

and several related species of *Ilex* are small trees or shrubs with shiny green leaves and bright red berries. They are often used as Christmas decorations. Ingestion of the berries produces vomiting, diarrhoea, and "mild narcosis". The active principle remains uncharacterized.

Ipomoea species (morning glory) (Convolvulaceae) are common, cultivates ornamental vines. The seeds of some species are varieties contain ergot alkaloids especially ergine.

Jatropha curcas Linn. and *J. multifida* Linn. (physic nut) (Euphorbiaceae) are tropical shrubs or small trees occurring with several closely related species in Florida, Texas, Puerto Rico and Hawaii. Closely related botanically to the castor plant, these plants produce seeds containing a purgative oil and a toxic lectin.

Kalmia angustifolia Linn. (dwarf laurel), *K. latifolia* Linn. (mountain laurel), and certain other members of the Ericaceae, such as species of *Ledum*, *Pieris*, and *Rhododendron* (*Azalea*), are widely occurring shrubs or small trees. All contain the same poisonous principle, acetylandromedol, a diterpene derivative. That compound has been identified as the toxic agent in honey produced by bees that feed on these plants.

Laburnum anagyroides Medicus (laburnum, golden-chain) (Papilionaceae) is a large ornamental shrub or small tree that is widely cultivated as a spectacular ornamental owing to its long, hanging, racemes of golden yellow flowers. The fruit, a legume pod containing up to 8 seeds, is commonly ingested by children. Laburnum seeds contain cytisine, a quinolizidine alkaloid resembling nicotine in its physiologic effects.

Lantana camara Linn. (lantana) (Verbenaceae) is an ornamental shrub, up to 1.5 meters in height, with aromatic leaves, orange or bright red flowers, and dark blue or black fruits (drupes). The plant is widely cultivated in California and the southern United States, where cases of poisoning have occurred through ingestion of the fruit. Most authorities attribute lantana's toxicity to 2 pentacyclic triterpenes, lantadenes A and B. Others deny this and state that the poisonous principle is unknown.

Melia azedarach L. (chinaberry tree) (Meliaceae) is a small, thickly branches tree with

large compound leaves, purple flowers, and smooth ovoid fruits (drupes) that are yellow when mature. Poisoning most often results from ingestion of the fruits whose toxicity is associated with a resinous fraction. Severe irritation, nervous symptoms and fatty degeneration of the liver and kidneys characterize the toxic effects.

Menispermum canadense L. (Canada moonseed) (Menispermaceae) is a high-climbing vine, indigenous to the northern United States and Canada, that has broadly ovata, cordate, 3- to 10-lobes leaves. Its fruits resemble small purple grapes and have been the cause of poisoning in children. The toxic principles are isoquinoline alkaloids, including dauricine which has a curare-like action.

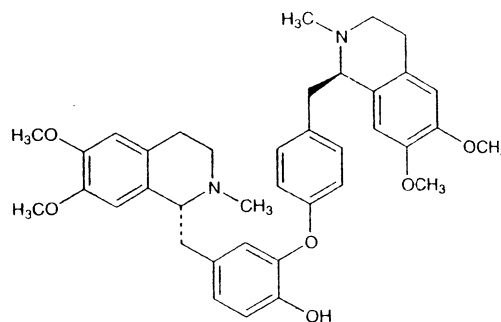


Fig. 12.23. Dauricine.

Metopium toxiferum Krug et Urban (poisonwood tree) (Anacardiaceae) is a large shrub or small tree with compound leaves and fleshy fruits. It is common in areas south of Miami, Florida and frequently causes severe contact dermatitis. Presumably, the active principle is identical to that of urushiol, the causative agent of poison ivy dermatitis.

Narcissus species (narcissus, daffodil, jonquil) (Amaryllidaceae) are well-known cultivated plants. Ingestion of narcissus bulbs produces severe gastroenteritis and nervous symptoms, apparently owing to the phenanthridine alkaloids contained therein.

Nerium oleander L. (oleander) (Apocynaceae) is an ornamental bush or shrub with coriaceous, sharply pointed, oblong-lanceolate leaves and showy pink or white blossoms. It is widely cultivated in the southern United States and California and is grown as an indoor pot plant. The plant contains a

certain false morels, especially *Gyromitra esculenta*, *G. gigas* and other closely related species of *Gyromitra* and *Helvella*. These nongilled fungi are characterized by a pileus surface which varies from smooth to strongly convoluted. However, it is never pitted. Their pilei are always lobed, usually saddle-shaped.

Chemically, the gyromitrins are *N*-methyl-*N*-formylhydrazine derivatives of low-molecular weight aliphatic aldehydes. In the body, they release *N*-methyl-*N*-formylhydrazine (MFH) which is oxidized to produce the extremely poisonous *N*-nitroso-*N*-methylformamide (NMFA). NMFA is a hepatotoxic but does exert additional effects on the hematopoietic system and the central nervous system. Gyromitrins are, therefore, classed as protoplasmic poisons, but differ in their chemistry and toxicity from the amatoxins.

Gyromitrins and their breakdown products are volatile. Both of these procedures destroy more than 99% of the mushroom's hydrazine content. European specimens of *Gyromitra esculenta* contain nearly 10 times as much gyromitrins as similar specimens collected in the Pacific Northwest region of the United States.

A latent period of 6 to 10 hours usually occurs between ingestion of the mushroom. The symptoms resemble those produced by amatoxins but are generally less severe. The mortality rate ranges between 15 and 35%. Treatment is similar to that recommended for amatoxin poisoning.

(c) Orellanine (Cortinarins A and B)

The third type of protoplasmic poisoning is produced by the mixture of compounds named orellanine present in *Cortinarius* species. Two toxic cyclopeptides, cortinarins A and B, closely related to the amanitins, are the responsible constituents. Both are active nephrotoxins, but cortinarin B is the more toxic than A.

The species *C. orelanus*, *C. orellanoides* and *C. speciosissimus* contain cortinarin B. More than 60 species contained varying amounts of cortinarin A.

Poisoning by cortinarius toxins occur between 3 to 14 days. An intense burning thirst is first noted, followed by gastrointestinal disturbances, headache, pain in the limbs, spasms and loss of consciousness.

Liver and kidney damage occurs following death after several weeks or longer. About 15% of the recorded cases have proved fatal. Due to the long latent period, treatment can only be symptomatic and supportive, especially maintenance of kidney function.

2. Compounds exerting neurologic effect

(a) Muscarine

Muscarine is a quaternary compound isolated from *Amanita muscaria*, *A. pantherina*, and in species of *Boletus*, *Lepiota*, *Hebeloma* and *Russula*. Certain species of *Clitocybe*, and especially *Inocybe*, contain muscarine in high concentration. *Clitocybe* has white spores, fleshy central stipes and broadly adnate to decurrent gills; *Inocybe* shows subconic to companulate pileus, evanescent cortina, adnate or adnexed gills, and brownish spores.

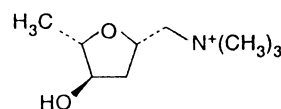


Fig. 12.37. Muscarine.

Symptoms of muscarine poisoning appear rapidly within 15 to 30 minutes after ingestion which include increased salivation, perspiration and lacrimation are followed by abdominal pain, severe nausea and diarrhoea. The pulse is slowed, the pupil is constricted and breathing is asthmatic. The patient's mental processes are unaffected. Death may result in severe cases from cardiac or respiratory failure. Treatment involves gastric lavage and administration of atropine, a specific antidote.

(b) Ibotenic acid-muscimol

Ingestion of some species of *Amanita* (*A. muscaria*, *A. pantheriana*) produces symptoms that are not typical of muscarine, but resemble the central nervous system stimulation induced by atropine.

The active principle includes a mixture of 2 isoxazole derivatives, ibotenic acid and its decarboxylation product, muscimol. Muscimol is at least 5 times as active as ibotenic acid. Some specimens of *A. muscaria* contains a third active constituent, muscazone, which is an oxazole derivative.

Aromatherapy

Aromatherapy is an ancient art and science of using the essential oils of plants in medicine, spicery and perfumery to enhance both physical and mental health and beauty. It is defined as 'the use of aromatic oils from herbs and flowers for their supposed therapeutic effects when applied to the skin, as in massage or when the scent is inhaled.'

Apart from the physical benefits, essential oils can have subtle effects on the mind and emotions. The role of mind is accepted in few diseases, e.g., peptic ulcer, ulcerative colitis, psoriasis, asthma and migraine. For heart attack, mental worries and tension are considered as one of the many risks.

Aromatherapy provides treatment through the stimulation of the sense of smell using pungent materials. The vital element in this treatment is the essential oils extracted from the plant source. These oils are light, concentrated essences which, because of their volatility, are usually used mixed as a few drops within other heavier ingredients to retain their properties. They are sensitive to the environment and should be stored in a cool place in darkened bottles to avoid photo-oxidation of the components.

Essential oils should never be taken internally without medical supervision. The oils are applied topically both in local and whole body massage. This is believed to stimulate the healing processes of the body by increased blood flow in the skin whilst at the same time the pungent aromas stimulate the 'limbic' system, or emotional centre of the brain.

Sandalwood, lavender, bergamot, chamomile and sweet marjoram are used as a sedative effect,

while basil, clove, jasmine, peppermint and ylang are thought to stimulate the central nervous system. Some oils adapt their action to 'balance' the systems of the body depending on an individual's needs. These 'adaptogens' include rosewood and geranium which may, therefore, be either sedative or stimulating.

Aromatherapy may be effected by using essential oils in aromatic baths. A few drops of the chosen essential oil within the carrier oil added to the bath water will spread across the surface of the water and coat the skin on immersion. The oil acts as a lubricant to the skin, the stimulating or sedative activity of the chosen essence will also assist the healing or relaxation process.

Aromatherapy is also achieved by the use of burners, diffusers and sprays. These can employ the decongestant properties of the materials as well as freshen a room with antibacterial action during illness.

Mechanism of action

The aroma molecules of the essential oil contain numerous and very potent organic plant chemicals which are natural and highly potent medicines. They can be antibacterial, antiviral, anti-inflammatory, support the immune system or all the systems of the body like hormonal, glandular, emotional, circulating, nervous system, tranquillizing or stimulating the body awareness including memory enhancement and alertness as sedative and helping us to sleep. The aroma molecules of the essential oils are trans-

arthritis, obesity, multiple sclerosis, eczema, acne, hyperactivity in children, premenstrual discomfort, alcoholism and many other conditions.

Evening primrose oil is marketed in the United States as a "dietary supplement" or "health food", not as a drug. The oil is decomposeable, therefore, unless proper precautions are taken, tablets could not be expected to be a very stable dosage form. Some of the soft gelatin capsules labeled as containing evening primrose oil have been filled merely with soy oil or safflower oil.

Feverfew : Ingestion of relatively small amounts (ca. 60 mg daily) of the fresh whole leaves or freeze-dried powdered leaves of *Chrysanthemum parthenium* (Asteraceae), known as *feverfew*, provides some relief from the painful symptoms of migraine headache and arthritis. The antimigraine activity has been confirmed in preliminary clinical trials. However, neither the identity of the active principle(s) nor its mechanism of action has been established with certainty.

Certain sesquiterpene lactones present in feverfew may have a spasmolytic activity, thus rendering vascular smooth muscle less reactive to such compounds as serotonin. The active compound(s) might function in a manner similar to that of methysergide, a known serotonin antagonist.

Eleuthero : *Acanthopanax senticosus* also known as *Eleutherococcus senticosus* (Araliaceae), is a tall shrub native to eastern Siberia, Korea, and the Shansi and Hopei Provinces of China. It yields the drug known as *eleuthero* or *Siberian ginseng*. Eleuthero consists of the root of the plant.

Eleuthero, like ginseng contains a series of saponin glycosides, known in this case as eleutherosides, which accounts for its reputation as an adaptogen or antistress agent. The stimulant and tonic effects of eleuthero are said to be greater and longer acting than those of ginseng.

Royal jelly : The milky white, highly viscous secretion from the paired salivary glands of the worker honey bee, *Apis mellifera* (Apidae), is known as *royal jelly*. It constitutes the sole food of all bee larvae for the first 3 days of life, and future queens continue to be nurtured with the product which is responsible for their development into mature female insects.

Royal jelly contains proteins, lipids, fatty acids (including 10-hydroxy- Δ^2 -decenoic acid and 9-oxo- Δ^2 -decenoic acid), and vitamins of the B complex, especially pantothenic acid (100 μ g per g of fresh material). It is available commercially in almost all forms, including lotions, creams, soaps, capsules and injections. A "hair restorer" containing royal jelly proved so popular in Hungary that fights broke out among the men waiting in line to purchase a bottle.

There is no scientific evidence that royal jelly affects the growth, longevity, or fertility of experimental animals. It does not exhibit estrogenic activity. Its use as a general tonic, to ward off the effects of old age, and to ease suffering from degenerative diseases, is without foundation.

Sarsaparilla : It is the dried root of various *Smilax* species (Liliaceae). *S. aristolochiaefolia*, *S. regelii* and *S. febrifuga* are known in commerce as Mexican, Honduran, and Ecuadorian sarsaparilla, respectively. Sarsaparilla has been used as an alternative, an antirheumatic, a pectoral, tonic, as a "blood purifier" and as a specific for syphilis. Sarsaparilla is currently recognized as having potential value only as a flavoring agent and as a source of sarsapogenin and smilagenin, steroidal aglycones with potential for use as precursors for the semisynthetic production of cortisone and other steroidal drugs.

Brahmi : The leaves and stems of *Centella asiatica* (Apiaceae) constitute the drug. This slender, creeping plant is especially abundant in the swampy areas of India and Sri Lanka, in South Africa, and in the tropical regions of the New World. It is used as a diuretic, blood purifier, in promoting the healing of skin conditions, and in treating leprosy, as a body strengthener and revitalizer that can promote longevity.

The drug has a sedative effect that resides in 2 saponin glycosides, brahmoside and brahminoside. Another glycoside, madecassoside, exhibits anti-inflammatory activity, and asiaticoside, exerts a wound-healing action by stimulating mitosis.

Fo-ti-tieng is said to consist of a mixture of the leaves and stems of *Centella asiatica* (Linn.) Urban var. *minor* (Apiaceae), meadowsweet, and cola nut.

The drug contains vitamin X, a principle alleged to exert a marvelous rejuvenating effect on the brain cells and endocrine glands. The regular use of