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Many readers may find this issue a little heavy going. You should be able to get the message by just reading the captions to the sketches and colour plates. This issue is really part 2 of a series of three issues presenting all the lily type plants of Australia. Understandably, the scientists who have gone to a lot of trouble to keep the article simple, nevertheless want it complete.

There are many, many thousands of plants not yet made extinct by man. To classify these plants, scientists have given each distinct species a name and grouped similar plants into genera (the first word of a species name) and similar genera into plant families with names ending in *aceae*. Similar plant families are grouped into orders. We are using the scientific publication series *Flora of Australia* as our guide and where more recent research indicates an update of plant names as published in the flora, these are published in *Australian Plants*. As described in the footnote on the bottom of page 335, a correction to plant names is not involved but the re-arrangement of similar genera into plant families is made, an issue that will not concern most readers. It is, however, desirable to keep in step with the scientific world; the changes presented here were foreshadowed in Volume 45 of *Flora of Australia* and have been widely adopted following more recent research and study.

Monocotyledon — What is this?

The first strange word in the article is 'monocotyledon'. Possibly to oversimplify this, it is that group of flowering plants with one seed leaf at germination, as in Fig. A.

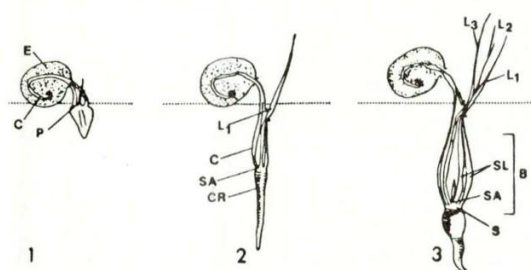
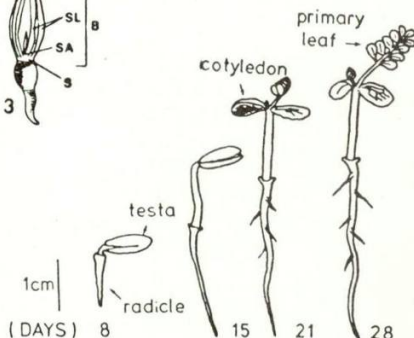


Fig. A. The seed/fruit, E, of *Crinum*, a lily, sitting on the ground, sending down a root and then the first seed leaf, L₁, (cotyledon) up from the ground. More leaves L₂ and L₃ follow.

Fig. B. An *Acacia* seedling with two seed leaves (cotyledons) above ground after 15 days followed by the primary/mature leaves. Fig. B is the other group of plants with two seed leaves (cotyledons) known as dicotyledons. Other features that define the 'lily' group of plants are shown in Fig. 1, page 339, the simplest, most easily recognised ones being the sheathing leaves from the base/ground and the flowers with six 'petals'.



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Australian Lilies:

Native and Naturalised species

by H. T. Clifford¹

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and A. Thongpukdee³

Amongst the flowering plants, the monocotyledons form a distinct group which were first described by thirteenth century Archbishop of Regensburg, Albertus Magnus (St Albert the Great), on the basis of their vascular structure. The English naturalist John Ray (1682) gave them the name Monocotyledons because all of the species known to him possessed a single cotyledon.

More recently it has been shown that with a very few dicot exceptions, only the protein bodies of the sieve tube plastids (structures inside the phloem cells) in monocots are cuneate (wedge-shaped) in outline. It is this feature above all others which is diagnostic for the group for scientists.

Most monocotyledons can be recognised with reasonable certainty on the basis of a combination of conspicuous vegetative characters. These are, leaf-blades with parallel veins, sheathing leaf-bases and lack of a woody stem. If a trunk is formed, the leaf-bases are retained, or the leaf-scars of shed leaves encircle the stem. If the species have conspicuous flowers, the sepals, petals and stamens generally are arranged in whorls each of three members. The generalisation that lily flowers have a 6-partite perianth (sepals and petals; collectively called tepals) of $\pm$ similar members, six stamens and a superior ovary with three compartments (carpels) fused together, is inadequate. Variation from these predominantly characteristic features can be seen in Table 1.

Within the Monocotyledons, the Liliiflorae (lilies) constitute a large and varied assemblage of taxa whose classification has long been the subject of dispute. The dissention stems in part from the diversity of life-forms associated with superficially similar flowers, and in part from attaching undue importance to the perianth of these flowers.

One of the first botanists to recognise the inadequacy of the perianth for defining families within the lilies was Robert Brown (1810) who in his *Prodromus* placed the Australian lilies into two families distinguished primarily on seed characters. In particular, he considered the presence or absence of a shiny black coating on the seed (now known to be due to a substance called phytomelan) to be of particular importance. His opinion was not accepted by Conquist (1981, 1988) whose classification was used in the *Flora of Australia* Volumes 45⁵ and 46. It was however, accepted by Dahlgren *et al.* (1985), who recognised five orders and 52 families within the diversity of the "lilies", grouped together as the superorder Liliiflorae⁴. Of these families, about 20 are placed by Conquist in a single large and heterogeneous Liliaceae. Based upon their natural relationships, the Australian "lilies" will now be reassigned from Liliaceae to a number of "new" families according to the arrangement in the treatment of Dahlgren *et al.* (1985) as modified by more recent studies.

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⁴Families of "lilies". Since then, several additional families have been recognised, and others reduced to synonymy (Conran and Clifford 1986; Dahlgren and van Wyk 1988; Dahlgren 1989) bringing the current total to somewhere between 54 and 56.

⁵The introduction to the plant family Lilaceae in *Flora of Australia*, Vol. 45, page 149, notes that whereas the classification used throughout the series is that of Conquist (1981) research could well support the adoption of the system recommended by Dahlgren *et al.* (1985) and lists his proposed families. References to the botanical scientific world now support the Dahlgren system.



△ *Arnocrinum preissii*

See page 346 — Anthericaceae, plant order Asparagales

Photography by F. W. Humphreys.

▽ *Arthropodium strictum*

See page 345 — Anthericaceae, plant order Asparagales

Photography by A. J. Cough.





△ *Orthrosanthus multiflorus*

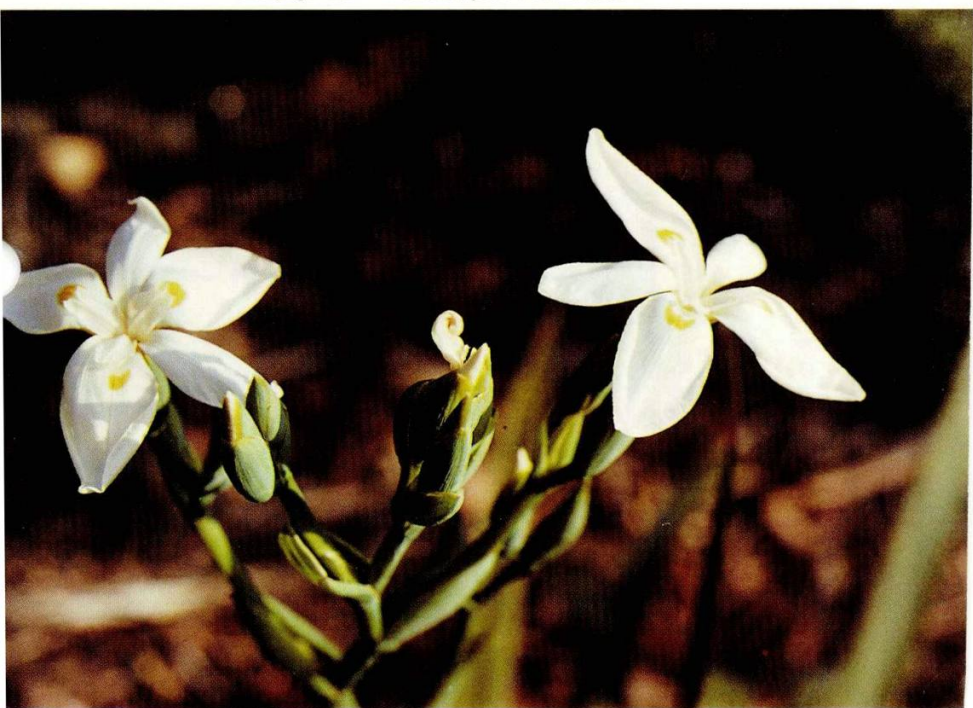
See page 369 — Iridaceae, plant order Liliales

Photography by C. Woolcock.

▽ *Dietes robinsoniana*

See page 369 — Iridaceae, plant order Liliales

Photography by W. H. Payne.



It is now generally accepted that the plants commonly considered to be lilies (referred to as the Liliiflorae) throughout the world should be grouped into plant families based upon their natural relationships. This is defined in *The Families of Monocotyledons* by Dahlgren, Clifford and Yeo (1985). As this supersedes the order published in *Flora of Australia*, Volumes 45 and 46, the following report is presented. Similar plants are grouped in genera and related genera grouped into families. Dahlgren has grouped similar families into five orders. The features that distinguish these five orders from one another are given in the key and in Table 1.

Key¹ to the orders of the Liliiflorae

- 1 Leaves with reticulate, dicot-like venation (See Fig. 19) Dioscoreales [8/6]
- 1* Leaves with parallel venation (if reticulate the petioles twisted through 180°, *Dryophila*, Fig. 1F)
- 2 Perianth reduced (or only a single tepal, petaloid)
- 3 Style one (with or without stigmatic branches) Fig. 2A Burmanniales [3/2]
- 3* Styles and stigmas several, free, carpels often free Melanthiales [2/1]
- 2* Perianth ± petaloid, or sepals and petals, not reduced
- 4 Anther orientation usually inwards (Fig. 1J); seeds often black Asparagales [33/14 + †4]
- 4* Anther orientation usually outwards (Fig. 1K); seeds never black
- Liliales [7 excl. orchids/3 + †2]

¹The key is a guide to the families of the Liliiflorae in Australia. Numbers in brackets after order names indicate the number of families worldwide and in Australia. The symbol "†" indicates that the taxon is introduced.

Table 1. Comparative features of the five "Orders" — Characters shown in sketches opposite.

Characters	Asparagales	Burmanniales	Dioscoreales	Liliales	Melanthiales
Habit	shrubs and herbs	tufted herbs	shrubs and vines	herbs	herb/parasites
Rootstock	bulbs, corms and rhizomes	fibrous roots	rhizomes	bulbs and corms	rhizomes
Leaves and veins	sessile and parallel	sessile and parallel	petiolate and reticulate	sessile and parallel	sessile and parallel
Inflorescence type	terminal or axillary scape	terminal scape	terminal or axillary scape	terminal, not scapose	terminal scape
Tepal type	unmarked	unmarked and reduced	unmarked	variegated	unmarked reduced
number	4,6,8,10,12,14	3,6	4,5,6,9	6,8	6
fusion	fused or free	free or fused	free or fused	free or fused	free
articulation	base or pedicel	base	base	base	base
Nectaries	mostly septal	septal	septal or petal	petal assoc.	septal or petal
Anther no.	3,4,6,8,10,12,14	3,6	4,5,6,9,12-18	3,4,6	6
orientation (Fig. 1J-1K)	inwards	inwards or outwards	inwards	outwards	outwards
Ovary position	superior or 1/2 inferior or inf.	inferior	superior or inferior	superior or inferior	superior
Styles and Stigmas	mostly simple	simple or branched	mostly simple or sessile	mostly branched	free, carpels often free
Fruit type (Fig. 1L-1M)	loculicidal capsule or berry common	capsule	loculicidal capsule or berry	septicidal or loc. capsule	septicidal or loc. capsule
Seeds black (with phytomelan)	common	absent	absent	absent	absent
Seed outer cell-layers	both or inner collapsed	both present	both present	both present	both or inner collapsed
Calcium oxalate raphides*	present	present or absent	present	very rare	present

*Calcium oxalate raphides are small needle-like crystals which occur in bundles in specialised cells throughout plant tissues.

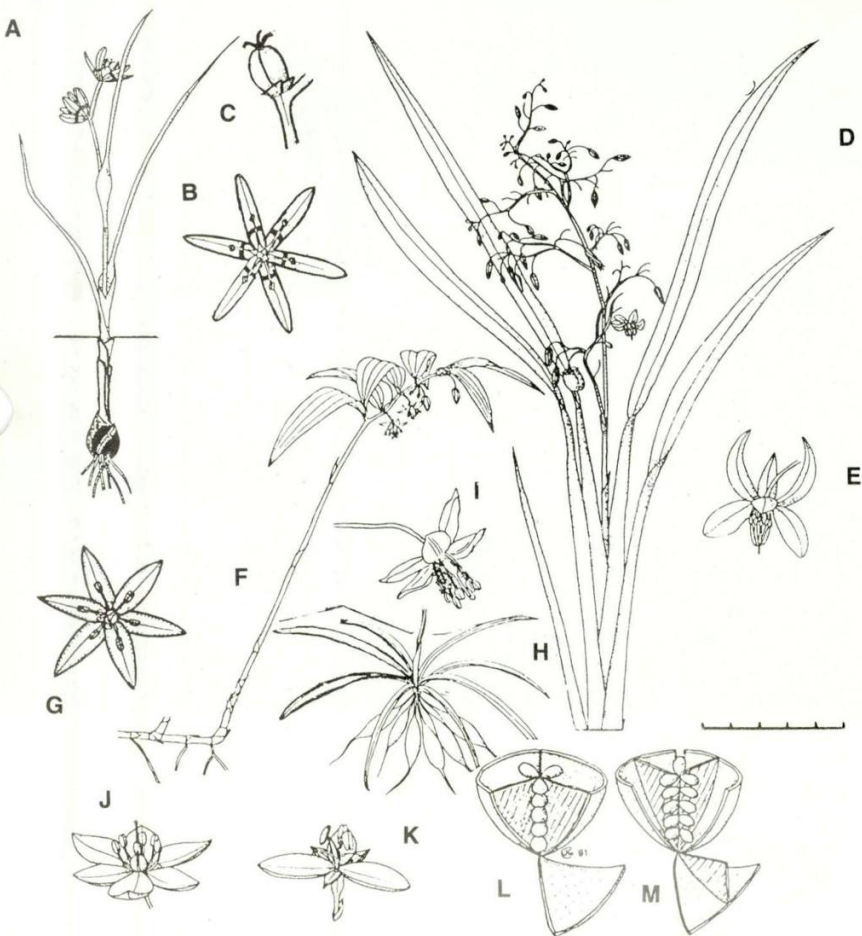


Fig. 1. Floral and vegetative features of Liliiflorae.

- A–C: *Wurmbesia dioica*. A: Plant with **corm** (root), **sheathing leaves** and a spike (a **terminal inflorescence** of flowers without stalks); B: Flower with prominent **coloured nectaries on the six tepals**; C: Ovary (tepals removed) showing **deeply divided styles** or branched on top of a **superior ovary**. Colour photograph on page 361.
- D–E: *Dianella revoluta*. D: Plant with equitant leaves (flattened leaf bases overlapping in one plane) and a racemose (flowers stalked) and panicle (branched) inflorescence; E: Flower showing swollen anther appendages. Photographs on pages 301 and 332.
- F–G: *Drymophila moorei*. F: Plant showing leaf bases twisted through 180°, a **rhizomatous** growth habit, aerial stems and **axillary flowers**; G: A flower with **six tepals**. See page 359.
- H–I: *Arthropodium milleflorum* plant showing basal leaves and **tuberous roots** and flower.
- J: *Chamaescilla corymbosa* flower with **inward oriented anthers** surrounding a **partially superior ovary**. Photograph in Volume 16: 294.
- K: *Libertia paniculata* flower with **outward oriented anthers** and an **inferior ovary** partially visible below the six tepals. See page 371.
- L: A stylised fruit showing **septicidal** dehiscence, capsule splits at edges of segments.
- M: A stylised fruit showing **loculicidal** dehiscence, capsule splits in the middle of segments.

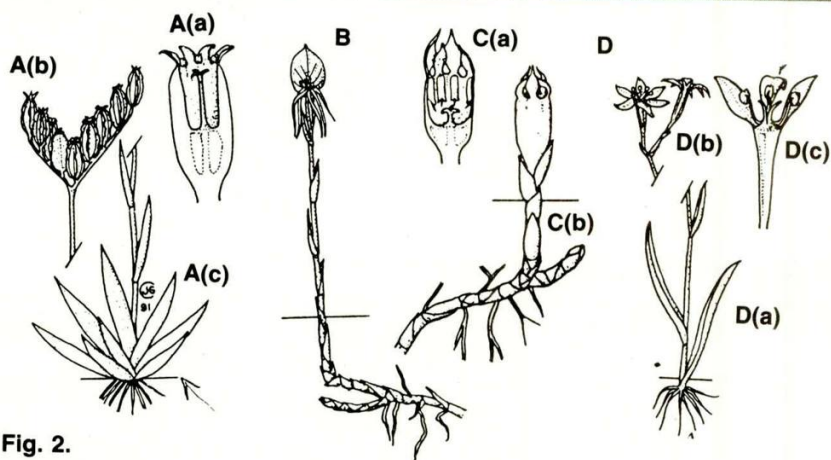


Fig. 2.

- A: *Burmannia disticha* (above) — (a) flower showing six tepals fused in a tube enclosing the style with a branched stigma, the yellow anthers between the lobes of the sepals being exposed on maturity; (b) the inflorescence, a group of flowers "perched" along a stalk; (c) the grass-like leaves clustered at the base of the stem. Photography by S. Pearson.
- B: *Corsia ornata*, the enlarged petal prominent with the other five very narrow.
- C: *Thismia rodwayi*, the flower in section and on short stem and fibrous roots.
- D: *Campynema lineare* — (a) erect stem on rhizomatous roots; (b and c) the flower.

The Plant Order Burmanniales

Represented in Australia by three families covering only five species.

The **Burmanniaceae** have a single genus *Burmannia* with three species *B. coelestris*, *B. disticha* and *B. juncea*. Perennial herbs with erect stems and fibrous roots. The leaves linear, grass-like and clustered at the base of the stem, Fig. 2A. The colour photograph and Fig. 2A (of *B. disticha*) show the blue expanded, winged floral tube of six tepals fused for most of their length, enclosing half-inferior ovaries. As the flower matures the six tepals open at the top, folding back to reveal the yellow stamens attached at the top of the floral tube. A cosmopolitan tropical and subtropical family of small herbs usually of moist or swampy places. Most members are photosynthetic, but some have lost this ability, becoming saprophytes and relying on the breakdown products of symbiotic fungi for survival. Both Australian species have chlorophyll, and despite having reduced perianth lobes, the flowers of the native species are very attractive with large, brightly coloured winged ovaries and floral tubes.

The **Corsiaceae** have a single genus *Corsia* with one species *Corsia ornata*, Fig. 2B. This is a rhizomatous perennial herb lacking chlorophyll with an erect stem and fibrous roots. The leaves are reduced to scale-like bracts. The flowers are bilaterally symmetrical, the six tepals being free, one being brightly coloured and large as shown in Fig. 2C, the remainder being linear. The six stamens are free. A tiny saprophytic family, with two genera, one in Chile, and the other in eastern Australia and New Guinea. The plants grow in leaf litter on the floor of moist forests, and are rarely encountered. They are impossible to cultivate due to their reliance on symbiotic fungi. The flowers are relatively small, and somewhat spidery in appearance.

Thismiaceae J. Agardh [6:35] is a family of saprophytes with an unusual distribution, being found in Asia, Africa, America and Australia and New Zealand. The flowers, as their common name "Fairy Lanterns" suggests are lantern-shaped on short stalks above the moist leaf litter in which the plants grow. In Australia there is a single genus *Thismia* with one species *Thismia rodwayi*. This rhizomatous, slightly succulent perennial herb lacks chlorophyll, has a short erect stem and fibrous roots as in Fig. 2C. The leaves are reduced to scale-like bracts. The usually regular solitary flower has six tepals fused into an urn-shaped tube surmounting inferior ovaries, the (3) six stamens attached to the inside of the tube.

The Plant Order Melanthiales

Campynemaceae

This comprises one genus with one species *Campynema lineare* in Australia, Fig. 2D. A rhizomatous perennial herb with an erect stem $\pm$ tuberous roots and a few linear leaves scattered along the stem. The flowers are six-partite, usually regular with inferior ovaries, single or several in a panicle. The six tepals are free, the six stamens being attached at the base of the tepals. The fruit is a ribbed capsule containing numerous small brown seeds. The only other species is a similar achlorophyllous herb found in New Caledonia. The saprophytic nature of their life-history would make their cultivation difficult.

The Plant Order Asparagales

A group of Australian Lilies

The plant order Asparagales comprises the following families.

- 1 Ovary superior
 - 2 Plants with bulbs
 - 3 Inflorescence an umbel sheathed by two bracts when in bud Alliaceae†
 - 3* Inflorescence a raceme or spike, not enclosed by bracts Hyacinthaceae†
 - 2* Plants without bulbs
 - 4 Leaves with reticulate venation; petioles twisted 180° Luzuriagaceae
 - 4* Leaves not twisted or with reticulate venation
 - 5 Leaves reduced to scales and replaced by leaf-like flattened stems (cladodes) . Asparagaceae
 - 5* Leaves otherwise, or if reduced not replaced by leaf-like cladodes
 - 6 Flowers sessile in heads, spikes or solitary
 - 7 Stamens free; seeds black
 - 8 Leaves narrow, grass-like; spike simple Xanthorrhoeaceae
 - 8* Leaves not grass-like; spike branched (Cordylie) Asteliaceae
 - 7* Stamens attached to the tepals; spikes compound, or flowers in heads or solitary; seeds not black Dasypogonaceae
 - 6* Flowers pedicellate
 - 9 Stigmas several; style (if present) divided Asteliaceae
 - 9* Style and stigma single, at most minutely trifid
 - 10 Seeds not black
 - 11 Flowers large, showy; fruits capsular Blandfordiaceae
 - 11* Flowers not showy; fruits baccate
 - 12 Plants with tall erect stems Dracaenaceae
 - 12* Plants with leafy rhizomes (Aspidistra) Convallariaceae†
 - 10* Seeds black
 - 13 Plants with leafy, climbing stems Geitonoplesiaceae
 - 13* Plants without leafy climbing stems
 - 14 Inflorescence an umbel, sheathed by two bracts (when in bud) Alliaceae†
 - 14* Inflorescence not sheathed by two bracts in bud
 - 15 Tepals 1-nerved; flowers not in heads Asphodelaceae
 - 15* Tepals usually 3–5 nerved; if 1-nerved, flowers in heads
 - 16 Leaves usually distichous; otherwise anthers three and flowers not in ebracteate umbels, nor tepals fringed; or inflorescence a racemose panicle or raceme, with unfringed tepals which twist spirally after anthesis Phormiaceae
 - 16* Not as above Anthericaceae
 - 1* Ovary inferior or half-inferior
 - 17 Large rosette herbs or branched trees
 - 18 Flowers red with thick, fleshy tepals Doryanthaceae
 - 18* Flowers green or white, without thick fleshy tepals Agavaceae†
 - 17* Largely stemless herbs arising from bulbs, corms or rhizomes
 - 19 Ovary half-inferior
 - 20 Seeds blue, fleshy, acting as berries (Ophiopogon) Convallariaceae†
 - 20* Seeds black, not fleshy, enclosed in capsules Tecophilaeaceae†
 - 19* Ovary inferior
 - 21 Inflorescence an umbel sheathed by two bracts when in bud Amaryllidaceae
 - 21* Inflorescence not enclosed by bracts Hypoxidaceae

Although families not restricted to Australia are included, the keys are not intended to be comprehensive at world level. The symbol "†" indicates that the taxon is introduced. The family descriptions apply particularly to taxa represented in Australia, and are not intended to be comprehensive. Numbers in brackets after family names refer to the number of genera and species in each family, and those after generic names indicate the number of species worldwide and in Australia. Naturalised taxa are also included.

Agavaceae and Alliaceae (with only naturalised spp.) see page 355.

Australian Amaryllidaceae

Amaryllidaceae J. St-Hil. [50: 860]

Plant Order Asparagales

A large, world-wide and extensively cultivated family, especially developed in southern Africa. Commonly characterised by the presence of umbels of flowers with inferior ovaries (although these features are not unique to the Amaryllidaceae). Most amaryllids are of horticultural interest, and the Australian members: *Calostemma*, *Crinum* (a large African and south-east Asian genus with many cultivated species) and *Priophys* (commonly called *Eurycles*) are all attractive and easy to grow. Those naturalised in Australia include the daffodil, narcissus and snow-drop.

Bulbous perennial herbs with flat or linear leaves. Flowers 6-partite with inferior ovaries and borne usually in heads (umbels). These heads are enclosed in bud by two fused bracts which split apart as buds enlarge. Tepals may be free or fused for part of their length and upper surfaces may have a raised extension called a corona on which stamens are borne. Fruits are dry or fleshy capsules containing numerous flattened and winged shiny black seeds or a single green, white or pinkish-green seed or seed-like parthenocarpic (asexually derived) propagule.

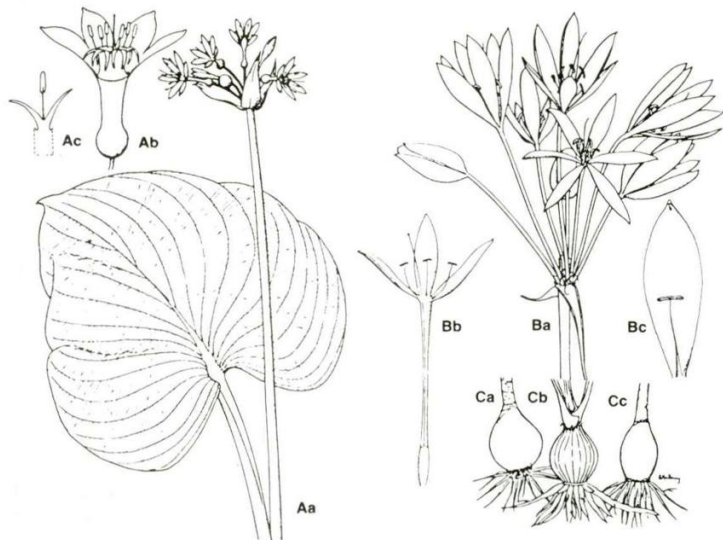


Fig. 3A. *Priophys amboinensis* (photograph on page 361) — Aa, leaf and inflorescence — Ab, the white flower, to 6 cm diam., two tepals removed to show the six stamens, the lower part of which is expanded with two apical lobes, Ac, partly united to form an inner ring known as the corona. *Priophys cunninghamii* has smaller more ovate leaves with white flowers to 4 cm diam., the apical lobes at the base of the filaments being united to form a tube; the lobes curving outwards. *Priophys alba* is a smaller plant.

Fig. 3B. *Crinum venosum*. The head of white flowers, Ba, is typical of this genus of five species. The flower, Bb, comprises six tepals united for much of the length into a narrow tube. The six pink stamens are each attached to a petal at the point where they flare out. The difference between the various species is the width of leaf and relative length of the stamens, Bc.

Fig. 3C. The bulbous root of *Crinum*, Ca, smooth with rings up the plant stem, of *Priophys*, Cb, surrounded by a papery cover like an onion, the leaves growing from its apex, and *Calostemma*, Cc.

The Anthericaceae are a large family, often of relatively hot, drier climates, and many of the Australian genera are summer deciduous, dying down to a tuberous rootstock in periods when water is not generally abundant. The family generally have capsular fruits with black seeds. A number of the native genera such as *Arthropodium* (the vanilla and chocolate lilies), *Sowerbaea* (also called vanilla lilies), *Tricoryne* and *Thysanotus* (fringe lilies) are relatively common in cultivation and are easy to grow. Of interest also is the genus *Borya*, whose members look more like seedling Pine trees than Lilies, and many of whom are capable of being totally dehydrated, and yet are able to re-green their dried, apparently dead leaves soon after the application of water. The tuberous roots of most *Caesia*, *Thysanotus* and *Arthropodium* spp. were eaten by Koorie and Nunga tribes.

Key to the genera of the Anthericaceae² in Australia

Features are shown in Fig. 4

- 1 Tepals twisting spirally after flowering
 - 2 Leaves mostly reduced to scales or bracts
 - 3 Stamens 6
 - 4 Stamen filaments hairy †*Tricoryne* R.Br. [7/7]
 - 4* Stamens hairless †*Corynotheca* F. Muell. (Sand Lily) [6/6]
 - 3* Stamens 3 †*Arnocrinum* Endl. and Lehm. [3/3]
 - 2* Leaves not mostly reduced to scales or bracts
 - 5 Stamens 3 + 3 staminodes †*Hodgsoniola* F. Muell. [1/1]
 - 5* Stamens 6, all similar
 - 6 Inflorescence a many-flowered raceme or panicle †? *Caesia* R.Br. (Grass Lily) [c.12/8-9]
 - 6* Inflorescence a few-flowered cyme *Chamaescilla* F. Muell. (BlueStar, Blue Squill) [2/2]
- 1* Tepals not twisting spirally after flowering
 - 7 Flowers umbellate or in compact heads
 - 8 Stamens 6
 - 9 Tepals free
 - 10 Pedicels longer than the tepals *Alania* Endl. [1/1]
 - 10* Pedicels shorter than the tepals, or flowers sessile *Laxmannia* R.Br. [13/13]
 - 9* Tepals fused at the base *Borya* Labill. [9/9]
 - 8* Stamens 3
 - 11 Leaves distichous (2-ranked) †*Johnsonia* R.Br. (Hooded Lily) [5/5]
 - 11* Leaves not distichous
 - 12 Tepals free; pedicels >1 mm long *Sowerbaea* Sm. (Rush Lily, Vanilla Lily) [5/5]
 - 12* Tepals fused at least in part; pedicels <0.5 mm long or flowers sessile
 - 13 Tepals fused for at least 1/3 of their length †*Hensmania* W. Fitz. [3/3]
 - 13* Tepals very shortly fused †*Stawellia* F. Muell. [2/2]
 - 7* Inflorescence a raceme, cyme or spike
 - 14 Filaments or anthers with hairs or appendages *Arthropodium* R.Br. (incl. *Dichopogon*²) (Vanilla Lilies and Chocolate Lilies) [c.18/c.14]
 - 14* Staminal or anther hairs or appendages absent
 - 15 Inner tepal margins fimbriate *Thysanotus* R.Br. (Fringe Lilies) [49/49]
 - 15* Inner three tepals unfringed
 - 16 Anthers attached basally to the tepals *Murchisonia* Britton [2/2]
 - 16* Anthers free from tepals . *Chlorophytum* Ker-Gawler (Spider or Ribbon Plant) [300/1 + 1†]

¹Studies by Thongpukdee (1989) have shown that the Anthericaceae, as previously circumscribed, included several genera which were better placed in the family Phormiaceae but as the results of this thesis are currently unpublished, a more traditional account is followed here with the contentious genera marked with †. They are shown on sketches on page 346.

²*Arthropodium* and *Dichopogon* are separately described in *Flora of Australia* (Britton 1987). A recent study by Stringer and Conran (1991), supports the reduction of *Dichopogon* to synonymy, and this is being used here.



Fig. 4A. *Sowerbaea alliacea* plant, Aa, with flower, Ab. *S. juncea* flower, six free tepals, three forked stamens. See page 303 for a description of all five species in the genus. Photograph on page 304.

Fig. 4B. *Tricoryne elatior*. A flowering stem Ba showing the characteristic twisting of the flowers when dying and the leaves reduced to bracts, the flower Bb with six similar tepals characteristically marked down the centre with six stamens, Bc, with hairs on the stalk (filament). All seven species of *Tricoryne* are described and illustrated in 14: 314–18. Photographs on pages 305 and 360.

Fig. 4C. *Chamaescilla spiralis*. A tufted plant Ca which is similar to the only other species *C. corymbosa* except that the tufted leaves to 25 cm long tend to form a spiral. The flower Cb, with six tepals mostly equal, 3–5 nerved and spiralling after maturity, and six stamens. Photograph in 16: 294.

Fig. 4D. *Alania endlicheri*, the only species in the genus, is a perennial herb, rooting at nodes on the rhizome roots, Da. The leaves are 2–12 cm long, the flowers, Db, less than 1 cm diam., with long pedicels (stalks), six free tepals, six stamens and a superior style.

Fig. 4E. *Borya sphaerocephala*, Ea. Tussocky "resurrection" plants described in more detail shortly. The flowers are in compact heads, each Eb, with six tepals fused at the base. Photograph in 16: 40.

Fig. 4F. *Laxmannia gracilis*. Erect, stilted herb to 40 cm tall, Fa. Flowers are in a compact head, Fb, of 4–17, flowers on very short pedicels (stalks), each flower, Fc, with six tepals, pink rarely white, 10–15 mm diam., and for this group of species, nocturnal. Photograph on page 352.

Fig. 4G. *Chlorophyllum laxum*. The only Australian species is a tufted perennial to 40 cm high. The green to white flowers, G, are to 8 mm diam. All species described 16: 19.

Fig. 4H. *Arthropodium curvipes*. One of nine species of *Arthropodium* (including *Dichopogon*) all six stamens with hairs or appendages on the filaments. Most species described in 12: 122–26.

Anthericaceae — Genera that may be transferred to Phormiaceae



Fig. 5A. *Arnocrinum preisii*. A perennial herb to 35 cm tall, Aa. The other two species are similar except that for *A. drummondii* the small bracts along the flowering stem are not hairy as shown here and for *A. gracillimum*, the flowering stem has numerous short sterile hairy branchlets along it. The flowers, Ab and Ac, with six sepals, united in a tube at the base are yellow with a dark band down the centre are to 2.5 cm diam. with six stamens, three being very short and not apparent, the stamens forming a tube to enclose the style. Photograph on page 336.

Fig. 5B. *Caesia setifera*. A tufted glabrous perennial to 37 cm. The flower, Ba and Bb, of *Caesia calliantha* has a sepal and stamen removed to show the flower detail, the three-nerved blue or purple tepals which twist on dying, and the six stamens resting on them. Described on page 293.

Fig. 5C. *Corynotheca pungens* one of six species of tufted, herbaceous or shrub-like perennials. The flower of *C. micrantha*, 1 cm diam., has had a petal and a stamen removed to show the marking on the inside of the petals varying from white, pink to purplish.

Fig. 5D. *Hodgsoniola junciformis*. This tufted perennial herb to 85 cm high, Da, has a raceme of purple flowers, Db, each 10–20 mm diam., that twist spirally after flowering. Three prominent lance-shaped stamens that enclose the style, peeping from the end as shown, alternating with three short heart-shaped staminodes at the base.

Fig. 5E. *Hensmania turbinata* is a rhizomatous, tufted perennial to 20 cm tall, Ea. The flowers are in a head covered by woolly bracts, Eb. The flower is very similar to that of *Stawellia* Fb with six tepals united in a tube at the lower end. Some tepals have been removed to show the long winged stamens surrounding the style. The leaves are round and pungent, 3 mm or more in diam. for *Hensmania chapmanii* but less than 3 mm diam. for *H. turbinata* and *H. stoniella*, the latter being distinguished for its stilt habit. Photograph 16: 8.

Fig. 5F. *Stawellia dimorphantha* is a prostrate plant, stilt-rooted at the nodes (Fa). The few leaves are terete to 4.5 cm long. The tiny purple or cream flowers are in a small head surrounded by the leaves, each as shown in Fb where some tepals have been removed to show the long winged stamens surrounding the style. *Stawellia gymnocephala* is a tufted plant to 40 cm tall with 20–52 flowers in a long scape, usually as long as the leaves. The pale purple tubular flowers (with a darker central stripe) have six tepals 4–5 mm long.

Best known for the extensively cultivated edible species *Asparagus officinalis*, the Asparagaceae are predominantly a family of Africa and Asia, often associated with drier forest types. In Australia, there is a single native species, *Protasparagus racemosus*, extending from far northern Australia into south-east Asia and India. The family are rhizomatous perennial climbing or shrubby, herbaceous or woody plants with annual or perennial aerial parts and tuberous or fibrous roots. The leaves are reduced to small bract-like structures, and bear in their axils, clusters of flattened and leaf-like photosynthetic axillary stems called cladodes. The flowers have superior ovaries and the uni- or bisexual flowers are borne singly or in racemes in the axils of reduced leaf-bracts. The tepals are free, although they overlap to form a tube in *Myrsiphyllum*, and the pedicels are jointed. The fruits are berries, containing usually a single shiny black seed. The three genera currently recognised are often included within *Asparagus* as subgenera, and most of the horticulturally popular species are either species of *Protasparagus* or *Myrsiphyllum*. Several are major weeds in southern Australia, including *Myrsiphyllum asparagoides* the "Smilax" or "Bridal Creeper" weed of Vic., S.A. and W.A., and *Protasparagus africanus* in Brigalow scrub and river margins around the Brisbane and Toowoomba areas.

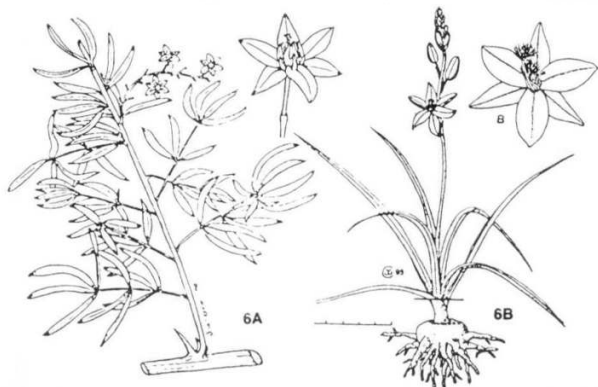


Fig. 6A. *P. densiflorus* from South Africa as labelled in *Fl. Aust.* 45. 6B. *Bulbine bulbosa* from Gott and Conran *Vict. Koorie Plants*.

Habit: slender, thorny sprawling climber 2–7 m high; deciduous. **Leaves:** reduced to small scales 0.3–0.4 cm long, at the base of very narrow, needle-like modified stems (cladodes) mostly 2–3.5 cm × up to 0.1 cm, in clusters of 3–6, usually slightly curved, sharp-pointed. **Flowers:** small, white, scented, 0.3–0.6 cm across, borne on axillary racemes 2–10 cm long, sometimes paired. **Fruit:** small globular berries about 0.5 cm diam., red when ripe, single-seeded. **Flowering:** Dec.–Feb. (March). **Fruiting:** Feb.–April (May). **Features:** slender, thorny fern-like climber; delicate white flowers. **Habitat:** coastal monsoon vine-thickets, on stabilised sand dunes or lateritic sites above the beach; monsoon forest associated with lowland freshwater streams; vine-thickets on rock outcrops in open woodland; occasional in open forest in sandy soils. **Cultivation:** from seed or division of the rhizomes. A decorative pot-plant or shade-house plant. **Aboriginal Uses:** preparation from roots used to treat diarrhoea, stomach pain, sores and general sickness; vine worn as ceremonial head-wreath.

Asphodelaceae Juss

Described on page 355

Fig. 6B. *Bulbine bulbosa* has soft onion-like leaves which send up a spike of yellow flowers in the spring. Colour photograph on page 292. The leaves arise from a creamy spherical corm surrounded by a ring of swollen roots. It can be eaten year-round and was probably cooked. The Leek Lily *Bulbine semibarbata* has fibrous inedible roots. In S.A. the green leaves were cooked and eaten — Reprinted from Victorian Koorie Plants, see page 367.

A predominantly southern hemisphere family in Australia, South America and the Pacific, with extensions to south-east Asia and tropical Africa by the widespread genus *Cordyline*. Several have been used as ornamentals. Species of *Cordyline* and *Astelia* have been used by the Pacific Islanders and Maoris for fibre, food, or to make fermented beverages. *Cordyline* species described in No. 134 Issue.

Rhizomatous tufted herbs, sometimes epiphytic (growing attached to trees), or woody branched trees or shrubs with fibrous roots. The leaves are large and often leathery. Flowers uni- or bisexual six- (rarely 10–14) partite, with superior ovaries, and borne in large compound racemes or spikes. The tepals are free or fused at the base. The fruits are dry to fleshy berries or rarely, fleshy capsules, and contain few to numerous shiny black seeds.

Key to the genera of the Asteliaceae in Australia

- 1 Plants dioecious (male and female plants) *Astelia* Banks et Soland. ex R. Br. (*Astelia*) [25/3]
- 1* Plants hermaphrodite (plants bisexual)
- 2 Tall branched shrubs or trees *Cordyline* Comm. ex R. Br. (*Tree Lily*) [20/8]
- 2* Stemless, rhizomatous rosette herbs
- 3 Tepals 10–14; leaves >1.5 m long *Neoastelia* J. Williams [1/1]
- 3* Tepals six; leaves <1.5 m long *Milligania* Hook.f. [5/5]

The exact relationships of the family are presently unresolved, and the subject of further study. Possible affinities with the Phormiaceae and Asphodelaceae have been postulated.

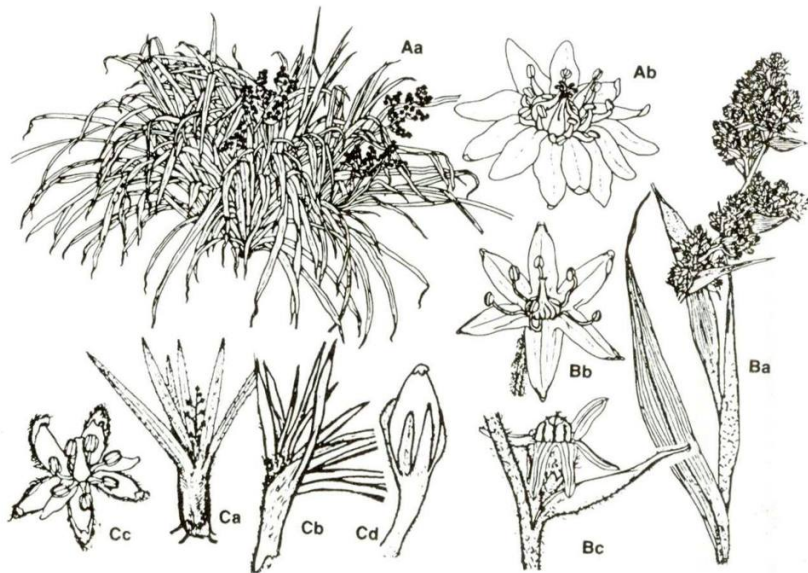


Fig. 7. *Neoastelia spectabilis* plant, Aa; flower, Ab, with 10–14 tepals, the only species found in the New England National Park.

Milligania stylosa plant, Ba and the flower Bb, *M. densiflora*, fruit capsule with persistent perianth, Bc.

Astelia alpina, shoot with male flower head, Ca (male flower Cc), and shoot with female flowers, Cb (female flower, Cd). Photograph on page 289.



△ *Milligania longifolia*
Photography by John Simmons

Lomandra multiflora ▽
Photography by J. F. Noble



One of the most attractive of the native lilies, the endemic family has one genus (*Blandfordia* Smith (Christmas Bells) [4/4]). It occurs along the eastern coast of Australia generally in heath swamps. They can be cultivated, but have a reputation for being difficult, and tend to be fairly slow to flower. The large showy bell-like flowers are well worth the effort, and although usually red with yellow lobes, there are forms which are pure yellow.

Tufted perennial herbs with fibrous roots, numerous narrow, grass-like leaves. Flowers six-partite, with superior ovaries and borne in terminal racemes. The tepals are fused together for most of their length, and the stamens are attached to them. The fruits are dry capsules containing numerous oblong "furry" brown seeds. Photograph on page 292.

Despite being highly distinctive and easily recognisable as a genus, the affinities of *Blandfordia* are unclear. The family has been traditionally allied with groups such as the Eurasian day-lily family Hemerocallidaceae, but as yet incomplete studies by JGC and HTC suggest that it is more isolated and relationships require further investigation.

Convallariaceae Horan. [16/c.130] (including Ophiopogonaceae)

The Convallariaceae are a widespread northern hemisphere family, with their centres of diversity in China and the Himalayas. They are typically understorey herbs in cool-temperate to subtropical moist forests. A number of taxa are commonly cultivated, including *Aspidistra* (*Aspidistra elatior*), Lily-of-the-Valley (*Convallaria maialis*) and Solomon's Seal (*Polygonatum* spp.). *Aspidistra elatior* is naturalised in the inhabited areas of Lord Howe Island, and *Ophiopogon japonicus* which has not apparently survived.

Dasyopogonaceae Dumortier (incl. Calcectasiaceae) [9: 71]

An almost entirely Australian family, with its centre of diversity in south-west Western Australia. The Dasyopogonaceae are mostly shrubby or almost arborescent, tough-leaved plants, and in the case of *Kingia* superficially resemble *Xanthorrhoea* species. The flowers are reduced and clustered in heads in many of the genera, and with a few notable exceptions, lack a showy perianth. The families affinities seem to be with the Dracaenaceae with which they share the woody shrub/small tree habit.

Best known and most widely cultivated genus is *Lomandra* (Mat rush), which is easy to grow under a wide range of conditions. One of the most spectacular members of the family is the genus *Calcectasia* (Tinsel Lily) from sandy heaths in Victoria, South Australia and Western Australia, with brilliant metallic enamel-blue flowers. Despite its horticultural appeal, it is unfortunately difficult to grow unless conditions are ideal, and resents disturbance.

Rhizomatous or woody, branched trees or shrubs with fibrous roots. The leaves are often large and grass-like or wiry. Flowers uni- or bisexual six-partite with superior ovaries and borne in large compound spikes, heads or singly. The tepals are free or fused at the base and the stamens sometimes fused to the tepals. The fruits are capsules or nutlets, and contain one to several orange, red or pale-brownish seeds.

Fig. 8 (opposite page). *Kingia australis* Aa, the plant; Ab, a head of flower; Ac, a flower, stamens thrusting out from the enclosing bracts and sepals; Ad, a pair of stamens enclosing the style.

Dasyopogon Ba, the plant; Bb, a head of flower; Bc, a flower with Bc its enclosing bracts.

Baxteria australis Ca, a flower, the tepals cupped by bracts with the style, just showing at the top.

Acanthocarpus preissii Da, a head of flowers on the end of a flowering stem and Db, a flower.

Chamaexeros serra, E, a flower held in raceme at base of plant, leaf margins lacerated.

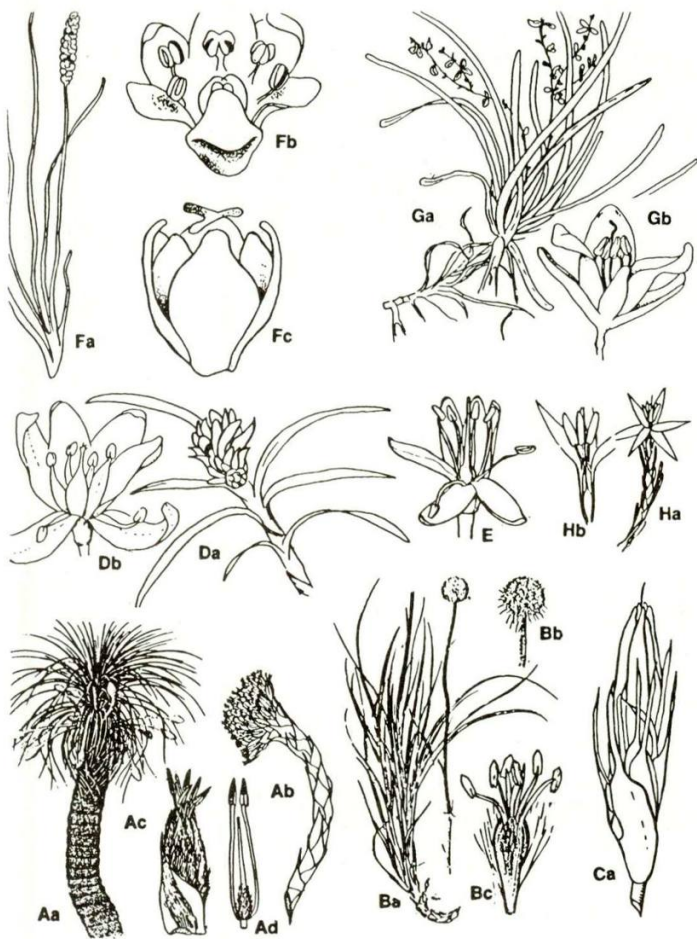
Lomandra preissii, Fa, a plant with spike of flower; Fb, a head of flower; Fc, a male flower; Fd, a female flower.

Romnaldia grallata, Ga, a plant; Gb, a flower; Gc, flower in section.

Calcectasia Ha, a flowering branchlet; Hb, a section through a flower.

Key to the genera of the Dasypogonaceae in Australia

- 1 Flowers unisexual
- 2 Flower numerous in panicle or umbellate spikes *Lomandra* Labill. (Mat Rush) [50/50]
- 2* Flowers solitary *Xerolirion* A. S. George [1/1]
- 1* Flowers bisexual
- 3 Flowers single
- 4 Tepals fused; brilliant metallic blue *Calectasia* R. Br. (Tinsel Lily) [3/3]
- 4* Tepals free; not brightly coloured *Baxteria* R. Br. ex Hook. [1/1]
- 3* Flowers numerous
- 5 Inflorescence spicate; flowers sessile
- 6 Leaves linear, angular in x-section *Kingia* R. Br. [1/1]
- 6* Leaf sections not angular *Dasypogon* R. Br. [3/3]
- 5* Inflorescence racemose or cymose, simple or compound; flowers pedicellate
- 7 Aerial stems present *Acanthocarpus* Lehm. [7/7]
- 7* Aerial stems absent
- 8 Leaves two-ranked, spiral; margins entire *Romnalda* P. Stevens [3/2]
- 8* Leaves clustered; margins lacerated *Chamaexeros* Benth. [3/3]





△ *Dasypogon bromeliifolius*

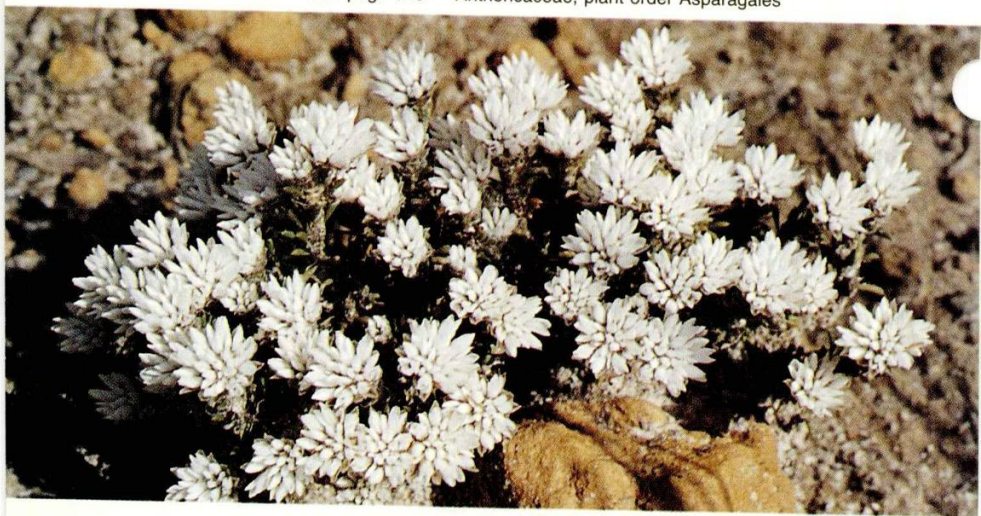
See page 350 — Dasypogonaceae, plant order Asparagales

Photography by Ivan Holliday.

▽ *Laxmannia brachyphylla*

See page 345 — Anthericaceae, plant order Asparagales

Photography by John Simmons.





△ *Lomandra caespitosa*

See page 350 — Dasypogonaceae, plant order Asparagales

Photography by John Simmons.

▽ *Lomandra leucocephala*

See page 350 — Dasypogonaceae, plant order Asparagales

Photography by John Simmons.



One of the largest of the Australian lilies, the Doryanthaceae consist of the single genus *Doryanthes* with two species in warm temperate eastern Australia. With inflorescences several metres tall bearing hundreds of large, blood-red flowers, they are attractive ornamentals. The plants are easy to grow, and their only draw-backs seem to be their size, and slowness to mature. They are very large, rosette "herbs". The leaves are large, linear, thick and leathery. Flowers six-partite with inferior ovaries and borne in $\pm$ arborescent bracteate heads or racemes. The tepals are fused at the base, and the stamens are attached to them for part of their length. The fruits are dry capsules containing numerous winged, reddish-brown seeds. Photograph on page 356.

Despite their superficial resemblance to some members of the Agavaceae, the relationships of the Doryanthaceae are still unsettled. Dahlgren *et al.* (1985) suggested that they might be close to the Phormiaceae, but current studies seem possibly to indicate a number of Asian and African families. The GyMEA festival in Sydney's southern suburbs, where *Doryanthes excelsa* (the GyMEA Lily) is relatively common, recalls the festive gatherings of Koorie to feast on the developing GyMEA inflorescences. These were cooked and eaten like cabbages, providing an abundant food resource.

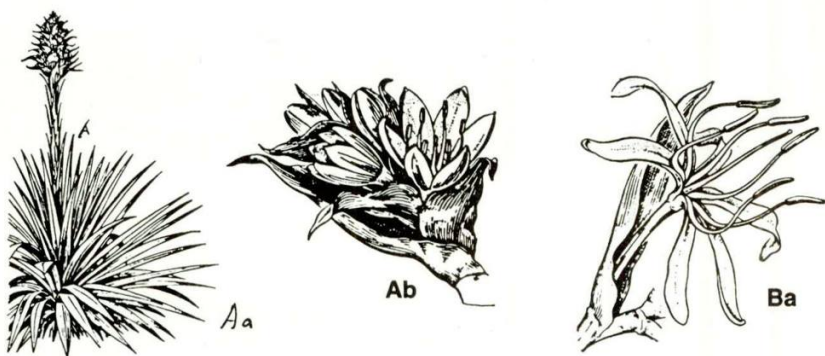


Fig. 9. *Doryanthes palmeri* plant Aa and flower head, Ab.

Photograph page 356

Doryanthes excelsa. The plant has a head of flowers on a stalk to 5 m high, each flower being as in Ba.

Dracaenaceae Salisb. [2-3: c.250]

Plant Order Asparagales

A relatively small family with only 2-3 genera worldwide one only found in Australia (*Pleomele* Salisb. [c.140/1]). The only native, *Pleomele angustifolia* (photograph on page 357) from tropical north Queensland, is sometimes included under the genus *Dracaena* which is widespread in the Old World tropics and subtropics. The plants are typically tree-like with a $\pm$ woody trunk, or in the case of the introduced ornamental *Sansevieria*, stemless plants with leathery or succulent leaves arising from a creeping surface rhizome.

Large woody shrubs or trees, or rhizomatous herbs with fibrous roots. The strap-shaped leaves are large thick and leathery. Flowers six-partite with superior ovaries and borne in simple or compound racemes or umbels. The tepals are fused for part of their length and the stamens are attached to the tepals. The fruits are fleshy to $\pm$ woody berries containing 1-3 cream to brown seeds.

Asphodelaceae Juss. (Incl. Aloëaceae) [17: c.800]

Asparagales

The family are best developed in Africa and Asia Minor, but are widespread, with *Bulbine* the only native genus. The corms of *Bulbine bulbosa* (native leek) are edible and were used by the Koorie and Nunga for food. Many of the family are cormous, dying down in the dry months, but some like *Aloë* are perennial succulents, and others such as the common onion weed *Asphodelus fistulosus* are annuals. The leaves may be hollow or solid in cross section, and are often thickened and succulent, sometimes with serrate margins. Flowers six-partite, with superior ovaries, borne in terminal, simple or compound racemes or spikes. The tepals may be free or fused for part of their length. The fruits are usually dry, or fleshy capsules, containing few to numerous often arillate (with a fleshy appendage), black seeds.

The Asphodelaceae are very closely related to the Anthericaceae, and less so to the Phormiaceae. Cronquist (1981) places *Aloë* and *Kniphofia* in a separate family Aloëaceae, mostly on the basis of the succulent nature of the former, and the obviously close relationship of the latter to *Aloë*, despite its not being succulent. Dahlgren *et al.* (1985) considered instead that both genera and their relatives fit better in the Asphodelaceae as the subfamily Aloëideae. Although not included in the *Flora of Australia* treatment of Aloëaceae due to oversight, *Kniphofia uvaria* (Red-Hot Poker) is naturalised in southern Australia and is thus included here.

Agavaceae Endl. [8:300]

Plant Order Asparagales

The Agavaceae are a sizeable North and Central American family, the majority of whose members are arid-adapted, large, often spiny-leaved succulents. The Century plants (*Agave*) and *Yuccas* are widely cultivated as ornamental shrubs, and *Agave sisalana* is the commercial source of fibre for sisal rope. Three genera have escaped from cultivation in Australia.

Alliaceae J. Agardh (Onion family) [30: c.720]

Plant Order Asparagales

Although none of the Alliaceae are native to Australia, this northern hemisphere family is well established in the form of escaped crop, ornamental and weed species. *Agapanthus* is naturalised in a number of places in southern Australia, as is the Spring Star Flower *Ipheion* (widely known in the nursery trade by its former generic name of *Tritelia*), and *Nothoscordum* and a number of *Allium* species are widespread and persistent weeds. The Alliaceae are allied to the Amaryllidaceae, within which they have been periodically included by various authorities.

Geitonoplesiaceae Conran in ed. [2: 2]

Plant Order Asparagales

Woody climbers or shrubs with tuberous or fibrous roots. The leaves are numerous along the stems, and in *Geitonoplesium* are inverted by twisting of the leaf base so that the apparently upper surface is actually the lower one. Flowers

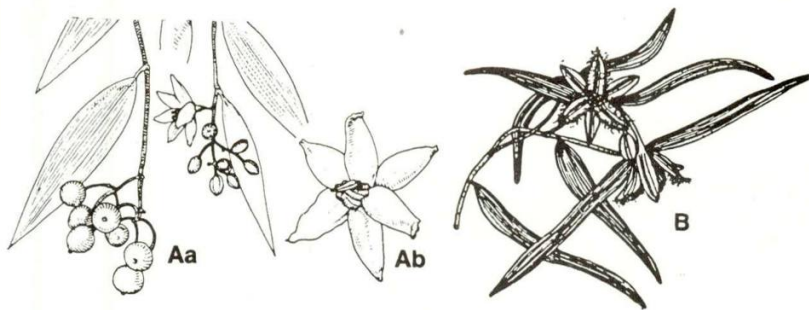


Fig. 10. *Geitonoplesium cymosum* fruiting branch, Aa, flowers, Ab.

Eustrephus latifolius, B, a flowering branch, three inner tepals fringed with hairs. Photograph page 360.



△ *Pleomele angustifolia*, in fruit.

Photography by P. Ball.

▽ *Doryanthes excelsa* Sketch page 354

Photography by H. Smith.





Pleomele angustifolia (above)

Happy Plant

Photographs and report by Peter Ball in his series on Plants For Top End Gardens.

A shrub suitable for a sunny or partly sunny position in the garden. It makes a good pot plant and is often seen decorating offices and vestibules.

Long clusters of white to yellow trumpet flowers appear during the early wet season making a fine display. The stamens clustered at the end of the flower trumpet are a feature. A delicate perfume attracts bees and other insects. An added feature is the round orange fruits that follow the flowering, giving globules of colour. Long strap-like leaves surround the stem at the point of attachment, the foliage thick, dark green in the shade and pale green in sunny locations.

It is sold in numbers in the Darwin area due to its adaptability and low maintenance and as a fill in for shady areas. Plant it in almost any spot, mulch and water well. When in full sun use a little NPK fertiliser to maintain the green in the leaves.

six-partite with superior ovaries and borne in terminal sub-umbellate simple or compound cymes. The tepals are all similar in *Geitonoplesium*, the only species being *Geitonoplesium cymosum*, but in *Eustrephus* (again with only one species *Eustrephus latifolius*) the inner three are fringed with hairs, and the stamens are free or fused together, and not attached to the tepals. The fruits are berries or fleshy capsules, containing few to many black seeds, sometimes with fleshy arils. The Geitonoplesiaceae have been described in *Australian Plants* by Conran (1988) as part of the Smilacaceae *sensu* Conquist (1981) and this is now being "formally" changed.

Hypoxidaceae R. Br. [10: 150]

Plant Order Asparagales

A predominantly southern hemisphere family with centres of diversity in southern Africa, South America, southern Asia and Australia. They are either herbs of grasslands with annual leaves, or rainforest understorey "shrubs" with perennial palm-like leaves. These latter in particular are sometimes cultivated as ornamentals for their foliage. They are herbs with a tuberous subterranean rhizome and perennial aerial parts, or a bulb-like corm and annual aerial parts, fibrous roots. The leaves are numerous and range from linear and grass-like to broad and palm-like. Flowers six-partite, with inferior ovaries and borne on leafless scapes in racemes, spikes, heads or singly. The tepals are $\pm$ similar, free or fused and the stamens (rarely three, usually six) are attached to the base of the tepals. The fruits are either capsules or berry-like and contain numerous shiny black seeds.

Key to the genera of the Hypoxidaceae in Australia

- 1 Leaves annual, grass-like; rootstock a bulb-like corm *Hypoxis* L. [c.150/10]
(Yellow Star, Weather Grass, Star Grass)
- 1* Leaves perennial, broad, plicate; rootstock a rhizome
- 2 Perianth fused basally for several millimetres *Molineria* Colla [c.7/1]
- 2* Perianth fused basally for several centimetres *Curculigo* Gaertner [c.10/1]

The family have in the past been related to the extra-Australian southern hemisphere family Velloziaceae in the Bromeliiflorae. Recent treatments, while still uncertain of the family's precise relationships, nevertheless place it clearly in the Asparagales, with any similarities to the Velloziaceae deemed to be convergences.

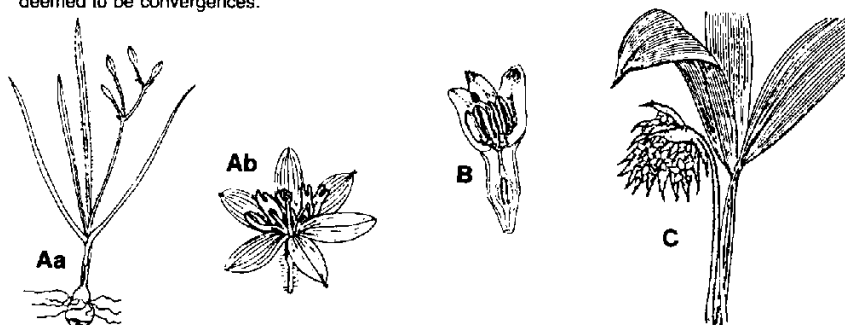


Fig. 11A. *Hypoxis pratensis*. A perennial herb from a corm, Aa, to 40 cm high with yellow flowers, Ab, the stamens with these unusually shaped anthers attached near the middle and, of course, facing out. The moderately hairy annual, grass-like foliage is common to five other species, the remaining four species found in Australia are without hairs. Photograph on page 305.

Fig. 11B. *Molineria capitulata*. This one species genus is characterised by its heads of flowers, each flower cradled by a large green bract, the six tepals fused at the base, each with a stamen attached. This tufted perennial is widely cultivated in Australia as an ornamental, often for indoor use.

Fig. 11C. *Curculigo ensifolia*. The only Australian species is a tufted cormous perennial to 50 cm tall and in habit resembles *Molineria*. Photograph in No. 134 Issue.

The single Australian member of the family is *Drymophila* with two species in south-eastern Australia: *D. moorei* with bright orange berries, in northern New South Wales and far south-east Queensland, and *D. cyanocarpa* with blue berries in southern New South Wales, Victoria and Tasmania. The plants are found as understorey shrubs in cool temperate rainforest and wet sclerophyll forests, and are readily distinguished by their net-veined, inverted leaves (*Geitonoplesium* has inverted leaves but parallel venation). Although attractive propositions for a fernery or moist shaded environment with lots of leaf litter, both species resent disturbance and can be difficult to transplant. Germination is sporadic, and very fresh seed is essential. The seedlings grow relatively quickly but are susceptible to damping off if damaged. In spite of this, neither the seedlings nor adult plants will tolerate being allowed to dry out. The South American *Luzuriaga* species are known to be poisonous.

The position and relationships of *Drymophila* were the subject of study by Conran (1985; 1987b) who concluded that instead of being the only native member of the Lily-of-the Valley family (Convallariaceae) its affinities were much closer to the Luzuriagaceae, with genera in South Africa (*Behnia*) and New Zealand and South America (*Luzuriaga*), reflecting the geography of the former Gondwanan supercontinent. The Luzuriagaceae seem to be one of the more primitive families of the Asparagales and are in some aspects a bridging group between the net-veined Dioscoreales and the Asparagales. In addition, they share a large number of features with the Uvulariaceae (Liliales), making the clear separation of these three orders difficult.

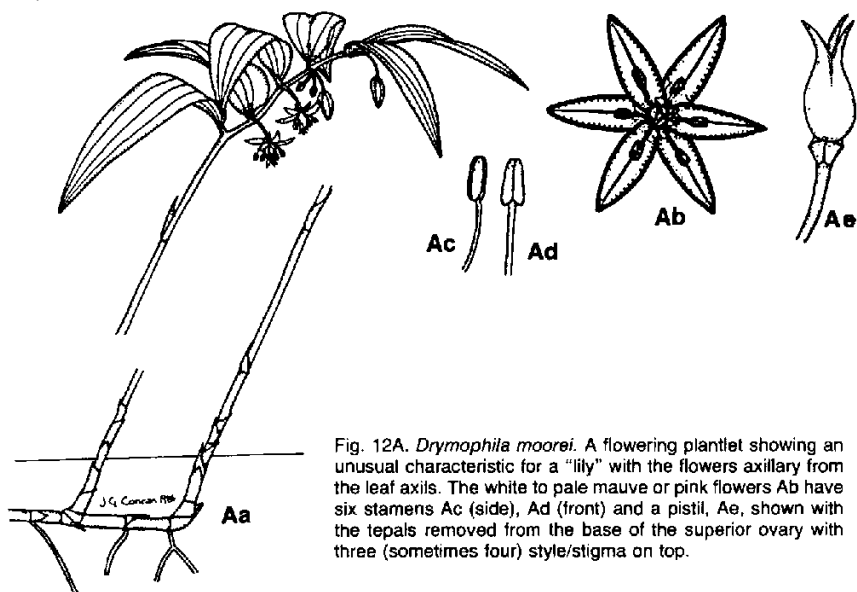


Fig. 12A. *Drymophila moorei*. A flowering plantlet showing an unusual characteristic for a "lily" with the flowers axillary from the leaf axils. The white to pale mauve or pink flowers Ab have six stamens Ac (side), Ad (front) and a pistil, Ae, shown with the tepals removed from the base of the superior ovary with three (sometimes four) style/stigma on top.

A large family of predominantly Old World genera, especially in southern Europe, south-west Asia and southern Africa. They are all herbs which die down annually to a bulb (or very rarely a rhizome), and a great number of the family are extensively cultivated as ornamental spring bulbs. No members of the Hyacinthaceae are native to Australia, but a number of the cultivated species have become garden escapes, particularly south-east Australia.



△ *Eustrephus latifolius*

Photography by H. Nicholson.

See page 355 — Geitnoplesiaceae, plant order Asparagales

▽ *Tricoryne humilis*

Photography by F. W. Humphreys.

See page 345 — Anthericaceae, plant order Asparagales





△ *Wurmbea dioica*

See page 367 — Colchicaceae, plant order Liliales

Photography by John Simmons.

▽ *Priophys amboinensis*

See page 343 — Amaryllidaceae, plant order Asparagales

Photography by D. Hockings.



This large Southern Hemisphere family has representatives in all areas of Gondwana, in addition to several endemic Australian genera. Most of the species are woody shrubs with fibrous or occasionally tuberous roots. The leaves are numerous along the stems or clustered at the stem bases, and they often have flattened (equitant) leaf bases. The flowers have superior ovaries and are borne in terminal or rarely axillary, simple or compound cymes, bracteate racemes or singly. The tepals are all $\pm$ similar, free, and may twist spirally after flowering. The pedicel is often jointed. The stamens are free or rarely fused at the base, free from the tepals and may have hair or swollen appendages on the filaments. The fruits are berries or capsules which contain numerous black seeds sometimes with arils.

Several members of the family are of economic or traditional ethnic importance, with *Phormium* (New Zealand Flax) and *Dianella* both sources of fibre from their leaves. Many of the Phormiaceae are or have potential as horticultural plants, in particular *Agrostocrinum scabrum* from the Perth region with its glandular bright blue flowers, and the various *Dianella*, *Stypandra* and *Theilonema* species with their usually blue flowers with contrasting bright yellow or brown anthers, and in the case of *Dianella* blue berries. Most members of the family are easy to grow and will tolerate a wide range of conditions.

Key to the genera of the Phormiaceae in Australia

- 1 Stamens with hairs, papillae, swellings or appendages; flowers several
 - 2 Tepals glandular, blue *Agrostocrinum* F. Muell. (Blue Grass Lily) [1/1]
 - 2* Tepals not glandular
 - 3 Fruit a berry *Dianella* Lam. (Flax Lilies) [25–30/15]
 - 3* Fruit otherwise
 - 4 Stamen filaments hairy distally *Stypandra* R.Br. (Nodding Blue Lily) [1/1]
 - 4* Stamen filaments not hairy *Theilonema* R. Henderson (Tufted Blue Lily) [3/3]
- 1* Stamens lacking appendages; flowers solitary *Herpolirion* Hook.f. (Sky Lily) [1/1]

Due largely to the studies of Thongpukdee [., 1989, No. 19], it is now appreciated that many of the Australian genera belonging in this family were formerly considered part of the Anthericaceae [Dahlgren 1985, No. 17]. Nevertheless, as a result of these changes, the Phormiaceae, Anthericaceae and Asphodelaceae are now difficult to separate clearly on the basis of just a few characters. Within the family as it now stands, should be included many of the former members of the "Johnsoniaceae", a tribe within the broadly defined Liliaceae, which were characterised by small flowers generally enclosed within bracteate heads or spikes. As this proposal is currently unpublished, these genera have been retained within the Anthericaceae for this treatment but shown separately on page 346.

Tecophilaeaceae Leybold [5C.: 15]

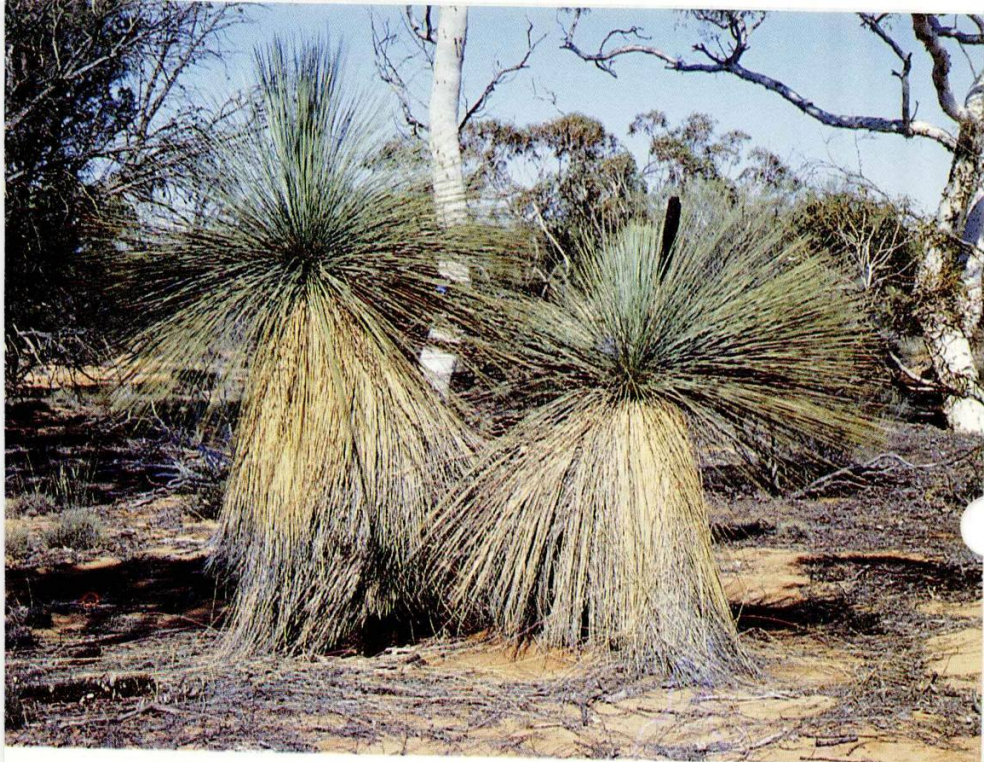
Plant Order Asparagales

A small South African and South American family, occasionally cultivated as ornamentals. A single species, *Cyanella hyacinthoides* [8/1†] has become naturalised in W.A. near Perth.

Xanthorrhoeaceae Dumortier [1: 28]

Plant Order Asparagales

Although one of the best known, and most distinctive of the Australian lily families, the Xanthorrhoeaceae are isolated in terms of their affinities. The single genus is *Xanthorrhoea* Sm. (Grasstree, Yakka, Blackboy) [28/28]. They are at first sight so different from anything else that it is difficult to relate them to other lily groups. They share a number of gross morphological features with the Dasypogonaceae, especially the genus *Kingia* from Western Australia,



△ *Xanthorrhoea*

Photography by D. Hockings

Dasypogon hookeri ▽

Photography by John Simmons



in having an arborescent habit, with numerous, wiry, grass-like leaves, and small flowers embedded in a densely bracteate axis. Despite this, they are florally quite different.

Shrubs or branched trees with fibrous, sometimes seasonally tuberous roots arising from a thick, sometimes subterranean rhizome. The leaves are tough linear, grass-like and often angular in cross-section, and their leaf scars and bases enclose the stems, conferring fire-resistance. Flowers six-partite, with superior ovaries and borne embedded in a tall, densely-bracteate spike-like inflorescence. The tepals are inconspicuous, all similar and free, and the stamens are free and not attached to the tepals. The fruits are woody or cartilaginous capsules containing 1–2 black seeds. The dried peduncles were used by various Koori tribes in fire making, and the resin exuded from the bases of the plants after fire was also used for a number of purposes. Some species also produce tuberous roots at certain times of the year and these were used as a food source.

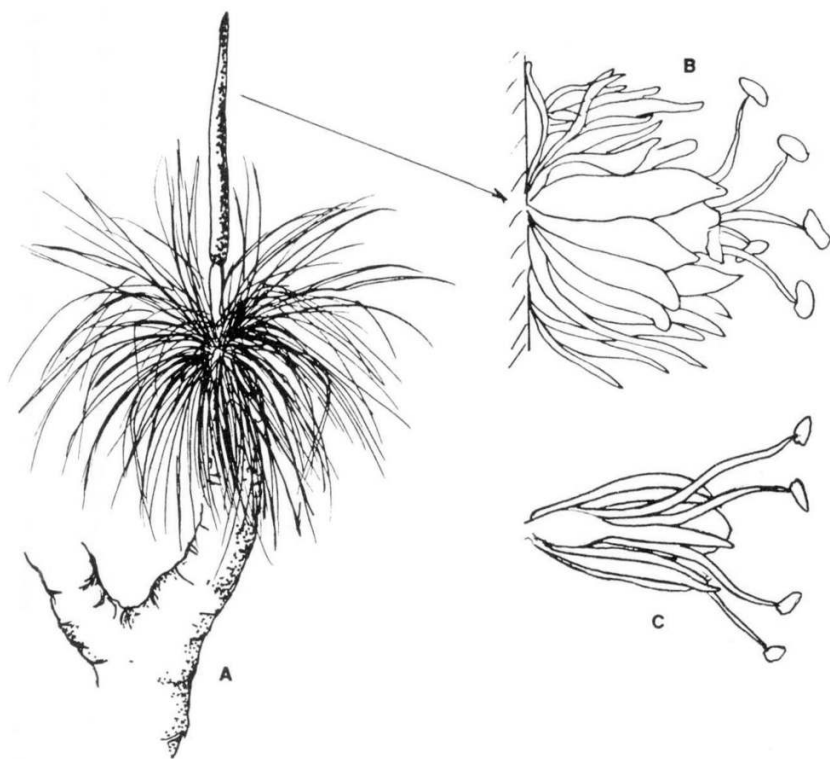


Fig. 14. *Xanthorrhoea preissii*, the plant A with a large scape of flowers. B, the side of the flowering spike enlarged to show a flower crowded by bracts. C, a flower in section.

The Plant Order Liliales

A Group of Australian Lilies

With the assignment of related genera to other families, this order of plants in Australia is reduced to two families and two naturalised species.

Key to the families of the Liliales in Australia

- 1 Ovary inferior
 - 2 Stamens 6 *Alstroemeriaceae*†
 - 2* Stamens 3 *Iridaceae*
- 1* Ovary superior
 - 3 Stamens 3 (*Isophysis*) *Iridaceae*
 - 3* Stamens 6
 - 4 Flowers >8 cm long; tepals overlapping in bud *Liliaceae*†
 - 4* Flowers <8 cm long; tepals each enclosing a stamen in bud
 - 5 Plants with corms *Colchicaceae*
 - 5* Plants with rhizomes *Uvulariaceae*

Liliaceae Juss. [13: 385]

The Plant Order Liliales

With the reassignment of all Australian genera to other families, the only species in Australia is the naturalised S.E. Asian, *Lilium formosanum*.

Alstroemeriaceae Dumortier [4: 160]

The Plant Order Liliales

A South American family with two large and two monotypic genera. *Alstroemeria* is popular in the cut flower trade, with numerous brightly coloured hybrids having been developed. Two species have become garden escapes in parts of eastern Australia. They are rhizomatous perennial herbs with erect or climbing, unbranched annual, aerial stems and fibrous roots. The leaves are scattered along the stems and inverted (twisting in the petiole (leaf stalk) with the upper and lower surfaces thus reversed). Flowers six-partite, bilaterally symmetrical, with inferior ovaries and borne in simple or compound umbel-like cymes. The tepals are spotted and free from each other, the stamens are free. The fruits are dry capsules containing numerous brown or yellowish seeds with rough seed coats.

The family shares with the *Geitonoplesiaceae* and *Luzuriagaceae* the possession of members with resupinate leaves, but these features are thought to be convergent in origin. The *Alstroemeriaceae* are more closely allied with the *Liliaceae* and *Uvulariaceae*, but as a group have many features which make them distinctive and somewhat isolated.

Colchicaceae DC. [17: 170]

The Plant Order Liliales

Although perhaps best known for the popular autumn crocuses (*Colchicum*) which belong to this family (non-edible: see note under *Iridaceae*), they are represented in Australia by both native and introduced elements. All of these are of horticultural merit, and the native species are as easy to grow as their more commonly grown foreign relatives. Whereas the tuberous roots of *Burchardia* and the bulbous corms of *Wurmbea* were eaten by the Koorie, many other members of the family such as the introduced *Gloriosa* are quite poisonous.

Key to the genera of the Colchicaceae in Australia

- 1 Rootstock a bulbous corm
 - 2 Flowers with prominent nectaries on the tepals *Wurmbea* Thunb. (Early Nancy) [c.40/19]
 - 2* Flowers lacking conspicuous nectaries
 - 3 Tepals uniformly dark red to reddish-brown, clawless *Iphigenia* Kunth [c.13/c.5]
 - 3* Tepals yellow inside, orange-red outside, clawed *Baeometra*† Salisb. ex. Endl. [1/1]
- 1* Rootstock a rhizome
 - 4 Flowers white or pink *Burchardia* R. Br. (Milkmaids) [5/5]
 - 4* Flowers orange to red with green *Gloriosa*† L. (Flame Lily) [1/1]

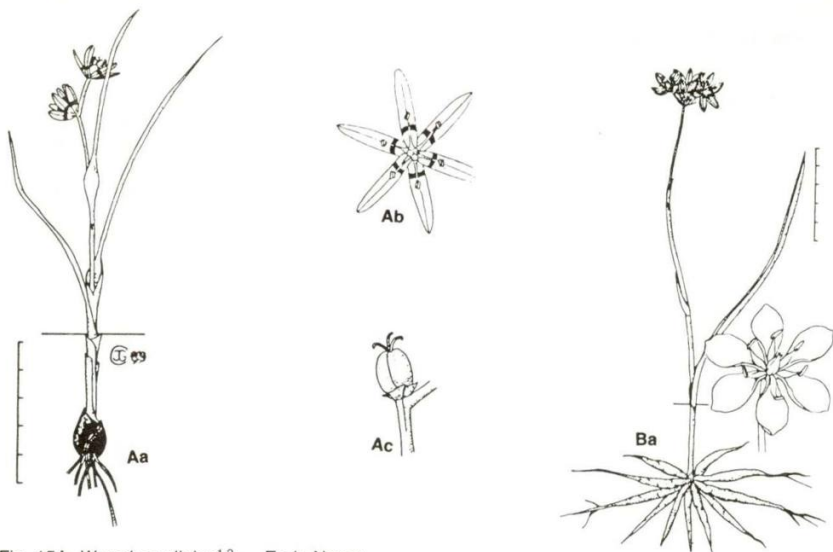


Fig. 15A. *Wurmbea dioica*^{1,2} — Early Nancy.

A fine-leaved native lily, the first one to flower in spring. The flowers are white with bands and purple centres, and are usually separately male and female. Underground small white, densely starchy, enveloped in black scale-leaves. The corms were cooked before eating. Photo page 361.

Fig. 15B. *Burchardia umbellata*^{1,3}

Popoto (Lake Condah)

A spring-flowering native lily bearing a head of white flowers with pink centres found everywhere except the Mallee, and not uncommon even around Melbourne. Several tapering, starchy roots arise from the base of the plant; available year-round and cooked before eating. Photo page 312.

Colchicaceae are perennial herbs with erect or climbing, usually annual, aerial stems arising from bulbous or stoloniferous corms with fibrous roots. The leaves are scattered along the stems, and are linear and grass-like to broad. Flowers six-partite, with superior ovaries and borne singly or in racemes. The tepals are free from each other or basally fused, the stamens may be fused to the tepals or free. The fruits are capsules containing numerous brown or yellowish, sometimes arillate seeds.

The relationships of the family are most probably with the Uvulariaceae, with which many of the genera share the unusual feature of each tepal individually enclosing the anther which it subtends in bud, with the ovary left unprotected (in most flowers the tepals overlap and enclose all of the anthers and the ovary as a group). The family are an important source of the drug/poison colchicine which is used in some genetics experiments to manipulate chromosomes.

¹Reprinted, with permission, from **Victorian Koorie Plants** by B. Gott and J. Conran, and available from Yangennanock Women's Group, Aboriginal Keeping Place, P.O. Box 666, Hamilton, Victoria, 3300, for \$10 plus \$2 postage. Quite a remarkable book of 72 pages, it features 51 species illustrated by sketches such as those above with a report on how the plants were used as food, medicine, etc.

²*Wurmbea* is a genus of 40 species, 19 native to Australia. A characteristic feature is the nectaries that occur as thickening, often coloured, on the inner face of each tepal comprising three petals and three sepals. They are andromonoecious plants, with bisexual lower flowers and male upper flowers which have a reduced pistil.

³*Burchardia* is a genus of four species endemic to Australia, all described on page 311.

Victorian Koorie Plants A book on Aboriginal use of plants. (see above)

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by H. T. Clifford, J. G. Conran and A. Thongpukdee

The Australian "Lilies" arranged in five plant **Orders** as definition 338

Each plant order containing one or more plant **Family** ending in the letters "aceae". Each plant family comprising one **Genus** or more. Each genus comprising one or more unique plant **Species**. Each species name having the "genus" name followed by a unique species name.

This seemingly technical article is supported by other articles that describe, in simple terms, the species mentioned, together with details of cultivation and propagation. A reference to these supporting articles is given in brackets. An * indicates that the species are to be described and illustrated in the next three to four issues.

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A key to all genera of the family Iridaceae is given on page 370 but ignoring all the foreign plants that have become naturalised, Australian Iridaceae are confined to just six genera shown in bold and readily distinguished by the following characters and as illustrated opposite: The ovary of the flower is superior in *Isophysis* with a single species *Isophysis tasmanica* found only in Tasmania.

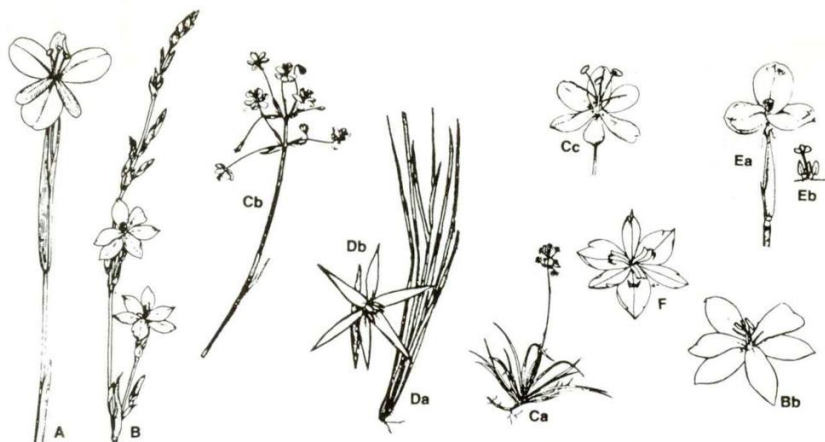
The flowers have six tepals, three petals and three sepals, all equal in size in *Isophysis* but with the petals tending to be smaller than the sepals in *Libertia* and *Orthrosanthus*, much narrower in *Diplarrena* and very small in *Patersonia*.

The three stamens all have the anthers on the end facing outwards except for *Diplarrena*, where one is sterile and only two stamens are prominent.

The style is branched at the end, very shortly and not obvious for *Diplarrena* and *Patersonia*, short for *Isophysis*, but with long lobes often poking out between the stamens in *Libertia* and *Orthrosanthus*.

Fig. 16A. *Diplarrena moraea*, a flowering stem showing clasping leaves and six tepals comprising three large sepals and three smaller petals, two stamens facing out and the style. Photo page 377.

B. *Orthrosanthus multiflorus* with flowers along a stem, Ba and the sessile flower Bb. Photo page 337.



C. *Libertia pulchella*, the plant, Ca, showing the rhizome rootstock common to all these plants, a head of pedicellate (each on a stalk) flowers, Cb and the symmetrical flower, Cc, with its six nearly equal "petals" known as tepals (actually three petals and three very similar sepals), three stamens with anthers facing out. The long lobes of the style are seen alternating with the stamens.

D. *Isophysis tasmanica*, a tufted plant, Da, with the "star" symmetrical flowers of six tepals (three petals and three similar sepals). The exceptional feature is not shown, a superior ovary. All other Iridaceae have inferior ovaries.

E. *Patersonia occidentalis*. The symmetrical flower, Ea, comprises three large free sepals, the true petals being tiny and inconspicuous. The centre of the flower is shown in detail, Eb, the three spear-head like anthers facing out from but surrounding the larger style with its three stigmatic lobes on top. Photograph on page 316.

F. *Dietes robinsoniana* is endemic to Lord Howe Island. The white flowers, each on a pedicel (stalk) have three large sepals each with a distinctive yellow marking, and three smaller petals. The three stamens are expanded, almost petal-like. Photograph on page 337.

The Iridaceae are mainly of southern hemisphere distribution, and show their closest affinities with the achlorophyllous family Geosiridaceae from Madagascar an island in the Indian Ocean with which they probably share a common ancestry. Beyond this, the relationships of the family are less certain.

Iridaceae Juss. [70: 1400]

The Plant Order Liliales

A very large and well known family with a world-wide distribution and numerous members widely in cultivation such as various *Iris*, *Gladiolus* and *Freesia* spp. and hybrids. The expensive spice saffron is obtained from the stigmas of *Crocus sativus* (not to be confused with the highly poisonous *Colchicum* spp. (Colchicaceae), also called autumn crocuses). In addition to the reasonable number of native species, a large number of particularly South African genera have become established as garden escapes in much of southern Australia. Of particular interest amongst the native genera is *Isophysis tasmanica* from Tasmania, which is the only member of the Iridaceae with a superior ovary; and the endemic Lord Howe Island *Dietes robinsoniana* species (all of the remainder of the genus are from southern Africa). *Patersonia*, *Libertia* and *Orthrosanthus* are amongst those native genera in cultivation, although all of them are worthy of wider horticultural consideration.

Perennial or annual herbs, often with erect aerial stems, arising from rhizomes or corms with fibrous roots. The leaves are clustered basally or scattered along the stems in two-ranks, and are linear and grass-like to broad. Flowers six-partite, with inferior ovaries (superior in *Isophysis*) and borne singly or in simple or compound cymes or spikes. The 3 + 3 tepals are free from each other or basally fused, regular or bilaterally symmetrical, the three stamens may be fused to the tepals or free. The fruits are capsules containing numerous brown or yellowish, sometimes arillate seeds.

- 1 Ovary superior **Isophysis** T. Moore ex. Seeman [1/1]
- 1* Ovary inferior
- 2 Rootstock a bulb **Herbertia**† Sweet [6/1]
- 2* Rootstock a corm or rhizome
- 3 Anthers equally spaced around the style, opposite the style branches
- 4 Rootstock a corm
- 5 Petals and sepals markedly different
- 6 Fruit beaked, enclosed within bracts **Gynandriis**† Parl. (Thread Iris) [9/1]
- 6* Fruit not beaked, longer than subtending bracts **Moraea**† Miller [c.120/3-4]
- 5* Petals and sepals ± similar
- 7 Style branches simple; stigmas three
- 8 Tepals brownish, undulate **Ferraria**† Burman ex. Miller [10/1]
- 8* Tepals yellow, with smooth margins
- 9 Flowers solitary **Galaxia**† Thunb. [14/1]
- 9* Flowers numerous **Hexaglottis**† Vent. [4/1-2]
- 7* Style branches two-fid; stigmas six **Homeria**† Vent. (Cape Tulip) [31/3]
- 4* Rootstock a rhizome **Iris**† L. (Flag, Dutch and English Iris) [c.250/3-5]
- 3* Anthers if equally spaced around the style then alternating with the style branches, else clustered to one side of the style.
- 10 Rootstock a corm; flowers sessile
- 11 Style branches simple; stigmas three
- 12 Perianth tube cylindrical basally, abruptly funnel shaped above
- 13 Leaves > hairy, ± petiolate **Babiana**† Ker Gawler (Babiana) [60/1]
- 13* Leaves not densely hairy, not petiolate
- 14 Flowers ± erect
- 15 Stamens secund **Tritonia**† Ker Gawler (Tritonia) [28/2]
- 15* Stamens equally spaced around the style **Hesperantha**† Ker Gawler [55/1]
- 14* Flowers spreading
- 16 Flowers strongly asymmetrical
- 17 Flowers two-lipped **Chasmanthe**† N.E.Br. [3/1]
- 17* Flowers not two-lipped **Homoglossum**† Salisb. [10/1]
- 16* Flowers weakly asymmetrical **Crocsmia**† Planchon (Montbretia) [9/2]
- 12* Perianth tube gradually widening, else cylindrical up to the lobes
- 18 Flowers pendulous **Dierama**† K. Koch and C. Bouché [c.20/1-2]
- 18* Flowers otherwise
- 19 Flowers erect
- 20 Perianth tube narrow **Ixia**† L. (Ixia) [45/4-5]
- 20* Perianth tube broadly-tapering **Sparaxis**† Ker Gawler (Harlequin Flower) [6/2]
- 19* Flowers spreading
- 21 Floral bracts green **Gladiolus**† L. (Gladiolus) [c.180/9]
- 21* Floral bracts brown, scarious
- 22 Flowers two-lipped **Synnotia**† Sweet [5/1]
- 22* Flowers not two-lipped **Tritonia**
- 11* Style branches paired or two-fid; stigmas six
- 23 Flowers solitary **Romulea**† Maratti (Onion Grass) [90/4]
- 23* Flowers several per inflorescence
- 24 Flowers in two-ranked **Watsonia**† Miller (Watsonia) [c.45/6]
- 24* Flowers on one side of the spike only
- 25 Floral tube curved **Freesia**† Klatt (Freesia) [6/1]
- 25* Floral tube straight **Anomatheca**† Ker Gawler [5/1]
- 10* Rootstock a rhizome
- 26 Flowers conspicuously pedicellate
- 27 Stamens expanded and petal-like **Dietes** Salisb. ex. Klatt (Orchid Iris) [6/1 + 2†]
- 27* Stamens not expanded or petal-like
- 28 Tepals fused **Sisyrinchium**† Kunth (Pig-root) [100/2]
- 28* Tepals free
- 29 Flowers asymmetrical **Diplarrena** Labill. (Butterfly Flag) [2/2]
- 29* Flowers symmetrical
- 30 Tepals all petaloid **Libertia** Spreng. (Grass Flag) [12/2]
- 30* Sepals large, petals reduced, tiny **Patersonia** R.Br. (Purple Flag) [19/17]
- 26* Flowers sessile or almost so
- 31 Tepals fused **Schizostylis**† Backh. and Harvey ex. Hook. f. [1/1]
- 31* Tepals free **Orthrosanthus** Sweet (Morning Flag) [7/4]

All of the Australian members of the family (a total of four species) are relatively easy to cultivate, and have attractive pink flowers. *Kuntheria pedunculata* is restricted to the wet rainforest areas of coastal tropical Queensland between Cairns and Townsville, but *Schelhammera pedunculata* and *S. undulata* as well as *Tripladenia cunninghamii* are much more widespread in eastern Australia, and also more commonly encountered in cultivation.

They are rhizomatous perennial herbs or woody shrubs with erect aerial stems and fibrous roots. The leaves are scattered along the stems or grouped in clusters, and are usually sessile to stem-clasping and broad. Flowers six-partite, with superior ovaries and borne in terminal or axillary cymes, spikes or singly. The tepals are free from each other or fused basally, and the stamens are free or $\pm$ attached basally to the tepals. The fruits are berries or capsules containing numerous brown or yellowish, often arillate seeds.

Key to the genera of the Uvulariaceae in Australia

- 1 Tall branched shrubs; stems perennial *Kuntheria* Conran and Cliff. [1/1]
- 1* Short herbs with single-season-growth stems
- 2 Tepals with paired, branched basal glands *Tripladenia* F. Muell.
(incorrectly known as *Kreysigia*) [1/1]
- 2* Tepals lacking glands *Schelhammera* R. Br. (Lilac Lily) [2/2]

A widespread family extending to Asia and across much of the sub-Arctic and northern temperate regions of the Old and New World. The Uvulariaceae share features both with the Liliales, especially the Colchicaceae, and with some members of the Asparagales such as the Luzuriagaceae. This intermediate position makes separation of the orders difficult, and may indicate shared relictual characteristics between primitive members of the two orders.

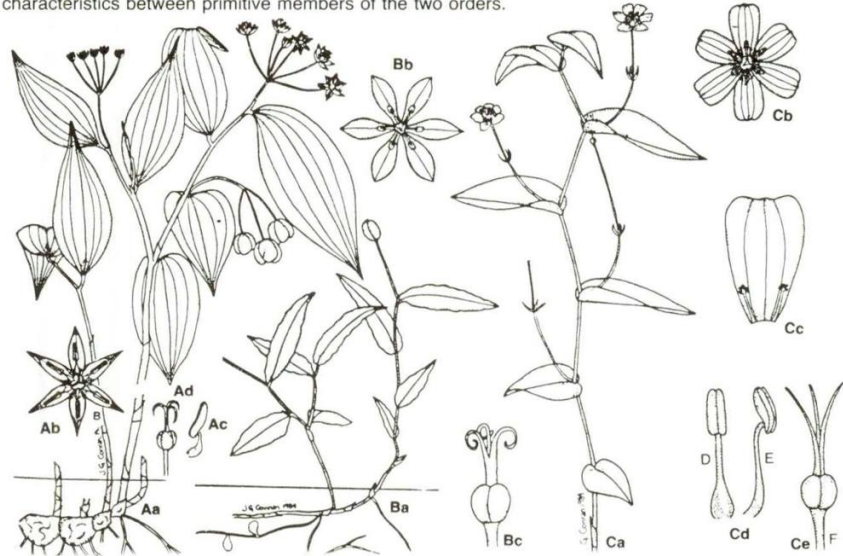


Fig. 17A. *Kuntheria pedunculata*. A tall branched shrub arising from a thick, knotty rhizome. Leaves alternate, flowers b; pale pink with six stamens, c; and pistil, d, with superior ovary.
B. *Schelhammera undulata*. A prostrate/erect herb to 20 cm with single terminal or axillary pale pink to mauve flowers 10–15 mm diam., Bb, with a branched style, Bc. *Schelhammera multiflora* is a large more erect herb to 40 cm with white flowers in a terminal umbel-like cyme. Photo page 373.
C. *Tripladenia cunninghamii* is a herb to 40 cm, the flowers, Cb, 15–25 mm diam., mauve or pink, have a branched basal appendage on the six sepals, Cc; six stamens, Cd; and a forked style, Ce.

This group of "Lily" families, unlike most of the others, has plants with net-veined (reticulate) leaves as found in the plants referred to as dicots. Their association with Australian "lilies" is because of their basic floral similarity to the remainder of the Liliiflorae, and probable common origin with them.

Key to the families of the Dioscoreales in Australia

- 1 Perianth parts in 4's Stemonaceae
- 1* Perianth parts in 3's
- 2 Ovary superior
- 3 Flowers in unisexual umbels; plants dioecious Smilacaceae
- 3* Flowers in racemes or spikes; plants hermaphrodite Ripogonaceae
- 2* Ovary inferior
- 4 Flowers unisexual; plants dioecious Dioscoreaceae
- 4* Flowers bisexual; plants hermaphrodite
- 5 Prickly climbers with leaf opposed tendrils Petermanniaceae
- 5* Rhizomatous or tuberous stemless herbs Taccaceae

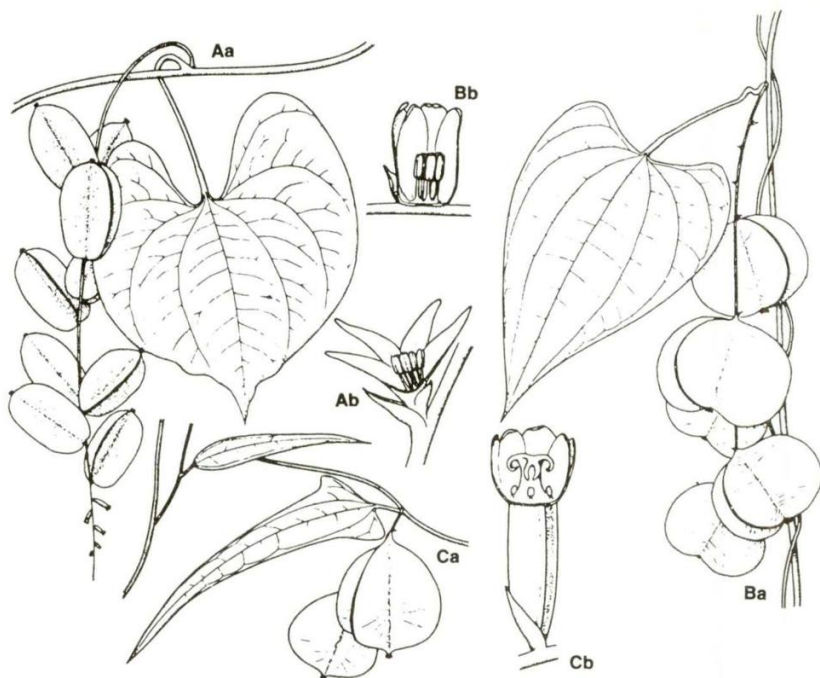


Fig. 18. *Dioscorea bulbifera* — fruiting stem, Aa — male flower, Ab
Dioscorea transversa — fruiting stem, Ba — male flower, Bb
Dioscorea hastifolia — fruiting stem, Ca — female flower, Cb

Dioscoreaceae R. Br.

Plant Order Dioscoreales

The Dioscoreaceae are an important family in tropical countries, where a number of species, especially *Dioscorea sativa* (the edible yam), are major tuber crops, producing both subterranean and aerial tubers.



△ *Dioscorea transversa*

Photography by S. Pearson.

▽ *Schelhammera multiflora*

Photography by H. Nicholson.

See page 371 — Uvulariaceae, plant order Liliales



Some of the African desert species of Dioscoreaceae have developed large, gnarled woody stem bases, earning them the name "Elephant's Feet", and even their Latin sub-generic name (*Testudinaria*) refers to their resemblance to tortoises. The tubers of several Mexican *Dioscorea* species are an important source of the drugs from which the contraceptive "Pill" is produced. In Australia, the family are relatively poorly represented, with some five species in a single genus *Dioscorea* L. (Yam) [c.600/4+1] from tropical and sub-tropical areas (one in southwestern Australia). These were eaten by the various Aboriginal peoples in the areas where they grew, although sometimes only after lengthy preparation to remove toxins from the tubers.

The relationships of the family are with the other members of the Dioscoreales, but many of the features used to relate them are now thought to be remnant ancestral characteristics rather than ones brought about through more recent common origins. The order as a whole, is thought to be close to the form of the ancestral monocot, and shares a large number of features with primitive dicot families such as the Aristolochiaceae (Dutchman's Pipes).

Rhizomatous perennial dioecious vines with annual to perennial, woody or herbaceous stems, and fibrous or tuberous roots and sometimes tuberous rhizomes. The leaves are borne singly or in groups along the stems, and are net-veined, petiolate and often arrow-head shaped (hastate). Flowers six-partite, with inferior ovaries, and borne in axillary spikes or racemes. The tepals are usually free, as are the stamens. The fruits are usually three-winged capsules containing several large, winged brown seeds.

Petermanniaceae Hutch. [1: 1]

Plant Order Dioscoreales

The single genus, *Petermannia* F. Muell. with a single species *Petermannia cirrosa* is a rhizomatous perennial vine with woody, prickly stems, and fibrous roots. The leaves are borne singly along the stems, and are net-veined and petiolate. Flowers six-partite, with inferior ovaries, and borne in leaf-opposed compound cymes, some of which lack flowers and function as tendrils. The tepals are free, as are the stamens. The fruits are usually berries containing several reddish-brown seeds.

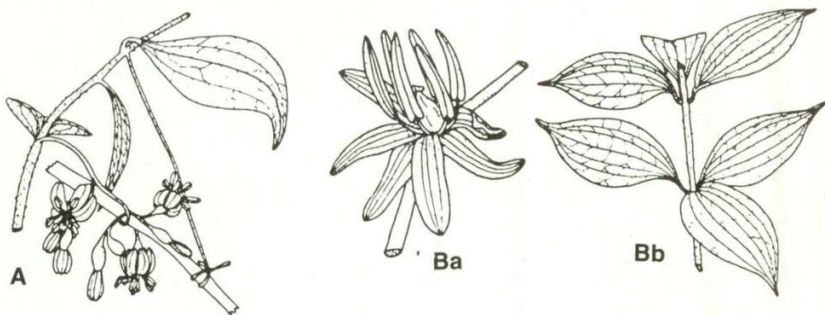


Fig. 19. *Petermannia cirrosa*, A — *Ripogonum album* flower Ba and leaves Bb.

The family is morphologically quite distinct from any of its relatives, but suffers from the problem that most of the features which it does share with other Dioscoreales are ancestral, and thus shed no light on its relationships. There is little fossil evidence for the origins of Australian monocots, but a recent (as yet unpublished) find from a site near Adelaide included a mummified leaf very similar to *Petermannia*. Although this does not prove that the Petermanniaceae were around in Adelaide's Eocene rainforests 40 million years ago, the taxonomic isolation of the family, and its large number of primitive features support the idea of the present species being a relictual survivor.

Ripogonaceae Conran and Cliff. [1: 6]

Plant Order Dioscoreales

The single genus in Australia (*Ripogonum* Forster and Forster f. (Supplejack) [6/5]) comprises rhizomatous perennial vines with woody, sometimes prickly and/or hairy stems, and fibrous roots. The often hairy leaves are borne singly or in groups along the stems, and are net-veined and petiolate. Flowers six-partite, with superior ovaries, and borne in axillary or terminal racemes or spikes. The tepals are free, as are the stamens. The fruits are berries containing one to few brown seeds.

The Australian members of the Ripogonaceae have already been described and illustrated in *Australian Plants* by Conran (1988) as part of the Smilacaceae *sensu* Cronquist (1981). Like the Peternmanniaceae, the Ripogonaceae are a small, monogeneric family with contested affinities. Although traditionally included within the Smilacaceae, this was found to have been due largely to a misinterpretation of the stamens, and they seem to have more in common with families such as the Stemonaceae (Conran and Clifford 1986; Conran 1989).

Smilacaceae Vent. [2: c.300]

Plant Order Dioscoreales

The single genus *Smilax* L. (Sarsapirilla) [c.300/c.8] comprises rhizomatous perennial dioecious vines with woody, sometimes prickly stems, and fibrous roots. The leaves are borne singly along the stems, are net-veined and usually have a pair of tendrillar outgrowths at the base of the petiole. Flowers six-partite, with superior ovaries, and borne in axillary simple or compound clusters of umbels. The tepals are free, as are the stamens. The fruits are usually berries containing one to few reddish-brown seeds.

Smilax australis is sometimes referred to as "Ant Vine", because of the leaf-tip exudates which attract ants to the vines. The name is also apt because of the association between one of these ant species and the larvae of a Lycaenid butterfly which feeds on the plant: the ants protect the larvae, and they in turn exude sweet secretions for the ants. *S. australis* is the most widespread and variable *Smilax* in Australia, extending all the way down the east coast to Gippsland in Victoria. The Austral Sarsapirilla, *S. glycyphylla*, as with many of the overseas species, was used medicinally by the early settlers. The preferred method was to steep the leaves in hot water to make a soothing sarsapirilla-flavoured(?) infusion.

The Australian members of the Smilacaceae *sensu* Dahlgren *et al.* have already been described and illustrated in *Australian Plants* by Conran (1988) as part of the Smilacaceae *sensu* Cronquist (1981). The taxonomy of the family in Australia is still very uncertain; the main problem is how to cope with apparent wide morphological variations in leaf form. As these are the types of characters used to describe *Smilax* species, classical herbarium-based approaches are thus very difficult. As a family, the Smilacaceae are one of the oldest of the monocot groups, with fossils assignable to the modern genus *Smilax* known from the late Cretaceous (some 70 MY ago). This strongly supports the argument that the early monocots were probably net-veined and Dioscorealean in general form. Nevertheless, there are also well developed fossil palms from the same period, so the debate as to the nature of the earliest is still (and may stay) unresolved.

Stemonaceae Engl. [4: c.45]

Plant Order Dioscoreales

The family are in many ways much more like dicots than monocots, with not only net-veined leaves, but in this case, floral parts in four's or five's — features usually used to distinguish dicots. Nevertheless, on their germination and sieve-tube plastid protein bodies, they are clearly monocots, albeit very primitive ones.

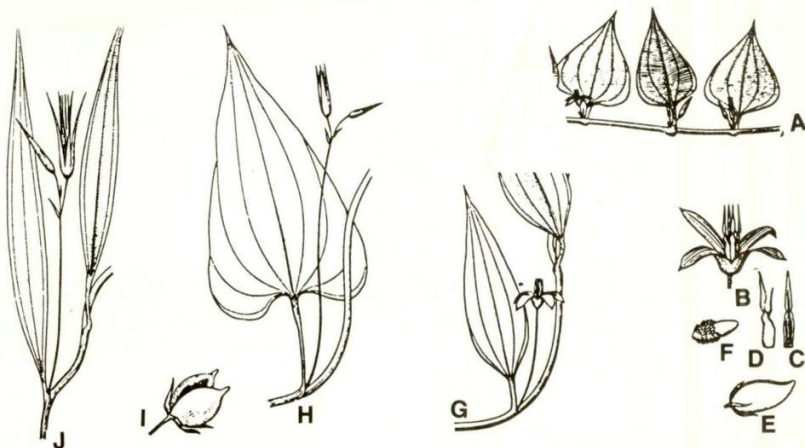


Fig. 20. *Stemona prostrata* A, flowering stem $\times 0.4$; B, flower $\times 2$ with four petals (dark red to black) and four stamens as shown in C and D; fruit E and seed F. A decumbent to prostrate plant with stems to 50 cm long from N.T.

Stemona australiana G, flowering stem $\times 0.4$, stems twining to 2 m long. Flowers, deep red.

Stemona philippinensis H, flowering stem $\times 0.3$ with fruit I. Stems twining several metres.

Stemona angustata J, flowering stem $\times 0.3$, dark red purplish flowers in cymes. Vegetatively similar to *Dioscorea* but may be distinguished by the close, parallel transverse veins of the leaf.

The single genus *Stemona* Lour. [c.30/4]. comprises rhizomatous perennial herbs or vines with herbaceous stems and fibrous roots. The leaves are borne singly or in groups along the stems, and are net-veined and petiolate. Flowers two or five-partite, with superior ovaries, and borne in few-flowered axillary racemes or cymes. The 4–5 tepals are free, and the 4–5 stamens are usually basally attached to the perianth. The fruits are usually fleshy capsules containing one to few brown, arillate seeds.

Taccaceae Dumortier [1: 11]

Plant Order Dioscoreales

A small but highly distinctive family with large, often deeply divided leaves arising from a starchy rhizome or tuber. The flowers are a deep brownish-purple, subtended by long filamentous bracts and generally pollinated by flies, often trapping the insects such that they pollinate the flower in the process of escaping. The tubers of several species of *Tacca* are edible after the removal of various bitter compounds, and are a good starch source.

The two Australian species *T. leontopetaloides* and *T. maculata* extending to South-east Asia, are relatively easy to grow, and have potential as horticultural curiosities growing under warm moist conditions. Several exotic *Tacca* spp. are cultivated as indoor or glasshouse plants, but they will grow well outdoors in sheltered situations at least as far south as Brisbane.

The single genus *Tacca* Forster and Forster f. (Arrowroot, Bat Flower) [11/2] comprises rhizomatous or tuberous perennial stemless herbs with fibrous roots. The leaves are borne singly or in groups along the stems, and are net-veined, petiolate and often deeply dissected. Flowers six-partite, with inferior ovaries, and borne in stalked, bracteate umbels. The tepals are free from each other, as are the stamens, although the latter are usually attached to the fleshy tepals. The fruits are usually berry-like capsules or berries, containing one to several dark-brown, arillate seeds.

The relationships of the family have been contentious, with previous authors associating the Taccaceae with the Amaryllidaceae on the basis of the bracteate umbels and inferior ovaries. Current theories place the family closer to the Dioscoreaceae and Stemonaceae, although still somewhat isolated.



Diplarrena moraea

See page 369 — Iridaceae, Plant Order Liliales

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