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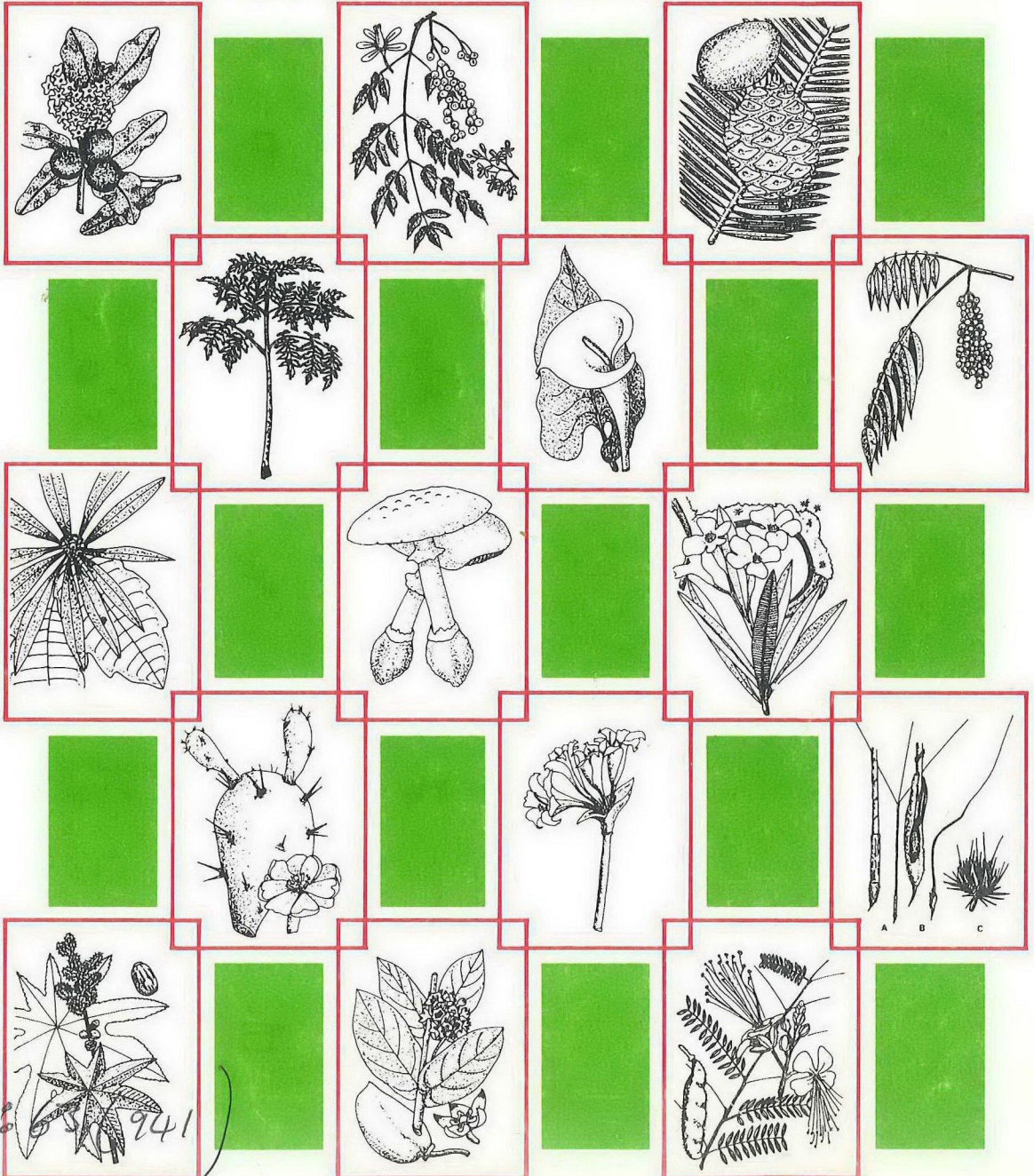
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# POISONOUS GARDEN PLANTS AND OTHER PLANTS HARMFUL TO MAN IN AUSTRALIA



# **POISONOUS GARDEN PLANTS AND OTHER PLANTS HARMFUL TO MAN IN AUSTRALIA**

by T. E. H. APLIN, Western Australian Herbarium  
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Western Australian Department of Agriculture.

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## Poisonous garden plants and other plants harmful to man in Australia

A number of commonly grown garden plants and many weeds found in gardens are known to be poisonous. Many species found outside garden situations are also harmful to man. All of these are potentially dangerous, particularly to children who are more likely to chew them. This bulletin has been compiled in response to frequent requests for information on poisonous plants, particularly in relation to human poisonings and injuries caused to humans by plants. It follows an earlier publication which dealt with the problems of poisonous plants in the garden in a more general way.

There are a number of poisonous plants grown in most suburban gardens. To be cultivated so commonly these plants must have considerable appeal both horticulturally and aesthetically and it is not suggested that these be not grown in gardens. However, as these plants do present a hazard, particularly to the very young, it is essential that adults, and more especially those in charge of children, have some knowledge of these plants. Cases of plant poisonings, in modern society, are usually most prevalent amongst children. Children should be protected, by constant vigilance, against poisonous plants. They should be warned of the dangers of chewing and handling plants.

Poisonous plants have been known to man since very early times and man's knowledge of poisonous plants logically preceded agrarian civilization inasmuch as man the food gatherer and man the hunter had to be aware of poisonous plants to survive. The earlier Indian and Chinese civilizations classified herbal poisons and medicines as did the ancient Romans and Greeks. Many of our present-day "primitive" cultures possess a knowledge of poisonous and medicinal plants which has been passed down through generations.

Toxic substances contained in poisonous plants may be harmful when touched or poisonous when eaten. Those which cause harm when handled may act as a corrosive, as an irritant or through an allergic reaction. When ingested these plants can cause gastro-intestinal upsets. Those plants which are poisonous only when ingested may cause several types of effects,

depending upon the type of toxic substances present in the plant and on the ingested dose rate of the toxin. Some toxic substances affect the heart, others the nervous system, the alimentary system, the respiratory system and other organs.

The toxic chemical constituents in plants range from simple inorganic salts to very complex organic compounds. Knowledge of the toxic principles of plants, both with regard to the chemistry and the physiological action of toxins, is increasing year by year, and is essential for providing treatment.

Metallic and non-metallic *mineral* toxins are of particular significance in animal health. They include arsenic, lead, cadmium, copper, molybdenum, selenium, fluorine, nitrates, and nitrites, and are found in herbage eaten by livestock as well as in some human diets.

*Organic* toxins are of great significance in human poisonings and include a great diversity of compounds. For convenience they may be divided into two groups, those with nitrogen and those without nitrogen.

The nitrogen-containing organic compounds include:

*Cyanogenetic glycosides.* These compounds have a cyanogen (CN) radical combined with a sugar molecule. The prussic acid (HCN) released by these compounds causes cyanide poisoning, as in poisonings by *Prunus*.

*Goitrogenic substances.* These substances, which can be responsible for the development of goitre, are found in members of the mustard family (*Brassicaceae*). Soybeans and linseed meal have also been implicated on some occasions.

*Mustard oils.* These compounds, which are extremely irritant, are related to the goitrogenic substances and are also found in the mustard family.

*Alkaloids.* These organic compounds include a number of molecular configurations, some of which are complex. The nitrogen is located in heterocyclic and/or aromatic ring structures. Tropane alkaloids are present in plants such as *Datura*,



pyrrolizidine alkaloids in *Crotalaria*, pyridine alkaloids in *Nicotiana*, isoquinoline alkaloids in *Papaver*, indole alkaloids in *Psilocybe*, quinolizidine alkaloids in *Lupinus*, steroid alkaloids in *Solanum*, diterpenoid alkaloids in *Delphinium* and colchicine alkaloids in *Gloriosa*.

*Polypeptides and amines.* These are very common substances in plants but only a few are known to be toxic. Polypeptides are the toxic principles in poisonous mushrooms and toadstools such as *Amanita* and in blue-green algae such as *Anacystis*.

*Amino-acids.* These are amongst the commonest of substances found in plants and animals and almost all those found in plants are not toxic. Toxic amino-acids have been isolated from leguminous plants such as *Leucaena*.

*Toxalbumins or phytotoxins.* These substances are extremely poisonous and are found only in the families Fabaceae (*Abrus* and *Robinia*) and Euphorbiaceae (*Ricinus*, *Aleurites* and *Jatropha*).

Toxic organic compounds which do not contain nitrogen include:

*Oxalates.* These simple organic compounds are found in a number of plants including the rhubarb.

*Coumarin glycosides.* These glycosides contain as its aglycone the compound coumarin or some modification of it. They are present in toxic moulds as difuranocoumarin. Furanocoumarins, as those present in *Phebalium*, cause percutaneous photosensitization.

*Protoanemonin glycosides.* These glycosides release the unstable, volatile, irritant oil, protoanemonin. They are present in some members of the buttercup family (Ranunculaceae).

*Cardiac glycosides.* These are found in plant families such as the Scrophulariaceae (*Digitalis*) and Apocynaceae (*Nerium*, *Thevetia*) and Asclepiadaceae (*Asclepias*.) The cardiac glycosides have a steroidal structure.

*Saponic glycosides.* These include the non-cardiac steroidal glycosides and the triterpenoid glycosides. When shaken up with water they form a non-alkaline soapy froth. The toxicity of some members of the pink family (Caryophyllaceae) and of genera such as *Hedera* and *Phytolacca* is due to saponic glycosides or saponins.

*Terpenes.* These include the natural rubbers and essential oils. Toxic furanoid sesquiterpenes have been extracted from *Myoporum*, which is not included in this article, while sesquiterpene lactones are found in a number of dermatitis-producing plant species e.g. Asteraceae.

*Phenols.* These include gossypol, found in the cotton plant, and the tannins. Some tannins, such as those in *Quercus*, are poisonous.

*Alcohols.* The water hemlock, of North America, contains a highly unsaturated higher alcohol which is toxic.

*Quinones.* It has been claimed that hydroquinone is the toxic principle in North American species of *Xanthium*.

*Resins and resinoids.* These substances with similar physical characteristics contain many organic compounds of widely differing chemical composition. In *Toxicodendron* the poisonous principle is 3-n-pentadecyl-catechol. *Cannabis* contains tetrahydrocannabinols while other compounds are found in *Melia* and in members of the Asclepiadaceae.

*Dianthrone.* Hypericin, a complex dianthrone which causes primary photosensitization in livestock, is present in *Hypericum*.

*Organo-fluorine compounds.* Monofluoroacetic acid, which causes serious livestock mortalities is found in *Acacia georginae* and in many Western Australian species of *Gastrolobium* and *Oxylobium*. These plants are outside the scope of this article.

The great majority of poisonous plants grown in Australian gardens are of overseas origin. Many have a long history of toxicity. Thus, when a poisonous plant has been ingested, or when harm is caused by contact with a plant, it is highly desirable that the offending plant be taken to the medical practitioner in attendance. The correct botanical identification of the incriminated plant and what is known of its toxic nature could assist considerably in determining the type of treatment needed.

Livestock owners should be aware of the dangers of allowing valuable stock to browse in gardens. The manner in which poisonous garden clippings are disposed of is also very important to prevent livestock poisonings. Only those plants harmful to man or those found in garden situations are dealt with in this bulletin. For information on poisonous plants harmful

to livestock in the field readers are referred to the excellent text *Poisonous Plants of Australia*, by S. L. Everist.

Mechanical injuries through plants can be of significance both to humans and to livestock. Some plants which bear spines or barbs can cause injuries to humans and impede the movement of livestock. These include many members of the introduced Cactaceae including *Opuntia* spp. Prickly Pear. *Prosopis juliflora* Mesquite, *Lycium ferocissimum*, African boxthorn, *Dovyalis caffra*, Kei apple; *Acacia karoo*, Karroo thorn, *Crataegus* spp., Hawthorn, *Rosa* spp., Roses, *Rubus* spp., Brambles, *Euphorbia milii*, Crown-of-thorns and many other naturalized and cultivated plants bear spines or thorns, as do many native species such as *Acacia pulchella*, Prickly Moses, *Scaevola spinescens*, Maroon bush, *Solanum* spp., and *Lycium australe*, Australian boxthorn. Grasses such as *Aristida* spp., Kerosene grass or Wind-grass, *Bromus diandrus*, Rip-gut brome. *Heteropogon contortus*, Bunch spear grass, *Hordeum leporinum*, Barley grass, *Pennisetum rare*, Comet grass, *Sorghum* spp., Giant spear grass, and *Stipa* spp., Spear grass, cause injury through their sharp-pointed seed. *Cenchrus* spp., Burr grass, have tenacious spines which form a cup surrounding the seed. *Emex*

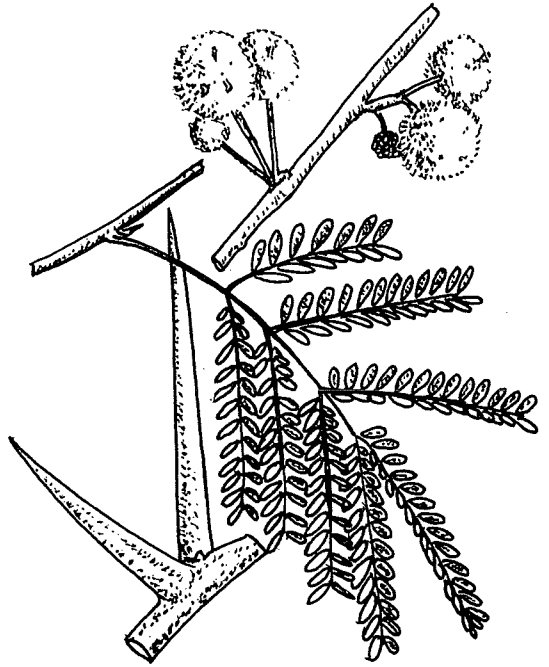


Fig. 2.—Karoo thorn (*Acacia karoo*)

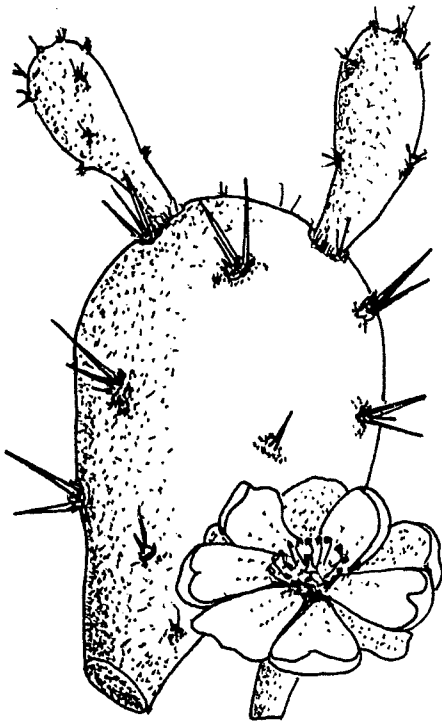


Fig. 1.—Prickly pear (*Opuntia* sp.)

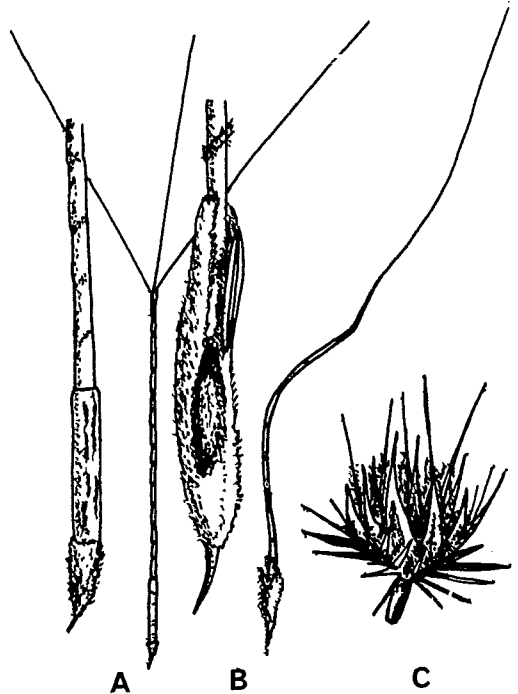


Fig. 3.—Grass seeds of (a) *Aristida browniana*, (b) *Sorghum stipoides*, (c) *Cenchrus biflorus*

*australis*, Double gee, and *Tribulus terrestris*, Caltrop, are noted for their spiny fruit, a feature which makes them undesirable weeds. Rigid hairs, siliceous inclusions, etc., found in plants such as *Echium lycopsis*, Paterson's curse,

*Avena sativa*, Oats, *Bambusa* spp., Bamboo, *Cortaderia selleana*, Pampas grass, *Cymbopogon citratus*, Lemon grass, and *Stenotaphrum dimidiatum*, Buffalo grass can cause cuts and itchiness in humans.

## POISONOUS PLANTS AND THEIR EFFECTS ON MAN

The plants are listed alphabetically by family

**AMARYLLIDACEAE**, Amaryllis family, is related to the lily family. It includes many garden subjects which have bulbs or tuberous roots. The bulbs of some species contain alkaloids which are toxic.

*Amaryllis belladonna* L., Belladonna lily, a garden subject with flat, strap-like leaves and large (10 to 12 cm long) flowers which are salmon-red and lighter coloured towards the base. The bulb when eaten in small doses produces emesis and in large doses is very poisonous, having a cardiac action. The active principle is the alkaloid *lycorine*. (1)

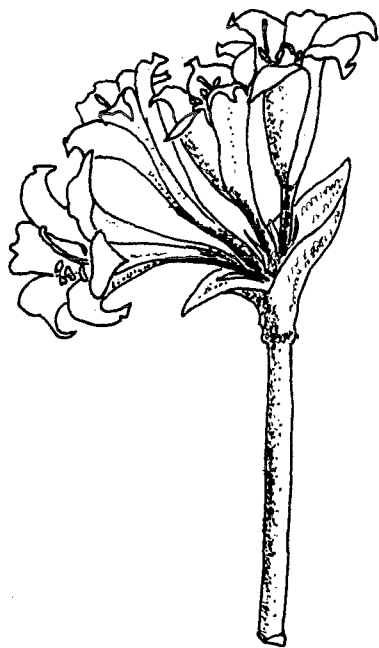


Fig. 4.—Belladonna lily (*Amaryllis belladonna*)

*Crinum* spp., Spider lily or Crinum lily, are cultivated for their spider-like flowers. These are plants with bulbs and strap-like leaves. The white flowers borne in umbels are subtended by two large broad spathe-valves. The perianth passing into long segments gives a

spider-like appearance. Some species are reputedly toxic. (2)

*Narcissis jonquilla* L., Jonquil, and *N. pseudo-narcissus* L., Daffodil, are popular garden subjects. The flowers are yellow or white, each with a crown borne on the perianth tube. Narcissus bulbs contain active principles which produce severe gastro-enteritis, vomiting and purging, sometimes accompanied by nervous symptoms such as trembling and convulsions. The sap from the leaves and flower stems has caused dermatitis. (3)

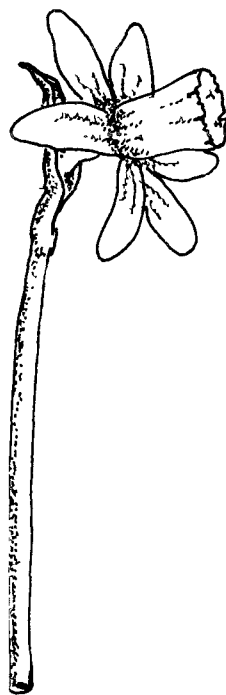


Fig. 5.—Daffodil (*Narcissus pseudo-narcissus*)

*Nerine* spp., Spider lily, has strap-shaped leaves, produced with the flowers or after them. The flowers, in shades of red, are borne in umbels on a solid scape. The bulbs yield *lycorine* and have proved toxic to livestock. (2, 4)



*Zephyranthes atamasco* Herb., Atamasco lily, has narrow-linear leaves that appear after the flowers. The flowers, from pure white to purple tinged, are borne one to each hollow scape. This plant has been incriminated in stock losses. The bulbs are the most poisonous part. (4)

**ANACARDIACEAE**, Cashew family, includes many well known edible species such as the cashew nut, pistachio, mango and kaffir plum.

*Anacardium occidentale* L., Cashew nut, is a spreading evergreen tree with milky juice. The leaves are oblong-oval 10 to 20 cm long. The yellowish-pink flowers are borne in panicles. The kidney shaped fruit is borne on a greatly enlarged receptacle. The tree is grown for its edible nuts and is sometimes seen in northern Australia. The oily juice from the shell of the nut is extremely acrid and irritant to the skin causing reddening, swelling and blistering. The fumes which come off during the roasting of the kernels are highly irritant. Tar from the bark also causes blistering. (1, 3)

*Mangifera indica* L., Mango, a large evergreen tree, has lanceolate leaves up to 40 cm long. The pinkish white flowers are borne in panicles. This species is grown in the tropics for its edible fruit which varies in shape, size and colour. The leaf and the sap have been known to cause dermatitis in susceptible people. The plant juice, particularly that of the young fruit is irritating. The eating of excessive quantities of fruit is known to produce kidney inflammation. (1)

*Rhus cotinus* L., Smoke tree, is a deciduous shrub up to 5 m tall, grown for its feathery panicles of purplish flowers and its yellow autumn foliage. It has been reported to cause dermatitis in some persons. (3)

*Schinus molle* L., Pepper tree, is an evergreen tree with graceful pendulous branches, leaves that are alternate, odd-pinnate, with numerous narrow leaflets to 5 cm long, and fruit which are about 1 cm across and rose coloured. The fruit when eaten in quantity is toxic, producing gastro-intestinal irritation, vomiting and diarrhoea, accompanied by headache and lassitude. (1)

*Schinus terebinthifolius* Radlk., Japanese pepper tree, is similar to the pepper tree but with a more rigid habit. The leaflets usually number seven and are oblong rather than narrow. The fruit are smaller and a bright red. The fruit when eaten causes an effect

similar to *S. molle*. A susceptible person developed dermatitis through contact with the plant. (1, 5)

*Semecarpus australiensis* Engl., Tar tree or Marking nut, a tree native to northern Queensland, is sometimes planted in that region as a shade tree. The leaves are up to 20 cm long, pale green to almost white on the lower surface. Male and female flowers are borne on separate trees. The large, oblique-conical, flattened fruits are borne on fleshy stalks. The seeds sometimes drip an oily resin which hardens like lacquer. Contact with the resin can produce severe dermatitis in susceptible people. (2)

*Toxicodendron radicans* (L.) Kuntze, Poison ivy, is a deciduous shrub or vine, climbing by means of aerial rootlets on the stem, as in English ivy. Poison ivy has leaves that are trifoliolate with margins entire, toothed or lobed. It is grown in gardens for its yellow, orange and red foliage. Poison ivy is sometimes mistakenly cultivated for *Parthenocissus quinquefolia* Planch., Virginia creeper and *P. tricuspidata* Planch., Boston ivy. These species however are members of the grape family and are attached to the substrate by means of disc-bearing tendrils, not aerial rootlets.

Contact with broken parts of poison ivy or articles contaminated with the sap of poison ivy causes severe dermatitis in susceptible



Fig. 6.—Poison ivy (*Toxicodendron radicans*)

persons. Ash and smoke from burning plants may also contain droplets of the poisonous principle, an oily resinous substance, *3-n-pentadecyl-catechol*, which is present in all parts of the plant apart from pollen. Contact with the poisonous principle causes inflammation and swelling (swelling may spread to other parts of the body), intense irritation followed by the formation of vesicles, which in severe cases fuse into blisters and exude serum, forming scales or crusts on drying. Mucous and alimentary canal membranes may be affected. Ingestion of leaves and fruit causes serious gastric upset, even death. The oily resinous substance is found in canals which do not connect with the surface. Contact has to be made through broken or bruised parts of the plant for dermatitis to develop. (1, 3, 4)

*Toxicodendron succedaneum* (L.) Kuntze, Japanese wax tree, Scarlet rhus or Sumach, is a small tree, with slightly drooping leaves clustered at the end of the new season's shoots. The nine to 15 broadly elliptic, pointed leaflets turn orange-red to scarlet in autumn. The small yellow flowers are followed by pendulous clusters of tawny fruit. Japanese wax tree causes severe dermatitis similar to poison ivy. (2, 3)

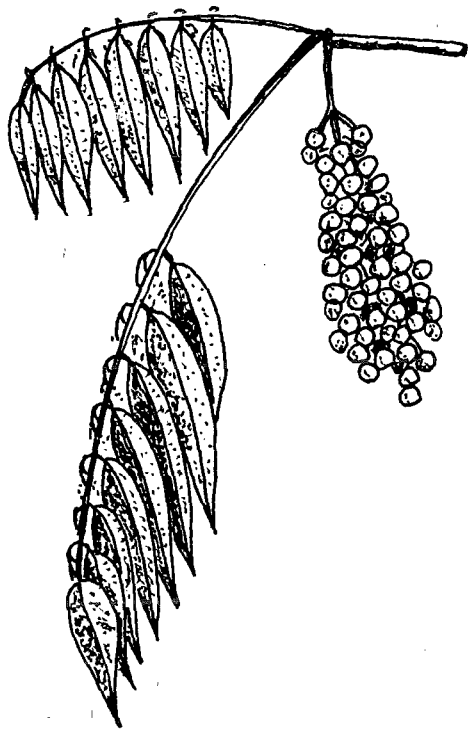


Fig. 7.—Japanese wax tree or Scarlet rhus (*Toxicodendron succedaneum*)

Japanese wax tree and poison ivy have been incriminated in a number of cases of dermatitis in Western Australia. Poison ivy is a declared Dangerous Weed under the Weeds Act of South Australia. Plants of Japanese wax tree were voluntarily withdrawn from sale by several South Australian nurserymen, when six or seven workers in one nursery were affected through handling the plant. (3, 5)

*APIACEAE* (Umbelliferae), Carrot family, includes many well known edible plants and herbs.

*Apium graveolens* L., Celery, has well developed leaf-stalks which are eaten raw or cooked. The pinnate leaves are made up of two or three pairs of leaflets which are again compound. Celery tops have been reported to contain dangerous levels of nitrates. Losses of dairy cattle have been reported. In the wild state the plant is somewhat poisonous and irritant, producing a dermatitis. (4)

*Conium maculatum* L., Hemlock or Carrot fern, a much-branched herb with finely cut dark foliage and large umbels of small white flowers, is readily distinguished by the stiff hollow stems which are speckled reddish-purple

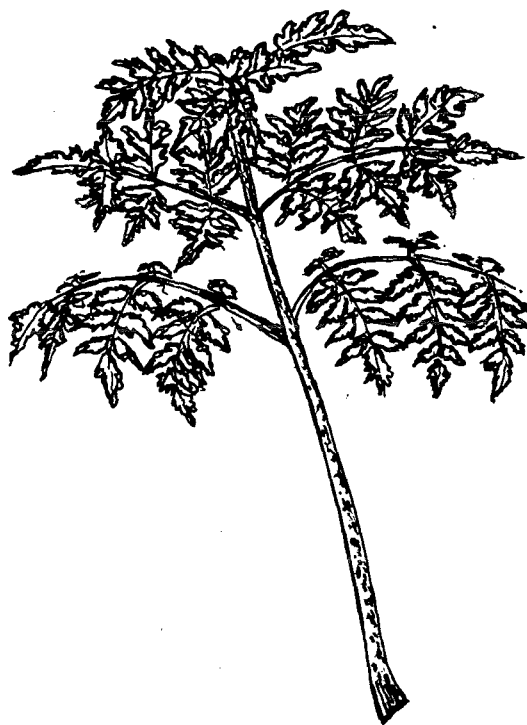


Fig. 8.—Hemlock (*Conium maculatum*)

and which have a distinct disagreeable "mousy" odour when crushed. Cases of human poisonings usually happen as a result of the plant being mistaken for edible plants. The history of poisoning in man through hemlock goes back into ancient times. Classical symptoms are nervousness, trembling, inco-ordination, dilation of pupils, weakened and slow heart-beat, coldness of the extremities or of the entire body, coma and eventual death through respiratory failure. Nausea, vomiting and convulsions have also been reported. The toxic principles are pyridine alkaloids, the most notable being *coniine*, a colourless, volatile strongly alkaline oil. (1, 2, 3, 4)

*Daucus carota* L., Carrot, cultivated for its edible root, is said to cause dermatitis in some persons through contact with the leaves, especially when wet. (6)

*Pastinaca sativa* L., Parsnip, has a thickened edible tap-root. The leaves are odd-pinnate with three or four pairs of ovate, oblong-toothed or lobed leaflets. The plant causes contact dermatitis through an allergic sensitization caused by a substance which is probably *d-limone*. Percutaneous photosensitization through contact with the foliage, the flower and the root juice is ascribed to *bergapten* and *imperatorin*. A dermatitis ascribed to *pastinacin* has also been reported. For a description of percutaneous photosensitization see *Ficus carica*. (1)

**APOCYNACEAE**, Dogbane family, includes many ornamental shrubs and climbers. Many of these are toxic and usually contain a milky sap.

*Allamanda cathartica* L., Yellow allamanda, a vine or shrub with obovate leaves to 15 cm long in whorls of three or four or opposite and with large yellow flowers, is grown in the tropics. The fruit is considered to be dangerously poisonous, but evidence in support of these claims is lacking. (4)

*Carissa acokanthera* Pichon, Bushman's poison, which is closely related to winter sweet, but with leaves shorter in proportion to their width, is occasionally found in cultivation in Australia. It is also known as *Acokanthera venenata*. Bushman's poison is highly toxic and contains a number of cardiac glycosides. (1) *Carissa spectabilis* (Sond.) Pichon, Winter sweet, is a dense evergreen shrub to 3 m tall, with large, thick leathery leaves to 12 cm long, and small, white fragrant flowers densely

clustered in the forks of the leaves. The fruit is purple-black and resembles a black olive. It exudes a milky sap when cut. Winter sweet, sometimes known as *Toxicophloea spectabilis* or *Acokanthera spectabilis*, is a highly toxic species, producing a digitalis-like type of action. The fruit is highly toxic and the eating of it by children has resulted in fatalities. The latex has been used as an arrow poison. The poisonous principles are cardiac glycosides. Symptoms of poisoning by this plant are severe gastro-intestinal irritation with digitalis-like cardiac affects. Contact with the plant has caused irritation to eyes, skin and throat. (1, 3)

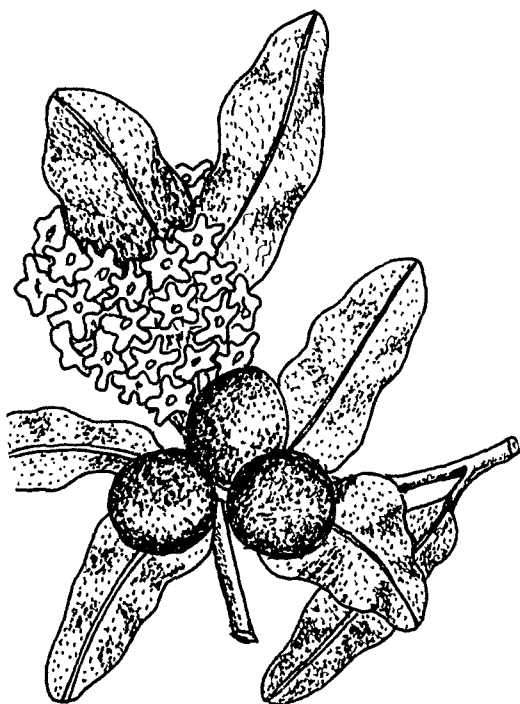


Fig. 9. - Winter sweet (*Carissa spectabilis*)

*Cerbera manghas* L., is a tropical species, found in northern Queensland. A small tree, with milky sap, it has oblong leaves to 30 cm long and densely clustered white flowers roughly 4 cm across. The fruit is rounded, smooth, up to 7.5 cm across and contains a woody one-seed kernel. The kernel of the fruit is an irritant poison and if eaten produces vomiting and purging followed by collapse and death. (2, 6)

*Ervatamia coronaria* Stapf., Crepe jasmine, an ornamental shrub with oblong to lanceolate leaves to 15 cm long and with waxy-white

flowers crimped on the margins, contains physiologically active compounds. Some species of *Ervatamia* are known to have caused loss of life. (4)

*Gonioma kamassi* (Eckl.) Mey., South African boxwood, cultivated as an ornamental, is a small tree with narrow pointed leaves arranged in whorls of three and with fragrant pale yellow flowers borne in clusters at the ends of the branches. The wood and sawdust has been incriminated in poisoning of workmen handling the timber. Symptoms are of a dermal, respiratory and cardiac nature. Irritation of the eyes has also been recorded. The wood contains an alkaloid with a curare-like action (1, 3)

*Nerium oleander* L., Oleander, is a shrub to 5 m tall. The leaves, borne in opposite pairs or in threes, are up to 20 cm long, leathery and tapering at both ends. The flowers, which vary from white through pink to dark red, are clustered at the ends of the branches. The fruit are cylindrical and 20 to 30 cm long. Oleander has been known as a poisonous plant since classical times. It is mentioned by Pliny, Dioscorides, Galen and others. All parts of the plant are poisonous. The ingestion of one leaf or one flower is sufficient to kill a child, and sometimes even a grown man. Fatal poisoning in humans has been caused by the use of oleander branches as skewers for meat. Poisoning has resulted from eating frankfurters roasted on oleander stems and from the poison introduced into porridge and tea by stirring with oleander twigs. Poisoning through the drinking of water into which leaves or flowers have fallen has been reported. Inhaling the smoke of burning oleander plants has been reported as being highly toxic. The nectar, although harmless to bees, produces a honey toxic to humans. Contact with the plant produces a form of dermatitis in some persons.

Oleander produces symptoms in man which are those of severe gastro-enteritis accompanied by the cardiac response to the glycosides, which are the main poisonous principles. The two principle glycosides *oleandrin* and *neriin* are similar to digitalis in physiological action. Symptoms of poisoning with oleander include nausea, vomiting, diarrhoea with blood, dizziness, drowsiness, dilation of pupils, mental confusion, convulsions, unconsciousness and death. (1, 3, 4)

Despite the ever constant hazards presented by oleander in many home gardens there have been no fatalities reported in Western Australia. As children may not unnaturally put

oleander flowers into their mouths, it is imperative that young children be kept away from these plants. The dangers of eating or sucking any part of this plant should be taught to children as early as possible.

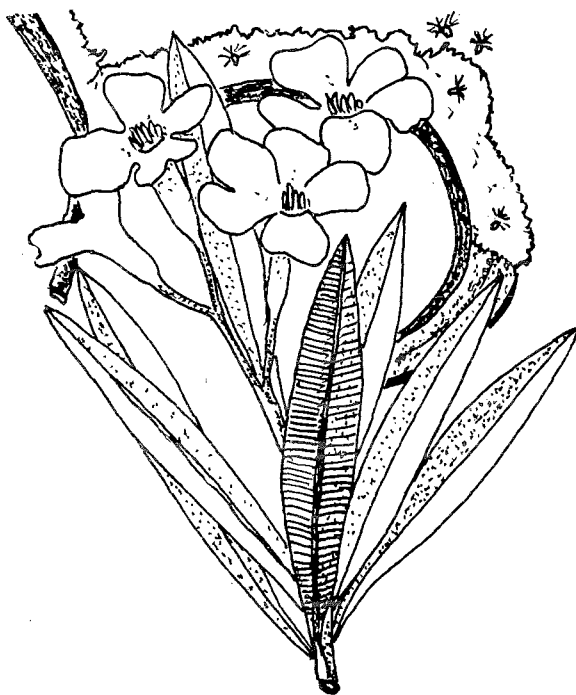


Fig. 10.—Oleander (*Nerium oleander*)

*Plumeria rubra* L., Frangipani, is a small tree with oblong-lanceolate leaves to 30 cm long borne on the ends of the branches. The flowers are white, tinged pink, with a yellow centre, in the variety *acutifolia*. Pink and red flowered forms are also grown. The plant exudes a tenacious milky latex when cut. This latex is reported to cause skin irritation and in small quantities is a purgative. Larger quantities are said to be poisonous. (6)

*Strophanthus speciosus* Reber is an evergreen shrub to 2 m tall with unique yellow to orange-red spidery flowers. The seed and foliage have been reported as poisonous and possibly used as an arrow poison and homicidally. (1)

*Thevetia peruviana* (Pers.) Schum., Yellow oleander or Lucky nut, is a shrub or small tree to 10 m tall. The narrow leaves, tapering at both ends are up to 15 cm long. The fragrant yellow flowers are clustered at the ends of the branches. The fruit are broadly triangular in outline, green becoming black, and

enclosing a hard "stone" with two starchy kernels inside it. Yellow oleander is cultivated in tropical and subtropical gardens.

All parts of the plant are toxic, especially the kernels in the "stone". The plant is reported to contain at least eight cardiac glycosides. The main ones, *thevetin*, *thevetoxin* and *nerifolin*, all have a digitalis action. Symptoms include slow, irregular pulse, vomiting and purging, drowsiness and dilation of pupils, together with burning and numbing sensations in the mouth and throat. In Hawaii it is considered to be the most frequent cause of fatal or dangerous poisoning in man. Children should not be allowed to play with the fruit of yellow oleander. (1, 2, 3, 4)

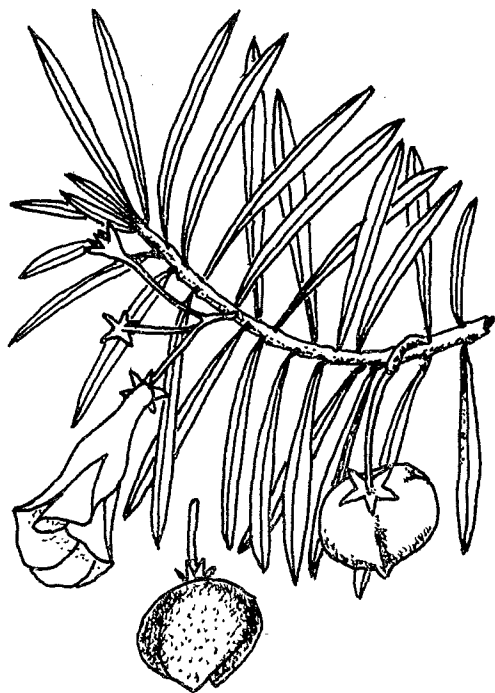


Fig. 11.—Yellow oleander (*Thevetia peruviana*)

#### AQUIFOLIACEAE, Holly family

*Ilex aquifolium* L., English holly, is a tree with shiny, ovate leaves which have a wavy surface and with strong spiny outstanding teeth. The fruit is globular, scarlet and shining, to 1 cm in diameter. The berry is reputedly harmful. (7)

ARACEAE, Arum lily family, includes many plants grown as ornamentals in gardens or as indoor plants. Most members of the Araceae contain quantities of oxalate, often in the

form of needle crystals (raphides) which cause irritation through penetration into the mucous membrane. Some species also contain unknown toxins capable of causing intense injury to the mouth, tongue and throat when bitten or chewed.

*Alocasia macrorrhiza* (L.) Schott, Cunjevoi, with large leaves up to 2 m long, yellowish-green spathe and yellow spadix is cultivated as a tub plant. Cases of poisoning and death in children eating flowers, leaves or stems of cunjevoi have been reported. Symptoms are those of an irritant poison with great pain, burning, swelling of mouth parts, excessive salivation and intense gastric irritation. The juice of the leaf or rhizome can cause intense conjunctivitis or destructive inflammation of the eye and may permanently injure or destroy vision. (2, 3)

*Arum italicum* L. and *A. maculatum* L., Lords and ladies, are garden subjects with spear-like bases to the leaves which are often spotted black. The spadix is yellow or yellow-purple and the spathe greenish-yellow or whitish-green flecked with purple. Both plants contain an acrid juice which is an acute irritant and causes acute gastritis, vomiting and purging when eaten. (3)

*Colocasia esculenta* (L.) Schott, Taro, Dasheen or Elephant's ears, is grown as a food plant in the Pacific region and as a garden subject, and *C. esculenta* var. *antiquorum* is cultivated as a garden subject. The leaf consists of a long stout petiole which bears a large leaf-blade up to 1 m long. The spathe is pale yellow, to 30 cm long and the spadix is yellow. Taro rootstock has to be cooked before being eaten. If eaten raw it causes symptoms of an irritant poison. Taro has given positive reactions for hydrocyanic acid (HCN). It has also been reported to contain a sapotoxin, which is apparently seasonal in incidence. This caused a kidney disease and marked degeneration of adrenals in the one reported case. (1, 2, 3)

*Dieffenbachia picta* Schott, and *D. seguinae* Schott, Dumbcane, are commonly grown as indoor plants. They are woody-stemmed plants with oblong leaves irregularly marked with white blotches. *D. seguinae* was formerly, in the West Indies, used for torturing slaves and rendering them dumb. Chewing or biting of stems and leaves produces irritation and burning of the mouth, lips and tongue, copious salivation and swelling with accumulation of fluid, causing difficulty in breathing and swal-

lowing and making the tongue immobile. The effects may last several days. Reported to have caused a fatal case of poisoning in a cat. (1, 2, 3, 4)

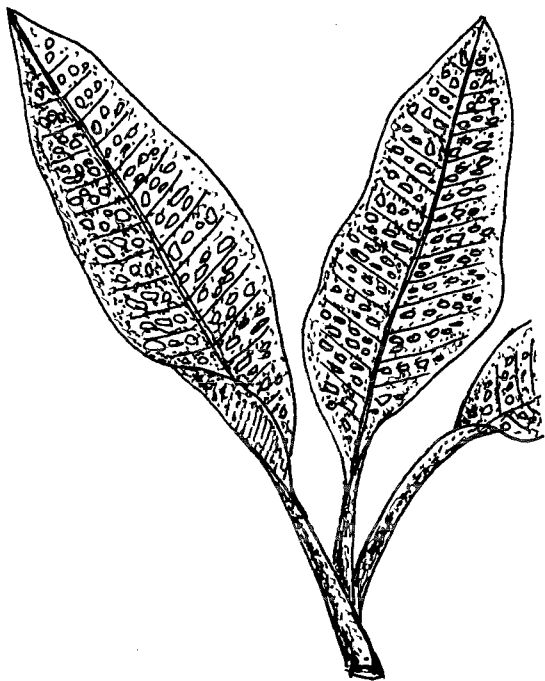


Fig. 12.—Dumbcane (*Dieffenbachia seguinae*)

*Monstera deliciosa* Liebm, Ceriman or Fruit-salad plant, is a popular garden and indoor subject. This climbing plant with hanging cord-like roots has large oval perforated leaves which are pinnately cut. The white spathe encloses the spadix upon which the edible fruit are borne. Eating of the ripe fruit may sometimes cause rapidly developing weals on the skin. The unripe fruit is exceedingly acrid. (3)

*Philodendron* spp., Philodendron, are vines with fleshy green or variegated leaves grown as indoor plants. They have been reported to have poisoned cats. Symptoms were debilitation and restlessness with complete destruction of kidney function, but no apparent pain. (4)

*Zantedeschia aethiopica* (L.) Spreng., Calla lily or White arum lily, is cultivated in gardens and naturalized in the south-west of Western Australia. This plant has ovate leaves with spear-like bases, borne on stalks to 1 m long. The white spathe and yellow spadix are particularly attractive to children. Cases of fatal poisoning in children have been reported. Symptoms

include swelling of tongue and throat, acute gastritis and severe purging followed by death from exhaustion and shock. (1, 2, 3)

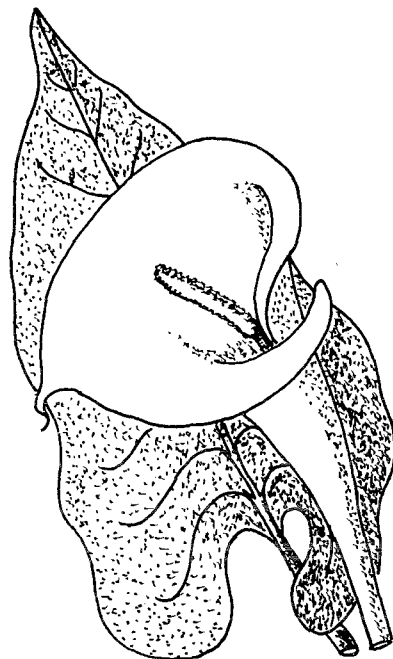


Fig. 13.—White arum lily (*Zantedeschia aethiopica*)

Other genera in the Araceae which produce burning and irritation upon chewing are *Arisaema*, *Caladium*, *Calla*, *Symptocarpus* and *Xanthosoma*. (4)

**ARALIACEAE**, Aralia or Ginseng family, includes many subjects with ornamental foliage.

*Hedera helix* L., English ivy, an evergreen climbing plant attached to the substrate by aerial rootlets, has been considered poisonous from earliest times. This species is extremely variable in form. The yellowish-green flowers appear in autumn and are followed by clusters of small black berries. Cases of poisoning through eating the berries have been reported. The plant is said to be purgative and when eaten in quantity produces symptoms of excitement, laboured breathing and eventual coma. Sapogluco-sides are considered to be the poisonous principles. Dermatitis from contact with the leaves is produced in some individuals. The sap is recorded as being damaging to eyes and causes a rash on the arms during pruning, even blistering and inflammation. (1, 3, 4)



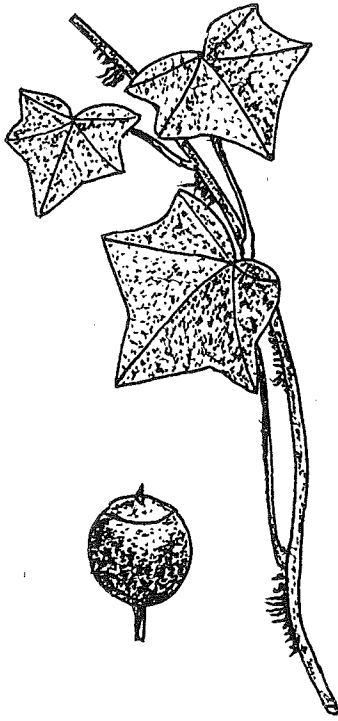


Fig. 14.—Ivy (*Hedera helix*)

*Schefflera actinophylla* Harms., Queensland umbrella tree or Octopus tree, is a tree with digitate leaves of several oblong leaflets up to 40 cm long. Radiating from the tops of the trees are clusters of spikes of red flowers. This species has on one occasion in Western Australia been suspected of causing an irritating rash to a person who had handled the plant. (5)

**ASCLEPIADACEAE**, Milkweed family, contain many members with copious milky sap. Many are cultivated in gardens.

*Araujia hortorum* Fourn., White moth plant, is a climber with opposite leaves, dark green above and pale and mealy beneath. The flowers are white or pale pink. The fruits are leathery. This plant has been referred to as *A. sericofera* or *A. sericifera*. It is naturalized in the eastern States where it is a pest in forestry plantations. It contains a toxic principle that affects the central nervous system and irritates the gastrointestinal system. No records of human poisoning have been noted. (1)

*Asclepias curassavica* L., Red-head cotton-bush, is a perennial to 1.5 m tall with narrow opposite leaves. The red flowers with orange

crowns are in groups near the top of the plant. The pods are long and narrow. This species is poisonous to stock, but has not been incriminated in human poisonings. The toxic principles are cardiac glycosides. (2)

*Asclepias fruticosa* L. and *A. physocarpa* (E. Mey.) Schlecht., Narrow-leaf cotton-bush or Duck bush, have pods that are balloon-like or bladder-like with soft, slender spines on the thin outer wall. The pods of *A. physocarpa* are generally larger and appear more globular. They contain cardiac glycosides, and have been recorded poisonous to stock. No cases of human poisonings have been reported. (2)

*Calotropis procera* (Willd.) R.Br., Calotrope, is cultivated in the northern part of Western Australia and also naturalized as a weed. Declared a primary noxious weed for northern Western Australia in 1968. This shrub has thick, opposite leaves, broad and rounded at the base, up to 15 cm long. The waxy white flowers bear a purplish crown in the centre. The pods are grey-green. Calotrope contains cardiac glycosides but there are no records of accidental human poisonings. It has been used for homicidal and suicidal poisonings. The milky juice causes blistering and irritation if brought into contact with tender parts of the body such as the vagina, prepuce or glans penis. The latex has also been used for making arrow poisons. (1, 2)



Fig. 15.—Calotrope (*Calotropis procera*)

*Cryptostegia grandiflora* R.Br., Rubber vine, is a weed in north Queensland. A woody vine, it has opposite, dark waxy green, leathery leaves to 12.5 cm long and tubular, purple flowers borne in terminal racemes. The fruit is a sharp-angled follicle. All parts of the plant may cause severe stomach and intestinal upset, and cases of death have been reported from India. (22)

*Marsdenia cinerascens* R.Br., a species native to northern Australia, is a twiner with oval, opposite leaves to 5 cm long. The slender pods, up to 8 cm long and tapering towards the apex, are filled with seeds, each with a tuft of long silky hairs. This species has twice been incriminated in the Kimberley region of Western Australia in the poisoning of children who had eaten all or parts of the fruit. Symptoms in the 19 children who were presented at a hospital, on one occasion, were predominantly of a gastro-intestinal nature. The symptoms included cramping abdominal pains, vomiting and cramps in the thigh muscles. Moderate dehydration in one child was recorded through vomiting and slight diarrhoea. Pin-point pupils was also recorded. Cardiovascular statics reports were normal. All children were fully recovered in 24 hours. (5)

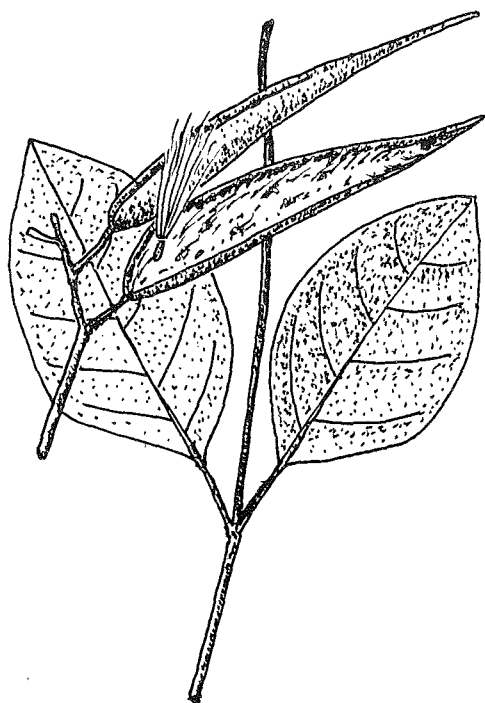


Fig. 16.—*Marsdenia cinerascens*

*Sarcostemma australe* R.Br., Caustic vine or Milk vine, a species widespread in Australia, is a leafless scrambler or bush with smooth, jointed, somewhat succulent stems covered with a "bloom". The creamy-white, waxy flowers are borne in clusters. This species has been shown to be toxic and has been incriminated in livestock losses in Queensland and New South Wales. The milky sap is irritant and can cause pain and discomfort to some people, particularly those with fair complexions. (2)

*Stapelia gigantea* N.E.Br., Carrion-flower, is a fleshy cactus-like plant. It has buff flowers with transverse lines of brown and covered with purple hairs. The flowers attract blow-flies. The plant has been reported to be emetic and to contain purgative anthroquinones. (1)

**ASTERACEAE** (Compositae), Daisy family, is a large family of wide distribution. Many are of economic and horticultural significance. A number are also poisonous to livestock. All plants listed in this bulletin are capable of causing dermatitis. The contained active principals are sesquiterpene lactones. Some of these plants are toxic to livestock.

*Achillea millefolium* L., Yarrow or Milfoil, is an erect, stoloniferous, hairy almost woolly perennial, with alternate, oblong-lanceolate, twice-divided leaves. The flowers, each with five ray-flowers, white or reddish, are borne in dense broad heads. This garden plant is also naturalised. It has been listed as a species capable of causing dermatitis and percutaneous photosensitization. (1, 8)

*Ambrosia artemisiifolia* L., Ragweed, and *A. psilostachya* DC., Perennial ragweed, are both naturalized plants. The former is an annual to 1 m tall with deeply cut leaves, and a fruiting head surrounded by spines. The latter, a perennial, is similar to the former but the fruiting head is devoid of spines. Both are known to cause contact dermatitis. (8)

*Anthemis cotula* L., Dog fennel or Mayweed, and *A. nobilis* L., Chamomile, are naturalized plants. The former is an erect annual with twice divided leaves. The white ray-flowers are in one row. This plant is reputed to cause percutaneous photosensitization. The latter is a hairy, aromatic perennial with the leaves once or twice divided. It is capable of causing contact dermatitis. (1, 8)

*Arctotheca calendula* (L.) Levyns (Syn. *Cryptostemma calendula*), Cape Weed or Cape dandelion, is a naturalized species. It is stemless with divided leaves, woolly underneath. The flower-heads are solitary on the glandular-hairy stem. The rayflowers, in one row, are yellow with a brown blotch at the base. Cape weed has caused contact dermatitis. (8)



Fig. 17.—Cape weed (*Arctotheca calendula*)

*Artemisia absinthium* L., Wormwood, and *A. ludoviciana* are cultivated plants. The former is a shrubby, white-silky perennial to 1.2 m tall. The leaves are pinnately divided two or three times. The small flowering heads are borne in leafy panicles. Both species can cause or are capable of causing contact dermatitis. (8)

*Calendula* spp., Marigold, are annual or perennial herbs. The common marigold *C. officinalis* L., is an annual with serrated, oblong leaves to 15 cm long. The flowering heads are up to 10 cm across, yellow-white to deep orange. The marigolds are capable of causing contact dermatitis. (8)

*Cassinia aculeata* R.Br., Dogweed, is a native shrub found in eastern Australia. It has sticky,

narrow-linear leaves and numerous flower heads in dense panicles. Dogweed has been reported to cause contact dermatitis. (8)

*Chrysanthemum coccineum* Willd., Common pyrethrum, *C. maximum* Ramond, Shasta daisy, *C. morifolium* Ramat, Florists chrysanthemum, and *C. parthenium* (L.) Bernh., Feverfew, are grown in gardens. They are all perennials with tooth, notched or divided leaves. *C. cinerarifolium* (Trev.) Vis., Dalmation pyrethrum, is the source of pyrethrins used in fly sprays. All these plants are capable of causing contact dermatitis. (8)

*Chrysanthemum vulgare* (L.) Bernh. (Syn. *Tanacetum vulgare*) Tansy, is a strongly scented perennial garden plant. The leaves are deeply lobed and divided more than once. The small flower heads are corymbosely clustered. Tansy contains the oil, *Tanacetin*, which is used medicinally as a "tea" made from the leaves. An overdose can cause poisoning. Symptoms include nausea, abdominal pain, dilated pupils, frequent and feeble pulse, convulsions, frothing at the mouth and violent spasms. Tansy also causes contact dermatitis. (3, 4, 8)

*Conyza canadensis* (L.) Cronq. (Syn. *Erigeron canadensis*), Canadian fleabane, is an annual up to 60 cm tall. The leaves are narrow-



Fig. 19.—Tansy (*Chrysanthemum vulgare*)

lanceolate and sometimes toothed. The numerous, small flower heads are in dense, leafy, compound panicles. The sap of this plant is irritant to the skin. The intact leaf and the dust of the powdered leaf is reported to cause a contact irritation. Canadian flea-bane is listed as a plant capable of causing contact dermatitis. (1, 8)

*Cosmos bipinnatus* Cav., Cosmos, is an annual to 3 m tall with finely twice divided leaves. The flowering heads are over 5 cm across, white, pink or crimson. This plant has caused contact dermatitis. (8)

*Cynara cardunculus* L., Wild artichoke, Artichoke thistle or Cardoon, and *C. scolymus* L., Globe artichoke, are stout, erect perennials, with deeply cut leaves and large flowering heads. The former has spiny leaves and spiny flower bracts. Both species have been reported to cause contact dermatitis. (8)

*Gaillardia pulchella* Foug., and *G. pulchella* var. *picta* Gray, are garden subjects. They are annuals with the lower part of the leaves cut or divided and with the flowers reddish. Both forms have caused contact dermatitis. (8)

*Helenium autumnale* L., Sneezeweed, a cultivated subject, is a leafy-stemmed perennial to 2 m tall. The leaves are ovate and toothed. The flower heads, to 5 cm across, are yellow. This plant has caused contact dermatitis. (8)

*Helianthus annuus* L., Sunflower, is a coarsely hairy, erect annual to 4 m tall. The ovate, cordate leaves are up to 30 cm long. The flower heads are up to 15 cm across, with golden-yellow ray flowers and reddish-brown disc flowers. Sunflower is listed as a plant capable of causing contact dermatitis. (8)

*Humea elegans* Sm., is a biennial to 2 m tall, native to eastern Australia. The lower leaves, to 25 cm long, are oblong and stem-clasping at the base. The small heads are in large, loose, terminal panicles. This species causes contact dermatitis. (9)

*Inula graveolens* (L.) Desf., Stinkwort, is a naturalized erect, aromatic, glandular-hairy, sticky annual growing to about 50 cm tall. The leaves are soft, lanceolate with a toothed or entire margin. The flower heads are small and in a rather open panicle. Stinkwort has been reported to cause dermatitis which may persist for several weeks. (2, 8)



Fig. 18.—Stinkwort (*Inula graveolens*)

*Iva axillaris* Pursh., Poverty weed, an introduced plant, is a low spreading perennial producing many erect branches to 30 cm tall. The leaves are ovate to oblong to 2 cm long. The solitary, nodding heads are small and arise from the leaf axils. Poverty weed can cause contact dermatitis. (8)

*Lactuca sativa* L., Lettuce, the vegetable grown in gardens is listed as a plant capable of causing contact dermatitis. (8)

*Matricaria* spp., Chamomile, is represented in Australia by *M. suffruticosa* (L.) Druce, an introduced species. This plant is an erect annual to 50 cm tall with leaves that are finely cut two or three times. The numerous bright yellow flower heads are borne in dense corymbs. Chamomile is listed as a plant capable of causing contact dermatitis. (8)

*Rudbeckia hirta* L., Black-eyed Susan, is a perennial or sometimes annual to 1 m tall. It has broad, oblong, coarsely-toothed leaves. The flower heads have showy golden-yellow ray flowers and black disc flowers. This species causes contact dermatitis. (9)

*Senecio cineraria* DC., Dusty miller, sometimes referred to as *Cineraria maritima*, is a stiff perennial, to 75 cm tall, grown in gardens for its white-woolly appearance. The leaves are

divided and become green above. The yellow or cream flowers are 2 to 3 cm across. Dusty miller is capable of causing contact dermatitis. (8)

*Tagetes* spp., Legion-of-honour or Marigold, are scented annual herbs with divided leaves and solitary or clustered flower heads which are yellow to orange. Legion-of-honour is included in the list of plants capable of causing contact dermatitis. (8)

*Taraxacum officinale* Weber s.lat Dandelion, naturalized as a weed or grown for greens, is a perennial herb with basal, deeply divided or segmented leaves. The yellow flower heads to 5 cm across terminate a naked yellow, hollow stalk. Dandelion is listed as a plant capable of causing contact dermatitis. (8)

*Xanthium pungens* Wallr., Noogoora burr, and *X. spinosum* L., Bathurst burr, are characterised by their mature burrs which are covered with tenaceous hooked spikes. Both are annual herbs naturalized in Australia. The former has broad leaves with three to five lobes which are irregularly toothed. The latter has narrow three-lobed leaves at the base of each of which are a pair of bright yellow three-branched spines. Both species are known to cause contact dermatitis. (1, 8)



Fig. 20.—Bathurst burr (*Xanthium spinosum*)

#### *BASELLACEAE*, Basella family

*Anredera cordifolia* (Tenore) Steenis, Madeira vine or Lambs tails, usually called *Boussingaultia baselloides*, is a vigorous vine with somewhat fleshy heart-shaped leaves to 10 cm long. The stems often have fleshy tubercles in the forks of the leaves. The small, white, fragrant flowers are in hanging spikes. This species has been reported to be toxic to cattle. (2)

#### *BEGONIACEAE*, Begonia family

*Begonia* spp., Begonia, are well known garden subjects. A species of *Begonia* was suspected of causing an oxalate-type poisoning in a kangaroo. The animal recovered after treatment with calcium borogluconate. (5)

#### *BIGNONIACEAE*, Bignonia family

*Campsis radicans* (L.) Seeman, Trumpet creeper, is a woody vine with opposite leaves, pinnately divided into 9-11 ovate leaflets with toothed margins and with orange-yellow to red tubular flowers borne in terminal clusters. Contact with the leaves or flowers may cause inflammation of the skin with blisters persisting for a few days. (22)

*Jacaranda acutifolia* Humb. et Bonpl., Jacaranda, a tree with opposite leaves that are twice pinnate, bears large panicles of blue-violet flowers. Jacaranda is reported to contain a volatile oil in the leaf which is a fish poison. (1)

*Kigelia pinnata* DC., Sausage tree, is grown in the tropics and is recognisable by its hanging sausage shaped fruit, which may be up to 50 cm long. The leaves are odd-pinnate with seven to nine oblong leaflets, each leaflet is up to 15 cm long. The claret-coloured flowers are in drooping panicles. The unripe fruit is said to be very poisonous. (1)

*BORAGINACEAE*, Borage family, includes a number of poisonous plants with contained pyrrolizidine alkaloids e.g. *Heliotropium*, which are poisonous to livestock. (2, 4)

*Echium lycopsis* L., Paterson's Curse or Salvation Jane, an annual herb, that is widely naturalized in Australia, has a basal rosette of broadly spoon-shaped leaves to 20 cm long. The stem leaves are narrow and stalkless. The

flowers vary from bright blue to heliotrope. This species caused an irritating rash to a person who had handled the plant. The rash was considered to have been caused by the bristly hairs on the leaves and stem. (5)

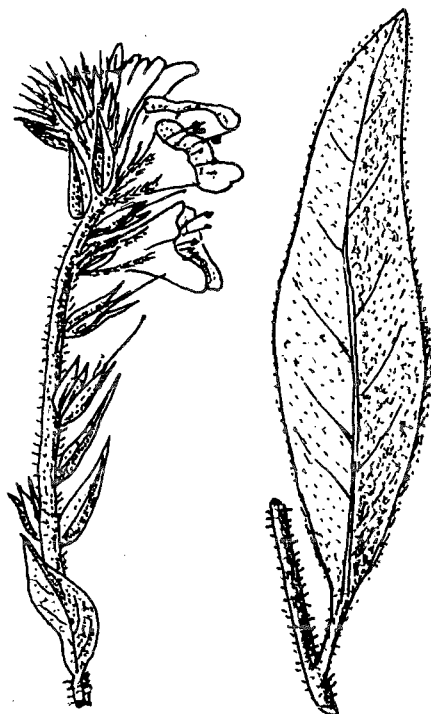


Fig. 21.—Paterson's curse (*Echium lycopsis*)

#### BRASSICACEAE (Cruciferae), Mustard family

Many members of the mustard family contain glycosides which yield *isothiocyanates*, the highly irritant mustard oils, and thiocyanates, which are goitrogenic. In Australia the mustard family includes a number of naturalized annual weedy species found in and around human habitation. The more important of these are *Raphanus raphanistrum*, Wild radish, *Brassica tournefortii*, Wild turnip, *Cardaria draba*, Hoary cress, *Capsella bursa-pastoris*, Shepherd's purse, *Rapistrum rugosum*, Turnip-weed, *Carrichtera annua*, Ward's weed, *Sinapis arvensis*, Charlock, and *Sisymbrium orientale*, Wild mustard. Many of these weeds cause taint in milk. Some have been suspected in livestock losses. In Australia, it was suspected that an abnormally high incidence of goitre in children in restricted areas in Tasmania and Queensland may have been due to consumption on farms of milk too strongly tainted by

cruciferous plants to be acceptable for town supplies. No definite casual relationship was established. (2, 4)

#### BUXACEAE, Box family

*Buxus sempervirens* L., Common box, is a shrub or small tree with slightly winged branches and oval to oblong leaves up to 3 cm long, dark green above, pale beneath. The pale green flowers are in clusters. Common box is lethal to horses, pigs, cattle and camels. No cases of human toxicity are on record. (4)

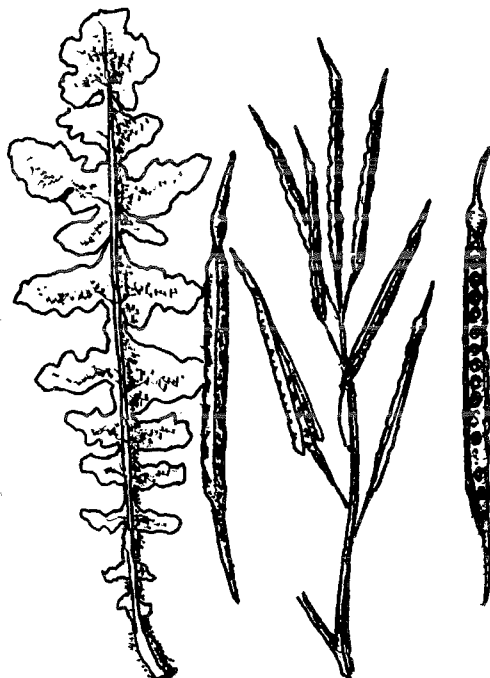


Fig. 22.—Wild turnip (*Brassica tournefortii*)

#### CAMPANULACEAE, Bluebell family

*Isotoma hypocrateriformis* (R. Br) Druce, Woodbridge poison, an annual native species with narrow leaves and with a raceme of white to mauve flowers, has been reported to contain a sap which is very irritant to the eye. (5)

*Isotoma petraea* F. Muell., Rock isotome, is a native species of wide distribution. A small erect branched perennial herb, it has sharply toothed leaves and conspicuous pale blue flowers. The sap is reputed to be extremely bitter to the taste and to be very irritant to the eye. The acrid vapours caused throat soreness in two persons collecting bulk samples



of the plant. The dry dust or vapour from this plant has been reported to be irritating to the eyes. (2, 3, 5)

*Lobelia cardinalis* L., Cardinal flower, is a perennial with showy red flowers. It contains pyridine alkaloids including *lobeline*, which has an action similar to nicotine. Poisoning by *Lobelia*, through overdoses of medicinal preparations, produces vomiting, sweating, pain, paralysis, depressed temperature, rapid but feeble pulse, collapse, coma and death in the human being. (4)



Fig. 23.—Wild radish (*Raphanus raphanistrum*)

#### CANNABACEAE, Hemp family

*Cannabis sativa* L., Marihuana or Cannabis, is an annual with leaves long-stalked, palmately divided into three to seven leaflets. An illegal "narcotic" plant it is drunk as an extract, chewed or smoked. The toxic resins, mainly tetrahydrocannabinol, are found in green and dried plants. Symptoms of intoxication are exhilaration, hallucinations, delusions, blurred vision, poor coordination, stupor and coma. (22)

#### CAPRIFOLIACEAE, Honeysuckle family

*Sambucus* spp., Elder, are large coarse shrubs or trees. The leaves are opposite and odd-pinnate with serrate leaflets. Flowers are in terminal clusters. Elder has been reported to cause poisoning in cattle, pigs and humans. The root is perhaps the most poisonous part. Uncooked berries may produce nausea. (4)

#### CARYOPHYLLACEAE, Pink family

Several species, which have been introduced from Europe and are naturalized as weeds in gardens in Australia, are toxic to livestock. They include *Agrostemma githago* L., Corn cockle, *Vaccaria hispanica* (Mill.) Rauschert, Bladder soapwort, *Silene gallica* L., French catchfly, *Stellaria media* (L.) Cyrill., Chickweed and *Petrorhagia nanteuilii* (Burnat) P.W. Ball et Heywood, Proliferous pink. Members of the pink family contain toxic saponins. Human poisonings have been caused through ingestion of wheat grain contaminated with seeds of corn cockle. (1, 4, 11)

#### CELASTRACEAE, Staff tree family

*Catha edulis* Forsk., Khat, Cafta or Arabian tea, is a small tree with oval leaves to 10 cm long. The flowers are white. The seeds have a white aril. Cafta has been used as a stimulant in Africa and in the Middle East. Excessive khat chewing can apparently result in insanity and also toxic effects. In the former the symptoms are mild mania associated with schizophrenic symptoms. Toxic effects result in excitability and loss of articulation, inability to walk and periodic spasmodic and jerky movements of the limbs, with eyes wide open and staring, pupils normal size and equal and reacting sluggishly to light accommodation. Limbs are spastic and resist passive flexion and extension. The patient is very sensitive to external impressions. Sudden noises result in groaning and twitching of limbs. Pin pricks produce pain and twitching in adjacent muscles. A patient under observation and treatment for four days was in a coma for the whole period and then died. (1)

*Euonymus europaeus* L., Spindle tree, is a small tree with ovate or oblong leaves to 7.5 cm long. The flowers are yellowish-green. This plant is grown in gardens for its red-tinted autumn foliage and its pink or red fruit. All parts are poisonous. The fruit, and the seeds which are white and surrounded by

a bright orange sheath-like aril, are attractive to, but dangerous to children. Poisoning in humans have been described. Symptoms are those of an irritant and purgative poison, with nausea, diarrhoea, persistent vomiting, fever, prostration and loss of consciousness. (1, 3)

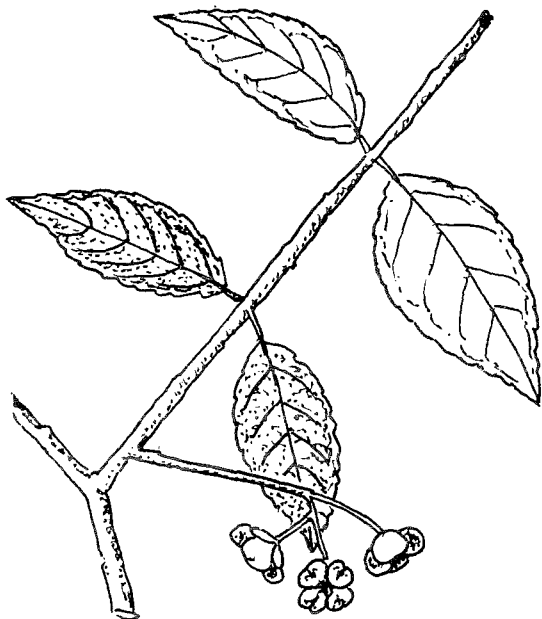


Fig. 24.—Spindle tree (*Euonymus europaeus*)

#### CHENOPODIACEAE, Goosefoot family

*Beta vulgaris* L., Beet, Beetroot, Sugarbeet, Mangel, etc., grown for their swollen storage roots, contain potentially toxic quantities of nitrates and oxalates. Livestock losses have occurred from ingestion of tops. (1, 2, 4)

*Chenopodium anthelminticum* L., Wormseed, an annual herb with many erect stems and with leaves containing glandular dots has a characteristic pungent aromatic odour. The volatile oil has been reported to cause an irritating itch to a person who handled the plant. The plant is cultivated for its anthelmintic oil. Overdoses of the oil have caused death in humans and domestic animals. (4, 5)

#### CONVOLVULACEAE, Morning-glory family

*Convolvulus arvensis* L., Bindweed, is an introduced weed. It has been listed as a plant which causes percutaneous photosensitization. (1)

*Ipomoea violacea* L., Morning glory, is known by the cultivars Heavenly Blue, Pearly Gates and many others. The seeds of this species

contain amides of lysergic acid. Nausea and acute chronic psychotic reactions follow ingestion. *I. muelleri* Benth., a northern native species of morning glory, is also known to contain amides of lysergic acid. (2, 22)

#### CRASSULACEAE, Orpine family

Several species of African *Crassula*, *Cotyledon*, *Andromischus* and *Bryophyllum* are known to be toxic to livestock. (1)

These plants may be seen in Australian gardens, particularly in rockeries.

**CUCURBITACEAE**, Gourd family, include tendril-climbing plants many of which are cultivated for ornament and for their edible fruit.

*Bryonopsis laciniosa* (L.) Naud., Native Bryony, is a woody vine of the tropics. The bright red or yellow fruit have been suspected of causing illness and occasionally death in children. (2, 3)

*Citrullus colocynthis* (L.) Schrad., Colocynth, and *C. lanatus* (Thumb.) Matsum. et Nakai, Watermelon and Piemelon. The colocynth has leaves with lobes less rounded than those of watermelon. The hard round fruit to 7 cm across are conspicuously marked with broad yellow stripes and speckled green bands. The bitter taste in colocynth and in some "wild" forms of watermelon or piemelon is thought to be due to the presence of a purgative, intensely bitter glycoside or to a toxic bitter principle. Colocynth can produce severe purging. The bitter watermelon is capable of producing diarrhoea. (1, 2)

*Cucumis myriocarpus* Naud., Prickly paddy-melon, is an annual vine with globular fruit to 3 cm across, covered with hooked soft prickles. Although this plant is not grown in gardens, it is usually readily accessible for human consumption. The plant is used as a purgative in Africa. Overdoses have caused deaths. The death of a child resulting from eating the fruit has been reported. (1, 2)

*Lagenaria siceraria* (Molina) Standl., Bottle gourd or Calabash gourd, is cultivated in the tropics. Some forms have an intensely bitter pulp which is capable of causing extremely violent purging. (1, 2)

*Luffa cylindrica* (L.) M. Roem., Loofah, Sponge gourd or Vegetable sponge, is grown as a curiosity in gardens. The fruit when

dry has a hard outer skin. Inside there is a complex network of fibres somewhat resembling a coarse sponge. The juice of wild forms has a severe purgative action. (2)

*Momordica balsamina* L., Balsam apple, and *M. charantia* L., Balsam pear, are cultivated for their ornamental red or orange fruit which are soft, eggshaped and covered with warts or tubercles. The scalloped seeds have a conspicuous fleshy aril. Balsam apple has smaller fruit, serrate bracts and hairless leaves. Balsam pear has larger hairy leaves, larger fruit and entire bracts. Both plants are reputed to be poisonous, producing vomiting. The fruit are intensely bitter, except possibly when quite ripe. (1, 2)

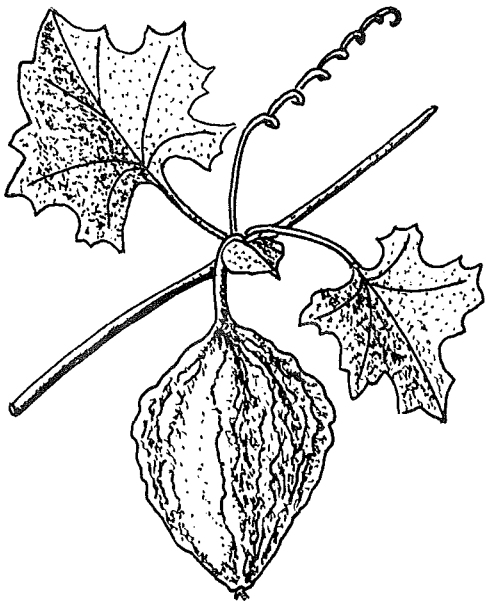


Fig. 25.—Balsam apple (*Momordica balsamina*)

**CUPRESSACEAE**, Cypress family

*Cupressus macrocarpa* Hartw., Monterrey Cypress, is a tree with horizontal branches. The leaves are closely appressed and dark green. Cones are 3 to 4 cm across with ridge-like bosses on the scales. The leaves have been suspected of causing death in cattle, the symptoms being those of an irritant poison. (1)

**CYCADACEAE**, Cycad family, and **ZAMIA-CEAE**, Zamia family, include several plants cultivated in gardens.

The seeds of *Cycas*, *Bowenia* and *Macrozamia* contain azoglycosides. The aglycone is

*methylazoxymethanol* (MAM). The kernel of the seed is eaten after proper preparation, but it has been claimed that its continued consumption as a staple food produces neurotoxic effects leading to inco-ordination. Fresh or inexpertly prepared seeds, when eaten, cause acute toxicity which is manifest by acute gastro-enteritis. Sometimes there is toxic damage to the liver, with hardening of the tissue. Effects upon small laboratory animals indicate that MAM is a liver poison and a general carcinogen. The consumption of leaves by cattle produces "rickets" or "wobbles". (2)

*Cycas media* R.Br., Zamia palm or Tree zamia, is a species found in northern Australia. It grows up to 3m tall and has a crown of large, pinnate leaves. The seeds are borne on flattened structures (sporophylls). In 1770 Captain Cook's men became ill following eating the raw seeds. Later, pigs died after being fed with fresh seed. This is the first recorded feeding test with any Australian toxic plant. (2)

*Macrozamia riedlei* (Fisch. ex Gaud.) C.A. Gardn., Zamia palm, native to the south-western portion of Western Australia, is grown in some gardens. It is a variable plant, with

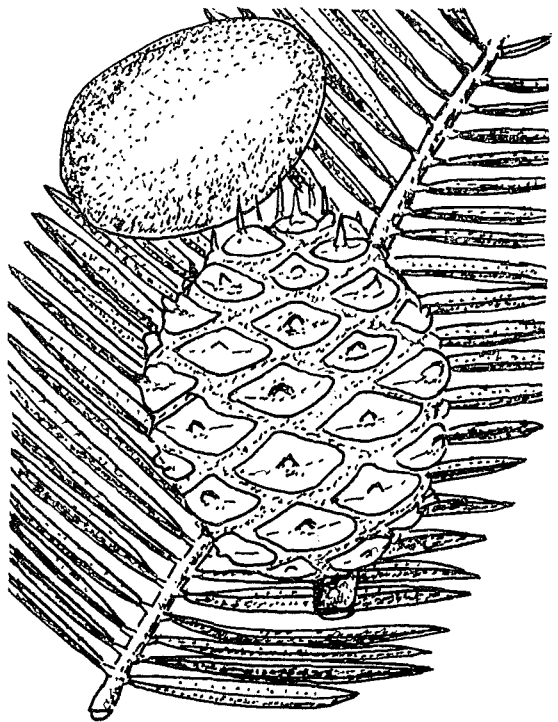


Fig. 26.—Zamia palm (*Macrozamia riedlei*)

palm-like fronds numerous in the crown. The female cones are up to 45 cm long and bear the bright red seeds. The seeds were reported to cause sickness in man as early as 1697, by Vlaming. (10)

*DAVIDSONIACEAE*, Davidsonia family

*Davidsonia pruriens* F.Muell., Davidsonia plum, a small tree found in rainforests of northern Queensland, bear large pinnate leaves, the largest leaflets being up to 30 cm long. The purple-red plum-like fruits are somewhat bitter. It has been reported that a person who ate the fruits exhibited vomiting and epigastric pain. (2)

*ERICACEAE*, Heath family, includes many ornamentals grown in gardens

A number of species and genera are listed as toxic. These include *Andromeda floribunda*, *Arbutus* spp., *Gaultheria* spp., *Kalmia* spp., *Ledum* spp., *Menziesia* spp., *Pieris* spp. and *Rhododendron* spp. The azaleas are included in *Rhododendron*.

Livestock losses due to members of the heath family is attributed to an amorphous, physiologically active substance which may be a resinoid and to hydroquinone. At autopsy non-specific gastro-intestinal irritation and some haemorrhage is usually found. (2)

*EUPHORBIACEAE*, Spurge family, includes a number of cultivated species, some cactus-like in appearance. Many species contain a milky latex.

*Aleurites fordii* Hemsl., Tung-oil tree, is a small tree with bright green, broadly heart-shaped leaves which have three to five lobes and which are up to 25 cm long. The white or cream flowers are in bunches. The fruits, which hang from the branches, are rounded, to 7 cm in diameter, and contain three to seven seeds each in a separate compartment. It is cultivated in warm regions for its seed, from which the drying oil known as tung-oil is expressed. Cultivation of the tung-oil tree as a commercial crop in Western Australia was attempted about 50 years ago. The plant is toxic to stock. Cases of human poisoning through eating the fruit kernel have been recorded. Symptoms include nausea, abdominal cramps, severe vomiting, diarrhoea, weakness and later exhaustion. (1, 2)

*Aleurites moluccana* (L.) Willd., Candlenut, native to eastern Australia, has only one or two seeds per fruit. The seeds sometimes produce severe vomiting and diarrhoea when eaten. (1)

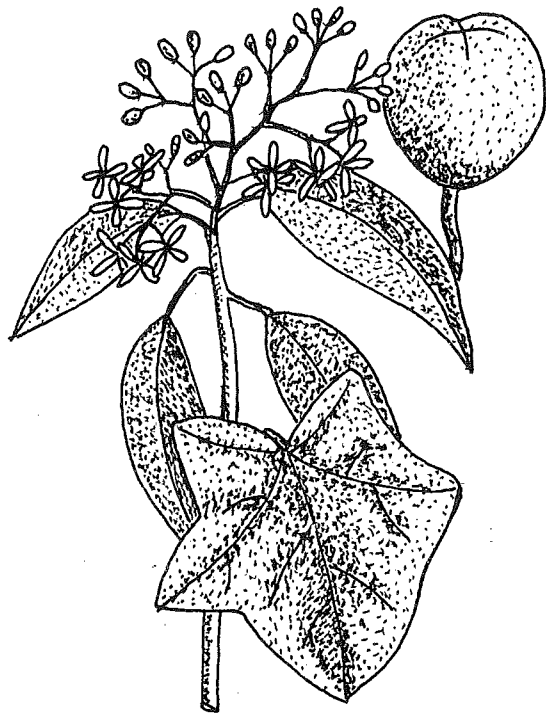


Fig. 27.—Candlenut (*Aleurites moluccana*)

*Croton* spp., grown in the tropics, are considered to contain acrid, irritant principles. The eating of fruit of *Croton* was reported to cause illness in children and an adult. (11)

*Euphorbia lathyris* L., Caper spurge, is a naturalized alien herb which grows to about 1 m tall. The leaves are opposite, narrow, to 10 cm long. The capsules are about 2.5 cm long. A case of non-fatal poisoning in women who ate pickles made from the fruit in mistake for capers has been reported. (2)

*Euphorbia marginata* Pursh., Snow-on-the-mountain or white-margined spurge, is an annual herb up to 60 cm tall. Upper leaves are white-margined. Floral bracts are green and white. The latex is reported to be highly irritant. Its honey is considered more or less poisonous to humans. (2, 3, 4)

*Euphorbia milii* Ch. des Moulins, Crown-of-thorns, is armed with stout spines. The obovate to spoon-shaped leaves are on the new growth. The flowers are subtended by two

red bracts. It contains a juice that is irritant, but no cases of severe poisonings are on record. (4)

*Euphorbia peplus* L., Petty spurge, is a common weed of gardens. It is a small annual herb with pale green leaves which are rounded or obovate. Handling of the plant when weeding is a common source of subsequent irritation to skin, eyes, lips and face. The acrid latex is emetic and highly purgative and causes severe gastro-enteritis if swallowed. It is corrosive to tender skin and mucous surfaces. It has proven lethal to humans. (2, 3, 4)

*Euphorbia pulcherrima* Willd., Poinsettia, is a shrub to 2.5 m tall and with coarsely shallow lobed leaves. The large leaf-like bracts which surround the small flowers are bright red to

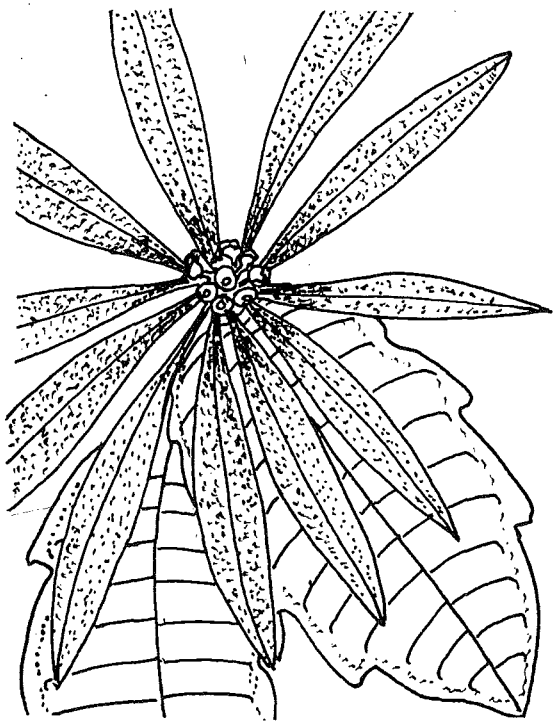


Fig. 28.—Poinsettia (*Euphorbia pulcherrima*)

pale yellow. Poinsettia was responsible for the death of a two-year-old child in Hawaii who had eaten a leaf of the plant. Symptoms included intense gastro-enteritis, with delirium. Latex is irritant to tender skin and mucous surfaces. (2, 3, 4)

The Dwarf poinsettia or Painted spurge, *Euphorbia cyathophora* Murr. has been suspected of being toxic. The leaf-like bracts in

this plant are red only at the base. The latex appears to be corrosive. (2)

*Euphorbia terracina* L., False caper or Geraldton carnation weed, is a perennial herb with narrow leaves and with flowers borne in four to five-rayed, repeatedly divided umbels. The oval bracts are finely toothed. False caper has been reported, through its latex, to cause severe corneal ulcerations in a man. (23)

*Euphorbia tirucalli* L., Naked Lady or Pencil bush, is a small tree with smooth pencil-like, dull green, leafless branches and a very copious milky sap. The latex is a severe irritant and produces a more intense irritation of the eyeball than of the skin. It is a frequent cause of temporary blindness which may last for several days. Ingestion of the plant caused the death of a man through haemorrhagic gastro-enteritis. (1, 2)

*Excoecaria agallocha* L., Milky mangrove, River poison tree or Blind-your-eye; *E. dalachyana* (Bail.) Benth., Scrub poison or Blind-your-eye; and *E. parvifolia* Muell. Arg., Gutta percha tree, are tropical species which are poisonous to livestock. All are small trees with copious milky sap. The milky sap can cause intense pain and temporary blindness if it gets into the eye or painful blisters if it makes contact with other tender parts of the body. Sucking the sap of *E. agallocha* has caused illness in children. (2)

*Jatropha curcas* L., Curcas bean or Barbados nut, grown in the tropics, is a small tree with heart-shaped leaves which have three to five lobes. The oval fruit split when ripe to release two or three black seeds. Ingestion of seeds or overdoses of oil has been responsible for human poisoning. Symptoms and lesions are mainly those of gastro-enteritis. There is acute abdominal pain and a burning sensation in the throat about half an hour after ingestion of the seeds, followed by vomiting and diarrhoea. There may be depression and collapse, particularly in children. The seeds contain a purgative oil and what may be a toxalbumin or phytotoxin. (1, 2, 4)

*Jatropha gossypifolia* L., Bellyache bush or Cotton-leaf physic nut, is a shrub with leaves deeply lobed three times. This species is reputedly toxic in the same way as *J. curcas*. (2, 4)

*Jatropha multifida* L., Coral plant, is a shrub with the leaves deeply divided into 9 to 11 narrow, entire or toothed lobes. This plant

has been reported to be a frequent cause of human poisoning in the U.S.A. Symptoms and lesions are similar to those of other species of *Jatropha*. Atropine-like effects were recorded in four boys admitted to hospital eight hours after eating fruits. Diminished sweating, dry skin and mouth, slight mydriasis, mild increase in pulse rate and flushing of the skin persisted for four hours. (2, 4)

*Jatropha podagrica* Hook., Guatemala rhubarb, Coral plant or Physic nut, is a perennial with a short thick stem. The leaves are rounded in outline with broad, blunt lobes and a stalk attached on the underside of the blade. It has the reputation of being toxic in the same way as other species of *Jatropha*. (2)

*Manihot esculenta* Crantz., Cassava, Manioc or Tapioca, is sometimes cultivated in gardens, particularly the variegated form. It is a shrub with soft, pithy stems and large leaves divided into narrow segments. Sometimes referred to as *M. utilisissima*, it is listed as a poisonous plant. The roots are a source of starch known as tapioca, but when eaten raw or improperly prepared they can be acutely poisonous through contained cyanogenetic glycosides. (1, 2)

*Ricinus communis* L., Castor-oil plant or Castor bean, a tall branching perennial to 2.5 m tall, is grown in some gardens, but it is more often seen in vacant suburban allotments, rubbish dumps and other neglected situations. The plant has large leaves with seven to nine triangular lobes radiating from the attachment of the stalk which is off-centred on the lower side. The seeds of the castor-oil plant are highly toxic. The lethal dose for man is from two to about eight seeds. One seed is sufficient to poison a child. The highly toxic principle is ricin, a toxalbumin or phyto-toxin. The seed also contains castor oil which is purgative and small amounts of the mildly toxic alkaloid *ricinine*. Ingestion of the seed produces purging with nausea and vomiting, gastric pain, rapid and later imperceptible pulse, cramps in muscles of calves and abdominal wall, drowsiness, bluish discolouration of the skin, followed by delirium, collapse and death. Sometimes a choleraic condition is produced although stools are not of the cholera type. The pressed cake obtained after the oil has been removed from the seed is poisonous. Castor oil used for industrial purposes contains ricin whereas medicinal castor oil does not. (1, 2, 3, 4)

*Synadenium grantii* Hook.f., African milk bush, is a garden shrub with thick, fleshy stems

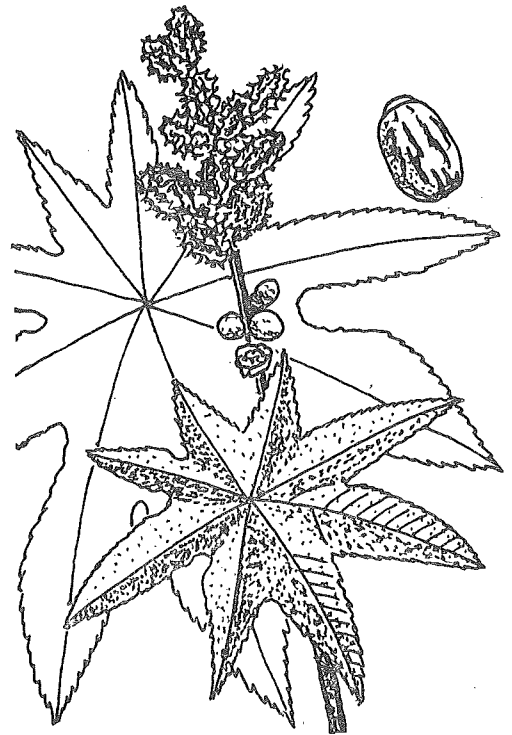


Fig. 29.—Castor-oil plant (*Ricinus communis*)

and with somewhat fleshy leaves spirally arranged and often crowded near the ends of the stems. Both stems and leaves have a copious latex. The latex is irritant to eyes, mouth and tender surfaces. Several cases are recorded of non-fatal poisoning in children. Symptoms include irritation of mucous surfaces, vomiting, diarrhoea, general malaise and sometimes convulsions. (2, 5)

**FABACEAE** (Léguminosae), Legume family, a large family, includes many well known garden plants and other economic plants.

*Abrus precatorius* L., Crab's eye, Gidec-gidec, Precatory bean or Rosary pea, a perennial vine, is sometimes grown in gardens in the tropics. The glossy seeds are ovoid, one-third black and the rest scarlet. A white-seeded form is also known. The seed is extremely toxic but, being hard and difficult to chew, when swallowed whole the toxic principle is not easily released or always readily absorbed through the walls of the intestine. The contained toxalbumin, *abrin*, is similar to *ricin* found in the castor-oil seed. One seed of crab's eye is sufficient to kill an adult human. Symptoms include nausea, repeated vomiting, severe diarrhoea, weakness, inability to stand,



cold perspiration, colic, weak fast pulse and trembling of hands. The plant roots, which contain *glycyrrhizin* as in licorice, probably has toxic properties similar to those of the seed, and should not be eaten as a licorice substitute. Abrin severely irritates mucous membranes, especially the conjunctiva of the eye. (1, 2, 4)

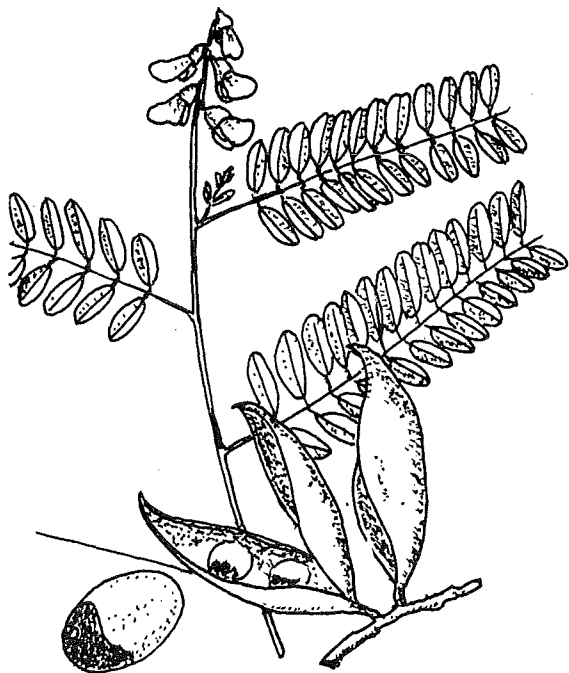


Fig. 30.—Crab's eye (*Abrus precatorius*)

*Acacia longifolia* Willd., Sydney golden wattle, cultivated in some gardens, is a shrub or small tree, with phyllodes to 15 cm long, three or four nerved. The flowers are in simple spikes. The pods are up to 12.5 cm long. This plant has been suspected of killing a goat. It gave a positive test for hydrocyanic acid (prussic acid.) (2)

*Canavalia ensiformis* (L.) DC., Jack bean, is an erect or semi-erect plant with trifoliolate leaves. The purple flowers are in pendulous racemes. The pods are up to 35 cm long. The seeds are white with a brown hilum. Jack bean is cultivated in the tropics to a limited extent. It is cooked and eaten as with ordinary bean, when immature. The mature beans of some varieties yield prussic acid. (2)

*Canavalia gladiata* (Jacq.) DC., Sword bean, which is a twiner, has pods to 30 cm long. The seeds are red, pink or brown. Sword

bean is reputedly cyanogenetic in much the same way as jack bean. (2)

*Cassia didymobotrya* Fres., is known locally as New Guinea cassia, although native to Africa. The leaf is poisonous and causes an intense inflammation of the intestinal canal. (1)

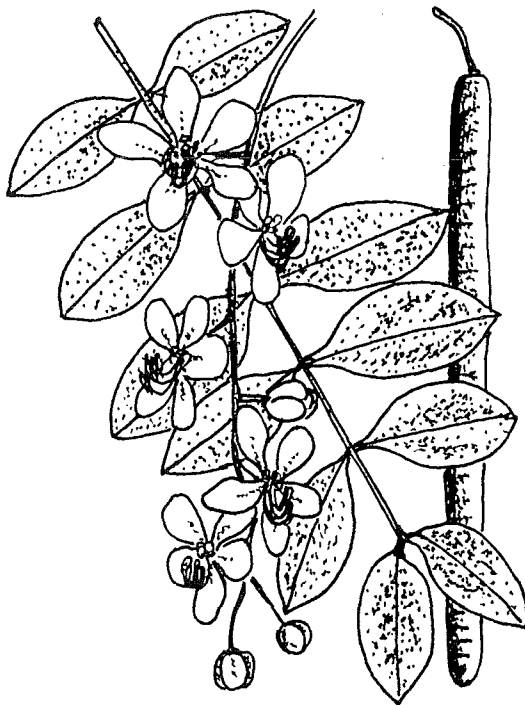


Fig. 31.—Golden shower (*Cassia fistula*)

*Cassia fistula* L., Cascara bean or Golden shower, a tree with pinnate leaves, each leaflet up to 20 cm long, is grown in gardens for its long racemes of yellow flowers. It is the well known source of the purgative senna. (1, 4)

*Castanospermum australe* A. Cunn. et C. Fraser ex Hook., Moreton Bay chestnut or Black bean, is a tree with pinnate leaves. Each leaf consists of eight to 17 leaflets which are dark green, 5 to 15 cm long and about half as broad. The sprays of orange to red flowers are followed by large leathery pods containing up to six chestnut-like seeds separated from each other by pithy partitions. Ingestion of seeds, either raw or roasted, produce severe, painful diarrhoea with vomiting and dizziness. The seeds are eaten by aborigines after soaking in water for several days and roasting. (2, 3)

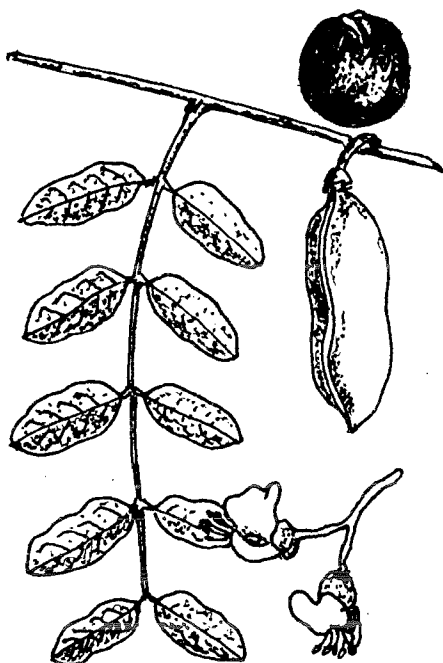


Fig. 32.—Moreton Bay chestnut (*Castanospermum australe*)

*Crotalaria* spp., Rattlepod, contain pyrrolizidine alkaloids of various kinds. Some are toxic to livestock. *Crotalaria retusa* L., Wedge-leaf rattlepod, the cause of "Kimberley horse disease" is sometimes grown as a garden annual. (1, 2, 4)

*Erythrina* spp., Coral trees, are soft-wooded trees with deciduous trifoliate leaves and with racemes of red to orange pea-shape flowers. The seeds of many species contain alkaloids with a curare-like action.

*Erythrina corallodendron* L., a cultivated species, was suspected of having a narcotic effect on horses; the flowers have been considered toxic to bees. (7)

*Erythrina vespertilio* Benth., Bat's wing coral tree, native to northern Australia, has been suspected of poisoning cattle. (2)

*Lablab purpureus* (L.) Sweet (Syn. *Dolichos lablab*), Hyacinth bean or Lablab, is a twining vine with trifoliate leaves, each leaflet being broad, ovate and 7.5 to 15 cm long. The white, pinkish or purplish flowers are borne in racemes. The flat pods, to 12.5 cm long, contain 3-5 black or white seeds. Lablab bean is cultivated as a herbage legume in the tropics. The pods are edible when properly

cooked. Insufficient boiling causes poisoning from a cyanogenetic glycoside. (22)

*Laburnum anagyroides* Medic., Golden chain or Laburnum, is a large shrub or small tree with tri-foliolate leaves and pendulous racemes of golden-yellow flowers. It is considered to be one of the most poisonous trees in Britain. All parts are poisonous. Numerous cases are recorded of laburnum poisoning of human beings who have eaten the flowers or seeds, or who have carried twigs or bunches of flowers in their mouths. The symptoms are dilation of the pupils, stomach pains, vomiting, giddiness, muscular weakness, coldness of the limbs, inco-ordination, convulsions and death from asphyxia. The toxic principle is a quinolizidine alkaloid *cytisine*, which has an action similar to nicotine. (3, 4, 12)



Fig. 33.—Golden chain (*Laburnum anagyroides*)

*Lathyrus odoratus* L., Sweet pea, a tall climbing annual grown for its fragrant flowers, has large flowers on stalks longer than the leaves. It has been reported to cause a condition similar to "lathyrism" which is caused by the ingestion of the seeds of *L. sativus* L., Indian or Mutter pea. Lathyrism is a disease that develops, during times of famine and acute financial stress in India, when human beings are being forced to eat this pea. The disease

takes the form of a spastic paralysis of the lower limbs, which is inclined to be progressive. There may be a delay of four to seven weeks from cessation of feeding upon Indian pea and the onset of symptoms. The compound producing paralysis and skeletal lesions upon ingestion of the seeds of *L. odoratus* has been identified as *beta-(gamma-L-glutamyl)-aminopropionitrile*. (1, 4, 12)

*Lotus berthelotii* Masf., Coral gem, a grey pubescent bush to 60 cm tall, with pinnate leaves and scarlet flowers, fading orange, has been suspected of causing sheep deaths in Western Australia. (5)

*Phaseolus lunatus* L., Lima bean, Java bean, Sieva bean, etc., is an annual with many, small, white flowers borne on long racemes. This species is grown in the tropics, and used for human and livestock consumption. All parts of the plant contain *phaseolunatin*, a cyanogenetic glycoside. The lima bean of commerce which is edible, has large, flat, almost, white seeds; the wild tropical forms, which are toxic, have smaller, plumper seeds which are speckled or solidly coloured. The dark brown and purple seeds yield more hydrocyanic acid than the lighter brown seeds. Mistaken identification of lima bean for other kinds of bean (species of *Phaseolus*) has resulted in human poisonings. The seeds of lima bean may be distinguished by the presence of distinct lines radiating over the entire surface from the scar of attachment, and by the fact that the scar of attachment is located in the centre of the inner curved surface. Symptoms of lima bean poisoning are typical of cyanide poisoning. (1, 3, 4)

*Pisum sativum* L., Garden pea, and *P. sativum* var. *arvense* Poir., Field Pea are annual species with pinnate leaves and large leaf-like stipules. The flowers are white in the former and coloured, usually pink, in the latter. Both have been reported to cause nervous symptoms in sheep and cattle. (4)

*Poinciana gilliesii* Hook., Bird-of-paradise plant, is a shrub to 3 m tall with ferny foliage and with yellow flowers with long exerted red stamens. It is sometimes called *Caesalpinia gilliesii*. The unripe seed pods have caused illness in children. Symptoms are of an irritant poison with nausea, vomiting and diarrhoea which develop rapidly after ingestion of the pod. (1, 3, 4, 5)

*Robinia pseudoacacia* L., Black locust or Robinia, is an ornamental tree with odd-pinnate leaves, each leaflet 3 to 5 cm long, and

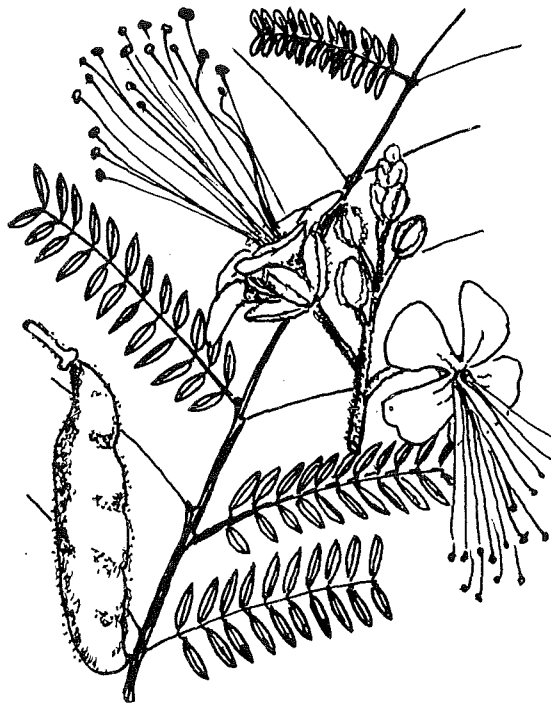


Fig. 34.—Bird of paradise plant (*Poinciana gilliesii*)

with pendulous sprays of white flowers. The roots, stems, leaves and pods are poisonous. The bark, which tastes like licorice, has been reported to cause poisoning in humans. Symptoms produced include repeated vomiting, flushing of face, dryness of mouth and throat, dilation of pupils, epigastric pain, feeble and intermittent pulse, pallor, sleepiness, stupor and convulsions. Cases of stock losses have been recorded with death resulting within a few hours of eating a lethal quantity. The toxic principle most commonly cited is *robin*, a heatlabile phytotoxin or toxalbumin. Robinia is objectionable in gardens in the manner it sends up suckers from disturbed or severed roots. (1, 4)

*Templetonia retusa* (Vent.) R.Br., Cockies tongue or Bullock bush, is a native species that is sometimes grown in gardens. A shrub up to 2 m tall, it has blue-green leaves and attractive red flowers. The seeds caused a child to become ill, with symptoms of vomiting and drowsiness. A dog which ate a pod of the plant became sick. The plant contains the quinolizidine alkaloid *cytisine*. (5, 13)

*Vicia faba* L., Broad bean, Fava bean or Horse bean, is an annual species growing to 2 m tall. The flowers, borne in the axils on

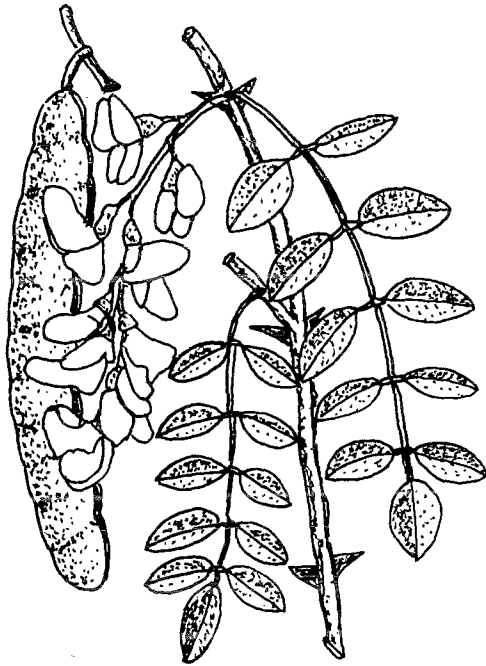


Fig. 35.—Black locust or robinia (*Robinia pseudoacacia*)

a short stalk, are dull white, blotched purple. Broad bean is widely cultivated as a food for man and livestock. Ingestion of the beans, especially raw or partially cooked, or inhalation of pollen produces acute toxic hepatitis, commonly called "favism" in certain susceptible individuals. The disease is frequent among residents of Sardinia and occasional cases have occurred among persons of Italian or Jewish descent. Males are more commonly affected than females, and the disease appears to be transmitted by a sex-linked factor of intermediate dominance. A genetically determined biochemical defect in persons susceptible to favism is characterised by unusually low levels of whole-blood glutathione (which can be reduced still further by incubation with acetylphenylhydrazine) and a deficiency of glucose-6-phosphate dehydrogenase activity. Favism is regarded as an allergic reaction which results in acute haemolytic anaemia. The illness varies from a severe breakdown of red blood cells, with haemoglobin in the kidneys and shock, to a mild state in which there is malaise, dizziness and slight gastro-intestinal upset with an increased excretion of urobilin. Intervening forms show pallor, jaundice, vomiting, back pain and weakness. Symptoms appear within five to 24 hours of ingestion of the bean. (1, 4)

*Wisteria floribunda* DC. and *W. sinensis* Sweet, both commonly referred to as Wisteria, are ornamental climbers noted for their showy pendulous racemes of fragrant blue, lilac, pink or white flowers. Cases of children being poisoned by the consumption of seeds and pods have been recorded. Symptoms produced are mild to severe gastro-enteritis, vomiting, abdominal pain and diarrhoea. Clinical dehydration occurs in more severe cases. Recovery is essentially complete within 24 hours. The toxic principle in the seed is not known. (1, 3, 4)

#### FAGACEAE, Beech family

*Fagus sylvatica* L., European beech, is a large tree with ovate leaves, rounded at the base, and denticulate in the margins. Staminate flowers are in slender pendulous heads. The pistillate flowers are in pairs. The fruit are sharply three-angled. Beech has been reported in European countries to cause poisoning in human beings from ingestion of the seeds (beechnuts). The poisonous principle is saponin-like and causes severe gastro-intestinal distress. (4)

*Quercus* spp., Oaks, are usually large trees, with serrate lobed or pinnatifid leaves. The one-seeded fruit (acorn) is enclosed at the base by a cup-like involucre. The leaves of the oak when eaten in sufficient quantities have been reported to cause livestock losses. The acorns are also reputed to be toxic. (1, 4)

#### FUMARIACEAE, Fumitory family

*Dicentra spectabilis* Lem., Bleeding heart, is a herb to 60 cm tall. The flowers, in simple racemes, are rosy red. This species, regarded as probably poisonous, contains isoquinoline-structured alkaloids. (4)

*Fumaria* spp., Fumitory, herbs with pinnatisect leaves and with leaf-opposed racemes of white or reddish flowers, are sometimes found as weeds in gardens. The isoquinoline alkaloids *coptisine* and *sanguinarine* have been reported in seeds of five species of *Fumaria*. The contamination of grain or oils with these alkaloids is thought to be linked with the incidence of glaucoma in humans. (2)

#### GINKGOACEAE, Ginkgo family

*Ginkgo biloba* L., Ginkgo, is an ornamental tree with leaves to 10 cm across, broad at the summit and with numerous parallel veins.

It is sometimes referred to as maidenhair tree. The fruit pulp is highly irritant to the skin. When applied to the skin it produces reddening, accumulation of fluid, pimples and pus-filled swellings accompanied by intense itching. Individual human beings vary in their reaction to these irritant effects. The toxic principle is said to resemble cantharidin in its general pharmacological action. (1)

#### *HIPPOCASTANACEAE*, Horse-chestnut family

*Aesculus hippocastanum* L., Horse-chestnut, is a large tree with five to seven foliolate leaves. The fruit is globose and prickly. All parts of the plant are poisonous and contain the glycoside *esculin*. Children have been poisoned by eating the seeds, or making "tea" from the leave and twigs. Symptoms are nervous twitching of muscles, weakness, lack of coordination, dilated pupils, vomiting, diarrhoea, depression, paralysis and stupor. Other species of *Aesculus* are known to be poisonous. (22)

*IRIDACEAE*, Iris family, contains a number of genera which are toxic to livestock. Many are cultivated in gardens or are garden escapes.

*Gynandris setifolia* (R.C. Foster, Thread iris, has one leaf arising from a small corm covered with fibres. The small iris-like flowers are blue, blotched with orange and purple. This naturalized species has been reported to be toxic to livestock. (1)

*Homeria breyniana* (L.) Lewis, One-leaved Cape tulip, and *H. miniata* (Andr.) Sweet, Two-leaved Cape tulip have salmon-pink flowers though a yellow form of *H. breyniana* is also found. *H. miniata* bears bulbils in the leaf axils and at the base of the corm. Both are regarded as noxious weeds and have been reported to cause deaths in livestock. The toxic principles are cardiac glycosides. (1, 2)

*Iris germanica* L., Flag iris, Flag lily or Fleur de lis, and other forms of iris are grown in gardens. They have a long rootstock and sword-shaped leaves. The larger flowers are blue or white. There are reports to indicate that these plants are acrid and irritant and capable of causing gastro-enteritis. However, they appear to be extremely unpalatable and cases of poisoning are very rare. (2)

*Moraea* spp., *Moraea*, are naturalized species, with petaloid style branches as in flag iris.

The leaves are narrow and the flower parts are free. They are reputed to cause "tulip poisoning" similar to species of *Homeria*. (1, 2)

*LAMIACEAE* (Labiatae), Mint family, include a number of aromatic plants grown in gardens.

*Stachys arvensis* L., Stagger weed, a common weed in disturbed situations, is a weak annual with opposite leaves and with false whorls of violet flowers forming terminal leafy spikes. Stagger weed has been reported to cause "staggers" and "shivers" in livestock. (2)

#### *LAURACEAE*, Laurel family

*Cinnamomum camphora* Nees et Eberm., Camphor laurel, the source of natural camphor is grown as an ornamental tree. The leaves are opposite or sometimes alternate, oval shaped and 5 to 12 cm long, pinkish on the young growths. The yellow flowers are borne in short axillary panicles. Camphor laurel, has not been recorded as a toxic plant. Large doses of camphor result in nausea and vomiting. (1)

*Cryptocarya pleurosperma* White et Francis, Poison walnut, a rainforest tree, found in northern Queensland, is reported to cause severe skin irritation and blistering on face, hands, neck and lips of workers in sawmills handling the timber. Laboratory workers handling bark or ground-up material have also been affected. Several alkaloids have been isolated from the bark. The phenanthroquinolizidine alkaloid, *cryptopleurine*, is apparently responsible for the powerful vesicant and irritant action of the bark. (2, 11)

*Persea americana* Mill., Avocado, a tree with leathery oblong to oval leaves up to 40 cm long, is grown commercially for its fruit. The leaves, fruit, bark and seeds have been reported to be toxic to livestock. Not all varieties are said to be equally toxic. (4)

*LILIACEAE*, Lily family, contains a number of garden subjects with bulbs or tuberous roots. Closely related to the amaryllis family.

*Agapanthus orientalis* Leighton, Agapanthus or African blue lily, a fleshy-rooted perennial herb, with strap-like leaves and blue tubular flowers, is widely grown in gardens. It has

been reported that the sticky acrid sap in the leaves causes severe ulceration of the mouth. (3)

*Allium cepa* L., Onion, and *A. sativum* L., Garlic, as well as other species of *Allium* (Leek, Wild leek, Chives, etc.) include both cultivated or naturalized plants. The sulphur-containing volatile oils have a local irritant action on the skin, nose and eyes. Contact with onion and garlic produces dermatitis. Fatal poisoning in livestock have been attributed to ingestion of quantities of onion. (1, 4)

*Colchicum autumnale* L., Autumn crocus or Meadow saffron, grown for its large purple flowers, contains the alkaloid *colchicine*, which is extensively employed in genetic investigations to produce polyploids. All parts of the plant are toxic, and loss of life in all cases of livestock and in human beings has been reported following ingestion of *Colchicum* in Europe. The symptoms and lesions are primarily those of gastro-intestinal irritation. (4)

*Convallaria majalis* L., Lily-of-the-Valley, a perennial with a creeping root stock, is commonly cultivated in gardens for its sweetly scented white flowers. All parts of the plant contain two glycosides, *convallamarin* and *convallarin*. Between them, they are purgative and have an action on the heart similar to that of digitalis. The plant is dangerously poisonous if eaten by animals and birds; most of the reports of poisoning, by the growing plant, being of poultry. Toxic effects include absence of appetite, nausea, excessive salivation, vomiting, headache, increased pulse rate with a regular irregularity of the heart terminating in ventricular fibrillation and cardiac arrest. (3, 12)

*Gloriosa superba* L., Glory lily, a climbing species bearing yellow, changing to red, flowers, is extremely poisonous and contains alkaloids similar to, but not identical with colchicine. All parts of the plant are poisonous. The root-stock is considered to be the most toxic part, and most reports of human poisoning refer to that part of the plant. Symptoms include tingling followed by numbness of lips, burning pain in the epigastrium and numbness of the skin, nausea followed by vomiting and bloody diarrhoea, giddiness, loss of power in limbs, intolerance of light, difficulty in breathing and a quick, feeble pulse. In severe cases there is a drop in body temperature and tetanic trembling proceeding to convulsions, unconsciousness and death. (1, 2, 4)

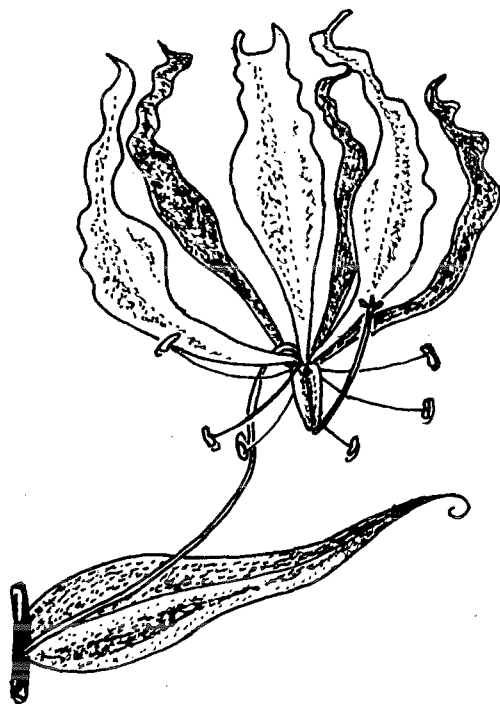


Fig. 36.—Glory lily (*Gloriosa superba*)

*Hyacinthus orientalis* L., Hyacinth, has a large bulb and several thick strap-like leaves. The tall, hollow scape bears several flowers in a terminal raceme. The flowers vary from red through blue and yellow to white. This species has been reported to produce severe purging in cattle fed on the bulbs of the plant. This plant can be dangerous (to humans) if eaten in quantity. The bulb is the most dangerous part, causing intense stomach cramps, vomiting and diarrhoea. (4, 22)

*Ornithogalum thyrsoides* Jacq. Chinchinchee or Star-of-Bethlehem, has an onion-like bulb and clusters of white flowers. It has been reported to be toxic of horses, eight flower spikes being sufficient to kill a horse. (1)

*Ornithogalum umbellatum* L. differs from *O. thyrsoides* in having a green stripe on the back of the perianth parts. Children have been poisoned by eating flowers and bulbs. Symptoms include nausea and intestinal disturbance. (22)

*Scilla nonscripta* (L.) Hoffm. et Link, Bluebell, grown for its bell-shaped blue, sometimes white, flowers, is reputedly toxic and a case involving the poisoning of a horse which had eaten the bulbs has been reported. (12)



**LOGANIACEAE**, Logania family

*Gelsemium sempervirens* (L.) Ait.f., Carolina jessamine, is a woody perennial evergreen vine with opposite leaves and clear yellow, fragrant, tubular flowers. It is poisonous to all classes of livestock. Children have been poisoned by sucking nectar from the flowers. Symptoms of poisoning are those of depression followed by death through respiratory failure. The plant contains indole alkaloids related to strychnine. (4)

**LYTHRACEAE**, Pomegranate family

*Lagerstroemia indica* L., Crepe myrtle, is an ornamental shrub or small tree grown for its crepe-like sprays of pink, red or white flowers. The flowers, leaves and bark are considered to be drastic purgative. (6)

**MALVACEAE**, Mallow family

*Malva parviflora* L., Small-flowered mallow or Marshmallow, is an annual up to 50 cm tall. The leaves are circular in outline, indented at the base, and with five to seven rounded lobes. The pink flowers are in axillary clusters. The eight to 12 fruitlets are wrinkled. This weed, seen commonly around buildings and stockyards, causes "shivers" or "staggers" in livestock. Eggs from hens consuming seeds (or more rarely leaves) of this plant develop yolk and white discoloration during cold storage. (1, 2, 4)

**MELIACEAE**, Mahogany family

*Melia azedarach* L., Cape lilac, White cedar or Chinaberry, a deciduous tree with bipinnate leaves made up of numerous leaflets. Each leaflet is bright green, coarsely toothed along the margins and 2.5 to 7.5 cm long. The lilac flowers are borne in large panicles. The dull yellow, oval fruit which hang down in open bunches from the branches contains a hard, grooved seed surrounded by a fleshy pulp. Children are reported to have died after eating six to eight fruit. Death may not occur until some days after eating the fruit. Symptoms are of two types. The plant is a severe irritant and produces nausea, vomiting, constipation or diarrhoea, often with blood. As well, nervous symptoms of excitement or depression, weakened heart action and difficulty in breathing are present. Severe thirst, cold sweats, grinding of teeth, sleepiness and convulsions have also been recorded. The leaf, bark and

flowers are also toxic and the poisoning of cattle after eating the leaves has been noted, although loppings from trees fed to dairy cattle caused no ill effects apart from off-flavours in the milk. (1, 2, 3, 4)

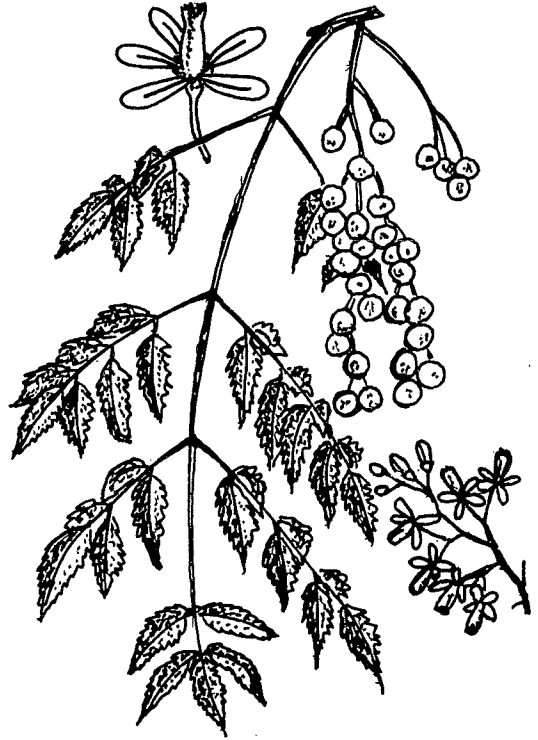


Fig. 37.—Cape lilac or white cedar (*Melia azedarach*)

**MELIANTHACEAE**, Melianthus family

*Melianthus comosus* Vahl., Cape honey flower, and *M. major* L., Tall Cape honey flower, are shrubs with large pinnate leaves and with flowers borne in long racemes. The fruit are four-lobed and bladdery. Both species are toxic to livestock. The root is apparently the most poisonous part. In man and animals there is an increased flow of saliva and vomiting, followed by colic, bloody diarrhoea and extreme exhaustion. The honey, which like the nectar is black, is reputedly poisonous, although it is also reported to be quite harmless and tasty. (1, 2)

**MENISPERMACEAE**, Moonseed family

*Legnephora moorei* (F.Muell.) Miers, Native grape, is a tropical and sub-tropical vine found in eastern Australia. It is reputed to be poisonous to livestock. The fruits have made children ill. (2)



Fig. 38.—Tail cape honey flower (*Melianthus major*)

**MORACEAE**, Mulberry family

*Ficus carica* L., Fig, has been implicated in the production of percutaneous photosensitization which is a type of photogenic dermatosis. The condition is a bullous eruption on parts of the skin which have been in contact with the causative plant and simultaneously exposed to sunlight some 48 hours previous to the development of the eruption. The photosensitizing agents are probably fluorescent principles belonging to the group of coumarins or furo-coumarins. The furo-coumarin in *F. carica* is *ficusin*. (1)

*Maclura pomifera* (Raf.) Schneider, Osage orange, has been reported to be poisonous to livestock, with symptoms of diarrhoea. (2, 4)

**MYRISTICACEAE**, Nutmeg family

*Myristica fragrans* Houtt., Nutmeg, is the source of the commonly used nutmeg and mace. Nutmeg is a mild hallucinogenic drug. Ten grams of nutmeg seed can produce a mild, brief euphoria, accompanied by light-headedness. In larger amounts symptoms include rapid heart beat, excessive thirst, agitation, anxiety, stomach pain, drowsiness, double

vision, delirium, and sometimes acute panic. (22)

**MYRTACEAE**, Myrtle family, is well represented in Australia, particularly in the sub-family *Leptospermoideae*, characterised by the possession of dry fruits, e.g. gum "nuts". Nearly all species contain essential oils.

*Eucalyptus cladocalyx* F.Muell., Sugar gum and *E. viminalis* Labill., Manna gum, are grown for shade and ornament. Both are cyanogenetic, yielding hydrocyanic acid or prussic acid in sufficient quantities to be lethal. Sugar gum, which is widely planted, has been reported to cause numerous field cases of poisoning in livestock. Manna gum is believed to have been responsible for the death of koalas. (2)

*Rhodomyrtus macrocarpa* Benth., Finger cherry, Cooktown loquat or Wannakai, is a shrub or small tree found in northern Queensland. It has large, glossy leaves, with white flowers borne singly or in small clusters in the forks of the upper leaves. The fruit are fleshy and loquat-like, pinkish-red ripening to dark red. The fruit causes permanent blindness if eaten. There is no agreement concerning the stage of maturity at which the fruits are toxic. (2)

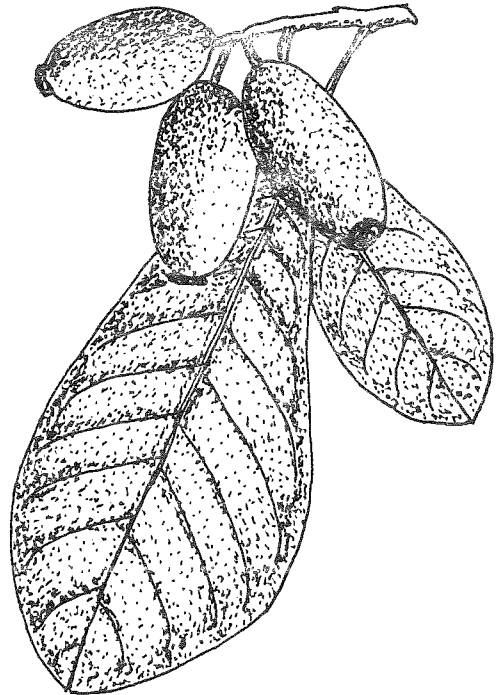


Fig. 39.—Finger cherry (*Rhodomyrtus macrocarpa*)

### NYCTAGINACEAE, Four-o'clock family

*Bougainvillea* sp., Bougainvillea, is a well-known garden subject which is grown over porches, trellises, etc. The stems carry stout, straight spines and oblong to ovate leaves. The flowers are hidden by showy coloured bracts. The leaf has been suspected of causing death in poultry. (1)

*Mirabilis jalapa* L., Marvel-of-Peru or Four o'clock, is a garden subject that is also naturalized in eastern Australia. A quick growing herb, it has soft ovate leaves to 15 cm long and white, red or yellow flowers. The root is purgative and has been used as a substitute for jalap. Poisoning of a child is thought to have followed eating the fruit, the effects being vomiting and diarrhoea. The roots and seeds are the cause of acute pain, vomiting and diarrhoea in children. (1, 22)

### OLEACEAE, Olive family

*Ligustrum vulgare* L., Common privet, *L. japonicum* Thunb., Japanese privet, *L. lucidum* Ait., Tree privet or Large-leaf privet, and *L. sinense* Lour., Chinese privet, are widely cultivated in gardens. The privets have opposite entire leaves and terminal panicles of small



Fig. 40.—Common privet (*Ligustrum vulgare*)

white flowers. The leaves and fruit of *Ligustrum* are poisonous. Cases of poisoning in children eating the fruit have been recorded for *L. vulgare*. The berries of *L. lucidum* have also been suspected of poisoning children. Symptoms are severe gastric irritation, vomiting and purging, a weak thready pulse, subnormal temperature and coldness of body, muscular twitching and convulsions. Drowsiness, difficulty in movement, with paralysis of the lower part of the body, and dilation of pupils have also been recorded. (1, 2, 3, 4)

### OXALIDACEAE, Oxalis family

*Oxalis corniculata* L., Yellow wood sorrel, and *O. pes-caprae* L., Soursob, are weedy plants found in garden situations and elsewhere. The leaflets number three in both species. In *O. corniculata* the leaves and flowering stems are borne on the stem. In *O. pes-caprae* the leaves and flowering stems arise from the root at ground level. The flowers are yellow. Both species contain oxalates in considerable quantities. Both species have caused poisoning in livestock. Oxalates cause the removal of calcium ions in the serum by precipitation, leading to tetany, and sudden death as a result of extensive renal damage. Over activity of the parathyroid in horses can result from prolonged grazing of oxalate-containing plants. (1, 2)

### PAPAVERACEAE, Poppy family

*Eschscholtzia californica* Champ., Californian poppy, an annual with large orange-yellow to red flowers has been suspected of poisoning livestock, though conclusive evidence that this species was involved is lacking. About 15 isoquinoline alkaloids have been isolated from this plant. (1, 2)

*Papaver nudicaule* L., Iceland poppy, bears its flowers on leafless scapes. The pinnate leaves are all basal. The flowers vary from white to orange to red. Double-flowered kinds are seen. Iceland poppy has been suspected of poisoning sheep. Pollen from the flowers was suspected of being injurious to bees, but a feeding test with adult bees using pollen from this species failed to show any abnormalities. (2)

*Papaver somniferum* L., Opium poppy, is the source of opium. This species has flowers carried on leafy stems. The stem leaves have

a broad, clasping base. Many forms are present ranging from white flowered through to pink, red and purple. The double-flowered forms ("carnation poppy"), sometimes grown as ornamentals, are derived at least in part from *P. somniferum*. The most important alkaloid found in the plant is *morphine*. Other alkaloids present in appreciable quantities are *codeine*, *papaverine*, *thebaine*, *noscapine* and *narcotine*. The unauthorized cultivation or the possession of opium poppies is prohibited in all States. (2, 4)

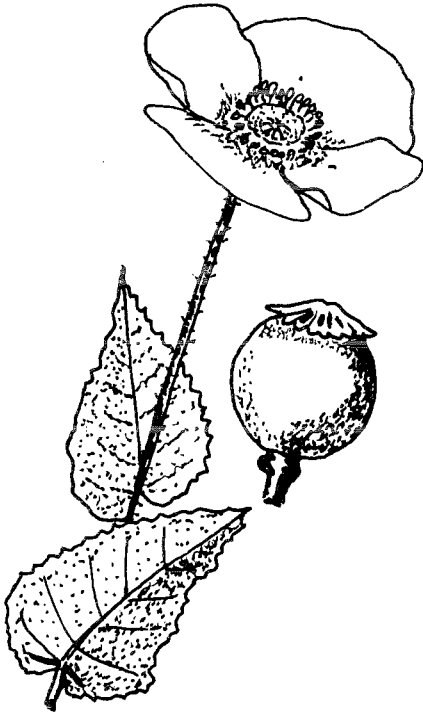


Fig. 41.—Opium poppy (*Papaver somniferum*)

**PASSIFLORACEAE**, Passion flower family

*Passiflora foetida* L., Mossy passion flower or Stinking passion flower, is naturalized in tropical Australia, and may be found climbing up fences in garden situations. The white, pink or yellow flowers bear a purple "corona". The leaves are broadly ovate, slightly angled or lobed and indented at the base. The whole plant is covered with yellowish fine hairs. This species has been reported to contain cyanogenetic glycosides. Deaths in goats and fowls have been ascribed to eating this plant but there is no experimental proof of toxicity. (2)

**PHYTOLACCACEAE**, Pokeweed family

*Phytolacca americana* L., Pokeweed, Inkberry or Pigeonberry, *P. dioica* L., Bella sombra or Packalacca and *P. octandra* L., Inkweed or Red ink plant, are naturalized species. They are characterised by the small flowers in terminal racemes, which later give way to the fleshy berries. These red or purple berries are made up of a number of united pistils. These plants are reputedly toxic to livestock and humans and all parts of the plant are poisonous. The roots of *P. americana* have been used in folk medicine and the consumption of overdoses has resulted in human poisoning. The berries are the most attractive part and seem to be the least toxic, but may have been responsible for human fatality. The seed, rather than the pulp, is thought to be the toxic part. Violent illness followed by trembling was reported in a man following eating of a small portion of the root of *P. dioica*. A decoction of *P. octandra* taken medicinally was reported to have killed an adult. (1, 2, 4)



Fig. 42.—Red ink plant (*Phytolacca octandra*)

**POLYGONACEAE**, Buckwheat family

*Emex australis* Steinb., Doublegee or Spiny emex, is an annual with long-stalked ovate leaves. The flowers are clustered in the axils of the leaves. The hard fruit have three rigid spreading spines. This naturalized plant is

widely distributed in temperate regions of Australia. It contains oxalates and has on a few occasions caused poisoning in livestock. (2, 5)

*Fagopyrum esculentum* Moench, Buckwheat, is grown to limited extent in Australia. Buckwheat is an annual herb to 1 m tall with spear-shaped leaves and with erect or drooping panicles of white flowers. The fruit is pointed at the top. Buckwheat is well known as an allergic reactor in humans, including skin reactions. It has also been reported as producing a contact irritation of the skin. (1)

*Polygonum* spp., Smartweed, are soft herbs with tubular stipules around the stem at the point of attachment of the leaves. The flowers are white or pink. Several have been suspected of causing dermatitis in man. (2)

*Rheum rhaponticum* L., Rhubarb, the well known vegetable, has broad and large, entire or divided leaf blades borne on elongated thickened petioles. The leaf stems or petiole contains malic acid which gives it its pleasant acidity. The leaf blade, on the other hand, can contain dangerous amounts of *oxalic acid* and *oxalates*. Cases of human and livestock poisoning and death through ingestion of the blades have been recorded. Symptoms are staggering, nausea, salivation, violent vomiting, abdominal pain, diarrhoea, and impaired clotting of blood. Cooking with soda increases toxicity through the production of soluble *oxalates*. (1, 2, 3, 4)

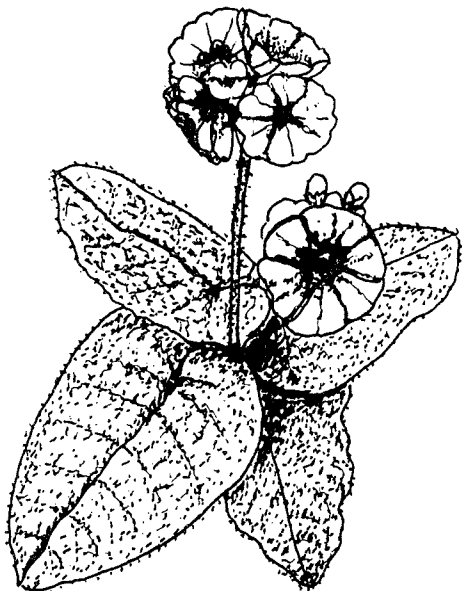


Fig. 43.—Primrose (*Primula obconica*)

#### PRIMULACEAE, Primrose family

*Primula obconica* Hance has circular to ovate leaves, 5 to 10 cm long, and indented at the base. The lilac to pink flowers are borne in umbels at the end of a scape up to 30 cm tall. This plant is well known for producing an allergic contact dermatitis, ascribed to the glandular hairs on various parts of the plant. Other species, *P. auricula* L., *P. sinensis* Sabine and *P. malacoides* Franch, can cause a severe form of dermatitis in some people. The face (around mouth), eyelids, neck, arms and hands are the parts usually affected. Symptoms produced including itching, burning, red colouring often filled with fluid, frequently blistered, distinctive blotching and linear streaks, blistering on sides of fingers after handling leaves, extensive rash, fever, inflammation of nasal passages and conjunctivitis. (3)

#### PROTEACEAE, Banksia family

*Grevillea banksii* R.Br., Red-flowered silky oak, and *G. robusta* A. Cunn., Silky oak, are well known cultivated native plants. Both have divided leaves. The former is a small tree or shrub with red flowers. The latter is a tall tree with orange flowers. Both have given positive reactions for hydrocyanic acid in



Fig. 44.—(*Grevillea pyramidalis*)

flowers and fruit, and are potentially poisonous. (2)

*Grevillea mimosoides* R.Br. and *G. pyramidalis* A. Cunn. ex R.Br. are both northern species. *G. mimosoides* has an undivided leaf while *G. pyramidalis* has a divided leaf. Both have flowers borne in panicles. In *G. mimosoides* the flowers are pink. In *G. pyramidalis* they are white. The gummy exudate on the fruit is reported to cause large watery blisters and "burns" when it comes in contact with the skin. The active principle is 5-(10-pentadecenyl) resorcinol. (2, 5, 21)

*Grevillea pilulifera* (Lindl.) Druce, Woolly-flowered grevillea is a shrub with small leaves and with clusters of small white woolly flowers. This species is native to the southwest of Western Australia where it has been reported to cause an intense rash to two persons who had walked through a patch of the shrub. (2, 5)

*Lambertia formosa* Sm., a shrub with red honeysuckle-like flowers, has been listed among species that have given a positive reaction for hydrocyanic acid. (2)

*Macadamia integrifolia* Maid. et Betche, Macadamia nut or Queensland nut, is cultivated for its edible nuts. A tree to 15 m tall it has a dense foliage of oblong to lanceolate, entire or remotely serrate leaves to 30 cm long, which are borne in whorls of three or four. The creamy-white flowers are borne in racemes. The leathery fruit encloses a single thick-shelled "nut". The young leaves and the outer green covering of the immature nuts have given positive reactions for hydrocyanic acid. Odd trees with bitter nuts which are presumed to be cyanogenetic have been observed. (2)

#### RANUNCULACEAE, Buttercup family

*Aconitum napellus* L., Aconite or Monkshood, is a herbaceous perennial with twice divided leaves, the ultimate divisions being narrow. The mostly blue or violet flowers are in dense spike-like racemes. This species contains the extremely poisonous polycyclic diterpenoid alkaloid *aconitine* in all parts. Although all parts of the plant are extremely poisonous accidental human poisonings are usually attributed to aconite root being mistaken for other edible, fleshy roots such as horse radish. Aconitine produces respiratory paralysis and a direct toxic action on the heart which may terminate in ventricular fibrillation. Death

usually occurs within a few hours. Symptoms included restlessness, salivation, weakness and irregularity of heartbeat, prostration, nausea, vertigo, impairment of speech and vision, anxiety and oppressive pain in the chest. (1, 4)

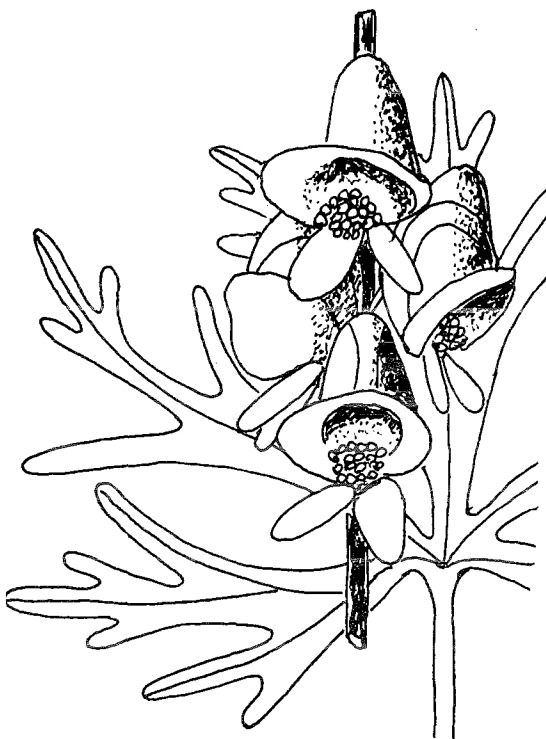


Fig. 45.—Monkshood (*Aconitum napellus*)

*Adonis annua* L., Pheasants eye, an annual species, with deep red flowers and dissected leaves, occurs occasionally as a weed. It has been reported to cause poisoning in livestock. The toxic principles are phenanthrene glycosides, with marked cardiac activity, collectively called *adonidin*. (2, 4)

*Anemone* spp., Anemomy or Wind flower, grown in gardens for their handsome flowers, contain *ranunculin*, which breaks down to yield toxic *protoanemonin*. These plants have been suspected of having caused livestock losses. (4)

*Aquilegia* spp., Aquilegia or Columbine, have regular flowers with the petals produced backward into a spur. These plants have poisonous properties similar to aconite. The infusion of seeds, used medicinally in several countries, is dangerous to children. (12)

*Clematis* spp., Clematis, Traveller's joy or Virgins bower, are cultivated in gardens. These climbers have opposite leaves which are entire or pinnately compound. The plumose achenes in the mature flowers are characteristic of many species. There are four native species in Australia. Clematis has been recorded as a toxic plant although all species are apparently distasteful to livestock. The toxic principle is probably *protoanemonin*. Prolonged contact with the skin of the crushed leaves of *C. glycinoides* and *C. microphylla* can produce irritation and sometimes blistering. (2, 3, 4)

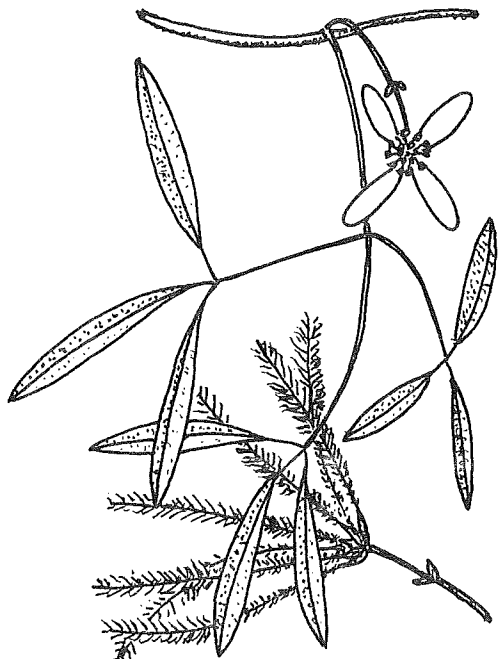


Fig. 45 —Small-leaf clematis (*Clematis microphylla*)

*Delphinium* spp., Larkspur or Delphinium, have irregular flowers with the upper sepal spurred and enclosing the spurs of the two upper petals. Cases of livestock poisoning through ingestion of larkspur have been recorded. The toxic principles are diterpenoid alkaloids, including *delphinine*, which are related to *aconitine* and are very toxic. (2, 4)

*Helleborus niger* L., Christmas rose, a perennial species with white or whitish-pink flowers, contains purgative glycosidic principles which produce gastric distress and other effects in animals and human beings. Secondary nervous effects also may be observed. (4, 12)

*Ranunculus* spp., Buttercup, are widely distributed. Thirty six species have been recorded from Australia including four naturalized aliens. The flowers are solitary or sometimes in groups. They are mostly yellow and with five sepals and petals. The toxic principle is the irritant *protoanemonin*. Livestock poisoning is rare. The early symptoms are colic, salivation and inflammation of the lining membranes of the mouth which may be so severe as even to cause blisters. In the later stages there is dark, almost black diarrhoea and blood-stained urine, gait becomes unsteady, impaired vision or blindness with death usually occurring in a convulsion or fit (4, 12)

**ROSACEAE**, Rose family, a large group of plants, with very many species cultivated for food or for ornament.

*Agrimonia eupatoria* L., Agrimony, is listed as a plant which causes percutaneous photosensitization. (1)

*Cotoneaster* spp., Cotoneaster, commonly grown in gardens for its white or pink clusters of flowers and the clusters of small red or blackish ornamental fruit, has been reported to make a child violently ill. *C. franchetti* Bois., *C. glaucophylla* Wall. and *C. horizontalis* Decne. have been reported to contain cyanogenetic glycosides or to yield hydrocyanic acid. (1, 5)

*Crataegus* spp., Hawthorn, is commonly grown in gardens as an ornament or a hedge. The white to red flowers are borne in clusters. These are followed by clusters of yellow, red or blackish fruit. Several species are known to yield hydrocyanic acid, but no case of poisoning has been recorded. (2)

*Cydonia oblonga* Mill., Quince, a small tree, with broad ovate to oblong leaves to 10 cm long and white to light pink flowers, is grown for its edible fruit, which are pear-shaped, fuzzy and up to 10 cm in diameter. The fresh leaves and seeds are cyanogenetic, but no case of poisoning has been recorded. (1, 2)

*Eriobotrya japonica* Lindl., Loquat, a small tree with rusty-hairy branchlets and large obovate leaves to 25 cm long has white flowers borne in terminal panicles. It is grown for its edible fruit which are up to 4 cm long, yellow, with two large seeds. Seeds of loquat yield hydrocyanic acid, but no case of poisoning has been recorded. (1, 2)

*Malus sylvestris* L., Apple, the familiar deciduous tree, with oval leaves which are bluntly serrate, yields the familiar fruit, which are various in shape and colour and which are edible. The fresh leaves and seeds are cyanogenetic. Ingestion of a cupful of seed by a man who found them a delicacy resulted in death through cyanide poisoning. (2, 4)

*Prunus armeniaca* L., Apricot, is a small tree with ovate, serrate leaves. The flowers are pinkish or white. The edible fruit has a yellow flesh and is mostly free from the flat ridge stone. Cyanogenetic glycosides are present in the kernel. A woman who ate 20 kernels showed symptoms of poisoning but recovered with emptying of the stomach. Two boys became seriously ill with symptoms of hydrocyanic acid poisoning after eating an unspecified number of kernels. One died as a result. (1, 2, 4)

*Prunus cerasus* L., Cherry, is a small tree with ovate, doubly-serrate leaves. The flowers are white. The red soft fleshed fruit encloses the globular stone. The seeds yield hydrocyanic acid to an extent which has led to suicide attempts with it. (2)

*Prunus domestica* L., Plum, is a small tree with ovate, serrate leaves. The flowers are white or cream coloured. The fruit are variable in texture, size and colour. The seeds yield hydrocyanic acid to an extent which has led to suicide attempts with it. (2)

*Prunus dulcis* (Mill.) D. A. Webb (Syn. *P. amygdalus*), Almond, is a tree with oblong-lanceolate leaves to 10 cm long, closely serrate on the margins. Flowers are showy and pink. The fruit has a hard flesh and contains a shallow pitted stone which may be hard or soft-shelled and which contains the kernel. The almonds may be divided into sweet and bitter varieties. The former are suitable for human consumption. The bitter varieties, grown for a fixed oil, almond oil, which is expressed from the kernel, may contain sufficient quantities of cyanogenetic glycosides to be poisonous. Lethal doses for the kernels of bitter almonds range from 40 to 60 kernels for a man and from seven to 10 kernels for a three year old child. It has been reported that a child died in three hours with convulsions and coma after eating 12 bitter almonds fresh from the tree. (1, 2, 4)

*Prunus laurocerasus* L., Cherry laurel, is an evergreen bush. The oblong to narrow leaves are up to 15 cm long. The flowers are in

racemes. The fruit are conic and pointed, not fleshy, and black-purple. This species has been reported to cause hydrocyanic poisoning of livestock. A handful of bruised leaves may liberate sufficient hydrogen cyanide to cause toxic symptoms by inhalation. Eggs produced by hens that ate the tips of young leaves were said to be inedible. (2, 4)



Fig. 47.—Cherry laurel (*Prunus laurocerasus*)

*Prunus persica* (L.) Batsch., Peach, is a small tree with oblong, lanceolate, serrate leaves. The flowers are showy and pink. The fruit are variable in size and shape, with an edible flesh and a hard, pitted stone. The kernel, flower, leaf and bark are reported to yield hydrocyanic acid. Livestock losses have been reported. The flower has caused fatal cases of poisoning in children following its use as a purgative and anthelmintic. (1, 2, 4)

*Pyrus communis* L., Pear, is a large tree with thorn-like leafy spurs. The leaves are oval, to 10 cm long, and finely serrate. The flowers are white or tinged pink. The fruit are variable, mostly pear-shaped. The seeds contain cyanogenetic glycosides. (1)

#### RUTACEAE, Rue family

*Citrus aurantifolia*, Swingle, Lime, is a small tree with stiff sharp spines and oblong leaves to 15 cm long. The flowers, borne in the leaf



axils, are white. The fruit are up to 6 cm in diameter. Lime oil produces a photodynamic action if applied to the skin which is subsequently subjected to solar irradiation. (1)

*Phebalium anceps* DC., Blister bush, is a shrub with leaves to 8 cm long and with flowers both terminal and axillary. Blister bush is native to Western Australia, and is sometimes present in areas accessible to large numbers of people. Contact with the plant causes percutaneous photosensitization, with blistering following on contact erythema. The furano-coumarins, *psoralen*, *bergapten*, *xanthotoxin* and *seselin* have been identified from this plant. (3, 14)

*Ruta graveolens* L., Rue, a strong-scented herb, with pinnate leaves and yellow flowers, causes percutaneous photosensitization through the furano-coumarins *bergapten* and *xanthotoxin*. (1)



Fig. 48.—Blister Bush (*Phebalium anceps*)

#### SAXIFRAGACEAE, Saxifrage family

*Hydrangea macrophylla* Ser., Hydrangea, is a shrub with opposite, ovate, coarsely toothed leaves up to 15 cm long. The pink, blue or rarely white flowers are borne in large terminal clusters. This commonly cultivated ornamental has been reported in cases of livestock poisoning. The toxic principle was thought to be hydrocyanic acid but symptoms

and lesions are not consistent with cyanide poisoning. Hydrangea buds added to a tossed salad caused poisoning in a family with symptoms of gastro-enteritis and nausea. (2, 4)

#### SCROPHULARIACEAE, Figwort family

*Digitalis purpurea* L., Foxglove, is a coarse-leaved annual, biennial or short-lived perennial plant with numerous pendant, purplish-pink tubular flowers, conspicuously spotted inside, borne in long, terminal racemes. The plant contains about 12 cardiac glycosides, the most important of which is *digitoxin*. The aglycone of digitoxin is digitoxigenin, a derivative of cyclopentenophrenanthrene. Extracts of *digitalis* are widely used in medicine to strengthen the force of contraction and, through stimulation of the nerve to the heart, slow it, prolonging the duration of the period of relaxation of the heart. Cases of poisoning in animals have been recorded. Poisoning in humans usually result from an overdose of the drug, which tends to accumulate in the body when taken regularly. Symptoms include nausea, diarrhoea and abdominal pain, various mental irregularities and drowsiness, gross disturbances in heartbeat and pulse, greenish-yellow vision and flickering sensations, tingling in the extremities, facial neuralgia, tremors or even convulsions with death by ventricular fibrillation. (1, 2, 3, 4)



Fig. 49.—Foxglove (*Digitalis purpurea*)

*SIMARUBACEAE*, Quassia family

*Ailanthus altissima* Swingle, Tree-of-heaven, a fast-growing ornamental tree, with odd-pinnate leaves up to 1 m long, each leaflet being up to 15 cm long. The greenish flowers are borne in panicles. The fruit is dry and winged. This species is regarded as a noxious weed in some localities because of its habit of suckering when the roots are disturbed or severed. It has been suspected of poisoning stock. Contamination of drinking water by the fallen blossom, which has a disagreeable odour, is said to result in dermatitis and chronic gastritis. The flower, leaf or bark has caused dermatitis which may well have been allergic. Chewing the leaf or the bark results in a condition characterized by weakness, nausea, cold sweat and vertigo. (1)

*SOLANACEAE*, Potato family, is a large group of plants which includes many ornamental, food and drug plants.

*Anthocercis littorea* Labill., Yellow-tail flower, is native to Western Australia and is sometimes found in areas accessible to large numbers of people. A shrub to 3 m tall, it has yellow flowers, striped purple in the tube, borne in loose, leafy racemes. The long narrow lobes of the corolla give it its distinctive appearance in its native habitat. This species,



Fig. 50.—Yellow-tail flower (*Anthocercis littorea*)

and others in the same genus, contain tropane alkaloids which are known to cause dilation of the pupils. Yellow tail flower has been reported to have caused poisoning in children in Western Australia. (10, 15)

*Atropa belladonna* L., Belladonna or Deadly nightshade, is a shrub to about 1.5 m tall, with oval pointed leaves and nodding, bell-shaped, purplish-blue or dull red flowers arising solitary from the forks of leaves or branches. The berries are purple or black, 1 to 1.5 cm in diameter, nestling in the centre of the five-pointed calyx. *Atropine*, a tropane alkaloid, is present in all parts of the plant as the isomeric *l-hyoscyamine*. Cases of belladonna poisoning in livestock are rare. The ripe berries are tempting to children. One berry is known to have caused severe illness, while three have proved to be fatal to a child. Symptoms include nausea, dilation of pupils, muscular weakness, increase in heart rate but weakening of pulse, hallucinations, inco-ordination, delirium and coma. Death is due to asphyxia and heart failure. (2, 3, 4)

*Capsicum annum* L., Chilli, Cayenne, etc., sometimes referred to as *C. frutescens* L., is a shrub of many forms. Several varieties are cultivated. The leaves are generally ovate to



Fig. 51.—Deadly nightshade (*Atropa belladonna*)

lanceolate and entire. The flowers are white or greenish white. The fruit is a pod-like berry which varies in size, shape and colour. The fruit is used for its pungency as a condiment and pot-herb. The plant is sometimes grown as an ornament. The fruit, even when dried has an irritant effect on the skin leading to reddening and blistering. Care should be taken to avoid contact with the eye membrane. When ingested in excess the fruit has an irritant action which may lead to enteritis and consequent diarrhoea. (1)

*Cestrum* spp., Jessamine or Cestrum, are grown as garden subjects. They are shrubs with simple, entire leaves and with tubular flowers in axillary or terminal clusters. The flowers of *C. parqui* are greenish-white to greenish-yellow. *C. nocturnum* has greenish-white to cream flowers while *C. diurnum* has white flowers. Some have been reported in cases of poisoning in livestock. *C. nocturnum* L. and *C. diurnum* L. have been recorded in cases of poisoning in human beings. Symptoms are nervous in character and resemble those produced by atropine. (1, 2, 4)

*Datura arborea* L., *D. candida* (Pers.) Stafford and *D. cornigera* Hook., which are garden subjects have large, white pendulous trumpet-like flowers. They are commonly called Angel's trumpet. *D. ferox* L., *D. innoxia* Mill., *D. stramonium* L., *D. tatula* L. and *D. wrightii* Regel, the Thornapples, are naturalized species, while *D. leichhardtii* F. Muell. is a native species. All have a prickly or spiny capsule, usually dry and bursting open when dry. Several tropane alkaloids have been reported from plants in this genus, mainly *scopolamine* (*hyoscine*), *hyoscyamine*, *nor-hyoscyamine*, *meteloidine* and *atropine*. Poisoning in livestock is rare. The showy flowers and spiny capsules are an attraction to children. Sucking of nectar from the base of the flower or eating the seeds from the capsule have resulted in fatal and near fatal cases of poisoning. Cases of poisoning through people eating flour made of grain contaminated with *Datura* seed have been recorded. The sap in contact with the eye causes dilation of the pupils. Symptoms of poisoning with *Datura* vary with the amounts of different alkaloids present in particular samples and with individual idiosyncrasies. Generally there is initially an intense thirst and dilation of the pupils followed by flushing of the skin and extreme irritability. Later, there is delirium, incoherence and a tendency to pick at imaginary objects. The delirium changes dramatically to a low-mut-

tering-type of exhaustion, coma and finally death. With sub-lethal doses, or where treatment has been successfully applied, the pupils may remain dilated for as long as two weeks even though acute symptoms may have subsided within 12 to 48 hours. *Datura* has been known as a poisonous plant since ancient times. (1, 2, 3, 4)

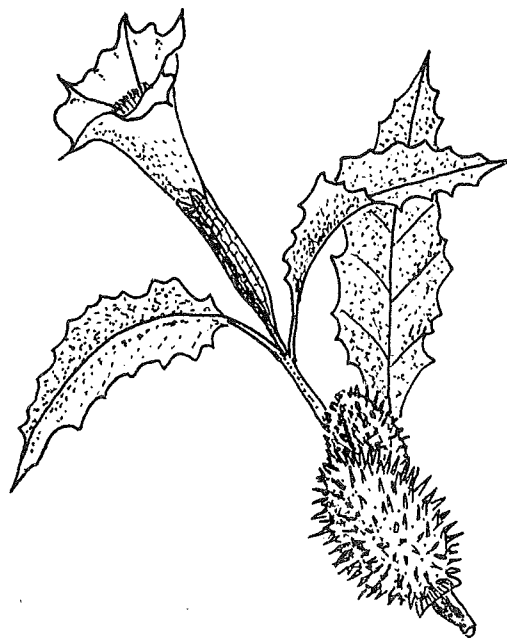


Fig. 52.—Thornapple (*Datura stramonium*)

*Duboisia hopwoodii* F. Muell., Pituri, a native shrub found in arid regions of Australia has narrow alternate leaves to 12 cm long, bell-shaped white, purple-striped flowers in panicles, and a small black berry. Pituri contains *nicotine* and *nor-nicotine*. This plant was used by Aborigines as a narcotic. Chewing was the most common method of use. The leaves are toxic to livestock. (2, 10)

*Duboisia leichhardtii* F. Muell and *D. myoporooides* F. Muell., both commonly called Corkwood, are found in north-eastern Australia. These are shrubs or small trees with pale green smooth leaves. The flowers are in open bunches. The petals are white and form a tube at the base. The berries are juicy, black, each with a few small, granular, kidney-shaped seeds. Tropane alkaloids, chiefly *nor-hyoscyamine*, *hyoscyamine*, *scopolamine* and *atropine*, are contained in these plants. Cases of poisoning have been reported in livestock and humans. (2)

*Hyoscyamus niger* L., Henbane, a hairy annual or biennial plant with coarsely toothed leaves, has greenish-yellow flowers, purple-veined, produced singly in the leaf angles. The fruiting capsule, with circumscissile opening, is enclosed in the enlarged persistent calyx. Henbane is recorded as a naturalized species in South Australia and Victoria. It has been known as a poisonous plant since ancient times. Henbane contains tropane alkaloids, particularly *hyoscyamine*, but also *scopolamine* (*hyoscine*) and *atropine*. All parts of the plant are very poisonous with effects similar to belladonna. Children have eaten seeds with fatal results. The large thick root, mistaken for parsnip or chicory, has been eaten with serious results. (2, 3, 4, 12)

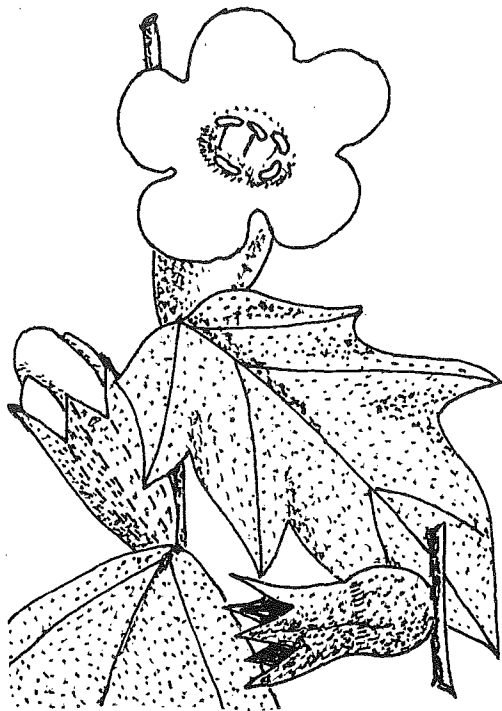


Fig. 53.—Henbane (*Hyoscyamus niger*)

*Lycium ferocissimum* Miers, African boxthorn, a shrub armed with thorns arising from the centre of clustered leaves, has a tubular white flower and orange-red berries. This species is sometimes seen as a hedge plant. The fruit, although considered edible, have been suspected on more than one occasion of producing narcotic symptoms in humans. (1, 2)

*Lycopersicon lycopersicum* (L.) Karsten, Tomato, commonly grown for its edible fruit, is a hairy, aromatic herb with odd-pinnate

leaves. The flowers are yellow, the fruit red or yellow. The tomato has been reported to cause poisoning in livestock and in a pet kangaroo. Steroid alkaloids of the *solanine* type are present. Symptoms and lesions are those of solanine poisoning. (2, 4, 5)

*Nicandra physaloides* (L.) Gaertn., Apple-of-Peru or Wild gooseberry, is an annual herb to 1 m or more tall. The leaves are oblong, to 15 cm long, and wavy in the margin. The flowers are blue. The berry is enclosed in the enlarged green calyx. This naturalized species has been reported to cause poisoning in sheep. (2)

*Nicotiana glauca* R. Grah., Tree tobacco, and *N. tabacum* L., Tobacco, are introduced species. *N. glauca* is a perennial with a smooth leaf, *N. tabacum* an annual herb with a sticky leaf. The flowers in both species are long and tubular. There are 19 native species of *Nicotiana* in Australia. Fatal poisoning from snuffing or from chewing tobacco has been reported, as have deaths from accidental inclusion of tobacco and tree tobacco in food. Tree tobacco contains *anabasine* and small quantities of *nicotine* and/or *nor-nicotine*. Tobacco is a well known source of *nicotine* alkaloids. Acute nicotine poisoning in man is characterized by nausea, vomiting, sweating, vertigo, headache, difficulty in breathing, stupor, convulsions, first slowing and later quickening of the pulse, subnormal temperature and death from respiratory paralysis. Anabasine poisoning is similar to that of nicotine, but is less potent. (1, 2, 4)

*Physalis peruviana* L., Cape gooseberry, is a hairy annual to nearly 1 m tall. The leaves are broad and indented at the base. The flowers are yellow, blotched purple inside. The yellow berry is enclosed in the bladder-like calyx. This species, grown for its edible fruit, has been suspected of poisoning stock. The stem and leaf have been suspected of causing degeneration of the lining of the bowels and death of cattle. The leaves and unripe fruit are poisonous to humans. (1, 2, 22)

*Solandra* spp., Chalice vine or Golden chalice, are climbing shrubs which are cultivated for their large, showy, cup-shaped or bell-shaped yellow or white flowers which open mainly at night. Alkaloids of the *solanine* type are contained in the plant and may produce poisoning in human beings if ingested. Poisoning is similar to that in *Solanum* and has resulted from children eating the leaves and flowers. It has been recorded that injuries had occurred

to people who had handled these plants, mainly where sap had been accidentally introduced into the eyes. (2, 4, 22)

*Solanum aviculare* Forst.f. and other members of the *S. aviculare* group, Kangaroo apples, are native to Australia. They are usually robust perennials devoid of prickles with lanceolate leaves which may be cut or lobed. The fruit vary from globular to ellipsoidal. The poisonous principle, *solasonine*, a glyco-alkaloid of the solanine group, has been reported from *S. aviculare* and *S. laciniatum*. This alkaloid is the source material for the synthetic production of cortisone and other steroid hormones. Kangaroo apples have been suspected of killing livestock. Symptoms shown were gastro-enteritis and unsteadiness of gait. (2, 5)

*Solanum capsicoides* All., Devil's apple, sometimes found near buildings in warmer areas of eastern Australia, has been suspected of poisoning a calf. (1, 2)

*Solanum dulcamara* L., Bittersweet or Woody nightshade, a climber or trailer, with small egg-shaped or globular red berries, contains large quantities of *solanine* and its allied alkaloids in all parts of the plant. Children may be attracted to the berries, and cases of poisoning by them are known. (2, 4, 12)

*Solanum jasminoides* Paxt., Potato vine, a climber with white flowers and with both simple leaves and pinnate leaves, is reported to be poisonous to the fowl. (1, 2)

*Solanum mammosum* L., Nipple plant or Udder plant, is a spiny hairy, annual species with blue flowers and lobed fruit. This species is thought to contain *solanine*-type alkaloids. (2)

*Solanum mauritianum* Scop., Wild tobacco tree, is a hairy species, devoid of spines, with entire leaves more than 10 cm long. At the base of the petioles are stipule-like leaflets. The flowers are purplish. This species is naturalized in the warmer parts of eastern Australia, where it is widespread and abundant. The fruit is said to be poisonous and fatal poisonings in human beings have been ascribed to it. (2)

*Solanum melongena* L., Egg plant, cultivated for its fruit, is a stout herb or subshrub, grey hairy and with a few spines. The oblong or oval leaves are up to 40 cm long, thick and heavy. The flowers are violet. The fruit, up to 30 cm long, is shining, purple, white or yellowish. Egg plant contains *solanine* type alkaloids. (1, 2)

*Solanum nigrum* L., Black nightshade, and other members of the *S. nigrum* group are common weeds. These are annual herbs with leaves entire or shallowly lobed, and with small black fruit, shiny or dull. Glycoalkaloids, including *solanine*, *solasonine* and *solmarginine*, have been reported from different plants in the group. Most cases of suspected poisoning have been due to ingestion of leaves or green fruit. The ripe fruit of most species are not toxic. *S. melanocerasum* All., Huckleberry, is cultivated for its fruit. The variation in the poison content of individual plants and differences in conditions of growth make it very necessary to warn children against eating the plant and berries. Acute illness and death in children have occurred following ingestion of green berries. Symptoms recorded were headache, colic, nausea, diarrhoea, bluish discoloration of the skin, accelerated pulse, spasms, depression, dilation of pupils and disturbed speech and vision. In severe cases death is preceded by coma. (1, 2, 3, 4, 10, 12)



Fig. 54.—Black nightshade (*Solanum nigrum*)

*Solanum pseudocapsicum* L., Jerusalem cherry or Madeira winter cherry, is a shrub to about 60 cm tall, with narrow-oblong entire leaves and small bright orange-red ripe berries. All parts of the plant yield *solanine* and *solanidine*. The berries, which are attractive to children,

is said to have caused fatal poisoning in children. The symptoms included nausea, somnolence, marked abdominal pain and dilation of the pupil. (1, 2, 4)

*Solanum sodomaeum* L., Apple-of-Sodom, is a woody shrub with spines or prickles. The leaves are deeply lobed or pinnately divided. The fruit are large and yellow. This naturalized weed, often found near human habitation, contains *solanine*. The fruit have been reported to cause serious illness and death in children. Symptoms include sweating, headache, dizziness, impairment of speech and vision, nausea, colic, diarrhoea, vomiting, dilation of pupils, hallucination and cramps. (1, 2, 3)

*Solanum tuberosum* L., Potato, is a herbaceous plant with odd-pinnate leaves, grown for its edible tubers. The yellowish or green fruit are about 2 cm in diameter. The potato contains the glycoalkaloid *solanine* in its green parts. The sprouts and the greened skin of the tuber are especially rich in this alkaloid. The green tuber is the commonest cause of poisoning in humans. The green fruit has caused fatalities. Symptoms are those of acute *solanine* poisoning. (1, 2, 3, 4)

*Solanum wendlandii* Hook.f., a commonly grown garden subject, is a shrubby climber with pinnatifid leaves to 25 cm long, and simple upper leaves. The lilac-blue flowers are in large clusters. This species probably contains *solanine*-type alkaloids. (2)



Fig. 55.—Yew (*Taxus baccata*)

#### TAXACEAE, Yew family

*Taxus baccata* L., Yew, a slow growing tree or shrub, evergreen, with stiff, linear leaves to 2.5 cm long, is regarded as highly poisonous. All parts contained the alkaloid, *taxine*, which is the poisonous principle. The fruit is composed of a single stony seed mostly surrounded by the aril, which takes the form of a brilliant red, fleshy, translucent cup. The aril in particular is attractive to children and although it is sweet and not very poisonous, the seed it contains is deadly. The leaves, ingested by chewing or taken as a decoction, have caused fatal poisoning. Symptoms of poisoning include vomiting, diarrhoea, abdominal pains, languor and coldness, irregularity of heart, coma with laboured respiration, tremors and convulsions preceding death. (1, 3, 4, 12)

#### THYMELAEACEAE, Daphne family

*Daphne* spp., Daphne, are garden subjects grown for their fragrant flowers. The white, pink or reddish flowers are borne in compact clusters. The fruit are succulent and red or bluish-black with a large solitary seed. Livestock losses have been recorded. Cases of poisoning in adults and children have been reported. The succulent berries present the greatest danger to children since only a few



Fig. 56.—Daphne (*Daphne mezereum*)

berries are needed to kill a child. Symptoms include a burning sensation in the mouth and stomach with swelling of the tongue and lips and corrosive lesions of the oral membrane, vomiting and diarrhoea, usually with blood and mucous, weak rapid pulse, stupor, weakness and convulsions. The plant is extremely acrid and produces blistering when rubbed on the skin. (2, 4, 12)

*Pimelea flava* R.Br., Yellow rice-flower, is a low shrub with almost overlapping decussate leaves. The yellow or yellowish-green flowers are enclosed by four bracts which are longer than the leaves. This native species has a wide distribution in eastern Australia. It has been reported to cause poisoning in two boys with symptoms of gastro-enteritis, after eating leaves of this plant. (2)

*Wikstroemia indica* C.A. Mey, Tie-bush, is a tall woody shrub with greenish-yellow flowers. This plant is widely distributed from southern Asia to the islands in the Pacific Ocean, and is found in northern Australia. A fatal poisoning in a child through eating the fruit has been reported. (2)

#### URTICACEAE, Nettle family

*Dendrocnide moroides* (Wedd.) Chew, Gympie, *D. cordata* (Warb. ex Winkl.) Chew, Stinger or Gympie, *D. excelsa* (Wedd.) Chew, Giant stinging tree, and *D. photinophylla* (Kunth.) Chew, Shining-leaved or Mulberry-leaved stinging tree, are tropical or sub-tropical trees or shrubs found in eastern Australia. These were previously placed in the genus *Laportea*. The large heart-shaped or oval leaves and the stems are beset with rigid stinging hairs. Contact with the hairs produces severe urtication which may be felt for days or occasionally weeks afterwards. At first a slight itch, followed immediately by a severe pricking effect, quickly becomes an intense pain. The pain has a background of tingling superimposed by an intermittent stabbing pain. The tingling sensation is increased by touching, rubbing or cold. Referred pain in the thorax, chin, forehead and the opposite limb may also be experienced within five minutes of being stung on one arm. Simultaneous with the pain, the nettled area quickly becomes covered with small red spots which join together to form a red, swollen area surrounded by a flare zone. Piloerection and sweating may occur on the affected area. Two pain-producing agents of high molecular weight

been isolated from the leaf. The plant hairs contain principles with *acetylcholine*-like activity, *histamine*-like activity and *5-hydroxytryptamine*-like activity but the characteristic reactions to the stings are not due to *Ach*, *histamine* or *HT* themselves. (2, 3)

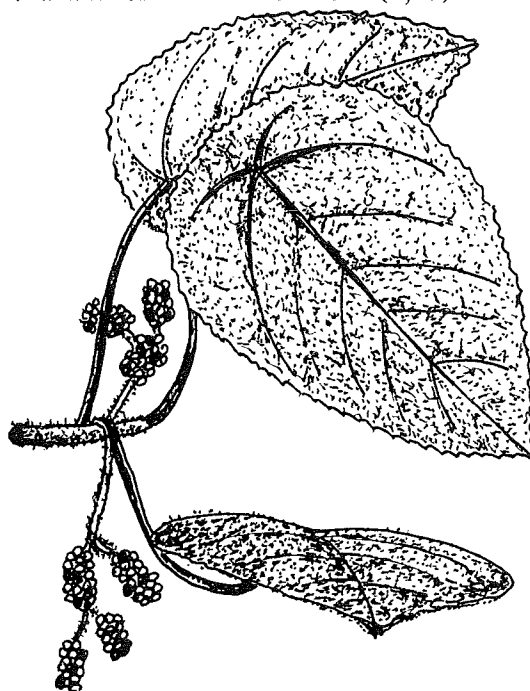


Fig. 57.—Gympie (*Dendrocnide moroides*)

*Urtica* spp., Stinging nettles, are herbs with opposite, toothed leaves and with rigid, stinging hairs. They mainly occur in cooler regions. Contact with the stinging hairs produce reddening accompanied by marked itching and followed rapidly by swelling and an intense burning sensation. *Acetylcholine*, *histamine* and *5-hydroxytryptamine* have been isolated from extracts of nettle leaf. (1, 2)

#### VERBENACEAE, Vervain family

*Duranta repens* L., Duranta, Golden dewdrop or Pigeon berry, is cultivated in gardens as a hedge plant or ornamental. A shrub to 4 m tall, it has opposite leaves and large bunches of blue flowers which are followed by small, persistent, golden-yellow, succulent berries. The berries are reputed to have caused illness and death in children. Symptoms included a high temperature, sleepiness, dilated pupils, rapid pulse, swelling of the lips and eyelids and convulsions. (1, 2, 4)

*Lantana camara* L., Lantana, which includes a variety of forms some of which may be different varieties or species, and *L. montevidensis* (Spreng.) Briq., Creeping lantana, have both been involved in livestock poisoning. These plants have opposite toothed leaves, that are aromatic when crushed, and flowers in terminal or axillary clusters. The green fruit of lantana has frequently caused illness in children and one fatal case is on record. Symptoms of poisoning, which are not fully documented, include muscular weakness and circulatory collapse. Less severe cases displayed mainly signs of gastro-intestinal irritation. (1, 2, 4)

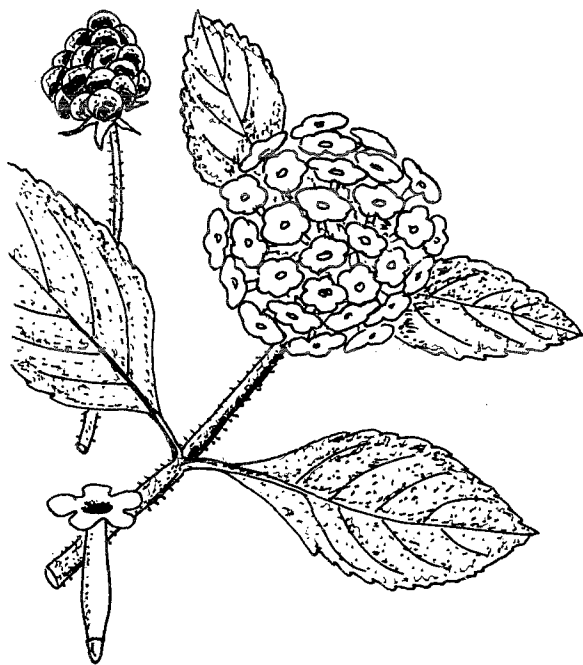


Fig. 58.—*Lantana* (*Lantana camara*)

#### VIOLACEAE, Violet family

*Viola odorata* L., Sweet violet, is a stemless perennial herb with heart-shaped or kidney-shaped leaves and deep violet, rarely rose or white, fragrant flowers. Large doses of the leaf, seed and root are emetic and purgative and the seed is said to be poisonous. (1)

*Viola tricolor* L., Pansy, is an annual or short-lived perennial with long branched stems. The flowers usually have three colours, mostly blue, white and yellow. It is an expectorant, emetic and purgative. (1)

#### VITACEAE, Grape family

*Parthenocissus quinquefolia* Planch., Virginia creeper, is a vine with leaves palmately divided into 5 leaflets. It has small blue berries borne in clusters. It is highly suspected of causing poisoning and death of children from eating berries. Details are not given. (22)

#### FUNGI

The fungi have been included in this article because although not strictly chlorophyll-containing plants, they are more often than not placed in the Plant Kingdom.

*MUSHROOM* and *TOADSTOOL* are general terms given to the larger fruiting bodies of certain fungi. The most common of our "wild" edible mushrooms are *Psalliota campestris*, Field mushroom, which has a white cap and pink gills becoming dark brown to black when mature, and *P. arvensis*, Horse mushroom, which is larger and coarser, with the gills white or greyish, not pink, when young.

Mushroom or toadstool poisonings usually result from eating the wrong type. It is essential therefore that the correct species or variety be collected for eating and that any damaged or unfamiliar mushroom be discarded. For identification purposes it is essential to collect the whole fruiting body, not just the cap and the top part of stem as is often done. The more important diagnostic features of a mushroom or toadstool may be at the very base of the stem and without this part it is difficult to be certain of the identity of the mushroom.

*Amanita muscaria* (L. ex Fr.) Pers. ex Gray, Fly agaric, is characterised by its bright scarlet or orange-yellow cap which is 10 to 20 cm across and covered with thick white or yellowish wart-like spots. The swollen base of the stem has a ridge of rough tissue but does not form a distinct cup. The spores are white. This is a naturalised species found with introduced trees such as birch, oak, pines and spruce. Symptoms of poisoning, which is rarely fatal, appear within three hours of ingestion. There is hallucination and excitement accompanied by salivation, tears, sweating, nausea, difficulty in breathing vomiting, gastro-intestinal discomfort, diarrhoea and lack of response to light in the pupils of the eyes. In very rare cases, there is delirium, followed by convulsions, coma and death. The toxic principles include *bufotenine* and *muscarine*. (1, 2, 3, 4)



*Amanita phalloides* (Bull.) Fr., Death cap or Angel-of-death, has a greenish cap up to 12 cm across and a white stem, tinged green, which dries to a brown skin. The stem is bulbous below ground level and has a distinct cup-like volva. This species is native to Europe and in this country has been recorded only from Canberra. This species has caused death in man. Symptoms appear some six to 15 hours or up to 40 hours after ingestion. There is sudden severe abdominal pain, nausea, vomiting and diarrhoea, with blood-stained vomitus and faeces, excessive thirst and retention of urine. There is rapid progressive loss of strength, followed by prostration and restlessness. Symptoms may continue with yellowish and bluish discoloration and coldness of the skin. In most cases there is a period of coma, preceded by convulsions, prior to death. The toxic principles are sulphur-containing cyclopeptides which are liver toxins. (2, 3, 4)

*Amanita verna*, similar to *A. phalloides*, but with the cap always white, is reported to produce symptoms in man similar to those produced by *A. phalloides*. (2)

*Amanita preissii* Fries has been responsible for cases of human poisoning in Perth, Western Australia. Symptoms which began half an hour after ingestion included salivation, nausea, colic, collapse, profuse sweating, cold clammy

skin and very slow pulse. The toxic principle is said to be *muscarine*. *A. preissii* has an ivory-like cap, to 8 cm across, sometimes dotted with irregular flat warts. The gills are white or creamy. The stem has a bulbous base tapering downwards, with remnants of the cup or volva forming a distinct upper edge to the bulbous portion. (2, 16)

*Entoloma* spp., with pink spores and somewhat wavy gills, are found in Australia. At least one species in Europe is reported to have caused violent sickness and diarrhoea and occasional death. (2)

*Gyromitra esulenta* Fr., False morel or Lorchel, has been recorded as rare in eastern Victoria. It consists of a brownish or orange irregularly convoluted spore-bearing mass 4 to 9 cm across borne on a thick, somewhat fluted stem. Occasional cases of poisoning have been reported from Europe and North America. The raw fungus is frequently poisonous and sometimes fatal. Vomiting, diarrhoea and weakness symptoms appear after six to eight hours of eating. (2)

*Inocybe* spp., are usually small mushrooms with the surface of the cap covered with radiating small fibres or with scales. The spores are dull brown. The presence of *muscarine* has been noted in some species. (2)

*Lepiota* spp., Parasol mushrooms, are normally white spored. *L. dolichaula* is often eaten without ill effect but on one occasion caused giddiness and a slight gastro-intestinal upset. *L. molybdites*, which is unusual in having spores which become green when first ripe, turning dull green to brownish-black with age, is also eaten without harm by some individuals. It has however caused fatal poisoning in man in North America. One individual in Queensland suffered severe gastro-intestinal upset when he ate a raw specimen but suffered no ill effect when he ate a cooked specimen several days later. (2)

*Pleurotus lampas* Berk., Lantern mushroom, is a phosphorescent species. The cap turns dark when mature. This species is found at the base of trees such as *Banksia*. It has been reported to have caused illness in people who had eaten it, but no details are available. (5)

*Psalliota arvensis* var. *iodoformis* Clel. et Cheel, Iodoform mushroom, is similar to the horse mushroom but is taller and more slender. During cooking it has a particularly strong

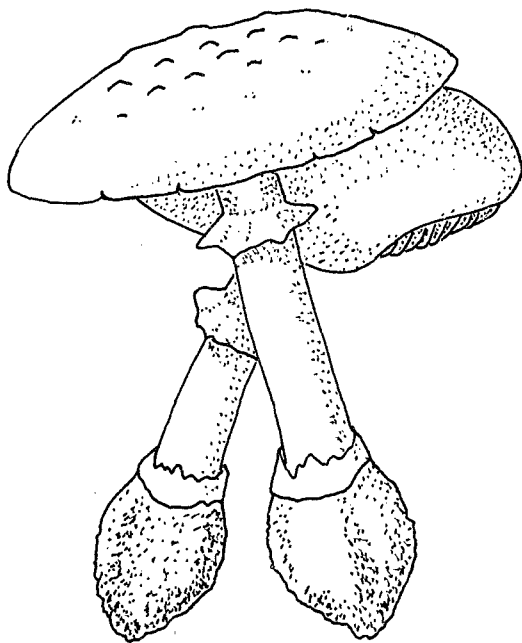


Fig. 59.—*Amanita preissii*

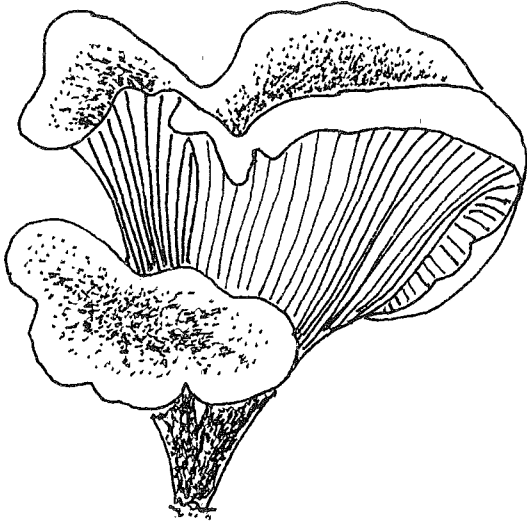


Fig. 60.—Lantern mushroom (*Pleurotus lampas*)

iodoform smell. This odour makes it nauseating to most people. Some people have become ill through eating this mushroom. (17)

*Psalliota xantherma* Genev., Yellow-staining mushroom, resembles the horse mushroom, but turns bright yellow when bruised, particularly the lower part of the stalk. It is poisonous to some individuals. A variety of it produces gastro-intestinal upsets with diarrhoea. This mushroom is commonly seen in gardens in Perth, Western Australia. (1, 5, 17)

*Psilocybe cubensis* (Earle) Singer, Mad mushroom, Hysteria toadstool or Golden-top, resembles the field mushroom (*Psalliota campestris*), but generally grows in clumps on cow dung. The gills are white or pale grey never pink as in the field mushroom when young, and very dark with a purplish tinge when mature. This species has also been confused with *Panaeolus ovatus*. The latter species grows on horse dung and does not have a ring on the stalk or purplish gills. *Psilocybin*, an indole alkaloid, is the toxic principle in *P. cubensis*. Symptoms of poisoning are drowsiness followed by dizziness, then uncontrolled hilarity, difficulty in standing and walking, making of incoherent and foolish remarks at which victim laughed immoderately. Vomiting occurred in some cases. Candidate species for hallucinogenic studies may be found in this genus and in other genera such as *Stropharia*, *Panaeolus*, *Hypholoma*, *Bolbitus* and *Agrocybe*. (2)

*Russula emetica*, Sickener, found in Victoria, is in England regarded as poisonous when eaten raw. (2)

*Volvariella gloiocephala* and *V. speciosa*, sometimes included in the genus *Volvaria*, are similar to *Amanita*, except that there is no collar or ring on the stem, and the spores, instead of being white as in *Amanita*, are pink. Both species have broad conical caps, pale olive-brown to smoky grey. They are reported to be very poisonous in Australia, but no details have been recorded. *V. gloiocephala* is much eaten in Portugal and Algeria. (2)

**MOULD** is the general term applied to those microscopic fungi which grow on a variety of organic substrates. These micro-organisms present serious potential problems to food producers, manufacturers and handlers of food and feed products. These problems are of extreme significance in underdeveloped countries when population groups, depleted in sources of protein, eat food contaminated with mould.

A great deal of information and data is available on aspects of fungal toxicity in experimental animals, but there is only suggestive evidence between these environmental intoxicants and incidence of disease in man. Some support to this implication is provided by yellow rice which is an aetiological factor in human disease in Japan. The aetiology of aflatoxicosis and hepatomagenesis also suggests that man may be just as easily susceptible to fungal toxins which effect other animals.

The toxic principles, collectively known as *aflatoxin*, associated with aflatoxicosis, are highly oxygenated heterocyclic compounds related to or derived from difuranocoumarin. Aflatoxins are produced by toxic strains of *Aspergillus*, *Penicillium*, *Mucor* and *Rhizopus*. Other fungal toxins which have been isolated include *aspergillilic acid*, *kojic acid*, *B-nitropropanoic acid*, *luteoskyrin*, *citrinin*, *citreoviridin*, *patulin*, *penicillilic acid*, *rubratoxin* and *rugulosin*. (18)

**ERGOT** is the general term applied to the black spore-mass (sclerotia) of species of *Claviceps* infecting seed-heads of grasses. Ergot-of-rye, *Claviceps purpurea* (Fr.) Tul., caused large-scale epidemics of ergotism in the Middle Ages. In contrast to fungal toxicity caused by moulds, ergotism today presents very few problems. Two main types of ergotism have been recorded, gangrenous ergotism and convulsive ergotism. The former type of

ergotism develops slowly as a result of continued ingestion of small doses of toxic ergot. The convulsive ergotism appears to result from eating larger amounts of ergot per day. (2)

### ALGAE

These are predominantly aquatic plants many of which are poisonous

The algae may be conveniently divided into two broad groups, the marine algae and the fresh-water algae. The former includes the seaweeds many of which are a source of food. The latter includes many planktonic (free-floating) forms which under certain conditions multiply rapidly and impart a strong colour to the water and form what are termed "water blooms". Many of these algae are extremely small and can only be identified with the aid of a high-power microscope. Fresh-water algae represent a potential food supply, but because they could at times be contaminated with poisonous species there could arise serious health and economic problems with regard to their cultivation. Poisonous algae also threaten the existence of edible aquatic organisms such as shellfish and fish as well as livestock and wildlife.

*DINOFLAGELLATES* are unicellular animals which are placed both in the plant and the animal kingdom. They may or may not possess a hard, horny shell. There are two grooves, one separating the upper and lower portions, and one that runs vertically down the lower portion. In each groove is a flagellum or thread-like whip which propels the organism in a rotating fashion. Dinoflagellates sometimes form "red tides" when a superabundance of these organisms give the water a brown or reddish tinge. Associations between "red tides" and shellfish poisonings in humans have been recorded on a number of occasions. Species involved have included *Gonyaulax catenella*, *G. tamensis*, *G. acatenella*, *Gymnodinium breve* and *Pyrodinium phoneus*. *Gymnodinium breve* has been associated with choking and coughing in humans through droplets carried inshore by winds. The fresh-water dinoflagellate *Peridinium polonicum* has been associated with mass mortalities in fish. The toxin of *Gonyaulax catenella* has a structure with a purine base and a methylcarbamate at position 6. A three-carbon bridge links positions 3 and 9. (4, 18)

*BLUE-GREEN ALGAE*, found in marine, brackish and fresh-water habitats, include a number of poisonous genera. These algae are

made up of colonies of cells or threads of cells, visible under a microscope only. They are dangerous when in the "water bloom" stage. Several genera have been incriminated in livestock, fish and wildlife mortalities.

*Anabaena circinalis* (Kuetz.) Rabenh. has been reported to be poisonous elsewhere and has been incriminated in stock losses in Western Australia. It produces a smell similar to that of commercial grades of the gamma isomer of benzene hexachloride (BHC) such as "gammexane".

*Anacystis cyanea* (Kuetz.) Drouet et Daily has been incriminated in livestock and waterfowl mortalities in a number of countries including Australia. The contained toxic principle is a cyclic polypeptide. It has also been reported to produce a smell similar to "gammexane".

*Nodularia spumigena* Mert. has been incriminated in livestock and waterfowl losses in Australia and overseas. At Peel Inlet in Western Australia this alga was found to produce a smell similar to "gammexane".

The effects of blue-green algae in man are gastro-intestinal, respiratory and dermatological. The genera most involved in gastro-intestinal disorders are *Anabaena*, *Anacystis* and *Aphanizomenon*. Respiratory disorders have been attributed to *Anacystis* and *Oscillatoria*. Dermatitis in humans have been attributed to allergic reaction to *Anabaena* and to primary irritation caused by *Lyngbya majuscula*. (2, 4, 18, 19, 20)

*YELLOW-GREEN ALGAE* are organisms of a golden or brown colour. These are motile, unicellular organisms or are aggregated in colonies or threads of cells. This group of algae are more common in colder waters. Water blooms of *Prymnesium parvum* have been responsible for sudden catastrophic mortalities in fish in Europe and the Middle East. Various species of *Ochromonas* have been shown to contain toxins. These organisms, to date, have not been involved in human poisonings. (18)

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