Drugs acting on nervous system

(Hyoscyamus, Belladonna, Aconite, Ashwagandha, Ephedra, Opium, Cannabis, Nux – vominca)

drugs can alter the function of the central nervous system (CNS) to provide

1. Anticonvulsant effects
2. Tranquilization (sedation)
3. Analgesia

There are many different types of drugs that work on the CNS, including anesthetics, anticonvulsants, antiemetics, antiparkinson agents, CNS stimulants, muscle relaxants, narcotic analgesics (pain relievers), nonnarcotic analgesics (such as acetaminophen and NSAIDs), and sedatives.

1. **Central Nervous System Stimulants**
   Stimulants are drugs that exert their action through excitation of the central nervous system. Psychic stimulants include caffeine, cocaine, and various amphetamines. These drugs are used to enhance mental alertness and reduce drowsiness and fatigue
2. **Central nervous system depression**
   Central nervous system depression is a physiological state that can result in a decreased rate of breathing, decreased heart rate, and loss of consciousness possibly leading to coma or death

Hyoscyamus

Synonyms
Common Henbane, Hyoscyamus, Hog's-bean, Jupiter's-bean, Symphonica, Cassilata, Cassilago, Deus Caballinus.

Biological Source
Hyoscyamus consists of the dried leaves and flowering tops of Hyoscyamus niger Linn., belonging to family Solanaceae. It contains not less than 0.05% alkaloids, calculated as hyoscyamine.

Geographical Source
It is found throughout Central and Southern Europe and in Western Asia, extending to India and Siberia. As a weed of cultivation it now grows also in North America and Brazil. Apart from these countries, it grows in Scotland, England and Wales and also in Ireland, and has been found wild in 60 British countries.

Characteristics
Both varieties are used in medicine, but the biennial form is the one considered official. The leaves of this biennial plant spread out flat on all sides from the crown of the root like a rosette; they are oblong and egg-shaped, with acute points, stalked and more or less sharply toothed, often more than a foot in length, of a greyish-green colour and covered with sticky hairs. These leaves perish at the appearance of winter. The flowering stem pushes up from the root-crown in the following spring, ultimately reaching from 3 to 4 feet

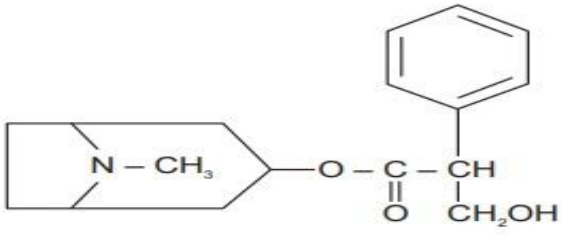
in height, and as it grows, becoming branched and furnished with alternate, oblong, unequally lobed, stalk-less leaves, which are stem-clasping and vary considerably in size, but seldom exceed 9–10 inches in length. These leaves are pale green in colour, with a broad conspicuous midrib, and are furnished on both sides (but particularly on the veins of the under surface) with soft, glandular hairs, which secrete a resinous substance that causes the fresh leaves to feel unpleasantly clammy and sticky. Similar hairs occur on the sub-cylindrical branches.

The flowers are shortly stalked, the lower ones growing in the fork of the branches, the upper ones stalkless, crowded together in one side, leafy spikes, which are rolled back at the top before flowering, the hairy, leafy, coarsely toothed bracts becoming smaller upwards. The flowers have a hairy, pitcher shaped calyx, which remains round the fruit and is strongly veined, with five stiff, broad, almost prickly lobes. The corollas are obliquely funnel-shaped, upwards of an inch across, of a dingy yellow or buff, marked with a close network of lurid purple veins. A variety sometimes occurs in which the corolla is not marked with these purple veins. The seed-capsule opens transversely by a convex lid and contains numerous small seeds.

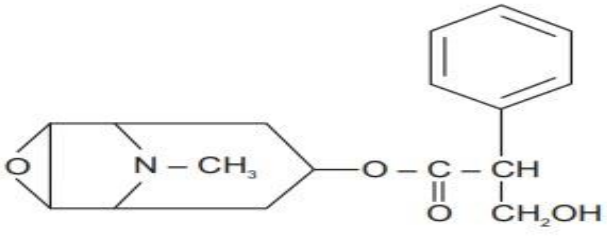
Hyoscyamus niger

Chemical Constituents

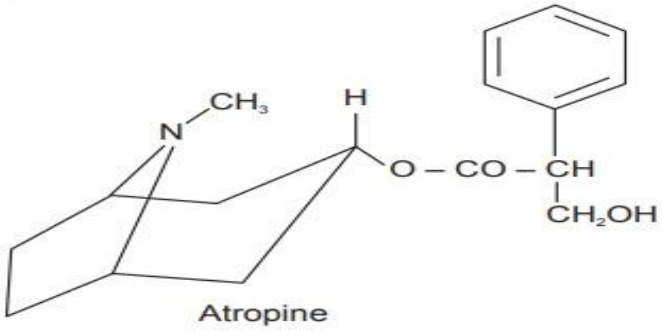
The chief constituent of Henbane leaves is the alkaloid Hyoscyamine, together with smaller quantities of Atropine and Hyoscine, also known as Scopolamine, The proportion of alkaloid in the dried drug varies from 0.045% to 0.14%. Other constituents of Henbane are a glucosidal bitter principle called hyoscytricin, choline, mucilage, albumin, calcium oxalate and potassium nitrate. On incineration, the leaves yield about 12% of ash. The chief constituent of the seeds is about 0.5–0.6% of alkaloid, consisting of Hyoscyamine, with a small proportion of Hyoscine, The seeds also contain about 20% of fixed oil.



Hyoscyamine



Scopolamine



Atropine

Uses

It is used as antispasmodic, hypnotic and mild diuretic. The leaves have long been employed as a narcotic medicine. It is similar in action to belladonna and stramonium, though milder in its effects. The drug combines the therapeutic actions of its two alkaloids, hyoscyamine and hyoscine. Because of the presence of the former, it tends to check secretion and to relax spasms of the involuntary muscles, while through the narcotic effects of its hyoscine it lessens pain and exercises a slight somnifacient action. It will also relieve pain in cystitis. It is used to relieve the griping caused by drastic purgatives, and is a common ingredient of aperient pills, especially those containing aloes and colocynth.

Marketed Products

It is one of the ingredients of the preparations known as Muscle and joint rub (Himalaya Drug Company), Brahmi vati, Sarpagandhaghan Vati (Dabur) and Zymnet drops (Aimil Pharmaceuticals).

BELLADONNA

Synonyms

Belladonna herb; Belladonna leaf; Deadly night shade leaves; Banewort; Death's herb, Dwale; Poison black cherry; Folia belladonnae.

Biological Source

Belladonna consists of dried leaves and flowering tops of Atropa belladonna Linn. (European Belladonna), belonging to family Solanaceae. It contains about 0.35% of total alkaloids calculated as hyoscyamine.

Geographical Source

A . belladonna is cultivated in United States, Canada, UK, Germany and India.

Characteristics

The drug contains leaves, smaller stems of about 5 mm diameter, flowers and fruits. Leaves are stalked, brittle, thin, entire, long-pointed, 5–25 cm long, 2.5–12 cm wide, ovate lanceolate, slightly decurrent lamina, margine-entire, apex acuminate, colour dull-green or yellowish-green, surface glabrous, lateral veins join the midrib at an angle of 60°C, curving upwards and are anastomose. The upper side is darker than the lower. Each has a petiole about 0.5–4 cm long and a broadly ovate, slightly decurrent lamina about 5–25 cm long and 2.5–12 cm wide. The margin is entire and the apex acuminate. A few flowers and fruits may be present. If the leaves are broken, they are characterized by the venation and roughness of the surface due to the presence of calcium oxalate in some mesophyll cells which causes minute points on the surface of the leaf on drying. The flowers blooming in June are solitary, shortly stalked, drooping and about 2.5 cm long. The corolla is campanulate, five-lobed and of a dull purplish colour. The five-lobed calyx is persistent, remaining attached to the purplish-black berry. The fruit is bilocular, contains numerous seeds and is about the size of a cherry. A yellow variety of the plant lacks the anthocyanin pigmentation.

Chemical Constituents

Belladonna contains 0.3–1.0% total alkaloids, the prominent base is l-hyoscyamine and other components are atropine, apoatropine, as choline, belladonnine, cuscohygrine, chrysa-tropic acid, volatile bases, such as atroscine, leucatropic acid; phytosterol, N-methylpyrroline, homatropine, hyoscyamine N-oxide, rutin, kaempferol-3-rhamnogalactoside and 7-glu-coside, quercetin-7-glucoside, scopoletin, calcium oxalate, 14% acid soluble ash and 4% acid-insoluble ash. Addition of ammonia to the alcoholic solution of scopoletin shows blue florescence. This test is useful to detect Belladonna poisoning. Atropine is formed by racemization during the extraction process.

Uses

The drug is used as adjunctive therapy in the treatment of peptic ulcer; functional digestive disorders, including spastic, mucous and ulcerative colitis; diarrhoea, diverticulitis and pancreatitis. Due to anticholinergic property, it is used to control excess motor activity of the gastrointestinal tract and spasm of the urinary tract.

Belladonna is anticholinergic, narcotic, sedative, diuretic mydriatic and used as anodyne and to check secretion. Other uses are similar to Hyoscyamus. It relieves spasm of gut or respiratory tract. Consumption of Belladonna checks excessive perspiration of patients suffering from tuberculosis. Belladonna acts as a parasympathetic depressant.

Marketed Products

It is one of the ingredients of the preparation known as Belladona plaster (Surgi Pharma) for backache, stiffness of muscles and boil, swollen joints.

ACONITE

Synonyms

Monkshood, Friar's cowl; Mouse-bane; Aconite root; Mit-hazahar (Hindi); Radix aconiti.

Biological Source

Aconite is the dried roots of *Aconitum napellus* Linn, collected from wild or cultivated plants., belonging to family Ranunculaceae.

Geographical Source

The plant has been originated from the mountaneous and temperate regions of Europe, It occurs in Alps and Carpathian mountains, hills of Germany and Himalayas. The greater part of the commercial drug is derived from wild plant grown in central and southern Europe, particularly Spain.

Morphology

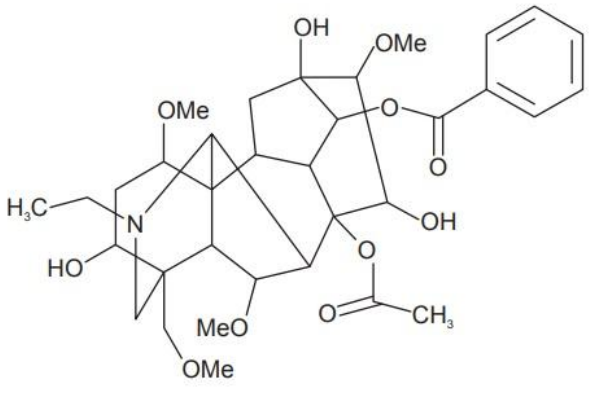
Appearance of Aconite varies from season to season. Aconite collected in autumn is conical in shape and tapering below. Surface is slightly twisted bearing longitudinal ridges. Some Aconites may contain fibrous rootlets or their scars. On the top of parent root some remains of stem base are present which are more shrivelled. An apical bud is present at the apex. The

colour is dark-brown. The root is 4–10 cm in length and 1–3 cm in diameter at the crown. Rootlets may be present. The fracture is short and starchy. The fractured surface is five to eight angled, contains stellate cambium and a central pith. The odour is slight. Taste is sweet at first followed by tingling and numbness.

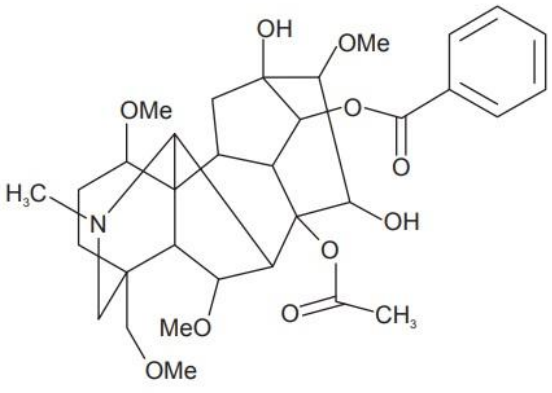
Aconitum napellus

Chemical Constituents

Aconite contains aconitine (0.4–0.8%), hypaconitine, mesa-conitine, aconine, napelline (isoaconitine, pseudoaconi-tine), neoline, ephedrine, sparteine, picraconitine, acotinic acid, itaconic acid, succinic acid, malonic acid, fat, starch, aconosine, 14-acetyineoline, hokbusine A, senbusines A and C and mesaconitine. The aconitines are diacyl esters of polyhydric amino alcohols and are extremely poisonous. The basic skeleton of aconite alkaloid is consisted of a pentacyclic diterpene.



Aconitine



Hypaconitine

Uses

It is used externally as a local analgesic in liniments and to treat neuralgia, rheumatism and inflammation. Tincture Aconite is antipyretic in small doses. Aconitine in amount 2–3 mg can lead respiratory failure, heart failure and in the end death. The drug is used for the preparation of an antineuralgic liniment.

Marketed Products

It is one of the ingredients of the preparation known as J.P. Painkill oil (Jamuna Pharma).

ASHWAGANDHA

Synonyms

Withania root. Ashwagandha, Clustered Wintercherry.

Biological Source

It consists of the dried roots and stem bases of *Withania somnifera* Dunal, belonging to family Solanaceae.

Geographical Source

Withania is widely distributed from southern Europe to India and Africa.

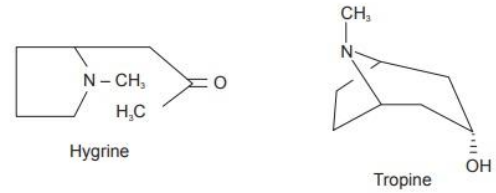
Characteristics

A low lying plant, often reaching only 1–2 ft, but occasion-ally 6 ft. It is a perennial, but can be grown as an annual. Plant and fruits resemble its relatives the ground cherry and Chinese lantern. Young roots are straight, unbranched and conical and in pieces of different lengths. Root thickness varies according to age and usually it is 5–12 mm below crown. Outer surface is buff to yellow and longitudinally wrinkled. Taste is bitter and mucilaginous.

Withania somnifera

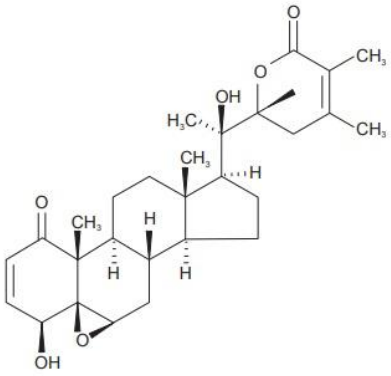
Chemical Constituents

The plants contain the alkaloid withanine as the main constituent and somniferine, pseudowithanine, tropine and pseudotropine, hygrine, isopellederine, anaferine, anahygrine and steroid lactones. The leaves contain steroid lactone, commonly known as withanolides.

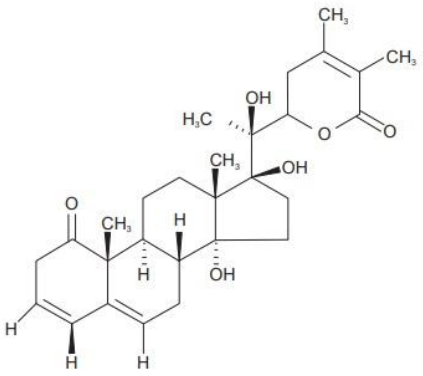


Hygrine

Tropine



Withanolide D



Withanolide F

Uses

All plant parts are used including the roots, bark, leaves, fruit and seed are used to treat nervous disorders, intestinal infections and leprosy. Ashwagandha is one of the most widespread tranquillizers used in India, where it holds a position of importance similar to ginseng in China. It acts mainly on the reproductive and nervous systems, having a rejuvenative effect on the body, and is used to improve vitality and aid recovery after chronic illness. It is also used to treat nervous exhaustion, debility, insomnia, wasting diseases, failure to thrive in children, impotence, infertility; multiple sclerosis, etc. Externally it has been applied as a poultice to boils, swellings and other painful parts. Withania is considered as an adaptogen and so is used in number of diseases.

Marketed Products

It is one of the ingredients of the preparations known as Abana, Geriforte, Mentat, Mentat syrup, Reosto, Tentex forte, AntiStress Massage Oil, Nourishing Baby Oil, Nourishing Skin Cream, Anxocare, Galactin Vet, Geriforte Aqua, Geriforte Vet, Immunol, Speman forte Vet, Tentex forte Vet, Ashvagandha tablet (Himalaya Drug Company), Balarishta (Baidyanath), Aswagandha tablet (BAPS AMRUT).

EPHEDRA

Synonyms

Ma Huang.

Biological Source

Ephedra consists of the dried aerial parts of *Ephedra gerardiana* Wall, *Ephedra sinica* Stapf, *Ephedra equisetina* Bunge, *Ephedra nebrodensis* Tineo and other Ephedra species, belonging to family Ephadreaceae.

Geographical Source

It is mainly found in China, India, Nepal, Turkey, Pakistan and Bhutan.

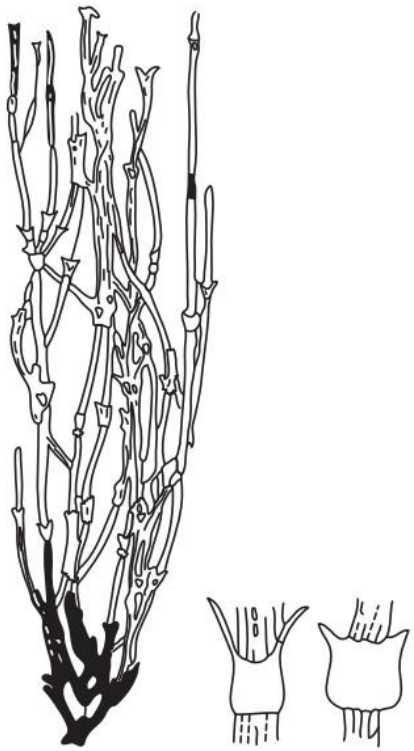
Characteristics

Ephedra gerardiana: It consists of cylindrical woody stem that is grey or greenish in colour. Nodes, internodes, scaly leaves and terminal buds are present in the stems. The distance between the internodes is 3–4 cm and the nodes bare the scaly leaves. They are bitter in taste. The plant has stamens and pistils on separate flowers; staminate flowers in catkins and a membraneous perianth, pistillate flowers terminal on axillary stalks, within a two-leaved involucre. Fruit has two carpels with a single seed in each and is a succulent cone, branches slender and erect, small leaves, scale-like, articulated and joined at the base into a sheath.

Ephedra sinica: Thickness of the stem is 4–7 mm branches are 1–2 mm. Length up to 30 cm of branches and 3–6 cm of internodes. The main stem is brown in colour. Leaves are 2–4 mm long, opposite, decussate and subulate. Leaf, base is reddish-brown, apex acute and recurved and lamina white in colour. A pair of sheathing leaves present at the nodes, encircling the stem and fused at the base,

Ephedra equisetina: Stems are woodier and more branched 1.5–2 mm. Length 25–200 cm of branches and 1–2.5 cm of internodes, outer surface is grey to pale green and smooth.

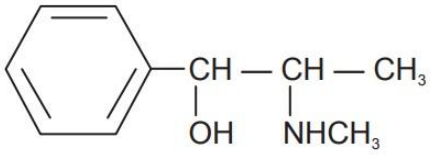
Ephedra nebrodensis: The stems are 15–35 cm in length; 1–2 mm thick, cylindrical, greenish-yellow in colour, nodes are brownish and distinct and fractured surface is fibrous in the cortex but pith contains brownish powdery mass. The leaves are brownish to whitish-brown in colour, scaly, connate, opposite and decussate, acute, agreeable and slightly aromatic odour and taste is astringent and bitter.



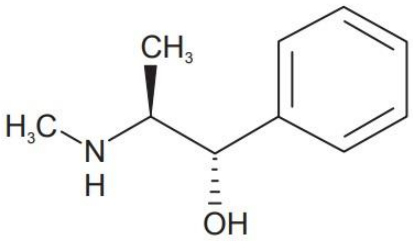
Ephedra sinica

Chemical Constituents

Ephedra contains alkaloids Ephedrine (water-soluble salt of an alkaloid), Pseudoephedrine (analog of ephedrine), Norpseudoephedrine (An analog of ephedrine). The leaves and stems of ephedra also contain many potentially active compounds, such as tannins, saponin, flavone and volatile oils.



Ephedrine



(+)-Pseudoephedrine

Chemical Test

To the drug (10 mg) in water (1 ml) dilute HCl (0.2 ml), copper sulphate solution (0.1 ml) and sodium hydroxide solution (2 ml) are added; the liquid turns violet. On adding solvent ether (2 ml) and shaking vigorously, the ethereal layer turns purple and the aqueous layer becomes blue.

Uses

Ephedrine is antiallergenic, antiasthmatic, antispasmodic, decongestant, cough suppressant, stimulant and vasoconstrictor. Pseudoephedrine is decongestant, cough suppressant and norpseudoephedrine is peripheral vasodilator used to treat angina. As a whole it is decongestant; it opens sinuses, increases sweating, dilates bronchioles (antiasthmatic use), diuretic, CNS stimulant, raises blood pressure, alleviates aches and rheumatism, alleviates hay fever/colds, etc.

OPIUM

Synonyms

Crude Opium; Raw Opium; Gum Opium; Afim; Post.

Biological Source

Opium is the air dried milky latex obtained by incision from the unripe capsules of *Papaver somniferum* Linn, or its variety *P. album* Decand., belonging to family Papaveraceae.

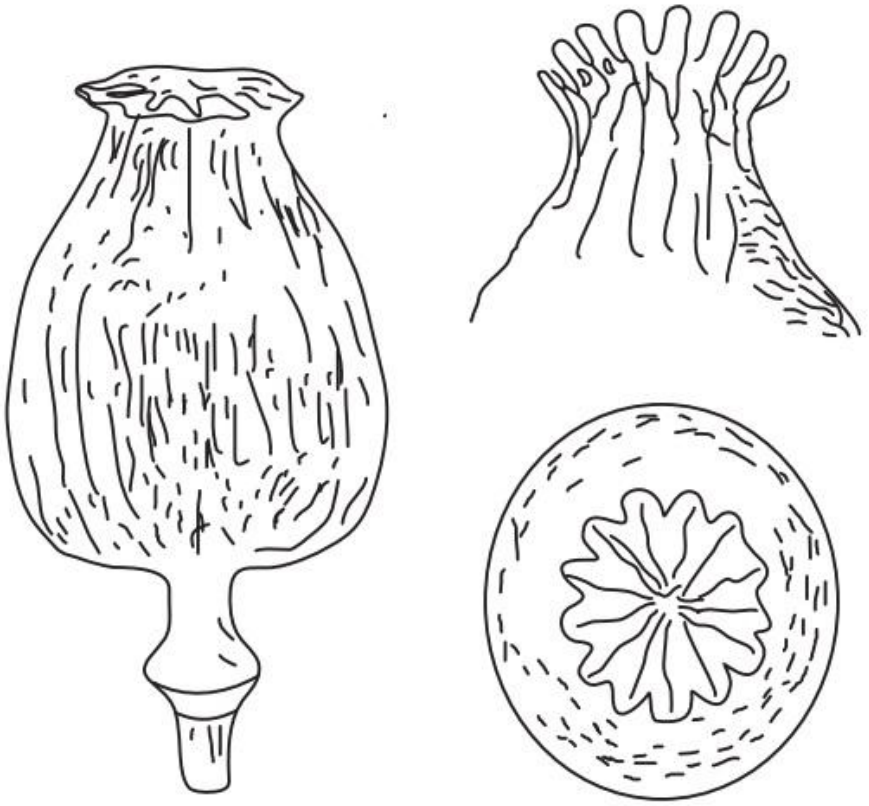
Opium is required to contain not less than 10% of morphine and not less than 2.0% of codeine. The thebaine content is limited to 3%.

Geographical Source

It is mainly found in Turkey, Russia, Yugoslavia, Tasmania, India, Pakistan, Iran, Afghanistan, China, Burma, Thailand and Laos. In India, Opium is cultivated in M.P. (Neemuch) and U.P. for alkaloidal extraction and seed production.

Characteristics

Opium occurs in rounded or flattened mass which is 8–15 cm in diameter and weighing from 300 g to 2 kg each. The external surface is pale or chocolate-brown, texture is uniform and slightly granular. It is plastic like when fresh and turns hard and brittle after sometime. Fragment of poppy leaves are present on the upper surface. Internal surface is coarsely granular, reddish-brown, lustrous; odour is characteristic; taste is bitter and distinct. Opium is intended only as a starting material for the manufacture of galenical preparations and is not dispensed as such.



Papaver somniferum capsules

Chemical Constituents

Opium contains about 35 alkaloids among which morphine (10–16%) is the most important base. The alkaloids are combined with meconic acid. The other alkaloids isolated from the drug are codeine (0.8–2.5%), narcotine, the-baine (0.5–2%). noscapine (4–8%), narceine and papaverine (0.5–2.5%). Morphine contains a phenanthrene nucleus. The different types of alkaloids isolated are:

1. *Morphine Type:* Morphine, codeine, neopine, pseudo or oxymorphine, thebaine and porphyroxine. Morphine consists of alkaloids which has phenanthrene nucleus

whereas those of the papaverine group has benzyliso-quinoline structure. Protopine and hydrocotamine are of different structural types. The morphine molecule has both a phenolic and an alcoholic hydroxyl group and acetylated form is diacetyl morphine or heroin. Codeine is ether of morphine (methyl-morphine). Other morphine ethers which are used medicinally are ethylmorphine and pholcodine.

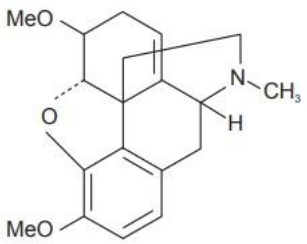
2. *Phthalide Isoquinoline Type:* Hydrocotarnme, narcotoline, 1-narcotine, noscapine, oxynarcotine, narceine, and 5'-O-demethyl-narcotine.

3. *Benzyl Isoquinoline Type:* Papaverine, dl-laudanine, lau-danidine, codamine and laudanosine.

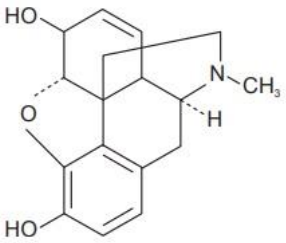
4. *Cryptopine Type:* Protopine, cryptopine.

5. *Unknown Constituents*: Aporeine, diodeadine, meconidine, papaveramine and lanthopine.

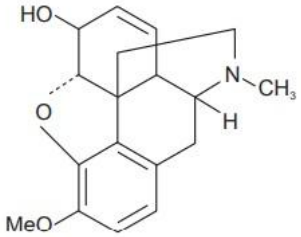
The drug also contains sugars, sulphates, albuminous compounds, colouring matter and moisture. In addition to these anisaldehyde, vanillin, vanillic acid, β-hydroxystyrene, fumaric acid, lactic acid, benzyl alcohol, 2-hydroxycinchonic acid, phthalic acid, hemipinic acid, meconin and an odorous compound have also been reported.



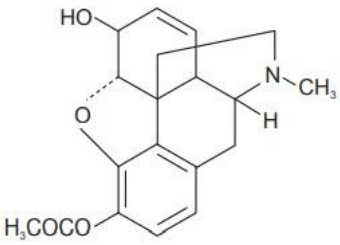
Thebaine



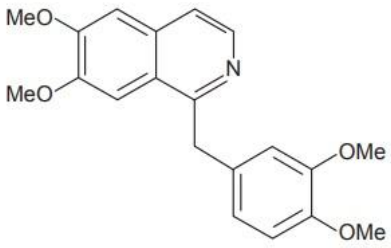
Morphine



Codeine



Heroin



Papaverine

Chemical Tests

Aqueous extract of Opium with $FeCl_3$ solution gives deep reddish purple colour which persists on addition of HCl. It indicates the presence of meconic acid.

Morphine gives dark violet colour with conc. H_2SO_4 and formaldehyde.

Uses

Opium and morphine have narcotic, analgesic and sedative action and used to relieve pain, diarrhoea dysentery and cough. Poppy capsules are astringent, somniferous, soporific, sedative and narcotic and used as anodyne and emollient. Codeine is mild sedative and is employed in cough mixtures. Noscapine is not narcotic and has cough suppressant action acting as a central antitussive drug. Papaverine has smooth muscle relaxant action and is used to cure muscle spasms. Opium, morphine and the diacetyl derivative heroin, cause drug addiction.

CANNABIS

Synonyms

Indian hemp, Indian cannabis, hashish, bhang, ganja, charas, *Cannabis indica*, marihuana.

Biological Source

Cannabis consists of dried flowering tops of the pistillate plants of *Cannabis sativa* Linn., belonging to family Cannabinaceae.

Geographical Source

Cannabis occurs in India, Bangladesh, Pakistan, Iran, Central America, United States, East Africa, South Africa, and Asia Minor.

Cannabis Products

The following products are prepared from Cannabis. *Ganja:* It contains up to 10% of its fruits, large foliage

leaves and stems over 3 cm. It is known as *Flat* or *Bombay ganja* when 30 cm long pieces of the herb are made into bundles and pressed. *Round* or *Bengal ganja* is prepared by rolling the wilted tops between the hands. Ganja is legally produced only by a few licensed growers in Bengal and southern India. The seeds are sown in rows about 1.3 m apart and male plants are discarded. The resinous tops of the unfertilized plants are cut about 5 months after sowing and pressed into cakes. The yield is nearly 120 kg per acre.

Bhang or Hashish: It consists of the larger leaves and twigs of both male and female plants. It is smoked with or without tobacco. It is unfit for medicinal use owing to deficiency of resin. It is also taken in the form of an electuary made by digestion with melted butter.

Charas: It is the crude resin obtained by rubbing the tops between the hands and beating them on a piece of cloth. This is an inferior product. It may be collected by beating the flowering tops in coarse cotton cloths spread on the ground. A greenish-brown soft mass adheres, and may be purified by pressing it through the cloths. The resin is scraped off. It is mixed with many smoking mixtures.

Cannabis sativa

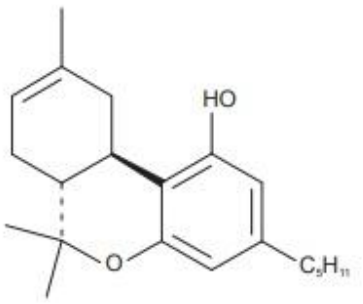
Morphology

Cannabis occurs in flattened, rough, dull dusky green masses. The dried resin is hard, brittle, and does not stick. The flat-ganja is flattened mass of a dull green colour. The odour is very marked in the fresh drug and becomes faint afterwards; taste is slightly bitter.

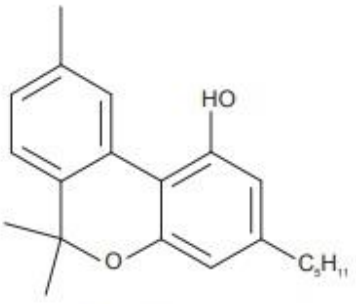
The flat- or Bombay ganja occurs in agglutinated flattened masses of a dull green or greenish-brown colour. The resin is not sticky but hard and brittle; the odour, which is very marked in the fresh drug, is faint. The drug has a slightly bitter taste. The lower digitate leaves of the plant are not found in the drug. The thin, longitudinally furrowed stems bear simple or lobed; stipulate bracts which subtend the bracteoles, enclosing the pistil late flowers. The bracts are stipulate and the lamina may be simple or three-lobed. The bracteole enclosing each flower is simple.

Chemical Constituents

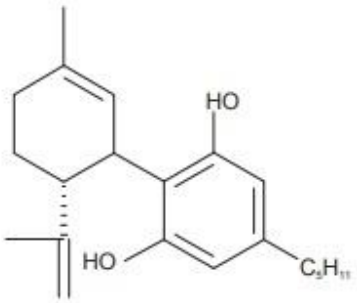
Cannabis consist of 15 to 20% resin, the resins are amorphous, semisolid, brown coloured, soluble in ether, alcohol, and carbon disulphide. The most important active constituents present in cannabis are: cannabidiol, cannabidolic acid, cannabinol, cannabichromene, and trans-tetrahydrocannbinol. Cannabis also contains Cannabidiolic acid, cannabidiol A 9, tetrahydrocannabinol, cannabinol A9, Tetrahydrocannabinol (THC), volatile oil, trigonelline, and cholene.



Δ^8 - Tetrahydrocannabinol



Cannabinol



Cannabidiol

Uses

Cannabis resin is tonic, sedative, analgesic, intoxicant, stomachic, antispasmodic, antianxiety, anticonvulsant, antitussive, and narcotic. Cannabis causes only pshycic dependence and act upon the nervous system.

Marketed Products

It is one of the ingredients of the preparation known as Bilwadi churna (Baidyanath).

NUX VOMICA

Synonyms

Semen strychni, Nux vomica Seed, Poison Nut, Semen strychnos, Quaker Buttons, Bachelor's buttons, Dog buttons, Vomit nut, Crow fig.

Biological Source

Nux vomica consists of the dried ripe seeds of *Strychnos nux vomica* Linn, belonging to family Loganiaceae; containing not less than 1.2% strychnine.

Geographical Source

It is mainly found in South India, Malabar Coast, Kerala, Bengal, Eastern Ghats, North Australia and Ceylon.

Characteristics

A medium-sized tree with a short, crooked, thick trunk, the wood is white hard; close grained, durable and the root very bitter. Branches irregular, covered with a smooth ash-coloured bark; young shoots deep green, shiny. Leaves opposite, short stalked, oval, shiny, smooth on both sides, about 4 inches long and 3 inches broad. Flowers small, greenish-white, funnel shape, in small terminal cymes, blooming in the cold season and having a

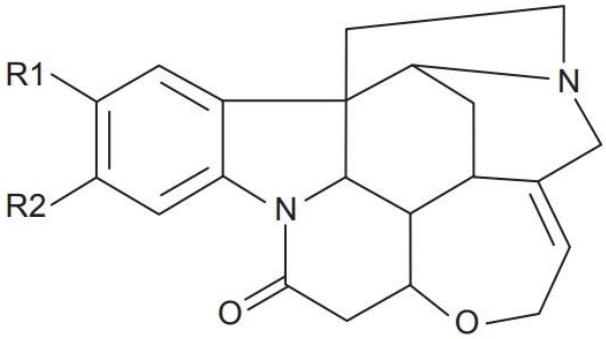
disagreeable smell. Fruit, about the size of a large apple with a smooth hard rind or shell which when ripe is a lovely orange colour, rilled with a soft white jelly-like pulp containing five seeds covered with a soft woolly like substance, white and horny internally. Seeds have the shape of flattened disks densely covered with closely appressed satiny hairs, size is 10–30 mm in diameter 3–5 mm thick, radiating from the centre of the flattened sides and giving to the seeds a characteristic sheen; they are very hard, with a dark grey horny endosperm in which the small embryo is embedded; no odour but a very bitter taste.

Strychnos nux vomica

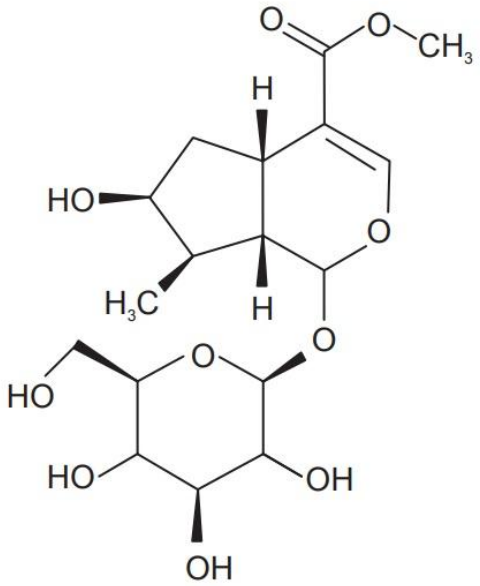
Chemical Constituents

Nux vomica contains the alkaloids, Strychnine (1.25%) and Brucine (1.5%), also traces of strychnicine, and a glucoside Loganin, about 3% fatty matter, caffeotannic acid and a trace of copper. It contains about 2.5–3.5% bitter indole alkaloids. Strychnine is therapeutically active and toxic alkaloid and is located in central portion of endosperm. Brucine is chemically dimethoxystrychnine and is less toxic and has very little physiological action. It is intensely bitter and is used as a standard for determining the bitter value, of many bitter drugs. Brucine is more in the outer part. Vomicine and pseudostrychnine are minor alkaloids.

The seeds also contain chlorogenic acid or caffeotannic acid. Alkaloids are combined with chlorogenic acid or caffeotannic acid. Loganin, a glucoside is also present. Cell walls of endosperm of nux vomica are thick walled and contain reserve material hemicellulose consisting of mannan and galactan which on hydrolysis yield mannose and galactose. Fatty matter is 3% aleurone grains and a trace of copper is present in the endosperm of the seed. The pulp of the fruit contains about 5% of loganin together with the alkaloid strychnicine.



	R1	R2
Strychnine	H	H
Brucine	OCH_3	OCH_3



Loganin

Chemical Tests

1. *Strychnine Test:* To a section of endosperm add ammonium vanadate and sulphuric acid. Strychnine in the middle portion of endosperm is stained purple.

2. *Potassium dichromate test:* Strychnine gives violet colour with potassium dichromate and conc. sulphuric acid.

3. *Brucine Test:* To a thick section add concentrated nitric acid. Outer part of endosperm is stained yellow to orange because of brucine.

4. *Hemicellulose Test:* To a thick section add iodine and sulphuric acid. The cell walls are stained blue.

Uses

The properties of nux vomica are substantially those of the alkaloid Strychnine. In the mouth it acts as a bitter, increasing appetite; it stimulates peristalsis, in chronic constipation due to atony of the bowel it is often combined with cascara and other laxatives with good effects. Strychnine, the chief alkaloid constituent of the seeds, also acts as a bitter, increasing the flow of gastric juice; it is rapidly absorbed as it reaches the intestines, after which it exerts its characteristic effects upon the CNS, the movements of respiration are deepened and quickened and the heart slowed through excitation of the vagal centre. Strychnine has a stimulant action on spinal cord and reflex movements are better. It is considered as nervine and sex tonic. The senses of smell, touch, hearing and vision are rendered more acute, it improves the pulse and raises blood pressure and is of great value as a tonic to the circulatory

system in cardiac failure. In toxic doses strychnine causes violent tetanus like convulsions and death takes place due to asphyxia and respiratory failure.

Brucine closely resembles strychnine in its action, but is slightly less poisonous; it paralyses the peripheral motor nerves. It is said that the convulsive action characteristic of strychnine is absent in brucine almost entirely. It is used in pruritis and as a local anodyne in inflammations of the external ear. Nux vomica is also known as vomiting nut but it has no vomiting properties. However *Strychnos potatorum* has emetic action.

Marketed Products

It is one of the ingredients of the preparation known as Neo Tablets (Charak Pharma Pvt. Ltd.).