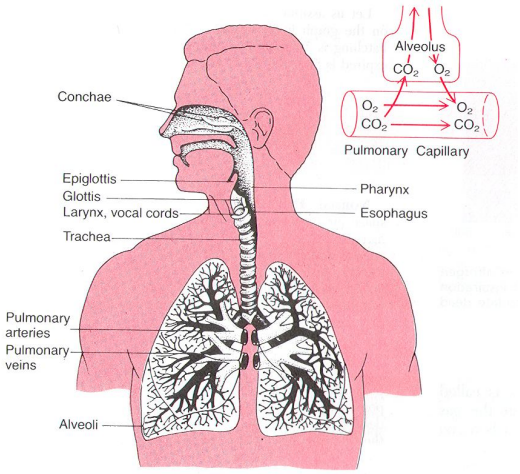
SCHEMA OF RESPIRATORY TRACT



COUGHT (TUSSIS)

Tussis – common symptom of disease of pulmonary tract

According to the duration

- acute (acute infection viral, during diseases from cold), at the beginning dry, later productive
- chronic (longer than three weeks, usually symptom of serious disease)

It is necessary to diagnose the causation of tussis and to determine, if better to support expectoration or suppress.

THERAPEUTICS OF RESPIRATORY TRACT

1 Antitussics
central - codeine, noscapine, glaucine
local – some antiphlogistics tpye of essential oils, plant mucilages

2 Expektorants
mucolytics (saponins)
secretolytics, secretomotorics (essential oils, saponins)
plant mucilages

3 Antiasthmatika
ephedrine
lobeline
tropane alkaloids, khellin

ANTITUSSICS – DRUGS SUPRESSING COUGHT via central mechanism

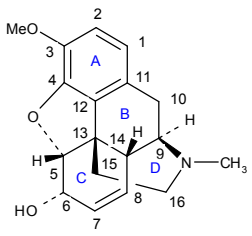
Codeinum monohydricum – Codeine monohydrate (ČL 2005)

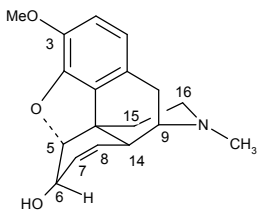
Source: Opium (1,5 %)

Preparation: Isolation, semisynthetic from morphine, less from thebaine

Usage: 0,015-0,030 g central antitussic, lowers bronchial secretion

Comment: In organism is from 10-15 % demethylated to morphine, during repeated dosage causes addiction





codeine

ANTITUSSICS – DRUGS SUPRESSING COUGHT via central mechanism

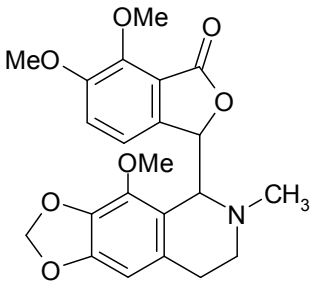
Noscapinum – Noscapine (narcotine) (ČL 2005)

Source: Opium (2–10 %)

Preparation: isolation

Usage: 0,015–0,03 g central antitussic, possesses papaverine relaxation effect. Does not trigger addiction.

Comment: can trigger release of histamine → can cause bronchocontstriction



noscapine

ANTITUSSICS – DRUGS SUPRESSING COUGHT via central mechanism

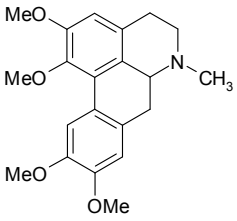
Glaucinum hydrochloridum

Source: *Glaucium flavum* – yellow hornpoppy (Papaveraceae); annual to perennial robust blue-green plant, contains latex

Drug: dried aerial part

CC: 3,9 % of alkaloids, from that 50 % of glaucine (aporphine derivative).

Usage: 0,05 g central antitussic, no inhibition of gut motility, does not trigger addiction. Lowers blood pressure.



glaucine

EXPEKTORANTS – SUBSTANCES FACILITATING EXPECTORATION

Compounds affecting tussis caused by irritation of pharyngeal mucosa

According to the mechanism of effect

- mucilaginose
- emetic
- secretolytic
- secretomotoric
- mucolytic

Used in form of galenic preparations

Single effects are mutually penetrated and the effect is supported also by antiphlogistic, antiseptic and spasmolytic properties of used drugs content compounds.

ALTHAEAE FOLIUM – COMMON MARSHMALLOW LEAVES (ČL 2005)
ALTHAEAE RADIX – COMMON MARSHMALLOW ROOT (ČL 2005)

Source: *Althaea officinalis* – common marshmallow (Malvaceae); perennial, robust, velvet-like herb with thick rhizome and numerous roots, native to wet meadows, for pharmaceutical purposes is cultivated.

Drug: green-yellow leaves, grey hairy, collected permanently in vegetative period

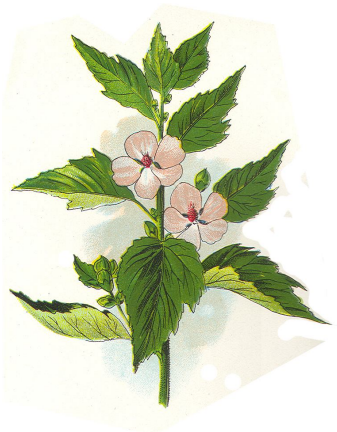
Root strong 0,5-2 cm, harvested from two years old plants in the autumn, after washing are peeled and dried.

CC: Mucilage – GalUA, Rha, Glc, Gal, Ara, further sugars, lipids, pectin, starch;

Usage: Folium – 1,5 g – maceration

Radix – 0,5 g cold macerate

Considerable protective effect on mucosal layer, threfore during pharyngeal inflammations. Also as gargle. Protective of GIT mucosa.



FARFARAE FOLIUM – CLOTSFOOT LEAVES

Source: *Tussilago farfara* – coltsfoot (Asteraceae); perennial plant with creeping rhizome – flowers, later leaves; found at fields, pastures, embankments

Drug: dried leaves with short stalk

CC: 7 % of mucilage from Fru, Gal, Ara, GlcUA; furthermore tannins, inulin, flavonoids and triterpens.

Comment: Some chemovars contain hepatotoxic and carcinogenic pyrrolizidine alkaloids, for example senkirkin.

Usage: 1,5 g of drugs – maceration – expectorant.

Farfarae flos – coltsfoot flower – harvested without stalk; contains mucilage, carotenoids, flavonoids and triterpenic alcohols. Expectorant.

SALEP TUBER – SALEPOVÁ HLÍZA

Source: *Orchis mascula* – Early Purple Orchid, *O. militaris, O. morio* Orchidaceae

Drug: dried daughter tubers harvested in flowering period; blanched in hot water, washed and dried; main producer Greece

CC: 50 % in water soluble mucilage composed of mainly Man and less Glc; furthermore starch and proteins

Usage: mucilaginose, gut inflammations, pediatrics

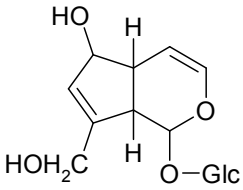
PLANTAGINIS FOLIUM – NARROWLEAF PLANTAIN LEAVES

Source: *Plantago lanceolata* – narrowleaf plantain (Plantaginaceae); perennial plant with rosette of ground leaves; inflorescence – cylindric spike. Weed. Can be cultivated.

Drug: dried green leaves, collected several times per year, before flowering; no dark stains.

CC: Mucilage - Xyl, Ara, Glc, Gal, GalUA, GlcUA; further more tannins, iridoid glycosides, silicic acid

Usage: 1,5 g maceration or infusion, expectorant with antiphlogistic effect



aukubin

MALVAE SYLVESTRIS FLOS – MALLOW FLOWER (ČL 2005)
MALVAE FOLIUM – MALLOW LEAVES

Source: *Malva sylvestris* – mallow (Malvaceae); biennial to perennial plants; for pharmaceutical purposes is cultivated. Priority to polypetalous cultivars.

Drug: dried whole or cut flowers with calyxes during whole flowering period. For pharmaceutical purposes cultivated. Dried leaves harvested during whole vegetation period.

Content compounds: mucilage - Rha, Ara, Gal, GlcUA , furthermore tannins, organic acids, flowers anthocyanine pigments

Usage: 1,5 g maceration, similarly to Folium althaeae

LICHEN ISANDICUS – ICELAND MOSS (ČL 2005)

Source: *Cetraria islandica* – Iceland moss (Parmeliaceae); perennial moss with straight thallus. Mountain areas of noth, middle and east Europe, Czech republic – Krkokonoše mountains

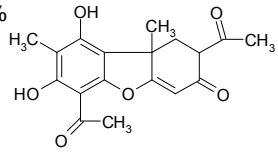
Drug: dried, shrub-like thallus of bitter taste

CC: cca 50 % of polysaccharides soluble in water

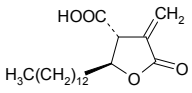
- **lichenine –** linear polymer from β-D-Glc connected alternately (1–3) and (1–4) bonds; soluble in hot water, when cooled gelated, do not react with iodine
- **isolichenine –** linear polymer of α-D-Glc connected (1–4) bonds; soluble in cold water, positively reacts with iodine
- **Polysaccharides** soluble under basic condition
- flavonoids, vitamins A, B1 and iodine

LICHEN ISANDICUS – ICELAND MOSS (ČL 2005)

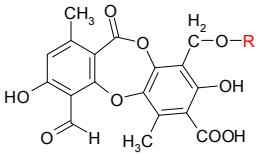
CC: lichen acids – depsidones 2-3 %



usnic acid



protolichsterinic acid



R = H protocetraric acid

R = C_2H_5 cetraric acid

R = CO-CH=CH-COOH fumarprotocetraric acid

Indication:

- expectorant with bacteriostatic depsidones
- immunomodulation effect of extract
- gastroenteritis and aversion to food – bitter taste of depsidones

Dosage:

1,5-2,5 g of smoothly cut drug / 2 dcl /10 min. (use of hot water and immediate decantation removes bitter tasting substances, following maceration leads to obtaining of mucilages).

FOENUGRAECI SEMEN – FENUGREEK SEED

Source: *Trigonella foenum-graecum* – fenugreek. Annual plant, up to 50 cm tall. Fruit is a loment. Demands warm climate. In agriculture food.

Drug: dried seed of irregular angular shape, very hard

CC: 20-45 % of mucilage (Man, Gal, Xyl), 25 % of proteins, oil, steroidal furostane saponins (hydrolyse on diosgenin, yamogenin), sterols, flavonoids.

Usage: 0,5 g of powdered drug – maceration (3 h in cold water) – expectorant during catarrh of upper respiratory tract. Externally to prepare antiphlogistic cataplasm

EMETIC EXPECTORANTS

After p.o. administration irritate stomach mucose membrane, that triggers irritation of parasympaticus and it increases the secretion of mucus.

- Alkaloid emetine

- Drugs containing saponins (infusion, decoction)
  - lower surface tension
  - secretolytic effect – lowering of mucus viscosity and easier expectoration

EMETINI DIHYDROCHLORIDUM – EMETINE DIHYDROCHLORIDE (ČL 2005)
IPECACUANHAE RADIX – IPECACUANHA ROOT (ČL 2005)

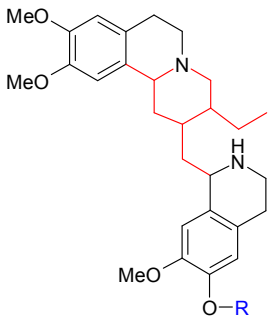
Source: *Cephaelis ipecacuanha* – ipecacuanha (Rubiaceae); evergreen shrub 40 cm tall; wet forests of south America (Brazil, Nicaragua), cultivated in India and Malaysia

Drug: dried, worm-shaped, nodular roots of 3-4 years old plants, harvested during flowering period (I - III)

CC: alkaloids 2-6 % in root bark; 2/3 represents emetine, furthermore cephaeline and others, saponins, starch

Usage: preparation of infusion or extract; reflexive expectorant, higher doses emetic, antiamoebic.

EMETINI DIHYDROCHLORIDUM (ČL 2005)



R = CH_3 emetine

R = H cephaeline

LIQUIRITIAE RADIX – LIQUORICE ROOT (ČL 2005)

Source: *Glycyrrhiza glabra* – liquorices (Fabaceae). Perennial up to 1,5 m tall plant, 4-8 member leaves, blue-purple flowers. South Europe, Mediterranean. Cultivated (Spain, France, Italy, Turkey, China, Iran)

Drug: Dried roots and projections (stolones); harvested in the autumn from 3-4 years old plants. Before drying sometimes peeled (removal of bitter tasting substances, but also removal of glycyrrhizin)

CC: Triterpenic saponins (3-15 %), prevalent sweet tasting glycyrrhizic acid (according ČL 2002 at least 4 %) – approx. 50x sweeter than saccharose; without hemolytic activity; aglycon – glycyrrhetin is not sweet, possesses hemolytic activity; further compounds: triterpenes, flavonoids, coumarins, bitter substances, starch.

Usage:

Expectorant with secretolytic, secretomotoric and antiphlogistic effect

Indirect corticoid-like effect of glycyrrhizic acid

Coregents of taste

Flavonoids and isoflavonoids possess spasmolytic effect, inhibit mitochondrial MAO, estrogenic activity

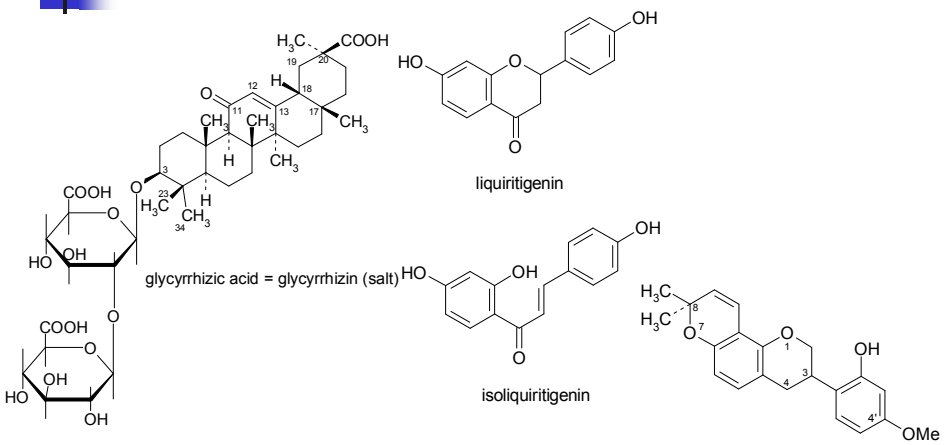
Preparations:

Liquiritiae extractum fluidum ethanolicum normatum – ethanolic extract from liquorice liquid standardized (3-5 % of glycyrrhizic acid)

Liquiritiae succus

Further usage: Food industry, tobacco industry

LIQUIRITIAE RADIX – LIQUORICE ROOT (ČL 2005) content compounds



PRIMULAE RADIX – COWSLIP ROOT (ČL 2005)
PRIMULAE FLOS – COWSLIP FLOWER

Source: *Primula veris* – cowslip; P. *elatior* – (Primulaceae); perennial plants of Europe.

Drug: dried rhizome with 1 mm thick, up to 10 cm long roots; dried (rapidly) flower with calyx.

CC: Triterpenic saponins (5-10 %), main is primula acid A

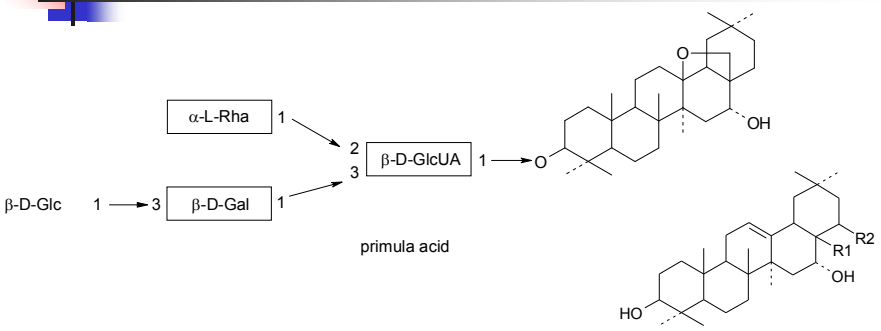
Usage:

Expectorant in form of infusion during acute and chronic inflammatory disases of upper respiratory tract.

Mild diuretic effect

Primula saponin - standard

PRIMULAE RADIX – COWSLIP ROOT (ČL 2005)
PRIMULAE FLOS – COWSLIP FLOWER
content compounds



primula acid

priverogenin A, R1 = CHO, R2 = OH

priverogenin B, R1 = CH_2OH, R2 = OH

primulagenin A, R1 = CH_2OH, R2 = H

echinocystic acid, R1 = COOH, R2 = H

SENEGAE RADIX – SENEGOVÝ KOŘEN

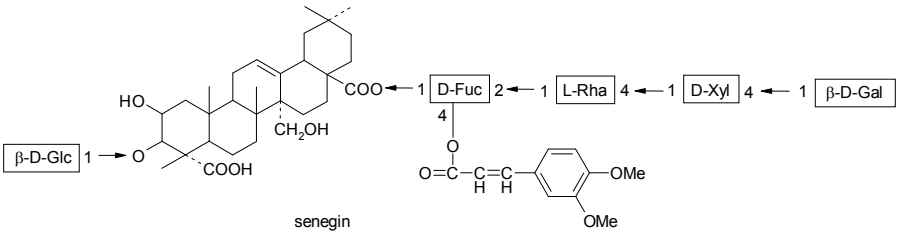
Source: *Polygala senega* – Vítod senega (Polygalaceae); perennial plant nativein north America, where is cultivated for pharmaceutical purposes

Drug: root with spherical, nodulary rough head, on the internal side of bending string-shaped keel; smells like methyl ester of salicylic acid

CC: Senega-saponins I to VIII, main is senegin

Usage: Expectorant in form of infusion or extract

SENEGAE RADIX – SENEGOVÝ KOŘEN
content compounds

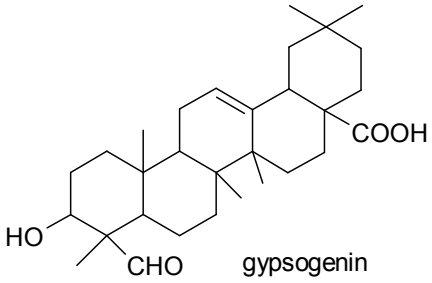


senegin

SAPONARIAE RUBRAE RADIX – COMMON SOAPWORT ROOT

- Source: *Saponaria officinalis* – common soapwort (Caryophylaceae); perennial plant, in Europe in wet areas
- Drug: dried spindle-like root with narrow white cortex and yellow wood
- CC: up to 5 % of saponins – „**saporubin**"; main are triterpenic, acidic bidesmosides, their aglycon is gypsogenin. Does not contain starch, lots of calcium oxalate aggregates
- Usage: expectorant, diuretic. Prevalently for technical purposes.

SAPONARIAE RUBRAE RADIX – COMMON SOAPWORT ROOT content compounds



gypsogenin

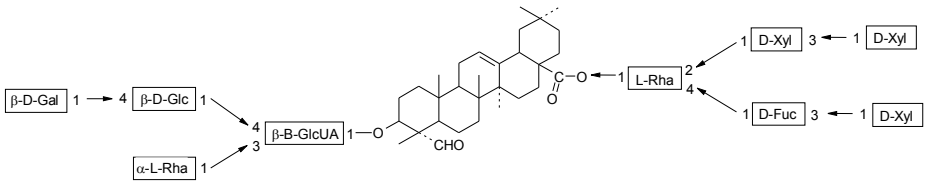
SAPONARIAE ALBAE RADIX – BABY´S BREATH ROOT

Source: *Gypsophila paniculata* – baby´s breath (Caryophyllaceae); perennial plant native in Europe, ornamental

Drug: dried root with white cortex and yellow wood.

CC: up to 20 % of saponins – main is gypsosid A

Usage: for isolation of saponins, which are asigned as „**saponinum album**". Expectorant, used for technical purposes



gypsosid A

VERBASCI FLOS – MULLEIN FLOWER (ČL 2005)

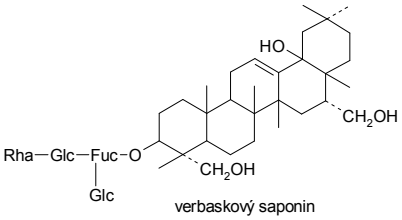
Source: *Verbascum phlomoides* – mullein, *V. densiflorum* (Scrophulariaceae); biennial plants, in the 2nd year a haulm bearing bunch-like organized yellow flowers; for pharmaceutical purposes is cultivated

Drug: dried flower corolla with stamens grown back; harvested in dry weather and immediately is dried; must be well protected aginst excessive humidity

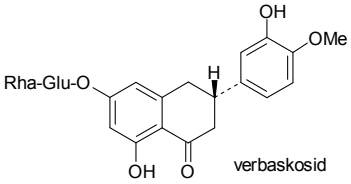
CC: Triterpenic saponins; cca 2,5 % of flavonoids (luteolin, apigenin, kaempferol, rutin, hesperidin) iridoids (aucubin, catalpol), fenolic glycosides (verbascoside), carotenoids, pigment crocin, mucilage

Usage: Expectorant in form of infusion or decoction - effect is caused by saponins and mucilage; mild diuretic, diaphoretic, spasmolytic.

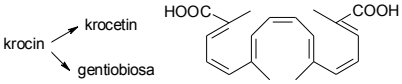
VERBASCI FLOS – DIVIZNOVÝ KVĚT
obsahové látky



verbaskový saponin



verbaskosid



krocetin

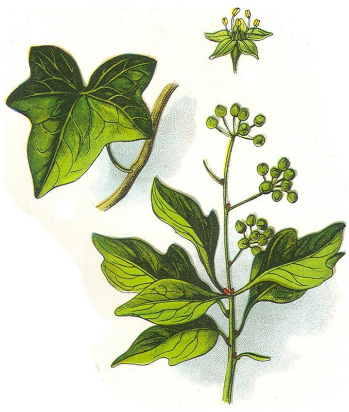
HEDERAE FOLIUM – COMMON IVY LEAVES

Source: *Hedera helix* – common ivy (Araliaceae); evegreen climbing shrub, leaves with hear-shaped or 3-5 lobular blade

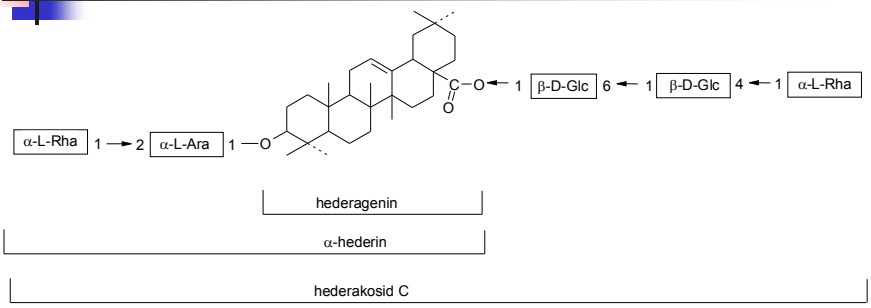
Drug: dried lobular, leathery, tough, shiny leaves, collected in spring

CC: up to 5 % of mixture of triterpenic saponins with prevalence of bidesmosides - hederacosides

Usage: Expectorant with spasmolytic effect (used during gag cough)



HEDERAE FOLIUM – COMMON IVY LEAVES
content compounds



Hederacosides possesses molluscidal (mollusks killing) effect.

They are used against *Biomphalaria glabrata*, which is vector of bilharziosis (it is caused by *Schistosomum bilharzia*)

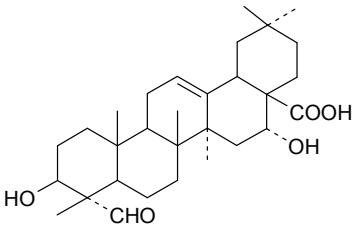
QUILLAJAE CORTEX – SOAP BARK TREE BARK

Source: *Quillaja saponaria* – soap bark tree (Rosaceae); tree native in South America (Chile, Peru, Bolivia, cultivated in USA and India).

Drug: dried bark peeled from outer part of bark

CC: up to 10 % of mixture of triterpenic saponins, main are acidic bidesmosides. Hydrolysis gives quillaic acid and Gal, GalUA, GlcUA

Usage: Expectorant, food industry, cosmetics. Saponins are used as component of toothpastes, mouthwashes, emulgators



quillajic acid

DROSERAE HERBA – ROUNDED SUNDEW AERIAL PART

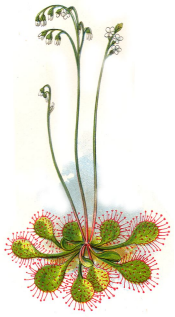
Source: *Drosera rotundifolia* – common sundew or rounded sundew (Droseraceae); perennial carnivorous plant. Leaf blade is covered with tentacles secreting proteolytic enzymes. In Czech republic strictly preserved. It is cultivated.

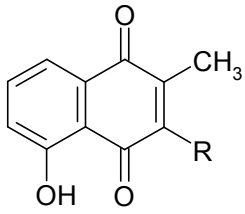
Drug: Whole plant is harvested in the beginning of flowering period

CC: Derivatives of naphtoquinone (droseron, plumbagin, ramenton and others), tannins, organic acids.

Usage: In form of extract or tincture

- Expectorant with spasmolytic and antibacterial effect, against pertussis
- Drug is a component of mixtures used in therapy of hypertension and arteriosclerosis





droseron, R = OH
plumbagin, R = H

STIMULATION EXPECTORANTS

Substances from this group are excreted by bronchial glands and rirectly stimulate them to support the production of phlegm.

Used are mainly infusions from some drugs containing essential oils, furthermore after isolation the essential oil can by administered by inhalation or percutaneously.

Some components of essential oils are surface active compounds and act as

- secretolytics (*Etheroleum anisi*, *E. foeniculi*, *E. thymi*)
- secretomotorics (*Etheroleum eucalypti*, *E. pini pumilionis*)

Further components of essential oil possesses effect antibacterial, spasmolytic and antiphlogistic.

ANISI FRUCTUS – ANISE FRUIT (ČL 2005)

Source: *Pimpinella anisum* – aniseed (Apiaceae); annual plant, inflorescence is umbel, fruits are diachenes with little pronounced ribs; it is cultivated in Mediterranean, in north Africa, in Asia and south America.

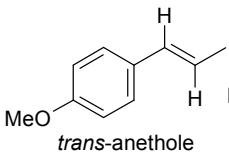
Drug: dried whole or partially decomposed diachene, oposite pear shaped, strongly aromatic odour.

CC: At least 20 ml of essential oil / kg of drug, contains up to 90 % of *trans*-anethol, furthermore its isomer methylchavicol, anisaldehyde, mono- and sesquiterpenic carbohydrates, sugars, proteins

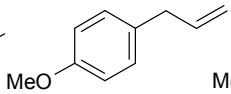
Usage: Infusion from grinded drug expectorant, carminative; for obtaining of essential oil

ANISI ETHEROLEUM – ANISE ESSENTIAL OIL (ČL 2005)

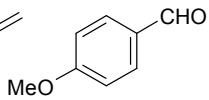
Essential oil obtained from dried fruits of *Pimpinella anisum* or *Illicium verum* by distillation with water steam; liquid weakly yellow, after storage can crystallize; characteristic pleasant odour, aromatic sweetish taste. Temperature of solidification is 15-19 ^{0}C. Solid essential oil is before use melted by mild heating and mixing.



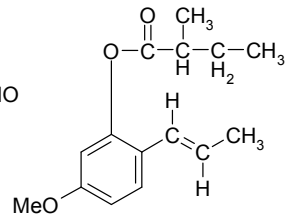
trans-anethole



methylchavicol

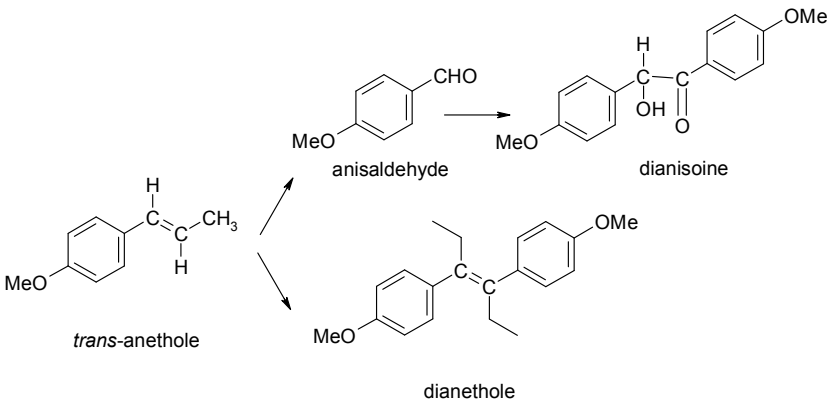


anisaldehyde



ester of 2-hydroxyanethol and 2-methylbutyric acid

PHOTOCHEMICAL REACTIONS OF ANETHOL



ANISI STELATI FRUCTUS – STAR ANISE FRUIT (ČL 2005)

Source: *Illicium verum* – star anise (Illiciaceae); evergreen tree native to Asia, cultivated in Japan, China, Vietnam, Philipines.

Drug: Dried compound fruit (from 6 to 11 keel-shaped follicles), contains at least 70 ml of essential oil / kg of drug; essential oil is obtained by water steam distillation.

CC: Weakly yellow liquid, during storage crystallizing, characteristic pleasant odour, aromatic sweetish taste. Temperature of solidification 15-19 ^{0}C. Solid essential oil is before use melted by mild heating and mixing. Essential oil possesses similar composition as essential oil from *Anisum vulgare* (+ saphrol, terpineol, phelandren)

Usage: expectorant; confectionery spice

Comment:

Illicium religiosum (japonicum, anisatum) – japanese star anise, – violently poisonous – shikimine, shikimitoxine

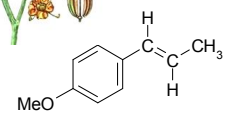
FOENICULI DULCIS FRUCTUS – SWEET FENNEL FRUIT (ČL 2005)

Source: *Foeniculum vulgare var. dulce* – sweet fennel; biennial or perennial plant, up to 150 cm tall, inflorescence is an umbel, fruits are diachenes

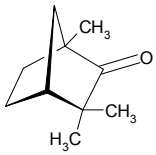
Drug: dried, ripened, usually desintegrated to sinlge achenes; strong aromatic odour, typical spicy taste

CC: essential oil, at least 20 ml / kg of drug, containing at least 80,0 % of trans-anethole, furthermore fenchon, methylchavicole, anisaldehyde, α-pinene, limonene; proteins, organic acids, flavonoids, fatty oil

Usage: Infusion from grinded drug expectorant, carminative; pediatrics, ?galactagogue?



trans-anethol



fenchon

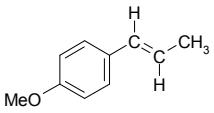
FOENICULI AMARI FRUCTUS – PLOD FENYKLU OBECNÉHO PRAVÉHO (ČL 2005)

Zdroj: *Foeniculum vulgare sp. vulgare var. vulgare* – Fenykl obecný pravý; dvouletá nebo vytrvalá bylina, 120 cm vysoká, květenství okolík, plod dvojnažka

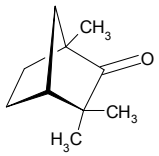
Droga: Usušená, zralá dvojnažka, většinou rozpadlá na jednotlivé nažky; silně aromatický zápach, chutná kořenitě.

OL: Silice, nejméně 40 ml / kg drogy, v ní nejméně 70,0 % trans-anetholu a 15,0 % fenchonu, dále je methyl-chavikol, anisaldehyd, α-pinen, limonen; bílkoviny, organické kyseliny, flavonoidy, mastný olej

Použití: Nálev z drcené drogy expekto-rans, karminativum.



trans-anethol



fenchon

FOENICULI ETHEROLEUM – FENNEL ESSENTIAL OIL

Essential oil obtained from ripened fruits *Foeniculum vulgare* by hydrodistillation

- Yellowish liquid, characteristic pleasant odour
- Firstly sweetish taste, than bitter, aromatic
- Temperature of solidification 4-9 ^{0}C

Usage:

- expectorant
- carminative
- Corigent of taste and odour

Higher doses can cause the congestion of pelvic area.

THYMI HERBA – COMMON THYME AERIAL PART (ČL 2005)
THYMI ETHEROLEUM – COMMON THYME ESSENTIAL OIL (ČL 2005)

Zdroj: *Thymus vulgaris* – common thyme, *T. zygis* (Lamiaceae); perennial, branched, evergreen shrub; leaves from the top bald, from the down white-felt-like; native in Mediterranean, cultivated also in India and USA

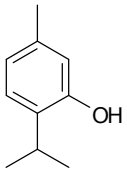
Drug: dried whole leaves and flowers separated from stems

CC: Essential oil at least 12 ml / kg of drug and at least 40 % of thymol and carvacrol, furthermore cineol, limonene, bornylacetate; tannins, flavonoids, bitter substances, triterpenic acids

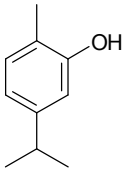
Usage: Infusion – expectorant, bronchospasmolytic, antiseptic. Externally as gargle.

Comment:

Higher doses or long-termed using can affect thyroideal gland, should not be a component of teas for daily use



thymol



karvakrol

SERPYLLI HERBA – WILD THYME AERIAL PART

Source: *Thymus serpyllum* – wild thyme (Lamiaceae); perennial plant, polymorphous and variable, sesile to earth, with purple read flowers; widespread in Europe

Drug: dried flowering herb, pleasant aromatic odour, bitterish spicy taste

CC: 0,1-0,6 % of essential oil, composition dependent on taxon (thymol, carvacrol, p-cymene, linalool, terpineol, borneol, geraniol, geranylacetate, citral); tannins, bitter substances, flavonoids.

Usage: Infusion – expektorant with antispetic effect. Externaly hyperemising for balneologic preparations

EUCALYPTI FOLIUM – TASMANIAN BLEU GUM (ČL 2005)
EUCALYPTI ETHEROLEUM – TASMANIAN BLUE GUM ESSENTIAL OIL (ČL 2005)

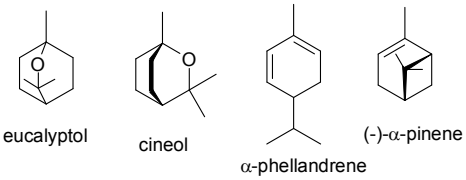
Source: *Eucalyptus globulus* – Tasmanian blue gum (Myrtaceae); up to 25 m tall tree with alternating, leathery, long, sickle-like curved leaves; native in Australia, cultivated also in Spain, Morocco, Brazil

Drug: dried sickle-like leaves from older trees, long up to 20 cm, whole or in pieces, considerably prominent main vein, on the blade visible ducti with essential oil, camphor-like odour, sharply spicy taste.

CC: Essential oil – uncut drug at least 20 ml /kg; cut drug at least 15 ml / kg; in essential oil 70-95 % of cineol = eucalyptol, *p*-cymen, pinene, phellandren, piperiton.

Usage: expectorant with disinfection effect, secretolytic action prevalent besides weak secretomotoric effect

Drug used mainly for essential oil isolation.



eucalyptol cineol α-phellandrene (-)-α-pinene

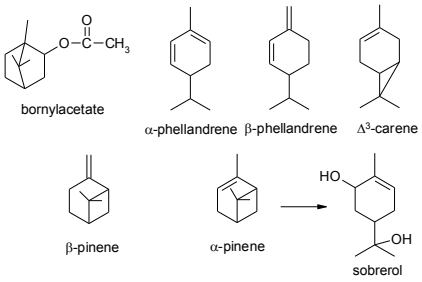
PINI PUMILIONIS ETHEROLEUM – MOUNTAIN PINE ESSENTIAL OIL

Source: needles of shrub *Pinus mughus* – mountain pine (Pinaceae); mountain woody plant with procumbent stem, dense, deep green; Alps.

Drug: essential oil obtained by distillation with water steam. Transparent liquid, characteristic odour; under UV and O_2 becomes denser and more dark.

CC: 3-10 % of esters expressed as bornylacetate; pinenes, phellandrene, carene, limonene.

Usage: Inhalation expectorant secretolytic with antiseptic properties; component of oitments applied on the margin of nostrils during rhinitis. External derivant, desinficient of public places.



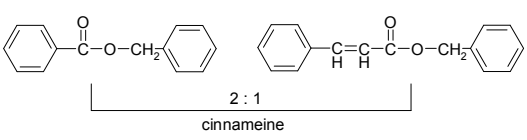
BALSAMUM TOLUTANUM – TOLU BALSAM (ČL 2005)

Source: *Myroxylon balsamum var. germinum* (Fabaceae); up to 40 m tall tree native in south America (cultivated in Columbia)

Drug: Balsam is obtained by cutting of bark - pathologic product; from wounds flows balsam, in time solidifies and gets brown; melts at 60-65 ºC, possesses pleasant aromatic odour, scratchy taste.

CC: 25,0 to 50,0 % free or bonded acids expressed as cinnamic acid; resin (esters of toluresinotanol with benzoic and cinnamic acid), cinnameine (benzylester of benzoic acid and cinnamic acid 2:1; vanillin, mono- and sesqui- terpenes, eugenol

Usage: Component of expectorant and bronchodilatation preparations; part of healing oitments accelarating granulation.



ANTIASTHMATICS

Bronchodilatants

- ephedrine, adrenaline
- methylxanthines, especially theophylline, caffeine, aminophylline
- spasmolytics, atropine, khellin

Adjuvants

- expectorants, Ol. eucalypti
- antitussics
- analgetic-antipyretic
- central analeptics, lobeline
- cardioactive glycosides, digitoxin, ouabain