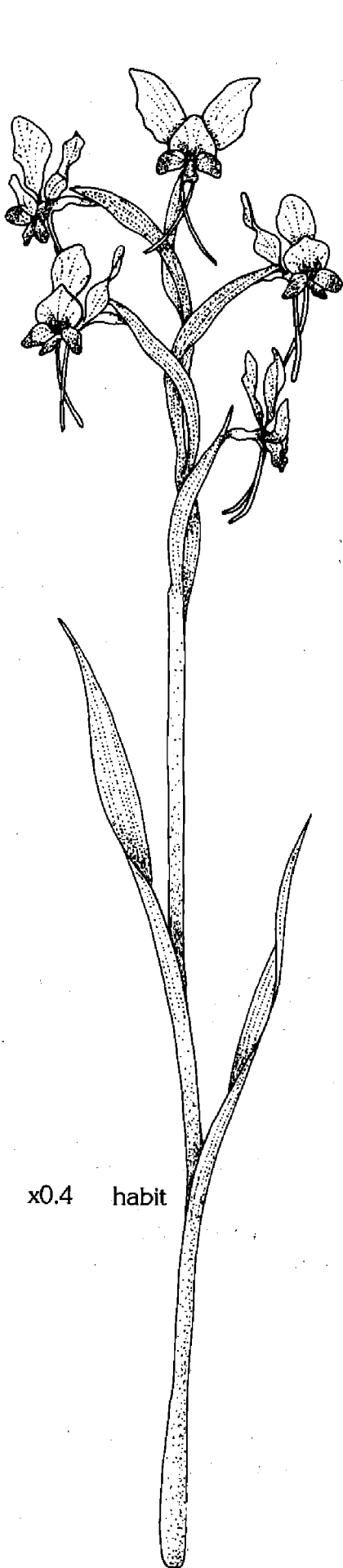
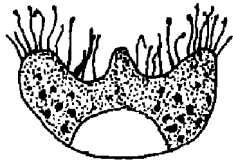


Fig.74



x4 labellum

Diuris longifolia R.Br.; common donkey orchid (Fig.74)

Herb to 0.5m, perennial, glabrous. Leaves 2 or 3, equal length and channelled. Bracts 2 or 3 on stem. Flowers in loose raceme of 2-8; labellum lobes of equal length; sepals and lateral petals yellow and brown with some purple.

Flowering period July-October

Occurrence A B C E



x4 column

Elythranthera brunonis (Endl.) A.S. George; purple enamel orchid (Plate 28)

Herb to 0.4m, perennial, stem with glandular hairs. Leaves one, glandular hairy; undersurface reddish purple. Flowers in loose raceme of 1-4 somewhat cup-shaped; upper surface purple, underneath white with prominent purple spots; labellum white or white with purple markings.

Flowering period August-December

Occurrence A



Elythranthera marginata (Lindley) A.S. George; pink enamel orchid

Herb to 0.25m, perennial, stem with glandular hairs. Leaves one, glandular hairy. Flowers sepals and lateral petals pink, sometimes white with pink spots; labellum purple.

Flowering period October-November

Occurrence A

Leporella fimbriata (Lindley) A.S. George; fringed hare orchid (Fig.75)

Herb to 0.36m, perennial, glabrous. Leaves one or possibly two, 3 red stripes on upper surface. Bracts present on stem. Flowers 3-4; labellum unlobed, fringed; petals erect, brown-green; sepals hanging, brown-green.

Flowering period June-September

Occurrence A

x1 habit

Lyperanthus nigricans R.Br.; red beaks

Herb to 0.3m, perennial, glabrous. Leaves one, up to 80mm. in diameter. Bracts present on stem. Flowers 2-8, crimson and white; labellum 3-lobed, middle lobe deeply fringed.

Flowering period August-October

Occurrence A



Fig.75

Lyperanthus serratus Lindley; rattle beak orchid (Plate 27)

Herb to 0.5m, perennial, glabrous. Leaves 10-35cm long. Flowers 3-6, pale green to yellow with crimson or brown; labellum 3-lobed, middle lobe recurved; lateral petals vertical; lateral sepals c. hanging.

Flowering period September-October

Occurrence C

Microtis unifolia (G. Forster) Reichb.; common mignonette orchid

Herb to 0.55m, perennial, glabrous. *Leaves* one, terete, rolled inwards. *Flowers* up to 100 in long raceme, green, labellum with irregular margin, obtuse or slightly 2-lobed at apex.

Flowering period October-December

Occurrence C

Pterostylis nana R.Br.; snail orchid

Herb to 0.2m, perennial, glabrous. *Leaves* in basal rosette and on stem. *Flowers* one, pale green with some white; dorsal sepal and lateral petals fused to form a hood; lateral sepals erect.

Flowering period July-September

Occurrence A

Pterostylis scabra Lindley var. *robusta* (R.S. Rogers) A.S. George; shell orchid

Herb to 0.27m, perennial, glabrous. *Leaves* several on stem. *Flowers* one, green-brown and white; dorsal sepal and lateral petals fused to form a hood; lateral sepals fused at base, erect.

Flowering period June-July

Occurrence A

Pterostylis vittata Lindley var. *vittata*; banded greenhood (Fig.76)

Herb to 0.3m, perennial, glabrous. *Leaves* several on stem, basal leaves usually absent on flowering plant. *Flowers* in loose raceme of 1-9, green or sometimes red-brown with green or white stripes; dorsal sepal and lateral petals form a hood; lateral sepals hanging.

Flowering period May to October

Occurrence A C

Thelymitra campanulata Lindley; bell sun orchid

Herb to 0.4m, perennial, glabrous. *Leaves* one. *Bracts* present on stem. *Flowers* 1-4, striped reddish-purple to blue-purple; labellum petal-like; column deep purple.

Flowering period September-October

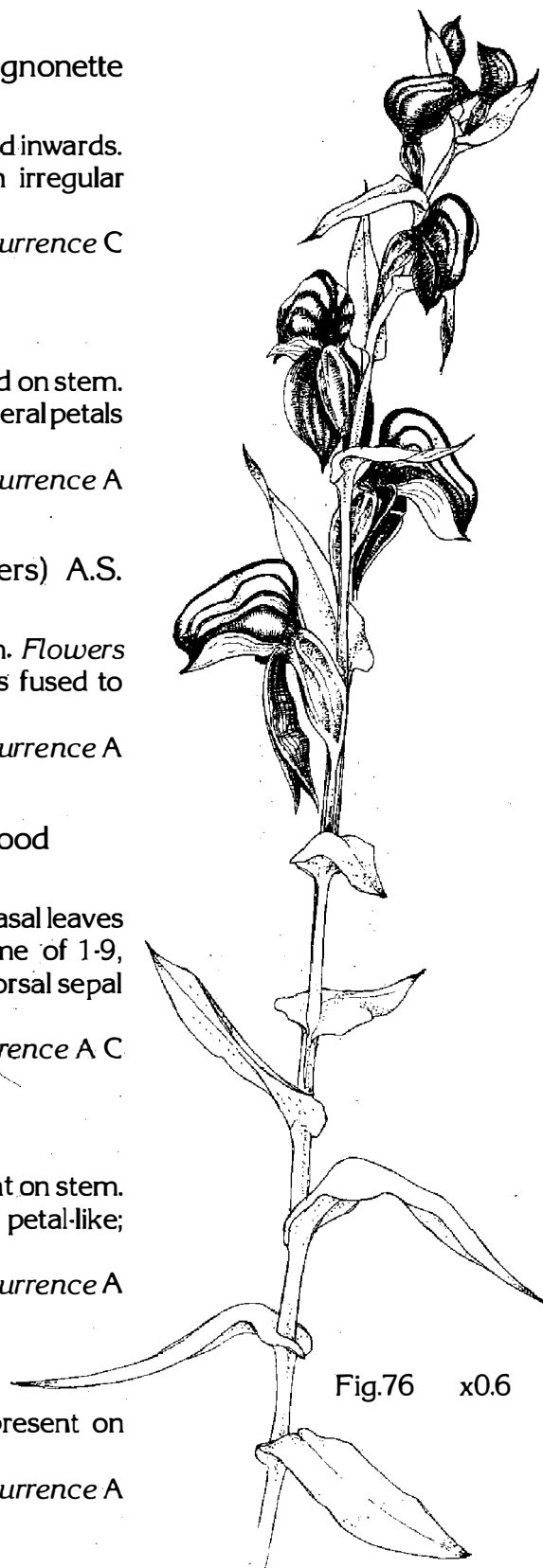
Occurrence A

Thelymitra crinita Lindley; queen orchid.

Herb to 0.6m, perennial, glabrous. *Leaves* one. *Bracts* present on stem. *Flowers* 1-12, bright blue; labellum petal-like.

Flowering period September-December

Occurrence A



APPENDIX 1

Abbreviations to Authors

Andrews	H.C. Andrews	J.D. Hook.	J.D. Hooker
Benth.	G. Bentham	Huegel	C.F. von Huegel
Bolus	H. Bolus	Kuek.	G. Kuekenthal
Bonpl.	A.J.A. Bonplaud	L.	C. Linnaeus
R.Br.	Robert Brown	Labill.	J.J.H. de Labillardiere
Burm.	N.L. Burman	Lehm.	J.G.C. Lehmann
Caruel	T. Caruel	Lindley	John Lindley
Cav.	A.J. Cavanilles	Meissner	C.F. Meissner
Cockayne	L. Cockayne	Merr.	E.D. Merrill
Crisp	M.D. Crisp	Miq.	F.A.W. Miquel
Cunn.	Allan Cunningham	F. Muell.	Ferdinand H.J. von Mueller
Cutler	H.C. Cutler	Nannf.	J.A. Nannfeldt
DC.	Augustin Pyramus de Candolle	Nees	C.G.D. Nees von Esenbeck
Diels	L. Diels	Norman	C. Norman
Dietr.	F.G. Dietrich	Otto	F. Otto
Don	G. Don	Poiret	J.L.M. Poiret
Donn	J. Donn	Rees	B. Rees
Druce	G.C. Druce	Reichb.	H.G.L. Reichenbach
Ecklon	C.F. Ecklon	A. Rich.	A. Richard
Endl.	S.L. Endlicher	Rottb.	C.F. Rottboll
Ewart	A.J. Ewart	Schauer	J.C. Schauer
Fischer	F.E.L. von Fischer	Schrader	H.A. Schrader
Gaertner	J. Gaertner	Sm.	J.E. Smith
Gaudich.	C. Gaudichand-Beaupre	Sonder	W.A. Sonder
Gilg	E.F. Gilg	Steetz	J. Steetz
Ging.	F.C.J. Gingins de Lassaraz	Steudel	E.G. von Steudel
Grah.	R. Graham	Stokes	J. Stokes
L'Her.	C.L. L'Heritier de Brutelle	Wendl.	H.L. Wendland
Hehynh.	G. Heynhold	Willd.	C.L. von Willdenon
Hoffsgg.	J.C. von Hoffmannsegg		

APPENDIX 2

Common Weeds

<i>Airea caryophyllea</i>	Silvery hair grass
<i>Anagallis arvensis</i>	Scarlet/blue pimpernel
<i>A. pumilla</i>	Pimpernel
<i>Arctotheca calendula</i>	Capeweed
<i>Asphodelus fistulosus</i>	Onion weed
<i>Avena fatua</i>	Wild oat
<i>Azolla filiculoides</i>	Red azolla
<i>Brassica rapa</i>	Wild turnip
<i>Briza maxima</i>	Quaking grass, blowfly grass
<i>B. minima</i>	Lesser quaking grass
<i>Bromus diandrus</i>	Brome grass
<i>Callitriche stagnalis</i>	Common starwort
<i>Carpobrotus edulis</i>	Pigface
<i>Chamelaucium uncinatum</i>	Geraldton wax
<i>Citrullus lanatus</i>	Wild melon, pie melon
<i>Conyza bonariensis</i>	Tall fleabane
<i>Cortaderia selloana</i>	Pampas grass
<i>Cucumis myriocarpus</i>	Prickly paddy melon
<i>Cynodon dactylon</i>	Couch
<i>Cyperus tenuiflorus</i>	Scaly sedge
<i>Cytisus proliferus</i>	Tree lucerne
<i>Dittrichia graveolens</i>	Stinkwort, stinkweed
<i>Ehrharta calycina</i>	Perennial veldt grass
<i>E. longifolia</i>	Annual veldt grass
<i>Emex australis</i>	Double gee
<i>Empodisma gracillimum</i>	
<i>Erodium botrys</i>	Long storksbill
<i>Euphorbia</i> spp.	Spurges
<i>Festuca bromoides</i>	Squirrel-tail fescue
<i>Gladiolus caryophyllaceus</i>	
<i>Homeria collina</i>	One-leaf cape tulip
<i>Hypochoeris radicata</i>	Flatweed
<i>Lagarus ovatus</i>	Hare's-tail grass
<i>Lemna minor</i>	Duckweed
<i>Leptospermum laevigatum</i>	Coastal teatree
<i>Lolium multiflorum</i>	Italian rye grass
<i>Lupinus angustifolia</i>	New Zealand blue lupin
<i>Lupinus cosentinii</i>	Sand plain lupin/Western Australian blue lupin

Orobanche minor
Osteospermum clandestinum
Oxalis pes-caprae

Parentucellia latifolia
Paspalum dilatatum
Pelargonium capitatum
Pennisetum clandestinum
Phytolacca octandra
Pinus pinaster
Plantago lanceolata
Poa annua
Polygonum minus

Ranunculus muricatus
Raphanus raphanistrum
Ricinus communis
Romulea rosea
Rumex acetosella
R. crispus

Shinus terebinthifolius
Silene gallica
Solanum nigrum
Sonchus asper
S. oleraceus

Taraxacum officinale
Trifolium campestre
Trifolium subterraneum
Typha domingensis

Ursinia anthemoides

Vellereophyton dealbatum
Verbascum virgatum

Wahlenbergia capensis

Zantedeschia aethiopica

Lesser broom rape
Stinking roger
Soursob

Common bartsia
Paspalum
Rose pelargonium
Kikuyu grass
Inkweed, red ink plant
Maritime pine
Plantain
Winter grass

Buttercup
Wild radish
Castor oil plant
Guildford grass
Sorrel
Dock

Pepper tree
French catchfly
Blackberry nightshade
Prickly thistle
Common sow thistle

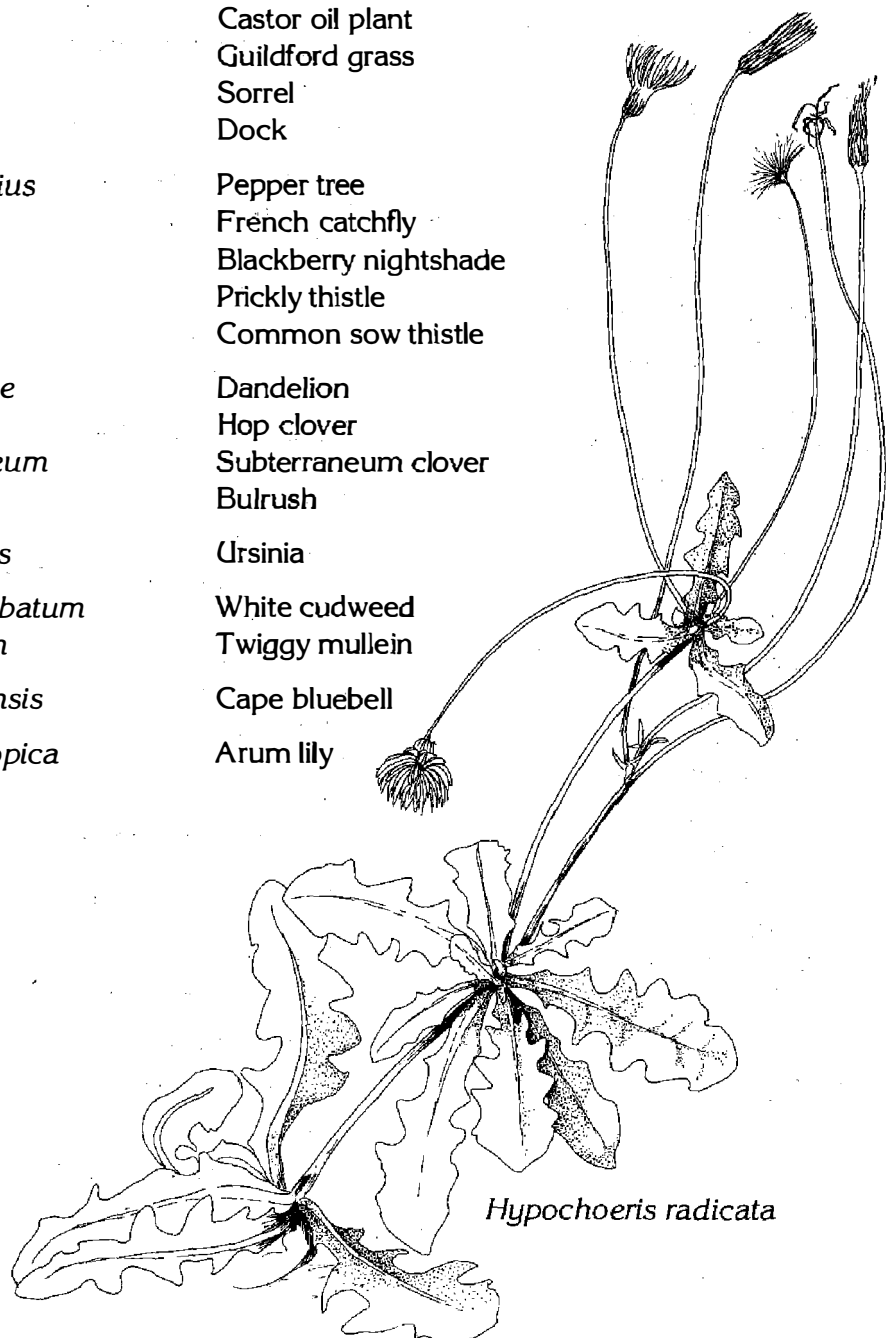
Dandelion
Hop clover
Subterranean clover
Bulrush

Ursinia

White cudweed
Twiggy mullein

Cape bluebell

Arum lily



Hypochoeris radicata

APPENDIX 3

Australian Plants in Murdoch University Gardens

- Anigozanthos flavidus* hybrids
Banksia ashbyi
B. grandis
B. media
B. prionotes
B. repens
B. speciosa
Beaufortia sparsa
B. squarrosa
Brachychiton gregorii
B. populneus
Calothamnus quadrifidus
Casuarina cunninghamiana
C. equisetifolia
C. stricta
C. turtulosa
Chamelaucium uncinatum hybrids
Darwinia citriodora
Dodonaea ceratocarpa
Eucalyptus caesia
E. calophylla
E. calophylla var. *rosea*
E. camaldulensis
E. cinerea
E. citriodora
E. erythrocorys
E. ficifolia
E. forrestiana
E. gomphocephala
E. grandis
E. landsowneana
E. lehmannii
E. leucoxylon
E. nicholii
E. platypus
E. ptychocarpa
E. sideroxylon
E. spathulata
E. stoatei
E. todtiana
Grevillea bipinnatifida
G. biternata
G. crithmifolia
G. hookeriana
G. obtusifolia
G. 'Robyn Gordon'
G. thelemanniana
Guichenotia macrantha
Hakea francisiana
H. laurina
H. petiolaris
Hemiandra pungens
Hibbertia cuneiformis
H. scandens
Hypocalymma robustum
Isopogon cuneatus
I. formosus
I. dubius
I. latifolius
Kunzea baxteri
K. pulchella
Melaleuca citriodora
M. diosmifolia
M. elliptica
M. fulgens
M. 'Georgina Molloy' (*M. teretifolia* x *M. lateritia*)
M. hypericifolia
M. incana
M. leucadendron
M. nesophila
M. scabra
M. violacea
Myoporum parvifolium
Pimelea ferruginea
Regelia velutina
Ricinocarpos tuberculatus
Verticordia chrysantha
V. mitchelliana
V. plumosa
Xanthorrhoea preissii

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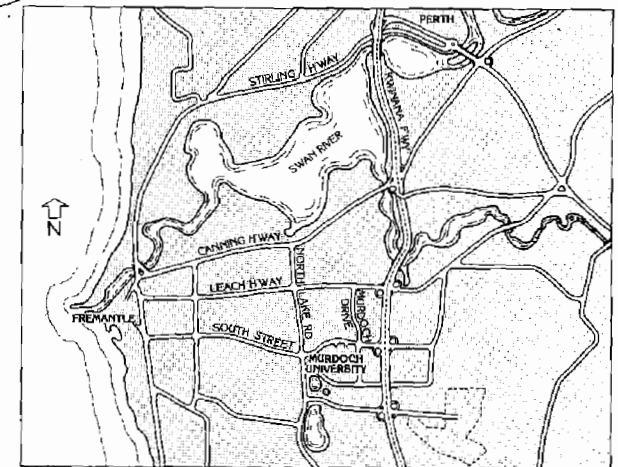
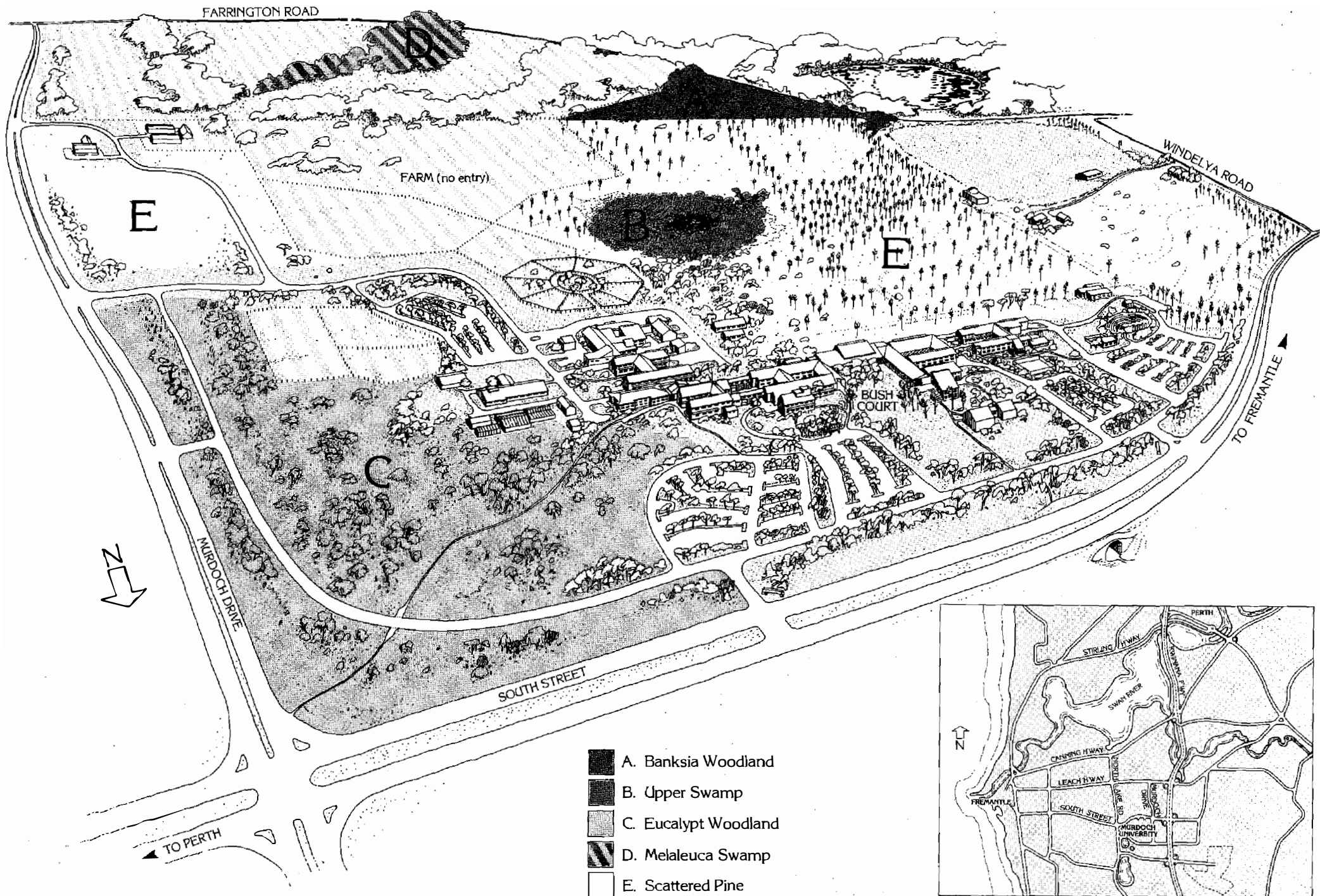
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