Medicinal Plant and Raw Material Containing Volatile Oil

CORIANDER FRUIT - *CORIANDRI FRUCTUS*

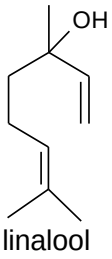
Coriander - *Coriandrum sativum* L., Fam. Apiaceae.

Plant. An annual, unpleasant smelling plant, up to 60 cm tall, with 1-3 times pinnately divided leaves. Small and white 5-part flowers, with the petals pointing towards the outside mostly somewhat larger; flowers arranged in double umbels. All parts of the fresh plant when crushed give off a fetid odour.

Area of distribution. Originally from the eastern Mediterranean region, it is cultivated worldwide.

Description. The drug consists of the dried, ripe, more or less spherical (diameter 3-5 mm) fruits (cremocarps or double achenes), which have mostly not split into the mericarps. The ridges first become visible on drying: 10 wavy, inconspicuous primary ridges and 8 straight, more conspicuous secondary, ridges. Odour is spicy and aromatic; taste - spicy and characteristic.

Constituents. Up to 1% essential oil with 60 70% linalool, 20% monoterpene hydrocarbons (pinene, limonene. γ-terpinene, *p*-cymene etc.); camphor (3-6%); geraniol and geranyl acetate (1-3%). Responsible for the fetid smell of the unripe fruit and of the herb are aldehydes (0,07 – 0,4%). Other constituents of the drug are fatty oil (about 20%), as well as proteins (about 15%), carbohydrates and small amounts of flavonoids, furocoumarins, caffeic acid derivatives (particulary chlorogenic acid) and triterpenes.



Uses. Because of the essential oil, as a stomachic, spasmolytic, and carminative, which also has bactericidal and fungicidal properties; also for sub-acid gastritis, diarrhoea, and dyspepsia of various origins. Coriander is employed more especially as a spice, e.g. in bread in order to make it more wholesome when fresh, in certain kinds of curry powders, and in gingerbread, and as an ingredient in liqueurs, e.g. Danziger.

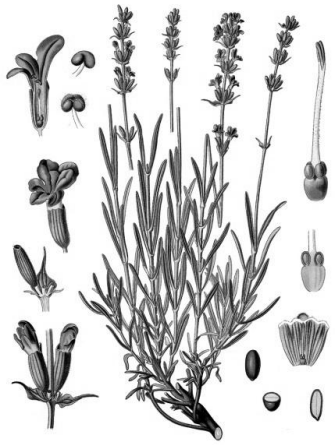
Contraindications: None known.

Drug interactions. None known.

Side Effects: Powdered coriander, and more particularly the oil, is known to give rise to allergic reactions. 5- and 8-methoxypsoralen and imperatorin and other photo-active compounds are present in various parts of the plant, including the fruit.

Drug: As a component of carminative and laxative remedies, in the form of alcoholic distillates and drops, often in combination with other essential-oil drugs, such as anise, caraway, and fennel. It is a component of Carminativum Babynos®. Coriander essential oil is a component of Gastricard ® N drops and of ointments.

Pharmacopoeial and Other Monographs: DAB 10, Ph. Eur. 6.4, BP 2009.



LAVENDER FLOWERS - *LAVANDULAE FLORES*

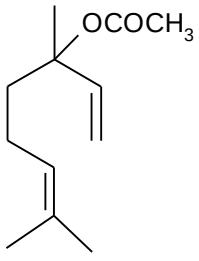
Lavender – *Lavandula angustifolia* L., Fam. Lamiaceae.

Synonym(s): English lavender, Common lavender.

Plant. Shrub with narrow lanceolate leaves initially they are densely pubescent, later becoming glabrous. The flowers are on long peduncles and in dense whorls forming a false spike.

Area of distribution. Native in the Mediterranean region and grown there on a large scale. The drug is imported from France, former Yugoslavia, Bulgaria, and Spain. Most of the lavender plants were originally grown and distilled in the higher areas of Mediterranean France (600–1500 m). Exact figures for the production of the oil are difficult to obtain owing to the immense amount of adulteration, mixing, cutting and addition of synthetics or simply synthetic lavender oil itself. In 1984, world production of lavender oil was 200 tonnes; Bulgaria produced 100–129 tonnes; France 55, USSR 35, Australia 5. More than 30 different types of lavender oils and blends are traded on world markets, but there are only a few that are sold in bulk, mainly *L. angustifolia* oil

Description. The inflorescences, consisting of flowers arranged in false whorls, are stripped before flowering is finished and dried. Because the petals readily fall off during the drying process, the drug consists mainly of the tubular-ovoid, ribbed, bluish grey calixes; these have five teeth, four of which are short, while the fifth one forms an oval or cordate projecting lip. The petals, are fused into a tube with a lower lip consisting of three small lobes and an upper lip comprising two larger erect lobes; the colour varies from deep bluish to a discoloured brown. Inside the corolla, there are four stamens and the superior ovary. Odour is intense, pleasantly aromatic and fragrance, taste - bitter.



linalyl acetate

Constituents. 1 – 3% essential oil, containing mainly monoterpenes, the most important component of which is linalyl acetate (30 – 55%), also linalool (20 – 35%), cineole, camphor, and also the sesquiterpene caryophyllene oxide; tannins (5 – 10%), probably derivatives of rosmarinic acid: coumarin; flavonoids; phytosterols.

Uses. The drug is applied as a mild sedative in excitement, nervous exhaustion, disturbances of sleep, and is frequently included as a component of calming teas. The drug is also used as a cholagogue,. In *folk* medicine the drug is also employed as a .spasmolytic, carminative, stomachic and diuretic. Lavender baths are still often prepared for the treatment of wounds and as a mild stimulant for the skin, and so also are herbal cushions as an aid to sleeping. Lavender flowers are offered as herbal tea formulas. Varies lavender preparations are used as component in sedative, cholagogue and external use products.

Pharmacopoeial and Other Monographs: BHP 1983, Ph. Eur. 6.4, BP 2009.

MELISSA LEAF –*MELISSAE FOLIUM*

Melissa - *Melissa officinalis* L., Fam. Lamiaceae.

Synonym(s): Balm, Lemon Balm, Sweet Balm.

Plant. It is an herbaceous perennial, up to 70 cm in height, with a strong lemon scent and distinctly petiolate, broadly ovate and decussate leaves on quadrangular stems. The venation is very prominent on the lower leaf surface; the margin is crenate and serrate. Flowers are pale colored, about 5 cm long, with a 2-lobed calyx, grouped in the axils of the leaves.

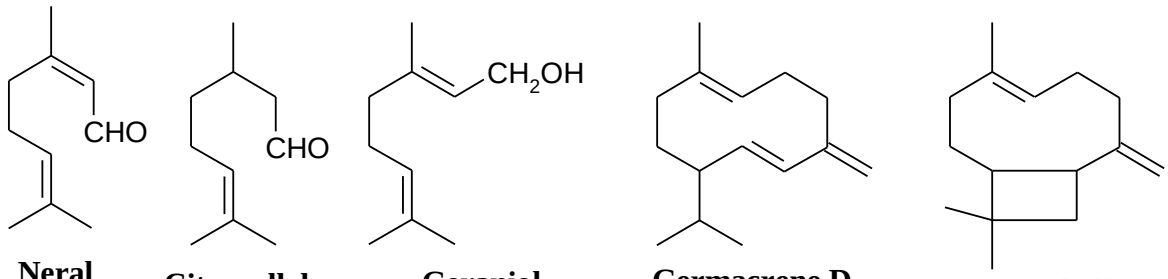
Area of distribution. Originally, it is native to the eastern Mediterranean region (from the Balkan States to the Asia Minor) and western Asia. Melissa is widely distributed and cultivated in Central Europe.

Description. The drug consist of the dried leaves, about 8 cm long and up to 3 cm wide, with petioles of varying length and broadly ovate , rounded or almost cordate lamina at the base. The thin leaves have a dark green upper surface, which is slightly pubescent and a lighter green lower surface that is glabrous or only slightly pubescent along the veins with a small, glandular punctuation. The margin is irregulary crenate or serrate, and the venation prominent on lower surface. Odour is aromatic, reminiscent of lemon, taste – pleasantly spicy.

Constituents. Volatile oil 0,06–0,375% v/m. Contains at least 70 components, including: monoterpenes more than 60%. Mainly aldehydes, including citronellal, geranial (= citral a), neral (= citral b); also citronellol, geraniol, nerol, b-ocimene. Sesquiterpenes more than 35%, among them b-Caryophyllene, germacrene D.

Flavonoids contains is 0,5%, including glycosides of luteolin, quercetin, apigenin and kaempferol.

Polyphenols: protocatechuic acid, hydroxycinnamic acid derivatives, caffeic acid, chlorogenic acid, rosmarinic acid.



Neral **Citronellal** **Geraniol** **Germacrene D** **β-Caryophyllene**

Uses. It has spasmolytic and antibacterial properties. It is also stated to be a carminative, diaphoretic and a febrifuge, and has been used for headaches, gastrointestinal disorders, nervousness and rheumatism. Current interest is focused on its use as a sedative, and topically in herpes simplex labialis as a result of infection with herpes simplex virus type 1 (HSV-1). The German Commission E monographs state that lemon balm can be used for nervous sleeping disorders and functional gastrointestinal complaints. A dry extract of Melissa leaf is a component of a cream used in the treatment of *Herpes simplex* infections (US product Herpilyn® and Herpalieve®). Several combination products in the sedative therapeutic category contain Melissa extract (for example, Novo-Passit).

Contraindications: None documented.

Drug interactions. None documented.

Side Effects: No severe adverse events were reported.

Pharmacopoeial and Other Monographs: BHP 1996, BP 2009, Complete German Commission E, ESCOP 2003, Martindale 35th edition, Ph. Eur. 6.4.

PEPPERMINT - *MENTHAE FOLIUM*

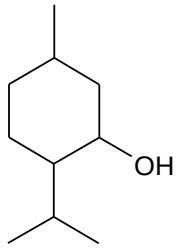
Peppermint - *Mentha piperita* L., Fam. Lamiaceae.

Plant. It is a triple hybrid, *Mentha longifolia, M. rotundifolia, M. aquatica* of English origin. The perennial herb is up to 60 cm in heighth and has a distinctly quadrangular stem and decussate leaves. The pale red flowers are arranged in spicate whorls. Propagation occurs asexually (stolons0 for genetic reasons.

Area of distribution. Entirely from cultivation (for genetic reasons, only through vegetative multiplication by means of runners (stolons)). Nowadays. exports come mainly from: Bulgaria. Greece, Spain, and a few other Balkan countries; a small amount of the drug is produced in southern Germany. Northern Europe and the USA also export the leaf.

Description. The drug consist of the whole or cut , ovate to lanceolate leaves which are thin and brittle, 3-9 cm long, with a pinnate and often violet tinged venation and a sharply serrate margin. On examination with a magnifying glass, the glands can be recognized as yellow dots.

Constituents. 0.5 4% essential oil (menthol and menthol esters (especially the acetate and isovalerianate), menthone, menthofurane and other monoterpenes. and small amounts of sesquiterpenes. 3,4-4,5 % lamiaceae-tannins, rosmarinic acids and others caffeic acid derivatives are also present. Flavonoid content varies considerably (sometimes up to 17%). Triterpenes are also been detected. The yield of oil depends on the age of the plants.



mentol

Uses. As a spasmolytic carminative, and cholagogue: mixed with other herbal drugs, also as a sedative. The action is mainly, but not entirely, due to the content of essential oil, the direct action of which on organs with smooth-muscle tissue causes a stronger spasmolysis than some of its individual components. Peppermint tea brings about a considerable increase in the production of bile, the effect is due to the essential oil, but presumably the flavonoids also play a part.

Peppermint tea is indicated in acute and chronic gastritis and enteritis, in colicky disorders of the gastrointestinal tract, and in flatulence; and also in chronic cholecystopathies. It is used as a sedative. It is free from of harmful side effects on prolonged use, provided that it is not used to excess. Drug: Corvaldin, Corvalol, Validol, Valokormid, Zelenin's drops - spasmolytic, hypotensive, sedative, analgesic; Ingalipt, Cameton, Camphomen - anti-inflammatory, antiseptic; Mint tablets – anti-nausea; liniment Bom-benge, Boromentol, Gevcamen, Menovazin, - analgesic, anti-inflammatory.

Contraindications: When gallstones are present, use only after consultation with a doctor.

Peppermint leaf or extracts prepared from it are included in many (ca, 50) prepared cholagogues and bile-duct remedies, as well as sedative. Volatile oil, menthol, gastric drops, infusion, tincture – raise secretion of digestive glands produce a choleretic, spasmolytic, sedative action.

Side Effects: Reported side effects relate chiefly to peppermint oil and/or its constituents menthol and menthone or to product in which they are significant components of the formulation, e.g. confectionery, menthol cigarettes, peppermint-oil capsules.

Pharmacopoeial and Other Monographs: Ph. Eur. 6.4, USNF, BP 2009, USP 34, SPU.

SAGE LEAVES - *SALVIAE FOLIA*

Sage - *Salvia officinalis* L., Fam. Lamiaceae.

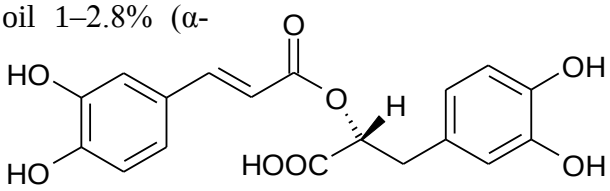
Synonym(s): Dalmatian Sage, Garden Sage, True Sage.

Plant. 70 cm tall subshrub becoming woody at the base and with characteristically smelling, oblong leaves: lamina, because of the velvet/ tomentosum greyish green, especially on the lower surface, and often auriculate at the base. 2 cm long flowers, mostly with a bluish violet corolla, arranged in whorls forming a loose spike

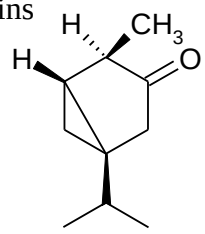
Area of distribution. Native in the Mediterranean region, especially in the Adriatic; cultivated to some extent in various European countries. Imports of the drug come from Albania and former Yugoslavia.

Description. The petiolate 3-10 cm long and up to 3 cm wide, oval, oblong-ovate, to lanceolate leaves are densely pubescent on both surfaces; they have a distinctly crenulate margin and deeply depressed venation which is very prominent on the lower surface, and a lamina which is rounded and sometimes singly or doubly auriculate at the base. Odour is intensely spicy and aromatic; taste – spicy, bitter, and astringent.

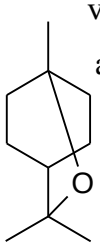
Constituents. The characteristic components of sage to which its traditional uses can be attributed are the volatile oil and tannins. It contains volatile oil 1–2.8% (α- and β-thujones, 1,8-cineole, borneol, camphor, caryophyllene, linalyl acetate and various terpenes). Others include phenolic – caffeic, chlorogenic, ellagic, ferulic, gallic and rosmarinic acids; flavonoids; diterpenes, including carnosic acid and derivatives; triterpenes: oleanolic acid and derivatives and hydrolysable and condensed tannins 3–8%.



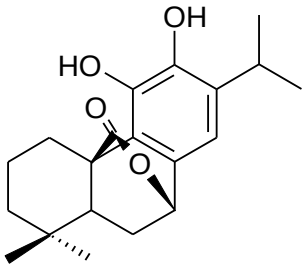
Rosmarinic acid



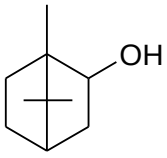
alpha-Thujone ((-)-thujone)



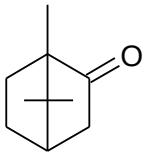
1,8-Cineole



Carnosol



Borneol



Camphor

Uses. Sage is stated to possess carminative, antispasmodic, antiseptic, astringent and antihidrotic properties. Traditionally, it has been used to treat flatulent dyspepsia, pharyngitis, uvulitis, stomatitis, gingivitis, glossitis (internally or as a gargle/mouthwash), hyperhidrosis, and galactorrhoea. Drug: Salvin.

Contraindications: Sage oil is reported to be a moderate skin irritant and is not recommended for use in aromatherapy

Drug interactions. There is limited evidence from preclinical studies that sage has hypoglycaemic activity. Sage oil has a high content of thujones, which are convulsants.

Side Effects: Sage oil is toxic (due to the thujone content) and should not be ingested

Pharmacopoeial and Other Monographs: BHP 1996, BP 2009, Complete German Commission E, ESCOP 2003, Martindale 35th edition, Ph. Eur. 6.4.

CARAWAY FRUIT - *CARVI FRUCTUS*

Caraway - *Carum carvi* L., Fam. Apiaceae.

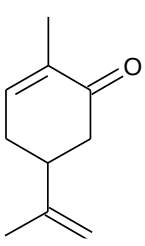
Synonym(s): *Cuminum pratense*.

Plant. Caraway is a perennial herb about 1m high. The stem is upright, branchy. The leaves are alternate, petiolate, decreasing in size to the top of the stem. At the base leaves are widening into sheathes. The blade of the leaf is twice or three times pinnately sected into linear - lanceolate lobes. Inflorescence is a compound umbel. The flowers are small, white. Fruit is a cremocarp.

Area of distribution. Native in Europe. The drug comes from cultivated plants, especially from Poland, the eastern part of Germany, and Egypt. The fruits are usually harvested before they are fully ripe when the essential oil content is at its greatest.

Description. The drug usually consists of mericarps separated from the pedicel. The fruit are slightly curved, brown and glabrous about 4 - 7 mm long, 1 - 2 mm wide tapered at both ends. They are crowned with a stylopod often with style and stigma attached. Each maricarp shows fine almost equal sides, five narrow light-coloured primary ridges. The odour is strong, aromatic. The taste is aromatic and spicy.

Constituents. 3 7% essential oil, with as main odoriferous component carvone (up to 65%); also limonene and other terpenes (including α- and β- pinene, sabinene,



carvone

carveol, dihydrocarveol). Further, 10-18% fixed oil, 20% protein, 20% carbohydrate; flavonoids.

Uses. As a stomachic, since the essential oil promotes gastric secretion and stimulates the appetite. Because of its good spasmolytic activity (like fennel, aniseed, and coriander), as a carminative, e.g. in meteorism and flatulence; also as a cholagogue. Caraway oil has been shown to have marked fungicidal activity (stronger than that of nystatin). In folk medicine, caraway is also employed as a galactagogue.

Pharmacopoeial and Other Monographs: DAB 10, BP 2009; BHP 1983, Ph. Eur. 6.4.

EUCALYPTUS LEAF - *EUCALYPTI FOLIUM*

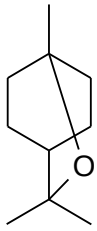
Eucalyptus - *Eucalyptus globulus* Labill., Fam. Myrtaceae.

Plant. A large tree with smooth bark, very pale or ash-grey, up to 3-20 m high. Branchlets quadrangular, glaucous. Leaves of young trees and first leaves of young shoots opposite, sessile, oval-oblong, with a cordate base, farinaceousglaucous; older leaves dangling, spirally arranged, lanceolate-falcate, up to 30 cm long. Flowers with very short pedicels, mostly umbellate, sometimes 2-3 in a fascicle. Calyx tube double: outer tube drops early, smooth; inner tube semipersistent and warty. Stamens about 1.5cm long. Fruit turbinate, angular, 2.0-2.5 cm in diameter

Area of distribution. Indigenous to Australia, cultivated in subtropical regions of the world including Africa, South America (e.g. Argentina, Brazil and Paraguay), Asia (e.g. China, India and Indonesia), southern Europe and the United States of America

Description. Leaf lanceolate-falcate, bifacial, 8-30 cm long, 2-7 cm wide; petiole twisted, strongly wrinkled, 2-3 cm, occasionally 5cm, in length; apex, when present, acute or acuminate; base unequal, obtuse or somewhat rounded, margin uneven, revolute; ventral and dorsal surfaces greyish-green to pale yellowish-green, coriaceous, glaucous, glabrous, glandular-punctate, with numerous small, rounded, brown dots of cork; venation pinnate-reticulate, veins of the first order running to a short distance from margin where they are anastomosed and form a vein nearly parallel with the margin

Constituents. Dried leaves contain 1-3% (v/w) essential oil (fresh leaves contain 0,4-1,6%), the major constituent of which is 1,8-cineole (54-95%). In addition, there are moderate amounts of other monoterpenes, including *β*-pinene (2,6%), *p*-cymene (2,7%), aromadendrene, cuminaldehyde, globulol and pinocarveol. Gas chromatography and gas chromatography-mass spectroscopy of the oil indicated the



1,8-Cineole (eucalyptol)

presence of more than 70 components, 48 of which were identified. The concentration of α-terpineol was estimated to be 28%. The leaves are rich in tannins and ellagitannins, and also contain 2—4% triterpenes (ursolic acid derivatives), a series of phloroglucinol-sesquiterpene-coupled derivatives (macrocarpals B, C, D, E, H, I and J) and flavonoids (rutin, quercetin, quercitrin and hyperoside).

Uses. As an expectorant for symptomatic treatment of mild inflammation of the respiratory tract and bronchitis. Also for symptomatic treatment of asthma, fever and inflammation of the throat. Treatment of cystitis, diabetes, gastritis, kidney disease (unspecified), laryngitis, leukorrhoea, malaria, pimples, ringworm, wounds, ulcers of the skin, urethritis and vaginitis. Drug: Volatile oil - bactericidal; infusion, tincture, Ephcamon, Gevcamen, Alorom, Cameton, Ingalipt, Pektussin, tea Elecosol - bactericidal, anti-inflammatory, astringent; Khlorophillipt – antistaphylococcal.

Contraindications: Eucalyptus oil should be diluted before internal or external use.

Drug interactions. None documented. However, the potential for preparations of eucalyptus to interact with other medicines administered concurrently, particularly those with similar or opposing effects, should be considered. There is limited evidence from preclinical studies that constituents of eucalyptus have hypoglycaemic activity.

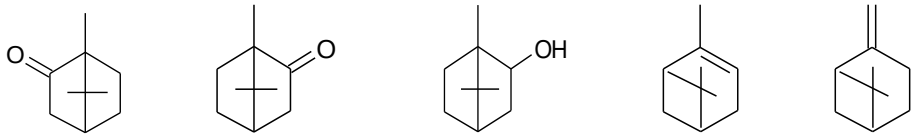
Side Effects: Externally, eucalyptus oil is stated to be generally non-toxic, non-sensitising and non-phototoxic. Undiluted eucalyptus oil is toxic and should not be taken internally. A dose of 3.5 mL has proved fatal. Symptoms of poisoning with eucalyptus oil include epigastric burning, nausea and vomiting, dizziness, muscular weakness, miosis, a feeling of suffocation, cyanosis, delirium and convulsions.

Pharmacopoeial and Other Monographs: BHP 1996, BP 2009, Complete German Commission E, Martindale 35th edition, Ph. Eur. 6.4.

CAMPHOR is a ketone obtained from Cinnamomum camphora (natural camphor).

Natural camphor occurs as a crystalline product in clefts in the woody stems and roots and, to a greater extent, dissolved in the volatile oil. The wood is chipped and distilled with steam, and 1 lb (453,6g) of crude camphor is obtained from 20 to 40 lb of chips. The crude camphor is then freed of oil by centrifugation and pressing and finally re-sublimed and pressed into the familiar cakes.

Camphor is a strong-smelling white substance used in various medicines, prepared from the wood by distillation in steam. The specific rotation of natural camphor is between +41° and +43°.



(+)-Camphor **(-)-Camphor** **Borneol** **α- Pinene** **β-Pinene**

Semisynthetic camphor ((-)-isomer) is made from borneol, obtained from fir tree.

Synthetic camphor is made from pinene, the principal constituent of turpentine oil. Synthetic camphor is the optically inactive racemic form.

A number of complex methods have been used for producing synthetic camphor, but all are based on (1) converting pinene into bornyl esters, which are (2) hydrolyzed to isoborneol, and (3) finally oxidized to camphor.

Uses. Camphor (natural camphor only) oil solution for injection as analeptic, semi synthetic and synthetic Camphor is a topical antipruritic, rubefacient, and anti-infective employed at 1 to 3% in preparations for use on the skin.

CAMPHOR TREE WOOD- *CINNAMOMI LIGNUM*

Camphor tree- *Cinnamomum camphora* (L.) J. Presl, Fam. Lauraceae.

The plant is a large evergreen tree indigenous to eastern Asia but naturalized in the Mediterranean region, Sri Lanka, Egypt, South Africa, Brazil, Jamaica, Florida, and California. From 1900 until World War II, about 80% of the world's supply of natural camphor (about 4 million kg per year) was produced in Taiwan, where the tree occurs naturally in abundance and is also extensively cultivated.

Camphor tree contains volatile chemical compounds in all plant parts, and the wood and leaves are steam distilled for the essential oils.

FIR TWIG- *ABIETIS SUMMITATES*

Fir tree - *Abies sibirica* Ledeb., Fam. Pinaceae.

Fir tree is an evergreen coniferous tree with upright cones and flat needle-shaped leaves, typically arranged in two rows. Firs are an important source of timber and resins.

It contains essential oil (2,5-3%): borneolacetate, borneol, camphen, α-, β-pinene, resins.

TURPENTINE - *TEREBINTHINA*

Pine tree - *Pinus sylvestris* L., Fam. Pinaceae.

Turpentine (also called spirit of turpentine, oil of turpentine, and wood turpentine) is a fluid obtained by the distillation of resin obtained from pine trees. It is composed of terpenes mainly the monoterpenes α-pinene and β-pinene.

Pine buds, extracts, essential oil, resin (sap) are used in bronchitis, diseases of the lungs. Pine needles are used for prophylaxis and treatment of hypo-and avitaminosis vitamin C. Pine tar is used externally in the form of ointments of some skin diseases (psoriasis, eczema, etc.).

VALERIAN ROOT - *VALERIANAE RADIX*

Valerian - *Valeriana officinalis* L.., Fam. Valerianaceae.

Synonym(s): All heal, baldrian, cat's love, cat's valerian, great wild valerian, St. George's herb.

Plant. A tall perennial herb whose underground portion consists of a vertical rhizome bearing numerous rootlets and one or more stolons. The aerial portion consists of a cylindrical hollow, channelled stem attaining 2 m in height, branched in the terminal region, bearing opposite exstipulate, pinnatisect, cauline leaves with clasping petioles. The inflorescence consists of racemes of cymes whose flowers are small, white, or pink. The fruits are oblong-ovate, 4-ridged, single-seeded achenes. *Valeriana officinalis* is an extremely polymorphous complex of subspecies.

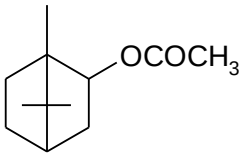
Area of distribution. *Valeriana officinalis* is an extremely polymorphous complex of subspecies with natural populations dispersed throughout temperate and sub-polar Eurasian zones. The species is common in damp woods, ditches, and along streams in Europe, and is cultivated as a medicinal plant, especially in Belgium**,** England, eastern Europe, France, Germany, the Netherlands, the Russia.

Description. Rhizome, erect, entire or usually cut into 2-4 longitudinal pieces, 2-5 cm long, 1-3 cm thick; externally dark brown, sometimes crowned by the remains of stem bases and scale leaves, and bears occasional, short, horizontal branches (stolons), and numerous rootlets; fracture is short and horny. Internally, whitish, with an irregular outline, occasionally hollow and exhibiting a comparatively narrow ark traversed, here and there, by root-traces, and separated by a dark line, the cambium, from a ring, small xylem bundles surrounding a central pith. Roots, numerous, slender, cylindrical, usually plump; 2-12 cm but mostly 8-10 cm long, 0.5-2 mm in diameter; externally, greyish brown to brownish yellow, longitudinally striated, with fibrous lateral rootlets; brittle; internally, showing a wide bark and a narrow central stele. Odour, characteristic, penetrating valeric acid-like, becoming stronger on aging; taste, sweetish initially,

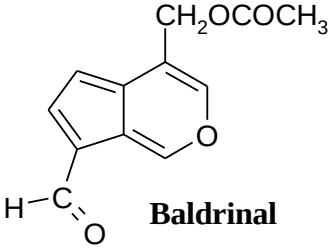
becoming camphoraceous and somewhat bitterincluding. The rhizomes, roots, and stolons, carefully dried at a temperature below 40°C.

Constituents. The chemical composition of Radix Valerianae varies greatly depending on the subspecies, variety, age of the plant, growing conditions, and type and age of the extract. The volatile oil (ranges 0.2-2.8%) contains bornyl acetate and bornyl isovalerate as the principal components.

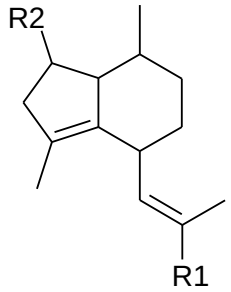
Other significant constituents include p-caryophyllene, valeranone, valerenal, valerenic acid, and other sesquiterpenoids and monoterpenes. The various subspecies of *V. officinalis* have different compositions of volatile oil and, for example, average bornyl acetate content varies from 35% in *V. officinalis* ssp. *pratensis* to 0.45% in *V. officinalis* ssp. *illyrica.* A second important group of constituents (0,05-0,67% range) is a series of non-glycosidic bicydic iridoid monoterpene epoxy-esters known as the valepotriates. The major valepotriates are valtrate and isovaltrate (which usually represent more than 90% of the valepotriate content). Smaller amounts of dihydrovaltrate, isovaleroxy-hydroxydihydrovaltrate, 1-acevaltrate or others are present. The valepotriates are rather unstable owing to their epoxide structure, and losses occur fairly rapidly on storage or processing, especially if the drug is not carefully dried. Principal degradation products are baldrinal, homobaldrinal, and valtroxal.



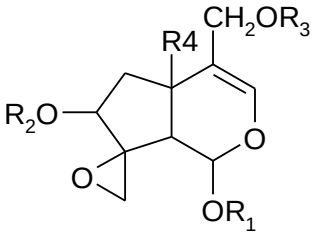
Bornyl acetate



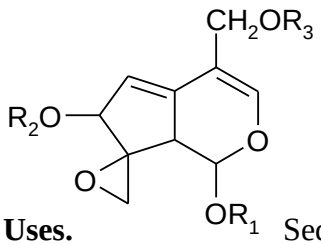
Baldrinal



R_1=CHO, R_2=H, valereanal
R_1=COOH, R_2=H, valerenic acid
R_1=COOH, R_2=$OCOCH_3$, acetoxyvalerenic acid



R_1=isovaleryl, R_2=acetyl, R_3=isovaleryl, R_4= H, didrovaltrate
R_1=isovaleryl, R_2=acetyl, R_3=2-(isovaleryl-oxy)-isovaleryl, R_4=OH, isovaleryloxyhydroxydidrovaltrate
Isovaleryl = $(CH_3)_2CH=CH_2CO$-)



R_1=isovaleryl, R_2=isovaleryl, R_3=acetyl, valtrate
R_1=isovaleryl, R_2=acetyl, R_3=isovaleryl, isovaltrate
R_1=isovaleryl, R_2=*beta*-acetoxyvaleryl, R_3=acetyl, acevaltrate

Uses. Sedative and hypnotic properties have been described for certain valerian rhizome/root preparations following preclinical and clinical studies. However, the available scientific evidence is strong; also it remains unclear precisely which of the constituents of valerian are responsible for the observed sedative and hypnotic properties. Attention had focused

on the volatile oil, and then the valepotriates and their degradation products, as the constituents responsible. However, it appeared that the effects of the volatile oil could not account for the whole action of the drug, and the valepotriates, which degrade rapidly, are unlikely to be present in finished products in significant concentrations. Current thinking is that the overall effect of valerian is due to several different groups of constituents and their varying mechanisms of action. Therefore, the activity of different valerian preparations will depend on their content and concentrations of several types of constituent. One mechanism of action is likely to involve increased concentrations of the inhibitory transmitter GABA in the brain. Increased concentrations of GABA are associated with a decrease in CNS activity and this action may, therefore, be involved in the reported sedative activity. Valerian is stated to possess sedative, mild anodyne, hypnotic, antispasmodic, carminative and hypotensive properties. Traditionally, it has been used for hysterical states, excitability, insomnia, hypochondriasis, migraine, cramp, intestinal colic, rheumatic pains, dysmenorrhoea, and specifically for conditions presenting nervous excitability. Modern interest in valerian is focused on its use as a sedative and hypnotic. A Community Herbal Monograph adopted by the European Medicines Agency's Committee on Herbal Medicinal Products states the following therapeutic indications for valerian root: traditional use, for support of mental relaxation and to aid natural sleep; well-established use, for the relief of mild nervous tension and difficulty in falling asleep. Drug: Infusion, liquid extract, extract in tablets, tincture, Cardiophit, Valocormid, Cardiovalen, Doppelherz Vitalotonik; Herbion Drops for the Heart; Persen; Sanason.

Contraindications: Intake of valerian preparations immediately (up to two hours) before driving or operating machinery is not recommended. The effect of valerian preparations may be enhanced by consumption of alcohol, so excessive consumption of alcohol whilst receiving treatment with valerian root preparations should be avoided. Patients should seek medical advice if symptoms worsen beyond two weeks' continuous treatment with valerian

Drug interactions. Only limited data on the potential for pharmacodynamic and pharmacokinetic interactions with other medicines administered concurrently are available for valerian root preparations. In view of the documented pharmacological actions of valerian the potential for preparations of valerian to interfere with other medicines administered concurrently, particularly those with similar or opposing effects, should be considered. In particular, co-medication with barbiturates and other sedatives is not recommended because of the potential for excessive sedation.

Side Effects: Minor side-effects have been associated with chronic use of Radix Valerianae and include headaches, excitability, uneasiness, and insomnia. Very large doses may cause

bradycardia and arrhythmias, and decrease intestinal motility. The recommended first aid is gastric lavage, charcoal powder, and sodium sulfate.

Pharmacopoeial and Other Monographs: American Herbal Pharmacopoeia, BHC 1992, BHP 1996, BHMA 2003, BP 2009, Complete German Commission E, EMEA HMPC Community Herbal Monograph, ESCOP 2003, Martindale 35th edition, Ph Eur 2007, USP 32, WHO volume 1 1999, SPU.

JUNIPER BERRIES - *JUNIPERI FRUCTUS*

Juniper - *Juniperus communis* L., Fam. Cupressaceae.

Synonym(s): Horse Savin Berries.

Plant. It is a low evergreen tree or erect shrub, up to 9 m., having thin, straight, acerose leaves, white glaucous on the lower surface, arranged in whorls of 3, and dioecious flowers. The carpellate cones are ovoid and consist of 3 fleshy scales, each one-ovuled. The fruit is a subglobose galbulus 5 to 8 mm in diameter, which contains 3 seeds.

Area of distribution. In dry woods of Europe, United States and Canada, Asia and Northern Africa.

Description. Subglobular berry, 5 to 10 mm. in diameter, externally smooth, shining, purplish black to red purple, occasionally reddish brown or sometimes, usually covered with a blue-grey bloom; at the summit a 3-rayed furrow marks the cohesion of the three fleshy bracts forming the pericarp; internally exhibiting a yellowish brown to dusky yellow flesh containing many large schizogenous cavities; seeds usually 3, triangular ovate, hard, brown, on the surface of which are large uneven oil glands; odour aromatic upon crushing; taste sweet, pleasant, terebirithinate, slightly bitter.

Constituents. From 0.3 to 1.5 % of a *volatile oil* containing the terpenes *camphene* and α-pinene, β-pinene, sabinene, a sesquiterpene called cadinene*;* terpene alcohols borneol, terpineol; limonene, resin, fixed oil, up to 30 % of dextrose, etc. A crystalline substance deposits in the oil at low temperatures known as juniper camphor. Juniper yields not less than 0.5 ml. of the volatile juniper oil from each 100 g. of drug.

Uses. Juniper is stated to possess diuretic, antiseptic, carminative, stomachic and antirheumatic properties. Traditionally, it has been used for cystitis, flatulence, colic, and applied topically for rheumatic pains in joints or muscles. The diuretic activity of juniper has been attributed to the volatile oil component, terpinen-4-ol, which is reported to increase the glomerular filtration rate.(G60) Terpenin-4-ol is no longer thought to be irritant to the kidneys.

Contraindications: Juniper is contraindicated in individuals with acute or chronic inflammation of the kidney

Side Effects: Dermatitic reactions have been recognised with juniper and positive patch test reactions have been documented.

Pharmacopoeial and Other Monographs: BHP 1996, BP 2009, Complete German Commission E, ESCOP 2003, Martindale 35th edition, Ph. Eur. 6.4.